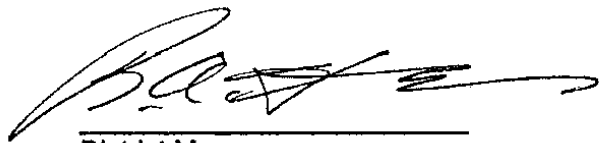


# Sunshine Coast Timber Supply Area Timber Supply Review

Data Package

Updated April 2011



District Manager  
Sunshine Coast Forest District



Acting Director  
Forest Analysis and Inventory Branch



Ministry of  
Forests, Lands and  
Natural Resource Operations

## Table of Contents

Overview of the Sunshine Coast TSA Timber Supply Review (TSR) .....	1
1. Introduction .....	2
1.1 Overview of the Sunshine Coast Timber Supply Area (TSA) .....	2
1.2 First Nations .....	3
1.21 Treaty Settlement Lands.....	3
2. Current Forest Management Considerations and Issues.....	4
2.1 Base case management assumptions .....	4
2.2 Major forest management considerations and issues .....	4
3. Inventories .....	8
3.1 Background information .....	8
4. Division of the Area into Management Zones.....	10
4.1 Management zones and tracking of multiple objectives (grouping) .....	10
4.2 Analysis units .....	11
5. Timber Harvesting Land Base Definition .....	12
5.1 Land outside the core TSA.....	12
5.2 Non-forest, non-productive forest and non-commercial cover .....	12
5.3 Land not administered by the BC Forest Service for TSA timber supply.....	13
5.4 Inoperable areas .....	14
5.5 Sites with low timber growing potential and problem forest types.....	15
5.6 Cultural heritage resource reductions.....	16
5.7 Experimental and permanent sample plots.....	16
5.8 Sites with unstable terrain .....	16
5.9 Established recreation reserves and sites .....	17
5.10 Wildlife habitat area reductions .....	18
5.11 Old growth management areas (OGMAs) .....	19
5.12 Environmentally sensitive areas (ESAs) .....	21
5.13 Riparian reserve and management zones .....	22
5.14 Roads, trails and landings .....	23
5.15 Wildlife trees (WTs) and wildlife tree patches (WTPs).....	24
5.16 Timber licence reversions .....	25
6. Current Forest Management Assumptions .....	26
6.1 Harvesting .....	26
6.1.1 Utilization levels .....	26
6.1.2 Volume exclusions for mixed-species stands.....	27
6.1.3 Minimum harvestable age .....	27
6.1.4 Harvest scheduling priorities.....	28
6.1.5 Logging method .....	29
6.1.6 Silvicultural systems .....	30
6.2 Unsalvaged losses .....	30
6.3 Silviculture .....	31
6.3.1 Regeneration activities in managed stands.....	31
6.3.2 Stand fertilization .....	33
6.3.3 Immature plantation history .....	33
6.3.4 Not satisfactorily restocked (NSR) areas .....	33
6.3.5 Genetic gain through tree improvement.....	34
6.4 Integrated resource management.....	35
6.4.1 Forest cover requirements .....	35
7. Sensitivity Analyses to be Performed.....	37
Appendix A: Land base Summaries.....	38

## Table of Contents

---

Table 1.	Major forest management considerations in the Sunshine Coast TSA .....	4
Table 2.	Inventory information .....	8
Table 3.	Objectives to be tracked.....	10
Table 4.	Definition of analysis units .....	11
Table 5.	Ownership contributions.....	13
Table 6.	Description of operable areas.....	14
Table 7.	Description of sites with low timber growing potential and problem forest types <sup>(a)</sup> .....	15
Table 8.	Description of sites with unstable terrain.....	16
Table 9.	Established recreation reserves and sites in the Sunshine Coast TSA .....	17
Table 10.	Description of wildlife orders and WHAs for the Sunshine Coast TSA.....	18
Table 11.	Status of OGMA's by landscape unit — Sunshine Coast Forest District 2010 .....	20
Table 12.	Description of environmentally sensitive areas .....	21
Table 13.	Riparian reserve and management zone buffer widths for river and streams .....	22
Table 14.	Riparian reserve and management zone buffer widths for lakes and wetlands.....	22
Table 15.	Summary of unclassified roads in Sunshine Coast TSA.....	23
Table 16.	Reductions to reflect volume retention in cutblocks.....	24
Table 17.	Utilization levels .....	26
Table 18.	Volume exclusions for mixed-species types .....	27
Table 19.	Minimum harvestable age criteria.....	28
Table 20.	Modelling priorities for harvest scheduling .....	28
Table 21.	Logging method .....	29
Table 22.	Unsalvaged losses .....	30
Table 23.	Regeneration assumptions for recent plantations and second-growth stands. ....	32
Table 24.	Regeneration assumptions for future stands .....	32
Table 25.	Forest cover requirements.....	35
Table 26.	Old seral forest retention requirements .....	36
Table 27.	Sensitivity issues.....	37

## Overview of the Sunshine Coast TSA Timber Supply Review (TSR)

---

Under Section 8 of the *Forest Act* the chief forester must review the timber supply for each timber supply area at least once every 10 years. Under the same section the chief forester may extend the current AAC up to 15 years if the current timber supply is stable and any new developments would unlikely change the AAC. For more information about the AAC process please visit the following internet site:

<http://www.for.gov.bc.ca/hts/pubs/tsr/tsrbackgrounder.pdf>

The completed data package contains those inputs that represent current performance for the TSA. For the purpose of the timber supply review (TSR), "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 practices used in the area;
- fully implemented land-use plans;
- land-use decisions approved by Cabinet;
- orders issued through the *Government Actions Regulation (GAR)* of the *Forest and Range Practices Act (FRPA)*;
- the order establishing provincial non-spatial old growth objectives and landscape units pursuant to the *Forest Practices Code of British Columbia Act*; and,
- approved higher level plans under the *Forest Practices Code of British Columbia Act*.

The primary 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.

Each section of this data package includes:

- 1) A short explanation of the data required;
- 2) A data table or lists of modelling assumptions;
- 3) A description of data sources and other comments.

The information in this data package represents the best available knowledge at the time of publication, but is subject to change. A First Nations consultation and public review period has been established to allow submission of comments and concerns about the data package to the Ministry of Forests and Range. The information and assumptions in the data package that have been revised to incorporate First Nations and public input will be used to determine the timber harvesting land base (THLB) - the productive Crown forest land in the TSA available for timber harvesting. Until the THLB is determined, it is not possible to finalize the values shown in some of the tables in this document. Where the final value is not yet available, the applicable columns are shaded grey. In addition, should any major changes in management practices occur during the next few months, the timber supply analysis will attempt to capture them. The final technical report will include an appendix that highlights any changes made to this data package.

## 1. Introduction

---

### 1.1 Overview of the Sunshine Coast Timber Supply Area (TSA)

---

The Sunshine Coast TSA comprises approximately 1.5 million hectares along the southwest coast of British Columbia. The TSA is administered from the British Columbia Forest Service (BCFS) Sunshine Coast Forest District office in Powell River. The TSA is bordered by the Fraser TSA to the south, the Soo TSA to the east, the Strathcona and Kingcome TSAs to the west and the Williams Lake TSA to the north. It is also adjacent to portions of TFL 39 and TFL 43.

The landscape of the Sunshine Coast TSA is dominated by the Coast Mountains and several coastal fjords, most notably Bute, Toba and Jervis Inlets. The landscape ranges from nutrient rich, moist floodplains in the valley bottoms to alpine meadows. About 28 percent of the land base of the TSA is considered to be productive forest land managed by the BCFS, of which just over half is considered to be available for timber harvesting.

The forests of the TSA are diverse, and about half of the forests on the THLB are considered to have medium or good site productivity. Major tree species include Douglas-fir, hemlock and amabilis fir (balsam), while other species such as western redcedar, spruce, pine, alder, and cottonwood also occur. The forests of the TSA have a long harvesting history, and as a result there are rapidly maturing second-growth forests on the lower elevation, more accessible and higher productivity growing sites. Nearly half of the stands on the THLB are between 21 and 100 years of age.

The varied topography and forests of this TSA are home to many species of wildlife. Large mammals include grizzly and black bear, black-tailed deer, Roosevelt elk, mountain goat, cougar and wolf, as well as isolated populations of moose. Small mammals are diverse and abundant. The nutrient-rich, protected waters of the various estuaries in the TSA provide shelter and food for many waterfowl species, from ducks, Canada geese and gulls to eagles and ospreys. Large wintering congregations of harlequin duck, bald eagle, trumpeter swan and Barrow's golden eye duck also occur in coastal waters throughout the TSA. Several species of raptor are found within the TSA, including pygmy owl, saw-whet owl, barred owl, western screech owl, Cooper's hawk, red-tailed hawk, sharp-shinned hawk, merlin, kestrel and golden eagle in remote valleys. The TSA is also home to several species which have been identified as species at risk such as: the Marbled Murrelet, the Queen Charlotte goshawk, two Vananda Creek stickleback species, the Coastal Tailed frog and the Great Blue heron.

According to the BC Stats, the population of the TSA in 2009 was 49,758 persons, more than half of which live in the communities of Powell River, Sechelt and Gibsons.

Other smaller communities within the TSA include Halfmoon Bay, Pender Harbor and Lund, as well as communities on Texada, Cortes and Lasqueti Islands.

The chief forester last determined the AAC on December 20, 2001, setting it at 1 143 000 cubic metres effective January 1, 2002. In June of 2004 he postponed the next AAC determination to no later than December 31, 2011 under Section 8(3.1) of the *Forest Act*. In February 2007, to account for land added to the TSA from TFL 10 by order under Section 3(2) of the *Forest Revitalization Act*, the chief forester increased the AAC by 54 949 cubic metres to the current level of 1 197 949 cubic metres. The AAC contains a partition of 98 000 cubic metres for deciduous-leading stands and 1 099 949 cubic metres for conventional (coniferous) stands.

For more information about the Sunshine Coast TSA please visit the following internet site:

<http://www.for.gov.bc.ca/hts/tsa/tsa39/>

## 1.2 First Nations

Thirteen First Nations have traditional territory in the Sunshine Coast TSA. Five of the First Nations also have reserve lands (the *shíshálh* First Nation, the Sliammon First Nation, the Xwémalhkwi First Nation, the Klahoose First Nation and the Squamish First Nation). The other eight First Nations with traditional territory are the We Wai Kai First Nation, Wei Wai Kum First Nation, Kwiakah First Nation, the Snaw'Naw'As First Nation, Qualicum First Nation, Líl'wat First Nation, the Xení Gwet'in First Nations Government, and the Ulkatcho First Nation.

The *shíshálh* First Nation has traditional territory, reserves and areas known as 'Sechelt Band Lands' covering Jervis, Sechelt, Narrows and Clowhom inlets and the majority of the members reside in Sechelt. The Sliammon First Nation has six reserves and traditional territory located around Powell River. The Klahoose First Nation has a reserve and office in Squirrel Cove on Cortes Island and other reserves and traditional territory extending up Toba Inlet into the Toba River valley. The Squamish Nation has reserves and traditional territory in Howe Sound, the Squamish River valley and the lower mainland with their offices located in North Vancouver. The Xwémalhkwi First Nation has traditional territory in Bute Inlet and the band office is located in Campbell River. These five First Nations have a combined population of over 4800 people located both on and off their various reserves.

Archaeological Overview Assessments (AOA) have been completed for portions of the Sunshine Coast TSA. AOAs are the basis for determining areas and sites that may require further assessment in the form of an Archaeological Impact Assessment (AIA). AIAs are carried out as part of operational planning. Known archaeological sites are considered in this timber supply review.

Many First Nations' members participate in the forest sector and several First Nations have obtained volume and/or area based tenures within the Sunshine Coast TSA. First Nations have also expressed concern about the impact of logging on water, fishery and heritage resources and spiritual ceremonial sites in their traditional territories. The Sunshine Coast Forest District attempts to address these concerns through cooperative planning processes, and during consultation on Forest Stewardship Plans.

### 1.21 Treaty Settlement Lands

The Sliammon Agreement-in-Principle (AIP) has been ratified. This AIP includes 6000 hectares of Treaty Settlement Lands, all of which is provincial Crown land within the Sunshine Coast TSA. It consists of several blocks, the largest being adjacent to Okeover Inlet and Sliammon Lakes, one block in the "Edgehill" area immediately east of the Municipality of Powell River and one small block at Pocahontas Bay on the east side of Texada Island. These lands have been designated by Ministerial Order as Sliammon Designated Area No. 2. With a few minor exceptions this order prohibits the issuance of permits, licences or plans under the *Forest Act*, essentially excluding these lands from timber harvesting. This designation expires August 6, 2011.

