

**Kootenay Lake Timber Supply Area
Timber Supply Review**

Data Package

July 2008


District Manager
Kootenay Lake Forest District

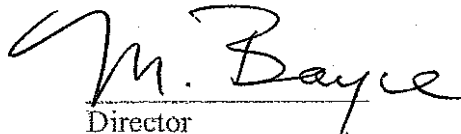

Director
Forest Analysis and Inventory Branch

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1. Introduction

1.1 Purpose

1.1.1 Timber supply review

Timber supply is the quantity of timber available for harvest over time. Timber supply is dynamic, not only because trees naturally grow and die, but also because conditions that affect tree growth, and the social and economic factors that affect the availability of trees for harvest, change through time.

Assessing the timber supply involves considering physical, biological, social and economic factors for all forest resource values, not just for timber. Physical factors include the land features of the area under study as well as the physical characteristics of living organisms, especially trees. Biological factors include the growth and development of living organisms. Economic factors include the financial profitability of conducting forest operations, and the broader community and social aspects of managing the forest resource.

All of these factors are linked: the financial profitability of harvest operations depends upon the terrain, as well as the physical characteristics of the trees to be harvested. Determining the physical characteristics of trees in the future requires knowledge of their growth. Decisions about whether a stand is available for harvest often depend on how its harvest could affect the growth and development of another part of the forest resource, such as wildlife or a recreation area.

These factors are also subject to both uncertainty and different points of view. Financial profitability may change as world timber markets change. Unforeseen losses due to fire or pest infestations will alter the amount and value of timber. The appropriate balance of timber and non-timber values in a forest is an ongoing subject of debate, and is complicated by changes in social objectives over time.

Thus, before an estimate of timber supply is interpreted, the set of physical, biological and socio-economic conditions on which it is based, and which define current forest management — as well as the uncertainties affecting these conditions — must first be understood.

Timber supply analysis is the process of assessing and projecting the current and future timber supply for a management unit (a geographic area). For a timber supply area (TSA), the timber supply analysis forms part of the information used by the chief forester of British Columbia in determining an allowable annual cut (AAC) — the permissible harvest level for the area.

Timber supply projections made for TSAs look far into the future — 250 years or more. However, because of the uncertainty surrounding the information and because forest management objectives change through time, these projections should not be viewed as static prescriptions that remain in place for that length of time. They remain relevant only as long as the information upon which they are based remains relevant. Thus, it is important that re-analysis occurs regularly, using new information and knowledge to update the timber supply picture — usually every five years. This allows close monitoring of the timber supply and of the implications for the AAC stemming from changes in management practices and objectives.

Timber supply analysis involves three main steps. The first is collecting and preparing information and data. The Ministry of Forests and Range (MFR) forest inventory plays a major role in this. The second step is using this data along with a timber supply computer model or models to make projections or estimates of possible harvest levels over time. These projections

are made using different sets of assumed values or conditions for the factors discussed above. The third step is interpreting and reporting results.

1.1.2 Data package

The purpose of the data package is to provide a clear description of information sources, assumptions, issues, and any relevant data processing or adjustments related to the land base, growth and yield, and management objectives and practices. The data package will act as a foundation document for the timber supply review (TSR), and all other TSR documents, such as the information report, analysis report and TSR binder, will be based on the information and summaries found within it.

The following principles and standards will apply to the data sources and data package:

- The data package must describe, and where appropriate summarize, all data and information to be used in the timber supply analysis;
- The data package must contain descriptions of how current forest management, or reasonable extrapolations of current management will be modelled;
- The most current and best available data must be used;
- Data will undergo rigorous screening and quality assurance procedures before inclusion in the analysis;
- More detailed discussion should be provided in the package for data for which there is a high degree of uncertainty;
- The data package must contain a summary of plans for examining the potential impacts of important uncertainties in information (e.g., planned sensitivity analysis);
- The evidentiary basis for information used in analyses must be available on request, and to the extent possible be included in the data package. Evidence could include the following:
 - A description of data sources;
 - The source data itself;
 - A description of sampling and data analysis methods or standards;
 - Digital or analog maps of the land base (e.g., forest cover, ownership, habitat areas);
 - Results of any reviews or audits of source information or inventories; and
 - Any acceptances by appropriate professionals.
- When collecting or analyzing data to include in the data package, existing standards should be followed, unless justification is provided for diverging from standards. Such justification should demonstrate that although standards were not followed, the information is the best available that could be obtained for the timber supply review;
- Where possible, the implications to the timber supply analysis (e.g., increased uncertainty) of diverging from the standards should be examined and reported; and
- The area summaries in this data package represent gross or total land area. Reductions have not been made to account for areas not suitable for harvest or areas otherwise removed from the timber harvesting land base.

1.2 Background

The AAC for the Kootenay Lake TSA was set in 1995 at 700 000 cubic metres. This was a 22% reduction from the previous level of 900 000 cubic metres per year. In May 1999, the Kootenay Lake TSR 2 data package and information report were published, followed by the publication of the timber supply and social-economic analysis in March 2001. November 2001 saw the publication of the summary of public input and the rationale statement. The current AAC for the Kootenay Lake TSA, effective January 2001, is 681 300 cubic metres per year. This determination is a 3% reduction from the previous AAC and excludes 9000 cubic metres for woodlot licenses issued since the 1995 determination and 9700 cubic metres for the Harrop-Procter Community Forest.

In the last AAC determination, the chief forester made several recommendations to district staff to reduce risk and uncertainty in subsequent TSRs:

- Complete a thorough review of the current operability lines, which could include an assessment of various categories of operability (i.e., based on conventional *versus* aerial harvesting systems);
- Review the definition of unmerchantable forest types to ensure that all unmerchantable stands are captured;
- Conduct field examinations to provide more accurate estimates of the extent of existing roads, trails and landings; and
- Evaluate existing and projected impacts of various forest health agents, in particular, develop mitigative strategies that might reduce potential impacts from armillaria root disease.

1.2.1 Description of the Kootenay Lake TSA

The Kootenay Lake TSA is located in south-eastern British Columbia and covers approximately 1.2 million hectares of the Southern Interior Forest Region. The boundaries of the TSA are similar to those of the Kootenay Lake Forest District, which administers the TSA from the forest district office located just east of Nelson.

The Kootenay Lake TSA is located in the Selkirk and Purcell Mountain ranges and encompasses three major drainage systems (Kootenay Lake, Duncan River and Lardeau River). To the north of the TSA is Glacier National Park and to the south is the Canada-U.S.A. Border. West of the Kootenay Lake TSA is the Arrow TSA, and to the east are the Invermere and Cranbrook TSAs.

Forests in the Kootenay Lake TSA have the distinction of being among the most productive in the interior of the province. In addition, lower elevation forests have a wide diversity of tree species. Within the land base currently considered available for timber harvesting, Douglas-fir, western larch, Engelmann spruce, subalpine fir, lodgepole pine, western redcedar and western hemlock predominate, while western white pine, Ponderosa pine, whitebark pine, aspen, birch and cottonwood occur in smaller amounts.

The current allowable annual cut (AAC) in the Kootenay Lake TSA is 681 300 cubic metres. This level was set by the chief forester in January 2001. About 46% of the total TSA land base is considered productive forest land managed by the MFR (approximately 571 400 hectares). Currently about 39% of that productive forest or 18% of the total TSA land base, is considered available and suitable for harvesting.

Significant changes in forest management that have occurred since the last timber supply review was completed include:

- Implementation of the *Forest and Range Practices Act (FRPA)*; and
- Management direction from variances to the *Kootenay-Boundary Higher Level Plan (KBHLP) Order*.

The forests of the Kootenay Lake TSA provide a wide range of forest land resources, including timber, water minerals, forage, fisheries, wildlife, scenic landscapes and recreation opportunities. Both residents and tourists enjoy outdoor recreation activities such as hiking, camping, hunting, fishing, wildlife watching, boating, mountain-biking, snowmobiling, and ski touring. The TSA includes part or all of several parks, including Bugaboo Alpine Recreation Area, Purcell Wilderness Conservancy, and Kokanee Glacier, Lockhart, Kianuko, West Arm and Goat Range provincial parks. Numerous recreation trails and campsites are scattered throughout the TSA.

1.2.2 The environment

The Kootenay Lake TSA includes both moist and wet climatic regions, and is commonly referred to as part of the Interior Wet Belt. The moist climatic region covers most of the TSA, except for a wet region north of the Purcell Wilderness Conservancy. Varied ecological features and species diversity contributes to the high biodiversity values in this TSA. Three biogeoclimatic zones and four ecosections occur in the Kootenay Lake TSA.

The Interior Cedar Hemlock (ICH) zone occupies valley bottoms and lower slopes to about 1400 metres. Four different subzones of the ICH occur in this TSA, reflecting differences in precipitation. They range from a drier subzone around the south end of Kootenay Lake where annual precipitation averages 70 cm to a wetter subzone in the Duncan Valley where annual precipitation averages 120 cm. In general, the ICH zone has wet, cool winters and warm, dry summers, and is the most productive forest zone in the interior of BC. The ICH has a high diversity of tree species including western redcedar, western hemlock, grand fir, Engelmann spruce, subalpine fir, western larch, Douglas-fir, western white pine, western yew, Ponderosa pine and lodgepole pine.

The Engelmann Spruce-Subalpine Fir (ESSF) zone is the uppermost forested zone in the Kootenay Lake TSA, typically occurring at elevations between 1400 and 2500 metres (i.e., above the ICH and below the Interior Mountain-heather Alpine zone). The ESSF zone has a relatively cold, moist and snowy continental climate. Growing seasons are cool and short, while winters are long and cold. Engelmann spruce and subalpine fir are the dominant climax tree species, while alpine larch and whitebark pine also occur. At the lower elevations of this zone, lodgepole pine, Douglas-fir, western hemlock and western redcedar can be found.

The Interior Mountain-heather Alpine (IMA) zone occurs at elevations greater than 2250 metres, above the ESSF zone. The climate is cold, windy and snowy with a short, cool growing season. By definition this area is largely treeless — consisting of rock, ice and snow. Vegetated areas are dominated by shrubs, herbs, mosses and lichens.

Water is a primary and fundamental resource of the Kootenay Lake TSA. Whether occurring as surface or groundwater, it is a crucial component of the ecosystems found in the area. The rivers and lakes of the TSA are home to numerous fish species including kokanee, Gerrard rainbow trout, Westslope cutthroat, bull trout, whitefish, eastern brook trout, burbot and white sturgeon. As well, approximately 37% of the timber harvesting land base falls within watersheds providing water for consumptive uses.

1.2.3 Wildlife and species at risk

The diverse forests of the Kootenay Lake TSA support an abundance and wide variety of wildlife species. Large mammals include black bear, grizzly bear, moose, mule deer, white-tailed deer, cougars, elk, mountain goat, bighorn sheep and caribou. Mountain caribou require older forests for forage and security cover, as well as large unfragmented forests for seasonal migrations.

Seventy percent of the bird species known to occur in BC and 62% of bird species that breed in the province are known to exist in the Kootenay Lake area. More than 20 varieties of birds are area year-round residents of the TSA including golden eagles, grouse, woodpeckers, jays, magpies, ravens and English sparrows. The area also contains one of the highest breeding concentrations of ospreys in the world. The Creston Flats area at the south end of Kootenay Lake is particularly rich in birdlife, given its location on the North American flyway. The Midge Creek Wildlife Management Area was established in 1997.

Under the *FRPA*, a process exists for identifying species at risk and designating wildlife habitat areas with specific management practices. The wildlife species that have been designated as 'identified wildlife' in the four ecosections of the Kootenay Lake Forest District are presented in Table 1. At the time of the previous TSR eleven species were identified as 'species at risk' under the Forest Practices Code of British Columbia (FPC); whereas, there are currently 20 species identified as 'at risk'.

Table 1. Identified wildlife

Common name of identified wildlife	Ecosections			
	CCM	NKM	SCM	SPM
<i>Fish</i>				
Bull Trout	X	X	X	X
Westslope Cutthroat Trout	I	X	X	X
<i>Amphibians</i>				
Coeur d'Alene Salamander	X		X	X
Northern Leopard Frog			X	
Rocky Mountain Tailed Frog				X
<i>Birds</i>				
Great Blue Heron	X		X	X
Interior Western Screech-Owl			X	X
Lewis's Woodpecker	X		X	X
Long-billed Curlew			X	
Prairie Falcon			X	
Sandhill Crane			X	
Short-eared Owl			X	X
White-headed Woodpecker			I	
Yellow-breasted Chat			P	
<i>Mammals</i>				
Badger			X	
Bighorn Sheep			X	
Fisher	X	X		X
Grizzly Bear	X	X	X	X
Mountain Caribou	X	X	X	
Wolverine	X	X	X	X

X – Present; I = Irregular/incidental; P = Possible

Ecosections: CCM = Central Columbia Mountains; NKM = Northern Kootenay Mountains; SCM = Southern Columbia Mountains; SPM = Southern Purcell Mountains

Source: B.C. Ministry of Water, Land and Air Protection. 2004. Accounts and Measures for Managing Identified Wildlife – Accounts V. 2004. B.C. Ministry of Water, Land and Air Protection, Victoria, B.C.

Available: <http://www.env.gov.bc.ca/wld/frpa/iwms/accounts.html> (accessed December 2007).

Current forest management practices, including wildlife habitat, follow the legislation and guidelines set out by the FRPA. The Kootenay-Boundary Land Use Plan Implementation Strategy (KBLUP-IS) provides further direction regarding landscape units (LU), biodiversity emphasis objectives, caribou habitat, ungulate winter range, scenic corridors, community and domestic watersheds, and forest cover constraints. In 2001 (revised in 2002) the provincial government issued the Kootenay-Boundary Higher-Level Plan (KBHLP) Order, establishing resource management zones and resource management zone objectives within the area covered by the KBLUP as a higher level plan.

The BC Conservation Data Centre (CDC) lists the conservation status of animals, plants and plant communities and assigns a provincial ranking, which is based solely on the species status

within British Columbia. There are 47 animal and 53 plant species identified as ‘species of concern’ for the Kootenay Lake forest district.

Indigenous species, subspecies or ecological communities that have — or are candidates for — ‘extirpated’, ‘endangered’, or ‘threatened’ status in British Columbia.

Indigenous species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. Ecological communities that are considered to be of Special Concern in British Columbia. Blue-listed elements are at risk, but are not extirpated, endangered or threatened.

Indigenous species, sub-species or ecological communities that are not ‘extirpated’, ‘endangered’ or ‘threatened’ but are considered to be special concern in British Columbia are referred to as ‘blue-listed’.

Indigenous species, sub-species, or ecological communities that have — or are candidates for ‘extirpated’, ‘endangered’ or ‘threatened’ status in British Columbia are red-listed and may be formally designated.

Table 2. *Animal species of concern*

Scientific name	English name	BC status	Identified wildlife
<i>Acipenser transmontanus</i> pop. 1	White Sturgeon (Kootenay River population)	Red	
<i>Aechmophorus occidentalis</i>	Western Grebe	Red	
<i>Anguispira kochi</i>	Banded Tigersnail	Blue	
<i>Anodonta nuttalliana</i>	Winged Floater	Blue	
<i>Ardea herodias herodias</i>	Great Blue heron, <i>herodias</i> subspecies	Blue	June 2006
<i>Ascaphus montanus</i>	Rocky Mountain Tailed Frog*	Red	May 2004
<i>Asio flammeus</i>	Short-eared Owl	Blue	May 2004
<i>Botaurus lentiginosus</i>	American Bittern	Blue	
<i>Chrysemys picta</i> pop. 2	Western Painted Turtle - Intermountain - Rocky Mountain Population	Blue	
<i>Colias pelidne</i>	Pelidne Sulphur	Blue	
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	Blue	
<i>Cottus hubbsi</i>	Columbia Sculpin	Blue	
<i>Cryptomastix mullani</i>	Coeur d'Alene Oregonian	Blue	
<i>Dolichonyx oryzivorus</i>	Bobolink	Blue	
<i>Eumeces skiltonianus</i>	Western Skink	Blue	
<i>Fluminicola fuscus</i>	Ashy Pebblesnail	Red	
<i>Glaucopsyche pius</i>	Arrowhead Blue	Blue	
<i>Gulo gulo luscus</i>	Wolverine, <i>luscus</i> subspecies	Blue	May 2004
<i>Hemphillia camelus</i>	Pale Jumping-slug	Blue	
<i>Hirundo rustica</i>	Barn Swallow	Blue	
<i>Icteria virens</i>	Yellow-breasted Chat	Red	May 2004
<i>Lota lota</i> pop. 1	Burbot (lower Kootenay population)	Red	
<i>Magnipelta mycophaga</i>	Magnum Mantleslug	Blue	
<i>Martes pennanti</i>	Fisher	Blue	June 2006

(continued)

Table 2. *Animal species of concern (concluded)*

Scientific name	English name	BC status	Identified wildlife
<i>Megascops kennicottii macfarlanei</i>	Western Screech-Owl, <i>macfarlanei</i> subspecies*	Red	May 2004
<i>Melanerpes lewis</i>	Lewis's Woodpecker	Red	May 2004
<i>Musculium partumeium</i>	Swamp Fingernailclam	Red	
<i>Neotamias minimus selkirkii</i>	Least Chipmunk, <i>selkirkii</i> subspecies	Red	
<i>Neotamias ruficaudus simulans</i>	Red-tailed Chipmunk, <i>simulans</i> subspecies	Blue	
<i>Oncorhynchus clarkii lewisi</i>	Cutthroat Trout, <i>lewisi</i> subspecies	Blue	June 2006
<i>Oreohelix strigosa</i>	Rocky Mountainsnail	Blue	
<i>Oreohelix subrudis</i>	Subalpine Mountainsnail	Blue	
<i>Ovis canadensis</i>	Bighorn Sheep	Blue	June 2006
<i>Parnassius clodius altaurus</i>	Clodius Appolo, <i>altaurus</i> subspecies	Blue	
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	Blue	
<i>Plethodon idahoensis</i>	Coeur d'Alene Salamander	Blue	May 2004
<i>Pyrgus communis</i>	Checkered Skipper	Blue	
<i>Rana pipiens</i>	Northern Leopard Frog	Red	May 2004
<i>Rangifer tarandus</i> pop. 1	Caribou (southern population)	Red	May 2004
<i>Recurvirostra americana</i>	American Avocet	Red	
<i>Salvelinus confluentus</i>	Bull Trout	Blue	June 2006
<i>Sterna forsteri</i>	Forster's Tern	Red	
<i>Taxidea taxus</i>	Badger	Red	May 2004
<i>Thomomys talpoides segregatus</i>	Northern Pocket Gopher, <i>segregatus</i> subspecies	Red	
<i>Ursus arctos</i>	Grizzly Bear	Blue	May 2004
<i>Vallonia cyclophorella</i>	Silky Vallonia	Blue	
<i>Valvata tricarinata</i>	Threeridge Valvata	Red	

* Wildlife habitat areas have been established for these species. WHAs total 180 hectares (including sensitive data).

Source: B.C. Conservation Data Centre. 2008. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, BC.

Available: <http://a100.gov.bc.ca/pub/eswp> (accessed May 2, 2007).

Forest District tracking lists are restricted to those species that breed in the District; i.e. species will not be placed on Forest District lists for districts where they occur only as migrants.

