North Coast LRMP

Resource Analysis Report

Timber Supply Analysis

October 7, 2002

Prepared by

North Coast Government Technical Team

BRITISH COLUMBIA

Executive Summary

As part of the North Coast Land and Resource Management Plan (LRMP), the British Columbia Forest Service has examined the availability of timber in the North Coast Timber Supply Area (TSA) through a timber supply analysis. The analysis assesses how current forest management practices in the TSA affect the supply of wood available in the future, if those practices continue. Current management practices are those practices governed by legislation (*Forest Practices Code*) and criteria used by the Ministry of Forests District Manager to approve forest development plans. The timber supply analysis also examines the potential changes in timber supply stemming from uncertainties about forest growth and management actions, through sensitivity analyses. It is important to note that the various harvest forecasts included in this report are used for discussion purposes only; they are not allowable annual cut (AAC) recommendations.

The boundaries of the North Coast TSA and LRMP areas do not coincide everywhere. But because timber supply analysis is conducted on a timber management unit called the timber supply area, or TSA, this analysis includes a section that is outside the North Coast LRMP area. This area is known as Princess Royal Island. Since it is known that the size of the LRMP area is approximately 90% of the TSA area, the impacts from the TSA can be estimated for the LRMP area. Future analyses will look specifically at the North Coast LRMP area.

The North Coast TSA is situated along the coast of northwestern British Columbia. It covers approximately 1.875 million hectares, which is about half the size of Vancouver Island. It is dominated by stands of old-growth western hemlock, amabalis fir and western red cedar. About 45% of the North Coast TSA is considered productive forest area managed by the Ministry of Forests. Currently, 137 323 hectares are available for timber harvesting. This represents about 16% of the productive forest, or 7% of the total TSA area. The size of the LRMP area is approximately 90% of the TSA area, with a timber harvesting land base (THLB) of 123 532 hectares.

The results of the timber supply analysis for current management suggest that harvests can be maintained at the current allowable annual cut for the North Coast TSA (573 624 cubic metres per year) for the next 60 years without creating future timber disruptions. This is possible when followed by two controlled reductions of 10% each over the subsequent 20-year period to a long-term sustainable level of 462 000 cubic metres per year.

These results reflect current knowledge and information on forest inventory, growth, and management. However, it is important to recognize that uncertainty exists about several factors important in defining timber supply. A series of sensitivity analyses showed that these uncertainties could affect timber supply to varying degrees.

The uncertainty with the largest potential effect on projected harvests is the estimate of site productivity of future managed stands. Inventory based estimates of site productivity for old-growth stands have been proven to underestimate productivity of regenerated stands in some areas of the province. Preliminary results of a pilot project in the North Coast TSA are suggesting the same trend. By late 2002, complete results for the entire TSA are expected to be available for use in future timber supply analyses.

Another factor having a large potential effect on timber supply is the size of the timber harvesting land base (THLB). The size of the THLB is subject to uncertainties about economic operability. Very little harvesting has occurred north of the Nass River over the past 20 years. This portion of the land base contributed approximately 18 000 hectares, or 13 percent of the timber harvesting land base in the TSA for this analysis. At the time of the next AAC determination in 2005, the chief forester will review the harvesting performance in that area. If his review shows continued lack of harvesting performance, he may consider it appropriate to remove the area north of the Nass River from contributing to timber supply in a future AAC determination.

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1.0 Definitions

Allowable annual cut (AAC) The rate of timber harvest permitted each year from a specified area of land, usually expressed as cubic metres of wood per year.

Analysis unit A grouping of types of forest – for example, by species and site productivity, done to simplify analysis and generation of timber yield tables.

Base case forecast The timber supply forecast which illustrates the effect of current forest management practices on the timber supply using the best available information, and which forms the reference point for scenario analysis.

Biodiversity The diversity of plants, animals and other living organisms in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems, as well as the evolutionary and functional processes that link them.

Biogeoclimatic zones A large geographic area with broadly homogeneous climate and similar dominant tree species.

Clearcut harvesting A harvesting method whereby all trees that meet utilization standards are harvested. The harvested site is then regenerated to acceptable standards by appropriate means including planting and natural seeding.

Culmination age The age at which a timber stand reaches its highest average growth rate, or mean annual increment (MAI). MAI is calculated as stand volume divided by stand age. Culmination age is the optimal biological rotation age to maximize volume production from a growing site.

Cutblock adjacency The desired spatial relationship among cutblocks. Most adjacency restrictions require that recently harvested areas must achieve a desired condition (green-up) before nearby or adjacent areas can be harvested. Specifications for the maximum allowable proportion of a forested landscape that does not meet green-up requirements are used to approximate the timber supply impacts of adjacency restrictions.

Environmentally sensitive areas	Areas with significant non-timber values, fragile or unstable soils, or impediments to establishing a new tree crop, or areas where timber harvesting may cause avalanches.
Forest cover objectives	Specify desired distributions of areas by age or size class groupings. These objectives can be used to reflect desired conditions for wildlife, watershed protection, visual quality and other integrated resource management objectives. General adjacency and green-up guidelines are also specified using forest cover objectives (see Cutblock adjacency guidelines and Green–up).
Forest inventory	Assessment of British Columbia's timber resources. It includes computerized maps, a database describing the location and nature of forest cover, including size, age, timber volume, and species composition, and a description of additional forest values such as recreation and visual quality.
Forest Practices Code	Legislation, standards and guidebooks that govern forest practices and planning, with a focus on ensuring management for all forest values.
Free-growing	An established seedling of an acceptable commercial species that is free from growth-inhibiting brush, weed and excessive tree competition.
Green-up	The time needed after harvesting for a stand of trees to reach a desired condition (usually a specific height) — to ensure maintenance of water quality, wildlife habitat, soil stability or aesthetics — before harvesting is permitted in adjacent areas.
Growing stock	The volume estimate for all standing timber, at a particular time.
Harvest forecast	The flow of potential timber harvests over time. A harvest forecast is usually a measure of the maximum timber supply that can be realized over time for a specified land base and set of management practices. It is a result of forest planning models and is affected by the size and productivity of the land base, the current growing stock, and management objectives, constraints and assumptions.

