KISPIOX TIMBER SUPPLY AREA

TIMBER SUPPLY REVIEW III

TIMBER SUPPLY ANALYSIS

DATA PACKAGE

Version 4.1

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1.0 Introduction

This data package outlines the basic information and assumptions required for the Kispiox timber supply area (TSA) timber supply analysis.

The completed data package contains inputs that describe current management performance in the Kispiox TSA. For the timber supply review, current performance can be defined by:

- The current forest management regime — the productive forest land available for timber harvesting, the silviculture treatments, the harvesting systems, and the integrated resource management guidelines used in the area;
- The standards used to approve or reject forest development plans;
- Fully implemented land-use plans;
- Land-use decisions approved by Cabinet;
- Legally established objectives under the *Forest and Range Practices Act;*
- Approved higher level plans under the *Forest Practices Code;* and
- Other approved B.C. Forest Service and joint agency forest management practices and policy.

The purpose of the timber supply review program is to model what is not what if. Changes in forest management objectives and data, when and if they occur, will be captured in future timber supply analyses. This data package, while representing the best available knowledge and information today, is subject to change.

1.1 Changes to the Data Package

The original Data Package was published and distributed for public and first nations review and comment in September 2005. Since that time changes in the definition of current management as well as changes to input data have occurred. The following sections describe the changes in base case assumptions from those documented in the September 2005 Data Package.

At the initiation of this analysis in May 2005 the West Babine Sustainable Resource Management Plan (WBSRMP) was finalized and the management objectives contained within it had been established as legal objectives under the *Forest Practices Code of British Columbia Act*. The Kispiox LRMP Higher Level Plan (the Kispiox FRPA Project) was in draft stage and had not been designated as legal objectives. Consequently these management assumptions were not current management and were to be addressed through sensitivity in the September 2005 version of the Data Package.

In 2006, two significant orders, based on the Kispiox FRPA Project, were approved by government changing the definition of *current management* in the TSA:

> *Order To Establish the Kispiox Landscape Units and Objectives - effective June 1st, 2006*
>
> *Order To Establish Scenic Areas in the Kispiox Timber Supply Area - effective February 1st, 2006*

1.1.1 Order To Establish the Kispiox Landscape Units and Objectives

The signing of the *Order To Establish the Kispiox Landscape Units and Objectives* legally establishes management objectives for wildlife and biodiversity for the portion of the TSA outside of the WBSRMP Planning Area. These objectives are set out in the *Kispiox LRMP Higher Level Plan Objectives for Biodiversity, Visual Quality and Wildlife - Version 1.6* (KLHO):

1. The number of landscape units is reduced from 33 to nine;
2. The establishment of spatially explicit old growth management areas (OGMA) which are removed from the THLB;
3. Early, mature+old, and old seral stage biodiversity objectives have been applied;
4. Mountain goat winter range areas are removed from the THLB;
5. Critical grizzly bear habitat is removed from the THLB; and
6. Identified mule deer winter range areas are managed to ensure that at least 40% of the area is older than 150 years at any point in time.

1.1.2 Order To Establish Scenic Areas in the Kispiox Timber Supply Area

The *Order To Establish Scenic Areas in the Kispiox Timber Supply Area* legally establishes scenic areas in the TSA outside of the Gitanyow Planning Area and the WBSRMP Planning Area thereby changing the visual quality objectives (VQO) from those published in the September 2006 Data Package.

The original Data Package describes the application of VQO based on the established VQO from the 2005 visual landscape inventory (VLI). Management for the scenic areas established through this order is represented by both the existing VQO and recommended visual quality classifications (rVQC) from the same VLI. These are described in Section 6.12.1. Variations of these VQO classifications are explored through sensitivity analysis.

1.1.3 Changes to the Operable Land Base

A review of the Harvest Method Mapping (HMM) attributes used to define the operable land base was conducted following the September 2006 publication of Data Package found that approximately 20,000 ha of timber harvesting land base (THLB) had no HMM secondary stand quality code information. Ministry of Forests and Range District staff conducted a detailed review of the original HMM procedures and found that some stands were not being classified due to gaps in the HMM procedure. The District developed a procedure to classify these gaps (Section 5.9) and the netdown was re-run.

1.1.4 Even Flow Sawlog Requirements

As a result of further discussion, the DFAM group concluded that the maintenance of a steady supply of sawlog volume is an integral part of the economic stability and thereby the sustainable timber supply of the TSA. As such, the base case and all sensitivity analysis scenarios have been revised to include a requirement for an even flow sawlog supply.

The definition of stand quality (i.e. sawlog, marginal sawlog, pulpwood or deciduous, etc.) is based on the stand quality classification from the HMM project. All current and future managed stands are assumed to be of sawlog quality.

1.1.5 Summary Timber Harvesting Land Base Changes

Table 1 shows the changes to the netdown information for the current base case relative to those published in the September 2005 Data Package. Overall, the current THLB is 39,600 ha lower than was reported in the September 2005 Data Package.

Table 1: Timber Harvesting Land Base Definitions

Land Base Classification	Original Data Package - September 2005 (ha)	Final Area (ha)	Difference (ha)
Total Land Base (Gross Area)	1,224,856	1,224,856	-
Non-BC Forest Service Managed Lands	149,988	149,988	-
Non-Forest / Non-productive Forest	376,309	376,309	-
Non-Commercial Cover	823	823	-
Total Productive Forest	**697,736**	**697,736**	-
Reductions to Productive Forest:			-
Old Growth Management Areas	-	65,677	65,677
WBSRMP Grizzly Bear Habitat	9,362	9,362	-
Cultural Heritage Resource	1,150	898	-252
Environmentally Sensitive Areas (ESA)	44,869	32,756	-12,113
Inoperable Areas	152,866	123,527	-29,339
Low Timber Growing Potential	29,097	32,764	3,667
Problem Forest Types	1,587	4,213	2,626
Deciduous Leading Stands	42,872	42,731	-141
Riparian Management Areas	23,510	21,342	-2,168
Specific Geographically Defined Areas	16,011	15,912	-99
Existing Roads, Trails and Landings	8,894	8,463	-431
Kispiox LRMP Goat and Grizzly Objectives	-	12,253	12,253
Total Reductions to Productive Forest	*330,219*	*369,899*	*39,680*
Current Timber Harvesting Land Base	**367,517**	**327,837**	**-39,680**

2.0 Current Forest Management Considerations and Issues

2.1 Base Case Management Assumptions

The assumptions described in the following sections reflect current performance with respect to the status of forest land, forest management practices and knowledge of timber growth and yield. A base case harvest forecast will be developed using these assumptions, and will serve as a baseline for assessing the impacts of uncertainty in the assumptions.

2.2 Major Forest Management Considerations and Issues

As shown in Figure 1 below, four planning processes are either recently completed or currently underway in the Kispiox TSA:

- West Babine Sustainable Resource Management Plan (WBSRMP);
- Kispiox LRMP Higher Level Plan (the Kispiox FRPA Project);
- Gitsegukla Watershed Pilot Planning Project; and
- Gitanyow Planning Process.

2.2.1 The Gitsegukla Watershed Pilot Planning Project

In addition to the WBSRMP and the Kispiox FRPA Project described above, the Gitsegukla Watershed Pilot Planning Project was a 2005 planning process involving Chiefs from the Gitxsan's Gitsegukla watershed, Skeena Stikine District stewardship staff, and Gitxsan Treaty Society staff. District staff worked directly with Chiefs to identify and spatially represent Gitxsan forest values (e.g. water, biodiversity, wildlife, fish, timber, etc.) and to co-develop forest management strategies to help maintain those values. The planning process was discontinued in 2006, so its planning products were not finalized and thus not incorporated into the base case.

2.2.2 The Gitanyow Plan

The *Landscape Unit Plan for all Gitanyow Traditional Territory within Kispiox and Cranberry Timber Supply Areas* (the "Gitanyow Plan") is a cooperative consultation and planning process involving Gitanyow chiefs and Skeena Stikine District staff. The Gitanyow Plan is a document that represents a statement of Gitanyow cultural and heritage values, their interests and plans for future use of their territories, and their plan for long-term sustainability of ecological resources. This process concluded in 2006 and objectives from the Gitanyow Plan have not been set by government thus will not be considered in this timber supply review.

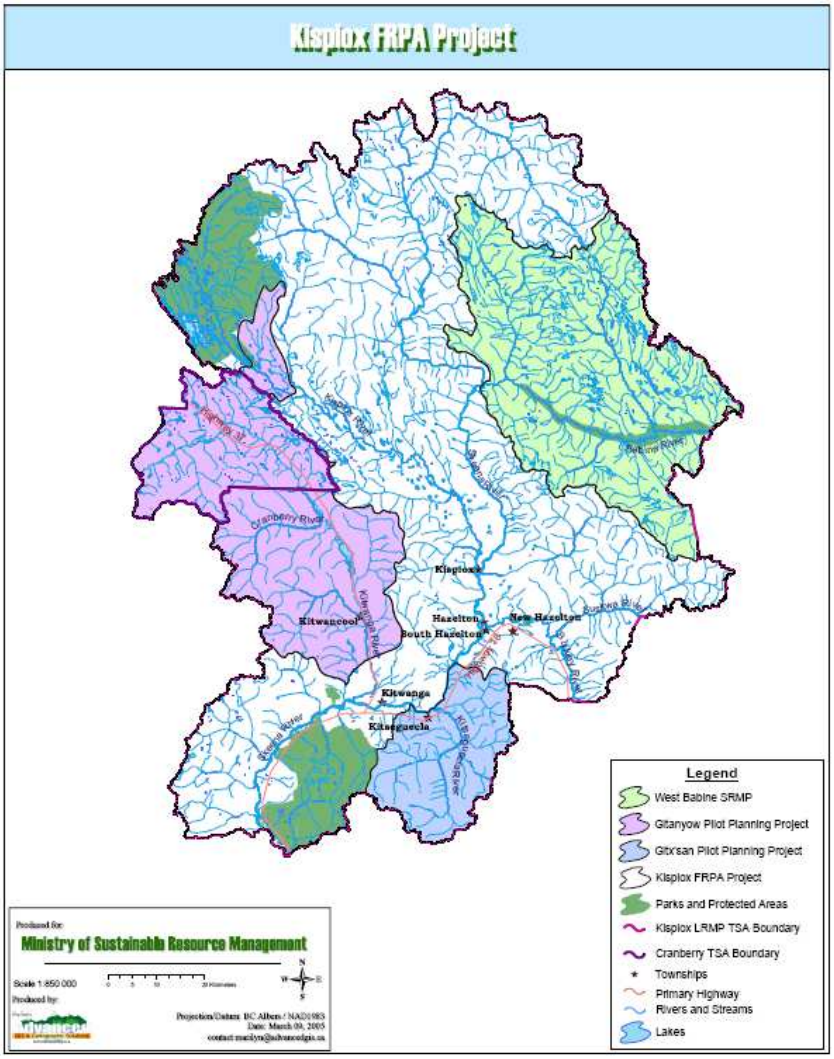

Figure 1: Map of Planning Projects Areas in the Kispiox TSA[1]

The major forest management issues and considerations in the Kispiox TSA are listed in the table below. Where issues are defined within legislation, regulations or policy, they will be incorporated into the base case. In cases of important uncertainties in defining current management, critical issue analysis may be done. Also, it may be difficult to quantify or assess some issues within a timber supply model, in which case sensitivity analysis may assist in assessing the timber supply implications and assigning degrees of risk to timber supply during allowable annual cut determination.

[1] From http://srmwww.gov.bc.ca/ske/frpa/kispiox/docs/Kispiox_frpa_map.pdf

Table 2: Major Forest Management Considerations and Issues

Consideration/issue	Description
Landscape-Level Biodiversity	Landscape unit (LU) boundaries and objectives for landscape-level biodiversity have been defined though the KLHO and the WBSRMP.
Riparian Management	Requirements from the *Forest and Range Practices Act* for riparian reserve zones and riparian management zones will be included in the analysis.
Stand-level Biodiversity	The wildlife tree requirements of the *Landscape Unit Planning Guide* and the WBSRMP will be represented, as per current practice.
Grizzly Bear Habitat	Direction on management activities for grizzly bear habitat provided in both the KLHO and the WBSRMP will be addressed in the analysis
Mule Deer Winter Range	Requirements for security cover, thermal cover and forage, as prescribed in the *Kispiox LRMP*, will be modelled for mapped winter range habitat.
Mountain Goat Habitat	Direction on management activities for mountain goat habitat provided in the KLHO will be addressed in the analysis
Visual Quality Objectives	Forest cover requirements originating from the visual landscape inventory will be included in the analysis.
Even Flow Sawlog Requirement	The maintenance of a steady supply of sawlog volume is an important part of the economic stability and thereby the sustainability of the timber supply of the TSA. The base case and all sensitivity analysis include the requirement for a stable, non-declining sawlog supply.

3.0 Inventory Information

Table 3 provides a list of data sources used in this analysis.