Table 3. Plant species of concern

Scientific name	English name	BC status
<i>Acorus americanus</i>	American sweet-flag	Blue
<i>Anemone canadensis</i>	Canada anemone	Blue
<i>Anemone piperi</i>	Piper's anemone	Red
<i>Artemisia ludoviciana</i> var. <i>incompta</i>	western mugwort	Blue
<i>Bidens vulgata</i>	tall beggarticks	Red
<i>Calamagrostis montanensis</i>	plains reedgrass	Red
<i>Carex amplifolia</i>	bigleaf sedge	Blue
<i>Carex comosa</i>	bearded sedge	Red
<i>Carex heleonastes</i>	Hudson Bay sedge	Blue
<i>Carex scoparia</i>	pointed broom sedge	Blue
<i>Carex scopulorum</i> var. <i>bracteosa</i>	Holm's Rocky Mountain sedge	Blue
<i>Carex tenera</i>	tender sedge	Blue
<i>Carex vulpinoidea</i>	fox sedge	Blue
<i>Cheilanthes gracillima</i>	lace fern	Blue
<i>Crassula aquatica</i>	pigmyweed	Blue
<i>Delphinium bicolor</i> ssp. <i>bicolor</i>	Montana larkspur	Blue
<i>Downingia elegans</i>	common downingia	Red
<i>Dryopteris cristata</i>	crested wood fern	Blue
<i>Eleocharis parvula</i>	small spike-rush	Blue
<i>Elodea nuttallii</i>	Nuttall's waterweed	Blue
<i>Elymus virginicus</i> var. <i>submuticus</i>	beardless wildrye	Red
<i>Epilobium halleanum</i>	Hall's willowherb	Blue
<i>Epipactis gigantea</i>	giant helleborine	Blue
<i>Glycyrrhiza lepidota</i>	wild licorice	Red
<i>Helenium autumnale</i> var. <i>grandiflorum</i>	mountain sneezeweed	Blue
<i>Heterocodon rariflorum</i>	heterocodon	Blue
<i>Hypericum scouleri</i> ssp. <i>nortoniae</i>	western St. John's-wort	Blue
<i>Idahoia scapigera</i>	scalepod	Red
<i>Impatiens aurella</i>	orange touch-me-not	Blue
<i>Impatiens ecalcarata</i>	spurless touch-me-not	Blue
<i>Juncus confusus</i>	Colorado rush	Red
<i>Lewisia triphylla</i>	three-leaved lewisia	Blue
<i>Ligusticum verticillatum</i>	Verticillate-umbel lovage	Blue
<i>Linanthus septentrionalis</i>	northern linanthus	Blue
<i>Lupinus arbustus</i> ssp. <i>pseudoparviflorus</i>	Montana lupine	Red

(continued)

Table 3. Plant species of concern (concluded)

Scientific name	English name	BC status
<i>Megalodonta beckii</i> var. <i>beckii</i>	water marigold	Blue
<i>Melica smithii</i>	Smith's melic	Blue
<i>Melica spectabilis</i>	purple oniongrass	Blue
<i>Mertensia paniculata</i> var. <i>borealis</i>	tall bluebells	Blue
<i>Monardella odoratissima</i> ssp. <i>odoratissima</i>	monardella	Red
<i>Muhlenbergia glomerata</i>	marsh muhly	Blue
<i>Myriophyllum ussuriense</i>	Ussurian water-milfoil	Blue
<i>Polygonum polygaloides</i> ssp. <i>kelloggii</i>	Kellogg's knotweed	Blue
<i>Scrophularia lanceolata</i>	lance-leaved figwort	Blue
<i>Senecio hydrophiloides</i>	sweet-marsh butterweed	Red
<i>Senecio hydrophilus</i>	alkali-marsh butterweed	Red
<i>Sphenopholis intermedia</i>	slender wedgegrass	Blue
<i>Sphenopholis obtusata</i>	prairie wedgegrass	Red
<i>Stellaria obtusa</i>	blunt-sepaled starwort	Blue
<i>Thalictrum dasycarpum</i>	purple meadowrue	Blue
<i>Thermopsis rhombifolia</i>	prairie golden bean	Red
<i>Veronica catenata</i>	pink water speedwell	Red
<i>Wolffia borealis</i>	northern water-meal	Red

1.2.4 First Nations

Three First Nations groups have identified traditional territories within the Kootenay Lake TSA: the Ktunaxa, Shuswap and Okanagan. The Lower Kootenay Band (LKB) is a member band of the Ktunaxa Nation and is the only First Nations group with a reserve and/or community within the TSA. Located at Creston, the LKB has approximately 160 members. While the LKB's major revenue comes from land leases to local agricultural producers, the band council is pursuing economic diversification through traditional practices such as trapping, fishing, hunting and guiding, and botanical forest products. The LKB has a growing interest in forest management through ongoing consultation with the MFR and forest industry staff. In 2003, the Ktunaxa/Kinbasket Tribe entered into a forest tenure agreement outside the Kootenay Lake TSA.

The Ktunaxa/Kinbasket First Nation has submitted a comprehensive land claim that covers the southeast corner of the province, including the Kootenay Lake TSA. If this land use claim is finalized prior to the AAC determination, the chief forester will account for it in his decision.

Archaeological Overview Assessment (AOA) mapping has been completed for the Kootenay Lake Forest District, to ensure that areas with significant archaeological potential are identified and managed appropriately prior to logging and road building. Field assessments (Archaeological Impact Assessments), when required are conducted by qualified archaeologists as part of the Forest Development Plan process.

1.3 Processes

1.3.1 Timber supply review process

The timber supply review process has three main stages: (1) data package preparation, (2) timber supply analysis and revised data package, and (3) AAC determination. First Nations and the public are formally offered an opportunity to review and comment on the draft documentation prepared for the first two steps. Comments and information obtained from First Nations and the public during the formal review processes will be summarized and presented to the chief forester for his consideration in the AAC determination.

Specifically for the data package, there will be two opportunities for First Nations and the public to formally comment. The first is the current 30-day opportunity for the review of this draft data package and information report. The second opportunity will be for the review of the timber supply analysis report, which includes the revised data package as an appendix.

To facilitate the data package review process, a web site dedicated to the current TSR analyses was established at <http://www.for.gov.bc.ca/hts/tsa/tsa13/docs.htm>. This provides individuals with the opportunity to download these materials for review. A description of the TSR documents can be found at http://www.for.gov.bc.ca/hts/tsa/TSR_document_description.pdf.

The expected milestones for the current TSR process are presented in Figure 1.

Information Report & Data Package													
						Public Review							
						Analysis Report							
								Public Review					
											AAC Decision & Rationale		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	
2008												2009	

Figure 1. Kootenay Lake TSR process.

2 Inventory and Data Layers

2.1 Standard data layers

This section describes the data inputs for the TSR 3 analysis. For each layer, the data package provides a standard description that includes an introduction to the data, some background information on its relevance to current management, source information and the status of the data. A detailed data description table is followed by attribute information and land base impact summaries. Before inclusion in the timber supply analysis, subject matter experts from MFR, MOE or other agencies reviewed the data inputs and provided their approval, as indicated in the data description table. Each dataset has undergone a rigorous quality control procedure to ensure data quality and compatibility. The following table provides an overview of the standard data layers and their application in the analysis:

Standard data layers	Analysis-ready dataset	D	S	L	I
Kootenay Lake TSA boundary	dkl_bnd	X			
Landscape-level biodiversity emphasis options	beo		X		
Old BEC	qbec		X		
Biogeoclimatic ecosystem classification	abec		X		
Community and domestic watersheds	twato5kl		X		
Forest inventory	vri	X	X		
Depletions	depl	X			
Landscape units (contained in planning cells)	tlupc		X		
Ungulate winter range	uwr		X		
Protected areas	pas	X			
Old growth management areas	ogma	X			
1994 operability	oper94				X
Operability classification	oper	X			
Ownership	tsr_own	X			
Roads	roads	X		X	
Rail and transmission lines	rail_trans	X			
Caribou	achab		X		
Slope	slp		X		
Streams	Stream_class	X	X	X	
Lakes	Wtrbdy_class	X			
Wetlands	Wetland_class	X			
Terrain stability mapping	tsil	X			
Environmentally sensitive areas	Esa	X			
Visual management polygons	vli		X		
Planning cells	tlupc				X
Licensee operating areas (includes new woodlots)	loa	X			
Mountain pine beetle hazard classes	mpbhaz				X
Wildlife habitat areas	wha				X
Goal 2 park proposals	tpas2	X			
Wildlife management areas	wma	X			
Dewdney Trail Heritage Site	dewdney	X			
CP Rail Reserves	cp_rail				X

D – Derives THLB

S – Spatial Constraint

L – Linear Features

I – Information Only (included in the resultant dataset for information and/or additional analysis)

2.1.1 Landscape-level biodiversity emphasis options

Introduction

This dataset identifies Biodiversity Emphasis Objectives (BEOs) for the Kootenay Lake TSA. BEOs are based on landscape units and BEC classification.

Background

According to the *Biodiversity Guidebook*, BEOs provide a range of three options for emphasizing biodiversity at the landscape level. Each option is designed to provide a different level of natural biodiversity and a different risk of losing elements of natural biodiversity.

A low BEO may be appropriate for areas where other social and economic demands, such as timber supply, are the primary management objectives. This option provides habitat for a wide range of native species, but the pattern of natural biodiversity may be significantly altered, and the risk of some native species being unable to survive in the area may be relatively high.

An intermediate BEO is a trade-off between biodiversity conservation and timber production. Compared to the low BEO the intermediate BEO provides a higher level of biodiversity and a reduced risk of eliminating native species from an area.

A high BEO gives a higher priority to biodiversity conservation but would have the greatest impact on timber harvest. This option is recommended for those areas where biodiversity conservation is a high management priority.

Source

The KBHLP Order established BEOs for each landscape unit-BEC subzone combination in the Kootenay Lake TSA.

Status

This dataset reflects BEOs as established in the KBHLP Order.

Dataset

Source data file name	BEO
Version	
Data file description	Kootenay Lake Biodiversity Emphasis Options
Date	Created in-house June 27, 2007
Data format	Coverage
Quality control passed?	Some sliver areas with no bec label. See beo_qc.doc for issue resolution.
Data source	Kootenay Spatial Data Partnership/District ftp site
Date obtained	April 18, 2007
Link to metadata (if available)	
Data edits	
Data issues	New BEC linework not reflected in data.
Reference Sources	Based on LUs used in KBLUP
Changes since TSR2	Changes to mature retention requirements for some landscape units in 2002.
Analysis-ready coverage name	BEO
Approval (sign-off)	Dale Anderson
Approval date	June 27, 2007

Attribute information

Attribute	Value	Description
BEO	High	High BEO
	Int	Intermediate BEO
	Low	Low BEO
Old_bec	Various	BEC Zone/Subzone/Variant
LU	K1-K24	3 character code identifying unique landscape unit number.

Land base summaries

BEO	Area (ha)
High	180,970
Int	501,852
Low	505,871
Total	1,188,693

2.1.2 Biogeoclimatic ecosystem classification

Introduction

The biogeoclimatic (BGC) ecosystem classification (BEC) is an integrated hierarchical classification scheme that combines climate, vegetation and site classifications to describe and map an ecosystem on the land base. Biogeoclimatic Subzone/Variant/Phase mapping is the further stratification of the BEC zone landscape according to a combination of ecological features, primarily climate and physiography.

Background

One of the earliest applications for BEC was to provide a tool for determining which tree species to plant on which sites. Now, BEC influences many different aspects of the management of forests and other resources in British Columbia.

Broad biogeoclimatic zonal units are used for landscape timber supply modeling by providing natural disturbance types (fire frequency), and ecosystem-based wildlife habitat management. More detailed ecosystem mapping of site units provide a structure upon which forest productivity, reforestation considerations and tree species regeneration are used to assess the impact of future timber supply.

Source

The biogeoclimatic information for the Kootenay Lake TSA was obtained from the provincial BEC program web site: http://www.for.gov.bc.ca/hre/becweb/resources/maps/gis_products.html. Version 6 of the provincial BEC coverage, completed January 2006, contains the most recent BEC information for the Kootenay Lake TSA which was last revised in June 2001. Adrian Walton of the MFR research branch is the contact for version 6 provincial biogeoclimatic subzone/variant mapping. Source data that was used as input into the version 6 provincial dataset can be found within the MFR Nelson region FTP site. Attribute updating to provincial standards has only occurred in the provincial data set, while not being maintained in the districts BEC FTP data set.

Status

BEC updates for the Kootenay Lake TSA were last completed in June 2001 by former regional ecologist Tom Braumandl. These updates included the creation of the following zones: ICHmw4, ICHdm, ESSFdm, ESSFwc5, and ESSFwc6. Future modifications to the Kootenay Lake TSA will be conducted by Deb Mackillop over the next few years, with a scheduled completion date in 2009.

Source dataset

Data file name	ABEC
Version	Provincial Coverage Version 6.0; Kootenay TSA Version 2.0
Data file description	Kootenay Lake TSA Biogeoclimatic Subzone Variant Mapping
Date	Provincial BEC coverage January 31,2006; Kootenay TSA June 13, 2001
Data format	E00
Quality control	Yes. ABEC_qc.doc
Data source	Dennis Lloyd and Deb Mackillop; Russ Walton (Provincial)
Date obtained	May 13, 2007
Link to metadata (if available)	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?from=search&edit=true&showall=showall&recordSet=ISO19115&recordUID=4294 (Provincial Metadata)
Data edits	Clipped provincial ver 6.0 BEC coverage to Kootenay TSA, then eliminated polygons < 2 ha
Data issues	Revision and updates to take place over next 2 years
Reference sources	Available in LRDW or FTP site ftp://ftp.for.gov.bc.ca/HRE/external/!publish/becmaps/GISdata/
Changes since TSR 2	Replacement of AT Bec zone with IMA. Creation of ICHmw4, ICHdm, ESSFdm, ESSFwc5, and ESSFwc6 zones
Approval	Deb Mackillop
Approval date	May 28, 2007 (Phone conversation)

Attribute information

Biogeoclimatic zones are usually named after one or more of the dominant climax species in zonal ecosystems (e.g., cedar hemlock), and a geographic (e.g., coastal, interior) or climatic modifier (e.g., boreal, montane). Biogeoclimatic zone names are represented by a two- to four-letter acronym. For example, the Interior Cedar – Hemlock zone is the ICH zone and the Engelmann Spruce Sub-Alpine Fir zone is the ESSF zone.

Subzone names are derived from classes of relative precipitation and temperature or continentality. The first part of the subzone name describes the relative precipitation and the second part describes either the relative temperature (Interior zones) or relative continentality (Coastal zones). For example, the ICHmw stands for the Moist Warm subzone of the Interior Cedar – Hemlock Zone. Subzone names are abbreviated as letter codes (Table 4).

Biogeoclimatic variants are given geographic names reflecting their relative location or distribution within the subzone. For example, the Engelmann Spruce — Subalpine Fir wet cold Subzone (ESSFwc) has six variants. Variant names are given number codes (e.g., ESSFwc1), which in most cases reflect their geographic distribution within the subzone from south to north.

The polygon attribute BECLABEL contains the principal information for the biogeoclimatic subzone/variant/phase designation. The BECLABEL attribute is nine characters wide. The first four character positions designate the biogeoclimatic zone. Character positions 5-7 designate the subzone. Position 8 designates the variant, and position 9 designates the phase. A complete list

and description of the valid *BECLABEL* values can be obtained from the BEC website:
<http://www.for.gov.bc.ca/HRE/becweb/downloads>

Table 4. *BEC attribute values found in the Kootenay Lake TSA*

BECLABEL	BEC zone	BEC subzone/variant
ESSFdkp	Engelmann Spruce -- Subalpine Fir	Dry Cool Parkland
ESSFdm	Engelmann Spruce -- Subalpine Fir	Dry Mild
ESSFdmp	Engelmann Spruce -- Subalpine Fir	Dry Mild Parkland
ESSFdwm	Engelmann Spruce -- Subalpine Fir	Dry Mild Woodland
ESSFwc 1	Engelmann Spruce -- Subalpine Fir	Columbia Wet Cold
ESSFwc 4	Engelmann Spruce -- Subalpine Fir	Selkirk Wet Cold
ESSFwc 5	Engelmann Spruce -- Subalpine Fir	Salmo Wet Cold
ESSFwc 6	Engelmann Spruce -- Subalpine Fir	Ymir Wet Cold
ESSFwcp	Engelmann Spruce -- Subalpine Fir	Wet Cold Parkland
ESSFwcw	Engelmann Spruce -- Subalpine Fir	Wet Cold Woodland
ESSFwm	Engelmann Spruce -- Subalpine Fir	Wet Mild
ESSFwmp	Engelmann Spruce -- Subalpine Fir	Wet Mild Parkland
ESSFwmw	Engelmann Spruce -- Subalpine Fir	Wet Mild Woodland
ICH dm	Interior Cedar -- Hemlock	Dry Mild
ICH dw 1	Interior Cedar -- Hemlock	West Kootenay Dry Warm
ICH mk 1	Interior Cedar -- Hemlock	Kootenay Moist Cool
ICH mw 2	Interior Cedar -- Hemlock	Shuswap Moist Warm
ICH mw 4	Interior Cedar -- Hemlock	Ymir Moist Warm
ICH wk 1	Interior Cedar -- Hemlock	Wells Gray Wet Cool
ICH xw	Interior Cedar -- Hemlock	Very Dry Warm
IMA un	Interior Mountain-heather Alpine	Undifferentiated

Land base summaries

Table 5. Area (hectares) summary of BEC values found in Kootenay Lake TSA

BECLABEL	Hectares
ESSFdkp	31
ESSFdm	104,382
ESSFdmp	4,649
ESSFdmw	18,798
ESSFwc 1	44,413
ESSFwc 4	103,437
ESSFwc 5	18,363
ESSFwc 6	46,805
ESSFwcp	85,775
ESSFwcw	90,875
ESSFwm	76,822
ESSFwmp	35,115
ESSFwmw	34,884
ICH dm	92,248
ICH dw 1	153,279
ICH mk 1	2,499
ICH mw 2	135,222
ICH mw 4	47,512
ICH wk 1	50,574
ICH xw	38,827
IMA un	56,328
Total	1,240,841

2.1.3 Old biogeoclimatic ecosystem classification

Introduction

This dataset coverage represents an earlier version of BEC for the Kootenay Lake TSA which is still relevant in cases such as landscape-level biodiversity requirements.

Background

As above.

Source

The QBEC (Old) biogeoclimatic information for the Kootenay Lake TSA was obtained from the Nelson FTP site and is the version previous to the newer ABEC coverage completed in 2001.

Status

QBEC updates for the Kootenay Lake TSA were completed in the late 1980's to early 90's and represent version 1 of the BEC classification for the TSA.

Source dataset

Data file name	QBEC
Version	Kootenay TSA Version 1.0
Data file description	Historical version of BEC for the Kootenay Lake TSA used before current
Date	Circa 1980's. Confirmed in March 2005 to be the best available version of older BEC within TSA
Data format	E00
Quality control	Yes. QBEC_qc.doc
Data source	Contact Dale Anderson
Date obtained	May 16,2007
Link to metadata (if available)	Metadata attached to original E00 coverage on FTP
Data edits	None
Data issues	Old version of BEC. ABEC coverage takes precedence over this coverage
Reference sources	
Changes since TSR 2	Version of BEC used in TSR2 analysis
Approval	Deb Mackillop
Approval date	August 2007

Attribute information

The polygon attribute OLD_BEC contains the principal information for the biogeoclimatic subzone/variant designation.

Table 6. *Old BEC attribute values found in Kootenay TSA*

OLD_BEC	BEC zone	BEC subzone/variant
ATp	Alpine	Parkland
ESSFdk	Engelmann Spruce -- Subalpine Fir	Dry Cool
ESSFwc1	Engelmann Spruce -- Subalpine Fir	Columbia Wet Cold
ESSFwc4	Engelmann Spruce -- Subalpine Fir	Selkirk Wet Cold
ESSFwcp	Engelmann Spruce -- Subalpine Fir	Wet Cold Parkland
ESSFwm	Engelmann Spruce -- Subalpine Fir	Wet Mild
ICHdw	Interior Cedar — Hemlock	Dry Warm
ICHmw2	Interior Cedar — Hemlock	Shuswap Moist Warm
ICHwk1	Interior Cedar — Hemlock	Wells Gray Wet Cool
ICHxw	Interior Cedar — Hemlock	Very Dry Warm
MSdk	Engelmann Spruce — Subalpine Fir	Wet Mild

Land base summaries

Table 7. *Area (hectares) summary of old BEC values found in Kootenay Lake TSA*

OLD_BEC	Hectares
ATp	311,223
ESSFdk	124
ESSFwc1	64
ESSFwc4	225,512
ESSFwcp	1,138
ESSFwm	180,099
ICHdw	136,066
ICHmw2	299,720
ICHwk1	26,836
ICHxw	37,409
MSdk	21,656
Total	1,240,841

2.1.4 Community/domestic watersheds

Introduction

This dataset identifies community and domestic watersheds for the Kootenay Lake TSA. Approximately 37% of the timber harvesting land base in the Kootenay Lake Forest District occurs within the drainage areas of streams that provide water for human consumption.

The community watersheds 1:20,000-scale inventory shows the location of watersheds that supply communities with domestic water and is used in conjunction with stream network coverages from TRIM mapping.

The domestic watersheds 1:50,000-scale inventory is based on the *Kootenay-Boundary Land-use Plan* (KBLUP) and identifies watersheds licensed for human consumption but not classified as community watersheds. Domestic watersheds are classified into three categories as follows:

Class 1 watersheds	Watersheds associated with springs and very small creeks that do not have clearly defined drainage or catchment areas. Often these small water sources are located on “face units” (populated areas between major streams).
Class 2 watersheds	Small watersheds having drainage areas which are definable on existing topographic mapping and, less than 500 hectares (5 km ²).
Class 3 watersheds	Watersheds with a drainage area of 500 hectares (5 km ²) to 200,000 hectares (200 km ²).

Background

Designated community watersheds have been in existence since the *Guidelines for Watershed Management of Crown Lands used as Community Water Supplies* was prepared by a government interagency task force and published by the Ministry of Environment, Lands and Parks (now Ministry of Environment) in October 1980.

The broad definition of a community watershed is any natural watershed area on which a community holds a valid water licence, issued under the *Water Act*, by the Comptroller of Water Rights. Forest companies commonly conduct hydrological assessments to determine existing and potential water problems and recommend appropriate management strategies to protect water. Community watershed designations fall under the authority of the Ministry of Environment and are managed as per the *FPC Watershed Guidebook*.

Domestic watersheds are licensed for consumptive use but are not community watersheds. Guidelines for domestic watershed management were generated by the 1997 KBLUP–Implementation Strategy. These guidelines define a level of forest management activities on Crown land in domestic watersheds by providing:

- a classification and mapping system for domestic watersheds;
- a basic assessment of hazard related to forest activity;
- a set of recommended forest practices; and
- a contingency plan in case of damage to water supply.

When forest activities are proposed within known domestic watersheds, an assessment will be completed by the proponent. The objective of the assessment is to ensure that the proposed forest activities do not pose an unacceptable risk to water quality, and the quantity and timing of flow at the point of intake.