<http://www.for.gov.bc.ca/tasb/legsregs/forest/faregs/sliammon/>

Within the Sechelt First Nation's traditional territory, 939 hectares of former AIP Lands were identified at Deserted Bay, Brittain River, Narrows Inlet, Vancouver Bay and Chapman Creek; however, they were never ratified and have since expired. They are still covered under Map Notation MN1116. While there is no prohibition on the issuance of permits and licences, these areas inherently require a higher level of consultation.

## 2. Current Forest Management Considerations and Issues

### 2.1 Base case management assumptions

These assumptions reflect current performance with respect to the status of forest land, forest management practices and knowledge of timber growth and yield. The harvest forecast developed from these assumptions is termed the base case harvest forecast and is used as a reference to which other development scenarios are compared using the Forest Service Spatial Analysis Model (FSSAM). While there may be uncertainty associated with the assumptions used to develop the base case, these uncertainties are examined by conducting sensitivity analysis (see Section 7).

### 2.2 Major forest management considerations and issues

The following table lists major forest management issues and considerations. Where possible, the issues will be assessed directly in the timber supply analysis. If the issue does not fall within the definition of current management as described in Section 1, the related timber supply impacts will be considered during the allowable annual cut determination. There may be significant uncertainties in defining some current management issues. In such cases, sensitivity analysis can assist in assessing the potential timber supply implications and assigning degrees of risk to timber supply during the allowable annual cut determination.

*Table 1. Major forest management considerations in the Sunshine Coast TSA*

Consideration/issue	Description
Landscape-level biodiversity	Landscape unit (LU) boundaries and biodiversity emphasis objectives (BEO) were established under the Order Establishing Provincial Non-Spatial Old Growth Objectives, which came into effect June 30, 2004.
Old Growth Management Areas (OGMAs)	Landscape Unit Plans have been completed for five LUs (Bunster, Homathko, Skwawka, Chapman and Sechelt) and OGMAs (approved) have been established in them. OGMAs (draft and proposed) have been identified in 14 LUs (Bute West, Bute East, Cortes, Howe, Brittain, Haslam, Texada, Southgate, Quatam, Jervis (Deserted), Homfray, Brem, Narrows and Salmon Inlet). Approved, draft and proposed OGMAs will not be available for timber harvest. Two LUs within the TSA (Bishop and Toba) have no mapped OGMAs, and in these LUs non-spatial old growth objectives will apply.
Stand-level biodiversity	In areas covered by approved landscape unit plans, the specified wildlife tree patch retention percentage will be used in the analysis. In other areas 7% will be retained in wildlife tree patches as per the <i>Forest and Range Practices Act</i> .
Riparian management	A predictive geographic classification model has been used to assign stream classifications which have prescribed management regimes. Lakes and wetlands have assigned classifications with prescribed management regimes.

Consideration/issue	Description
Conservation of ungulate winter range (Mountain Goats and deer)	<p>Under the authority of Section 7(2) of the <i>Forest Planning and Practices Regulation</i> (B.C. Reg. 14/04) up to 54 096 hectares may be constrained for wildlife habitat required for the winter survival of Mountain Goat, not exceeding an impact to the timber harvesting land base of 2849 hectares. An additional 431 hectares of timber harvesting land base may be constrained for Mountain Goat in the <i>TFL-10 Instrument 15</i> portion of the Sunshine Coast TSA.</p> <p>Ungulate winter range mapping has yet to be approved. The current mapping (July 2010 Draft) of Mountain Goat winter range will be used for this timber supply review for all landscape units except Southgate. In the Southgate landscape unit January 2005 mapping will be used. Forest cover constraints for ungulates may also be applied to up to 1579 hectares. Any unused portion of the allowable impact to the timber harvesting land base may be used for a deer winter range plan.</p>
Conservation of Grizzly Bear Habitat	<p>Grizzly Bears are on the provincial <i>Blue List</i> in British Columbia. There are currently 49 approved WHAs in the TSA which maintain 4453 hectares of seasonally important habitats for Grizzly Bears. These WHAs impact the equivalent of 551 hectares of timber harvesting land base of which 331 hectares count towards the one percent mature timber harvesting land base allowance in accordance with the provincial <i>Identified Wildlife Management Strategy</i> (IWMS). Currently 47 hectares of the IWMS budget remain for Grizzly Bears.</p>
Conservation of Marbled Murrelet Habitat	<p>The Marbled Murrelet is on the <i>Blue List</i> in British Columbia. It is designated as <i>Threatened</i> in Canada (COSEWIC 2002). Currently, there are 35 approved WHAs which conserve 4312 hectares of Marbled Murrelet nesting habitat. These WHAs impact the equivalent of 640 hectares of timber harvesting land base of which 513 hectares count towards the one percent mature timber harvesting land base allowance in accordance with the provincial IWMS. Currently 135 hectares of the IWMS budget remain for the Marbled Murrelet.</p>
Conservation of Vananda Creek Stickleback Habitat	<p>The Vananda Creek Limnetic and Benthic Sticklebacks occur only on Texada Island in British Columbia. They are on the provincial <i>Red List</i> in British Columbia. In Canada, both species are designated as <i>Endangered</i>. Up to 678 hectares, not exceeding an impact to the mature timber harvesting land base of 237 hectares, may be conserved for Vananda Creek Sticklebacks. No Stickleback WHAs have been established to date.</p>
Conservation of Queen Charlotte Goshawk	<p>The Queen Charlotte Goshawk is on the provincial <i>Red List</i> in British Columbia. It is designated as <i>Threatened</i> in Canada (COSEWIC 2002). Up to 1000 hectares, not exceeding an impact to the mature timber harvesting land base of 213 hectares may be conserved for the Queen Charlotte Goshawk. No Goshawk WHAs have been established to date.</p>



Consideration/issue	Description
Conservation of Coastal Tailed Frog	The Coastal Tailed Frog is on the provincial <i>Blue List</i> in British Columbia. It is designated as a species of <i>Special Concern</i> in Canada (COSEWIC 2002). Up to 30 hectares, not exceeding an impact to the mature timber harvesting land base of 20 hectares may be conserved for the Coastal Tailed Frog. No Tailed Frog WHAs have been established to date.
Protection of archaeological sites	Archaeological Overview Assessments (AOA) and Archaeological Impact Assessments (AIA) are used to identify potential archaeological sites which include cultural, habitat and historic sites. When field verified the areas are excluded from logging.
Protection of water quality within community watersheds	Management practices needed to protect water quality in the 25 designated community watersheds mapped by the Ministry of Environment will be modelled using forest cover requirements.
Visual landscape management	Established visual quality objectives will be modelled to reflect the current level of management for scenic values.
Currency of the Vegetation Resource Inventory (VRI)	A re-inventory begun in 2002 is currently underway. Results will be ready for the next timber supply review. An updated forest cover inventory based on the 1993 VRI will be used for this timber supply review.
Operability	Operability consists of two distinct zones; conventional and helicopter logging. The criteria to develop the operability mapping was defined in the last timber supply review (TSR 2) and has been updated with licensee input in 2010.
Site productivity (site index adjustments (SIA))	The site productivity of old-growth stands has been shown to underestimate the productivity of regenerated stands. To address this adjusted potential site index (PSI) values will be used as inputs for managed stand yield tables (i.e., for regenerated stands).  Potential site index estimates based on field sampling provided by Timberline Natural Resource Group (now TECO) (March 2010) will be applied in this timber supply review.
Deciduous forest types	The annual allowable cut contains 98 000 cubic metres for deciduous volume. Weyerhaeuser Company Limited is apportioned 95 000 cubic metres of this volume coming from deciduous-leading stands in which at least 50% of the gross stand volume is made up of deciduous species.

Consideration/issue	Description
Independent power projects (IPP)	<p>Currently within the Sunshine Coast TSA there is approximately 100 kilometres of transmission line built on right-of-way varying between 20 metres and 200 metres in width depending on the capacity of the specific transmission line. Proposed in the current call to power is another 6.7 kilometres of transmission line with the potential for another 6.0 kilometres. Currently under review is the Bute Inlet Hydro Project that could possibly add another 300 kilometres of transmission line within the TSA.</p> <p>At this time there is no data showing an impact analysis to the timber supply. There are two types of impacts: 1) The IPP footprint (transmission line, penstock, power house, and access roads) and 2) The impact on harvesting i.e. isolation of timber, working around transmission lines, visual constraints.</p>
Treaty settlement lands for the Sechelt and Sliammon First Nations	<p>The Sliammon AIP includes 6000 hectares of Treaty Settlement Lands of which is provincial Crown land within the Sunshine Coast TSA.</p> <p>These lands have been designated by Ministerial Order as Sliammon Designated Area No. 2. With a few minor exceptions this order prohibits the issuance of permits, licences or plans under the <i>Forest Act</i>, essentially excluding the areas from timber harvesting. This designation expires August 6, 2011.</p> <p>Within the Sechelt's traditional territory a number of former AIP were identified totaling 939 hectares; however they were never ratified and have since expired. They are still covered under a Map Notation. While there is no prohibition on the issuance of permits and licences, these areas inherently require a higher level of consultation.</p>

**3. Inventories**

**3.1 Background information**

Table 2 lists the inventories that will be used to determine the timber harvesting land base and to model forest management activities.

*Table 2. Inventory information*

<b>Data</b>	<b>Source</b>	<b>Date of compilation</b>	<b>Vintage/(update)</b>
Sunshine Coast TSA Administrative Boundary and Timber Supply Blocks	LRDW	January 2010	
Pacific TSA Blocks 21, 22 & 23	LRDW	April 2010	
Woodlots and Community Forest Agreement Areas	LRDW	April 2010	
Tree Farm Licences	LRDW	January 2010	
Parks and protected areas	LRDW	January 2010	
Ownership and Land Administration (forest cover ownership)	MFR	2008	
TFL10 Instrument 15 – Take-back area	ILMB	April 2010	
Timber licences	LRDW	January 2010	
Vegetation Resources Inventory (VRI) — forest cover	LRDW	January 2010	1993 (2009)
Forest cover TFL 10 take-back	Interfor	March 2010	
Inventory disturbance Update – Non-standard overlay	MFR	May 2010	
Operability mapping	MFR	January 2010	2002 (2010)
Archeological data — Known Arch Sites	LRDW	November 2009	2009
Unstable terrain mapping	MFR	May 2010	
ESAs	MFR – RCO	January 2010	
FTEN recreation sites and reserves	LRDW	April 2010	

Data	Source	Date of compilation	Vintage/(update)
Approved wildlife habitat areas (WHAs)	LRDW	January 2010	
Proposed Vananda Creek Stickleback WHA	MOE – Surrey	March 2010	
Proposed ungulate winter range	MOE – Surrey	July 2010	2005 (2010)
Approved old-growth management areas (legal OGMA's)	LRDW	January 2010	
Draft old-growth management areas (non-legal OGMA's – Britain, Bute West, Bute East, Cortes, Haslam, Howe, Texada)	LRDW	January 2010	
Proposed old-growth management areas from licensees (Homfray, Jervis, Quatam, Southgate)	Interfor	March 2010	
Permanent sample plots (PSP)	LRDW	January 2010	
Landscape unit boundaries	LRDW	January 2010	
Biogeoclimatic classification	LRDW	January 2010	
Community watersheds	LRDW	January 2010	
Visual landscape inventory	LRDW	January 2010	
Community interface zone	MFR – Coast Region	April 2010	
Recreation features inventory	LRDW	March 2010	

**Data source and comments:**

These data for the Sunshine Coast TSA administrative area will be extracted from its source and converted to ESRI's Arc Info coverage format in preparation for the timber supply analysis. These inventories are listed in the order in which they are first used in the document. A more comprehensive table for the data set prepared for the timber supply review is available from the Forest Analysis and Inventory Branch, MFR.

## 4 Division of the Area into Management Zones

### 4.1 Management zones and tracking of multiple objectives (grouping)

Management zones are used to differentiate areas with distinct management objectives. For example, a zone may be based on a harvesting or silviculture system, visual quality objective or wildlife consideration. Sometimes an area of forest is subject to more than one management objective. In the timber supply model, each type of zone can be tracked separately, thereby allowing application of overlapping management objectives. Forest land that is unavailable for timber harvesting may contribute toward meeting objectives for other forest values.

Table 3 outlines the zones or objectives incorporated into the timber supply model. Further information on the forest cover requirements to be applied to these areas can be found in Section 6.4, “Integrated resource management.”