Inoperable areas	Areas defined as unavailable for harvest for terrain-related or economic reasons. Characteristics used in defining inoperability include slope, topography (e.g., the presence of gullies or exposed rock), difficulty of road access, soil stability, elevation and timber quality. Operability can change over time as a function of changing harvesting technology and economics.
Integrated resource management	The identification and consideration of all resource values, including social, economic and environmental needs, in resource planning and decision-making.
Landscape-level biodiversity	The *Forest Practices Code Biodiversity Guidebook* provides objectives for maintaining biodiversity at both the landscape level and the stand level. At the landscape level, guidelines are provided for the maintenance of seral stage distribution, patch size distribution and landscape connectivity.
Landscape unit	A planning area based on topographic or geographic features, that is appropriately sized (up to 100 000 hectares), and designed for application of landscape-level biodiversity objectives.
Long-term harvest level	A harvest level that can be maintained indefinitely given a particular forest management regime (which defines the timber harvesting land base, and objectives and guidelines for non-timber values) and estimates of timber growth and yield.
Management assumptions	Approximations of management objectives, priorities, constraints and other conditions needed to represent forest management actions in a forest planning model. These include, for example, the criteria for determining the timber harvesting land base, the specification of minimum harvestable ages, utilization levels, integrated resource guidelines and silviculture and pest management programs.
Operability	Classification of an area considered available for timber harvesting. Operability is determined using the terrain characteristics of the area as well as the quality and quantity of timber on the area.

Regeneration delay	The period of time between harvesting and the date by which an area is occupied by a specified minimum number of acceptable well-spaced trees.
Riparian area	Areas of land adjacent to wetlands or bodies of water such as swamps, streams, rivers or lakes.
Sensitive terrain areas	Areas with moderate to high potential for landslide initiation during timber harvesting or road construction, which therefore require special forest practices to ensure adequate site protection.
Sensitivity analysis	Examines how uncertainty in data and management assumptions affect timber supply.
Site index	A measure of site productivity. The indices are reported as the average height, in metres, that the tallest trees in a stand are expected to achieve at 50 years (age is measured at 1.3 metres above the ground). Site index curves have been developed for British Columbia's major commercial tree species.
Stocking	The proportion of an area occupied by trees, measured by the degree to which the crowns of adjacent trees touch, and the number of trees per hectare.
Timber harvesting land base	Crown forest land within the timber supply area that is currently considered feasible and economical for timber harvesting.
Timber supply area (TSA)	An integrated resource management unit established in accordance with *Section 7* of the *Forest Act*.
Timber supply	The amount of timber that is forecast to be available over a specified time period, under a particular management regime.
Tree farm licence (TFL)	Provides rights to harvest timber, and outlines responsibilities for forest management, in a particular area.
Unsalvaged losses	The volume of timber killed or damaged annually by natural causes (e.g., fire, wind, insects and disease) and not harvested.

Visual quality objective (VQO)	Defines a level of acceptable landscape alteration resulting from timber harvesting and other activities. A number of visual quality classes have been defined on the basis of the maximum amount of alteration permitted.
Volume estimate	Estimates of yields from forest stands over time. Yield projections can be developed for stand volume, stand diameter or specific products, and for empirical (average stocking), normal (optimal stocking) or managed stands.
Wildlife tree	A standing live or dead tree with special characteristics that provide valuable habitat for conservation or enhancement of wildlife.

2.0 Introduction

The following sections outline the timber supply analysis for the North Coast TSA. Section 2 provides an introduction to timber supply, and is followed by a discussion of data preparation and formulation of assumptions in Section 3. Analysis methodology and results are presented in Sections 4 and 5 respectively. Finally, Section 6 examines the sensitivity of the results to some uncertainties in the data and assumptions used.

The report, *North Coast LRMP Description of Data Inputs and Assumptions for the Timber Supply Analysis (base case) for the North Coast TSA, May 16, 2002*, contains details about the data and assumptions used in this analysis for the current level, or base case. This report describes the assumptions used in the scenarios analyzed in addition to the base case.

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

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

All of these factors are linked and are subject to both uncertainty and different points of view. The appropriate balance of timber and non-timber values in a forest is an ongoing subject of debate, and is complicated by changes in social objectives over time.

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

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

Timber supply projections made for TSAs look far into the future — 250 years or more. However, because of the uncertainty surrounding the information and because forest management objectives change through time, these projections should not be viewed as static prescriptions that remain in place for that length of time. They remain relevant only as long as the information upon which they are based remains relevant. Thus, it is important that

re-analysis occurs regularly, using new information and knowledge to update the timber supply picture. Indeed, the *Forest Act* requires that the timber supply for management units through British Columbia be reviewed at least every 5 years. This allows close monitoring of the timber supply and of the implications for the AAC stemming from changes in management practices and objectives.

Timber supply analysis involves three main steps. The first is collecting and preparing information and data. The B.C. Forest Service forest inventory plays a major role in this. The second step is using this data along with a timber supply computer model to make projections or estimates of possible harvest levels over time. These projections are made using different sets of assumed values or conditions for the factors discussed above. The third step is interpreting and reporting results.

3.0 Analysis components

There are two basic components to timber supply analysis. These are the timber harvesting land base (THLB) area, and the timber supply harvest forecasts. This section describes these components.

3.1 Area of timber harvesting land base – North Coast TSA

- Issue – area available for timber harvesting. Compare starting conditions among alternative scenarios - crude indicator of impact on timber supply if all other factors remain constant.
- Responsiveness to management - responsive to management actions that remove land from the timber harvesting land base (e.g., protection areas)
- Assessed quantitatively
- Reliable to interpret - as reliable as all underlying assumptions – e.g. operability can depend on market conditions.
- Measurable with accuracy, but with no temporal component

3.2 Timber supply harvest forecasts – North Coast TSA

- Issue – volume of timber available for harvest over time
- Responsiveness to management – highly responsive
- Assessed quantitatively
- Reliable to interpret – as reliable as all underlying assumptions.
- Measurable with accuracy, including the temporal component.

4.0 Analysis methods

The details of the assumptions and data used in the analysis are documented in the report, *North Coast LRMP, Description of Data Inputs and Assumptions for the Timber Supply Analysis (base case) for the North Coast TSA, May 16, 2002*.

In general, there are two basic indicators that are used in timber supply analysis.