The watershed assessment procedure (WAP) is a tool to help forest managers understand the type and extent of current water-related problems that exist in a watershed and to recognize the possible hydrologic implications of proposed forestry-related development in that watershed. The assessment of hydrological impacts focuses on:

- the potential for changes to peak flows;
- the potential for landslides;
- the potential for accelerated surface erosion, and;
- the anticipated changes to the channel riparian buffer.

From the results of a WAP, recommendations can be made, aimed at preventing or mitigating the impacts of forestry-related activities in the watershed. The recommendations may call for such actions as modifying future harvest layout or scheduling, recognizing sensitive zones, or adopting specific practices in the watershed.

Source

The combined CWS/DWS dataset was created in 2004 by the Kootenay Lake Forest District. Community watersheds were extracted from the provincial community watershed coverage available on the LRDW (WHSE_WATER_MANAGEMENT.BC_COMMUNITY_WATERSHEDS) and domestic watersheds were extracted from the Regional domestic watershed coverage for the old Nelson forest region (REG_LAND_AND_NATURAL_RESOURCE.DOMESTIC_WATERSHED_KBLUP_POLY).

Status

The community watershed dataset was created in November 2003 and is updated as needed. The domestic watershed dataset was created October 2001, and published in June 2005. The combined dataset for Kootenay Lake was confirmed correct March 2005, by D. Anderson and E.P. Runtz & Assoc. Ltd. No updates of these two datasets have occurred since the combined dataset was created.

Dataset

Source data file name	twat05kl
Version	
Data file description	Kootenay Lake Community and Domestic Watersheds
Date	Confirmed Correct March 2005
Data format	ArcInfo Coverage
Quality control	twat05kl_qc
Data source	Dale Anderson 250-825-1114
Date obtained	April 18, 2007
Link to metadata (if available)	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=3575&recordSet=ISO19115 (Community watersheds) http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=42354&recordSet=ISO19115 (Domestic watersheds)
Data edits	None
Data issues	None
Reference sources	Twat05kl metadata and discovery service metadata from original datasets
Changes since TSR 2	
Analysis-ready coverage name	Twat05kl
Approval	Dale Anderson by email
Approval date	August 31, 2007

Attribute information

Attribute	Value	Description
DWS_TYPE	1	Springs and small seepage areas with indistinct boundaries
	2	Small watersheds less than 500 hectares
	3	Larger watersheds with defined drainage area greater than 500 hectares
	3s	Major sub-drainages within class 3 watersheds (used to distribute ECA constraints on a sub-drainage basis)
TCWS_TAG	Various	Community watershed number
Par_wshd	Various	DWS 3s subunit name
WHSD_NAM	Various	Domestic watershed name
ws_type	CWS	Indicates community watershed
	1,2,3,3s	Indicates DWS type

Land base summaries

Watershed type	Area (hectares)
Community	84,046
Domestic 1	63,709
Domestic 2	14,010
Domestic 3	128,284
Domestic 3s	78,185
Total	368,234

2.1.5 Licensee operating areas**Introduction**

This dataset identifies licensee operating areas in the Kootenay Lake TSA.

Background

Operating areas indicate the defined forest areas for harvest tenures for the Kootenay Lake TSA. There are seven forest companies and three communities who hold tenures for the harvesting of Crown timber. There are also 14 woodlot licenses.

Source

The Kootenay Lake forest district created this dataset in July 2007.

Status

This dataset reflects existing operating areas, community forests and woodlots as well as candidate woodlots as of July 2007.

Dataset

Source data file name	tloa07kl_2.shp
Version	
Data file description	Licensee operating areas
Date	July 2007
Data format	Shapefile
Quality control	loa_qc.doc
Data source	Kootenay Lake Forest District
Date obtained	July 30, 2007
Link to metadata (if available)	
Data edits	
Data issues	
Reference sources	
Changes since TSR 2	
Analysis-ready coverage name	Loa
Approval	Dale Anderson
Approval date	August 7, 2007

Attribute information

Attribute	Value	Description
Licensee	Various	Indicates the tenure-holder or company name.
Loa_type	Comm Forest	Community forest
	Woodlot-P	Proposed woodlot
	Woodlot	
	Private	
	Park	
	Unallocated	
	Licensee	

Land base summaries

Licensee	Area (hectares)
Atco	18,002
BCTS	230,647
Creston Valley	24,585
Goose Creek	9,763
Harrop/Proctor	14,109
JH Huscroft	107,005
Kalesnikoff	41,709
Kaslo	38,650
Meadow Creek	173,810
Park	218,402
Private	88,345
Tembec	112,178
Unallocated	50,913
Woodlot	8,555
Woodlot – Proposed	4,078
Wynndel	100,097
Total	1,240,828

2.1.6 Forest inventory**Introduction**

This dataset identifies the forest inventory for the Kootenay Lake TSA projected to January 1, 2007.

Background

The Vegetation Resources Inventory (VRI) is a photo-based, two-phased vegetation inventory program. The photo interpretation phase (Phase I) involves estimating vegetation polygon

characteristics, from existing information, aerial photography, or other sources. No sampling is done in Phase I.

The ground sampling phase (Phase II) provides the information necessary to determine how much of a given characteristic is within the inventory area. Ground samples alone cannot be collected in sufficient numbers to provide the specific locations of the land cover characteristics being inventoried. The ground measurements are used to estimate the total for the population. The relationship between the polygon estimates and ground samples is used to adjust the photo-interpreted polygon estimate. The total for the population is then distributed into the adjusted description for each polygon.

Net Volume Adjustment Factor (NVAF) sampling collects data on a number of selected trees to account for inaccuracies in the estimates of net tree volume. The NVAF is calculated from the ratio of actual to estimates of sample tree volumes and is applied as a correction to VRI ground sample volumes. This data, used in conjunction with the original ground sampling data, provides an unbiased estimate of the net volume in the project area.

The ground measurements are used to estimate the proper total for the population. The relationship between the polygon estimates and ground samples is used to adjust the photo-interpreted polygon estimate. The total for the population is then distributed into the adjusted description for each polygon.

VRI identifies stand characteristics such as the presence or absence of trees, species, number of trees, age and timber volume. It is also used to identify non-forest and non-productive forest areas (e.g., rock, swamp, alpine areas and water bodies), non-commercial cover areas (e.g., non-commercial brush), and problem forest types (PFT) — stands that are operable but contain non-merchantable or low quality timber, and low timber productivity areas — areas occupied by forest with low timber growing potential.

Source

The Forest Analysis and Inventory Branch of the MFR provided the VRI dataset for this analysis. This dataset was retrieved from the LRDW on January 22, 2007 and includes VDYP 6 volumes at projected age (projection date = 01/01/2007).

Status

The VRI for the Kootenay Lake TSA is rolled over from legacy forest cover Forest Inventory Planning (FIP) files based on aerial photography from 1968 to 1972. Tree growth is projected to January 1, 2007. Recent depletion updates (from 1999-2007) to the inventory from harvesting or other disturbances are included as a separate layer. A VRI Phase I has recently been started in Kootenay Lake district with an estimated completion in 2011.

Dataset

Data file name	WHSE_FOREST_VEGETATION.VEG_COMP_LYR_R1_POLY
Version	
Data file description	Vegetation Resource Inventory – FC1 rollover
Date	
Data format	SDE
Quality control	vri_qc.doc
Data source	LRDW
Date obtained	January 22, 2007.
Link to metadata (if available)	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=42931&recordSet=ISO19115
Data edits	
Data issues	FIP roll-over data – VRI completion in 2011.
Reference sources	
Changes since TSR 2	
Analysis-ready coverage name	vri
Approval	Dave Waddell
Approval date	March 28, 2008

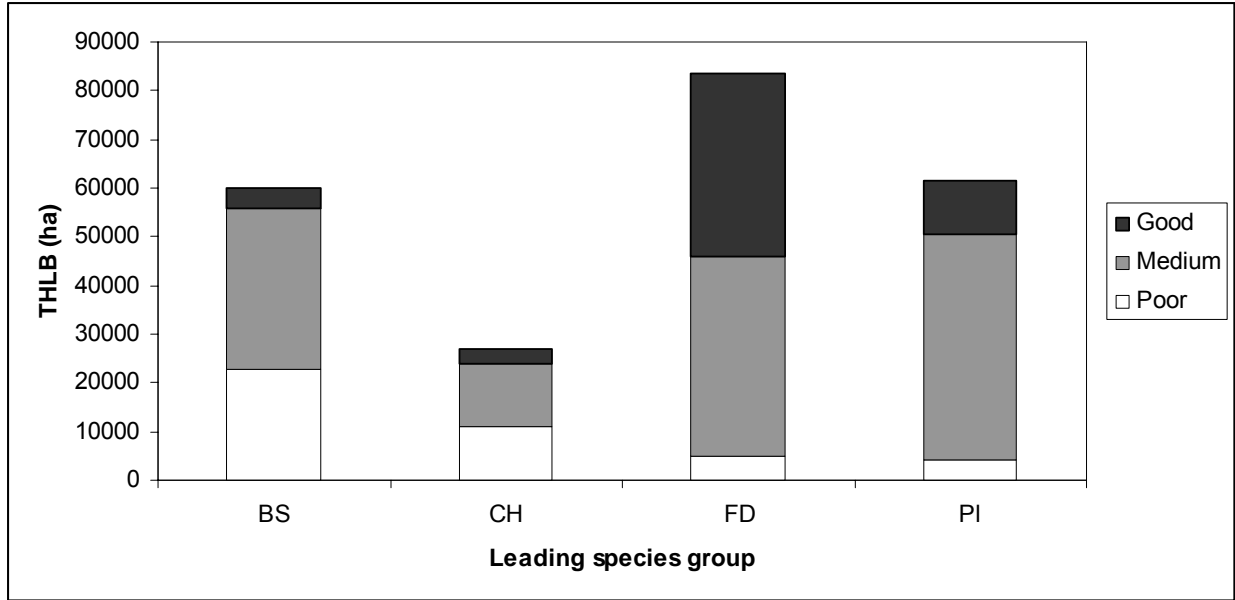
Attribute information

A detailed data dictionary for VRI is available at:

http://www.for.gov.bc.ca/hts/vridata/standards/datadictionary/rpt_vri_datadict0907_draft1.0e.pdf

Land base summaries

Leading Species	Crown Productive Forest (ha)	THLB (ha)
Aspen	8,603	
Balsam	136,925	27,803
Cedar	16,830	8,240
Birch	5,568	
Fir	87,751	45,096
Hemlock	46,598	18,844
Larch	63,849	39,032
Pine	113,077	60,654
Spruce	92,242	32,275



2.1.7 Inventory depletions

Introduction

This dataset identifies depletion updates to the inventory due to fire and harvesting activities in the Kootenay Lake TSA from 1999 to 2007.

Background

Vegetation cover update is the process of maintaining and updating changes to the approved Vegetation Resource Inventory (VRI). This update process includes identifying, mapping and describing the changes that occur across the VRI. These changes to the VRI may be the result of human activities such as logging, tree planting, right-of-way construction for highways and pipelines, etc; or be caused by natural disturbances to the VRI such as fires, insects and windthrow.

Source

The Forest Analysis and Inventory Branch of the MFR created the dataset for the TSR in January 2007. This data set was created specifically for the Kootenay Lake TSA timber supply review and is not the formal depletion that will be incorporated into the inventory. The depletions were generated from harvesting updates provided by licensees to the RESULTS application, satellite imagery and spatial files of fire boundaries.

Status

This dataset only identifies depletions from 1999 onwards. It is assumed that the VRI is current to 1998 depletions.

Dataset

Source data file name	Dkl_dep.e00
Version	
Data file description	Depletions to Kootenay Lake inventory from 1999 onwards
Date	January 31, 2008
Data format	Coverage
Quality control	depl_qc.doc
Data source	Doug Layden (FAIB)
Date obtained	January 31, 2008
Link to metadata (if available)	
Data edits	
Data issues	
Reference sources	Results silviculture and fire boundaries provided by DKL
Changes since TSR 2	
Analysis-ready coverage name	depl
Approval	Doug Layden
Approval date	January 31, 2008

Attribute information

Attribute	Value	Description
HARV_YEAR	0	Not harvested
	1999-2007	Year harvested
HARV_SOURCE	Results	Silviculture information from licensees entered into RESULTS
	Satellite	Depletion boundaries obtained from satellite imagery
HARV_CLASS	Not cut	No depletion
	Cut	Harvested
	Fire	Fire

Land base summaries

Year	Depletion type	Area (hectares)
1999	cut	2,065
2000	cut	2,762
2001	cut	2,471
2002	cut	2,712
2003	cut	6,480
	fire	17,950
2004	cut	3,526
2005	cut	3,008
2006	cut	2,782
2007	cut	938
	fire	3,484
Total		48,471

2.1.8 Landscape units

Introduction

This dataset identifies landscape unit and planning cell boundaries for the Kootenay Lake TSA.

Background

Landscape units are large areas of land, generally on the order of 50,000 hectares in size, where trade-offs between overlapping resource values takes place. This is of particular importance with regard to management of old growth forests over time.

Planning cells are geographical subdivisions of the district, based on stream channels and ridgelines, which serve a number of purposes in support of natural resource data management and planning.

Source

The Kootenay Lake Forest District created and maintains the landscape unit and planning cell data.

Status

The dataset reflects landscape units and planning cells established by the district in 2000.

Dataset

Source data file name	tlupc_kl
Version	
Data file description	Landscape Units and Planning Cells
Date	March 2005
Data format	Coverage
Quality control	tlupc_qc.doc
Data source	Kootenay Spatial Data Partnership
Date obtained	April 18, 2007
Link to metadata (if available)	
Data edits	
Data issues	Landscape Units K13 and K19 refer to lakes and should be ignored.
Reference sources	
Changes since TSR 2	No change.
Analysis-ready coverage name	tlupc_kl
Approval	Dale Anderson
Approval date	July 16, 2007

Attribute information**Details of important attribute values**

Attribute	Value	Description
LU	K1-K26	3 character code identifying unique Landscape Unit number.
PCELL	101-2643	Identifies unique planning cell number.

Land base summaries

There are 24 landscape units and 1161 planning cells within the Kootenay Lake TSA.

LU	Area (hectares)
K01	72,034
K02	25,998
K03	42,752
K04	49,981
K05	34,473
K06	77,758
K07	38,806
K08	43,239
K09	43,252
K10	52,936
K11	23,187
K12	81,997
K13	52,139
K14	42,306
K15	61,755
K16	39,847
K17	69,126
K18	47,140
K20	38,689
K21	51,509
K22	62,687
K23	23,038
K24	55,167
K25	70,022
K26	41,006
Total	1,240,832

2.1.9 Ungulate winter range

Introduction

This dataset identifies ungulate winter range (#U-4-001) for the Kootenay Lake TSA.

Background

Ungulates are hooved mammals, including whitetail deer, mule deer, moose, and elk. One of the most important requirements for the maintenance of healthy ungulate populations is their ability to overwinter when they have to forage for food and live off fat reserves.

An ungulate winter range (UWR) is an area that is required to meet the winter habitat requirements of an ungulate. UWR are based on our current understanding of ungulate habitat requirements in winter, as interpreted by the Ministry of Environment (MOE) regional staff based on current scientific and management literature, local knowledge, and other expertise from the region. Areas considered of particular importance as UWR include low elevations areas with minimal snow accumulation (i.e., south aspects), abundant forage plants, and sufficient forest cover to allow hiding or movement. The data indicates the general location where these areas can be found, but this does not mean that all the areas identified are high value winter range.

Timber harvesting can improve UWR in many instances, but requires careful forethought and planning. In general, a mix of different habitat types is considered desirable — open areas for foraging, and forested areas for cover. Since we do not have conclusive knowledge of optimal winter range requirements, or the likelihood of this emerging under "natural" disturbance patterns, a great deal of professional judgment is necessary.

Formal legal establishment of UWR and associated objectives began under the FPC and continue, under the *FRPA*. Sections 9 and 12 of the *Government Actions Regulation (GAR)* of the *FRPA* outline the regulatory authority for establishing UWR.

Source

The Ministry of Environment is responsible for UWR and posts all approved UWR orders and spatial files on their website.

Status

This file represents approved UWR 4-001, amended on February 7, 2007 under legal *GAR* order.

Dataset

Source data file name	tuwra_u-4-001
Version	
Data file description	UWR 4-001
Date	Nov 20, 2006
Data format	Coverage
Quality control	tuwr_qc.doc
Data source	Ministry of Environment http://www.env.gov.bc.ca/wld/frpa/uwr/approved_uwr.html
Date obtained	July 11, 2007
Link to metadata (if available)	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=36173&recordSet=ISO19115
Data edits	
Data issues	
Reference sources	
Changes since TSR2	New spatial data and GWMs. Areas removed for Caribou management.
Analysis-ready coverage name	uwr
Approval (sign-off)	Mike Knapik
Approval date	May 15, 2007

Attribute information

Attribute	Value	Description
Uwr_tag	u-4-001	UWR identifier
Unit_no	Various	A three-part code to identify the individual UWR polygons: [Management Unit]-[Species]_[polygon_id] i.e. 351-E_92 (Management Unit 351, Elk, Polygon 92) E – Elk MD – Mule Deer M – Moose
Feat_notes	Various	Identifies either the species and BEC subzone or as a foraging area
Mngt_unit	Various	Management unit

Land base summaries

Feat_Notes	Area (hectares)
Elk; ICHmw	3,839
Foraging area	6,327
Moose; moderate snow	23,687
Mule Deer; ICHdw	28,670
Mule Deer; ICHmw	9,347
Mule Deer; ICHwk	437
Total	72,307

2.1.10 Wildlife habitat areas

Introduction

The dataset contains approved legal boundaries for wildlife habitat areas (WHAs) and specified areas for species at risk and regionally important wildlife. WHAs consist of core areas, where harvesting activities are usually excluded. They may also include buffer or management zones, where general wildlife measures limit harvesting activities to protect the core area. The wildlife species may not be identified in the dataset if identification of the species or feature might place undue risk on the wildlife area or feature.

Background

WHAs are areas managed for selected species and plant communities that have been designated under the *FRPA* as "Identified Wildlife". The Identified Wildlife Management Strategy (IWMS) is a responsibility of the Ministry of Environment carried out in consultation with other resource ministries, stakeholders and the public. Statutory authority is provided for the Ministry of Environment to carry out this strategy under provisions of the *FRPA* and previously under the *FPC*. The IWMS provides direction, policy, procedures and guidelines for managing identified wildlife. The goals of the IWMS are to minimize the effects of forest and range practices on Identified Wildlife situated on Crown land and to maintain their current ranges and, where appropriate, their historic ranges. One method of managing identified wildlife is through the establishment of WHAs and the implementation of general wildlife measures and objectives.

Source

Under the *FRPA*, the Minister of the Environment, who is responsible for the *Wildlife Act*, is authorized to establish two categories of wildlife which require special management attention to address the impacts of forest and range activities on Crown land. Approved WHA spatial data is available directly from the Ministry of Environment website and is posted on the Land Resource Data Warehouse site.

Status

The most recent establishment of a WHA in the Kootenay Lake TSA was in May 2006. This dataset, obtained in May 2007, reflects all approved WHAs.

Dataset

Source data file name	WHSE_WILDLIFE_MANAGEMENT.WCP_WILDLIFE_HABITAT_A REA_POLY
Version	
Data file description	Approved wildlife habitat areas
Date	May 2006 (Most recent WHA approval date)
Data format	SDE
Quality control	wha_qc.doc
Data source	LRDW
Date obtained	May 24, 2007
Link to metadata (if available)	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=36172&recordSet=ISO19115
Data edits	
Data issues	
Reference sources	http://www.env.gov.bc.ca/cgi-bin/Apps/faw/wharesult.cgi?search=forest_region&forest=Kootenay+Lake&submit=Search
Changes since TSR 2	No WHAs were modelled in TSR 2
Analysis-ready coverage name	WHA
Approval	Mike Knapik
Approval date	May 15, 2007

Attribute information

Details of important attribute values

Attribute	Value	Description
Tag	Various	A unique five-character number identifying the WHA. This is the MOE Region number followed by a dash and a unique three-digit code.
Feature_co	FF33515110	Management zone or buffer
	FF33515120	Core area
Species	Various	Identified wildlife common species name or 'Data Sensitive'

Land base summaries

There are 23 WHAs in the Kootenay Lake TSA that cover a total area of approximately 180 hectares. WHAs have been established for the Rocky Mountain Tailed Frog and the Western Screech Owl. All other WHAs are 'Data Sensitive' and, for this reason, the species are not specifically identified in this document.

2.1.11 Wildlife management areas

Introduction

The Midge Creek WMA encompasses old-growth forest and habitat for caribou and other species. The Creston Valley WMA consists of a network of marshes and ponds, which are home to Northern Leopard Frogs and a large number of bird species.

Background

A WMA is a designation under the [British Columbia Wildlife Act \(Section 4\)](#) where conservation and management of wildlife, fish and their habitats is the priority land use but other uses may be permitted. It is not a “protected area” designation. WMAs may be used to conserve or manage various habitats including habitat for endangered, threatened, sensitive, or vulnerable species, habitat required for a critical life cycle phase of a species such as spawning, rearing, calving, denning, nesting, or winter feeding, migration routes or other movement corridors and areas of especially productive habitat or high species richness.

Source

WMAs are established and managed by the Ministry of Environment.

Status

This dataset reflects WMAs as established by MOE.