Table 3: Inventory Information

Description	TSR III Coverage Name	Source	Vintage	Update
Standard Layers				
Vegetation Resources Inventory	tsa12_veg	MSRM	1992	1997/2002
Biogeoclimatic Zones	tbec	MoF / MSRM	2002	
Visual Landscape Inventory 2001	vli_2001	MoF	2001	
Final Visual Landscape Inventory	dkivli_final	MoF / MSRM	2005	
Visual Quality Objectives Options 1 & 2 (revised August 2005)	vqo_opt12	MSRM	2005	
Extracted from 1992 Forest Cover				
Agricultural Land Reserve	f_alr	MSRM	1992	1997
Environmentally Sensitive Areas	esa	MSRM	1992	
Roads (from Forest Cover)	f_da	MSRM	1992	2001
Ownership	f_own	MSRM	1992	1997
New Woodlots	all_wlots	MoF / MSRM	2004	
Planning cells	f_pcell	MSRM	1992	
Provincial Forest	f_pfor	MSRM	1992	
Public Sustained Yield Unit	f_psyu	MSRM	1992	
Region Compartment	f_rc	MSRM	1992	
Timber Supply Area and Blocks	f_tsab	MSRM	2001	
Timber Supply Areas	kisp_tsa	MoF / MSRM	2001	
WBSRMP Zonation				
Access Management Zones	acc_mgnt	MoF / MSRM	2004	
Special Management Zones	smz	MoF / MSRM	2004	
Sustainable Resource Management Plan Zones	srmp_zn	MoF / MSRM	2004	
WBSRMP Biodiversity	biodiv	MoF / MSRM	2004	
TSA Zonation				
4th Order Watersheds	wtr_ord4	MoF	2004	
Community Watersheds	dki_cws	MoF	2004	
Draft Landscape Units	lu_2002	MoF / MSRM		
House Territories	houses	MoF	2004	
Kispiox LRMP Resource Management Zones, and Parks	lrmp_rmz	Kispiox LRMP	1996	
Legally Landscape Units	plan_unit	MoF	2004	
Mill Creek Sensitive Area	mill	MoF	1996	
Non-Timber Forest Products	botanical	MoF / MSRM	2004	
Old Growth Management Areas	ogma_v1	MSRM	2005	
Proposed Land Settlement Areas for Gitanyow Treaty Process	fn_parcel	MoF	2005	
Recreation	rec	MoF	2001	

Description	TSR III Coverage Name	Source	Vintage	Update
Operability / Access				
Accessible/Inaccessible Areas	access_070805	MoF / MSRM	2004	
Harvest Method Mapping	hmm_all	Bell Pole Co.	2004	
Harvest Deferral Areas (>8km from existing roads)	remote	MoF	2005	
Roads (block road update)	ext_rds	MoF / MSRM	2004	
Roads - KLC Update	klc_roads	KLC	2005	
Roads Buffers	roads_buf	TFIC	2005	
Slopes > 60% and Es1 class Environmentally Sensitive Areas	es1_slp	MoF	2005	
Terrain Stability Mapping	tsm_smp	MoF	2001	
Wetland / Riparian Areas				
Babine Wetland Buffers (1)	u4_br	MoF	1998	
Babine Wetland Buffers (2)	u4_sw	MoF	1998	
Floodplains	fp_merge	MoF / MSRM	1998	
Additional Floodplains	fp_add	MoF / MSRM	2005	
Riparian Reserve and Management Zones	rma_dki	MoF	1999	
S6 Riparian	str_s6	MoF	1999	
Wildlife Habitat				
Ungulate Winter Range	uwr_poly	MWLAP / MSRM	2005	
Goat Suitability Points	uwr_wpts	MWLAP / MSRM	2005	
Goshawk Suitability	ghawk_hi	MoF / MWLAP	2003	
High Value Grizzly Habitat (WBSRMP)	grizhab	MSRM	2004	
High Value Grizzly Habitat (KLHO)	kisp_grizc	MWLAP / MSRM	2003	
Critical Grizzly Bear Habitat	grizhabc	TFIC	2005	
Moose Winter Range (1)	thsm_n	MoF / MSRM / MWLAP	2003	
Moose Winter Range (2)	thsm_s	MoF / MSRM / MWLAP	2003	
Mule Deer Winter Range	mule_deer	MoF	2005	
Deer Winter Range (TSR II)	deer	MoF	1999	
Other Data Sources				
Blocks - KLC Update	klc_blocks	KLC	2005	
Dothistroma, Kispiox, 2002-2003	kispiox_doth	MoF / MSRM	2003	
Dothistroma, Cranberry and Kispiox, 2004	kispiox04	MoF / MSRM	2004	
Licensee Chart Areas	charts	MoF	2001	
Consolidated FDP coverage	fdp	MoF	2005	
Consolidated RESULTS openings	results	MoF	2005	

Data Source and Comments:

The Forest Cover inventory was produced in 1992, updated in 1997, and rolled over into Incosada in 2002. This inventory has not had a VRI Phase II volume adjustment, or a net volume

adjustment factor volume adjustment. The inventory has been projected to January 1st, 2005. Disturbances up to June 2005 are included.

The new woodlots coverage was not extracted from the 1992 forest cover but represents an update the ownership codes from the forest cover.

4.0 Zone and Analysis Unit Definitions

4.1 Management Zones and Objectives

Table 4 outlines objectives that are to be incorporated into the base case. Specific, legal objectives apply to the WBSRMP area. For the remainder of the area, objectives and data sources are unchanged from TSR II.

Table 4: Objectives to be Tracked

Objective	Inventory Source	TSR III Coverage Name
Entire TSA		
Visual Quality Objectives	Final Visual Landscape Inventory	dkivli_final
Community Watershed Water Quality Objectives	Community Watersheds	dki_cws
Integrated Resource Management Objectives for Green-up and Adjacency	THLB Area without VQO	dkivli_final
Landscape-level Biodiversity by Landscape Unit and BEC Variant	Approved Landscape Units	plan_unit
West Babine SRMP		
Landscape-level Biodiversity	Core Ecosystems	biodiv
Grizzly Bear Habitat	Critical Grizzly Bear Habitat	griz_hab
Babine River Special Management Zone	Special Resource Management Zones	smz
Atna/Shelagyote SMZ	Special Resource Management Zones	smz
Tourism	Special Resource Management Zones Sustainable Resource Management Plan Zones	smz srmp_zn
Pine Mushroom	Botanical	botanical
Kispiox LRMP Higher Level Plan Objectives for Biodiversity, Visual Quality and Wildlife		
Old Growth Management Areas	Old Growth Management Areas	ogma_v1
Mule Deer Winter Range	Mule Deer Winter Range	mule_deer
Mill Creek Sensitive Area Objectives	Mill Creek Sensitive Area	mill
Critical Grizzly Bear Habitat	High Value Grizzly Habitat Complexes with Critical Habitat	kisp_grizc
Mountain Goat Winter Range	Goat Suitability	uwr_poly

4.2 Analysis Unit Definitions

An analysis unit is composed of forest stands that have similar tree species composition, timber growing capability and treatment regimes. Each analysis unit is assigned its own timber volume projection (yield table) for existing and future managed stands. Yield tables for existing natural stands will be derived using the Variable Density Yield Projection (VDYP) model. Yield tables for recent plantations and future managed stands will be derived using the Table Interpolation Program for Stand Yields (TIPSY).

A Harvest Methods Mapping (HMM) project (Corstanje, 2004) was completed in 2004 to redefine the operable land base by creating and applying classifications for harvest method and stand quality. Stand quality codes from the HMM project are incorporated into analysis unit definitions.

The following table shows existing natural stand analysis unit definitions and the Timber Harvesting Land Base (THLB) area associated with each. Natural stand analysis units represent stands growing through natural regeneration. Yields associated with these stands are based on the B.C Forest Service's Variable Density Yield Prediction (VDYP) program. In TSR II it was assumed that all stand greater than 20 years of age are growing according to natural stand characteristics. At the time, this was based on an inventory file had been projected to 1999 meaning that all stands established before 1979 are considered unmanaged. This assumption has been carried forward to this analysis. This analysis is based on an inventory file that has been projected to 2005 and therefore, stands older than 26 years of age are considered to be unmanaged.

Table 5 shows the definition criteria and area distribution of existing natural stand analysis units. Existing natural stand analysis unit definitions include HMM stand quality code criteria which classify the operable land base into Sawlog, Marginal sawlog, Pulp log and Deciduous stands (see Section 5.9). Analysis units with less than 100 ha of THLB are grouped with similar analysis units. Table 5 shows the 292,994 ha of THLB that are in natural stand analysis units. The remaining 61,082 ha of THLB has been established since 1979 and has been assigned to a managed stand analysis unit. Assumptions associated with managed stand analysis units are discussed in Section 6.8.

Table 5: Existing Natural Stand Analysis Units

AU Group	Description	Analysis Unit	Stand Quality	ITG	Site Index	Age Class
01	Hw/Cw - good	01M	M	9-17	>=20	<=7
		01S	S			
02	Hw/Cw - medium	02M	M		H: 14.0-19.9 C:15.0-19.9	
		02S	S			
03	Hw/Cw - poor	03M	M		H: <14.0 C: 15.0	
		03S	S			
04	Balsam - good	04S	S	18-20	>=21	<=7
05	Balsam - medium	05S	S		15.0-20.9	
06	Balsam - poor	06M	M		<15.0	
		06S	S			
07	Spruce - good	07S	S	21-26	>=27	<=7
08	Spruce - medium	08M	M		16.0-26.9	
		08S	S			
09	Spruce - poor	09M	M		<16.0	
		09S	S			
10	Pine - good	10S	S	28-31	>=22	<=7
11	Pine - medium	11S	S		15.0-21.9	
12	Pine - poor	12M	M		<15.0	
		12S	S			
14	Ac/Con - medium	14D	D	35	28-36.9	All
		14M	M			
15	Ac/Con - poor	15D	D		<28.0	
		15M	M			
51	Old Hw/Cw - good	51P	P	9-17	>=20	8 & 9
		51S	S			
52	Old Hw/Cw - medium	52M	M		H: 14.0-19.9 C:15.0-19.9	
		52P	P			
		52S	S			
53	Old Hw/Cw - poor	53M	M		H: <14.0 C: 15.0	
		53P	P			
		53S	S			
55	Old Balsam- medium	55P	P	18-20	15.0-20.9	8 & 9
		55S	S			
56	Old Balsam- poor	56M	M		<15.0	
		56P	P			
		56S	S			
58	Old Spruce - medium	58M	M	21-26	16.0-26.9	8 & 9
		58S	S			
59	Old Spruce - poor	59M	M		<16.0	8 & 9
		59P	P			
		59S	S			
61	Old Pine - medium	61S	S	28-31	15.0-21.9	8 & 9
62	Old Pine - poor	62M	M		<15.0	
		62S	S			

Data Source and Comments:

Fir denotes true firs (*Abies lasiocarpa* and *A. amabilis*), not Douglas-fir (*Pseudotsuga menziesii*).

Separate analysis units will be created for the old-growth component (age class 8 and 9; i.e., 141 years and older) of each coniferous analysis units. This will facilitate the critical issue analysis of old-growth site index adjustments following harvest.

The timber supply analyst may decide to split analysis units where there are significant differences in site productivity, or to represent different treatment regimes. Analysis units may be combined where yield tables are similar, or if areas in individual units are small.

The HMM report identifies concerns with using the results for timber supply review. These concerns have largely been addressed through the incorporation of upper operability linework that defines areas that are inaccessible or unlikely to have access constructed based on current economics and management assumptions. This operability linework was developed by Kispiox TSA licensees in consultation with Forest District staff.

4.2.1 Managed Stand Analysis Units

Recent plantations and future stands will be grown on managed stand yield tables (MSYTs) produced using the Forest Service TIPSY growth and yield model. A MSYT may be built from a number of tables if more than one regeneration method is used within an analysis unit. When this is the case, tables are produced for the different regeneration methods (each method and species combination) and are then aggregated into one table. Assumptions used to develop MSYTs are discussed in Section 6.8.

All stands will be managed under clearcut silvicultural systems and will follow MSYT from TIPSY. All regenerated stands are assumed to be of Sawlog stand quality.

5.0 Timber Harvesting Land Base Definition

The THLB is defined as all productive forest expected to support timber harvesting within the Kispiox TSA. The THLB is determined by netting out categories of land which do not contribute to timber harvesting. Detailed descriptions of each land classification step are included in subsequent sections. Table 6 shows the areas removed from the THLB in each of the netdown categories.

Table 6: Timber Harvesting Land Base Definition

Land Base Classification	Productive Forest Area (ha)	Area (ha)	% of Total Area	% of Productive Forest
Total Land Base (Gross Area)		1,224,856	100	
Non-BC Forest Service Managed Lands		149,988	12	
Non-forest / Non-productive Forest		376,309	31	
Non-commercial Cover		823	-	
Total Productive Forest		**697,736**		
Reductions to Productive Forest:				
Old Growth Management Areas	65,677	65,677	5	9
Grizzly Bear Habitat	9,362	9,362	1	1
Cultural Heritage Resource	1,150	898	-	-
Environmentally Sensitive Areas (ESA)	45,247	32,756	3	5
Inoperable Areas	188,779	123,527	10	18
Low Timber Growing Potential	56,711	32,764	3	5
Problem Forest Types	4,727	4,213	-	1
Deciduous Leading Stands	46,872	42,731	3	6
Riparian Management Areas	91,022	21,342	2	3
Specific Geographically Defined Areas	33,594	15,912	1	2
Existing Roads, Trails and Landings	26,124	8,463	1	1
Kispiox LRMP Goat and Grizzly Objectives	102,564	12,253	1	2
Total Reductions to Productive Forest		*369,899*	*30*	*53*
Current Timber Harvesting Land Base		**327,837**	**27**	**47**
Future Road Reductions		11,958		
Long-Term Timber Harvesting Land Base		**315,879**		

5.1 Land Not Administered by the BC Forest Service for Timber Supply

Ownership codes are used to identify whether the land is considered to contribute to timber supply. Land with ownership codes 62C and 69C contribute to the TSA timber supply. These codes indicate Crown land in a forest management unit and miscellaneous reserves, respectively. All areas with other ownership codes are removed from the land base considered available for timber supply.

Table 7 shows the area removed from the THLB that is classified as non-crown ownership and therefore does not contribute to timber supply in the TSA. This table shows the gross area[2], reduction %[3], the area removed[4], and the remaining THLB area[5] for each ownership category in the TSA. These figures are provided for each netdown category in the following sections.

Table 7: Land Ownership Status

Description	Ownership / Schedule	Gross Area (ha)	Reduction (%)
Crown grant	40N	24,608	100
Indian reserve	52N	9,857	100
Use, recreation and	61C	237	100
enjoyment of the public	61N	1,876	100
Forest management unit	62C	1,161,186	0
Provincial park class A	63N	15,394	100
Government reserve	69C	5,623	0
Government reserve	69N	609	100
Woodlot license	77N	5,429	100
Miscellaneous lease	99N	14	100
New Woodlots	N/A	22	100
Total		**1,224,856**	

Data Source and Comments:

The ownership codes for many new woodlots have not been updated. A coverage containing new woodlots addresses this issue.

New parks, protected areas, and ecological reserves that are not accounted for by the ownership coverage are addressed in the following section.

5.2 New Parks, Protected Areas and Ecological Reserves

New parks and ecological reserves that have not been accounted for in the existing ownership data are removed from the THLB, in addition to those listed in Table 7. While these areas do not contribute to timber supply, the forested portions of these areas contribute to meeting various non-timber objectives (habitat, biodiversity, etc).

[2] The gross area represents the total area within the TSA in each category.
[3] The reduction % represents the percent of the remaining area in each netdown category that is removed from the THLB.
[4] The area removed is the amount of area that is removed from the THLB for each netdown category.
[5] The THLB area is the area that remains in the timber harvesting land base once all netdowns have been applied.

Table 8: Non-BC Forest Service Administered Land Summary

Description	Gross Area (ha)	Reduction (%)
Babine Corridor, Bulkley Junction, Kitwanga Mountain, Seven Sisters, Swan Lake / Kispiox River, Cath Creek Eco Reserve, Provincial Parks	107,952	100
Non-Park	1,116,904	0
Total	**1,224,856**	

5.3 Non-forest or Non-productive Forest

Areas with projected type identity 6 are non-forest or non-productive forest, and areas with projected type identity 8 have no typing available. These categories, which do not contribute to timber supply, include alpine areas, lakes, swamps, rivers, rock, and ice. Areas where past logging has occurred are not excluded from the THLB regardless of the projected type identity. Table 9 shows the area removed from the THLB as non-productive (6), no typing available (8), and non-commercial cover (5) (Section 5.4).