4.1 Indicator #1 – Timber Harvesting Land Base

A database operation to classify land using standard criteria for Timber Supply Review was completed to define the timber harvesting land base. Areas that are not part of the timber harvesting land base include:

- Areas not managed by the B.C. Forest Service
- Non-forested areas – water, rock, ice, swamp, highways, etc.
- Non-commercial forest – non-commercial brush
- Environmentally sensitive areas – may be completely or partially removed
- Areas of low timber productivity
- Unmerchantable forest types
- Inoperable or inaccessible areas
- Existing roads, trails and landings
- Riparian reserve zones

4.2 Indicator #2 – Timber Supply Harvest Forecast

A timber supply model using standard Timber Supply Review methods and the Forest Service Simulator (FSSIM) was created to generate a current conditions, or base case, harvest forecast. This forecast used the assumptions from the most recent Timber Supply Review, with the following differences as reflected in the Chief Forester's AAC Rationale, and new information as appropriate:

- transfer of approximately 92 000 ha from the North Coast TSA to the Nass TSA and 6 000 ha from the Kalum TSA to the North Coast TSA,
- transfer of approximately 58 000 ha from North Coast TSA to Nisga'a Lands,
- use up-to-date forest cover inventory,
- use modified operability that approximates potential harvestable area,

- use results from *North Coast Riparian Classification Inventory, September 2001* to increase area reserved for riparian reserve zones (7.49% from 4.8%),
- increase the area of existing unclassified roads, trails and landings from 1 430 ha to 1 697 ha to account for recent road construction,
- increase the volume of unsalvaged losses from 2 034 to 10 084 cubic metres/year to account for blowdown,
- decrease all volume over age curves by 1% to account for potential Identified Wildlife,
- re-define managed stands from 21 years old to 24 years old, to account for ageing since the last timber supply analysis three years ago,
- add forest cover requirements for approximately 300 hectares of community watersheds within the timber harvesting land base,
- decrease the area managed by the Ministry of Forests to account for the Kitasoo Spirit Bear, and
- decrease the initial harvest level from 600 000 m^3/year to 573 624 m^3/year to reflect the change in allowable annual cut as determined effective October 2000.

5.0 Analysis results

Table 1 summarizes the categories of areas excluded from the timber harvesting land base and shows the total area of the timber harvesting land base.

Table 1. Timber harvesting land base for the North Coast Timber Supply Area -- Current Conditions (Base Case)

Land base Classification	Land base reductions (hectares)	Land base area (hectares)
North Coast TSA		**1 875 334**
Not managed by MoF	191 104	
Non-forest	833 436	
Productive forest managed by the MoF		**850 794**
Non-commercial cover	335	
ESA	233 590	
Low growth potential	281 131	
Problem species	14 046	
Inoperable	171 554	
Existing roads	1 697	
Riparian reserve zones	11 118	
Timber harvesting land base		**137 323**

Figure 1 shows the current land base summary from Table 1 graphically. The timber harvesting land base in the North Coast TSA represents about 7% of the total TSA land area and about 16% of the productive forest managed by the Ministry of Forests.

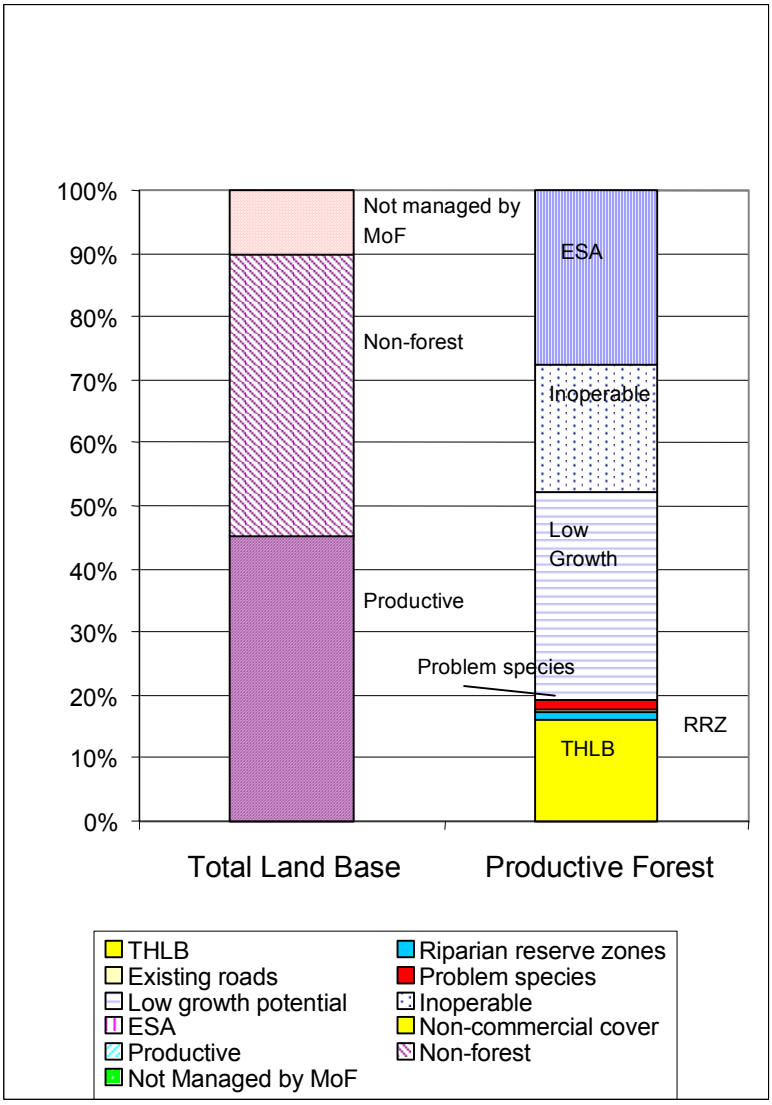

Figure 1. Land base for the North Coast TSA – current condition (base case), 2002

One uncertainty in determining the area available for timber harvesting, is the size of the operable area. In October 2001, staff from the Ministry of Forests, the Ministry of Sustainable Resource Management and licencees updated the 1994 operability maps. This new operability represents a much more realistic view of where harvesting actually occurs. The area excluded from the timber harvesting land base for inoperability did not vary much from the last analysis (171 798 hectares in TSR2 vs. 171 554 hectares in this analysis). However, this is misleading because there have been several changes to the land base since the previous analysis. These include land transfers and a re-inventory that together resulted in a different total TSA area. Because of this, it is very difficult to compare how the operable area has changed since the previous analysis.

The new operability lines were divided into combinations of conventional, helicopter and marginally operable stands for tracking purposes only. Table 2 shows the proportion of each category that makes up the timber harvesting land base.