Dataset

Source data file name	rwma_r4
Version	
Data file description	Wildlife Management Areas for Kootenay Region
Date	October 1996
Data format	Coverage
Quality control	wma_qc.doc
Data source	GIS Warehouse (nelmart)
Date obtained	June 28, 2007
Link to metadata (if available)	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=42366&recordSet=ISO19115
Data edits	Clipped to TSA boundary and removed slivers
Data issues	
Reference sources	
Changes since TSR 2	Midge Creek WMA was not factored into the TSR2 analysis.
Analysis-ready coverage name	wma
Approval (sign-off)	Mike Knapik
Approval date	June 29, 2007

Attribute information

Attribute	Value
WMA_NAME	Midge Creek Creston Valley

Land base summaries

WMA_NAME	Area (hectares)
Midge Creek	14,757
Creston Valley	7,196
Total	21,953

2.1.12 Parks and protected areas**Introduction**

This dataset contains boundaries for all provincial protected areas, as well as national parks within the Kootenay Lake TSA.

Background

British Columbia is home to many nationally and internationally significant natural and cultural values. Through the establishment of parks, ecological reserves and protected areas, an important first step has been undertaken to ensure that these values are afforded legal protection. The provincial legal framework for protecting these important areas includes the:

- *Protected Areas of British Columbia Act;*
- *Park Act;*
- *Ecological Reserve Act; and*
- *Environment and Land Use Act.*

Parks and protected areas are managed for important conservation values and are dedicated for the preservation of their natural environments for the use and enjoyment of the public.

Places of special ecological importance are designated as ecological reserves for scientific research and educational purposes. Scientific research and study of values contained in protected areas are part of BC Parks' mandate.

National Parks are a country-wide system of representative natural areas of Canadian significance. By law, they are protected for public understanding, appreciation and enjoyment, while being maintained in an unimpaired state for future generations.

Source

Individual datasets for provincial and national parks and protected areas to create a protected areas coverage for Kootenay Lake TSA. Both of the source datasets were obtained through the LRDW.

Status

All provincial and national protected areas designated by order-in-council or legislation are included in this dataset. Park proposals or draft boundaries are not considered.

Dataset

Data file name	pas
Version	
Data file description	Protected Areas
Date	February 2008
Data format	SDE layers
Quality control	If no, describe resolution
Data source	LRDW WHSE_ADMIN_BOUNDARIES.CLAB_NATIONAL_PARKS WHSE_PARKS.PA_PROTECTED_AREA_POLY
Date obtained	February 12, 2008
Link to metadata (if available)	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=3997&recordSet=ISO19115 http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=33892&recordSet=ISO19115
Data edits	Clipped to DKL
Data issues	
Reference sources	
Changes since TSR 2	
Approval	Dale Anderson
Approval date	Dec 18, 2007

The following parks are wholly or partially contained in the TSA:

Provincial protected area	Area within TSA (hectares)
Bugaboo Park	114
Cody Caves Park	49
Drewry Point Park	25
Glacier National Park	406
Goat Range Park	55,929
Grohman Narrows Park	10
Kianuko Park	11,656
Kokanee Creek Park	218
Kokanee Glacier Park	25,222
Kootenay Lake Park	363
Lew Creek Ecological Reserve	890
Lockhart Beach Park	4
Lockhart Creek Park	3,725
Pilot Bay Park	336
Purcell Wilderness Conservancy Park	92,600
Ryan Park	59
West Arm Park	25,088
Yahk Park	11
Total	216,706

2.1.13 Goal 2 protected areas

Introduction

This dataset identifies Goal 2 Protected Areas for the Kootenay Lake TSA.

Background

British Columbia's Protected Areas Strategy has two goals: representatives (goal 1) and special features (goal 2). Goal 2 areas are established to protect special natural, cultural heritage and recreational features of the province including: rare and endangered species; critical habitats; outstanding or unique botanical, zoological, geological and paleontological features, outstanding or fragile cultural heritage features, and outstanding outdoor recreational features such as trails.

Source

The Integrated Land Management Bureau (ILMB) in Nelson created and maintains this dataset.

Status

The Interagency Management Committee signed a list of PAS Goal 2 areas in 2000. In 2005, Section 16 *Land Act* reserves were established on the highest priority areas (“A” list) and the Ministry of Energy, Mines and Petroleum Resources established “no-staking” reserves. These measures were taken to protect these sites until government reviews have been completed. At the direction of the Kootenay-Boundary Management Committee a Regional Interagency Technical Team (RITT) was set up in 2006 to review the list and update it, identifying any new issues. The revised list was then taken to the KBMC and it was approved to move forward for consultation with Regional Districts and First Nations. Following local government input and First Nations consultation, the RITT will revisit the list with KBMC and make a recommendation to government.¹

Dataset

Source data file name	tpas2_r4_v4
Version	4
Data file description	Goal 2 Protected Areas
Date	February 20, 2007
Data format	Coverage
Quality control	tpas2_qc.doc
Data source	ILMB – Russ Hendry
Date obtained	June 28, 2007
Link to metadata (if available)	
Data edits	Clip to TSA boundary, remove slivers
Data issues	
Reference sources	
Changes since TSR 2	
Analysis-ready coverage name	tpas2
Approval	Dale Anderson
Approval date	July 16, 2007

Attribute information

Attribute	Value	Description
PAS_TYPE	PA	Protected Area
	Park	Park
NAME	Various	PA/Park Name

¹ According to Pamela Cowtan, Planning Team Leader for ILMB (July 2007).

Land base summaries

Name	Area (hectares)
Blue Ridge	337
Burden Cut/Kootenay Lake Shoreline	4
Cody Caves Expansion	30
Crawford Bay/Kootenay Lake Shoreline	7
Fletcher Falls/Kootenay Lake Shoreline	3
Harlequin Island/Kootenay Lake Shoreline	1
Howser Spire	361
Irvine Creek/Kootenay Lake Shoreline	13
Jock and Cory Creeks	432
Kokanee Creek ERP	214
Kootenay Lake North End	166
Lardeau River	715
Pebble Beach/Kootenay Lake Shoreline	14
Troup Junction/Kootenay Lake Shoreline	21
Twin Bays	255
Tye Creek/West Shore Kootenay Lake	41
Wilson Creek/Kootenay Lake Shoreline	5
Total	2620

2.1.14 Old growth management areas**Introduction**

This dataset identifies candidate old growth management areas (OGMAs) for the Kootenay Lake TSA.

Background

Old-growth forests contain unique habitat structure that takes a long time to return if altered. The establishment of OGMAs, areas generally excluded from harvesting operations, is one method to conserve old-growth biodiversity elements in the forest ecosystem. Candidate OGMAs cover more area than required by landscape biodiversity targets because, in some cases, they were used to delineate mountain caribou habitat as well. Old forests in the Kootenay Lake District rarely escape natural disturbance completely. Stand-replacing wildfires may come infrequently in some of the wetter parts of the District, but in dry years these areas may have extremely intense burns due to high levels of fuel.

Source

Candidate OGMAs were identified through negotiations between the MFR, ILMB, forest industry representatives and Environmental Non-governmental Organizations (ENGOS). The source dataset was provided by the Kootenay Lake Forest District via their FTP site.

Status

The OGMAs in this dataset are in draft format and there are no plans to legally establish beyond the KBHLPO requirements. This allows the strategy to be adjusted over time to deal with insect outbreaks, new information, etc.

Dataset

Source data file name	aog_kl
Version	
Data file description	Draft old growth management areas
Date	April 26, 2006
Data format	Coverage
Quality control	ogma_qc.doc
Data source	ftp://ftp.for.gov.bc.ca/DKL/external/!publish/Forest_Development_Info/General_FSP&FDP_info/Data_Layers/
Date obtained	February 25, 2008
Link to metadata (if available)	
Data edits	
Data issues	Draft only
Reference sources	
Changes since TSR 2	New proposal – were not modelled in TSR 2
Analysis-ready coverage name	OGMA
Approval	Dale Anderson
Approval date	July 16, 2007

Attribute information

Attribute	Value	Description
OGMA	Y	Old growth management area

Land base summaries

Draft OGMAs account for 264 740 hectares of the Kootenay Lake TSA while only 112 521 hectares are within the crown productive forest.

2.1.15 Operability classification

Introduction

This dataset identifies operability linework for the Kootenay Lake TSA developed in 2007.

Background

The operability or inoperability of an area based on the presence or absence of physical barriers or other limitations to harvesting.

Source

The Kootenay Lake Forest District staff developed this dataset based on input and discussions with licensees and consultants.

Status

This dataset reflects current management within the TSA.

Dataset

Source data file name	topr07kl
Version	
Data file description	
Date	February 19, 2007
Data format	Coverage
Quality control	oper_qc.doc
Data source	Kootenay Lake ftp
Date obtained	June 18, 2007
Link to metadata (if available)	
Data edits	
Data issues	
Reference sources	
Changes since TSR 2	Updated dataset in 2007
Analysis-ready coverage name	oper
Approval	Dale Anderson
Approval date	July 3, 2007

Attribute information

Attribute	Value	Description
oper	A	Operable (accessible)
	I	Inoperable
	N	Not mapped

Land base summaries

oper	Area (hectares)
A	516,158
I	708,479
Total	1,224,637

2.1.16 Old operability

Introduction

This dataset identifies operability linework for the Kootenay Lake TSA developed in 1994.

Background

The operability or inoperability of an area is based on the presence or absence of physical barriers or other limitations.

Source

The Kootenay Lake Forest District staff developed this dataset based on input and discussions with licensees and consultants.

Status

This dataset reflects the operability linework used in TSR 2. New operability linework was developed in 2007.

Dataset

Source data file name	aopr94kl
Version	
Data file description	1994 operability linework
Date	1994
Data format	Coverage
Quality control	oper94_qc.doc
Data source	Kootenay Lake ftp site
Date obtained	May 16, 2007
Link to metadata (if available)	
Data edits	See oper94_qc.doc for resolution of issues
Data issues	
Reference sources	
Changes since TSR 2	As included in TSR2
Analysis-ready coverage name	oper94
Approval	Dale Anderson
Approval date	July 16, 2007

Attribute information

Attribute	Value	Description
oper_old	A	Operable (accessible)
	I	Inoperable
	N	Not mapped

Land base summaries

Oper_old	Area (hectares)
A	451,759
I	728,380
Total	1,180,139

2.1.17 Ownership**Introduction**

This dataset identifies land ownership classifications used to derive the THLB.

Background

The ownership layer identifies land designations that are excluded from the Crown land base or are not administered by the MFR and, therefore, do not contribute to the THLB.

Source

The Kootenay Lake forest district prepared a new private land layer based on an old ownership layer (fown05kl) and Regional District of the Central Kootenay Cadastre, Tantalus, and Whitewater Controlled Recreation Area (CRA) datasets. For the purposes of the TSR, this dataset combines the latest source datasets including private land, woodlots, parks, Indian Reserves and controlled recreation areas exclude areas from the THLB.

Status

The ownership dataset used in the previous TSR was originally derived from old forest cover data and is no longer maintained. Although not a complete ownership inventory of the TSA, this dataset represents the best available data at this time, and sufficiently captures land areas that are excluded from the THLB based on ownership. Other datasets capture proposed tenures or changes in land ownership, such as community forests and proposed woodlots.

Dataset

Source data file name	N/A
Version	
Data file description	Land ownership
Date	February 2008
Data format	Coverage
Quality control	tsr_own_qc.doc
Data source	Created for TSR
Date obtained	
Link to metadata (if available)	
Data edits	See qc document
Data issues	
Reference sources	
Changes since TSR 2	Exclusion of Whitewater CRA, Goal 2 PAS, and Glacier National Park
Analysis-ready coverage name	TSR_own
Approval	Dale Anderson
Approval date	May 13, 2008

Attribute information

Attribute	Value	Description
TSR_own	CRA	Controlled recreation area
	IR	Indian Reserve
	park	Park or protected area
	private	Private lands
	priv-wl	Private land component of woodlot license
	woodlot	Crown land component of woodlot license
	WMA	Wildlife management area

Land base summaries

TSR_own	Area (hectares)
CRA	1,315
Dewdney	119
IR	2,452
park	216,798
private	115,785
priv-wl	1,226
woodlot	8,244
WMA	22,001
Total	367,940

2.1.18 Roads**Introduction**

This dataset contains road location and road class information for the Kootenay Lake TSA.

Background

This roads layer contains highways, streets, rural roads, and resource roads compiled from numerous datasets at a scale of 1:20,000. The roads are classified into four classes: main, operational, spur, and trail. It is recognized that further work is desirable to check and refine these categories, but this data is currently the best available.

Source

The data was compiled for TSR 3 by Southern Interior Forest Region Geomatics and further revised by Kootenay Lake District Geomatics. The roads layer compilation is comprised of

several data sources including: TRIM transportation (LRDW), kld_roads.dgn, fc_roads coverage, Digital Roads Atlas, FTEN roads, Kalesnikoff Lumber, Tembec, and manual digitization.

Status

The roads compilation was completed in August 2007 based on the best available information and includes the sources listed and manual digitization of 2004 and 2005 orthophotography. The data was amended with the addition of Kalesnikoff Lumber data in November and Tembec data in January before being published.

Dataset

Source data file name	trds07kl
Version	
Data file description	Kootenay Lake Forest District Roads
Date	January 2008
Data format	Coverage
Quality control	roads_qc.doc
Data source	Dale Anderson 250-825-1114
Date obtained	January 31, 2008
Link to metadata (if available)	\\marble\FOR\RSI\DKL\Local_Data\Roads\trds07kl.txt
Data edits	None
Data issues	
Reference sources	
Changes since TSR 2	As described above.
Analysis-ready coverage name	Roads
Approval	Dale Anderson
Approval date	November 6, 2007

Attribute information

Attribute	Value	Description
Source	dklroads	dkl_roads.dgn
	fta_roads_pol	fta_roads(ften) – LRDW
	fc_roads	Fc_roads coverage
	DRA	Digital Roads Atlas
	Kalesnikoff	Kalesnikoff contributed source
	other	Other or altered source
	null	Digitized
Road_class	Main	Main Road
	Operational	Operational Road
	Spur	Spur Road
	Trail	Small or overgrown road

Land base summaries

Road class	Length (km)
Main	1,190
Operational	2,723
Spur	4,509
Trail	2,609
Total	11,031

2.1.19 Rail and Transmission Lines**Introduction**

This dataset identifies railway, transmission line and powerline right-of-way buffers for the Kootenay Lake TSA.

Background

Utility and transportation lines including railways, transmission lines and powerlines have corridor widths that are excluded from harvesting.

Source

This dataset was created based on TRIM linework downloaded from the LRDW.

Status

This dataset reflects the linework as published in the LRDW and is the best information known information.

Dataset

Source data file name	WHSE_BASEMAPPING.TRIM_CULTURAL_LINES (FCODE EA16400120 = Transmission lines, FCODE EA21400000 = Pipelines) WHSE_BASEMAPPING.TRIM_TRANSPORTATION_LINES (FCODE DE* = Railway lines)
Version	
Data file description	
Date	Obtained January 2008
Data format	SDE layers
Quality control passed?	rail_trans_qc.doc
Data source	LRDW
Date obtained	January 2008
Link to metadata (if available)	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=4095&recordSet=ISO19115 http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=4123&recordSet=ISO19115
Data edits	
Data issues	
Reference Sources	
Changes since TSR2	
Analysis-ready coverage name	Rail_trans
Approval (sign-off)	Dale Anderson
Approval Date	

Attribute information

Attribute	Value	Description
FCODE	EA16400120	Transmission lines
	EA21400000	Pipelines
	DE22850000	Rail line (double track)
	DE22950000	Rail line (single track)

Land base summaries

FCODE	Length (km)
EA16400120	378
EA21400000	120
DE22850000	6
DE22950000	226

2.1.20 Canadian Pacific Rail reserves**Introduction**

This dataset identifies district lots and sublots associated with Canadian Pacific Rail (CPR) reserves.

Background

In 2005, CPR approached MFR regarding potential harvest on Crown lots for which CPR held harvesting rights. These rights vary by lot, and only apply to trees over a certain age. Work is presently ongoing to determine which lots are affected, and to what degree.

Source

This dataset was created by MFR district staff in 2006 based on several input data sources (tantalis, RDCK, RDEK).

Status

This dataset represents the best available information. This dataset is not regularly maintained and is not necessarily complete.

Dataset

Source data file name	railway_areas_of_concern_13nov2006shp.shp
Version	
Data file description	Produced by MFR staff
Date	Nov 13, 2006
Data format	shapefile
Quality control	Removed slivers created by conversion process. Added cprail attribute. cprail_qc.doc
Data source	Kootenay Lake Forest District (Barb Hanlon)
Date obtained	Dec 10, 2007
Link to metadata (if available)	
Data edits	
Data issues	
Reference sources	
Changes since TSR 2	Not included in TSR 2
Analysis-ready coverage name	CP rail
Approval	Dale Anderson
Approval date	January 11, 2008

Attribute information

Details of important attribute values

Attribute	Value	Description
CP rail	Yes	CP Rail Reserve
	No	

Land base summaries

CP rail	Area (hectares)
Yes	28,822

2.1.21 Dewdney Trail

Introduction

This dataset identifies the Dewdney Heritage Trail Reserve Zone buffer, an area designated under the *Heritage Conservation Act*.

Background

Originally constructed in the late 19th century to access gold fields, this trail has been designated as part of the Trans-Canada Trail.

Source

This dataset was created by the Kootenay Lake Forest District.

Status

This represents portions of the Dewdney Heritage Trail as designated under the *Heritage Conservation Act*.

Dataset

Source data file name	tdew_dkl_poly
Version	
Data file description	Dewdney Heritage Trail Reserve Zone Buffer (200m)
Date	
Data format	Coverage
Quality control	dewdney_qc.doc
Data source	Kootenay Lake Forest District
Date obtained	November 11, 2007
Link to metadata (if available)	
Data edits	
Data issues	
Reference sources	
Changes since TSR 2	
Analysis-ready coverage name	Dewdney
Approval	Dale Anderson
Approval date	May 13, 2008

Attribute information

No attributes. All areas in dataset consist of trail reserve.

Land base summaries

The Dewdney Trail reserve consists of 119 hectares within the Kootenay Lake TSA.

2.1.22 Caribou

Introduction

This dataset identifies mapped caribou management zones in the Kootenay Lake TSA as per the objective for caribou in Variance 4 of the KBHLPO.

Background

Mountain caribou, *Rangifer tarandus*, is an ecotype of British Columbia's woodland caribou population. Unlike most other ungulates, it can survive at high elevations during the winter, where it feeds primarily on arboreal lichens. The species is considered "endangered" or "red-listed" in British Columbia, and there are three herds which forage within the Kootenay Lake Forest District. One of these, the Southern Selkirk herd, spends time in both Canada and the United States, and is known as the "International" herd. Although genetically indistinct, mountain caribou are a globally unique population as the world's southernmost caribou population and the only remaining caribou that live in rugged, mountainous terrain and feed on arboreal lichens in winter. The population has drastically declined over this century, with a sharp decline from about 2,500 animals in 1995 to about 1,900 in 12 herds today.

The decline of this ecotype is due to the high mortality linked to predation and disturbance in the short term. In the long term, mountain caribou are threatened by habitat fragmentation, alteration and loss of old growth forest. Caribou depend heavily on old growth forests because of the increased likelihood of lichen production on older trees. Much of the suitable forest falls within the operable (timber harvesting) land base. Under the KBLUP-IS in 1997, forest management guidelines were developed which require maintenance of minimum amounts of old forest within caribou habitat. In some landscape units, such as K1, K6 and K18, this has greatly reduced the availability of timber for harvest.

In 2005, new caribou management zones were implemented as Variance 04 to the *KBHLP Order*. The associated habitat mapping provides zones in which management strategies are applied. Habitat types include core, supporting, recovery and connectivity and are further defined by the caribou (1994 operability) line, slope classes and leading species.

Since 2005, the Species at Risk Coordination Office (SaRCO) has been coordinating accelerated recovery planning for mountain caribou including the development of a cross-agency Mountain Caribou Recovery Implementation Plan. On October 16, 2007, government announced its endorsement of the Mountain Caribou Recovery Implementation Plan which includes financial commitments to support the recovery, protection of habitat and changes to activity levels in habitat. New map proposals of caribou habitat are being generated and it is expected that these proposals will be evaluated, possibly as a sensitivity analysis.

Source

This dataset represents the habitat management zones for KBHLP Order Variance 4, as produced by ILMB.

Status

Variance 4 to the KBHLP Order was released in March 2005. The Mountain Caribou Recovery Implementation Plan will establish new habitat zones and objectives in the Kootenay Lake TSA.

Dataset

Source data file name	achab_r4_05
Version	
Data file description	Caribou habitat zones (KBHLP-4)
Date	February 13, 2004
Data format	Coverage
Quality control	achab_qc.doc
Data source	dki ftp
Date obtained	May 2007
Link to metadata (if available)	
Data edits	
Data issues	
Reference sources	
Changes since TSR 2	Variance 4 to KBHLP established new habitat mapping and associated forest cover requirements.
Analysis-ready coverage name	achab
Approval	Mike Knapik
Approval date	Nov 7, 2007

Attribute information

Attribute	Value	Description
car_zone	1 – 8	Caribou management zone
car_pop	C. Selkirks South Selkirks South Purcells	Caribou population/herd
car_hab	CH CN Rc RN P M PARK Co N/A	Core habitat zone Core habitat zone — non-supporting Population recovery zone Recovery zone — non-supporting Supporting habitat zone Metapopulation connect National and provincial parks Connectivity zone No agreement

Land base summaries

car_zone	Area (hectares)
1	110,279
2	21,734
3	17,793
4	4,411
5	14,795
6	41,853
7	21,506
8	5,431
Total	237,802

2.1.23 Slope**Introduction**

This dataset identifies percent slope for the Kootenay Lake TSA.