5.4 Non-commercial Cover

Areas with projected type identity 5 are occupied by non-commercial brush species. These areas are considered to be unlikely sites for timber production and are excluded from the area considered available for timber harvesting. Areas where past logging has occurred are not excluded from the THLB regardless of the projected type identity.

Table 9: Non-Forested, Non-Productive, and Non-Commercial Cover

Logging History	Projected Type Identity[1]	Gross Area (ha)	Reduction (%)
No	0	365,950	100
	1 (Immature)	59,929	0
	2 (Mature)	620,838	0
	3 (Immature Residual)	-	0
	4 (NSR)	4,223	0
	5 (Non-Commercial)	1,327	100
	6 (Non-Productive)	63,711	100
	8 (No Typing Available)	82	100
	9 (Silviculture NSR)	-	0
Yes	All	108,796	0
	Total	**1,224,856**	

[1] There is no Projected Type ID 7.

Data Source and Comments:

Projected type identity 0 is not a standard value for this field and represents a significant portion of the TSA and there are no other VRI attributes for these stands. This situation existed in the Forest Cover inventory as well and does not appear to have been created through the conversion

of the Forest Cover into VRI. In TSR II this area was removed from the THLB as non-forest / non-productive and this assumption has been carried forward for this analysis. A review of projected type identity maps indicate that these areas are predominantly high elevation mountain tops which supports removal from the THLB. However, without any other inventory attributes this cannot be easily verified.

5.5 Old Growth Management Areas

The *Order to Establish the Kispiox Landscape Units and Objectives* (June 2006) establishes nine landscape units which replaced the 33 draft landscape units. The nine new landscape units are outside of the WBSRMP area, and have spatially explicit OGMA which are removed from the THLB.

Table 10: Old Growth Management Areas

Description	Gross Area (ha)	Reduction (%)
Old Growth Management Areas in the non-WBSRMP portion of the TSA	75,573	100

Data Source and Comments:

When the OGMA were created there was not enough old area available in the ICH mc2 variant to meet all of the old requirements. A spatial old percentage constraint will be applied to these areas in order to recruit and maintain adequate percentages of old forest. The established OGMA will contribute to meeting this percentage.

5.6 WBSRMP Wildlife Habitat

To provide security and bedding cover for grizzly bears, the WBSRMP requires that a 100 m forested buffer be retained around all non-forested critical habitats greater than 2 ha, within high value grizzly bear habitat areas within the of the WBSRMP area (see Table 11).

Table 11: Wildlife Habitat

Description	Gross Area (ha)	Reduction (%)
WBSRMP High Value Grizzly Bear Habitat within 100 m of wetlands and greater than 2 ha	15,534	100

5.7 Cultural Heritage Resources

Table 12 lists the areas with cultural heritage values that are removed from the THLB.

Table 12: Cultural Heritage Resources

Description	Gross Area (ha)	Reduction (%)
Telegraph Trail - 100 m on each side of the trail	1,346	100

Data Source and Comments:

The *Telegraph Trail Management Plan*, approved by the district manager in 1995, specifies that a buffer of 100 m must be left on each side of the trail. The Telegraph Trail is also in the process of being established under the *Heritage Act of B.C.*

The Old Kuldo Interpretative Trail accesses an ancient village site along the Skeena River. Review of the buffers of the Telegraph Trail and the riparian reserve zone of the Skeena River, show that this area is being protected through other land base exclusions, and no further exclusions will be applied.

There are several known sites with cultural heritage value in the Kispiox timber supply area. As cultural heritage inventory studies, archaeological impact assessments, and traditional-use survey results become available, they will be considered in the timber supply review process.

5.8 Environmentally Sensitive Areas

Some forest lands are environmentally sensitive and/or significantly valuable for other resources. These areas are identified and delineated during a forest inventory as environmentally sensitive areas (ESAs). The ESA system uses the following categories: soil (Es), forest regeneration problems (Ep), snow avalanche (Ea), recreation (Er), wildlife (Ew), water (Eh) and fisheries (fisheries symbols). With the exception of avalanche and fisheries, two ESA categories are recognized: high (1) and moderately sensitive (2).

Environmental sensitivity may reduce or preclude harvesting on identified sites, which can be accounted for through per cent area reductions or specific evaluation of individual ESA polygons for harvesting opportunity.

Table 13 identifies the proportion of ESA in various categories that are unavailable for harvesting.

Table 13: Environmentally Sensitive Areas

Logging History	ESA Category	ESA Description	Gross Area (ha)	Reduction (%)
No	Ea	Areas having severe snow chute and avalanche problems	128	100
	Class V from Terrain Stability Mapping	Areas with a high likelihood of landslide initiation following timber harvesting or road construction	42,788	100
	Es1 areas on > 60% slope	Areas with a moderate likelihood of landslide initiation following timber harvesting or road construction	24,597	100
Yes	All	No reductions for areas with previous logging history	817	
All	None	No reductions	1,156,526	0
	Total		**1,224,856**	

Data Source and Comments:

The current ESAs were mapped in the early 1970's and were seldom used in forest resources management planning as other mapping data provided far more valuable information. There was also some uncertainty about the reliability of the ESA classification, particularly for the soil and regeneration categories. This recognition led the Chief Forester to direct district staff to "re-examine environmentally sensitive areas and their corresponding incorporation in or exclusion from the timber harvesting land base" in his 1996 *Rationale for Allowable Annual Cut (AAC) Determination in the Kispiox Timber Supply Area (TSA).*

The results of this re-examination are presented below for the soil and regeneration categories:

Soil

Both the ESA classification systems for soil and *Terrain Stability Mapping* (TSM) share the same objective of identifying all unstable or potentially unstable areas. Terrain stability mapping was conducted in most physically and economically operable areas under forest development and is currently used to identify areas considered unavailable for timber harvesting and areas requiring further assessments.

A contractor was hired in the summer of 1998 to gather all the terrain stability information currently available for the Kispiox TSA. Where necessary, TSM data was digitized from hard copy maps or translated into one common *Geographic Information System* (GIS) format. Only sensitive soil units (i.e., stability classes IV or V from detailed mapping projects and classes P and U from reconnaissance projects) were considered. All terrain stability interpretations were converted to current standards for TSM (e.g. classes P and U were re-classified as classes IV and V).

Terrain stability mapping is complete for a large portion of the TSA however a few holes in the data still exist. In TSR II, terrain class V areas were 100% removed and terrain class IV areas were reduced by 95%. In his TSR II Rationale, the Chief Forester agreed with the 100% removal of class V terrain, but not with the removal of 95% of class IV terrain. While this removal reflected the practice of the day, it did not account for the likelihood that future harvesting would migrate out of the valley bottoms and into class IV terrain. Current practices corroborate the TSR II Rationale: licensees do not avoid class IV terrain in harvest planning.

For this analysis, all class V terrain will be 100% removed from the THLB. For areas not classified as class V terrain and areas where TSM has not been conducted, the area identified as having sensitive soils (Es1 in the ESA coverage) that are on slopes greater than 60% slope is thought to be the best available representation of potentially unstable soils that should be excluded from timber harvesting. Es1 areas on > 60% slope will also be 100% removed from the THLB.

Regeneration

All forest sites that are extremely difficult to regenerate and sites having extended regeneration delays that would lead to unacceptable crop rotations are considered for Ep designation (*Forest Inventory Manual*). Areas with severe regeneration problems are characterized by geoclimatic conditions that may affect moisture and nutrient quantity and availability, and frost heaving. These conditions — high elevations, talus slopes, lowland swampy areas, sand dunes, and floodplains — minimize regeneration potential and tree growth capacity. Sites having moderate regeneration problems are not inoperable or unproductive, rather, they are constrained by the potential for excessive brush, or the presence of damaging wildlife or domestic cattle populations.

At the time of the previous allowable annual cut determination, an analysis conducted by District staff showed that extensive logging occurred in areas classified as having regeneration problems in the inventory. Further, District staff conducted random field checks on seventeen sites classified as sensitive. Information on biogeoclimatic classification and site units was recorded. None of these sites had characteristics indicating that they would be difficult to regenerate. All areas that were found to be rocky or wet were beside streams and swampy areas that would be incorporated as riparian reserves or management zones.

In preparation for TSR III, District staff reviewed silviculture records for harvested areas designated as Ep (see Table 14). The openings reviewed were all classified as having severe regeneration problems, but only a small portion (8%) is still considered not satisfactorily restocked (NSR). It is anticipated that all areas currently NSR will be regenerated within the prescribed delays.

Table 14: Breakdown of ESA -Regeneration Areas on Map 103P069

Ep	# Of Polygons	Polygon Area (ha)	# Openings	Gross Area (ha)	NSR Total (ha)	SR Total (ha)	FG Area (ha)
—	N/A	N/A	22	1097.6	12.9	816.1	302
1	41	981.6	19	2844.3	225.2	2012.1	1185.1
2	27	3172.7	25	1631.8	42.5	1181.1	325.9

Note: SR is satisfactorily restocked and FG is free-growing.

These findings support the data suggesting that the current classification for ESA (regeneration) is inaccurate, and that many areas having potential regeneration problems are included in riparian reserves and/or wildlife tree patches (WTP). A large portion of the reductions associated with severe regeneration problems will therefore be accounted for through riparian and stand-level biodiversity reductions in the analysis.

Some areas harvested in the past have failed to regenerate satisfactorily or achieve free-growing, or have been re-classified as non-productive or non-commercial. To account for this and the fact that some areas may not be harvested due to potential regeneration problems not accounted for elsewhere, a further analysis was conducted on all blocks logged since October 1, 1990 and having a regeneration delay date prior to October 1, 1999 (in both Cranberry and Kispiox TSAs). The results show that, of 205 blocks (8,339 ha), only 11 have NSR status reported. However, only three of those eleven blocks (for a total of 55.3 ha) are NSR because of missing "planting results" in the database, thereby suggesting potential ground issues but not necessarily a result of regeneration difficulties that would warrant an Ep classification. Without field assessments the ESA status is unknown at this time. It is critical to note that in every case, these blocks have been planted and were not identified as having potential regeneration problems.

A secondary analysis of this same sample showed that only 41 blocks, where regeneration delay has been met, have *Silviculture Prescription* (SP) amendments. It was important to investigate if regeneration delay had been achieved through methods other than natural means (by amending SP standards). Of these amendments, only one (for 1.5 ha) had the status of the logged net area changed from reforest (NAR) to non-productive (NP), further verifying that the Ep classification overstated regeneration difficulties.

The findings described above suggest that no further land base reductions are needed to account for regeneration problems.

Wildlife

ESAs for wildlife (Ew) have been replaced by specific habitat mapping, such as critical deer winter range or grizzly bear habitat. Parts of these areas will be removed from the timber harvesting land base (Section 5.6) and parts of them will be assigned specific forest cover requirements (Section 6.10, Section 6.12.2, and Section 6.12.3).

5.9 Inoperable Areas

Areas are considered inoperable based on the presence of physical barriers or limitations to harvesting and also relates the appropriate logging methods (e.g. cable, ground, or helicopter), and associated costs to the merchantability and expected value of stands. Since physical and economic conditions are highly variable across British Columbia, the method used to interpret and map operability is highly variable and District dependant. The distinction between physical and economic operability becomes blurred when considered over extended time horizons and varying economic conditions.

An HMM project was undertaken in the Kispiox TSA in order to re-define the operable forest area in the TSA. Operability is defined based on physical accessibility and economic feasibility of harvest. Operability polygons have been assigned a ‘primary harvest method’ code and a secondary ‘stand quality’ code (see Table 16). The HMM project also recommends a netdown methodology based on these codes. HMM classifications form the foundation for identifying area

to be removed from the THLB as inoperable areas, sites with low timber growing potential, problem forest types, and deciduous leading stands.

The HMM report identifies concerns with using the results for timber supply review based on an underestimation of the areas that are inaccessible and are likely to remain inaccessible for the long-term. These concerns have largely been addressed through the incorporation of upper operability data that defines areas that are inaccessible or unlikely to have access constructed based on current economics and management assumptions. This operability linework was developed by Kispiox TSA licencees in consultation with Forest District staff.

Areas identified as inaccessible in the upper operability coverage are removed from the THLB. As recommended in the HMM report, Table 15 shows the HMM categories removed from the THLB. Any areas with a previous logging history remain in the THLB.

Table 15: Inoperable Areas

Logging History	Upper Operability Limit	Primary HMM Code	Secondary HMM Code	Gross Area (ha)	Reduction (%)
No	Inaccessible	All	All	340,567	100
	Accessible	I (inaccessible)	All	7,241	100
		G (ground)	S, M, P, <blank>	414,408	0
		C (cable)	S, <blank>	92,463	0
		C (cable)	M, P	107,947	100
		<blank>	All	16,804	0
Yes	All	All	All	99,432	0
Total					

Data Source and Comments:

Table 16 shows the primary harvest method and secondary stand quality codes developed through the HMM project.

Table 16: Harvest Method Mapping Codes

Primary "Harvest Method" Codes	Secondary "Stand Quality" Codes
G – Ground	S – Sawlog
	M – Marginal sawlog
C – Cable	P – Pulp log
	D – Deciduous
I – Inaccessible	L – Sites of low productivity
	T – Sites with density problems

Each primary HMM code was assigned parameters, specific to the Kispiox TSA, based on ground slope, as determined through GIS analysis using TRIM data (see Table 17). The limits for these parameters are subjective in nature, and are based on the experience and local knowledge from licensee and the Ministry of Forests personnel.

Table 17: Primary "Harvest Method Parameters

Primary Codes	Parameters
G – Ground	≤ 40% slope
C – Cable	> 40% ≤ 90% slope
I – Inaccessible	> 90% slope

HMM stand quality codes are defined through interpretation of forest inventory information (see Table 18). Forest polygon information such as species distribution, stand age and height, and site index were used as parameters to differentiate stand quality. The assignment of parameters to the HMM secondary codes was subjective in nature, based on the experience and local knowledge from licensee and Ministry of Forests personnel.