Table 2. Area of Operability by Category

Category	THLB area (ha)	% of THLB
Conventional - Operable	74 239	54
Conventional - Logged	24 151	18
Conventional - Marginal	13 861	10
Helicopter Operable	15 654	11
Helicopter – Logged	299	0.2
Helicopter - Marginal	9 118	7
TOTAL	137 322	100

Figure 2 shows the current composition of the timber harvesting land base by tree species group. Western hemlock and amabalis fir-leading stands dominate the timber harvesting land base at 51%. Western redcedar and western hemlock stands with a cedar component follow at 41%. The remainder of the timber harvesting land base is covered by spruce-leading (7%) and cottonwood-leading stands (1%). After harvest, stands are assumed to regenerate to the same leading species that dominated the stand prior to harvest. Figure 2 also shows the split for each species group between stands that are younger than the minimum harvestable ages and those that are older. See *North Coast LRMP, Description of Data Inputs and Assumptions for the Timber Supply Analysis (base case) for the North Coast TSA, May 16, 2002* for details. In total, about 82% of the stands in the timber harvesting land base are at or above the minimum harvestable ages.

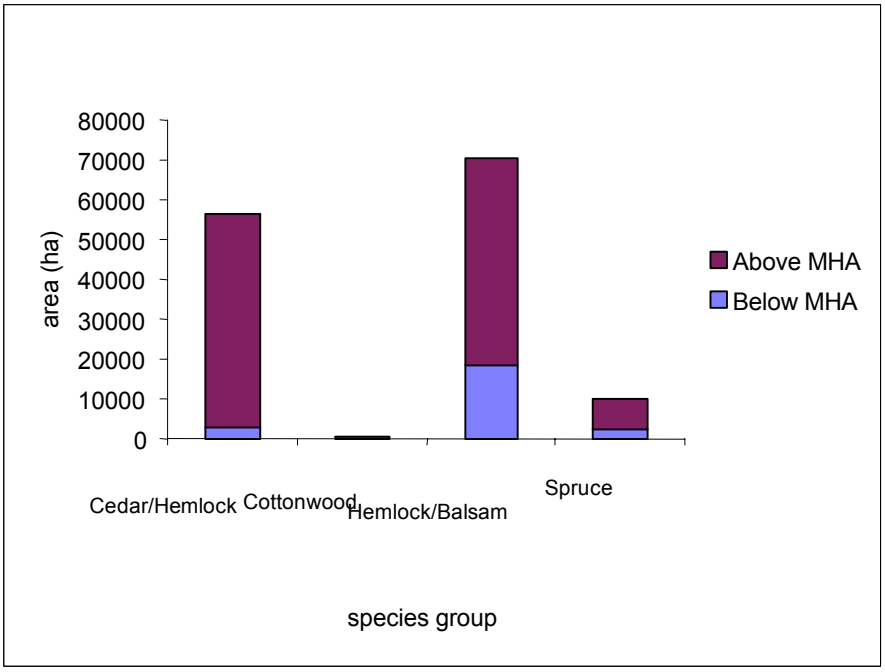

Figure 2. Area by tree species group and relative age – North Coast TSA timber harvesting land base, 2002.

Figure 3 provides an overview of the site productivity distribution by leading species group for the timber harvesting land base. About 55% of the timber harvesting land base is composed of poor growing sites.

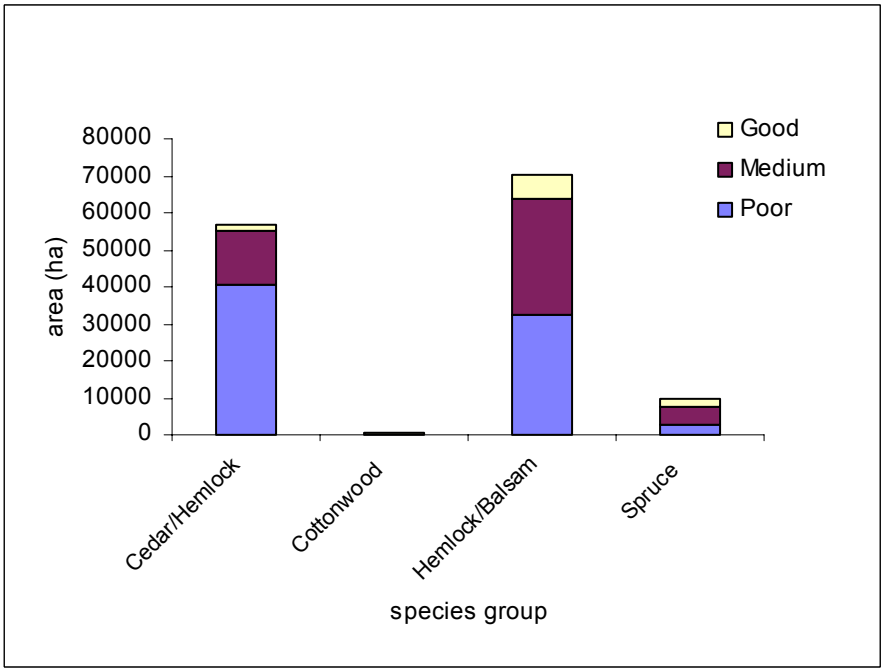

Figure 3. Area by tree species group and timber productivity – North Coast TSA timber harvesting land base, 2002.

Figure 4 shows the distribution of timber harvesting land base by leading species and age groups. Stands that are less than 24 years old have managed characteristics and are modelled with managed stand yield curves. Recent research indicates that productivity estimates using measurements from old stands may underestimate productivity upon regeneration. In a sensitivity analysis discussed in Section 6, productivity estimates for this group of old stands are adjusted after projected harvest and regeneration.