Background

Slope is used in managing and modelling resources such as visual polygons and terrain stability, or for identifying land base features.

Source

This dataset was created using TRIM II contours and spatial analysis functionality. The mean slope was calculated for each resultant polygon is indicated as the attribute mean-slope_perc.

Status

N/A

Dataset

Source data file name	Slp
Version	
Data file description	Slope
Date	Jan 18, 2008
Data format	Coverage
Quality control	slp_qc.doc
Data source	Derived from TRIM II contours lines obtained from LRDW.
Date obtained	May 23, 2007
Link to metadata (if available)	Contour metadata: http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=4089&recordSet=ISO19115
Data edits	
Data issues	
Reference sources	
Changes since TSR 2	None
Analysis-ready coverage name	slp
Approval	Erin Hunter
Approval date	February 14, 2008

Attribute information

Attribute	Value	Description
Slp_perc		Slope values

Land base summaries

Slope class	Area (hectares)
0-10	133,623
10-20	115,417
20-30	167,215
30-40	189,172
40-50	188,575
50-60	168,105
60-70	125,915
70+	152,787
Total	1,240,809

2.1.24 Riparian

2.1.24.1 Streams

Introduction

This dataset represents stream classification information for the Kootenay Lake TSA which, in turn, guides the requirement for riparian management.

Background

There are six stream riparian classes designated S1 to S6. Each stream reach receives a stream riparian classification based on:

- presence of fish;
- occurrence in a community watershed; and
- average channel width.

Within a community watershed or fish bearing		Not within a community watershed or fish bearing	
Stream width (m)	Stream class	Average channel width (m)	Stream class
>20	S1	>3	S5
>5-20	S2	<= 3	S6
1.5-5	S3		
<1.5	S4		

A stream reach is a relatively homogeneous section of a stream having a sequence of repeating structural characteristics (or processes) and fish habitat types. The key physical factors used to determine reaches in the field are channel pattern, channel confinement, gradient, and streambed and bank materials. Stream reaches generally show uniformity in these characteristics and in discharge.

Riparian areas occur next to the banks of streams, lakes, and wetlands and include both the area dominated by continuous high moisture content and the adjacent upland vegetation that exerts an influence on it. Riparian ecosystems contain many of the highest value non-timber resources in the natural forest. Streamside vegetation protects water quality and provides a "green zone" of vegetation that stabilizes streambanks, regulates stream temperatures, and provides a continual source of woody debris to the stream. The majority of fish food organisms come from overhanging vegetation and bordering trees, while leaves and twigs that fall into streams are the primary nutrient source that drives aquatic ecosystems. Riparian areas frequently contain the highest number of plant and animal species found in forests and provide critical habitats, home ranges, and travel corridors for wildlife. Biologically diverse, these areas maintain ecological linkages throughout the forest landscape, connecting hillsides to streams and upper headwaters to lower valley bottoms. There are no other landscape features within the natural forest that provide the natural linkages of riparian areas.

Under *FRPA* riparian zones must be preserved to maintain habitat, biodiversity, bank stability as well as integrity of watersheds. In most cases, trees within a riparian reserve zone (RRZ) must not be cut or removed and within riparian management areas (RMA) a portion of the basal area of trees is maintained.

Source

This dataset was created specifically for use in this TSR. Input data included a stream classification dataset developed for TSR 2 analysis purposes based upon the 1:50,000 scale *British Columbia Watershed Atlas*, in addition to 1:20,000 TRIM data representing minor or intermittent streams (FCODEs GA24850150 and GA24850140). While the first dataset provided stream classification information, the latter included more spatial detail of smaller streams. All minor or intermittent TRIM streams were assigned a stream class of S6 or a stream class of S4 when within a community watershed.

Status

This dataset represents the best available data for the purpose of this analysis. Several other sources of riparian information may be available or suitable in the future but are currently incomplete or unavailable.

Dataset

Source data file name	Streams
Version	
Data file description	Stream classification data for Kootenay Lake
Date	Feb 2008
Data format	Coverage
Quality control	streams_qc.doc
Data source	TSR 2 stream classification received from DKL ftp site, TRIM data obtained from LRDW
Date obtained	Jan 2008
Link to metadata	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=4129&recordSet=ISO19115
Data edits	
Data issues	
Reference sources	
Changes since TSR 2	Addition of S6 streams from TRIM
Analysis-ready coverage name	Streams
Approval	Dale Anderson
Approval date	Feb 6, 2007

Attribute information

Attribute	Value	Description
RMA_CLASS	S1-S6	Stream riparian class
	L	Lake construction line (ignore)
Model_width	Number	Used to indicate stream width when represented by line features.

Land base summaries

Rma_class	Length (km)
S1	593
S2	2,454
S3	1,697
S4	23
S5	5,061
S6	18,234
Total	28,062

2.1.24.2 Lakes**Introduction**

This dataset represents lake classification information for the Kootenay Lake TSA, which guides the requirement for Riparian Management Zone designations.

Background

Lake classifications are primarily determined by:

- lake size
- biogeoclimatic unit in which they occur.

In this dataset, lakes were classified according to feature size as follows:

Lake Riparian Classes

- L1A = Lakes > 1000 ha
- L1B = Lakes > 5 ha and < 1000 ha
- L3 = Lakes < 5ha and >1 ha
- L4 = Lakes < 1 ha and > 0.25 ha
- L9 = Lakes < 0.25 ha

Source

This dataset was created specifically for use in this TSR based on TRIM lake features (FCODE GB15300000), to apply riparian classification.

Status

This dataset represents the best available data for the purpose of this analysis. Several other sources of riparian information may be available or suitable in the future but are currently incomplete or unavailable.

Dataset

Source data file name	wtrbdy_class
Version	
Data file description	lake classification data for Kootenay Lake
Date	Created 2007-10-15
Data format	Coverage
Quality control	waterbody_qc.doc
Data source	TRIM data obtained from LRDW
Date obtained	Jan 2008
Link to metadata	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=4129&recordSet=ISO19115
Data edits	Application of riparian class
Data issues	
Reference sources	LRDW
Changes since TSR 2	TRIM data used
Analysis-ready coverage name	Wtrbdy_class
Approval	Dale Anderson
Approval date	Oct 25, 2007

Attribute information

Attribute	Value	Description
wtrbdy_class	L1-L9	Lake riparian class

Land base summaries

wtrbdy_class	Area (ha)
L1A	52,025
L1B	1,666
L3	704
L4	266
L9	89
Total	54,750

2.1.24.3 Wetlands

Introduction

This dataset represents wetland classification information for the Kootenay Lake TSA which guides the requirement for Riparian Management Zone designations.

Background

A wetland is a swamp, marsh, or similar area that supports natural vegetation that is distinct from the adjacent upland areas. More specifically, a wetland is an area where a water table is at, near, or above the surface or where soils are water-saturated for a sufficient length of time that excess water and resulting low oxygen levels are principal determinants of vegetation and soil development.

Riparian classification is based on:

- whether the wetland is a simple wetland or wetland complex;
- wetland size;
- biogeoclimatic unit in which the wetland occurs.

In this dataset, wetlands were classified according to feature size as follows:

- Wetlands/Marsh Riparian Classes
 - W1 = Wetland/Marsh is > 5 ha
 - W3 = Wetland/Marsh is < 5 ha and > 1 ha
 - W4 = Wetland/Marsh is > 0.25 ha and < 1 ha
 - W9 = Wetland/Marsh is < 0.25 ha

Source

This dataset was created specifically for use in this TSR based on TRIM water features representing marshes and swamps (FCODEs GC17100000 and GC30050000) to apply riparian classification.

Status

This dataset represents the best available data for the purpose of this analysis. Several other sources of riparian information may be available or suitable in the future but are currently incomplete or unavailable.

Dataset

Source data file name	Wetland_class
Version	
Data file description	wetland classification data for Kootenay Lake
Date	Created 2007-10-15
Data format	Coverage
Quality control	wetland_qc.doc
Data source	TRIM data obtained from LRDW
Date obtained	Jan 2008
Link to metadata	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=4129&recordSet=ISO19115
Data edits	Application of riparian class
Data issues	
Reference sources	LRDW
Changes since TSR 2	Use of TRIM data
Analysis-ready coverage name	Wetland_class
Approval	Dale Anderson
Approval date	Oct 25, 2007

Attribute Information

Attribute	Value	Description
Wetland_class	W1-W9	Wetland riparian class

Land base summaries

Wetland_class	Area (hectares)
W1	3,624
W3	363
W4	123
W9	5
Total	4,115

2.1.25 Environmentally sensitive areas

Introduction

This dataset identifies environmentally sensitive areas (ESA) for the Kootenay Lake TSA.

Background

These are forest lands identified and delineated as environmentally sensitive and/or significantly valuable during a forest inventory.

The ESA system employs the following categories:

soil (Es)	forest regeneration problems (Ep)
snow avalanche (Ea)	recreation (Er)
wildlife (Ew)	water (Ew)

Two ESA classes are recognized within each category: high (1) and moderate sensitivity (2).

Source

This dataset is a product of the forest cover inventory.

Status

This dataset is derived from the forest cover inventory. Most categories in the ESA data have been replaced by more detailed terrain stability mapping and/or classifications.

Dataset

Source data file name	tesa_dkl_poly
Version	
Data file description	Environmentally Sensitive Areas
Date	
Data format	Coverage
Quality control	esa_qc.doc
Data source	Kootenay Lake Forest District
Date obtained	November 2007
Link to metadata	
Data edits	
Data issues	
Reference sources	
Changes since TSR 2	
Analysis-ready coverage name	Esa
Approval	Dale Anderson
Approval date	March 3, 2007

Attribute information

Attribute	Value	Description
ESA_1 (high)	S	Soils
ESA_2 (moderate)	A	Avalanche
	P	Forest regeneration
	H	Water
	R	Recreation
	W	Wildlife

Land base summaries

ESA_1	Area (hectares)
A	90
AP	21
P	29,780
PH	22
PR	461
PW	39
R	10,465
RW	169
SA	61
SAP	5
SP	65,204
SPR	286
SR	275
Total	106,878

2.1.26 Terrain stability mapping

Introduction

This dataset identifies detailed and overview terrain stability mapping for the Kootenay Lake TSA.

Background

Terrain stability mapping is conducted to assess the likelihood of mass movement of soil (landslides). This is of particular importance to road construction. Harvesting of trees does not usually affect stability, but roads often do.

Steep slopes and non-cohesive soils are most susceptible to mass movement, which is often triggered by water. Concentration of water drainage onto an unstable slope is a common cause of landslides.

Terrain stability mapping is used to minimize road construction on or above unstable terrain, and to trigger more detailed Terrain Stability Field Assessments and road designs for those areas that cannot be avoided.

Overview mapping, also known as Level “D”, is based primarily on airphoto interpretation, with some ground investigation. Detailed mapping, also known as Level “B”, makes use of airphoto interpretation, but involves more field checks than Overview mapping. Level “B” and “D” terrain stability mapping has been completed for most of the TSA and replaces the use of ESA soils designations for the identification of terrain stability problems.

Source

The amalgamation of the overview and detailed terrain stability mapping was created in October 2007 by Kootenay Lake forest service staff. Data in LU's K02, K03, K05, and K06 was replaced with additional mapping from Tembec.

Status

This dataset reflects the detailed and overview terrain stability mapping that has been completed for the TSA. This dataset has been recently updated (March 2008) to include additional licensee data.

Dataset

Source data file name	tsil07kl
Version	
Data file description	Overview and detailed terrain stability mapping
Date	Oct 31, 2007
Data format	coverage
Quality control	tsil_qc.doc
Data source	Kootenay Lake ftp
Date obtained	Oct 31, 2007
Link to metadata	
Data edits	LU's K02, K03, K05, K06 replaced with Tembec data
Data issues	Some LUs not 100% mapped.
Reference sources	
Changes since TSR 2	Additional areas added from licensee data.
Analysis-ready coverage name	tsil
Approval	Dale Anderson
Approval date	March 13, 2008

Attribute information

Attribute	Value	Description	Mapping type
slpstb_cls	I	Nil	Detailed or level "B"
	II	Low Instability	
	III	Moderate Instability	
	IV	High Instability	
	V	Very high Instability	
slpstb_cls	S	Stable. There is a negligible to low likelihood of landslide initiation following timber harvesting or road construction.	Overview or level "D"
	SA or A	Assumed stable.	
	P	Potentially unstable. Expected to contain areas with a moderate likelihood of landslide initiation following timber harvesting or road construction.	
	U	Unstable. Natural landslide scars present. Expected to contain areas where there is a high likelihood of landslide initiation following timber harvesting or road construction.	

Land base summaries

slpstb_cls	Area (hectares)
I	11,982
II	40,598
III	34,257
IV	46,728
V	8,494
S	212,854
SA	108,004
A	12,321
P	81,064
U	33,995
Total	590,296

2.1.27 Visual management**Introduction**

The Visual Landscape Inventory identifies and delineates areas of visual sensitivity near communities and along travel corridors throughout the province. It includes information about the visual condition, characteristics and sensitivity to alteration. This data set identifies

individual scenic areas by assigned visual quality objectives (VQO). Also identified in the database table for these zones are the existing visual condition (EVC), visual absorption capability (VAC), biophysical rating (BR), viewing condition (VC), viewer rating (VR), and visual sensitivity class (VSC).

Background

Visual quality objectives (VQOs) are established to specify limits of acceptable visual change based on visual sensitivity, number of viewers, level of concern or user expectations and other amenity values.

Three levels of VQOs are managed in the Kootenay Lake TSA:

Retention — The retention VQO requires that management activities or alterations not be visually apparent. The goal is to repeat the line, form, colour and texture of the characteristic landscape.

Partial retention — The partial retention VQO requires that alterations remain visually subordinate to the characteristic landscape. Repetition of the line, form, colour and texture is important to ensure a blending with the dominant elements.

Modification — The modification VQO allows- alterations to dominate the original characteristic landscape. However, alterations must borrow from natural line and form to such an extent and on such a scale that they are comparable to natural occurrences.

Source

The Forest Practices Branch of the MFR provided the Visual Landscape Inventory (VLI) dataset for the Kootenay Lake TSA that has been prepared for submission into the LRDW in 2007.

Status

In the Kootenay Lake TSA recommended visual quality classes established July 12, 1999 were grandfathered under *FRPA* section 180 as VQOs. The VLI is expected to be re-inventoried in the Kootenay Lake district and may result in updated VQO classifications.

Dataset

Data file name	dkl_vli_final_30mar07
Version	
Data file description	Established Visual landscape inventory
Date	March 2007
Data format	Shapefile
Quality control	Yes. vli_qc.doc
Data source	Paul Picard, Visual Landscape Inventory Specialist
Date obtained	April 26, 2007
Link to metadata	http://aardvark.gov.bc.ca/apps/metastar/metadataDetail.do?recordUID=4021&recordSet=ISO19115
Data edits	Some areas identified by Peter Rennie, Regional Landscape Forester, as being visually sensitive and currently managed were missing in the initial dataset. Created tsr_vqo attribute and calculated to EVQO where available and RVQC where missed being established. Manual edits according to District direction (see vli_qc.doc).
Data issues	
Reference sources	To be uploaded into LRDW 2007.
Changes since TSR 2	None
Analysis-ready coverage name	vli
Approval	Dale Anderson
Approval date	May 31, 2007

Attribute information

Attribute	Value	Description
TSR_VQO	R	Retention
	PR	Partial retention
	M	Modification

Land base summaries

TSR_VQO	Area (ha)
R	36,454
PR	163,050
M	93,287
Total	292,791

2.2 Other Data

2.2.1 Silviculture records

Introduction

The **RE**porting **S**ilviculture **U**ppdates and **L**and Status **T**racking **S**ystem (RESULTS) information system tracks and reports on silviculture activities from harvest to free growing.

Data on the harvest method and regeneration characteristics of openings were extracted from the data base to provide a base for the volume projection of managed stands.

Background

The RESULTS information system is a business tool of the MFR used to capture and report on silviculture activities. It replaced the Integrated Silviculture Information System (ISIS).

Information on RESULTS can be found at http://psc2.for.gov.bc.ca/RESULTS/HELP/index.htm#Results_Online_Help/Welcome_to_RESULTS/WR_Welcome_to_Results.htm or <http://www.for.gov.bc.ca/his/results/>.

Source

Information from RESULTS was obtained from 2 sources for this analysis. In the first source information was directly obtained from RESULTS spatial layers and aspatial data tables in the LRDW. The second source was a summary of information extracted from the LRDW by Barry Snowden, FAIB in February 2008.

Status

The dataset is regularly updated.

Dataset

Data file name	varied data bases
Version	
Data file description	RESULTS
Date	March 2008
Data format	Shapefile/aspatial data
Quality control	Yes
Data source	LRDW
Date obtained	Various
Link to metadata	http://www.for.gov.bc.ca/his/results/
Data edits	
Data issues	Not all data/attributes complete.
Reference sources	
Changes since TSR 2	Yes
Analysis-ready coverage name	N/A
Approval	Jeff Stone/Barry Snowdon
Approval date	March 27, 2008

2.2.2 Road width inventory**Introduction**

- Road sampling project completed in 2008.
- Resulted in estimated road widths and unproductive areas.

Background

Forsite Consultants Ltd. (Forsite) were contracted to sample road widths in the Kootenay Lake district. Field sampling was completed in late 2007, while data checks and summaries were completed in 2008. Average right-of-way widths were determined for road classes (operational, spur, trail, main) in climate and age stratifications. The output was an estimate of the netdown to the land base due to unproductive roads.

Source

Forsite was contracted to complete this project and provided a data summary in January 2008.

Status

The contractor provided a data summary for the purposes of this data package and subsequent TSR analysis. The final report may provide additional information.

Dataset

Data file name	Road summary for TSR Tembec.xls
Version	
Data file description	Summary of road right-of-way widths, lengths and areas.
Date	January 2008
Data format	Excel spreadsheet
Quality control	Yes
Data source	Tracy Earle, Inventory Forester, Forsite consultants
Date obtained	January 2008
Link to metadata	
Data edits	
Data issues	
Reference sources	
Changes since TSR 2	Road classifications and right-of-way widths differ from TSR2
Analysis-ready coverage name	N/A
Approval	Dale Anderson
Approval date	January 28, 2008

2.3 Administrative, non-forest, and non-productive areas**2.3.1 Land not administered by the Ministry of Forests and Range, or outside the timber supply area****Overview**

- Areas not managed by the BC Forest Service for timber supply may include: parks; ecological reserves; private land; area-based tenures, such as community forests and woodlot licenses; and various special use permit areas.
- New ownership layer created for TSR 3 includes land classifications excluded from the THLB: parks and protected areas; Whitewater CRA; woodlots; private land; WMAs; and Indian Reserves.
- Future changes include the addition of proposed woodlots.
- Changes since TSR 2 include: exclusion of proposed Goal 2 parks protected under the *Land Act* as interim Land Act Reserves (2620 hectares); Whitewater controlled recreation area (CRA) (1314 hectares); new woodlot tenures; and a small portion (400 hectares) of Glacier National Park overlapping the TSA.

Legislation

These areas are excluded from timber harvesting and are not included in the THLB derived in the TSR.

Current practice

Current practice excludes harvesting from areas not administered by the MFR or outside the TSA.

Future considerations

Goals 2 PAS areas as are expected to be established as protected areas and incorporated into the ownership dataset. Proposed tenure changes (woodlots) will also be incorporated once finalized.

Modelling considerations

All areas with a 'tsr_own' value in the ownership dataset are excluded from the THLB. These classifications include: private land; parks; Indian Reserves; woodlots, including the private land component; the Whitewater CRA; and WMAs. Also excluded are Goal 2 PAS and three proposed community forests found in the operating areas dataset. Although not finalized, these tenures are essentially confirmed and will be designated as community forests, thereby removing them from the TSA.

2.3.2 Non-forest, non-productive forest, and non-typed**Overview**

This category includes areas covered by such things as sparse alpine forest, ice, swamps, water, and rock

Legislation

The chief forester must make an AAC determination according to Section 8 of the *Forest Act* on Crown Lands administered by the MFR and available for harvest.

Current practice

It is unlikely harvest would occur within areas identified except where areas are mistyped.

Future considerations

N/A

Modelling considerations

Non-forest and non-productive forest classifications such as water, rock, non-productive brush and non-commercial, do not contribute to the THLB or other management objectives. Stands that are not sufficiently restocked (NSR) are included in the THLB. Indicators of the presence of a productive forest including the British Columbia Land Cover Classification Scheme, site index, a history of harvesting and other VRI attributes are used to classify the land base as productive forest, non-forest or non-productive forest.

2.3.3 Roads, trails and landings

Overview

Roads and right-of-ways do not contribute to the THLB.

A road inventory project was undertaken in 2007/08 to determine average right-of-way widths for each road class.