Table 18: Secondary "Stand Quality" Code Parameters

Secondary Code	Lead Species	GTG[1]	Age Class	Ht Class	Stocking Class	Site Class	Volume (m^3)	Attribute CD[2]	Activity Code
S (Sawlog)	All conifers	E–N	8	All	0, 1	G	≥ 200	All	All
	All conifers	E–N	8	≥ 4	0, 1	M / P	≥ 200	All	All
	Ced, S, Pli	E,I–N	8	3	0, 1	M / P	≥ 200	All	All
	All conifers	E–N	5-7	≥ 3	0, 1	G / M	≥ 200	All	All
	All conifers	E–N	0-4	All	All	G,M,P	All	DI, PL, SI, ST, null	L
	All conifers	E–N	0-4	All	All	G,M,P	All	Null	All
	Hem,B,S,Ced	E–K	1-4	All	All	G,M,P	All	DI or null	Not L
M (Marginal sawlog)	Ced,S,Pli	E,I–N	9	≥ 3	0, 1	G / M	≥ 200	All	All
	Hem or B	F–H	8	≥ 3	0, 1	M	≥ 200	All	All
	Hem or B	F–H	8	3	0, 1	P	≥ 200 (Cw+S+Pli ≥ 20%)	All	All
	All conifers	E–N	5-7	≥ 3	0, 1	P	≥ 200	All	All
	All deciduous	O–Q	All	All	0,1 or null	G,M,P	(Cw+S+Pli ≥ 30%)	All	All
P (Pulp Logs)	Hem or B	F–H	9	All	0, 1	G,M,P	≥ 200	All	All
	Hem or B	F–H	8	3	0, 1	P	≥ 200 (Cw+S+Pli ≥ 20%)	All	All
	Ced, S, Pli	E,I–N	9	≥ 3	0, 1	P	≥ 200	All	All
D (Deciduous)	All deciduous	O–Q	All	All	0,1 or null	G,M,P	(Cw+S+Pli < 30%)	All	All
L (Sites of Low Productivity)	All	All	All	All	All	L	All	All	All
	All conifers	E–N	5-9	All	2,3,4 or null	G,M,P	All	All	All
	All conifers	E–N	5-9	≤ 2	All	G,M,P	< 200	All	All
	All conifers	E–N	5-9	≤ 2	All	P	≥ 200	All	All
T (Sites with Density Problems)	All conifers	E–N	5-9	All	2 – 4	G,M,P	All	All	All
	Pli	L–N	1-4	All	All	G,M,P	All	DI or null	Not L

[1] Growth Type Group
[2] Attribute_CD and Activity Code describe disturbances and activities that have occurred in the polygon (e.g. Attribute_CD – DI = Disturbance, PL = planting, ST = stand tending, L = logged)

A review of the HMM attributes conducted following the initial netdown found that approximately 20,000 ha of THLB had no HMM secondary stand quality code information. Ministry of Forests and Range District staff conducted a detailed review of the original HMM procedures and found that some stands were not being classified due to gaps in the HMM procedure. These gaps were classified according to the procedure developed by District staff, which is outlined in Table 19. Following this re-classification the netdown was re-run. All of the netdown figures in this data package represent the most recent version of the netdown but differ from figures provided in the data package submitted for public and First Nation's review and comment.

Table 19: Logic for HMM Stand Quality Code Gap Assignments

Secondary Code	GTG	Age Class or Age	Ht Class	Stocking Class	Site Class	Volume (m^3/ha)	Cw+S+Pli >= 20%	Cw+S+Pli >= 30%	Attribute Code	Activity Code
S	G, L, M	3-4	2-3	0, 1	M, G	>=200	YES	YES	All	All
	E to N	0-4	All	All	G, M, P	<200	All	All	PL, SI, ST	All
	F, G	8-9	3	R*	P	<200	All	All	Not null	All
P	F to H	8	3	1	P	>=200	NO	NO	All	All
L^	E to N	>=5	All	All	G, M, P	<200	All	All	Null	Null
X**	All	<= 26 yrs	All	All	All	0	All	All	All	All

* R – a stocking class of R is indicative of a stand that has been partially (25 – 75%) logged. Mature volume per hectare was consistently <100 m^3 for the stands captured in this category, indicating the stand was likely >50% logged. Logged stands are assumed to get planted thus should automatically be assigned to the Sawlog category.

** X – a secondary code of X was assigned to all stands <26 years of age, or had volume per hectare = 0. These stands are immature or NSR, and didn't need to be coded to S, M, P, D, L or T because they'll be assigned directly to a managed stand yield curve.

^L – these stands were coded Low because with these parameters they should easily have achieved volumes >200 m^3/ha. Some unknown factor is affecting the merchantability of these stands.

5.10 Sites with Low Timber Growing Potential

Sites may have low productivity either because of inherent site factors (nutrient availability, exposure, excessive moisture, etc.), or because they are not fully occupied by commercial tree species. Stands that do not currently have sufficient timber volumes to make harvesting feasible and are not likely to achieve a harvestable volume over time are excluded from the timber harvesting land base (Table 20). Sites with low timber growing potential are defined through HMM stand quality codes (see Table 18 above) and are removed from the THLB. All stands with a harvesting history are included in the timber harvesting land base.

Table 20: Low Timber Growing Potential

Logging History	Primary HMM Code	Secondary HMM Code	Gross Area (ha)	Reduction (%)
No	All	L	67,532	100

Data Source and Comments:
See Section 5.9.

5.11 Problem Forest Types

Problem forest types are stands that are physically operable and exceed low site criteria yet are not currently utilized or have marginal merchantability. These types are defined based on HMM stand quality classifications (see Table 18 above) and are excluded from the timber harvesting land base (Table 21).

A review of current management practices reveals that all coniferous stands with fewer than 76 stems/ha with a diameter at breast height of at least 27 cm are not harvested. A further subdivision of this category (stocking class 3 and 4) applies to lodgepole pine leading stands to characterize stagnant (stocking class 3) stands or stands with low density and few large stems (stocking class 4).

Table 21: Problem Forest Types

Logging History	Primary HMM Code	Secondary HMM Code	Gross Area (ha)	Reduction (%)
No	C,G	T	7,560	100

Data Source and Comments:
See Section 5.9.

5.12 Deciduous Leading Stands

Deciduous-leading stands that do not contain sufficient coniferous volume are considered unmerchantable and are removed from the THLB (Table 22). Cottonwood/coniferous stands (ITG 35) remain in the THLB as they are thought to contain sufficient coniferous volume to be merchantable. These stands are defined through a combination of HMM stand quality codes (see Table 18 above) and inventory type group. Stands are removed from the THLB irrespective of harvest history.

Table 22: Deciduous Stands

Primary HMM Code	Secondary HMM Code	Inventory Type Groups	Gross Area (ha)	Reduction (%)
All	D	Not 35	740	100
All	All	36-42	67,593	100
Total			**68,333**	

Netdown categories for inoperable areas, areas with low timber growing potential, problem forest types, and deciduous-leading stands are defined primarily through HMM classifications. Table 23 provides a summary of these netdown categories.

Table 23: Summary of HMM-based Netdown

Logging History	Upper Operability Limit	Primary HMM Code	Secondary HMM Code	ITG	Netdown Category	Gross Area (ha)	Reduction (%)
No	Inaccessible	All	All	All	Inoperable	340,567	100
	Accessible	I	All	All	Inoperable	7,241	100
		C	M, P	All	Inoperable	107,947	100
		C, G	L	All	Low Timber Growing Potential	67,532	100
		C, G	T	All	Problem Forest Types	7,560	100
		G	S, M, P	All	None	414,408	0
		C	S	All	None	92,463	0
		Blank	All	All	None	16,804	0
All		C, G	D	Not 35	Deciduous	68,333	100
		C, G	D	35	None	2,569	0
Yes	All	All	Not D	All	None	99,432	0
Total						**1,224,856**	

Note: only the HMM portion of the deciduous netdown is shown in this table. See Table 22 for the complete deciduous netdown.

5.13 Riparian Reserves and Management Zones

Table 24 lists the area reductions that will be applied to account for riparian reserve zones and riparian management zones along streams and around lakes and wetlands. These areas include:

- Areas identified by a stream classification and mapping project for riparian reserve zones or riparian management zones under the Forest and Range Practices Act;
- Riparian no-harvest areas from the WBSRMP; and
- Floodplain areas.

Table 24: Riparian Management Area Definitions

Riparian Class	Description	Gradient	RRZ (m)	RRZ Reduction (%)	RMZ (m)	RMZ Reduction (%)
Low bench	Floodplains of Kitwanga, Kitseguecla, Kispiox, Suskwa, Sicintine, Shelagyote, Cranberry rivers	All	All	100	0	0
Mid bench	Floodplains of Kitwanga, Kitseguecla, Kispiox, Suskwa, Sicintine, Shelagyote, Cranberry rivers	All	All	100	0	0
High bench	Floodplains of Kitwanga, Kitseguecla, Kispiox, Suskwa, Sicintine, Shelagyote, Cranberry rivers	All	0	0	0	0
S1	Skeena, Kispiox, Babine, Sicintine, Kitseguecla, Kitwanga and Suskwa rivers	All	50	100	20	25
S2 / S3	River/stream left bank and right bank	All	25	100	20	25
S3 / S4	River/stream — definite	< 20%	10	100	25	25
S4	River/stream — indefinite and intermittent	< 20%	0	0	30	25
S6	River/stream — definite, indefinite, and intermittent	> 20%	0	0	20	5
L1	> 5 ha	N/A	10	100	0	0
L3	< 5 ha	N/A	0	0	30	25
W1	> 5 ha	N/A	10	100	40	15
W3	< 5 ha	N/A	0	0	30	15
W5	Wetland complex	N/A	10	100	40	15

Table 25 shows the areas removed in each of the riparian categories based on the specification from Table 24.

Table 25: Riparian Management Areas

Riparian Class	Riparian Management Area	Gross Area (ha)
Low bench	RRZ	11,758
Mid bench	RRZ	3,790
S1,S2,S3/S4,S4,S6	RRZ	22,213
	RMZ	120,534
L1,L3	RRZ	481
	RMZ	682
W1,W3,W5	RRZ	2,230
	RMZ	9,911
None	None	1,053,256
Total		**1,224,856**

Data Source and Comments

A GIS analysis was completed for the Kispiox TSA in 1999 using TRIM and slope data to determine the extent of riparian area in the TSA. Fish inventory information was incorporated into the analysis, where available. The resulting map layer consists of stream buffers that identify riparian reserve zones (RRZ) and riparian management zones (RMZ). The assumptions used to

create the coverage are presented in the above table and are consistent with the *Forest and Range Practices Act*. Combination classes (e.g. S2/S3) are established where there are insufficient unique features for the GIS to separate one riparian class from another. The RRZ/RMZ widths are averaged (i.e. using the S2/S3 RRZ example: the S2 RRZ is 30 m and the S3 RRZ is 20 m. The RRZ width is averaged to 25 m).

A separate floodplain mapping project identified high, mid, and low-bench areas. Mid and low benches are treated as an RRZ.

High Bench floodplains received a 25% THLB reduction in TSR II. Demonstrated harvest performance in these areas, as well as anticipated direction from the Kispiox FRPA project, suggest that these areas should not be removed from the THLB.

During the public and First Nations review and comment period the Department of Fisheries and Oceans identified that fluvial fan areas were not addressed in the data package and suggested that harvesting constraints are necessary on unstable fan areas in order to protect vulnerable fish habitat. Some preliminary mapping of fluvial fan areas has been conducted on a small portion of the TSA and some of these areas fall within the THLB as it is currently defined. District staff suggest that some of these areas should be excluded from the THLB due to their potential impacts on fish habitat. The District is in the midst of contracting the mapping of sediment sources across the TSA. This project will be expanded to include fluvial fan mapping. While this information will not be available to be included in the base case it will likely be available to the Chief Forester at the time of the AAC determination.

5.14 Exclusion of Specific Geographically Defined Areas

Table 26 describes additional areas to be excluded from the timber harvesting land base to account for area exclusions not discussed in previous sections.

Table 26: Exclusion of Specific Geographically Defined Areas

Area Description	Excluded Area (ha)	Reason For Exclusion	Gross Area (ha)	Reduction (%)
Mill Creek Sensitive Area — Cedar stand and reserve zone	All	No Harvest	117	100
WBSRMP - Core Ecosystems	All		19,346	100
WBSRMP – Shelagyote / Babine Tourism Node	All		2,211	100
WBSRMP - Atna / Shelagyote SMZ	All		63,184	100
WBSRMP – 200 m area around Gunanoot Lake	All		300	100
Total			**85,158**	

Data Source and Comments:

The *Mill Creek Sensitive Area Plan,* approved by the District Manager in 1998, reserves a rare cedar stand and adjacent reserve zone from harvest.

Core ecosystems are defined in the WBSRMP as, *"Management zones identified for the express purpose of maintaining structural and functional features of old forest ecosystems. Zone includes Old Growth Management Areas (OGMAs) and Treatment Units 2 from the Babine LRUP."* These areas are spatially identified in the *WBSRMP Biodiversity* coverage. These stands are to be managed on a 1000-year rotation as defined in the WBSRMP. However, given this, it is unlikely that any harvesting will occur in these stands and they are excluded from the THLB.

The *Shelagyote/Babine Tourism Node* is identified in the WBSRMP Sustainable Resource Management Plan Zones (srmp_zn) coverage.

Atna/Shelagote SMZ is defined where either the PRIMARY or SECONDARY field in the Special Management Zones (smz) coverage equals "Atna-Shelagyote – WBSRMP"

As directed by the WBSRMP a 200 m no harvest buffer around Gunanoot Lake is defined and has been excluded from the THLB to maintain Gunanoot Lake in a wilderness setting.

5.15 Roads, Trails, and Landings

As shown in Table 27, separate estimates are made to reflect the loss in productive forest land due to existing and future roads, trails and landings (RTL). Existing RTL estimates are applied as reductions to the current THLB. Future RTL reductions are applied after stands are harvested for the first time in the timber supply model.

Table 27: Estimates for Existing and Future Roads, Trails, and Landings

Existing RTL's	Road Width (m)	Gross Area (ha)	Reduction (%)
Logging roads	15.5	35,010	100
Trails	14	14,060	100
Secondary roads	30	5,790	100
Highways	40	5,062	100
Landings	n/a	108,796	1.4
Total		**168,718**	
Future RTL's			

Data Source and Comments:

All available road data has been buffered according to the road widths in the above table. These areas are then spatially removed from the THLB.

The area occupied by landings was obtained from silviculture records and Soil Conservation Surveys conducted in 1995, 1997, and 1998. These surveys show that the average area occupied by landings was 1.4% of the gross cutblock area surveyed. All areas with a harvesting history are reduced by 1.4% to account for landings.

Future Roads, Trails and Landings

Future roads, trails and landing reductions address the area that will be permanently removed from production in the future as areas are harvested. The Soil Conservation Surveys also showed that 4.4% of the gross cutblock area is occupied by RTLs. This reduction is applied as stands without a previous harvesting history are harvested for the first time.

5.16 Kispiox LRMP Goat and Grizzly Habitat

Under the KLHO, there are to be no harvesting activities within areas identified as winter range for mountain goat, and no alteration of critical grizzly bear habitat shall occur unless no practicable alternative exists. Areas identified as mountain goat winter range and critical grizzly bear habitats are removed from the THLB.