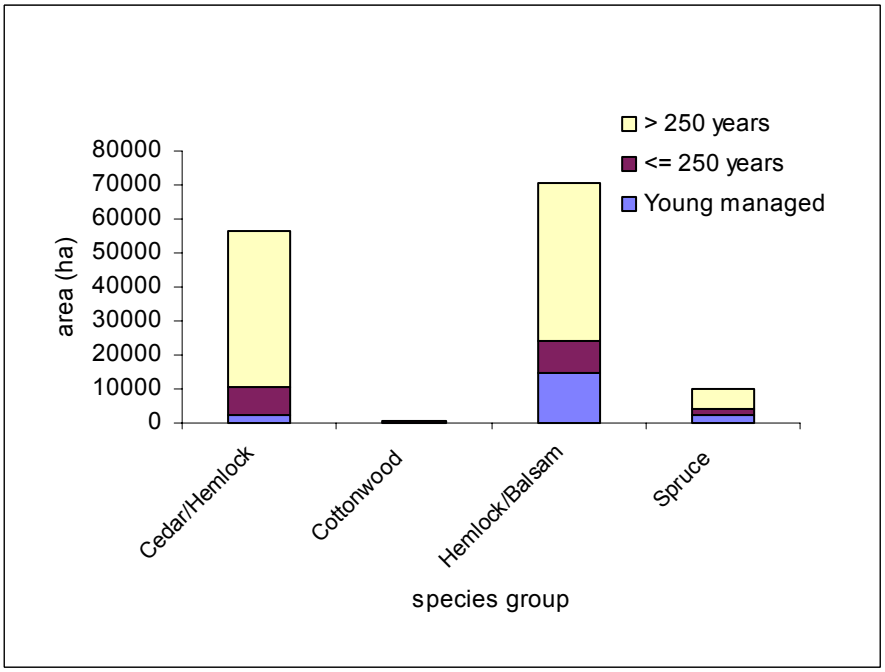

Figure 4. Area by species and age groups – North Coast TSA timber harvesting land base, 2002.

Figure 5 shows the current age class distribution of forested stands in the North Coast TSA. Approximately 65% of the productive forested area outside of the timber harvesting land base, and 75% of the area within, are currently covered with stands that are 250 years and older.

Forested stands that are excluded from the timber harvesting land base have an effect on timber supply. In the North Coast TSA, the majority (85%) of the total forested land base is situated in these stands. While these excluded stands do not contribute timber volume in the harvest forecast, they provide stand conditions such as old-forest characteristics that help achieve forest level management objectives, i.e., old forest landscape-level biodiversity objectives.

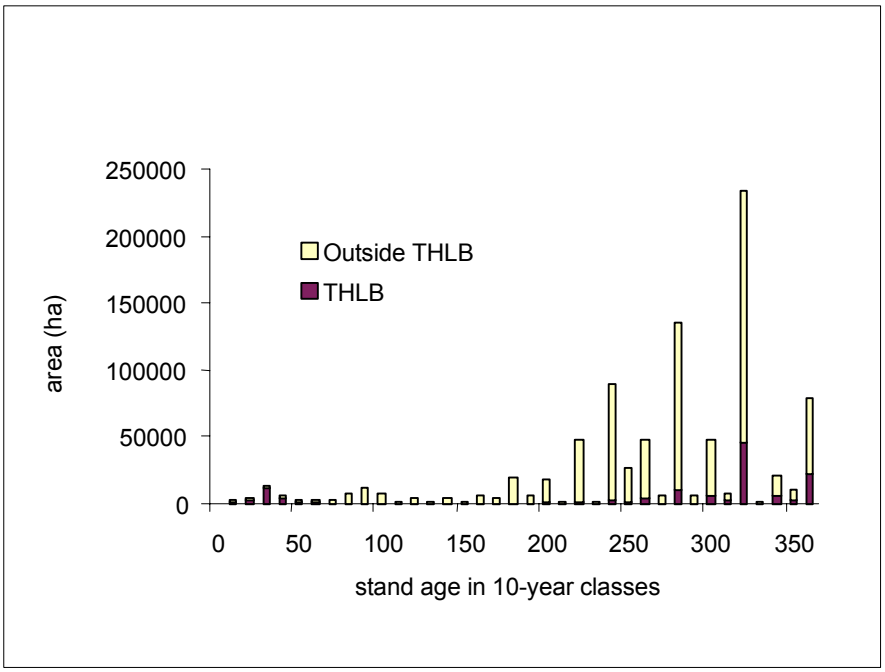

Figure 5. Current age class distribution – North Coast TSA productive forest land base, 2002.

Figure 6 shows the current conditions, or base case, harvest forecast for the North Coast TSA. The initial harvest level is the current allowable annual cut of 573 624 cubic metres per year. This harvest level is maintained for the next 60 years when followed by two controlled reductions of 10% each over the subsequent 20-year period to a long-term sustainable level of 462 000 cubic metres per year. Unsalvaged losses of 10 084 cubic metres per year have been subtracted from all harvest forecasts shown in this report for the 250-year horizon.

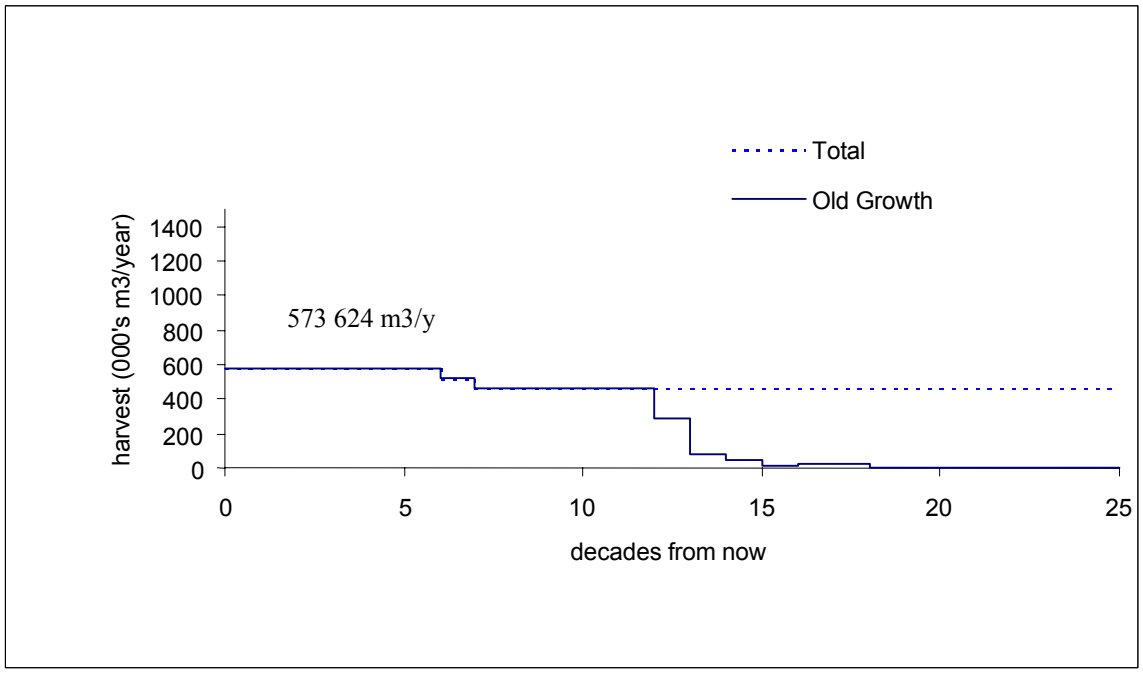

Figure 6. Current condition (base case) harvest forecast for the North Coast TSA, 2002.