Legislation

N/A

Current practice

A road width sampling project was recently undertaken in the Kootenay Lake TSA to determine right-of-way widths for each road class. The average non-productive width within climate/age class strata were summarized and provided a total non-productive area attributed to road right-of-ways. Landings were not considered in the analysis.

Future considerations

N/A

Modelling considerations

Based on the evidence found in the road sampling project, a length-weighted average right-of-way width was applied to each road class as shown in the following table.

Road class	Right-of-way width (m)
Main	15.37
Operational	6.98
Spur	5.01
Trail	4.26

The analysis is performed using 100 metre cell raster data format, therefore the areas occupied by roads are too small to remove from the land base spatially. To account for the decrease in productive forest area available for harvest, a percentage of each cell occupied by road is determined and this area is excluded from the THLB derived in the analysis.

The non-productive area associated with future roads must be estimated in order to account for this decrease in productive area after stands are assumed to be harvested for the first time in the analysis.

The average area of cutblocks required for access was estimated to be 4.2%, based on RESULTS data for the 5-year period from December 1, 2002 until December 1, 2007. Future managed stand volumes will be decreased by 4.2% to account for future roads.

2.3.4 CP rail reserves

Overview

- Included for information only at this time.
- Not all reserves are excluded from harvest therefore impacts are unknown.

Legislation

This issue revolves around rights granted under the *Land Act* in order to encourage CP Rail to construct rail lines into the West Kootenay area.

Current practice

Not all reserves are excluded from harvest and are dealt with on a case-by-case basis.

Future considerations

N/A

Modelling considerations

Included in the analysis for information purposes, and to allow further analysis if required.

2.3.5 Rail and Transmission Lines**Overview**

- Rail, transmission and pipe line corridor reductions identical to assumptions in TSR 2.

Legislation

N/A

Current practice

N/A

Future considerations

N/A

Modelling considerations

Feature	Right-of-way width (m)
Transmission lines	30
Pipelines	30
Railways	21

Because the analysis is performed using a 100m cell raster data format, the areas occupied by these features are too small to remove from the land base spatially. To account for the reductions to the current productive forest considered available for harvest, a percent of each cell occupied by these features is determined and will be reduced from the area available for harvest.

2.4 Economic factors**2.4.1 Operability****Overview**

In the chief forester's previous AAC determination, he recommends a thorough review of operability lines, including an assessment of various categories of operability (i.e., based on conventional versus aerial harvesting systems).

The Kootenay Lake district developed the operability assumptions based on input and discussions with licensees and consultants in 2007.

Legislation

There is no legislation related to operability.

Current practice

This dataset reflects the current practice of licensees in the Kootenay Lake TSA.

Future considerations

No expected changes in the near future.

Modelling considerations

Inaccessible/inoperable areas are excluded from THLB; however these areas may still contribute to other management objectives.

2.4.2 Exclusion of specific, geographically defined areas

Overview

- Areas uneconomic to develop.
- A sensitivity analysis of change in the size of THLB will be performed.
- No change since TSR 2.

Legislation

N/A

Current practice

No harvesting is occurring or is expected to occur in these areas.

Future considerations

N/A

Modelling considerations

The following areas are not considered economic to develop and are, therefore, excluded from the timber harvesting land base used in the timber supply analysis:

Area	Planning cell numbers (inclusive)
Hall Creek	2261-2267
East Creek	2221-2240
Houston Creek	2411 and 2414
Laidlaw Creek	2405 and 2406
Geigrich Creek	2205 - 2216

2.4.3 Problem forest types

Overview

- Problem forest types are physically operable stands that exceed low site criteria but are not currently utilized or have marginal merchantability.
- Also included here are sites with low timber growing potential.
- Sites may have low productivity because of inherent site factors (e.g. nutrient availability, exposure, excessive moisture), or because they are not fully occupied by an ecologically adapted, commercial tree species.
- Chief Forester recommended a review of the definition of unmerchantable forest types to ensure that all unmerchantable stands are captured.
- Forest Service staff reviewed problem forest type definitions and made recommendations in Oct 2007.

Legislation

N/A

Current practice

District staff reviewed current practice as described below under *Modelling Considerations*.

Future considerations

N/A

Modelling considerations

The following table describes “problem” forest types in the Kootenay Lake TSA and indicates the percentage of area in each forest type that is unharvestable. In the analysis the resultant area reductions will be fully (100%) excluded from the THLB, however, potential upward pressure on the THLB due to some of these areas contributing will be considered.

Species	Inventory type group	Age class	Percent reduction	CFLB ⁽¹⁾	THLB ⁽²⁾	Rationale for the reduction
Deciduous leading	35(Cottonwood) 36 (AcDeciduous) 38 (DrDeciduous) 39(Mb)	All	100	1,641	560	No applications for harvest within this type.
Deciduous leading	40 (E) 41 (AtConiferous) 42 (AtDeciduous)	All	90	12,530	6,943	Limited applications for harvest within these types. Only the "41" have had any in the past.
White Pine	27	>5	50	2,307	1,606	Very limited amounts of this type.
Hemlock	12 (>80% Hw)	≥9	100	3,104	927	Economics of delivering this type to the mill is questionable. Many of these types are within the proposed OGMA locations
		8	90	1,094	405	Economics of delivering this type to the mill is questionable. Many of these types are within the proposed OGMA locations
Balsam	18 (>80% BI)	>8	100	9,995	729	Economics of delivering this type to the mill is questionable.
Balsam/ Hemlock	19 (Balsam)	>8	80	668	218	Economics of delivering this type to the mill is questionable. There may be locations where, because of typing issues, the actual resultant stand is now Spruce or Cedar leading. Harvesting these types may be economically feasible.
Hemlock/ Deciduous	17 (Hemlock and Deciduous)	>8	100	41	0	Economics of delivering this type to the mill is questionable.
All	Site Index <8meters@50years	-	100	34,354	6,360	Economics of delivering this type to the mill is questionable. As per TSR2 assumptions.
Pine types						See below.

⁽¹⁾ Crown forest land base (excludes area based tenures)

⁽²⁾ Total timber harvesting Land Base (excludes area based tenures)

Low productivity lodgepole pine sites are areas that are not suitable for timber harvesting due to low timber growing potential. These stands have suitable species for timber harvesting but are not expected to contribute to the THLB because they take too long to grow a commercial crop of trees.

In the Kootenay Lake TSA, timber extraction is completed using different harvesting systems depending on the steepness of the site (see table below). Generally on slopes $\geq 40\%$, more expensive ground-based systems or cable-harvesting systems are typically used. On slopes $< 40\%$, conventional ground-based harvesting methods are used. In general, steeper slopes require a higher threshold of timber volume and piece size to be considered economic and this is reflected in a higher minimum site index threshold.

Leading species	Inventory type group	Site index	Slope percent	Percent reduction	Total Crown forest land base (hectares)	Area excluded (hectares)
PI leading	28-31	<10	< 40	100	5,511	346
PI leading	28-31	<12	≥ 40	100	12,455	1,032

2.5 Non-Timber Management Objectives Factors

2.5.1 Terrain stability

Overview

- Terrain stability mapping has been completed for the majority of the forest district.
- In areas without terrain stability mapping, the stability is based on ESA data and percentage slope (based on input from a geomorphologist).

Legislation

FPPR requires any road construction or maintenance activities must be conducted with regard for terrain stability.

Current practice

Terrain stability mapping is used to minimize road construction on or above unstable terrain. Based on these considerations, specific areas are not considered available for timber harvesting. This mapping identifies areas that require detailed terrain stability field assessments.

Future considerations

Terrain stability mapping will continue to be updated and completed for the TSA.

Modelling considerations

Based on the terrain stability class an amount of land base considered unavailable for timber harvesting can be estimated. These estimates are provided based on the opinion of the MFR regional geomorphologist.

Terrain stability class	Reduction percent (%)
U (level "D") and V (level "B") – unstable terrain	90
P (level "D") and IV (level "B") – potentially unstable terrain	30

Some landscape units within the TSA have complete terrain stability mapping while others require unstable and potentially unstable terrain to be derived from surrogate information. Land base reductions in unmapped areas were determined using high soil sensitivity ESA data and steep slopes. ESA 1 (Soils) approximates the unstable slopes (Terrain Stability Classes U/V). The analysis will exclude 100% of areas designated unstable and considerations of potential upward pressure due to the inclusion of some of these areas will be considered. Additionally, slopes greater than 70% approximate potentially unstable slopes (Terrain Stability Classes P/IV). The analysis is performed by excluding 100% of a random 30% sample of the resultant polygons considered potentially unstable.

2.5.2 Community/domestic watersheds

Overview

In the rationale for the previous AAC determination, the chief forester instructed district and regional staff to finalize watershed guidelines.

Legislation

Community watersheds designated under the *FPC* were grand-parented under *FRPA*. The minister responsible for the *Land Act* may designate an area as a community watershed by means of Government Actions Regulation (GAR) order. Community watersheds are established to protect water that is used for human consumption. The minister responsible for the *Wildlife Act* may establish water quality objectives for a community watershed.

Current practice

The KBLUP IS provides guidance on forestry activities taking place in domestic watersheds. Provision is made for consultation with water licensees, contingency planning, and professional field assessments. Priority is placed on the protection of water quality, quantity and timing of flow.

Future considerations

None expected.

Modelling considerations

Harvested stands are assumed to have partially recovered hydrological function at 6 m in height. Fully hydrologic recovery is attained when stands reach 9 m in height.

Forest district staff estimated the maximum non-greened-up disturbance percentages that represent the application of watershed constraints following hydrologic assessments. These estimates are applied consistently across different watershed types in modelling.

Zone or group	Green-up height (m)	Green-up maximum allowable disturbance %	Land base constraints apply to:
Domestic watersheds class 1	6	25	Total Crown area
Domestic watersheds class 2	6	25	Total Crown area
Domestic watersheds class 3	6	25	Total Crown area
Community watershed	6	25	Total Crown area

2.5.3 Riparian management areas

Overview

- Input received during the previous TSR indicated that many of the smaller streams were not represented in the analysis. By adding intermittent and minor streams from the TRIM dataset, the uncertainty around this factor has been reduced.
- However, the addition of small TRIM streams may over estimate the area occupied by these features where they are also represented in the TSR 2 dataset.
- The basal area retention requirements in the riparian management zone (RMZ) are based on those in the *FPC Riparian Area Management Guidebook*. These requirements are higher than retention requirements specified in the FPPR.

Legislation

Sections 8, 47 to 52 of the FPPR require the development strategies that ensure the physical integrity of riparian areas. Riparian areas occur around lakes, wetlands and streams.

Current practice

Current practice in the TSA is consistent with the FPPR guidelines.

Future considerations

Evaluation of licensee's post-FSP performance may indicate that retention requirements on S6 streams are largely being met by the deployment of wildlife tree requirements.

Modelling considerations

In the analysis, riparian area management will be accounted for by excluding area from the THLB. A riparian area consists of a riparian reserve zone (RRZ), where harvesting does not occur, and a riparian management zone (RMZ). Harvesting may occur in RMZs provided sufficient tree cover, measured as basal area, is retained. The RMZ area is calculated by multiplying the RMZ width by the percentage of basal area retention. Where the riparian features are too small to spatially exclude entire resultant polygons from the THLB, a percentage of the polygon area occupied by riparian features is calculated and removed from THLB areas. The following table describes the RRZ, RMZ and basal area retention in the RMZ used to derive the total effective area reserve for each riparian class.

Riparian class	Riparian reserve zone ⁽¹⁾ (metres)	Riparian management zone ⁽¹⁾ (metres)	Basal area retention in RMZ ⁽²⁾ (%)	Effective total area reserve (metres)
S1	50	20	50	60
S2	30	20	50	40
S3	20	20	50	30
S4	0	30	25	7.5
S5	0	30	25	7.5
S6	0	20	5	1
L1-A	0	0	25	0
L1-B	10	0	25	10
L3	0	30	25	7.5
L4	0	30	25	7.5
L9	0	0	0	0
W1	10	40	25	20
W3	0	30	25	7.5
W4	0	30	25	7.5

⁽¹⁾ RRZ and RMZ widths based on guidance in *FPPR*.

⁽²⁾ Basal area retention based on guidance in *FPC Riparian Area Management Guidebook*.

2.5.4 Protected areas strategy

2.5.4.1 Parks and protected areas

Overview

- Parks and protected areas are not included in THLB but can contribute where applicable to other management objectives.

Legislation

The legal framework for protecting these areas includes the:

- *Protected Areas of British Columbia Act*;
- *Park Act*;
- *Ecological Reserve Act*; and
- *Environment and Land Use Act*.

Current practice

Harvesting does not take place in these areas.

Future considerations

N/A

Modelling considerations

Protected areas are excluded from the THLB.

2.5.4.2 Goal 2 protected areas

Overview

- Areas identified for Goal 2 protected area status in 2000 have interim protection as reserves established under the *Land Act*.
- These areas will likely be established as protected areas under the *Park Act*.
- Current practice excludes development in these areas.

Legislation

These areas will likely be established under the *Park Act* as Class A, Goal 2 protected areas. In the interim, the majority of the areas have been designated as reserves under the *Land Act*.

Current practice

Given that these areas will likely be designated as protected areas before the next AAC decision, current practice avoids harvesting in these areas.

Future considerations

Following local government input and First Nations consultation, the Regional Interagency Technical Team will revisit the list with the Kootenay Boundary Management Committee (KBMC) and make a recommendation to government on designation of these areas under the *Park Act*.

Modelling considerations

Since these areas have interim protection under the *Land Act* and current practice excludes harvesting, they will be excluded from the THLB.

2.5.5 Cultural heritage resources and values

Overview

Archaeological overview assessment mapping was completed for the Kootenay Lake TSA between 1996 and 2007. No significant timber availability impacts have been noted with regard to archaeological sites.

Forest district staff do not anticipate significant additional cultural heritage area exclusions, with the exception of the Dewdney Trail. At this time the Dewdney Trail is the only heritage site that has been designated under the *Heritage Conservation Act*.

Legislation

Heritage sites may be designated under the *Heritage Conservation Act*.

Current practice

Current practice excludes harvesting from the Dewdney Trail.

Future considerations

N/A

Modelling considerations

According to management guidelines this area will be excluded from timber harvesting.

2.5.6 Integrated resources management zones

Overview

Integrated resource management zones are areas where harvesting operations are allowed unless otherwise constrained by non-timber resource objectives. Specifications for the maximum allowable proportion of a forested landscape that does not meet green-up requirements are used to approximate the timber supply impacts of adjacency restrictions.

Legislation

Rules for cutblock adjacency are described in the *FPPR*.

Current practice

The District operates according to a patch size management strategy which does not apply strict adjacency constraints. However, this does not mean that there is no timber supply impact due to harvest levels and adjacency in an area.

Future considerations

N/A

Modelling considerations

The maximum proportion of an area that does not meet green-up condition — trees at least two metres in height — will be assumed for this analysis, not to exceed 33%.

2.5.7 Visual resources

Overview

- Scenic areas with visual quality objectives, established in 1999 cover approximately 292 791 hectares or 24% of the Kootenay Lake TSA.
- Forest health issues are increasing and may affect disturbance levels and/or objectives.
- New visual landscape inventory is expected soon, but is not yet underway.
- Base case reflects an estimation of disturbance within permissible levels for established objectives.
- Sensitivity analysis will reflect impacts of higher green-up maximum allowable disturbance levels.

Legislation

Scenic areas in the Kootenay Lake Forest District were designated by the district manager, effective July 1999. Scenic area designation has been continued, according to Section 17 GAR.

Current practice

In the Kootenay Lake TSA visual quality objectives of retention, partial retention, and modification have been established. For established VQOs, licensees are designing harvest to mimic natural landforms, rather than attempting to hide logging. However, the visual management does result in a reduction of available timber. For modelling purposes, it is assumed that each VQO will effectively restrict the amount of harvesting that can occur until the harvested area is visually greened-up.

Future considerations

An updated visual landscape inventory is currently underway in the Kootenay Lake TSA with plans for completion in 2007 and will subsequently be used to establish new VQOs. The following is an expected area summary for the new inventory, which includes an overall decrease in visually sensitive areas by approximately 23 830 hectares.

VQO	Area (hectares)
R	18,612
PR	193,601
M	56,748
Total	268,961

Modelling considerations

The three visual quality objectives (VQOs) to be modelled are retention (R), partial retention (PR), and modification (M). Maximum allowable disturbance percentages for each VQO will be modelled as per the following table.

VQO	Green-up maximum allowable disturbance (%)	
	Base case	Sensitivity analysis
R	5	10
PR	15	20
M	25	30

Visually effective green-up (VEG) requirements vary by slope class as per the following table.

Table 8. Visual effective green-up (VEG) heights by slope class

Slope (%)	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-50	51-55	56-60	60+
Tree Height (m)	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5

For the purposes of the analysis, an area-weighted mean slope was calculated for each VQO of each landscape unit (LU) to determine the area weighted green-up height.

Table 9. Area-weighted mean slope and average green-up height for each VQO by LU

LU	VQO	Mean slope (%)	Green-up height (m)
K01	R	50	7
	PR	37	6.5
	M	22	5
K02	R	50	7
	PR	31	6
	M	33	6
K03	R	8	3.5
	PR	26	5.5
	M	23	5
K04	PR	43	7
	M	46	7
K05	R	30	5.5
	PR	25	5
	M	30	5.5
K06	PR	27	5.5
	M	42	7
K07	R	53	7.5
	PR	47	7
	M	51	7.5
K08	R	40	6.5
	PR	38	6.5
	M	58	8
K09	R	38	6.5
	PR	38	6.5
	M	41	7
K10	R	40	6.5
	PR	41	7
	M	34	6
K11	R	30	5.5
	PR	37	6.5
	M	36	6.5
K12	R	27	5.5
	PR	41	7
	M	42	7
K13	R	8	3.5
	PR	17	4.5
	M	0	3
K14	R	52	7.5
	PR	38	6.5
	M	59	8
K15	R	25	5
	PR	58	8

continued

Table 9. Area weighted mean slope and average green-up height for each VQO by LU (concluded)

LU	VQO	Mean slope (%)	Green-up height (m)
K16	R	46	7
	PR	50	7
	M	38	6.5
K17	PR	34	6
	M	37	6.5
K18	PR	30	5.5
	M	42	7
K20	PR	61	8.5
	M	57	8
K25	R	54	7.5
	PR	38	6.5
	M	17	4.5
K26	PR	42	7
	M	50	7

2.5.8 Wildlife and other species at risk

2.5.8.1 Ungulate winter range

Overview

- Current practice implements the general wildlife measures under the ungulate winter range (UWR) order U-4-001 under GAR.
- Areas with suitable snow interception cover and foraging areas are established for mule deer (*Odocoileus hemionius*), Rocky Mountain elk (*Cervus elaphus nelsoni*) and moose (*Alces alces*).
- UWR is located in various low elevation areas (generally below 1200 meters) throughout the TSA and leading tree species were identified by general geographic areas.
- Since TSR 2, areas have been reallocated from UWR to accommodate Caribou management.

Legislation

The UWR order and associated general wildlife measures (GWM) are issued under the authority of sections 9(2) and 12(1) of the GAR.

Current practice

Current practices among the licensees in the Kootenay Lake TSA are consistent with the GWMs in the UWR order. According to Higher Level Plan Order Monitoring Reports for UWR, created in September 2007, UWR minimum forest cover retention requirements are being met for the vast majority of management units, with only 14 units showing an area deficit. There are 3 landscape units which overall do not meet minimum retention requirements. Maximum disturbance of 40% < 21 years is being met in all but 6 management units.

Future considerations

N/A

Modelling considerations

As per the GAR order for UWR 4-001, private and federal land, parks and protected areas, and broadleaf/deciduous-leading stands (Inventory Type Groups 35-42) are excluded from the application of the GWMs and do not contribute to meeting the forest retention requirements for UWR. All other Crown forest stands within the UWR which are inoperable or otherwise constrained from timber harvesting can contribute to meeting the GWM objectives.

According to the GAR order, the GWMs state that forest practices carried out within the boundaries of UWR must not result in more than 40% of the Crown forest land base of any management unit being less than 21 years of age. Also, forest practices must result in retention of forest cover that is not less than the forest cover retention requirements that apply as a percentage of the total Crown vegetated land base within each management unit as shown in the following table:

Ungulate winter range attribute	Priority ungulate species	BEC subzones	Minimum forest cover area	Forest characteristics		Management units
				Age (years)	Evergreen Crown closure	
Snow interception cover	Mule deer	ICHdw, MSdk	30%	≥81	≥40%	91, 99, 105, 109, 118, 122, 123, 129, 132, 136, 141, 144, 145, 151, 164, 178, 180, 187, 190, 193, 206, 207, 216, 222, 223, 228, 229, 239, 241, 305
		ICHmw, ICHwk	40%	≥101	≥40%	58, 61, 64, 67, 68, 74, 80, 85, 87, 88, 92, 106, 113, 349, 352, 354
	Elk	ICHmw	30%	≥101	≥40%	69, 71, 75, 79, 350, 351
	Moose [mod. snow]	All subzones	20%	≥61	≥40%	55, 276, 282, 286, 288, 294, 296, 301, 303
Forage area	All species	All subzones	10%	≥81	Dispersed or patches	Where identified in Schedule A*
Ungulate winter range attribute	Priority ungulate species	BEC Subzones	Maximum disturbance area	Age (years)		Management units
All areas	All species	All subzones	40%	<21		All

* Forest cover requirements prescribed for forage areas are determined from the sum of all forage areas within the ungulate winter range management unit. When spatially applied, forest cover distribution can be disproportionate among these forage areas.