Table 28: KLHO Goat and Grizzly Habitat

Description	Gross Area (ha)	Reduction (%)
KLHO Goat and Grizzly Habitat	94,211	100

Data Source and Comments:

Areas will be removed from the THLB for mountain goat winter range with the exception of the following: worker safety for the felling of danger trees, felling for guy line anchors, or felling of tail holds; or, to access timber or other resources outside of the winter range, where no practicable alternative exists.

6.0 Current Forest Management Assumptions

6.1 Utilization Levels

Table 29 shows the utilization levels that define the maximum stump height, minimum top diameter (inside bark) and minimum diameter at breast height by species that are used in the analysis to calculate merchantable volume.

Table 29: Utilization Levels

Analysis Unit	Utilization		
	Minimum DBH (cm)	Maximum Stump Height (cm)	Minimum Top DIB (cm)
All pine	12.5	30	10
All other species	17.5	30	10

Data Source and Comments:

The above table represents current management practices; that is, Interior Utilization Specifications.

6.2 Volume Exclusions for Mixed Species Stands

The purpose of this section is to identify the proportion of mixed species stands that are unmerchantable. The unharvested portion of a stand does not contribute to the estimated stand volume and thereby does not contribute to timber supply. Table 30 shows the percent exclusion for the deciduous portion of mixed species stands.

Table 30: Volume Exclusions for Mixed Species Types

Inventory Type Group	Species	Volume Exclusion (%)
All	All deciduous except cottonwood	100
All	Cottonwood	50

Table 31 shows the percent reduction applied to the yields of each managed stand analysis unit to account for the deciduous component of mixed species stands.

Table 31: Deciduous Volume Reduction

Natural Stand Analysis Unit	% Volume Reduction	Natural Stand Analysis Unit	% Volume Reduction
01M	1	51P	-
01S	11	51S	3
02M	9	52M	5
02S	11	52P	1
03M	6	52S	2
03S	7	53M	1
04S	6	53P	-
05S	7	53S	1
06M	-	55P	-
06S	4	55S	3
07S	10	56M	-
08M	9	56P	-
08S	17	56S	1
09M	12	58M	1
09S	13	58S	14
10S	19	59M	2
11S	11	59P	1
12M	2	59S	8
12S	5	61S	3
14D	41	62M	1
14M	35	62S	3
15D	36		
15M	32		

Data Source and Comments:

Cottonwood is the only deciduous species that is commercially harvested along with coniferous species. Since much of the volume is left standing for biodiversity objectives or felled to waste, it is estimated that only 50% of the cottonwood volume in mixed wood stands is utilized. This proportion is based on a comparison of cruised and scale volumes for cottonwood in a sample of mixedwood stands that was conducted as part of the TSR II process.

6.3 Minimum Harvestable Age

The minimum harvestable age (MHA) is the minimum age at which a stand is considered to be harvestable. While harvesting may occur in stands at the minimum ages to meet forest level objectives (e.g. maintaining overall harvest levels for a short period of time or avoiding large changes in harvest levels), most stands will not be harvested until past the minimum ages due to management objectives for other resource values (e.g. requirements for the retention of older forest). The youngest age at which stands have achieved both a merchantable volume of at least 200 m^3/ha and an average stand diameter of 20 cm at breast height will be the minimum harvest age. Table 32 and Table 33 show the age in which merchantability criteria are met for natural and managed stand analysis units respectively.

Table 32: Minimum Harvest Age - Natural Stand Analysis Units

Natural Stand Analysis Unit	Age of Achieving Minimum Merchantable Criteria (Years)			Natural Stand Analysis Unit	Age of Achieving Minimum Merchantable Criteria (Years)		
	Volume	Diameter	Both		Volume	Diameter	Both
01M	70	30	70	51P	55	30	55
01S	65	30	65	51S	60	30	60
02M	85	45	85	52M	85	50	85
02S	80	45	80	52P	75	50	75
03M	105	60	105	52S	80	45	80
03S	110	60	110	53M	125	75	125
04S	70	30	70	53P	125	80	125
05S	95	35	95	53S	100	60	100
06M	125	55	125	55P	85	35	85
06S	130	55	130	55S	90	35	90
07S	70	35	70	56M	170	60	170
08M	90	45	90	56P	170	65	170
08S	90	45	90	56S	125	50	125
09M	170	75	170	58M	85	40	85
09S	130	65	130	58S	95	45	95
10S	75	50	75	59M	145	70	145
11S	90	65	90	59P	185	85	185
12M	120	95	120	59S	135	65	135
12S	110	85	110	61S	90	40	90
14D	n/a[1]	25	50[1]	62M	125	55	125
14M	n/a[1]	25	55[1]	62S	125	60	125
15D	n/a[1]	40	85[1]				
15M	n/a[1]	35	80[1]				

[1]These stands do not meet the minimum volume criteria throughout the 250 years of the yield curve, primarily because they contain a significant percentage of deciduous volume which has been removed from the yield curve (Section 6.2). For these curves the minimum harvest age is based on achieving a minimum averages stand diameter of 20 cm and the age in which culmination mean annual increment (CMAI) is achieved.

Table 33: Minimum Harvest Age - Managed Stand Analysis Units

Managed Stand Analysis Unit	Age of Achieving Minimum Merchantable Criteria (Years)		
	Volume	Diameter	Both
101	50	60	60
102	75	90	90
103	120	155	155
104	65	80	80
105	70	85	85
106	120	135	135
107	35	40	40
108	60	70	70
109	90	120	120
110	45	55	55
111	65	80	80
112	125	155	155
113	75	100	100
114	45	55	55
115	60	65	65
DOTH1	65	75	75
DOTH2	70	80	80
DOTH3	70	95	95

6.4 Harvest Scheduling

Harvest scheduling decisions will be based on maximizing harvest volume over the entire planning horizon subject to the management objectives and forest cover requirements described within this data package. The age in which a particular stand is harvested will be based on how these combined objectives are best achieved subject to minimum harvest age requirements, and not on harvest rules such as oldest first or relatively oldest first.

6.5 Harvest Flow Objectives

The harvest flow objectives for the base case analysis are as to maintain the current AAC of 977,000 m^3/yr for as long as possible before declining at a maximum rate of 10% per decade to a long-term sustainable harvest level. Harvest flow objectives for the base case also include a requirement for a non-declining supply of sawlog volume throughout the planning horizon.

6.6 Silviculture Systems

All recent harvesting in the Kispiox TSA has used a clearcut silviculture system. This trend is expected to continue into the foreseeable future. As such all harvesting will be modelled as under a clearcut system.

6.7 Unsalvaged Losses

Table 34 shows the estimate of average annual unsalvaged volume loss due to insect and disease epidemics, fires, wind damage or other agents on the timber harvesting land base. The unsalvaged loss column reflects only areas where the volume is not expected to be recovered or salvaged.

Table 34: Unsalvaged Losses

Cause Of Loss	Annual Unsalvaged Loss (m^3/yr)
Wildfire	12,105
Windthrow	735
Balsam bark beetle	0
Tomentosus	0
Total	**12,840**

Data Source and Comments:

Wildfire

Data was obtained from the inventory file for fires from 1978 to 1988, and from the Northwest Fire Centre for the period 1989 to 1998. The total activity period for this analysis covers the years 1978 to 1998 (21 years). The inventory file contains records of wildfire and salvage activity beginning in 1958. Wildfire/salvage activity for 1958 to 1977 was not used in data compilation due to the extraordinarily high fire activity during 1958 to 1961 period and the absence of reliable data covering the period 1962 to1977 (i.e., large number of fires and area burned and no records available respectively). Data selection was limited to the timber harvesting land base of the Kispiox TSA.

To estimate the volume losses, the total area burned or blown down was calculated. For the same areas, the size of the area salvaged was calculated. The difference represents the unsalvaged area. Volume losses were estimated by using the average volume per hectare for all merchantable stands in the TSA from the draft *Kispiox TSA Inventory Audit* (387 m^3/ha).

The above assumptions and results, developed for TSR II, were reviewed by District staff and found to be appropriate for TSR III.

Windthrow

Data was extracted from the inventory, and the total activity period covers 1971 to 1991 (21 years). No records related to windthrow are available in the inventory for periods prior to 1971 or after 1991. Data selection was limited to the timber harvesting land base of the Kispiox TSA. Cutblock-edge blowdown was not quantified, as no reliable data sources exist.

The above assumptions and results, developed for TSR II, were reviewed by District staff and found to be appropriate for TSR III.

Tomentosus Root Disease and Balsam Bark Beetle

Studies conducted prior to TSR II estimate annual unsalvaged volume of 52,000 m^3/yr due to tomentosus root disease. Unsalvaged losses due to balsam bark beetle are estimated at 138,535 m^3/yr for the first decade and 13,850 m^3/yr for subsequent decades. As part of TSR II a review of VDYP demonstrates that these losses are factored into VDYP yield estimates and as such, no additional volume reductions are required. There is still some uncertainty regarding the appropriate losses to assume for managed stands and the extent to which these losses are accounted for within managed stand yield estimates in the mid to long-term. Operational adjustment factor (OAF) reductions applied to managed stand yield curves may accommodate some of these losses. Operational adjustment factor reductions for tomentosus root disease in managed spruce leading plantations are being refined. These refinements may lead to increases in OAF2 reductions for managed stands which may be examined through sensitivity analysis if the updated information becomes available within the TSR schedule.

The Regional Entomologist is currently conducting a study to re-assess balsam bark beetle losses. These results can be used in future timber supply analyses or may be considered as part of the determination process.

6.8 Regeneration Assumptions in Managed Stands

Recent plantations and future stands will be grown on MSYTs produced using the Forest Service TIPSY growth and yield model. The regeneration assumptions for each existing analysis unit group are shown in Table 35. Where existing analysis units are separated according to stand quality codes (Sawlog, Marginal Sawlog, Pulp log and Deciduous) from the HMM project, it is assumed that all harvested stands regenerate to sawlog-quality stands. Therefore all existing natural stands within a particular analysis unit group will regenerate to the same regenerated analysis unit group. For example, stands with existing analysis units 01P, 01M, and 01S will all regenerate to regenerated analysis unit 101.

Table 35: Regeneration Assumptions by Analysis Unit

Existing AU Group	Regen. Analysis Unit	Description	Regen. Delay (yrs)	OAF[1]%		Method		Species		Initial Density (sph)
				1	2	Type	%	Code	%	
01, 101, 51, 151	101	Hw/Cw-good	2	15	5	Plant	100	Sw Hw Pl	40 30 30	3000
02, 102, 52, 152	102	Hw/Cw – medium	2	15	5	Plant	100	Hw Sw Pl	40 40 20	3000
03, 103, 53, 153	103	Hw/Cw -poor	2	15	5	Plant	100	Hw Sw Pl	40 40 20	3000
04, 104, 54, 154	104	Fir-good	2	15	5	Plant	100	Sw Hw	60 40	3000
05, 105, 55, 155	105	Fir-medium	2	15	5	Plant	100	Sw Bl Hw Pl	60 15 15 10	3000
06, 106, 56, 156	106	Fir-poor	2	15	5	Plant	100	Sw Bl	80 20	3000
07, 107, 57, 157	107	Spruce-good	2	15	5	Plant	100	Sw Pl	70 30	3000
08, 108, 58, 158	108	Spruce-medium	2	15	5	Plant	100	Sw Pl Hw	40 40 20	3000
09, 109, 59, 159	109	Spruce-poor	2	15	5	Plant	100	Hw Sw Cw	70 20 10	3000
10, 110, 60, 160	110	Pine-good	2	15	5	Plant	100	Pl Sw	50 50	3000
11, 111, 61, 161	111	Pine medium	2	15	5	Plant	100	Pl Sw	50 50	3000
12, 112, 62, 162	112	Pine-poor	2	15	5	Plant	100	Pl Sw Bl	50 35 15	3000
13, 113	113	Cottonwood–coniferous-good	2	15	5	Plant	100	Hw Sw	80 20	3000
14, 114	114	Cottonwood–coniferous-medium	2	15	5	Plant	100	Sw Cw Hw	70 15 15	3000
15, 115	115	Cottonwood–coniferous-poor	2	15	5	Plant	100	Sw	100	3000

[1]Operational adjustment factors (OAFs) are used to adjust timber yield estimates to account for operational factors. OAF1 is a constant percentage reduction to account for small unproductive areas within stands, uneven stem distribution and endemic losses that do not increase with age. OAF2 accounts for losses that increase with stand age, for example decay due to disease. In this case OAF2 increases from 0 at stand establishment and passes through 5% at 100 years of age.

Data Source and Comments:

All the land in the Kispiox TSA is planted with conifers. However, the records of crop development indicate that a proportion of land still develops into stands with different composition than anticipated. This evolution can be attributed to a combination of natural

regeneration and release of advanced natural regeneration. This is most obvious in two cases. Harvested hemlock timber types, although typically planted with spruce and pine, develop at 5-20 years into leading-hemlock stands. The other case is balsam (fir) in the ESSF zones. Fir has not been planted historically, however, these stands have frequently returned to leading fir. Natural ingress of all species is common in the ICH zone.

There are occasions, specific to backlog blocks, where the deciduous component is considered acceptable. This is evident where previous timber types were deciduous leading. However, deciduous ingress will not be modelled explicitly. Deciduous ingress, if any, cannot exceed 10% in managed stands, so it is assumed that it does not compete with the coniferous species at the densities shown in Table 35. It is further assumed that the deciduous volume of managed stands will not be harvested in the future, so it is not included in the regeneration specifications.

Licensees in the TSA have conducted a review of silviculture records for planting between 2000 and 2004 with projections for 2005. Average regeneration delay values were reported by subzone and varied between 2.0 and 2.2 years across the TSA. A 2-year regeneration delay will be incorporated into all managed stand yields.

Regeneration species composition assumptions from TSR II were reviewed by licensee and District staff. Since TSR II, the amount of lodgepole pine planted in the TSA has been reduced due to the incidence of Dothistroma needle blight in pine plantations. TSR II regenerated species composition assumptions will be used with the exception of regenerated analysis units 110, 111, and 113 where the pine percentage is reduced to 50% and the change distributed among 2nd and 3rd species if applicable.

A density of 3,000 stems/ha was used in TSR II to account for planting densities of 1,200 to 1,600, plus ingress. As part of TSR II, planting densities for the stands planted between 1998 and 2000, in both the Kispiox and neighbouring Cranberry TSAs combined indicate that first-plant blocks are being planted to 1,338 stems/ha in the ICH and 1,579 stems/ha in the ESSF. It is expected that licensees will only space when density exceeds the maximum density of 10,000 stems/ha allowed in the standards. These assumptions have been reviewed by licensee and Forest District staff and are deemed to be valid for this analysis.