The base case forecast was developed by first determining the maximum sustainable long-term harvest level, then maintaining the initial harvest level for as long as possible without compromising this long-term level, and simultaneously providing an orderly transition to this long-term level. These "rules" may be changed in future timber supply analyses to reflect new management objectives and direction resulting from the North Coast LRMP planning process.

These results reflect current knowledge and information on forest inventory, growth, and management. However, it is important to recognize that uncertainty exists about several factors important in defining timber supply. A series of sensitivity analyses showed that these uncertainties could affect timber supply to varying degrees. Section 6 describes these sensitivity analyses in more detail.

Figure 7 shows the projected average harvest age (weighted by area) by decade. The average harvest age from the start of the simulation corresponds to harvesting of old-growth stock. The large decline in average harvest age corresponds with the transition of harvesting to managed stands.

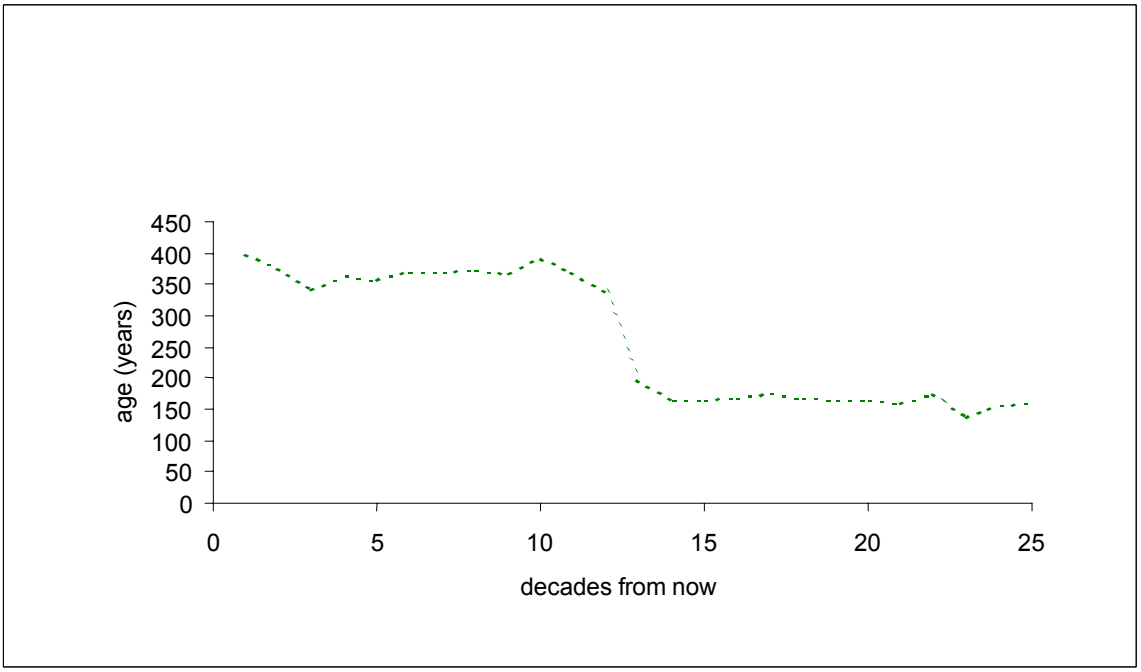

Figure 7. Average area-weighted harvest age by decade for the North Coast TSA base case, 2002.

Figure 8 shows the average annual area harvested by decade. The trend over the analysis horizon towards harvesting less area is the result of the lower harvest level over the long term, combined with higher average stand volumes in managed stands.

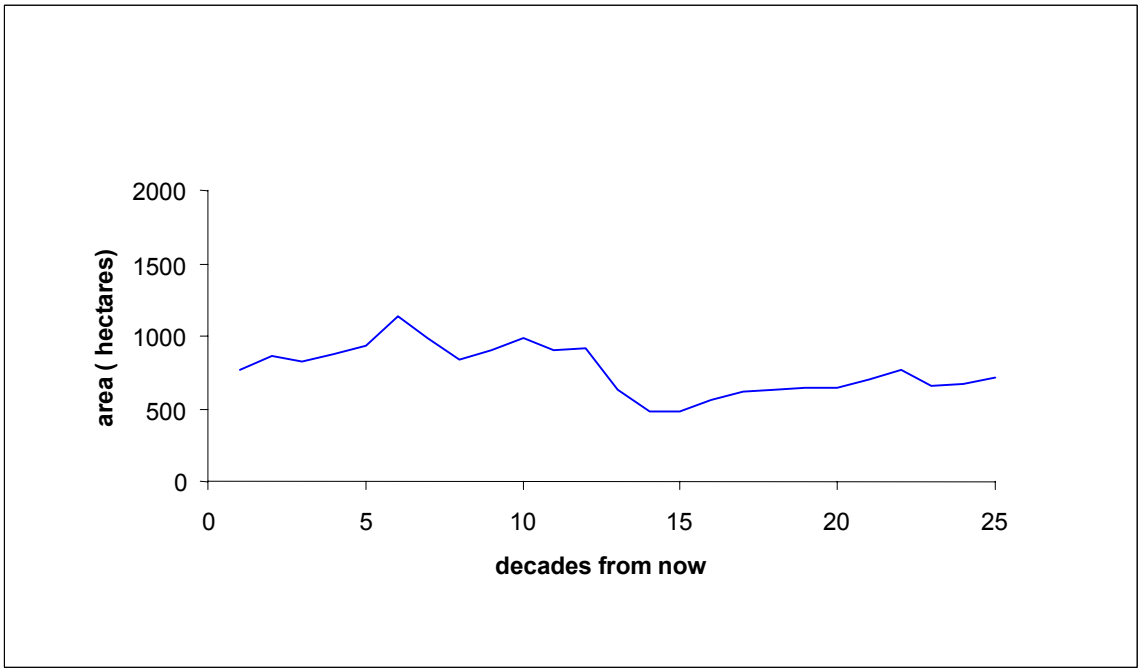

Figure 8. Average annual area harvested for the North Coast TSA base case, 2002.