2.5.8.2 Identified wildlife management strategy

Overview

- 23 WHAs cover approximately 180 hectares of the Kootenay Lake TSA.
- Species include western screech owl, Rocky Mountain tailed frog and other sensitive species.
- Other identified wildlife that would most likely impact timber supply are bull trout, northern goshawk, fisher and grizzly bear.
- Government has recognised that the implementation of wildlife habitat areas (WHA) will have up to a 1% maximum impact on the THLB.

Legislation

The authority to establish WHAs and associated objectives is enabled through Sections 9 and 10 of the *GAR*. This authority has been delegated by the Minister of Environment to the Deputy Minister of Environment.

Current practice

Current practices are consistent with the general wildlife measures established by WHA orders.

Future considerations

N/A

Modelling considerations

Constraints on harvesting practices within WHAs range from complete exclusion from the THLB to a range of GWMs that maintain forest qualities or structure essential for the habitat of Identified Wildlife. Due to their small spatial scale and limited impacts on the THLB, however, the GWMs associated with the WHAs were not modelled explicitly in the analysis. Instead, the MFR maximum reduction of 1% of the THLB area will be applied for identified wildlife.

2.5.8.3 Wildlife management areas

Overview

- The Midge Creek WMA was established by Order-in-Council in April 1998.
 - While there is currently no management plan in place, conservation efforts focus on both mountain caribou and grizzly bear habitats.
 - In TSR 2, approximately 4476 hectares of the total area (almost 15 000 hectares) was included in the THLB.
- The Creston Valley wildlife management area was established in 1968 for the purpose of wildlife conservation, management and development and, in particular, as a waterfowl management area.
 - The WMA is home to over 265 bird species, 50 mammal species, 30 fish, reptile and amphibian species, thousands of invertebrate and plant species.
 - Creston Valley WMA consists primarily of wetland complexes and has very little area suitable for harvesting.

Legislation

The Ministry of Environment is responsible for establishing WMAs under the *Wildlife Act* (*Section 4*) by Order-in-Council.

Current practice

Current management largely excludes harvesting operations from the Midge Creek WMA. Creston Valley WMA is excluded from harvesting.

Future considerations

N/A

Modelling considerations

Both the Midge Creek WMA and the Creston Valley WMA are excluded from the THLB.

2.5.8.4 Caribou**Overview**

- KBHLP Order Variance 4 issued March 2005 included new habitat management zones, strategies and practice requirements.
- Government announced its endorsement of the Mountain Caribou Recovery Implementation Plan in October 2007 which includes financial commitments to support the recovery and protection of habitat and changes to activity levels within habitat areas.

Legislation

KBHLP Order was established as a higher level plan pursuant to Sections 3(1), 3(2), and 9.1 of the *FPC*. Variance 4 of the order was implemented in March 2005 and replaces Objective 3 (Caribou) and any components of the order or variances which pertain to Objective 3.

Current practice

Implementation of this order is guided by the contents of the KBHLP Order Variance 4 Implementation Policy and associated reports. The Implementation Policy guides forest activities in mapped caribou habitat by providing strategies and best management practices.

Future considerations

Government announced its endorsement of the Mountain Caribou Recovery Implementation Plan in October 2007, which includes financial commitments to support the recovery and protection of habitat and changes to activity levels within habitat areas.

Modelling considerations

Caribou management zone	Forest leading species ⁽¹⁾	Minimum forest retention area ⁽²⁾	Forest age ⁽³⁾	Exceptions
1	All	100%	All	Previously harvested stands require future decisions.
2	S/B/PA/La/C/H	100%	All	
3	S/B/Pa/C/H ⁽⁴⁾	70%	≥ 61	
		40%	≥ 141	
4	All	33%	≥ 81	Stands may be partial cut to maintain 250-800 sph and connect cross valley.
5	All	≥ 70%	≥ 141	
6	All	≥ 70%	≥ 141	
7	All	≥ 40%	≥ 141	
		≥ 10% (1/4 of the 40% above)	251	
8	All	≥ 30%	≥ 141	
		≥ 10% (1/3 of the 30% above)	251	
		Plus 20% partial cut (with ≥ 70% basal area maintained)	≥ 121	

⁽¹⁾ Forest leading species is the first species listed in the forest inventory type label unless the leading species is PI and it makes up less than 50% of the stand, in which case the second-leading species shall be considered the forest leading species for the purposes of this table.

⁽²⁾ Forest retention requirements are determined by applying percentages to the Crown forested land base within the mapped caribou habitat of each individual landscape unit. Crown forested land base excludes provincial parks, protected areas, ecological reserves and Federal parks. The resultant forest retention requirements are applied to slopes less than 80%.

⁽³⁾ Forest stands ages will be based on the best available information.

⁽⁴⁾ The intent is to allow a maximum of 30% of these stands to be harvested every 80 years.

2.5.9 Landscape biodiversity

Overview

During the previous timber supply review many landscape units did not meet seral stage requirements for old growth.

The Kootenay Lake Forest District was used as a pilot during the development of the *Landscape Unit Planning Guide* (LUPG) in 1999-2000. The LUPG was vague regarding measures for landscape units did not meet their old-growth retention targets. District staff developed a process to identify mature stands that could be reserved from harvesting and allowed to become old growth over time.

For this analysis, seral stage retention targets by biogeoclimatic ecosystem classification (BEC) unit, natural disturbance type and BEO were established by the KBHLP Order.

- Candidate old-growth management areas (OGMAs) have been identified and current practice is to avoid new development in these areas. There are circumstances where limited harvesting can occur, but for analysis purposes these areas are considered unavailable for harvesting.
- Candidate OGMAs cover 256 959 hectares, however, only 112 521 hectares occur within the crown productive forest land base.

Legislation

KBHLP Order established resource management zones and resource management zone objectives, including landscape unit Biodiversity Emphasis Objectives, within the area covered by the *KBLUP* as a higher level plan pursuant to Sections 3(1), 3(2), and 9.1 of the *FPC*.

For the purposes of the *FRPA*, the minister may establish, by order, objectives for the use and management of crown land or resources. The Minister has authority under the *Land Act* to establish objectives (e.g. old-growth management areas), specifically section 93.4 – 93.8 of the *Land Act*.

Current practice

Most areas have no mature stand retention requirements, while old seral stage targets are met by draft OGMAs. Current practice avoids new development in draft OGMAs; however, some limited harvesting may occur (for example, removal of lodgepole pine stands to address the mountain pine beetle infestation).

Future considerations

It is anticipated that these candidate OGMAs will be largely avoided by logging companies in the foreseeable future, and that introduction of a range of harvest patch sizes will provide future options for old-growth forest.

Modelling considerations

The *KBHLP* describes mature and old forest retention requirements based on BEO assignments, natural disturbance type, and LU-BEC variant combinations (see table below).

Table 10. BEC/NDT seral stage requirements

	NDT	Biogeoclimatic zone	Minimum age (years)	Biodiversity emphasis option (% of forest area within the landscape unit)		
				Low	Intermediate	High
Mature + Old*	1	ICH	>100	>17	>34	>51
		ESSF	>120	>19	>36	>54
	2	ICH	>100	>15	>31	>46
		ESSF	>120	>14	>28	>42
	3	ICH	>100	>14	>23	>34
		ESSF	>120	>14	>23	>34
4	ICH	>100	>17	>34	>51	
	ESSF	>120	>14	>23	>34	
Old	1	ICH	>250	>4.3	>13	>19
		ESSF	>250	>6.3	>19	>28
	2	ICH	>250	>3	>9	>13
		ESSF	>250	>3	>9	>13
	3	ICH	>140	>4.7	>14	>21
		ESSF	>140	>4.7	>14	>21
	4	ICH	>250	>4.3	>13	>19

* Mature managed only the following areas:

Landscape unit	BEC subzone/variant	BEO
K05	ICHdw	Intermediate
K06	ICHdw	Intermediate
K08	ICHdw	Intermediate
K10	ICHdw	Intermediate
K12	ICHdw	Intermediate
K25	ICHdw	Intermediate
K17	ESSFwc4	High
	ICHmw2	High
	ICHwk1	High
K18	ESSFwc4	High
	ICHmw2	High
	ICHwk1	High
K23	ICHwk1	High

OGMAs are excluded from the THLB. Non-THLB, including established parks can contribute to landscape-level biodiversity objectives. In the analysis, inoperable stands are assumed to age.

2.5.10 Stand-level biodiversity — wildlife tree retention

Overview

- Wildlife tree patches (WTPs) are the primary method used by major licensees to maintain mature stand structural elements over time.
- Fewer than 10% of these areas are two hectares or greater in size (based on professional judgment of Kootenay Lake Forest District staff-TSR 2).

Legislation

Under the *FPC*, guidance on stand structure retention was provided in the *Biodiversity Guidebook* and through direction from the district manager. Under *FRPA*, the objective for stand-level biodiversity is simply “to retain wildlife trees” as stated in *FPPR (Sec 9.1)*. Licensees must state how they will meet the objective for stand-level biodiversity in the FSP.

Current practice

Licensees routinely identify WTPs in their development plans. They may also leave residual stand structure for other reasons, such as minimizing the visual impact of harvesting. Licensees have the option to use the default wildlife tree retention targets as defined under the *FPC* or they may perform analyses to determine targets under *FRPA* using newer BEC data.

Future considerations

N/A

Modelling considerations

For the purpose of this analysis, a wildlife tree retention (WTR) percentage for each cutblock was determined based on how the licensee with the largest proportion of operating area within an LU addressed landscape-level biodiversity in their FSP.

The following table identifies the target cutblock-level WTR percentage for each cutblock by landscape unit for each BEC variant. This table was developed based on the professional judgment of district staff and identifies the representative licensee for each LU and which BEC data is used to apply the retention assumptions. Using this table and the timber harvesting land base within each landscape unit variant combination, a TSA area-weighted reduction of 5.1% was calculated.

Landscape unit	Representative licensee	Old/new BEC	BEC subzone/variant	WTR (% of cutblock area)
K1	JHH	Old	ESSFwc4	7
			ICHmw2	3
			ICH dw	1
			ICHxw	0
			At-p	0
K2	Tembec	New	ESSFdm1	4.7
			ICHdm	5.8
			ICHdw	6.1
K3	BCTS/Tembec	New	ESSFdm1	7.6
			ICHdm	7.9
			ICHdw1	6.5
			ICHmk1	9.8
			ICHmw2	8.3
K4	Private	Old	ESSFwc4	9
			ICHmw2	5
			ICHdw	0
			ICHxw	0
			At-p	0
K5	Tembec	New	ESSFdm1	6.2
			ESSFdmw	4.5
			ICHdm	6.5
			ICHdw1	6.4
K06	Tembec/BCTS	New	ESSFdm1	4.3
			ESSFdmw	1.0
			ICHdw1	3.8
			ICHdm	3.5
K07	JHH	Old	ESSFwc4	1
			ICHmw2	3
			ICHdw	3
			AT-p	0
K08	Wynndel	Old	ESSFwm	5
			ICHmw2	7
			ICHdw	5
			ICHxw	0
			At-p	0
K09	Atco=Kal	Old	ESSFwc4	1
			ICHmw2	3
			ICHdw	3
			AT-p	0
K10	BCTS	New	ESSFwc1	1.0
			ESSFwc4	1.8
			ESSFwcw	1.0
			ICHdw1	6.6
			ICHmw2	5.4
K11	Atco=Kal	Old	ESSFwc4	5
			ICHmw2	7
			ICHdw	7
			At-p	0

Landscape unit	Representative licensee	Old/new BEC	BEC subzone/variant	WTR (% of cutblock area)
K12	BCTS	New	ESSFwc1	4.3
			ESSFwc4	1.1
			ESSFwcw	1.0
			ICHmw2	7.3
			ICHdw1	8.5
			ICHmk1	3.2
K14	Wynndel	Old	ESSFwm	0
			ICHmw2	3
			ICHdw	5
			At-p	0
K15	Park	Old	ESSFwm	0
			ICHmw2	0
			ICHdw	0
			At-p	0
K16	BCTS	New	ESSFwm	1.0
			ESSFwmw	1.0
			ICHmw2	1.1
			ICHdw1	5.8
K17	BCTS	New	ESSFwc1	3.9
			ESSFwc4	1.0
			ESSFwcw	1.0
			ICHmw2	9.4
			ICHwk1	4.8
K18	MCC	Old	ESSFwc4	1
			ICHwk1	5
			ICHmw2	5
			At-p	0
K20	BCTS	New	ESSFwm	1.0
			ESSFwcw	1.0
			ICHwk1	5.2
			ICHmw2	6.0

Landscape unit	Representative licensee	Old/new BEC	BEC subzone/variant	WTR (% of cutblock area)
K21	MCC	Old	ESSFwm	1
			ICHwk1	7
			ICHmw2	1
			ESSFdk	0
			At-p	0
K22	MCC	Old	ESSFwm	3
			ESSFwc4	0
			ICHwk1	3
			ICHmw2	1
			At-p	0
K23	BCTS	New	ESSFwc1	1.5
			ESSFwc4	1.0
			ESSFwcw	1.0
			ICHwk1	2.3
K24	MCC	Old	ESSFwc4	3
			ESSFwm	0
			ICHwk1	1
K25	Wynndel	Old	ESSFwm	3
			ICHmw2	3
			ICHdw	3
			ICHmw	1
			At-p	3
K026	BCTS	New	ESSFwc1	6.0
			ESSFwc4	2.7
			ESSFwcw	1.0
			ICHmw2	5.9
			ICHwk1	5.0

3.0 Analysis and Modelling Procedures

3.1 Timber supply model

All analyses for this timber supply review will be undertaken using the Spatially Explicit Landscape Event Simulator (SELES). SELES is a general tool for building models of landscape dynamics. It is comprised of a modelling language to build spatio-temporal models and a platform on which to run the models. The SELES developer has built a spatial timber supply model (STSM) that has been used to support many land base decisions in BC, including the recent Morice TSA timber supply review. STSM is a spatial, raster-based model that includes features to project stand development over time using growth and yield models, set target harvest levels within a set of land base constraints or objectives (i.e., biodiversity objectives), and track output indicators of those parameters.

3.2 Data formats

All data layers have been converted to ArcInfo coverage data format and projected to Albers Equal Area Conic NAD 83 projection. All datasets undergo quality control procedures to ensure quality and consistency and to reduce errors.

For the analysis, a raster-based data format is required. All input datasets are converted to GRASS raster format using a one hectare (100 m by 100 m) cell size and based on the provincial DEM grid used by Hectares BC (<http://www.hectaresbc.org/trac>).

3.3 Timber harvesting land base determination

Land classification	Reference section	Crown productive forest (ha)	THLB (ha)
Total Area			1,240,843
Not administered by the province of BC ¹	2.3.1		196,243
Non-forest/Non-productive	2.3.2		473,157
Crown Productive Forest			571,443
Not administered by the MFR for timber supply ²	2.5.4	111,437	111,437
Old growth management areas	2.5.9	112,521	63,190
Inoperable areas	2.4.1	232,850	120,781
Uneconomic areas	2.4.2	7,979	1,715
Low timber productivity	2.4.3	34,354	6,360
Problem forest types	2.4.3	49,346	12,766
Caribou	2.5.8.4	40,002	6,611
Sensitive terrain areas	2.5.1	59,307	16,537
Riparian areas	2.5.3	22,413	9,618
Existing roads, trails and landings	2.3.3	3,825	2,888
Railways and transmission lines	2.3.5	370	216
Total reductions			352,118
Current timber harvesting land base			219,325

¹ Includes areas under federal government jurisdiction (Indian Reserves, National Parks), private land, woodlots and community forests.

² Includes areas managed by other Crown agencies (provincial parks and protected areas, wildlife management areas, controlled recreation areas, etc).

4.0 Regeneration and Growth and Yield

4.1 General considerations

Stand level estimates of timber volume over time are required for modelling timber supply. These estimates require an understanding of the current and future stand condition and the subsequent growth and yield. In this section, the regeneration of stands upon harvest is discussed and the modelling of growth and yield. Forest inventory is discussed in a separate section.

Analysis units (AUs) group stands of similar characteristics for regeneration and growth and yield assumptions. Analysis unit numbering for managed stands is a sequence of codes representing four stand characteristics. The first digit reflects the stand managed status (E= existing managed, F=future managed); the second digit the species group (FD, CH, BS, PI); the third character the site index class (G='>20', M='14-20', P='<14'); and the fourth character the biogeoclimatic zone (ICH, ESSF). For example E-FD-G-ICH would be an existing managed stand for FD with site index >20m in the ICH. See section 4.4 *Growth and Yield Modelling* for a definition and description of all analysis units.

4.2 Regeneration

Current practice

Major licensees and timber sales managers are required to establish a free-growing stand (or retain a stocked stand) on harvested areas under the FRPA. The applicable stocking standards must be noted within approved FSPs.

Information sources

To determine current regeneration practices of regeneration, the MFR silviculture data base (RESULTS) was summarized for the Kootenay Lake TSA to identify the species composition and density for stands that had been clearcut harvested. This information is used to generate stand volume tables for previously harvested stands and is generalized for future stands. Future stand regeneration assumptions are based on information from RESULTS and staff professional opinion, and the standards identified in Forest Stewardship Plans. The RESULTS summary was completed by Barry Snowdon, MFR FAIB and summarizes data from 1987.

The RESULTS data base was also queried to provide area information on partially cut stands but could not be used to generate regeneration information.

In the timber supply analysis report for the previous determination summaries from silviculture records (MLSIS and ISIS) for a 5-year period were the basis of describing species composition and initial density. Regeneration delays were also investigated and reported in *Reichenback, G. 1996. Regeneration delay validation and effect on allowable cut in the Nelson Region MOF Technical Report MIT-004.*

Modelling

Species composition, regeneration method, initial density, genetic gain and regeneration delay information is used to develop future stand volumes using the growth and yield model TIPSYS. Stands were considered to be managed if the stand was clearcut after 1987 when basic silviculture requirements became legislated. In the analysis, 2 types of managed clearcut stands are recognized: existing managed and future managed. Existing managed stands are those stands harvested after 1987 up to the most recent harvest update identified in the base case scenario.

Regeneration information is based on an area weighted summary of the RESULTS data base by defined analysis units for openings harvested since 1987. Future stands are those stands that are harvested by the routines within the model. Regeneration information is based on the area weighted summary of the RESULTS data base by defined analysis units for openings harvested since 1997 with minor adjustments by ministry staff.

Yield tables for partially cut stands are assumed to be 70% of the VDYP based table. Regeneration is not specifically modelled for partially cut stands.

Species composition and density (stems per hectare) of single layered stands harvested since 1987 used as regeneration input for existing managed stands

Area weighted mean species composition (percent)									
Analysis unit	Fd	Lw	PI	Hw	Cw	Sw	B	Dec	Mean density (stems per ha)
E-FD-G-ICH	33	19	21	4	5	4	2	13	1181
E-FD-G-ESSF	2	11	30	0	4	36	10	8	1048
E-FD-M-ICH	22	22	29	4	5	5	4	10	1064
E-FD-M-ESSF	0	4	12	4	1	43	36	0	1121
E-FD-P-ICH	25	20	24	5	6	7	1	13	1056
E-FD-P-ESSF	0	0	0	10	10	40	40	0	1156
E-CH-G-ICH	25	12	7	15	14	19	0	8	1140
E-CH-G-ESSF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
E-CH-M-ICH	22	10	11	11	11	26	1	8	1142
E-CH-M-ESSF	0	1	34	7	8	30	20	0	944
E-CH-P-ICH	15	12	10	9	11	36	2	5	1129
E-CH-P-ESSF	0	25	27	4	4	29	11	0	1264
E-BS-G-ICH	0	5	20	4	1	62	3	5	1027
E-BS-G-ESSF	0	1	24	0	2	48	25	0	1064
E-BS-M-ICH	1	23	34	6	2	25	8	0	1064
E-BS-M-ESSF	0	1	20	3	2	53	20	0	1093
E-BS-P-ICH	1	29	46	4	3	9	8	0	1090
E-BS-P-ESSF	0	0	20	1	0	59	20	0	1063
E-PI-G-ICH	25	22	39	1	3	3	2	5	1078
E-PI-G-ESSF	0	0	48	0	0	18	33	0	1121
E-PI-M-ICH	6	23	54	1	1	4	4	7	1087
E-PI-M-ESSF	0	1	46	0	0	26	26	0	1089
E-PI-P-ICH	4	25	54	0	2	7	6	1	1093
E-PI-P-ESSF	0	2	42	0	1	29	26	0	1096

Species composition and density (stems per hectare) of single layered stands harvested since 1997 used as regeneration input for future managed stands

Area weighted mean species composition (percent)									
Analysis unit	Fd	Lw	PI	Hw	Cw	Sw	B	Dec	Mean density (stems per ha)
F-FD-G-ICH	17	31	30	0	7	4	5	6	1114
F-FD-G-ESSF	0	0	35	0	9	55	0	0	1305
F-FD-M-ICH	13	32	35	1	6	3	5	6	1121
F-FD-M-ESSF	0	10	26	0	1	60	3	0	1159
F-FD-P-ICH	28	41	18	1	1	1	0	9	1262
F-FD-P-ESSF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F-CH-G-ICH	19	17	18	1	14	25	0	7	1318
F-CH-G-ESSF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F-CH-M-ICH	15	15	24	3	13	27	2	1	1133
F-CH-M-ESSF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F-CH-P-ICH	10	24	12	3	9	41	0	1	1220
F-CH-P-ESSF	0	38	27	2	2	19	12	0	1248
F-BS-G-ICH	0	5	34	0	0	48	14	0	1001
F-BS-G-ESSF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F-BS-M-ICH	20	70	10	0	0	0	0	0	1168
F-BS-M-ESSF	2	2	16	0	0	68	12	0	1262
F-BS-P-ICH	4	21	13	16	11	18	17	0	1118
F-BS-P-ESSF	0	1	14	0	0	70	14	0	1112
F-PI-G-ICH	13	40	37	0	0	7	2	2	1161
F-PI-G-ESSF	1	3	28	0	0	34	35	0	1076
F-PI-M-ICH	8	35	44	0	1	2	3	6	1125
F-PI-M-ESSF	1	5	51	0	0	23	20	0	1086
F-PI-P-ICH	0	38	57	0	4	0	1	0	1089
F-PI-P-ESSF	0	8	55	0	0	21	16	0	1159

4.3 Genetic gain

Current practice

FRPA requires use of Class “A” seed from tree improvement programs where it exists. The analysis utilized the most current genetic gain information available from the MFR Research Branch and the Forest Genetics Council.