A 2002 review of the Seedling Planning and Registry (SPAR) system, conducted for TSR II , found that 12% of all trees planted in the TSA were from Class A seed and that the use of Class A seed increased from 3% in 1998 to 32% in 2002. During this time the use of Class A seed was restricted to lodgepole pine. Based on the endemic and epidemic pest problems associated with pine volumes gains associated with genetically improved stock were not incorporated in TSR II yields.

A similar review of the SPAR sowing requests for 2003 to 2005 (and partial requests for 2006) shows a reduced level of class A seed use in the TSA (2003: 2.10%; 2004: 00.0%; 2005: 1.92%; 2006(incomplete): 0.00%), primarily due to a lack of available seed cause by reduced harvest levels in the TSA. As such, volume gains associated with genetically improved stock have not been included in yields estimates.

6.9 Not Satisfactorily Restocked Areas (NSR)

Some land classified in the Kispiox TSA VRI as type identity 4 or 9 is included in the current THLB. These type identities indicate stands that have not achieved satisfactorily restocked levels. Areas with previous logging history but without species information in the inventory are

also classified as NSR. The Ministry of Forests and Range RESULTS database also tracks the amount of NSR and is considered to be the most up-to-date information with respect to NSR stands. RESULTS opening linework was incorporated into the resultant database, creating a spatial link between the RESULTS database and the resultant database. Table 36 shows the gross forested area of NSR as indicated by the inventory as well as the area of the openings containing NSR as indicated by the results database.

Table 36: Inventory / Results NSR Areas

Inventory NSR	Results NSR Category	Gross Forested Area (ha)	Modelling Assumption
Projected type ID 4 or 9 or no species information	None	5,959	Currently 100% restocked (zero years old)
	Current	1,565	100% restocked within 5 years
	Backlog	804	100% restocked within 15 years (1/3 every 5 years)
All others	Current	2,004	100% restocked within 5 years
All others	Backlog	2,323	100% restocked within 15 years (1/3 every 5 years)
Total NSR		**12,656**	

The RESULTS database tracks NSR at the standards unit (SU) level, which are subdivisions of individual openings. Standard units are not identified spatially in the resultant database and therefore individual openings may be partially NSR and partially stocked. Table 37 shows the actual area of NSR from the RESULTS database. These numbers represent only the area of the SU which are considered NSR whereas the areas in Table 36 show the entire area of the openings that have some component of NSR. This difference in spatial resolution is addressed in the model by creating an area-weighted age for each opening that contains NSR. In calculating the area-weighted age, the NSR portion of the opening receives a negative age based on the number of years before the stand is expected to be restocked; the age of the stocked portion of the opening is based on the actual age of that portion of the opening. Using this method, the entire portion of the stand is treated as NSR with an age that reflects the average for that stand.

Table 37: NSR Area Information from the Results Database

NSR Category	NSR Total Area (ha)	NSR of Natural Origin (ha)	Plantable NSR Area (ha)	Non-Plantable NSR Area (ha)
Backlog	1,833	1,043	645	145
Current	2,419	179	2,233	8
Total	**4,252**	**1,222**	**2,878**	**153**

Data Source and Comments:

Backlog NSR is defined as NSR stands that were harvested prior to October 1987. Planting backlog NSR is subject to funding pressures. In TSR II, 1,124 ha of backlog NSR was identified and was estimated to be completely restocked by 2010.

All backlog NSR areas are expected to be fully stocked over the next 15 years (by 2020) at a rate of approximately 1/3 each 5-year period. Because this is a spatial analysis and because we don't know when specific stands will become restocked, stands are randomly assigned which 5-year period they will become restocked in.

6.10 Wildlife Trees and Wildlife Tree Patches

The WBSRMP specifies the percentage of cutblock area to be retained in wildlife tree patches (WTPs) over the rotation (Table 38). However, a review of silviculture records across the entire TSA, conducted by licencee and District staff demonstrate that a higher level percentage of cut blocks are being retained as WTPs.

Table 38: WBSRMP WTP Retention Targets

Watershed	% of Cutblock Area Required as Wildlife Tree Patches		
	BEC subzone	Blocks < 80 ha	Blocks > 80 ha
Shelagyote	ESSFwv	1	1.5 – 2
Babine River	ESSFmc	7	10.5 – 14
	ICHmc	1	1.5 – 2
	SBSmc	3	4.5 – 6
Gail-Thomlinson	ESSFwv	1	1.5 – 2
Nichyeskwa[1]	ESSFmc	5	7.5 – 10
	SBSmc	3	4.5 – 6
Shedin	ESSFwv	1	1.5 – 2
Hanawald	ESSFmc	7	10.5 – 14
	ICHmc	3	4.5 – 6
	SBSmc	5	7.5 - 10

[1] Part of the Nichyeskwa watershed is in the Bulkley TSA. Targets for wildlife tree retention are based on the entire watershed.

Based on the above mentioned review of WTP retention, the assumptions used for TSR II remain valid for TSR III. As such, all stand volumes are reduced by 10.9% to account for the retention of WTP (Table 39). These reductions are applied in the timber supply model and are not incorporated into to the yields provided in Appendix I and Appendix II.

Table 39: Reductions to Reflect Retention for Wildlife Trees and Other Reserves

Management Zone	Analysis Unit	Persistence	% Recommended In LUPG	Residual Volume Estimate On The Timber Harvesting Land Base (%)
All	All	Long term	3	10.9

Data Source and Comments:

Wildlife tree patch (WTP) retention requirements for the Kispiox Forest District are outlined in a biodiversity district operating procedure (DOP). This DOP is consistent with the *Draft Provincial Wildlife Tree Policy and Management Recommendations* (December 1999) prepared by the Forest Practices Branch (MoF) and the Habitat Branch (MELP). Current management practices reflect the DOP.

Within the TSA, forest patches are reserved from harvest for a number of reasons. These include, but are not limited to, maintenance of riparian habitat around small unmapped water bodies, removal of non-productive and inoperable areas, and management for other non-timber resources.

A review of all blocks logged between 1992 and 1997 with in-block retention (148 blocks), showed that on average, 7.1% was retained as wildlife tree patches. A subsequent review was conducted to calculate the percentage of WTP retained on 179 blocks harvested between January 1st, 1997 and August 1st, 2000. This second review shows that WTPs occupy about 11% of the net forested area of the blocks. Patches contributing only to stand-level retention (< 2 ha) account for 3.8% of the net forested area, while patches contributing to both stand- and landscape-level retention (> 2 ha) account for 7.1% of the total. For the purpose of this timber supply review, the results from the second WTP analysis will be modeled. Estimates of wildlife tree patch retention over the next five years, as identified in forest development plans, show that the per cent retention indicated in the second study will be maintained or increased.

The following areas were not included in the calculation of WTP: aggregate harvest units larger than 150 ha, partial cut areas with a mature residual component, areas reserved for future entry, and areas already accounted for in timber supply deductions (e.g. Telegraph Trail, and riparian areas identified on TRIM maps). Where non-productive or non-forested areas were not quantifiable in the area summary, maps, or the silviculture prescription, it was assumed that the entire reserve was forested. Where non-forested or non-productive areas were apparent within a reserve, but had been separated in the area summary, these areas were measured and deducted from the forested area. Thus, the net forested area used in WTP calculations does not include non-commercial, non-productive, and inoperable areas, riparian reserves and management zones, cultural heritage features, or roads.

Table A3.1 of the *LUPG* recommends an average 3% WTP retention for the Kispiox TSA. Current management practice is 7.9% higher than recommended in the guidebook for the following reasons:

1. Areas that are unavailable for timber harvesting are identified during silviculture prescription development. These may be small riparian areas, low productivity sites, or wet soils that are situated within a forest stand that is otherwise classified as available for timber harvesting using forest cover inventory attributes.

2. For timber supply review, the percent retention would normally be reduced to account for overlap with areas outside of the timber harvesting land base (e.g. riparian areas, low timber productivity). A review of WTPs identified in silviculture prescriptions compared with the forest inventory shows that these riparian areas, low productivity sites and wet soils are not identified on the forest inventory and are not accounted for by any other netdown. The difference in scales used for silviculture prescription development (1:5,000) and the forest inventory (1:20,000) is the cause of this discrepancy.

3. A large percentage of the WTPs (7.1%) meet landscape-level biodiversity objectives.

In the timber supply model, the 7.1% portion of the retained patches that contribute to landscape-level biodiversity will also contribute to the old-growth forest cover requirements. A sensitivity analysis will examine the impact of a 3.8% WTP requirement (those that contribute only to stand-level biodiversity) in conjunction with these old-growth forest cover requirements.

6.11 Dothistroma Needle Blight

Dothistroma needle blight is affecting lodgepole pine plantations in the Kispiox TSA. This disease can reduce growth and cause plantation failure. Aerial surveys conducted before the TSR II determination shows that, of the 21,000 ha of pine plantations in the Kispiox TSA, about 75% of the area is affected to some degree by dothistroma. At the time of the surveys, just under 10% of the stands were exhibiting some stem mortality. Based on this, the Chief Forester estimated that the impact on timber supply from dothistroma could be as much as 6.5%. Since TSR II, a number of additional aerial and ground surveys have been conducted in an attempt to quantify these impacts.

The *Dothistroma Needle Blight Strategic Plan 2005/2006* (Tika Consulting and Kingfisher Forest Sciences, 2005) summarizes aerial and ground survey data from pine plantations from 2003 to 2004 and classifies stands into different categories based on degree to which the stand has been affected, or is likely to be affected by Dothistroma. This data has been incorporated into the resultant database and is used to identify the stands affected by Dothistroma in the model. In addition, The Ministry of Forests RESULTS database was queried to help identify stands that are likely to be affected by Dothistorma. These stands are:

- Within the ICH BEC zone;
- Contain any component of pine; and are
- Age <= 30 years

Of these stands:

- 5% will assume to lose 100% of the pine component in the next five years;
- 40% will assume to lose 100% of the pine component in the next 15 years;
- The remaining 55% is assumed to be growing normally.

The areas identified in the *Dothistroma Needle Blight Strategic Plan 2005/2006* as having significant dothistroma levels are included in the 5% anticipated to lose their pine component in the next 5 years. The areas identified in the *Dothistroma Needle Blight Strategic Plan 2005/2006* as having some dothistroma levels will be included in the 40% anticipated to lose their pine component in the next 15 years.

Stands affected by dothistroma that have < 75% pine will have their volumes and heights reduced based on the loss of the percentage of pine in the stand. Stands with >= 75% pine will be converted to a Balsam Fir / Hemlock / Cedar stand one year of age.

The threshold value of 75% pine represents the amount of pine in a stand that would drop the stand below minimum stocking standards if the entire pine component was killed. Stands with less than 78% pine could still maintain the minimum stocking of 700 stems/ha, assuming an initial density of 3,000 stems/ha, and that the remaining trees in the stand are still considered to be preferred or acceptable. A threshold value of 75% was used (instead of 78%) to include a margin of error.

It is expected that the majority of affected stands will become re-stocked through either natural or artificial regeneration and therefore no overall yield reduction has been applied to these stands. The primary effect on timber supply is through extended regeneration delays which has been applied through an age adjustment of affected stands. The removal of the pine component has been addressed through conversion to non-pine managed stand analysis units.

The areas in Table 40 are assigned to a regeneration analysis unit and have had their ages adjusted based on the expected time before the stand might be restocked through natural regeneration.

Table 40: Dothistroma Affected Areas

Dothistroma Subset	Regeneration AU
Expected to lose 100% of the Pine component in the next 15 years (40% of the affected area)	104
	106
	109
	113
	114
	DOTH1
	DOTH2
	DOTH3
Subtotal	
Expected to lose 100% of the Pine component in the next 5 years (5% of the affected area)	104
	106
	109
	114
	DOTH1
	DOTH2
Subtotal	
Total	

Where possible, dothistroma-affected stands have been converted to existing managed stand analysis units. However, three new managed stand analysis units have been created to reflect stands once the pine component has been removed. The yield assumptions for these analysis units are shown in Table 41.

Table 41: Dothistroma Managed Stand Yield Assumptions

Regen. Analysis Unit	Description	Regen. Delay (yrs)	OAF %		Method		Species		Initial Density (sph)
			1	2	Type	%	Code	%	
DOTH1	Dothistroma - Bl / Hw leading	2	15	5	Natural	100	Bl Hw Cw	40 40 20	3,000
DOTH2	Dothistroma - Sx / Bl leading	2	15	5	Natural	100	Sx Bl Hw	40 40 20	3,000
DOTH3	Dothistroma - Cw / Sx leading	2	15	5	Natural	100	Cw Sx	50 50	3,000

6.12 Forest Cover Requirements

Forest cover requirements are used to restrict harvesting to reflect the preservation of non-timber values and to incorporate, to the degree possible and practical, operational limitations on

harvesting. Forest cover requirements are separated into three distinct categories: those that apply to the entire TSA, those that apply only to the WBSRMP area, and those that apply to the KHLO portion of the TSA. Table 42 provides a summary of each of the forest cover requirements that are to be incorporated into the timber supply model. Each of these requirements is discussed in greater detail in the subsequent sections. Management practices that involve complete exclusions of harvest are addressed through removal of that area from the THLB and are discussed in Section 5.0.

Table 42: Summary of Forest Cover Requirements

Management Objective	Maximum Allowable Disturbance (%)	Green up Height (m) / Age (yrs)	Minimum Retained Area (%)	Minimum Age for Retention (yrs)	Applicable Land Base
Entire Timber Supply Area					
Community Watersheds	30	<6m			CFLB
Visual Quality					
Retention	5	<5m			CFLB
Partial Retention	15	<5m			CFLB
Modification	25	<5m			CFLB
Integrated Resource Management	33	<3m			CFLB
West Babine Sustainable Resource Management Plan Area					
Landscape Level Biodiversity					
ESSF wv	11	<40 yrs	61 39	>120 yrs >250 yrs	CFLB
ESSF mc	26	<40 yrs	44 15	>120 yrs >250 yrs	CFLB
ICH mc	27	<40 yrs	46 13	>100 yrs >140 yrs	CFLB
SBS mc	39	<40 yrs	35 17	>100 yrs >140 yrs	CFLB
Grizzly Bear Habitat					
Big Slide AMZ			70	>70 yrs	CFLB
Sperry / Rosenthal and Shenismike West AMZ			50	>50 yrs	CFLB
Babine River Special Management Zone			30	>140 yrs	CFLB
Pine Mushroom Habitat			60	>80 yrs	CFLB
Kispiox LRMP Higher Level Plan Objectives for Biodiversity, Visual Quality and Wildlife					
Landscape Level Biodiversity					
ESSF wv	11	<40 yrs	36	>120 yrs	CFLB
MH mm	22	<40 yrs	36	>120 yrs	CFLB
CWH ws	36	<40 yrs	34	>80 yrs	CFLB
ICH mc	27	<40 yrs	31 9	>100 yrs >250 yrs	CFLB
SBS mc	39	<40 yrs	23	>100 yrs	CFLB
Mule Deer Winter Range			40	>150 yrs	CFLB

6.12.1 Management Objectives for the Entire Timber Supply Area

Objectives for water quality in community watersheds, visual quality and integrated resource management are applied across the entire TSA. The assumptions associated with these objectives are described below. Section 6.12.2 discusses the assumptions associated with the WBSRMP and Section 6.12.3 discusses the assumptions applied to the KHLO portion of the TSA.