Table 3. Objectives to be tracked

Objectives	Inventory definition
Landscape units, biodiversity emphasis options (BEOs) and biogeoclimatic (BEC) inventory	Provincial BEC inventory and established landscape units and BEOs. Approved and draft OGMAs will be used in the base case where they have been identified. Where they have not been, the recommended seral stage distribution for the biogeoclimatic unit will be modelled.
Goat winter range	Winter range for goats was identified by MOE in 2005 (proposed) and subsequently updated to July 2010. Goat winter range is designated as retention zone. Goat winter range retention zone excludes timber harvesting.
Community watersheds	Community watersheds have been identified and modified harvesting practices are permitted (see Appendix).
Visuals	Visual polygons modelled by visual quality objective (VQO) and assigned visual absorption capacities (VAC). VQOs include preservation, retention, partial retention and modification. VAC include low, medium and high (see Appendix).
Cutblock adjacency	Non-visual areas modelled by cutblock size distribution by landscape unit.
Community interface areas	Communities along the Strait of Georgia where timber harvesting may be contentious. Defined by a coverage created for this analysis. A significant number of historic trails that have not been established or authorized either under the <i>Forest and Range Practices Act</i> or the <i>Forest Practices Code</i> are found here. When operating in these areas licensees often take measures to protect these trails. Reduced rates of harvest in the interface areas will be modelled to account for the impact of restricted harvesting practices (see Appendix).

## 4.2 Analysis units

An analysis unit is composed of forest stands with similar tree species composition, timber growing potential and treatment regimes. Each analysis unit is assigned its own timber volume projection (yield table) for existing and future stands. Yields tables for existing natural stands are derived using the Variable Density Yield Prediction (VDYP) model. Yield tables for existing managed stands and future stands are derived using the Table Interpolation Program for Stand yields (TIPSY).

A site index adjustment project has been completed (March 2010) for stands where Douglas-fir, hemlock and cedar are the leading species. Post-harvest site indices have been assigned to these stands which will be used to develop managed stand yield tables for both existing and future managed stands.

Table 4 shows the criteria for defining the analysis units for existing natural stands. Site index ranges for analysis units have been determined for the full timber harvesting land base.

Table 4. *Definition of analysis units*

Analysis unit	Leading species (B.C. Tree Codes)	Site index range (height in metres, at age 50 years)
1. Douglas-fir (Fd) – good	F (Fd, Fdc, Fdi)	> 27
2. Douglas-fir (Fd) – medium	F (Fd, Fdc, Fdi)	19 to 27
3. Douglas-fir (Fd) – poor	F (Fd, Fdc, Fdi)	< 19
4. Cedar – good/medium	C, Y (Cw, Yc)	≥ 17
5. Cedar – poor	C, Y (Cw, Yc)	< 17
6. Hemlock/Balsam/Spruce – good	H, B, S (Hm, Hw, Ba, Bg, Bl, Se, Ss)	> 23
7. Hemlock/Balsam/Spruce – medium	H, B, S (Hm, Hw, Ba, Bg, Bl, Se, Ss)	15 – 23
8. Hemlock/Balsam/Spruce – poor	H, B, S (Hm, Hw, Ba, Bg, Bl, Se, Ss)	< 15
9. Pine – good/medium/poor <sup>(a)</sup>	P, L, A (except Act), E, M (except Mb), W, U	All
10. Red Alder <sup>(b)</sup>	D (Dr)	All
11. Cottonwood/Maple	Act, Mb	All

a) Also includes any incidental larch-leading stands and some deciduous stands having a logging history.

b) Red alder-leading stands with at least 50% deciduous volume.

### Data source and comments:

The site index refers to the height of the tree in metres when its breast height age is 50 years. The amount of area in each analysis unit can be found in the appendix.

## **5. Timber Harvesting Land Base Definition**

---

This section outlines the steps that will be used to identify the Crown forested land base and the timber harvesting land base (THLB). The Crown forested land base consists of provincial Crown land that is managed by the BC Forest Service for TSA timber supply. The Crown forested land base excludes:

- tree farm licences;
- community forests;
- Pacific TSA;
- woodlot licences; and
- private lands.

The THLB is that portion of the Crown forested land base where timber harvesting is expected to occur. The THLB excludes:

- parks and protected areas;
- areas that are not suitable for timber production; and
- areas where timber harvesting is incompatible with management objectives for other resource values.

Land is considered outside the THLB only where harvesting is not expected to occur. Any area in which some timber harvesting will occur remains in the THLB, even if the area is subject to other management objectives, such as wildlife habitat and biodiversity. These objectives are modelled in the timber supply analysis. The Crown forested land base outside of the THLB also contributes to these other objectives.

Land may be added to the THLB in the following situations:

- where management activities improve productivity or operability (e.g., the stocking of land currently classified as non-commercial brush with commercial tree species);
- through the acquisition of productive forest land (e.g., timber licence reversions).

After all the areas that do not contribute to the THLB have been identified the resulting area is defined as the current timber harvesting land base for the TSA.

### **5.1 Land outside the core TSA**

---

The legal boundary of the Sunshine Coast TSA, which coincides with the Sunshine Coast Forest District boundary, contains several areas of significant size within the perimeter of the TSA that do not contribute to TSA timber supply and do not contribute to other objectives for the Sunshine Coast TSA when assessing timber supply. These areas are: Tree Farm Licences 39 and 43, Pacific TSA, CFA K4C — Klahoose Forestry Limited Partnership, CFA K3G — Powell River Community Forest Ltd, CFA K3F — Sechelt' Community Projects Inc. and CFA K3P — Tla'amin Timber Products Ltd.

### **5.2 Non-forest, non-productive forest and non-commercial cover**

---

Areas classified as “non-treed and vegetated” (VN) as well as alpine, wetland, lakes, rocks, shrubs etc. are excluded from the THLB. The exceptions are harvested areas that have little or no trees but are scheduled to be regenerated in the near future. Areas classified as ‘not forest management land base’ (FMLB = 0) in the vegetation resource inventory will be excluded from the THLB.

### 5.3 Land not administered by the BC Forest Service for TSA timber supply

Land not administered by the BC Forest Service for timber supply in the TSA includes private land, municipal land, federal land, Indian Reserves, tree farm licences, community forest agreements, and woodlot licences. Some of these areas have already been excluded from the core TSA in Section 5.1. These areas are all excluded from both the Crown forested land base (CFLB) and the THLB; they do not contribute to objectives for wildlife habitat or biodiversity. Timber licences are normally also removed, but many of the timber licences in the Sunshine Coast TSA have been harvested and have reverted to the TSA.

Parks and protected areas within the core TSA are part of the Crown forested land base and contribute to objectives for biodiversity and wildlife. However, they are not administered by the BC Forest Service for timber supply, so they are excluded from the THLB. Table 5 shows the contribution of each ownership to the CFLB and the THLB.

Table 5. Ownership contributions

Ownership code	Crown forested land base	Timber harvesting land base
40 Private Crown Grant	No	No
50 Federal Reserve	No	No
52 Indian Reserve	No	No
53 Military Reserve	No	No
54 Dominion Crown Block	No	No
60 Crown Ecological Reserve	Yes	No
61 Crown Use, Recreation and Enjoyment of the Public (UREP) Reserves	Yes	Schedule C: Yes Schedule N: No
62 Crown Forest Management Unit (TSA) or Crown Timber Agreement Lands	Yes	Yes
63 Crown Provincial Park Class A	Yes	No
67 Crown Provincial Park equivalent or Reserve	Yes	No
69 Crown Miscellaneous Reserves	Yes	Schedule C: Yes Schedule N: No
70 Crown Active Timber Licence in a TSA or TFL	Yes	Schedule N: Yes Schedule C: No
72 Crown and Private Schedule "A" and "B" Lands in a TFL	No	No
74 Crown and Private timber alienated in watershed	No	No
75 Crown Christmas tree permit	Yes	No
77 Crown and Private Woodlot Licence	No	No
79 Community Forest	No	No
99 Crown Misc. lease (Fairground, R&G Club site, recreation cottage site)	No	No



## Data source and comments:

The Ownership and Land Administration data set, along with the Vegetation Resource Inventory are the primary data sets used to determine land classified as Crown forest. A number of changes to the Ownership and Land Administration data set have occurred since its last update in 2008.

Additional information will be included in the data set created for the timber supply analysis to address recent changes in land administration within the Sunshine Coast TSA's administrative area. This information is contained in the following inventories (see Table 2 for further details about the inventories):

### Land deleted under the *Forest Revitalization Act* from TFL 10 now administered as TSA

Under *Instrument Number 15*, 69 171 hectares of Schedule B Crown land was removed from Tree Farm Licence 10 and is now administered as part of the Sunshine Coast TSA.

### Timber licence areas reverted back to 62-C

The following timber licences have reverted back to 62-C since the last timber supply review:

T0383	T0656	T0712	T0800	T0851
T0392	T0661	T0780	T0804	T0863
T0395	T0669	T0788	T0812	
T0404	T0704	T0790	T0842	

### Parks and protected areas

The parks and protected areas layer in the land and resource data warehouse will be used to capture any recent changes in park boundaries.

## 5.4 Inoperable areas

Operability codes are generally used to describe the presence or absence of physical and economic barriers that limit harvesting. Since physical and economic conditions are highly variable throughout British Columbia, interpretation and mapping may vary between management units. Definitions of operable may also change over time as technologies evolve and markets change.

Current operability for most of the Sunshine Coast TSA is based on mapping completed by the British Columbia Forest Service in 1992. This mapping was updated for some areas of the TSA in 1998 and again in 2010 when licensees were asked to review their chart areas and provide an estimate of where future harvest would occur beyond the current operable areas. Proposed operability changes were reviewed by Sunshine Coast Forest District staff and added to the existing operability map. Overall, changes to operability were minor.

Table 6. *Description of operable areas*

Inventory description	Code	Reduction (%)
Operable areas – conventionally accessible	A	0
Operable areas – helicopter accessible	C	0
Inoperable areas	I	100
Inoperable areas – not reported	N	100

**Data source and comments:**

Changes in the Operability inventory are captured in the following inventories (see Table 2 for further details on the inventories). Information in these inventories overrides information in the operability inventory.

Inventory disturbance update – non-standard overly

Mapped depletions (recent harvesting) since 2002 will be considered operable. This inventory will be used to update the age of the forest cover within the depletion polygon also.

RESULTS openings

Any forest cover polygon in the veg\_comp inventory having a logging history, as indicated by a RESULTS Opening Id, will be considered operable.

Licensee supplied future harvest blocks

Area having a designated harvest system will be considered operable. This inventory allows future harvest blocks to be categorized as conventionally or helicopter accessible.

**5.5 Sites with low timber growing potential and problem forest types**

Sites may have low productivity either because of inherent site factors (e.g., poor nutrient availability, exposure, excessive moisture, etc.), or because they are not fully occupied by commercial tree species. Typically, these stands are intermixed with other stands within the forested land base. As these stands are not considered to be harvestable, they need to be identified and excluded from the THLB.

Problem forest types are stands that are physically operable and exceed low site criteria that are not currently utilized or have marginal merchantability. Where logging has not occurred, these types are wholly or partially excluded from the THLB. Table 7 lists the stand types that will be excluded due to low volume and productivity.

Table 7. Description of sites with low timber growing potential and problem forest types<sup>(a)</sup>

Species group	Analysis unit(s)	Volume <sup>(b)</sup> (m <sup>3</sup> /ha)	Site index (m) <sup>(c)</sup>	Reduction <sup>(d)</sup>
Fir	(1) Fir – good, (2) Fir – medium and (3) Fir – poor	< 300	< 15.5	100%
Cedar	(4) Cedar – good/medium and (5) Cedar – poor	< 300	< 13.5	100%
Hemlock/ Balsam/ Spruce	(6) Hemlock/Balsam/Spruce – good, (7) Hemlock/Balsam/Spruce – medium, (8) Hemlock/Balsam/Spruce – poor	< 300	< 12.0	100%
Pine	(9) Pine	Any	Any	100%
Red Alder	(10) Red Alder	< 250	< 12	100%
Cottonwood/ Maple	(11) Cottonwood/Maple	< 300	< 12	100%

a) Only stands without any prior logging history ('Activity' = 'L') are removed from the timber harvesting land base.

b) Current VRI volume at prescribed utilization limits and based on a review of 3500 appraisal records.

c) Based on stands not being able to achieve 300 m<sup>3</sup>/ha by age 150.

d) For a stand to be excluded it should fail to meet both the minimum volume and site index requirements.