The chart in Figure 9 shows the current age composition, or age class distribution, of the productive forest within the North Coast TSA. It shows a relatively high proportion of older stands on both the timber harvesting land base and the area not available for harvesting (outside the THLB).

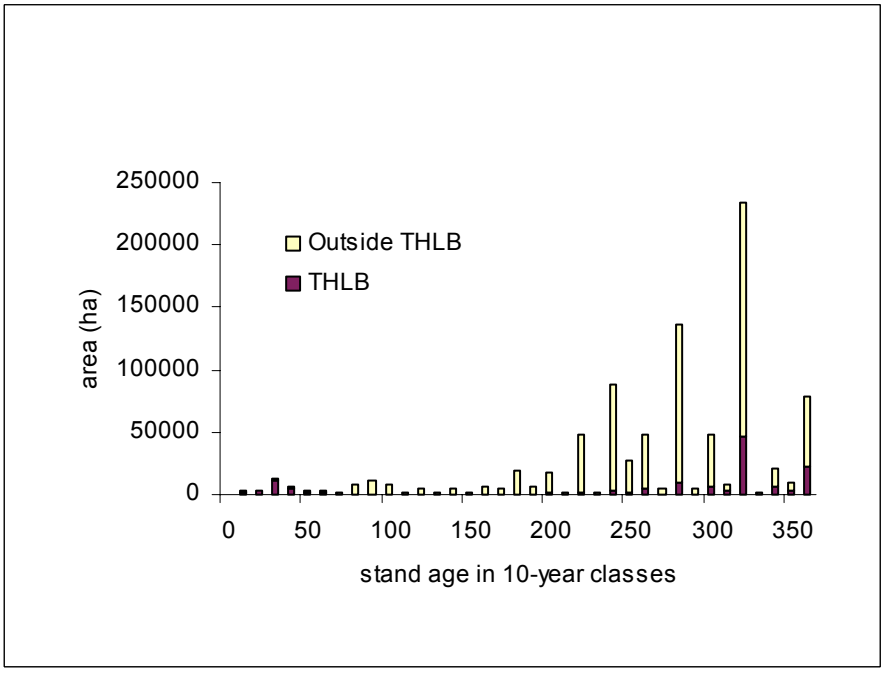

Figure 9. Age class distribution for the productive forest area – North Coast TSA base case forecast, 2002.

The charts in Figure 10 on the following page show how the age class distribution of the timber harvesting land base is projected to change from 50 to 200 years.

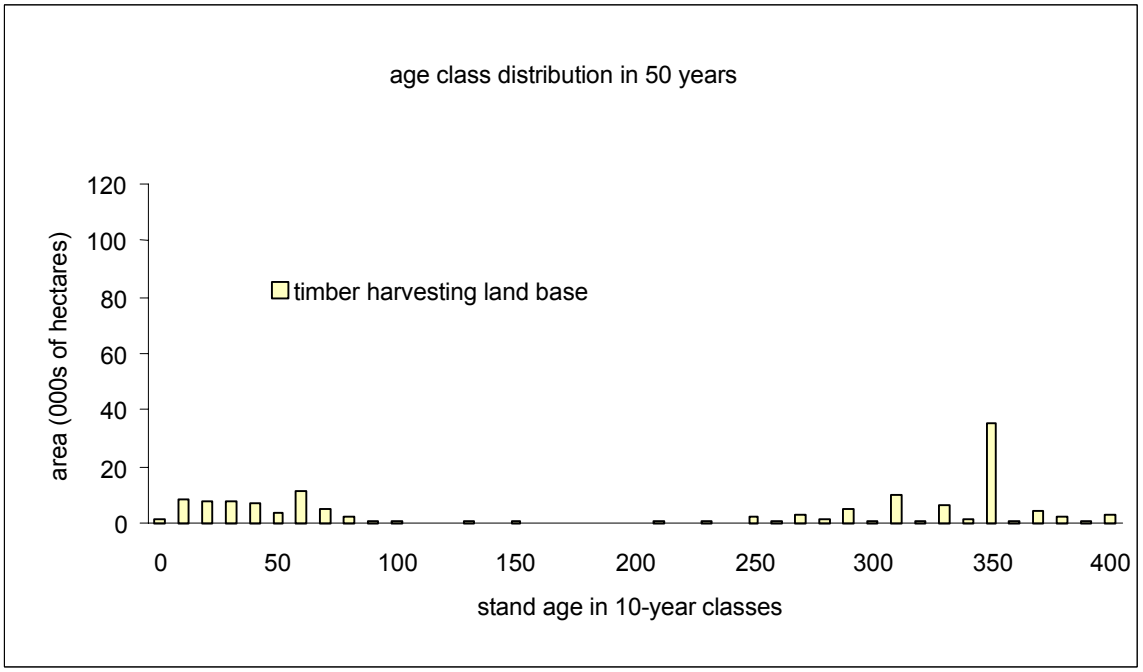

Figure 10. Age class distribution for the timber harvesting land base – North Coast TSA base case forecast, 2002.

Over time, the age class distribution of forests within the timber harvesting land base becomes relatively even.

6.0 Uncertainty and Risk

The best available information on forest inventories and management practices is used to analyse the timber supply implications of continuing with current management. However, forest management is complicated and must account for changing human values, the dynamics of complex ecosystems, and fluctuating and uncertain economic factors. In such a context, we cannot be certain that all data accurately reflect the current state of all values in the forest, how the forest will change, or how our management activities will affect the forest. One way of dealing with this uncertainty is to undertake sensitivity analysis. Sensitivity analysis can show how uncertainty could affect analysis results. For this analysis, three sensitivity analyses were conducted:

- A decrease in the size of the timber harvesting land base, to account for economic uncertainty in operating in the area north of the Nass River.
- An increase in the size of the timber harvesting land base, to address the possibility that the Kitasoo Spirit Bear area may not become a Protection Area. Currently, this area is under a one-year harvesting deferral as a designated area, pending recommendations from the Central Coast LRMP table. If the area does not become protected, it will be added to the timber harvesting land base.
- An increase in the estimate of site productivity of future managed stands, to assess the impacts of recent research, which suggest that the future productivity of regenerated stands may be underestimated.