Water Quality in Community Watersheds

Timber Supply Review II applied requirements for community watersheds and landscape unit water quality assuming equivalent clear cut area (ECA) of 30% and 22% respectively. The landscape unit water quality requirements, based on the *Kispiox LRMP* (1996), enforced a maximum of 15% of the forested land base less than 6 metres in height. The original TSR III Data Package (September 27th, 2005) reflects the TSR II assumptions.

The landscape unit water quality requirements were not included in the 2001, *Amended Kispiox and Resource Management Plan* and are therefore not designated explicitly as legal requirements for management. Additionally, a review of harvesting practices indicates that this is not currently an operational consideration. As such, this requirement has been removed from the base case but will be explored through sensitivity analysis.

The TSR II requirement to maintain a maximum of 30% ECA in community watersheds is based on direction from the *Watershed Assessment Procedures Guidebook* (1999) and maximum disturbance percentages derived from a calculation developed by Timber Supply Branch. Table 43 shows the nine community watersheds currently identified in the Kispiox TSA and the maximum allowable disturbance percentage for each. The equation used to calculate these percentages accounts for the gradual recovery of harvested areas, and approximates the forest cover requirement applicable to a 6-metre stand height that would achieve the desired ECA.

Table 43: Community Watersheds

Community Watershed Name	Gross Forested Area (ha)	Maximum Disturbance (%)	Green-up Height (m)
Chicago Creek	86	n/a	6
Dale Creek	873	20.7	6
Juniper Creek	3,085	8.7	6
Kits Creek	256	20.0	6
Quirmas Creek	7	21.0	6
Sikedakh Creek	1,029	19.9	6
Station Creek	288	6.0	6
Ten Link Creek	661	20.4	6
Two Mile Creek	1,899	19.5	6

Visual Quality Objectives

Viewscapes zoned with retention, partial retention, or modification visual quality objectives will be managed such that alterations are not visually apparent. This will occur by limiting the amount of disturbance that has not achieved visually effective green-up (VEG) height. Visual quality objective polygon classifications were updated in 2005 by the Ministry of Forests and

Range. Management objectives for visual quality are applied to both established VQO (eVQO) and recommended VQC (rVQC) from the 2005 VLI as determined by the *Order To Establish Scenic Areas in the Kispiox Timber Supply Area*. Variations of these VQO classifications are explored through sensitivity analysis. Table 44 shows the area attributed to each classification and the allowed maximum disturbance percentages for each classification. These maximum disturbance limits are applied to each landscape unit – VQO classification combination.

Table 44: VQO Green-up Heights and Maximum Disturbance Levels

VQO Classification	Maximum Disturbance (%)	VEG Green-up Height (m)
Modification (M)	25	5
Partial Retention (PR)	15	5
Retention (R)	5	5
Total		

Integrated Resource Management Zones

Areas that are neither part of a community watershed nor part of a VQO polygon are subject to an integrated resource management (IRM) constraint. This constraint limits the amount of area that is not considered greened-up at any particular point in time and is meant to approximate operational limits on cutblock size and green-up and adjacency. At any point in time there can be no more that 33% of a particular landscape unit less than 3 m in height.

6.12.2 West Babine Sustainable Resource Management Plan (WBSRMP) Objectives

The WBSRMP covers the western portion of the TSA (see Figure 1). The objectives in the WBSRMP became legal requirements under the *Forest Practices Code of British Columbia Act* and the *Forest and Range Practices Act* on August 1st, 2004. The following sections summarize the modelling assumptions used to reflect these objectives in the base case.

Landscape-Level Biodiversity

The WBSRMP provides direction for landscape-level biodiversity management. Based on this direction the following biodiversity requirements will be applied to the WBSRMP area.

Table 45: WBSRMP Landscape-Level Biodiversity Requirements

BEC Variant	Maximum Early-Seral (%)	Early Age (yrs)	Minimum Mature + Old Seral (%)	Mature + Old Age (yrs)	Minimum Old-Seral (%)	Old Age (yrs)	Land Base To Which Constraints Apply
ESSF wv	<11	<40	>61	>120	>39	> 250	Crown Forested Land Base
ESSF mc	<26	<40	>44	>120	>15	> 250	
ICH mc	<27	<40	>46	>100	>13	> 140	
SBS mc	<39	<40	>35	>100	>17	> 140	

NOTE: Much of the percent retention required for old seral forest has been spatially identified in Core Ecosystems, non-operable forest, Special Management Zones, and the Babine River Corridor Park.

No alteration of fluvial or floodplain ecosystems that may be subject to frequent or infrequent flooding will be allowed. These areas are removed from the THLB.

Grizzly Bear Habitat

According to the WBSRMP at least 70% of Big Slide Access Management Zone must be greater than 70 years at any time.

In order to minimize the disruption to bear use of the high value habitat and to reduce the risk of human / bear interactions in the Sperry / Rosenthal and Shenismike West access management zones, the model will maintain a minimum of 50% of forest greater than 50 years old.

A second component of this objective is to limit road building and harvesting to a five-year period every 50 years. Compliance with this objective will be assessed through a review of spatial analysis results.

The WBSRMP specifies that a 100m buffer of windfirm, functional forest cover adjacent to non-forested critical habitats should be maintained. Areas of forested cover within critical habitat to provide interior forest conditions that minimize wind exposure, provide shading and prevent the introduction of prolific understory growth will be maintained. As such no harvesting will occur in these areas and they are removed from the THLB.

Babine River Special Management Zone

A minimum of 30% of the forested land base greater than 140 years of age will be maintained.

Pine Mushrooms

In order to maintain pine mushroom habitat the age class distribution of ICHmc1 (01b) and ICHmc2 (01b) sites greater than 3 ha will be maintained such that at least 60% of the forested area is greater than 80 years of age.

6.12.3 Kispiox LRMP Higher Level Plan Objectives for Biodiversity, Visual Quality and Wildlife

The *Kispiox LRMP Higher Level Plan Objectives for Biodiversity, Visual Quality and Wildlife* defines objectives and targets for biodiversity, wildlife, and visual quality and applies to the portion of the TSA outside the WBSRMP area. The *Order to Establish the Kispiox Landscape Unit and Objectives* brings objectives for biodiversity and wildlife into law, thereby defining current management.

At the initiation this project these orders had not yet been signed and the associated management practices are addressed through sensitivity analysis in the September 2006 publication of the Data Package. With the 2006 signing of these two orders these management assumptions have become part of the base case.

Landscape Level Biodiversity

The *Kispiox LRMP Higher Level Plan Objectives for Biodiversity, Visual Quality and Wildlife* defines nine landscape units with early and mature + old requirements for each landscape unit BEC variant combinations. These are listed in Table 47. In addition the KHLO defines spatially explicit OGMA that achieve the majority of the old biodiversity requirements. The exception to this is the ICH mc2 variant where spatially explicit old targets have not been achieved with existing OGMA. For this variant an old target is applied in the model as per Table 47.

Table 46: Early, Mature + Old and Old Biodiversity Requirements

BEC Variant	Maximum Early-Seral (%)	Early Age (yrs)	Minimum Mature + Old Seral (%)	Mature + Old Age (yrs)	Minimum Old-Seral (%)	Old Age (yrs)	Land Base To Which Constraints Apply
ESSF wv	<22	<40	>36	>120	None - Assumed to be met by OGMAs		Crown Forested Land Base
MH mm2	<22	<40	>36	>120			
CWH ws2	<36	<40	>34	>80			
ICH mc1	<36	<40	>31	>100			
ICH mc2	<36	<40	>31	>100	>9%[1]	250	
SBS mc2	<54	<40	>23	>100	None - Assumed to be met by OGMAs		

Mule Deer Winter Range

As per the KHPO, areas identified as mule deer winter range be managed on a rotation of 150 years whereby at least 40% must be older than 150 years at all times.

7.0 Forest Estate Model

This timber supply analysis will be conducted using Remosft's spatial planning system Woodstock–Stanley (www.remsoft.com). Woodstock is the aspatial component of the suite and addresses the majority of the model objectives and constraints. Woodstock perfoms a similar function as the Ministry of Forests' FSSIM model whereby management zones and constraints are defined, yield curves incorporated and applied to an aggregated area file. The primary difference between Woodstock and FSSIM is that Woodstock is capable of using either optimization or sequential simulation in developing a harvest forecast.

Stanley, the spatial component of the suite, applies the Woodstock harvest forecast to specific polygons on the land base. Stanley will aggregate individual polygons into suitable harvest units (blocks) based on specified minimum, maximum and target block sizes. The model will also enforce green-up and adjacency requirements as it schedules the harvest spatially.

For this analysis, optimization will be used in Woodstock to develop the base case harvest schedule. The optimization will be subject to a number of harvest constraints including the requirement to produce a long-term sustainable harvest forecast.

The model will use five-year planning periods and will be run for a minimum 250-year planning horizon. For the base case, the current AAC of 977,000 m^3/yr will be maintained as long as possible. If necessary, a controlled decline of a maximum of 10% per decade will be employed. As managed stands become harvestable, a long-term harvest level will be established that maintains a relatively stable growing stock level over the long-term.

8.0 Growth and Yield

Natural stand yield tables were generated using the batch version of the Variable Density Yield Prediction (*BatchVDYP*) model version 6.6d4. Managed stand yield tables were developed using the batch version of the Table Interpolation Program for Stand Yields (*BatchTIPSY*) model version 3.2b.

8.1 Natural Stand Yield Tables

Stands that have not been previously harvested and replanted are referred to as natural stands. Consistent with TSR II, all stands established before 1979 (older than 26 years of age) are considered to be natural, unmanaged stands. Natural stand analysis unit definitions are described in Section 4.2. Natural stand yield tables are generated for each natural unique polygon (stand) within the THLB using VDYP, based on the following inventory attributes:

- Species composition (Species 1 to 6)
- Forest Inventory Zone (FIZ),
- Public Sustained Yield Unit (PSYU),
- Inventory site index,
- Projected stocking class,
- Crown closure, and
- Utilization level.

Each stand yield curve is then area-weighted into the appropriate natural stand analysis unit curves based on the THLB area of each stand. The resulting net merchantable volume for each natural stand analysis unit is shown in Appendix I. These yields include reductions to account for deciduous volumes as per Section 6.2 but do not include reductions to account for WTPs (Section 6.10) which will be addressed within the timber supply model.

8.2 Managed Stand Yield Tables

Stands that have been harvested and planted since 1979 (26 years of age or younger) are considered to be managed stands. Managed stand yield tables are used for stands that have already been harvested and planted as well as those stands that will be harvested and planted in the future. Once a natural stand is harvested in the model it is regenerated following a managed stand yield curve. Regeneration assumptions associated with each managed stand analysis unit are discussed in Section 6.8.

The base case will use inventory site index for managed stand yield estimates (Table 47). It is generally known that inventory site index values underestimate the true productivity of managed stands. The provincial Site Index by Biogeoclimatic Ecosystem Classification (SIBEC) correlates site productivity to Biogeoclimatic Ecosystem Classification site series classifications. As there is currently no ecosystem inventory (PEM or TEM) for the Kipsiox TSA these estimates cannot be used in the base case. However, the use of SIBEC site productivity estimates will be explored through sensitivity analysis.

Managed stand yield tables are generated for each managed stand analysis unit using TIPSY, based on the following attributes.

- Planted species composition,
- Initial planting density,
- Forest Inventory Zone (FIZ),
- Site productivity estimate (inventory site index / SIBEC),
- Regeneration delay,
- Operational adjustment factor (OAF) 1 and 2,
- Utilization level, and
- Planted or natural stem distribution.

To generate inventory site index yield tables an area weighted site index is calculated for each site series based on the inventory site index and the THLB area producing a TIPSY yield table for each managed stand analysis unit. The TIPSY inputs used to generate each managed stand yield table are shown in Table 47. These yields do not include reductions to account for WTPs (Section 6.10) which will be addressed within the timber supply model.

The net merchantable volumes for each managed stand yield table are shown in Appendix II.

Table 47: TIPSY Inputs – Inventory Site Index Yield Tables.

Managed Stand Analysis Unit	Spp 1	Spp 1%	Spp 2	Spp 2%	Spp 3	Spp 3%	Spp 4	Spp 4%	SI	FIZ	Initial Density	OAF 1	OAF 2	Planted / Natural	Utilization Level	Regen. Delay (years)
101	Sw	40	Hw	30	Pl	30			21.3	I/J	3,000	0.85	0.95	Planted	17.5	2
102	Hw	40	Sw	40	Pl	20			16.1	I/J	3,000	0.85	0.95	Planted	17.5	2
103	Hw	40	Sw	40	Pl	20			10.7	I/J	3,000	0.85	0.95	Planted	17.5	2
104	Sw	60	Hw	40					17.5	I/J	3,000	0.85	0.95	Planted	17.5	2
105	Sw	60	Bl	15	Hw	15	Pl	10	17.0	I/J	3,000	0.85	0.95	Planted	17.5	2
106	Sw	80	Hw	20					10.5	I/J	3,000	0.85	0.95	Planted	17.5	2
107	Sw	70	Pl	30					28.5	I/J	3,000	0.85	0.95	Planted	17.5	2
108	Sw	40	Pl	40	Hw	20			19.5	I/J	3,000	0.85	0.95	Planted	17.5	2
109	Hw	70	Sw	20	Cw	10			12.9	I/J	3,000	0.85	0.95	Planted	17.5	2
110	Pl	50	Sw	50					23.3	I/J	3,000	0.85	0.95	Planted	12.5	2
111	Pl	50	Sw	50					18.1	I/J	3,000	0.85	0.95	Planted	12.5	2
112	Pl	50	Sw	35	Bl	15			12.2	I/J	3,000	0.85	0.95	Planted	12.5	2
113	Hw	80	Sw	20					15.2	I/J	3,000	0.85	0.95	Planted	17.5	2
114	Sw	70	Cw	15	Hw	15			23.8	I/J	3,000	0.85	0.95	Planted	17.5	2
115	Sw	100							20.1	I/J	3,000	0.85	0.95	Planted	17.5	2
DOTH1	Bl	100							18.3	I/J	3,000	0.85	0.95	Planted	17.5	2
DOTH2	Sw	100							17.2	I/J	3,000	0.85	0.95	Planted	17.5	2
DOTH3	Cw	100							15.6	I/J	3,000	0.85	0.95	Planted	17.5	2

9.0 References

British Columbia Land Use Coordination Office. 2001. *Amended Kispiox Land and Resource Management Plan.* Government of British Columbia, Victoria, BC. 96 pp.