**Data source and comments:**

Areas with a low timber growing potential that have been logged will contribute to the THLB as these sites once supported merchantable timber and may do so in the future.

Unmerchantable forest types are stands which are physically operable and exceed low site criteria yet are not currently utilized. These types can be wholly or partially excluded from the THLB.

**5.6 Cultural heritage resource reductions**

Archaeological resource values primarily relate to First Nations historic village sites and shell middens as well as culturally modified trees (CMTs). Historic village sites and shell middens are most frequently identified close to marine shorelines; whereas, CMTs are generally found within remaining old-growth forest types, most often red- or yellow-cedar leading forests.

Archeological sites have been discovered and catalogued during the archaeological impact assessments. In the analysis these sites, which are protected under the *Heritage Conservation Act*, will receive a 50-metre buffer, and the total area will be excluded from the THLB.

**5.7 Experimental and permanent sample plots**

All experimental and permanent plots will receive a 100-metres buffer and the total area will be excluded from the THLB based on a 100 metres radius buffer around each plot. There are currently 32 growth and yield and 30 research plots that once buffered will result in an impact of 196 hectares to the timber harvesting land base.

**5.8 Sites with unstable terrain**

The unstable terrain layer was created from a combination of data sources: Terrain Stability mapping from Interfor and BCTS, slopes > 60% from TRIM, and ESA Soils from forest cover (f\_own) data.

Table 8. Description of sites with unstable terrain

Terrain stability code	Operability code	Slope class	ESA Soils	Description	Reduction
V	Any	Any		Terrain stability class V	100%
IV	Any	Any		Terrain stability class IV	30%
NULL	A,C	2		Slopes > 60%, outside of terrain stability class mapping, inside operable area	32.3%
NULL				Soils attributes in ESA_1 and ESA_2 outside terrain stability class mapping and slopes > 60%, inside operable area.	

The unstable terrain layer was created from a combination of Terrain Stability mapping, slopes > 60% and soil sensitive polygons.

## 5.9 Established recreation reserves and sites

Recreation tenures in the FTEN recreation polygon coverage obtained from the LRDW which have been established (Table 9) under the *Government Actions Regulation* (GAR) will be removed from the timber harvesting land base.

Table 9. Established recreation reserves and sites in the Sunshine Coast TSA

Forest file Id	Project name	Feature area (ha)
REC0489	Appleton Creek Site & Trail	12.4
REC5890	Big Tree Trail & Picnic	43.5
REC0139	Bob's Lake	48.9
REC6516	Dakota Ridge	936.1
REC0287	Dinner Rock	31.6
REC6670	Freke Anchorage	3.9
REC0134	Klein Lake	132.8
REC0283	Lyon Lake	65.0
REC3211	McMurray Bay	21.0
REC6206	Sechelt Heritage Forest	22.6
REC0383	Secret Cove Falls Trail	17.4
REC0140	Shingle Beach	45.5
REC6768	Sprockids Trail	48.2
REC6604	Stuart Island	52.4
	Total	1 481.3

### Data source and comments:

Recreation sites and trails inventory data was examined by the TSR technical team to determine which sites and trails are currently covered by a GAR order. Table 9 lists such recreation areas in the Sunshine Coast TSA. Often the GAR order includes a harvest restriction or exclusion as a measure to protect a recreation area. Sometimes, some harvesting is permitted in a recreation area under an authorization issued through *Section 16 of the Forest Recreation Regulation*.

In this analysis, forest management measures associated with other trails are addressed by applying forest cover constraints. Because trail development is heaviest near communities a more restrictive forest cover requirement is applied in the community interface zone (see Section 6.4.1, "Forest cover requirements").

## 5.10 Wildlife habitat area reductions

Wildlife habitat areas for grizzly bears, marbled murrelet, Vananda Creek Sticklebacks, and ungulate winter range for mountain goat have been mapped and the mapped data is available in corporate and local data warehouses (See Section 3). These areas will be excluded from the timber harvesting land base. For other species such as deer, the Coastal Tailed Frog and the Queen Charlotte Goshawk, areas for exclusion from the timber harvesting land base have not been identified. Future timber harvesting land base reductions for these species may be considered by the chief forester at the time of the AAC determination but will not be accounted for in the determination of the timber harvesting land base.

The specific wildlife orders and wildlife habitat areas are listed in the table below.

*Table 10. Description of wildlife orders and WHAs for the Sunshine Coast TSA*

Type	Species	Description and management activity
Approved WHAs	Grizzly Bear	Forty-nine WHAs have been established, located in Brem, Bute East, Bute West, Deserted, Homathko and Skwawka Landscape Units. These WHAs cover 4453 hectares and impact an equivalent of 551 hectares of THLB and 331 hectares of mature THLB. No forestry practices should be carried out within these WHAs with the exception of treatments approved by the statutory decision maker to restore or enhance degraded habitat or to ensure wind firmness.
Approved WHAs	Marbled Murrelet	Thirty-five WHAs have been established, located in Brittain, Bunster, Howe, Quatam and Southgate Landscape Units. These WHAs cover 4312 hectares and impact an equivalent of 640 hectares of THLB and 513 hectares of mature THLB. No harvesting and silviculture should be carried out within these WHAs except for salvage.
Draft WHA	Vananda Creek Sticklebacks	These two species occur only in the Emily, Priest, and Spectacle lakes in the Van Anda Creek watershed on Texada Island. No harvesting or salvage is allowed in the core area of the WHA. The core area covers 221 hectares of THLB.
Section 7 Draft Maps	Mountain Goat	Goat winter range covers 48 422 hectares based on the mapping provided for this timber supply review, impacting 24 485 hectares of productive forest. No harvesting will be carried out within the goat winter range.
Section 7 Notice	Queen Charlotte Goshawk	WHAs yet to be established for this species. General wildlife measures include no harvest or salvage within the core area of the WHA. Up to 213 hectares of mature timber harvesting land base may be impacted in the future, 1000 hectares in total.
Section 7 Notice	Coastal Tailed Frog	WHAs yet to be established for this species. General wildlife measures include no harvest or salvage within the core area of the WHA. Up to 20 hectares of mature timber harvesting land base may be impacted in the future, 30 hectares in total.

## 5.11 Old growth management areas (OGMAs)

---

An old growth management area (OGMA) is defined in the BCFPC Operational Planning Regulation as an area established under a higher level plan which contains or is managed to replace structural old growth attributes. OGMAs have been approved for 8 of 25 landscape units within the Sunshine Coast Forest District. OGMAs have been identified in 15 other landscape units and current practice for the licensee's is to treat the areas as no-harvest zones. Given the no-harvest status, the identified OGMAs will be used in the base case except for the less established proposals in the Brem, Deserted, Narrows and Salmon Inlet landscape units. Should the OGMA land base change after the analysis is completed the impact will be reported to the chief forester so it may be incorporated into his AAC determination. In the Bishop, Brem, Deserted, Narrows, Salmon Inlet and Toba landscape units forest cover constraints will be used to address landscape level biodiversity requirements.

Table 11. Status of OGMA's by landscape unit — Sunshine Coast Forest District 2010

Landscape unit Prov ID	Landscape unit name	Bio-diversity emphasis	Gross area (ha)	OGMA area (ha)	Status	Comment
157	Bunster	I	55 425	4 201	Approved (2000.09.21)	
200	Chapman	L	66 151	2 891	Approved (2002.11.25)	
560	Homathko	H	185 223	5 335	Approved (2001.09.27)	
759	Lois	L	64 551	4 535	Approved (2002.11.25)	Also overlaps with Pacific TSA and TFL 39
1034	Powell Daniels	I	41 277	1 552	Approved (2002.01.25)	Not TSA – TFL 39
1035	Powell Lake	L	63 488	3 234	Approved (2002.11.25)	Not TSA – TFL 39
1112	Sechelt	L	106 503	3 739	Approved (2004.08.16)	
1162	Skwawka	H	38 740	2 327	Approved (2002.03.20)	
143	Brittain	I	54 528	3 189	Draft (Non Legal)	
167	Bute East	I	75 875	2 771	Draft (Non Legal)	
168	Bute West	I	79 344	2 274	Draft (Non Legal)	
264	Cortes	I	102 900	3 932	Draft (Non Legal)	
524	Haslam	L	39 297	1 767	Draft (Non Legal)	
579	Howe	I	52 209	3 137	Draft (Non Legal)	
1271	Texada	L	161 010	1 792	Draft (Non-Legal)	
136	Brem	I	61 139		Proposed	Use constraint
1816	Deserted	H	13 714		Proposed	Use constraint
561	Homfray	I	50 860	3 081	Proposed (Interfor)	Local data
615	Jervis	I	72 172	4 547	Proposed (Interfor)	Local data
920	Narrows	I	39,545		Proposed	Use constraint
1054	Quatam	I	52,141	2 970	Proposed (Interfor)	Local data
1099	Salmon Inlet	I	68 682		Proposed	Use constraint
1190	Southgate	H	123 516	3 262	Proposed (Interfor)	Local data
106	Bishop	I	78 780		None Identified	Use constraint
1285	Toba	H	175 596		None Identified	Use constraint also overlaps with CFA K4C
		Total	1 922 665			

## 5.12 Environmentally sensitive areas (ESAs)

An environmentally sensitive area (ESA) is an area that is susceptible to disturbance (e.g., unstable terrain and areas that are difficult to reforest). ESA values are used to exclude areas from the timber harvesting land base where more specific and detailed information is not available about a particular forest resource. Areas can be identified as either very sensitive (1) or moderately sensitive (2) to disturbance, and are entirely or partially removed from the timber harvesting land base.

Table 12. Description of environmentally sensitive areas

ESA category	ESA description	Field reduction (%)
S1	Soils – highly sensitive	100
S2	Soils – moderately sensitive	20
A1	Avalanche hazard	100
P1 or P2	Difficult regeneration	100
H1 or H2	Watershed values	100

### Data source and comments:

The ESA classification is quite dated, and in some cases; namely, wildlife, recreation, and watershed, more recent information is available for portions of the TSA. However, where newer information is not available, the ESA inventory represents the best available information, and will be used in the analysis.

P1 = geomorphological regeneration problems. P2 = biotic regeneration problems, “percent area reduction” = 100% for both P1 and P2 areas.

With respect to ESA H1 and H2 (watershed values), some of these may fall within community watersheds (under the community watersheds – see Table 2 “Inventory Information”, as well as the “community watershed – management zone”). (N.B.: care will be taken to not double-count H1 and H2 areas with community watershed inventory information source or community watershed – management zone netdowns).

ESA S1 and S2 (sensitive soils) was augmented by contract work done by TECO, theming TSA net timber harvesting land base that is > 60% slope, then overlaying what terrain instability analyses has been completed to determine the proportion of > 60% slope that falls into terrain instability classes IV and V. These proportions will then be extrapolated to the rest of the TSA’s net timber harvesting land base, for which slope mapping is available, to estimate the amount of land base in instability classes IV and V. For the limited area where both terrain stability and slope mapping is not available, the ESA soils information will be used. In these areas, 100% of S1 and 20% of S2 will be excluded from the timber harvesting land base.



### 5.13 Riparian reserve and management zones

Detailed stream inventories are not available for the Sunshine Coast TSA. Only one watershed (Deserted River) had a complete stream inventory. An analysis of this drainage determined that 2.5% of its area is in riparian reserves. Due to the small sample size of the available classified inventory, a decision was taken that the same percentage (3%) as the previous TSR will be used for stream riparian reserves.

The TSR analysis will proceed without a spatial layer for stream classification.

Table 13 notes below outline the stream categories and the buffer widths that have been applied to each side of the rivers and streams in the sample watershed (Deserted River).

Table 13. Riparian reserve and management zone buffer widths for river and streams

River/stream class	Reserve width (metres)	Management zone width <sup>(a)</sup> (metres)
S1 large rivers	0	100
S1 fish streams	50	20
S2 fish streams	30	20
S3 fish streams	20	20
S4 fish streams	0	30
S5 non-fish streams	0	30
S6 non-fish streams	0	20

a) Fifty percent of the management zone is removed from the timber harvesting land base.

Lakes and wetlands were classified using the *Riparian Management Guidebook* and Table 14 outlines the reserve and management zone buffers that have been applied to the features in the GIS file.