Seed planning units (SPUs) are the organizational units that form the basis for breeding and seed production planning carried out by the Forest Genetics Council and the Tree Improvement Branch of the MFR. SPUs are polygon features that geographically delineate the extent of biologically feasible seedling use for stock originating from specific seed orchards throughout the province. Each SPU identifies the area throughout which seedlings of a given species originating from orchards within specific regions of the province may be used in regeneration.

All genetic gains are geo-referenced based on MFR provincial seed planning zones (SPZ) and SPUs. The following table lists the applicable SPUs in the Kootenay Lake TSA.

Planted species	Genetic class "A" seed planning zone	Seed planning unit	Elevation band
Douglas-fir	Nelson (NE)	Fdi NE High	> 1000 m
		Fdi NE Low	< 1000 m
Western Larch	Nelson (NE)	Lw NE High	1200 – 1800 m
		Lw NE Low	< 1300 m
Lodgepole pine	East Kootenay (EK)	Pli EK High	> 1500 m
	Nelson (NE)	Pli NE High	> 1400 m
White pine	Kootenay Quesnel (KQ)	Pw KQ All	All
		Spruce	Nelson (NE)
Spruce	Nelson (NE)	Sx NE Mid	1000 – 1500 m
		Sx NE Low	< 1000 m

The following table provides the published genetic gains and seed availability in both the short- and long-term for the applicable SPUs found in the Kootenay Lake TSA.

Planted species	Seed planning unit	Short-term ⁽¹⁾ gain ⁽²⁾ (%)	Short-term availability ⁽³⁾	Long-term ⁽⁴⁾ gain (%)	Long-term availability
Douglas-fir	Fdi NE High	29	12%	32	100%
	Fdi NE Low	25	17%	25	100%
Western Larch	Lw NE High	N/A ⁽⁵⁾	0%	N/A	100%
	Lw NE Low	29	100%	32	100%
Lodgepole pine	Pli EK High	N/A	N/A	N/A	N/A
	Pli NE High	N/A	100%	N/A	0%
White pine	Pli NE Low	10	100%	19	100%
	Pw KQ All	N/A	50%	N/A	100%
Spruce	Sx NE High	12	100%	15	100%
	Sx NE Mid	11	100%	17	100%
	Sx NE Low	20	9%	26	100%

⁽¹⁾ Current.

⁽²⁾ Percent gain in primary trait (stem volume).

⁽³⁾ Percent of seed planning unit requirement based on historical (5-year) needs.

⁽⁴⁾ Long term is 25 years.

⁽⁵⁾ Genetic gain not estimated at this time.

Information sources

MFR Tree Improvement Branch provided 2006/07 production forecasts and genetic gains for the SPUs in the Kootenay Lake TSA on September 5, 2007.

Modelling

Genetic gain estimates are used directly within the model TIPSYS to project improved yield estimates. Within the model TIPSYS the genetic gain estimate is applied to all trees within a stand.

Not all of the trees planted within the Kootenay TSA are from genetically improved stock. As such consideration must be given for the differences in gains. For the current analysis, a TSA wide average genetic gain was developed for each species. This average was based on an arithmetic average of short-term gain by short-term availability, weighted by the area contribution of the applicable SPU.

Short-term genetic gain will be incorporated in the base case for this analysis. If projected increases in genetic gain are realized future timber supply may increase.

Planted species	Seed planning unit	Short term gain	Short term availability	Portion of SPU for species	Modelled genetic gain
Douglas-fir	Fdi NE High	29%	12%	TBD	TBD
	Fdi NE Low	25%	17%	TBD	
Western Larch	Lw NE High	N/A	0%	TBD	TBD
	Lw NE Low	29%	100%	TBD	
Lodgepole pine	Pli EK High	N/A	N/A	TBD	TBD
	Pli NE High	N/A	100%	TBD	
	Pli NE Low	10%	100%	TBD	
White pine	Pw KQ All	N/A	50%	100%	0%
Spruce	Sx NE High	12%	100%	TBD	TBD
	Sx NE Mid	11%	100%	TBD	
	Sx NE Low	20%	9%	TBD	

4.4 Growth and yield modelling

Models

The forest estate model STSM requires the projection of volume for timber supply forecasts and of stand height for several forest cover constraints. These projections are obtained from the MFR growth and yield models: VDYP or TIPSYS.

VDYP provides projections for existing stands based on vegetation inventory descriptions. VDYP is a MFR empirical yield model. It is intended for use in unmanaged, natural stands of pure or mixed species composition. VDYP use is transitioning to a recent upgrade, VDYP7, from its current version VDYP6. See <http://www.for.gov.bc.ca/hts/vdyp/index.html> for further information on VDYP. As input for VDYP, specific forest cover inventory information is required.

TIPSYS is a growth and yield program that provides managed stand yield tables for a specific site, species, and management regime. TIPSYS interpolates tables generated by another growth and yield model TASS and an associated model SYLVER that looks at wood quality, products, and financial considerations. TIPSYS is intended for use in managed even-aged stands for various coniferous and deciduous species growing in British Columbia. TIPSYS and the underlying

models were developed by the MFR Research Branch. For further information on TIPSY see <http://www.for.gov.bc.ca/hre/gymodels/TIPSY/index.htm>. As input for TIPSY, a description of the initial stand conditions, including species composition, initial density, regeneration delay is required. Additionally, operational adjustment factors are required to modified the potential volumes projected by TIPSY to a volume level reflective of operational standards.

Volume table generation for the Kootenay Lake TSA TSR

Volume tables are generated based on forest stand, management, and growth and yield model characteristics. For the Kootenay Lake TSA TSR, these characteristics can be classed into four stand types:

1. Existing not recently harvested:

These stands are existing (also called unmanaged or natural) stands for which forest cover information is available. In the March 2001 timber supply analysis (TSR 2), this included all stands that did not have a silvicultural treatment history. In the current analysis, stands with a silvicultural treatment history are excluded if the stands were harvested after 1987 (the year major licensees were to assume legally required basic silviculture obligations).

Volume tables for individual forest cover polygons were obtained from the MFR, Forest Analysis and Inventory Branch. These volumes tables were generated by FAIB in 2006 with VDYP6 for all forest cover polygons within BC timber supply areas. As the inventory in the Kootenay Lake TSA used for the current analysis has not changed (other than updates for disturbances, etc.), these VDYP6 age-volume tables are appropriate to use. Stand ages reflect growth and depletion up to 2007.

In the previous timber supply review, similar stands were aggregated into the same analysis unit. Each analysis unit was assigned an existing stand volume table. In this analysis, each stand polygon has its own stand volume table.

2. Existing (managed) previously harvested by clearcut

These stands have a post-1987 silvicultural history (clearcut only) from which initial stand regeneration characteristics can be discerned. It is assumed that these stands are being managed, with the objective of full site occupancy. Description of these stands are available within the MFR RESULTS data base as described under the regeneration section of this document.

Yield tables were generated for these existing managed stands with the model TIPSY. TIPSY inputs will use information obtained from the RESULTS data base. FAIB will generate a listing of all existing managed stands that had been clearcut.

Based on the “quality” of the information obtained from the RESULTS data base, yield tables will be either generated based on individual polygons or based on using an analysis unit approach that uses representative initial conditions.

Definition of existing managed analysis units

Analysis unit identification	Species group	Inventory type group	Site index group	BEC Subzone	Initial timber harvesting land base (hectares)
E-FD-G-ICH		F,FC,FH,FS,FP	> 20	ICH	3635
E-FD-G-ESSF		I,FPy,FL,FDeci		ESSF	131
E-FD-M-ICH		d, Py, LF,E,	14-20	ICH	7358
E-FD-M-ESSF		ATdecid (1-8,		ESSF	429
E-FD-P-ICH	FD	32-34, 40, 42)	< 14	ICH	902
E-FD-P-ESSF				ESSF	241
E-CH-G-ICH			> 20	ICH	577
E-CH-G-ESSF		C,CF,CH,H,HF,		ESSF	12
E-CH-M-ICH	CH	HC,HB,HS,Hdecid (9-17)	14-20	ICH	2375
E-CH-M-ESSF				ESSF	165
E-CH-P-ICH				ICH	1008
E-CH-P-ESSF			< 14	ESSF	178
E-BS-G-ICH			> 20	ICH	258
E-BS-G-ESSF				ESSF	246
E-BS-M-ICH		B,BH,BS,S,SF,	14-20	ICH	5719
E-BS-M-ESSF	BS	SH,SB,S,SF,S		ESSF	10566
E-BS-P-ICH		H.SB,SPI,Sdecid (18-26)	< 14	ICH	1126
E-BS-P-ESSF				ESSF	3867
E-PI-G-ICH			> 20	ICH	1640
E-PI-G-ESSF				ESSF	502
E-PI-M-ICH		PI,Pw,PIF,PIS,	14-20	ICH	7247
E-PI-M-ESSF	PI	PIdecid,Atconif (27-31, 41)		ESSF	2868
E-PI-P-ICH			< 14	ICH	499
E-PI-P-ESSF				ESSF	428

3. Future (managed) harvested by clearcut

In the timber supply analysis, the model “selects” forest stand polygons to be harvested. Following this harvest, these stands are assigned a managed stand yield table generated by TIPSYS.

Future yield tables will be generated from analysis units, which group stands based upon leading species and site index classes. The regeneration assumptions used in TIPSYS will be generated from current management identified from the RESULTS data base post 1997 and guidance provided by district and licensee staff.

The species composition and density information used to generate TIPSYS model input assumptions for these future stands have been described under the Regeneration and Genetic gain sections of this document. Deciduous species are assumed not to contribute to the available volume.

The underlying volume tables within TIPSYS predict potential yields that may not be realized for a variety of reasons (e.g., non-productive areas within stands, reduced growth due to disease). TIPSYS provides 2 operational adjustment factors (OAF). OAF1 provides a general percent reduction across all time periods. OAF2 provides a percent reduction that increases over time. In BC, OAF1 and OAF2 are assumed to be 15% and 5% respectively. A further accounting for root

rots (Douglas-fir in the ICH) is made within the TIPSY model. This model is based on an unpublished Canadian Forest Service report *Armillaria mortality and growth loss estimates for Interior Douglas-fir in the ICH ecosystem* which describes two components of stand loss. The first is mortality, which also creates a related drop in volume, at any given age. The second is volume loss of the remaining trees due to chronic non-lethal infection. A low severity rating will be assumed for the base case scenario.

Definition of future managed analysis units

Analysis unit identification	Species group	Inventory type group	Site index group	BEC Subzone	Initial timber harvesting land base (hectares)
F-FD-G-ICH		F,FC,FH,FS,FP	> 20	ICH	31588
F-FD-G-ESSF		I,FPy,FL,FDecid, Py, LF,E,	14-20	ESSF	1419
F-FD-M-ICH		ATdecid (1-8,		ICH	32759
F-FD-M-ESSF		32-34, 40, 42)	< 14	ESSF	2736
F-FD-P-ICH	FD			ICH	3673
F-FD-P-ESSF				ESSF	541
F-CH-G-ICH			> 20	ICH	2508
F-CH-G-ESSF		C,CF,CH,H,HF,		ESSF	188
F-CH-M-ICH	CH	HC,HB,HS,Hdecid (9-17)	14-20	ICH	8589
F-CH-M-ESSF				ESSF	1267
F-CH-P-ICH				ICH	8237
F-CH-P-ESSF			< 14	ESSF	1459
F-BS-G-ICH			> 20	ICH	1682
F-BS-G-ESSF				ESSF	1578
F-BS-M-ICH		B,BH,BS,S,SF,	14-20	ICH	4692
F-BS-M-ESSF	BS	SH,SB,S,SF,S		ESSF	10120
F-BS-P-ICH		H.SB,SPI,Sdecid (18-26)	< 14	ICH	3054
F-BS-P-ESSF				ESSF	12865
F-PI-G-ICH			> 20	ICH	5908
F-PI-G-ESSF				ESSF	1091
F-PI-M-ICH		PI,Pw,PIF,PIS,	14-20	ICH	24558
F-PI-M-ESSF	PI	PIdecid,Atconif (27-31, 41)		ESSF	9011
F-PI-P-ICH			< 14	ICH	1289
F-PI-P-ESSF				ESSF	1817

4. Partially harvested

Partial harvesting is employed in the Kootenay Lake TSA to enable access to timber volumes in constrained land bases, particularly those for visual objectives. The objective is to retain sufficient mature forest in order that the stand is still considered undisturbed. District staff and licensees indicate that about 20-40% of the mature forest cover is being left behind to meet the cover constraint. Licensees indicate that there is little expectation of a second entry to access the timber retained on site.

For existing partially harvested stands in the timber supply analysis, it will need to be determined whether existing partially harvested stands can be readily identified and what stand information is available. If these stands can be identified, these stands will be modelled such that only 70% (or % determined based on stand information) of a VDYP volume table is credited. These stands will be modelled as clearcut stands except that adjacency/maximum disturbance constraints would have been modified to reflect the retention meeting forest cover objectives. The derivation of the VDYP volume tables may be based on individual polygons or grouping of polygons into analysis units dependant on the information available.

For future stands that are identified for partial harvest, the stands will be modelled similarly to the description above for existing partially harvested stands.

Area separated by harvesting system

Harvesting system	Species group	Initial timber harvesting land base (hectares)
Clearcut	FD	TBD
	CH	TBD
	BS	TBD
	PI	TBD
Partial (existing)	FD	TBD
	CH	TBD
	BS	TBD
	PI	TBD
Partial (future)	FD	TBD
	CH	TBD
	BS	TBD
	PI	TBD

5.0 Modelling Considerations

5.1 Minimum harvestable age

The minimum harvestable age (MHA) is the time required for a stand to grow to a harvestable size, it defines the lower stand age limit for harvesting. Harvesting may occur in stands at the MHA to meet a harvest target for a short period of time or to avoid large and abrupt changes in harvest levels. However, at present, most stands are not harvested until well past the MHA timber production ages because of management objectives for other resource values (e.g., requirements for the retention of older forest).

For the base scenario, the age at which the stand reaches a 95% of its cumulative mean annual increment (i.e., optimal point for volume production) will be used as the minimum harvestable age unless the stand has not yet reached 100 cubic metres per hectare. The implications of this choice will be investigated by sensitivity analyses.

MHA by analysis unit

Existing managed	Years to achieve				Future managed	Years to achieve			
	CMAI	95% of CMAI	> 100 m ³ /ha	MHA		CMAI	95% of CMAI	> 100 m ³ /ha	MHA
E-FD-G-ICH	90	70	40	70	F-FD-G-ICH	80	70	40	70
E-FD-G-ESSF	80	70	40	70	F-FD-G-ESSF	80	70	30	70
E-FD-M-ICH	100	80	50	80	F-FD-M-ICH	100	80	50	80
E-FD-M-ESSF	100	90	50	90	F-FD-M-ESSF	100	90	50	90
E-FD-P-ICH	140	110	80	110	F-FD-P-ICH	130	110	100	110
E-FD-P-ESSF	150	130	70	130	F-FD-P-ESSF	150	130	70	130
E-CH-G-ICH	90	80	40	80	F-CH-G-ICH	90	80	40	80
E-CH-G-ESSF	90	80	40	80	F-CH-G-ESSF	90	80	40	80
E-CH-M-ICH	110	90	50	90	F-CH-M-ICH	110	90	50	90
E-CH-M-ESSF	110	90	50	90	F-CH-M-ESSF	110	100	50	100
E-CH-P-ICH	150	130	80	130	F-CH-P-ICH	150	130	80	130
E-CH-P-ESSF	140	110	70	110	F-CH-P-ESSF	150	130	80	130
E-BS-G-ICH	80	70	40	70	F-BS-G-ICH	80	70	40	70
E-BS-G-ESSF	70	70	30	70	F-BS-G-ESSF	80	70	30	70
E-BS-M-ICH	110	100	50	100	F-BS-M-ICH	110	80	60	80
E-BS-M-ESSF	110	100	50	100	F-BS-M-ESSF	110	100	50	100
E-BS-P-ICH	150	120	90	120	F-BS-P-ICH	170	140	80	140
E-BS-P-ESSF	160	140	80	140	F-BS-P-ESSF	160	140	80	140
E-PI-G-ICH	80	70	40	70	F-PI-G-ICH	80	100	40	100
E-PI-G-ESSF	80	70	30	70	F-PI-G-ESSF	80	70	40	70

Ages calculated using criteria and yield tables.

CMAI = culmination mean annual increment.

MHA = Minimum harvestable age.

5.2 Harvest systems

A variety of harvesting systems are employed in the Kootenay Lake TSA. Most areas are harvested with a single harvest entry, to regenerate even-aged forest stands. However, even in these areas, residual stand structure is commonly retained, for stand-level biodiversity or other reasons.

5.3 Harvest flow objectives

5.4 Utilization

The utilization levels define the maximum stump height, minimum top diameter inside bark (dib) and minimum diameter at breast height (dbh) by species, and are used in the analysis to calculate merchantable volume.

Utilization criteria by analysis unit

Analysis unit	Utilization		
	Minimum dbh (cm)	Maximum stump height (cm)	Minimum top dib (cm)
All pine leading	12.5	30	10
Western redcedar > 140 years	17.5	30	15
All others	17.5	30	10

5.5 Volume exclusions for mixed species stands

One or more species in mixed species stands may be unmerchantable. For example, the deciduous species in a predominantly coniferous stand may not be harvested, or may only be partially harvested. The unharvested portion should not contribute to the estimated stand volume. Most deciduous-leading stands are excluded from the timber harvesting land base. For stands within the harvesting land base, the following table indicates which portions did not contribute to harvest volume forecasts.

Inventory type group	Species	Volume exclusion (%)
All coniferous leading	Deciduous (broadleaf)	100

5.6 Unsalvaged losses

Unsalvaged losses account for average annual unsalvaged volume lost to insect infestation and disease, fires, wind or other causes on the timber harvesting land base. Unsalvaged losses reflect only those areas where the volume will not be recovered or salvaged. The following table indicates annual unsalvaged volume based on the Kootenay Lake Forest District staff expertise.

Cause of loss	Annual unsalvaged loss (m³/year)	Percent (%)
Fire	25,272	52%
Douglas-fir beetle	500	1%
Spruce bark beetle	500	1%
Balsam bark beetle	2,500	5%
Mountain pine beetle (average IBM NRL since 2002)	16,954	35%
Windthrow	2,500	5%
Total	48,226	100%

6.0 Sensitivity Analyses

Sensitivity analysis provides a measure of the timber supply impact of uncertainty in management assumptions and/or data. The magnitude of the increase or decrease in a particular variable should reflect the degree of uncertainty surrounding the assumption. By developing and performing a number of sensitivity analyses, it is possible to determine which variables most affect analysis results. The following table lists the sensitivity analyses to be performed for the Kootenay Lake TSA.

Uncertainty in land base available for harvest	THLB +/- 10%
Uncertainty in the estimated existing stand yields	Yield +/- 5%
Uncertainty in the estimated managed stand yields	Yield +/- 5%
Uncertainty in minimum harvestable ages	MHA +/- 10 years
Uncertainty in stand productivity	SI +/- 3 m
Uncertainty in adjacency restrictions	Green-up ages +/- 5 years and/or green-up height +/- 1 m. Examine change in maximum disturbance.
Alternative harvest queue	Compare relative oldest (base case) to random harvest queue.
Visuals	Retention requirements +/- 5%
Caribou	The proposed Mountain caribou recovery strategy will be investigated in place of the current KBLUP management.
Mountain pine beetle	All existing mature lodgepole pine will be assumed to be unavailable after 10 years.
Alternative harvest flows	Harvest objectives that demonstrate the maximum even flow harvest and higher initial decade harvest levels will be modelled.
OGSI	Managed stand volume tables based on site indices adjusted for provincial old-growth site index studies will be used in place of forest inventory based tables
Uncertainty in volume reductions caused by root rot	Higher incidences of root rot will be assumed.