British Columbia Ministry of Forests and Ministry of Environment, Land and Parks. 1999. *Landscape Unit Planning Guide*. Government of British Columbia, Victoria, BC. 101 pp.

British Columbia Ministry of Forests and Ministry of Environment, Land and Parks. 1995. *Biodiversity Guidebook*. Government of British Columbia, Victoria, BC. 99 pp.

British Columbia Ministry of Forests. 2003. *Defined Forest Area Management (DFAM) Timber Supply Review Technical Information Sheet*. Government of British Columbia, Victoria, BC. 7 pp.

British Columbia Ministry of Forests Timber Supply Branch. 2005. *DFAM Interim Standards for Public and First Nations Review*. Government of British Columbia, Victoria, BC. 3 pp.

British Columbia Ministry of Forests Forest Analysis Branch. 2004. *Interim Standards for Data Package Preparation and Timber Supply Analysis; Defined Forest Area Management Initiative*. Government of British Columbia, Victoria, BC. 21 pp.

British Columbia Ministry of Forests Forest Practices Branch. 1999. *Interior Watershed Assessment Procedure Guidebook (IWAP); Second Edition Version 2.1*. Government of British Columbia, Victoria, BC. 40 pp.

British Columbia Land Use Coordination Office. 1996. *Kispiox Land and Resource Management Plan.* Government of British Columbia, Victoria, BC.

British Columbia Ministry of Forests. 2003. *Kispiox Timber Supply Area Analysis Report*. Government of British Columbia, Victoria, BC. x + 138 pp.

British Columbia Ministry of Forests. 2002. *Kispiox Timber Supply Area Public Discussion Paper*. Government of British Columbia, Victoria, BC. 11 pp.

British Columbia Ministry of Forests. 2003. *Kispiox Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination*. Government of British Columbia, Victoria, BC. 51 pp + app.

British Columbia Ministry of Forests. 2002. *Kispiox Timber Supply Area Timber Supply Review Summary of Public Input*. Government of British Columbia, Victoria, BC. 9 pp + app.

British Columbia Ministry of Forests and Ministry of Environment, Land and Parks. 1999. *Landscape Unit Planning Guide*. Government of British Columbia, Victoria, BC. 101 pp.

British Columbia Ministry of Forests and Ministry of Environment, Land and Parks. 1999. *Mapping and Assessing Terrain Stability Guidebook; Second Edition*. Government of British Columbia, Victoria, BC. 36 pp.

British Columbia Ministry of Forests - Forest Analysis Branch. 2003. *Supplemental Guide for Preparing Timber Supply Analysis Data Packages*. Government of British Columbia, Victoria, BC. 61 pp.

British Columbia Ministry of Forests and Range. 2006. *Kispox FRPA Project - Watershed Objectives - Draft Version 1.2.* Government of British Columbia, Victoria, BC. 8pp.

British Columbia Integrated Land Management Bureau. 2005. *Kispox LRMP Higher Level Plan Objectives for Biodivesity, Visual Quality and Wildlife Version 1.6.* Government of British Columbia, Victoria, BC. 35pp.

British Columbia Ministry of Sustainable Resource Management. 2004. *Xsu gwin lik'l'inswx: West Babine Sustainable Resource Management Plan*. Government of British Columbia, Victoria, BC. 121 pp.

Corstanje, J., RPF. 2004. *Harvest Method Mapping Operability for the Kispiox Timber Supply Area.* Forest Investment Account Project #2237001. Bell Pole Co., Terrace, BC. 22 pp

Crane Management Consultants Ltd. and Enfor Consultants Ltd. 2004. *West Babine Sustainable Resource Management Plan Socio-Economic Assessment*. Prepared for Skeena Resource Management Region; British Columbia Ministry of Sustainable Resource Management. Government of British Columbia, Victoria, BC. 92 pp.

Kispiox DFAM Committee. 2005. *Action Item Summary; March 17, 2005*. 4 pp.

Kispiox DFAM Committee. 2005. *Action Item Summary; May 31, 2005*. 5 pp.

Kispiox DFAM Committee. 2005. *Current Management Assumptions Discussion Paper; March 17, 2005*. 29 pp.

Kispiox DFAM Committee. 2005. *Meeting Notes; March 17, 2005*. 29 pp.

Kispiox DFAM Committee. 2005. *Meeting Notes; May 31, 2005*. 3 pp.

Kispiox DFAM Committee. 2005. *Request for Proposal for Timber Supply Analysis for the Kispiox TSA*. 18 pp.

Kispiox DFAM Committee. 2005. *Status and Location of Coverages for Kispiox TSR3 Dataset; Updated: April 14, 2005*. 6 pp.

Tika Consulting Services and Kingfisher Forest Sciences Co. 2005. *Dothistroma Needle Blight Strategic Plan 2005/2006.* Forest Investment Account Project # 2352010. 16pp + app.

Appendix I - Managed Stand Yield Tables

Analysis Unit / Age	**101** Hemlock / Cedar Good	**102** Hemlock / Cedar Med.	**103** Hemlock / Cedar Poor	**104** Fir Good	**105** Fir Med.	**106** Fir Poor	**107** Spruce Good	**108** Spruce Med.	**109** Spruce Poor	**110** Pine Good	**111** Pine Med.	**112** Pine Poor	**113** Ac / Conifer Good	**114** Ac / Conifer Med.	**115** Ac / Conifer Poor	**DOTH1**	**DOTH2**	**DOTH3**
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	10	-	-	1	-	-	-	-	-	-	-	-
30	26	-	-	1	1	-	131	11	-	54	4	-	-	40	5	1	-	-
40	113	14	-	25	19	-	279	73	1	163	39	-	7	162	59	29	17	2
50	212	63	1	90	77	1	400	160	9	261	104	4	44	279	154	97	76	51
60	297	130	8	172	152	7	463	237	43	344	174	18	105	387	238	176	155	135
70	370	193	29	243	217	28	490	304	91	402	233	43	172	459	324	243	222	232
80	423	250	61	310	279	60	504	358	147	440	287	76	233	513	380	310	291	316
90	463	303	98	366	333	100	512	398	200	467	327	112	287	559	416	356	346	377
100	498	346	135	407	372	144	517	429	247	485	356	145	334	595	442	386	383	452
110	524	379	169	439	401	180	518	456	289	485	379	173	377	619	464	408	409	521
120	546	406	201	466	423	215	518	478	327	484	398	199	412	639	479	425	429	585
130	561	428	231	491	442	249	518	494	361	482	414	224	443	657	490	438	446	640
140	572	449	260	512	459	283	518	507	392	484	426	247	469	673	492	449	460	685
150	582	467	282	528	471	311	518	516	419	485	435	265	492	680	493	459	469	726
160	590	483	302	543	481	334	518	524	442	486	442	279	514	680	494	464	476	779
170	598	496	319	553	490	351	518	532	462	487	447	291	534	680	494	468	480	827
180	606	507	334	562	494	365	518	537	480	487	449	301	551	680	494	472	481	872
190	612	516	347	570	498	378	518	539	496	487	450	310	566	680	494	474	481	905
200	616	523	358	576	502	387	518	541	512	487	450	317	579	680	492	473	481	934
210	616	529	368	582	504	395	518	542	527	487	450	323	591	680	491	471	480	961
220	616	535	377	587	506	402	518	543	540	487	450	328	601	680	490	470	479	986
230	616	540	384	592	507	408	518	544	553	487	450	332	610	680	489	469	478	1,008
240	616	544	391	596	507	413	518	545	563	487	450	335	618	680	488	468	477	1,027
250	616	548	397	600	508	418	518	546	572	487	450	337	626	680	488	467	476	1,045

Appendix II - Natural Stand Yield Tables

Analysis Unit / Age	01M Hemlock / Cedar Good	01S Hemlock / Cedar Good	02M Hemlock / Cedar Med.	02S Hemlock / Cedar Med.	03M Hemlock / Cedar Poor	03S Hemlock / Cedar Poor	04S Fir Good	05S Fir Med.	06M Fir Poor	06S Fir Poor	07S Spruce Good	08M Spruce Med.	08S Spruce Med.	09M Spruce Poor	09S Spruce Poor
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-
30	3	6	0	1	0	0	11	5	-	-	0	0	0	-	-
40	59	69	5	22	1	0	54	31	6	8	53	8	9	0	0
50	115	133	45	74	10	8	111	68	25	27	119	54	50	1	3
60	163	189	96	125	46	38	160	104	49	54	175	101	98	9	29
70	204	236	142	170	90	79	205	140	82	84	222	141	139	25	61
80	239	277	184	209	130	118	243	171	108	109	261	175	175	46	92
90	265	309	220	242	167	152	276	198	133	131	293	204	205	74	122
100	287	337	251	271	200	183	306	222	156	152	319	228	230	97	147
110	305	360	278	295	229	211	331	245	177	171	341	249	252	117	170
120	319	379	302	315	255	235	354	265	197	189	358	266	269	135	189
130	336	398	325	336	280	259	377	286	218	207	374	281	286	152	207
140	350	414	344	353	301	279	398	305	237	224	387	293	299	167	222
150	362	427	361	368	320	297	416	323	255	240	399	303	310	181	236
160	373	437	375	380	336	312	432	340	271	255	407	312	318	192	247
170	382	446	388	391	350	325	447	355	287	268	415	318	326	202	257
180	389	454	398	400	361	337	460	369	302	281	421	324	332	211	265
190	395	460	406	408	371	346	472	382	316	293	426	328	337	218	272
200	402	467	415	416	381	356	484	395	329	305	431	333	342	226	278
210	408	473	424	423	391	366	496	408	342	317	435	336	346	232	284
220	413	478	433	430	401	375	507	419	355	328	439	340	350	239	290
230	419	483	441	436	410	384	517	431	367	339	442	343	354	244	295
240	424	488	447	442	418	392	526	442	379	349	445	345	357	249	300
250	427	492	453	447	426	400	535	452	390	359	448	348	360	254	304

Analysis Unit	10S	11S	12M	12S	14D	14M	15D	15M	51P	51S	52M	52P	52S	53M	53P	53S
	Pine	Pine	Pine	Pine	Ac Conifer	Ac Conifer	Ac Conifer	Ac Conifer	Hemlock / Cedar	Hemlock / Cedar	Hemlock / Cedar	Hemlock / Cedar	Hemlock / Cedar	Hemlock / Cedar	Hemlock / Cedar	Hemlock / Cedar
	Good	Med.	Poor	Poor	Med.	Med.	Poor	Poor	Good	Good	Med.	Med.	Med.	Poor	Poor	Poor
Age									Old	Old	Old	Old	Old	Old	Old	Old
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	0	0	0	0	5	0	0	0	-	0	-	-	0	-	-	-
30	33	10	1	1	42	31	5	7	6	5	0	1	0	0	0	0
40	84	51	7	12	67	59	23	29	86	79	6	13	10	0	0	1
50	126	92	38	49	87	82	41	55	165	154	41	65	63	1	2	6
60	162	127	70	84	102	99	58	78	234	218	95	126	123	11	16	42
70	193	158	99	115	113	113	73	98	292	272	143	180	176	34	41	90
80	219	185	125	142	122	123	87	115	341	318	186	228	222	69	73	135
90	243	209	148	167	128	131	98	129	381	355	223	268	261	104	107	174
100	264	231	170	189	133	138	107	140	413	386	255	302	295	138	139	209
110	282	250	189	209	136	143	115	149	440	411	283	332	324	169	169	239
120	299	268	207	228	139	147	121	157	463	433	307	357	349	197	196	267
130	314	284	225	246	142	150	127	164	488	456	332	383	375	224	223	294
140	324	295	238	259	144	153	132	171	509	476	353	406	396	248	247	317
150	332	304	248	269	146	156	137	177	528	493	372	426	416	270	269	338
160	337	311	256	277	147	157	139	180	543	508	388	443	433	289	289	356
170	340	315	262	283	148	158	141	182	556	520	402	459	447	306	307	373
180	341	318	266	287	148	159	142	185	567	531	414	472	459	321	322	387
190	340	318	268	288	149	160	143	187	577	539	424	483	470	334	336	399
200	341	321	272	292	150	161	145	189	586	548	435	494	481	348	350	411
210	343	323	276	296	150	161	146	191	594	555	446	505	491	361	363	423
220	345	326	280	299	151	162	147	193	601	562	456	515	501	373	376	434
230	346	329	283	303	151	162	148	194	607	568	465	524	510	384	388	445
240	348	331	286	306	152	163	149	196	613	574	474	532	518	395	399	455
250	350	334	290	309	152	163	150	197	619	579	482	539	524	405	410	464

Analysis Unit	55P	55S	56M	56P	56S	58M	58S	59M	59P	59S	61S	62M	62S
	Fir	Fir	Fir	Fir	Fir	Spruce	Spruce	Spruce	Spruce	Spruce	Pine	Pine	Pine
	Med.	Med.	Good	Good	Good	Med.	Med.	Poor	Poor	Poor	Med.	Poor	Poor
Age	Old	Old	Old	Old	Old	Old	Old	Old	Old	Old	Old	Old	Old
10	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	0	0	-
30	2	4	0	-	-	0	0	-	0	-	2	1	0
40	25	28	1	1	5	12	7	1	1	0	25	10	2
50	66	66	8	7	24	56	43	5	3	3	68	27	14
60	113	107	24	22	49	108	91	19	7	18	109	54	41
70	158	147	46	44	82	153	134	41	15	44	145	81	70
80	195	180	66	64	109	191	170	66	24	74	179	106	98
90	229	210	85	83	133	223	200	93	40	102	209	130	124
100	259	237	102	101	154	250	225	118	55	128	237	152	148
110	286	261	118	118	175	272	246	141	73	151	263	174	171
120	311	284	134	133	193	290	264	162	93	172	287	193	192
130	336	306	149	149	212	308	281	182	113	192	310	213	213
140	360	327	164	164	231	324	294	200	131	209	327	226	228
150	382	347	178	178	248	338	307	216	149	224	339	238	240
160	402	365	192	192	264	350	316	231	165	237	348	246	250
170	421	381	205	205	279	361	324	244	180	249	354	253	257
180	439	397	217	218	293	371	331	256	194	259	357	257	261
190	456	411	229	230	307	379	337	267	207	269	358	259	263
200	472	425	241	242	321	387	343	277	220	278	362	263	267
210	487	438	252	253	333	394	348	287	231	286	366	267	270
220	502	451	263	264	346	400	352	295	242	293	369	270	274
230	516	463	273	274	357	406	356	303	253	300	373	274	278
240	529	475	283	285	369	411	360	311	263	307	376	277	281
250	541	486	293	295	380	416	364	318	272	313	379	280	284