Table 14. Riparian reserve and management zone buffer widths for lakes and wetlands

Feature class	Reserve zone width (m)	Management zone width <sup>(a)</sup> (m)
L1 <sup>(b)</sup>	10	0
L2	10	20
L3	0	30
L4	0	30
W1	10	40
W2	10	20
W3	0	30
W4	0	30
W5	10	40

a) Fifty percent of the management zone is removed from the timber harvesting land base.

b) L1 lakes < 1000 hectares gave a 10 metre reserve zone and the management zone is determined by the district manager. L1 lakes >1000 hectares only have a management zone determined by the district manager.

## 5.14 Roads, trails and landings

Roads, trails and landings will be accounted in the analysis in one of two ways. Large roads, such as a highway having a wide right-of-way, are categorized in the forest cover inventory as non-forest land polygons, and will be removed from the land base considered available for timber supply (see Section 5.2.2). Smaller roads, as well as trails and landings, are considered unproductive area within a forest cover polygon and will be factored out of the land base considered available for timber supply. These features do not get classified in the 1:20,000 scale forest cover inventory because of their linear shape and small size.

Unclassified roads occupy 4670 hectares of land categorized as Crown forest within the Sunshine Coast TSA (see Table 15). Without any new road construction or re-construction or maintenance much of the unclassified road area would eventually be overgrown by forest. However, enough new road construction, re-construction and maintenance occurs to roughly balance off road area being overgrown (as indicated by summaries of road data over time i.e., the amount of map worthy roads is more-or-less stable). For modelling purposes it is assumed that 4670 hectares is occupied at any given time by unclassified roads. Because the size of this TSA's forest access road network appears stable, this amount of road area is assumed to stay more-or-less the same throughout time (i.e., area lost to future road construction is offset by area gained from old roads, trails and landings reverting back to forest).

Table 15. Summary of unclassified roads in Sunshine Coast TSA

Road type	Road status			Roaded area (ha)
	Active (km)	Retired (km)	Total (km)	
Forest Service Road	797	31	828	828
Road Permit	2854	984	3838	3838
Special Use Permit, Forest	4	0	4	4
Total	3654	1015	4670	4670

### Data source and comments:

Each of the major licensee's on the TSRIII technical team submitted information on widths of forest access roads. The technical team reviewed these data and derived an average road width of 10 metres. This width allows for some area being lost to trails and landings.

### 5.15 Wildlife trees (WTs) and wildlife tree patches (WTPs)

Biodiversity planning is a requirement under the *Forest and Range Practices Act* and is done in accordance with the *Landscape Unit Planning Guide* (MFR, 1999). Objectives for retention of old growth forest and stand structure through wildlife tree retention are described in the guide. Retention of old growth forest as it applies here is described in Section 5.2.11.

The practice of leaving wildlife tree patches will be modelled in the timber supply analysis by reducing the land base available for harvesting to account for trees that must be left standing in harvested areas. Where Landscape Unit Plans exist, allowances for WTPs have been specified. For all other landscape units, and BEC variants not specifically addressed within these plans, a seven percent WTP allowance will be made.

For application in the timber supply analysis WTP allowances have been related to the BEC subzones (column 1) found within the Sunshine Coast TSA (Table 16). The specified WTP reduction shown in the second column is an area weighted average based on all landscape units within the TSA. This figure was reduced by 75% (column 3) following assumptions used in the *Forest Practices Code Timber Supply Analysis*, February 1996, that 75% of the wildlife tree patch requirements will be met by riparian reserves, management zones, non-merchantable stands, inoperable areas, steep slopes and unstable soils.

An area reduction will be used to model wildlife tree patch requirements rather than a volume reduction because it more accurately reflects the area upon which harvesting will occur. These wildlife trees, in conjunction with other riparian reserves and area removals, are often larger than two hectares in size and are left to maintain stand structure within the landscape unit over time. Those wildlife tree patches that are larger than two hectares in size this area may contribute to meeting old-seral stage forest requirements at the landscape level. By using 2006-2009 FREP sample blocks located throughout the TSA, it was found that 86% of the wildlife tree patches were smaller than two hectares in size. It is assumed that these wildlife tree patches will not be economical to harvest at a later date, nor will they be available to harvest in subsequent harvesting of the stand.

Table 16. Reductions to reflect volume retention in cutblocks

BEC sub-zone	Specified wildlife tree reduction (weighted)	Residual area of wildlife tree patches on the timber harvesting land base
CDFmm	6.67%	1.67%
CWHdm	7.90%	1.98%
CWHds	7.90%	1.98%
CWHmm	7.00%	1.75%
CWHms	6.34%	1.59%
CWHvm	7.24%	1.81%
CWHxm	7.79%	1.95%
MHmm	6.62%	1.66%

## 5.16 Timber licence reversions

---

Timber licences are a form of timber tenure that gives the holder exclusive right to harvest merchantable timber from defined areas of Crown land. After the area is harvested and reaches a free-growing condition the land reverts to Forest Service jurisdiction. The timber cut from timber licences is not part of the allowable annual cut of a TSA.

For this timber supply review, all active timber licences were reviewed by BC Forest Service tenures staff and were updated to reflect their current status. Most active timber licences have reverted and will be added back into the CFLB and THLB (see Section 5.3, “Land not administered by the BC Forest Service for TSA timber supply”). A few timber licences have not yet reverted to Forest Service jurisdiction but are expected to do so by the next timber supply review. The area yet to revert is about 3000 hectares.

## 6. Current Forest Management Assumptions

### 6.1 Harvesting

#### 6.1.1 Utilization levels

The utilization level defines the maximum stump height, minimum top diameter (inside bark) and minimum diameter at breast height that must be removed from harvested areas. These factors are needed to calculate merchantable stand volume for use in the analysis. The levels used in the analysis reflect current operational practice.

Table 17. Utilization levels

Leading species	Minimum dbh (cm)	Maximum stump height (cm)	Minimum top dib (cm)
Conifer except Pine > 120 years	17.5	30	10
Conifer except Pine ≤ 120 years	12.5	30	10
Pine <sup>(a)</sup>	N/A	N/A	N/A
Red Alder <sup>(b)</sup> > 40 years	17.5	30	10
Red Alder <sup>(b)</sup> ≤ 40 years	12.5	30	10
Cottonwood/Maple <sup>(c)</sup> > 40 years	17.5	30	10
Cottonwood/Maple <sup>(c)</sup> ≤ 40 years	12.5	30	10

a) Also includes any incidental larch (ITGs 33, 34), and some deciduous stands (ITG s 40, 41, 42).

b) ITG 37 or 38 and deciduous volume in stand must be 50% or more of the total volume.

c) Includes ITGs 35, 36, 39.

#### Data source and comments:

- Table 17 above reflects current regional utilization standards, licence requirements and current performance except for the minimum dbh (diameter at breast height) of managed stands (coniferous stands ≤ 120 years, and deciduous stands ≤ 40 years) and minimum top dib (diameter inside bark) for stands of any sort. The utilization standards for managed stands are a minimum dbh of 12 cm, while for natural stands above 120 years of age the minimum dib is 15 cm. The Ministry of Forests and Range yield models (VDYP/TIPSY) currently compile volumes at 12.5 cm minimum dbh and 10 cm top dib. While the model's top diameter somewhat overestimates volume yields, and the breast height diameter assumed for managed stands somewhat underestimates volume yields, Forest Analysis and Inventory Branch of the Ministry of Forests and Range has indicated that the difference from actual yield is negligible.
- With respect to Red Alder and other merchantable deciduous species, Table 17 reflects current utilization standards, licence requirements and current performance, except dib for deciduous stands. Current utilization standards for deciduous stands above 40 years of age is a minimum top dib of 15 cm. However,

as is the case with mature coniferous volume, utilization specifications in the variable density yield projection (VDYP) model currently compile mature deciduous volumes at 10 cm top dib. And again, Forest Analysis and Inventory Branch of the Ministry of Forests and Range has indicated that the difference in yield between 10 cm top dib and 15 cm top dib is negligible.

### 6.1.2 Volume exclusions for mixed-species stands

One or more species may be unmerchantable in mixed-species stands. For example, deciduous species may not be harvested in a predominantly coniferous stand. The unharvested portion should not contribute to estimated stand volume.

In the Sunshine Coast TSA, all merchantable coniferous and deciduous species are charged against AAC when they occur within a cutblock. Aspen and birch are the only non-merchantable deciduous species within the Sunshine Coast TSA.

*Table 18. Volume exclusions for mixed-species types*

Species	Volume exclusion (%)
Aspen	100
Birch	100

### 6.1.3 Minimum harvestable age

Minimum harvestable age are, as the term implies, the minimum age at which harvesting is expected to be feasible. While harvesting may occur in stands at the minimum requirements in order to meet forest level objectives (e.g. maintaining over harvest level for a short period of time or avoiding large inter-decadal changes to harvest levels), most stands will not be harvested until well past the minimum ages because other resource values take precedence (e.g. requirements for the retention of older timber).

The criteria used to define minimum harvestable age for each stand in this analysis is minimum volume per hectare determined by analysis unit.

Table 19. Minimum harvestable age criteria

Analysis unit	Criteria
	Minimum volume per hectare
1. Fir – good	300 m <sup>3</sup>
2. Fir – medium	300 m <sup>3</sup>
3. Fir – poor	300 m <sup>3</sup>
4. Cedar – good, medium	300 m <sup>3</sup>
5. Cedar – poor	300 m <sup>3</sup>
6. Hemlock/Balsam/Spruce – good	300 m <sup>3</sup>
7. Hemlock/Balsam/Spruce – medium	300 m <sup>3</sup>
8. Hemlock/Balsam/Spruce – poor	300 m <sup>3</sup>
9. Pine – good, medium, poor	250 m <sup>3</sup>
10. Red Alder – good, medium, poor	250 m <sup>3</sup>
11. Cottonwood/Maple – good, medium, poor	300 m <sup>3</sup>

**Data source and comments:**

Minimum volume per hectare for each analysis unit was determined based on appraisal information for Sunshine Coast TSA. The values in Table 19 reflect the absolute minimum volume at which about 99% of stands would contain enough merchantable volume to be economical to harvest based on the appraisal. Over 3500 appraisal records dating as far back as 1996 were part of the sample for this determination. Expert opinion was used for cottonwood and maple stands because too few records were found to make a reliable determination on.

**6.1.4 Harvest scheduling priorities**

Minimum harvest levels for fir- and cedar-leading stands for the first 10 years of the base case forecast will be set at the average harvest performance across the species profile calculated on the past nine years of harvest. After which, the harvest level for fir- and cedar-leading stands will be set to the inventory profile.

A harvest target of 98 000 cubic metres will be set for the deciduous component of the current AAC.

Table 20. Modelling priorities for harvest scheduling

Management zone	Analysis unit	Period (10 year increments)	Minimum harvest level
N/A	Fir (1,2,3)	1	25%
N/A	Cedar (4,5)	1	38%
N/A	Deciduous (10,11)	All	98 000

**Data source and comments:**

A non-replaceable forest licence has been awarded to Weyerhaeuser Company Limited for an annual harvest of 95 000 cubic metres.

The table below breaks down by species the annual harvest from Sunshine Coast TSA's Crown land for the period between 2001 and 2009. The data was taken from the Ministry of Forests and Range's harvest billing system.

Year	% of annual harvest			
	Cedar	Fir	Other conifer	Deciduous
2001	23	39	32	6
2002	24	38	34	4
2003	25	42	27	6
2004	24	42	31	3
2005	24	35	37	5
2006	25	39	32	4
2007	23	37	37	3
2008	33	31	34	2
2009	25	42	31	2
Average	25	38	33	4

**6.1.5 Logging method**

Conventional logging methods (i.e., cable, grapple and skidder) are the dominant harvesting systems within the Sunshine Coast Timber Supply Area. Heli-logging is currently employed; however, the volume contribution from areas identified as heli-operable in the operability layer will be tracked during the analysis.

Table 21 presents historical heli-logging performance within the TSA.

Table 21. Logging method

Year	Heli-logging volume (m <sup>3</sup> )	Annual harvest – billed volume (m <sup>3</sup> )	Heli-logging percent of annual harvest
2002	415 074	963 079	43%
2003	262 969	687 073	38%
2004	372 013	1 484 551	25%
2005	313 307	1 266 164	25%
2006	298 237	1 145 009	26%
2007	190 109	939 835	20%
2008	79 996	952 214	8%
2009	300 730	632 245	48%



**Data source and comments:**

Heli-volume harvested estimated from the Ecommerce Appraisals System (ECAS). Not all volume in cutting permits is harvested which creates uncertainty in some of the percentages shown in Table 21 (i.e., percent of heli-logging may be high for 2002 and 2009 because not all permitted volume was harvested and billed).

**6.1.6 Silvicultural systems**

In the Sunshine Coast TSA, the majority of the area harvested is with a clearcut silvicultural system. Although alternative silvicultural systems (e.g., partial cutting – retention) may be used adjacent to communities along the Strait of Georgia, these systems are not used enough to warrant accounting for them in the timber supply at this time.

**6.2 Unsalvaged losses**

Table 22 shows the estimated average annual unsalvaged volume loss due to catastrophic events such as insect epidemics, fires, wind damage or other agents. The unsalvaged loss column only reflects those areas in which the volume will not be recovered.

Table 22. *Unsalvaged losses*

Cause of loss	Annual unsalvaged loss (m <sup>3</sup> /year)
Wind	6 900
Fire	500
Mountain Pine Bark Beetle, Douglas-fir Bark Beetle, Spruce Beetle	250
Conifer sawfly & Hemlock L	1 000
Balsam Woolly Adelgid	200
Mammal damage and abiotic damage	300
Other abiotic damage including landslides, flooding, wind shear from snow & ice events	3 500
Total	12 650

**Data source and comments:**Wind

Loss to windfall was based on 50 m<sup>3</sup> per opening for clearcut harvested blocks with the number of cutblocks calculated to be 115. With the increase in alternate harvesting method there has been an increase in blowdown within harvested areas and leave trees and reserves. For these areas, losses are based on FREP data that indicate an average of 60 m<sup>3</sup> per cutblock.

Fire

Non-recoverable loss to wildfire has decrease significantly since the last TSR review. Pervious loss was calculated at 5946 m<sup>3</sup> per year. Most of the loss to fire resulted in the 1990 fire season, which had six large fires resulting in over 59 000 m<sup>3</sup> of timber lost and not salvaged. Data provided by Protection shows only

640 hectares lost to fire and most of the larger fires occurred within areas considered outside to operability lines. Fires of five hectares and under are accounted for in NRL calculations.

## Mountain Pine, Douglas-fir & Spruce Beetle

Some increase in Douglas-fir beetle activity over the past five years, some active salvage has occurred. Estimate 250 m<sup>3</sup> per year NRL, modest increase.

## Defoliator Damage – Conifer Sawfly & Hemlock Looper

Conifer sawfly damage has decreased since last TSR review. Major hemlock looper outbreak in Howe Sound area resulted in considerable mortality in the Rainy River & McNab Creek area has occurred since 2000. Salvage operations have recovered @ 70 000 m<sup>3</sup> and some of the unsalvaged material is accounted for under the cruised based sale.

## Balsam Woolly Adelgid

BWA has spread in range within the Sunshine Coast Forest District. It has been confirmed in four new sites in the past three years north of Jervis Inlet. Mortality remains low and estimate NRL of 200 m<sup>3</sup> per year.

## Mammal Damage & Abiotic Damage

Black bear damage and volume loss has increased within the Ramsay Arm, Quatam River and lower Toba Inlet over the past 10 years. Larger diameter Douglas-fir has been damaged and killed within the Quatam River area. A flight last spring revealed trees of over 40 centimetres in diameter and over 25 metres in height have been killed. Damage in younger managed stands has increased and mortality levels are over 40% in some plantations. Another consideration is decay within damaged trees and long term implications. Some of the early damaged juvenile spaced stands are showing mortality from decay. Wounding from bear damage has weakened the stem, with wind and snow resulting in breakage, killing the tree, projected to contribute future volume loss.

## Other Abiotic losses include, landslide events, flooding, wind shear from snow & ice events

A major slide event occurred in 2006 in the Potlatch Creek area in Howe Sound, resulting in a loss of 30 000 m<sup>3</sup> and washed out a power line. Other slide events have occurred at Sechelt Creek, since 2000, resulting in losses of 30 000 m<sup>3</sup>.

## **6.3 Silviculture**

---

### **6.3.1 Regeneration activities in managed stands**

Recent plantations and second-growth stands, and future stands will be grown on managed stand yield tables (MSYTs) produced using the Forest Service's TIPSy growth and yield model. Tables 23 and Table 24 contain the inputs required to produce MSYTs for this analysis. 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 x species combination) are then aggregated into one table.

Table 23. Regeneration assumptions for recent plantations and second-growth stands.

No	Analysis unit Description	Regeneration		Genetic gain	Regen delay	OAFs %		Species composition	Density	
		Method	%			1	2		Initial	Thin
1	Fir – good	Planted <sup>(1)</sup>	100	6.7	1.5	15	12 <sup>(2)</sup>	Fd <sub>70</sub> Cw <sub>30</sub>	1 200	700
2	Fir – medium	Planted	100	6.7	1.5	15	12 <sup>(2)</sup>	Fd <sub>70</sub> Cw <sub>30</sub>	1 200	700
3	Fir – poor	Planted	100	6.7	1.5	15	5	Fd <sub>80</sub> Cw <sub>20</sub>	1 200	N/A
4	Cedar – g,m	Planted	100	2.7	1.5	15	5	Fd <sub>60</sub> Cw <sub>40</sub>	1 200	700
5	Cedar – poor	Planted	60	2.7	1.5	15	5	Fd <sub>60</sub> Cw <sub>40</sub>	1 200	700
		Natural	40	0.0	0.0	15	5	Cw <sub>50</sub> Hw <sub>50</sub>	1 200	700
6	H/B/S – good	Planted	100	0.3	1.5	15	5	Ba <sub>50</sub> Yc <sub>50</sub>	1 200	700
7	H/B/S – medium	Planted	100	0.3	1.5	15	5	Ba <sub>50</sub> Yc <sub>50</sub>	1 200	N/A
8	H/B/S – poor	Planted	50	0.3	1.5	15	5	Ba <sub>50</sub> Yc <sub>50</sub>	1 200	N/A
		Natural	50	0.0	1.5	15	5	Ba <sub>50</sub> Hw <sub>50</sub>	1 200	N/A
9	Pine – g,m,p	Natural	100	0.0	1.5	15	5	PI 100	1 200	700
10	Alder – g,m,p	Planted	0	0.0	1.5	15	5	Dr <sub>90</sub> Fd <sub>5</sub> Cw <sub>5</sub>	1 600	900
11	Cot/Maple – g,m,p	Planted	100	0.0	1.5	15	5	Dr <sub>50</sub> Fd <sub>25</sub> Cw <sub>25</sub>	1 200	N/A

Table 24. Regeneration assumptions for future stands

No	Analysis Unit Description	Regeneration		Genetic gain	Regen delay	OAFs %		Species composition	Density	
		Method	%			1	2		Initial	Thin
1	Fir – good	Planted <sup>(1)</sup>	100	11.1	1.5	15	12 <sup>(2)</sup>	Fd <sub>90</sub> Cw <sub>10</sub>	1 200	700
2	Fir – medium	Planted	100	11.1	1.5	15	12 <sup>(2)</sup>	Fd <sub>80</sub> Cw <sub>20</sub>	1 200	700
3	Fir – poor	Planted	100	11.1	1.5	15	5	Fd <sub>80</sub> Cw <sub>20</sub>	1 200	N/A
4	Cedar – g/m	Planted	100	4.5	1.5	15	5	Cw <sub>60</sub> Fd <sub>40</sub>	1200	700
5	Cedar – poor	Planted	60	4.5	1.5	15	5	Cw <sub>50</sub> Fd <sub>50</sub>	1 200	700
		Natural	40	0.0		15	5	Cw <sub>50</sub> Hw <sub>50</sub>	1 200	700
6	H/B/S – good	Planted	50	1.0	1.5	15	5	Ba <sub>50</sub> Cy <sub>50</sub>	1 200	700
		Natural	50	0.0	1.5	15	5	Hw <sub>60</sub> Ba <sub>20</sub> Cy <sub>20</sub>	1 200	N/A
7	H/B/S – medium	Planted	50	1.0	1.5	15	5	Ba <sub>50</sub> Cy <sub>50</sub>	1 200	N/A
		Natural	50	0.0	1.5	15	5	Hw <sub>40</sub> Ba <sub>30</sub> Cy <sub>30</sub>	1 200	N/A
8	H/B/S – poor	Planted	50	1.0	1.5	15	5	Ba <sub>50</sub> Cy <sub>50</sub>	1 200	N/A
		Natural	50	0.0	1.5	15	5	Hw <sub>35</sub> Ba <sub>35</sub> Cy <sub>30</sub>	1 200	N/A
9	Pine – g,m,p	Natural	100	0.0	1.5	15	5	PI <sub>100</sub>	1 200	700
10	Alder – g,m,p	Planted	100	0.0	1.5	15	5	Dr <sub>90</sub> Fd <sub>5</sub> Cw <sub>5</sub>	1 600	900
11	Cot/Maple – g,m,p	Planted	100	0.0	1.5	15	5	Dr <sub>50</sub> Fd <sub>25</sub> Cw <sub>25</sub>	1 200	N/A

<sup>(1)</sup> The common planting stock for all stands is 1+0.

<sup>(2)</sup> OAF contains an allowance for losses due to laminated root rot.

### 6.3.2 Stand fertilization

The Sunshine Coast Forest District has fertilized Douglas-fir stands in the past. Much of the program has been dependant on special program funding (e.g. FIA). Therefore, fertilization has not occurred every year for the last 25 years.

As part of the current provincial government strategy for the coast, fertilization is a key component. Therefore, this treatment will be incorporated into managed Douglas-fir plantations with a site index less than 30 metres where feasible.

Once Douglas-fir stands reach an age of 30 they will be treated with 400 Urea at 435 kilograms per hectare.

#### Data source and comments:

The table below shows the hectares treated in the annual urea fertilization program for the Sunshine Coast TSA for the period between 2002 and 2009. The program includes both early and late rotation fertilization. The data was provided by district staff.

Year	Hectares
2002	0
2003	600
2004	30
2005	0
2006	50
2007	40
2008	3300
2009	2300

### 6.3.3 Immature plantation history

This section identifies areas of existing immature forest where the density (i.e., stems per hectare) is controlled and therefore should be assigned to a managed stand yield table curve (MSYT). All NSR and stands harvested in the future will be managed under MSYTs.

District review of plantations indicates that Douglas-fir stands less than 35 years old have had some form of density control (natural or man-induced by spacing). These stands will be modelled as managed stands using the TIPSYS model. For other leading species plantations (hemlock, balsam, cedar and spruce) there is a great variation in whether a stand can be considered in a managed state. For example, stands with natural hemlock are typically very dense in stocking and would initially grow as a natural stands. In order not to overestimate past performance in these stands they will be modelled as natural stands. All future harvested hemlock, balsam, cedar and spruce stands will be modelled using the regeneration assumptions outlined in Table 24.

### 6.3.4 Not satisfactorily restocked (NSR) areas

The inventory file for the analysis is a Forest Inventory Planning (FIP) file converted into Vegetation Resource Inventory (VRI) format. For the most part NSR will be defined by the original FIP format by which NSR is identified as type identity 4 or 9. These type identities indicate old cutblocks which have not yet reached free-growing status.

Openings where there are no type identity will be assessed as NSR if there is a logging history, stand attributes or a record in the RESULTS database. Finally, recent cutovers will be updated through satellite imagery techniques.

NSR is included in the timber harvesting land base.

## **6.3.5 Genetic gain through tree improvement**

Data from the Tree Improvement Branch of the Ministry of Forests and Range indicate that Class A seed will be used for cedar, Douglas-fir and spruce stands. The data is currently being collected and will be available for the analysis and reported in the final timber supply analysis technical report.

## 6.4 Integrated resource management

### 6.4.1 Forest cover requirements

Forest cover requirements may be examined at a number of different levels, including landscape units, wildlife areas and visual quality areas. With the requirement to retain different forest characteristics across the landscape, it is important to identify how forest outside of the THLB may be considered in the forest cover requirements (i.e., maximum allowable disturbance or minimum area retention). Table 25 describes the forest cover requirements to be applied.

Table 25. Forest cover requirements

Resource objective	Area target (%)	Condition target	Affected land base
Patch size distribution	Maximum 35%	Height 3 m	THLB by landscape unit outside community watersheds, community interface areas and visual areas
Visual quality objective (VQO) — preservation	Maximum 1%	Height 5 m	Crown forested land base for each visual unit
VQO — retention	Maximum 3%	Height 5 m	Crown forested land base for each visual unit
VQO — partial retention (low VAC)	Maximum 15%	Height 5 m	Crown forested land base for each visual unit
VQO — partial retention (medium VAC)	Maximum 10%	Height 5 m	Crown forested land base for each visual unit
VQO — partial retention (high VAC)	Maximum 6%	Height 5 m	Crown forested land base for each visual unit
VQO — modification	Maximum 20%	Height 5 m	Crown forested land base for each visual unit
Community watershed	Maximum 5% (1% per year)	Height 5 m	Crown forested land base by community watershed
Community interface	Maximum 25%	Height 5 m	THLB
Landscape level biodiversity — old forest retention	Area targets in Table 26	Age target for old seral forest requirement in Table 26	Crown forested land base by landscape unit for landscape units without identified old growth management areas (Bishop, Brem, Deserted, Narrows, Salmon Inlet, Toba)

#### Data source and comments:

##### Patch size distribution

The maximum opening size for a harvest area is 40 hectares. The individual blocks average 10 to 15 hectares in size. The timber supply analysis will utilize a block size distribution pattern based on the maximum opening size. Harvesting is limited when adjacent openings have not reached a three metre green-up height.

##### Wildlife forest cover objectives

Many of the wildlife habitats are managed by retention management (no harvesting). Forest cover requirements are not needed for wildlife habitats because they have been removed from the timber harvesting land base (see Section 5.10, “Wildlife habitat area reductions.”)

## Community watersheds

There are 25 community watersheds within the Sunshine Coast TSA. A generalized forest cover constraint will be modelled in the base case based on the recommendations from the *Community Watershed Guidebook* for timber supply analyses. The assumption is no more than five percent of the area can be less than five metres tall. This equates to a one percent harvest every year.

## Landscape-level biodiversity

Management for biodiversity is a requirement under the *Forest and Range Practices Act*. To protect biodiversity at the landscape level, old forest is retained in every landscape unit and natural disturbance type.

In order to ensure that the maintenance of older forests is spread out with the TSA the following forest cover requirements (Table 26) will be applied to landscape units without any mapped old growth management areas. These requirements are taken from the *Landscape Unit Planning Guide*. The landscape units are used to simulate the geographic retention of older forest characteristics across the Sunshine Coast TSA. The numbers in the minimum retention area column coincide with the percent requirement in year 1, 70 and 140.

Table 26. Old seral forest retention requirements

Biogeoclimatic zone	Natural disturbance type	Biodiversity emphasis option	Old seral stage			
			Minimum retention area by year (%)			Minimum age
			1	70	140	
CWH	1	L	4.3	8.6	13	250
		I	13	13	13	250
		H	19	19	19	250
MH	1	L	6.3	12.7	19	250
		I	19	19	19	250
		H	28	28	28	250
CWH	2	L	3	6	9	250
		I	9	9	9	250
		H	13	13	13	250
CDF	2	L	3	6	9	250
		I	9	9	9	250
		H	13	13	13	250

## 7. Sensitivity Analyses to be Performed

Sensitivity analysis can provide a measure of the timber supply impact if uncertainty in management assumptions and/or data integrity exists. The magnitude of the increase or decrease in a particular variable should reflect the degree of uncertainty surrounding the assumption. For instance, minimum harvestable age may be developed based on some minimum stand attributes which currently appear to dictate the earliest time stands are eligible for harvest. Sensitivity analysis may indicate that a small reduction in these attributes may alleviate anticipated harvest level reductions in the future. By developing and testing a number of sensitivity analyses, it is possible to determine which variables most affect results. Table 27 lists the sensitivity analyses to be undertaken as part of this timber supply review.

Table 27. *Sensitivity issues*

Issue to be tested	Sensitivity levels
Harvest flow alternatives	Various alternatives to the base case, including immediate harvesting of second growth.
Harvest priority	Two priorities: a) lowest priority for natural hemlock-leading stands; b) top priority for second-growth stands.
Harvest profile	Three levels: a) take $\geq 30\%$ of harvest from cedar-leading stands; b) take $\geq 40\%$ of harvest from fir-leading stands; c) take $\leq 25\%$ of harvest from hemlock, balsam or spruce-leading stands.
Managed stand yields	Use inventory site index (unadjusted site index)
Existing natural stand yields	Adjust stand yields by $\pm 10\%$
Minimum harvestable age	Adjust minimum volume criteria by $\pm 15\%$
Land base revisions — uncertain areas	Remove highly constrained areas (e.g., community interface areas, treaty settlement areas, transmission line right-of-ways)
Land base — recreation features	Sensitivity=H, Significance=VH,H; remove 100% Sensitivity=H, Significance=M; remove 50% Sensitivity=M, Significance=VH, H; remove 50%



Appendix A: Land base Summaries

Table A-1. Analysis unit statistics — Sunshine Coast TSA timber harvesting land base

Analysis unit ID	Analysis unit name	Current timber harvesting land base (hectares)			Weighted average	
		<35 years	>= 35 years	Total	Inventory site index	Adjusted site index
TSA-39 Inventory						
1	Fir — good	6,516	13,365	19,881	31.1	33.0
2	Fir — medium	14,130	38,625	52,755	23.7	31.3
3	Fir — poor	6,074	18,502	24,576	17.1	30.8
4	Cedar — good, medium	3,506	6,851	10,357	23.3	23.4
5	Cedar — poor	1,144	3,472	4,616	14.5	21.6
6	Hemlock/Balsam/Spurce — good	3,324	14,953	18,277	27.5	28.5
7	Hemlock/Balsam/Spurce — medium	15,303	22,993	38,296	20.8	26.5
8	Hemlock/Balsam/Spurce — poor	8,139	17,426	25,566	13.1	24.7
9	Pine — incidental	450	275	725	15.2	N/A
10	Red Alder — good, medium, poor	970	12,984	13,954	23.1	N/A
11	Cottonwood/Maple — good, medium poor	242	1,586	1,828	25.7	N/A
<b>TSA-39 Inventory Total</b>		<b>59,702</b>	<b>151,128</b>	<b>210,831</b>	<b>21.9</b>	<b>28.2</b>
TFL-10 Inventory						
2	Fir — medium	129	1,958	2,087	23.3	N/A
4	Cedar — good, medium	210	2,177	2,387	20.5	N/A
7	Hemlock/Balsam/Spurce — medium	991	6,094	7,085	19.9	N/A
9	Pine — incidental	-	5	5	19.9	N/A
10	Red Alder — good, medium, poor	-	383	383	19.9	N/A
11	Cottonwood/Maple — good, medium poor	-	116	116	19.9	N/A
<b>TFL-10 Inventory Total</b>		<b>1,330</b>	<b>10,733</b>	<b>12,063</b>	<b>20.6</b>	<b>N/A</b>
<b>Total</b>		<b>61,033</b>	<b>161,861</b>	<b>222,894</b>	<b>21.8</b>	<b>27.8</b>

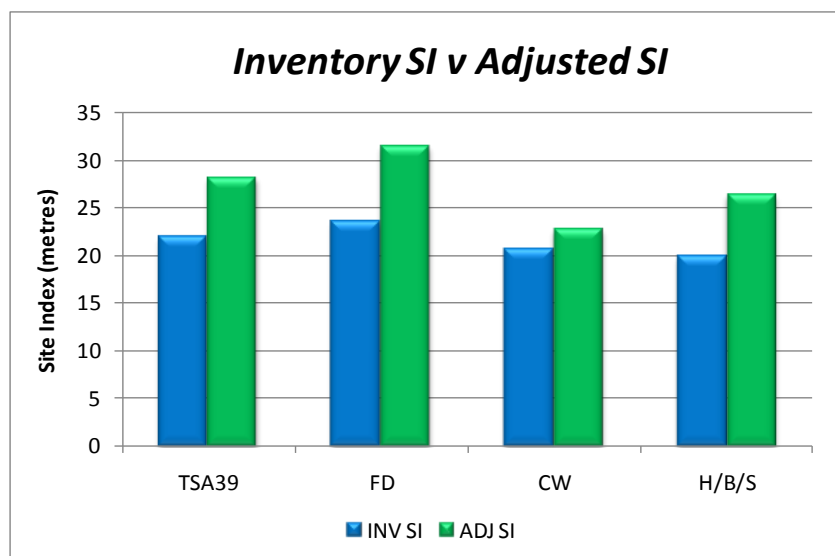


Table A-2. Timber harvesting land base determination — Sunshine Coast TSA

Classification	Area in classification (ha)		
<b>Sunshine Coast Forest District (total area)</b>	<b>1,937,013</b>		
Community Forest Agreements (CFAs)	187,061		
Pacific TSA	26,020		
Tree Farm Licences	163,507		
<b>Sunshine Coast TSA (core area)</b>	<b>1,560,426</b>		
Non-forest, non-productive and non-commercial	1,041,953		
Productive forest in private, federal, WLS, other ownership outside management unit	62,129		
Productive forest in parks and ecological reserves	30,481		
<b>Crown administered (For. Act) productive forest</b>	<b>425,863</b>		
Classification of Crown administered For. Act productive forest	Productive forest in classification (ha)	Productive forest reduced by (ha)	Percent of productive forest (ha)
<b>Reductions (100%) to the productive forest:</b>			
Inoperable areas	132,408	132,408	31.1%
Low sites and problem forest types	19,856	7,638	1.8%
Cultural heritage resources	187	160	0.0%
Experimental and permanent sample plots	196	196	0.0%
Sites with unstable terrain (class V)	17,371	7,426	1.7%
Established recreation reserves and sites	597	255	0.1%
Wildlife (goat winter range, approved WHA core area)	28,415	7,123	1.7%
Old growth management areas (OGMAs)	36,610	13,091	3.1%
Environmentally sensitive areas (ESAs):S1,A1,P1,P2	95,545	6,100	1.4%
Buffers around lakes and wetlands	53	52	0.0%
<b>Total 100% reductions to the productive forest:</b>		<b>174,448</b>	<b>41.0%</b>
<b>Productive forest wholly or partially contributing</b>	<b>251,414</b>		<b>59.0%</b>
<b>Partial reductions to the productive forest:</b>			
Sites with unstable terrain or blk2 partially contributing	67,896	13,477	3.2%
Wildlife (draft Stickleback, WHA buffer)	1,853	237	0.1%
Environmentally sensitive areas (ESAs):S2	22,382	677	0.2%
<b>Total partial reductions to the productive forest:</b>		<b>14,391</b>	<b>3.4%</b>
<b>Productive forest partially contributing</b>	<b>47,265</b>		<b>11.1%</b>
<b>Productive forest wholly contributing (before allowances)</b>	<b>204,150</b>		<b>47.9%</b>
<b>Allowance reductions to the productive forest:</b>			
Riparian reserve and management zones	425,863	7,542	1.8%
Unclassified roads	425,863	2,757	0.6%
Wildlife trees and wildlife tree patches	204,150	3,830	0.9%
<b>Total allowance reductions to the productive forest:</b>		<b>14,130</b>	<b>3.3%</b>
<b>Total reduction to the productive forest:</b>		<b>202,969</b>	<b>47.7%</b>
<b>Timber harvesting land base (14.3% of TSA core area)</b>	<b>222,894</b>		<b>52.3%</b>

Table A-3. Wildlife Habitat Areas — Sunshine Coast TSA

Species	WHA No	Gross (ha)	CFLB (ha)	PFLB (ha)	THLB (ha)
Grizzly Bear	2-005	110.35	36.09	36.09	0
	2-007	42.77	26.82	26.82	0
	2-008	170.9	160.45	160.45	0
	2-010	80.7	36.89	36.89	0
	2-011	143.62	64.16	64.16	0
	2-013	116.15	106.57	106.57	0
	2-014	294.78	191.87	191.87	0
	2-015	323.03	216.78	216.78	0
	2-016	303.76	247.48	247.48	0
	2-017	97.94	37.28	37.28	0
	2-070	183.87	54.51	54.51	0
	2-071	89.1	41.7	41.7	0
	2-072	56.17	26.36	23.18	0
	2-076	135.43	18.01	18.01	0
	2-206	19.26	12.72	12.72	1.21
	2-208	80.92	31.88	31.88	28.66
	2-209	38.37	3.69	3.69	3.32
	2-210	91	71.63	71.63	59.43
	2-212	135.66	64.16	64.16	0
	2-213	6.78	2.5	2.5	0
	2-214	5.82	0.48	0.48	0.44
	2-215	30.08	13.87	13.87	12.05
	2-216	14.93	3.17	3.17	0
	2-217	28.7	13.02	13.02	0.99
	2-218	53.88	4.75	4.75	0
	2-219	117.14	3.5	3.5	0
	2-220	5.63	2.96	2.96	0
	2-221	160.14	36.7	36.7	0.82
	2-222	19.31	8.47	8.47	0
	2-223	67.16	25.68	25.68	0
	2-224	79.91	31.98	31.98	0
	2-225	63.87	29.88	29.88	0
	2-226	115.8	23.86	23.86	0
	2-227	52.66	12.49	12.49	0
	2-228	85.43	18.59	18.59	0
	2-229	136.17	18.94	18.94	0
	2-232	2.73	2.73	2.73	0.23
	2-233	62.55	47.97	47.97	27.99
	2-234	39.4	19.7	19.7	0.35
	2-235	74.87	43.47	43.47	37.13
	2-236	157.31	41.31	41.31	0
	2-237	144.88	29.39	29.39	9.85
	2-238	52.79	18.08	18.08	1.66
	2-240	197.02	46.37	46.37	0
	2-242	47.46	4.56	4.56	2.91
	2-243	108.37	23.62	23.62	14.2
	2-244	31.96	14.29	14.29	0.29
	2-245	86.95	24.62	24.62	1.67
2-246	16.82	12	12	3.58	
2-247	18.08	12.44	12.44	2.02	
2-248	121.98	71.15	71.15	12.46	

Table A-3. Wildlife Habitat Areas cont'd — Sunshine Coast TSA

Species	WHA No	Gross area (ha)	CFLB (ha)	PFLB (ha)	THLB (ha)
	2-249	55.08	0	0	0
	2-298	2.69	2.69	2.69	0
	2-299	30.49	0	0	0
	2-300	20.63	16.62	16.62	0
	2-301	63.02	6.66	6.66	0
	2-302	88.85	38.78	38.78	24.29
<b>Grizzly Bear</b>	<b>Total</b>	<b>4981.12</b>	<b>2176.34</b>	<b>2173.16</b>	<b>245.55</b>
<b>Marbled Murrelet</b>	2-001	265.73	246.26	246.26	0
	2-003	50.39	50.39	50.39	0
	2-018	406.51	233.96	233.96	0
	2-019	204.78	86.94	86.94	0
	2-020	335.33	73.84	73.84	0
	2-021	258.22	191.86	191.86	0
	2-022	342.1	132.33	132.33	0
	2-080	38.52	38.52	36.88	0
	2-082	448.5	313.2	313.2	0
	2-083	54.29	54.29	54.29	0
	2-084	45.31	44.4	44.4	0
	2-085	87.68	79.54	79.54	0
	2-086	141.56	131.01	131.01	0
	2-088	42.35	42.35	42.35	0
	2-089	92.29	90.06	90.06	0
	2-091	51.6	51.6	51.6	0
	2-092	66.2	66.2	66.2	0
	2-093	31.08	31.08	31.08	0
	2-094	12.36	12.36	12.36	0
	2-095	121.3	121.3	121.3	0
	2-096	70.17	70.17	70.17	0
	2-161	90.16	90.16	90.16	0
	2-162	167.94	167.94	167.94	0
	2-163	29.57	29.57	29.57	0
	2-164	56.21	55.92	55.92	0
	2-165	15.53	15.53	15.53	0
	2-166	35.67	27.92	27.92	0
	2-167	7.01	7.01	7.01	0
	2-168	8.56	6.49	6.49	0
	2-169	10	7.77	7.77	0
	2-170	91.39	91.39	91.39	0
	2-171	9.04	9.04	9.04	0
<b>Marbled Murrelet</b>	<b>Total</b>	<b>3687.35</b>	<b>2670.4</b>	<b>2668.76</b>	<b>0</b>
<b>Grand Total</b>		<b>8668.47</b>	<b>4846.74</b>	<b>4841.92</b>	<b>245.55</b>

Table A-4. Visual Landscape Inventory Summary — Sunshine Coast TSA

Landscape Unit	Unit	P	VQO			Grand Total
			R	PR	M	
Brem	CFLB (ha)	0	0	868	1,843	2,712
	THLB (ha)	0	0	450	1,131	1,581
Brittain	CFLB (ha)	0	0	8,794	1,078	9,873
	THLB (ha)	0	0	3,121	644	3,765
Bunster	CFLB (ha)	0	833	4,688	2,457	7,979
	THLB (ha)	0	368	3,715	1,949	6,032
Bute East	CFLB (ha)	0	0	348	4,089	4,437
	THLB (ha)	0	0	1	1,369	1,370
Bute West	CFLB (ha)	0	0	0	3,493	3,493
	THLB (ha)	0	0	0	1,112	1,112
Chapman	CFLB (ha)	73	212	7,904	211	8,399
	THLB (ha)	0	0	5,694	157	5,850
Cortes	CFLB (ha)	706	5,397	15,719	97	21,919
	THLB (ha)	200	2,918	9,949	91	13,159
Deserted	CFLB (ha)	0	0	2,600	0	2,600
	THLB (ha)	0	0	1,114	0	1,114
Haslam	CFLB (ha)	0	249	1,206	257	1,711
	THLB (ha)	0	128	765	201	1,094
Homathko	CFLB (ha)	0	0	0	1,481	1,481
	THLB (ha)	0	0	0	368	368
Homfray	CFLB (ha)	0	30	7,817	2,648	10,495
	THLB (ha)	0	26	3,637	1,259	4,923
Howe	CFLB (ha)	0	817	8,285	751	9,852
	THLB (ha)	0	158	5,181	535	5,874
Jervis	CFLB (ha)	987	444	15,375	1,430	18,236
	THLB (ha)	89	83	8,196	890	9,257
Lois	CFLB (ha)	0	186	932	0	1,118
	THLB (ha)	0	109	635	0	744
Narrows	CFLB (ha)	196	393	10,822	115	11,526
	THLB (ha)	116	197	6,785	75	7,174
Powell Lake	CFLB (ha)	0	0	0	149	149
	THLB (ha)	0	0	0	104	104
Quatam	CFLB (ha)	0	117	13,472	2,896	16,485
	THLB (ha)	0	40	5,616	1,338	6,995
Salmon Inlet	CFLB (ha)	0	0	2,131	6,884	9,015
	THLB (ha)	0	0	1,310	4,169	5,479
Sechelt	CFLB (ha)	247	4,166	21,613	641	26,667
	THLB (ha)	93	1,950	15,439	272	17,754
Skwawka	CFLB (ha)	0	108	377	1,725	2,210
	THLB (ha)	0	0	164	782	945
Southgate	CFLB (ha)	0	0	0	132	132
	THLB (ha)	0	0	0	5	5
Texada	CFLB (ha)	0	619	12,829	25	13,473
	THLB (ha)	0	205	8,929	21	9,154
Total CFLB		2,208	13,571	135,781	32,403	183,963
Total THLB		498	6,183	80,701	16,472	103,854

Table A-5. Community Watershed Summary — Sunshine Coast District

CWS Code	CWS Description	Source Name	Gross (ha)	CFLB (ha)	PFLB (ha)	THLB (ha)
900.008	Chapman Community Watershed	Chapman Creek	6,275	2,945	1,683	1,252
900.012	Community Creek Community Watershed	Community Creek	81	80	80	49
900.013	Dakota Community Watershed	Dakota Creek	3,243	3,219	3,219	2,131
900.02	Gray Community Watershed	Gray Creek	4,422	1,066	0	0
900.021	Greer Community Watershed	Greer Brook	18	17	17	1
900.026	Mcneill Lake Community Watershed	Haslam Creek	1,530	1,457	1,457	1,271
900.027	Helena Community Watershed	Helena Creek	578	260	260	177
900.031	Jefferd Community Watershed	Jefferd Creek	315	220	220	199
900.034	Haslam/Lang Community Watershed	Lang Creek	13,074	1,570	912	753
900.042	McNair Community Watershed	McNair Creek	1,839	1,395	1,224	786
900.044	Milne Community Watershed	Milne Creek	435	146	122	112
900.059	Silver Community Watershed	Silver Creek	5	0	0	0
900.06	Sliammon Lake Community Watershed	Sliammon Lake	4,430	864	852	727
900.066	Thulin Lake Community Watershed	Thulin Lake	689	371	371	330
900.094	Dysart Community Watershed	Dysart Brook	43	43	43	41
900.1	Waugh Lake Community Watershed	Waugh Creek	793	680	670	497
BOY.001	Bowyer Community Watershed	Bowyer Brook	4	0	0	0
GAM.001	Gambier Community Watershed	Gambier Creek	703	675	647	266
GAM.002	Fircom Community Watershed	Fircom Creek	100	42	33	0
GAM.003	Laurena Community Watershed	Laurena Creek	13	10	1	0
LAS.001	Hadley Community Watershed	Hadley Creek	116	10	0	0
NEL.001	West Lake Community Watershed	West Lake	1,805	1,220	1,149	444
NEL.002	Little Quarry Lake Community Watershed	Little Quarry Lake	146	118	118	47
STU.001	Harbott Community Watershed	Harbott Creek	47	29	29	2
TEX.001	Cranby Community Watershed	Cranby Creek	890	696	696	585
TEX.003	Priest Lake Community Watershed	Priest Lake	1,131	578	578	344
TEX.004	Ball Park Community Watershed	Ball Park Creek	928	515	515	388
<b>Total</b>			<b>43,653</b>	<b>18,227</b>	<b>14,898</b>	<b>10,401</b>

Table A-6. Summary of Community Interface Zones – Sunshine Coast TSA Core Area

Community Interface Zone	Gross area (ha)	CFLB (ha)	PFLB (ha)	THLB (ha)
Cortes Island	11,003	4,735	4,031	3,321
Gambier Island	6,875	3,803	3,521	854
Half Moon Bay	30,093	13,482	11,481	9,168
Lasqueti Island	6,614	1,824	1,618	1,318
Nelson Island North	1,932	1,260	1,189	473
Nelson Island South	868	597	597	386
Nelson Island West	388	127	127	56
Powell River	20,548	8,863	8,091	6,718
Rainy River	1,987	1,190	1,189	832
Read Island	1,461	191	141	120
Refuge Cove	215	113	113	69
Stuart Island	586	197	197	99
Surge Narrows	221	5	5	5
Texada Island	9,328	4,762	4,762	3,550
<b>Total</b>	<b>92,120</b>	<b>41,150</b>	<b>37,062</b>	<b>26,970</b>

Table A-7. Landscape Unit Summary — Sunshine Coast TSA Core Area

Landscape Unit Name	LU Id	Gross area (ha)	CFLB (ha)	PFLB (ha)	THLB (ha)
Bishop	106	78,443	9,310	4,512	991
Brem	136	61,139	15,769	15,769	9,702
Brittain	143	48,523	20,492	20,468	8,046
Bunster	157	31,546	16,526	13,844	11,020
Bute East	167	75,876	22,419	22,360	8,378
Bute West	168	79,344	19,367	19,355	6,003
Chapman	200	56,558	13,799	10,429	8,225
Cortes	264	102,901	39,885	32,184	22,009
Denman/Hornby	2226	3,503	0	0	0
Deserted	1816	13,714	6,335	6,335	2,451
East Howe	356	531	0	0	0
Elaho	365	289	0	0	0
Estero	381	14	7	7	3
Fraser Valley South	429	2,579	0	0	0
Haslam	524	21,302	3,312	2,311	1,932
Homathko	560	179,795	31,732	31,591	10,559
Homfray	561	50,757	21,308	18,820	8,753
Howe	579	52,207	22,295	21,430	11,258
Jervis	615	72,171	33,784	33,167	16,343
Little Qualicum	752	457	0	0	0
Lois	759	14,679	2,251	2,185	1,694
Lower Squamish	796	81	23	22	0
Millstone	869	3,384	0	0	0
Nanoose	917	65	0	0	0
Narrows	920	39,550	21,734	21,604	12,723
Phillips	1024	72	8	8	5
Powell Daniels	1034	175	96	96	90
Powell Lake	1035	2,158	197	197	143
Quadra	1050	29	0	0	0
Quatam	1054	52,143	22,948	22,902	9,795
Rosewall	1089	659	0	0	0
Salmon Inlet	1099	68,675	36,197	35,806	21,115
Sechelt	1112	105,311	37,013	32,644	25,193
Seymour-Capilano	1120	7	0	0	0
Skwawka	1162	38,683	11,165	11,165	3,749
Southern Gulf Islands	2228	833	0	0	0
Southgate	1190	123,428	20,784	20,784	4,732
Stafford	1204	89	0	0	0
Texada	1271	161,010	24,874	23,156	17,327
Thurlow	1277	5	0	0	0
Toba	1285	17,035	2,712	2,712	656
Upper Lillooet	1361	596	0	0	0
Upper Squamish	1378	112	0	0	0
<b>Grand Total</b>		<b>1,560,425</b>	<b>456,343</b>	<b>425,863</b>	<b>222,894</b>