6.1 North of the Nass River Sensitivity Analysis

Very little harvesting has occurred north of the Nass River over the past 20 years. This portion of the land base contributed approximately 18 000 hectares or 13 percent, of the timber harvesting land base in the TSA. At the time of the next AAC determination in 2005, the chief forester will review the harvesting performance in this area. If his review shows continued lack of harvesting performance, he may consider it appropriate to remove the area north of the Nass River from contributing to timber supply in a future AAC determination.

Figure 11 shows the total and productive land base when the area north of the Nass River is excluded from the timber harvesting land base.

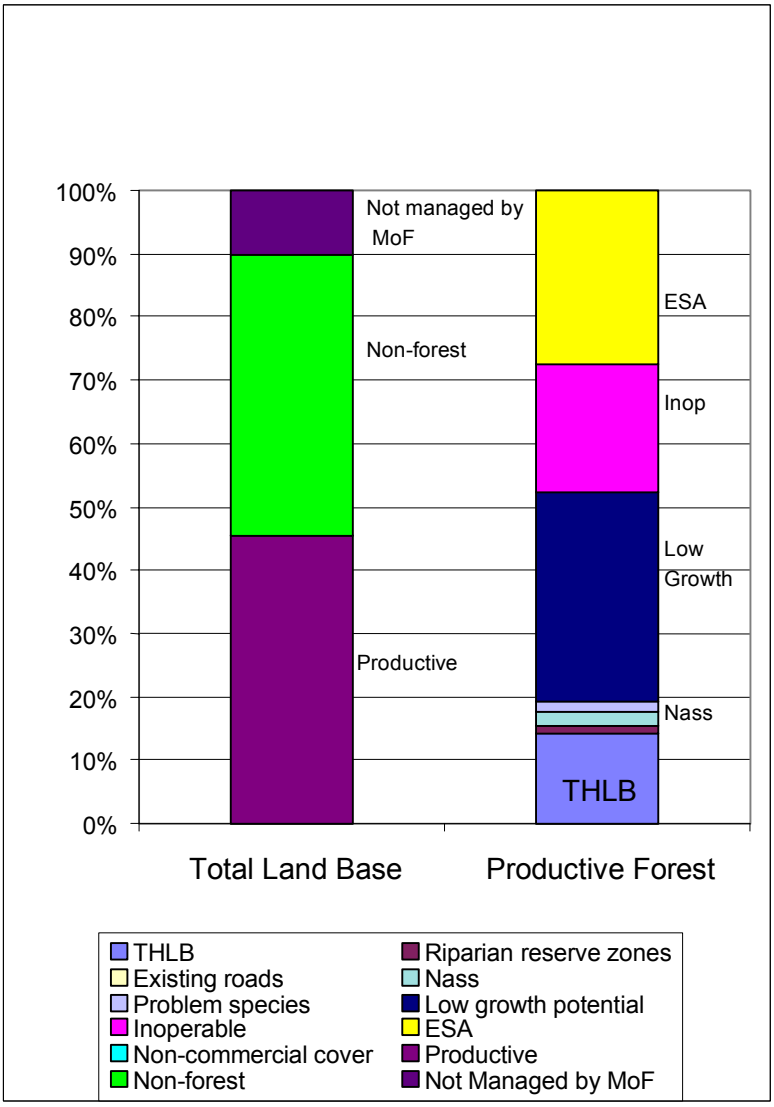

Figure 11. Area of total and productive land base – north of the Nass River excluded from THLB.

Figure 12 shows the impact on the harvest forecast if the area north of the Nass River is removed from the timber harvesting land base. The current allowable annual cut can be maintained for one decade less than in the base case when followed by three controlled reductions of 10% each over the next 30 years, to a long-term harvest level of 419 000 cubic metres per year. Note that the base case showed two controlled reductions to the long-term harvest level.

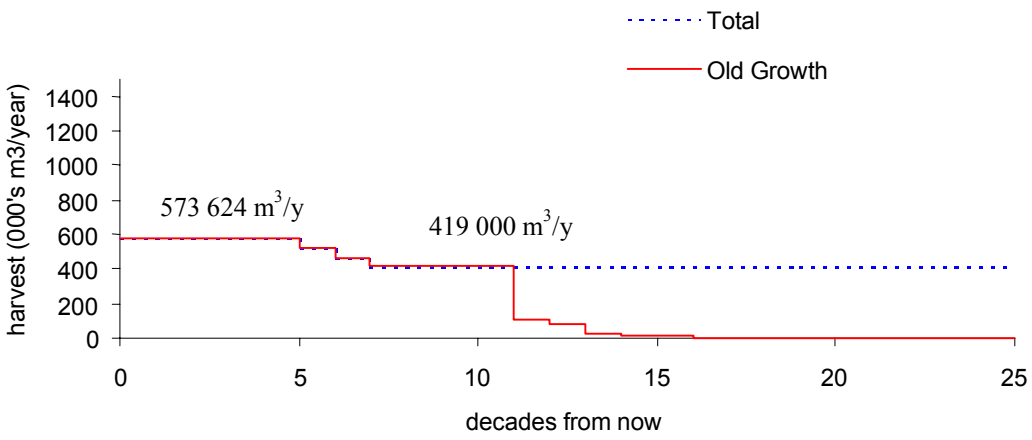

Figure 12. Harvest forecast if area north of the Nass River is removed from the timber harvesting land base.

6.2 Kitasoo Spirit Bear Sensitivity Analysis

The Kitasoo Spirit Bear became a designated area in May 2002 and is currently unavailable for timber harvesting for one year, pending recommendations from the Central Coast LRMP table. For this analysis, it was assumed that the Kitasoo Spirit Bear would become a Protection Area after the one-year deferral period, making it effectively unavailable for timber harvesting throughout the analysis horizon. However, because it is uncertain as to what the decision will be at the end of the deferral period, a sensitivity analysis was performed to assess the timber supply impact of this area becoming available for harvest.

Figure 13 shows the total and productive land bases under the assumption that the Kitasoo Spirit Bear were to become available for timber harvesting after the one-year deferral period. Figure 14 shows how the base case timber supply harvest forecast would be impacted if this were to occur.

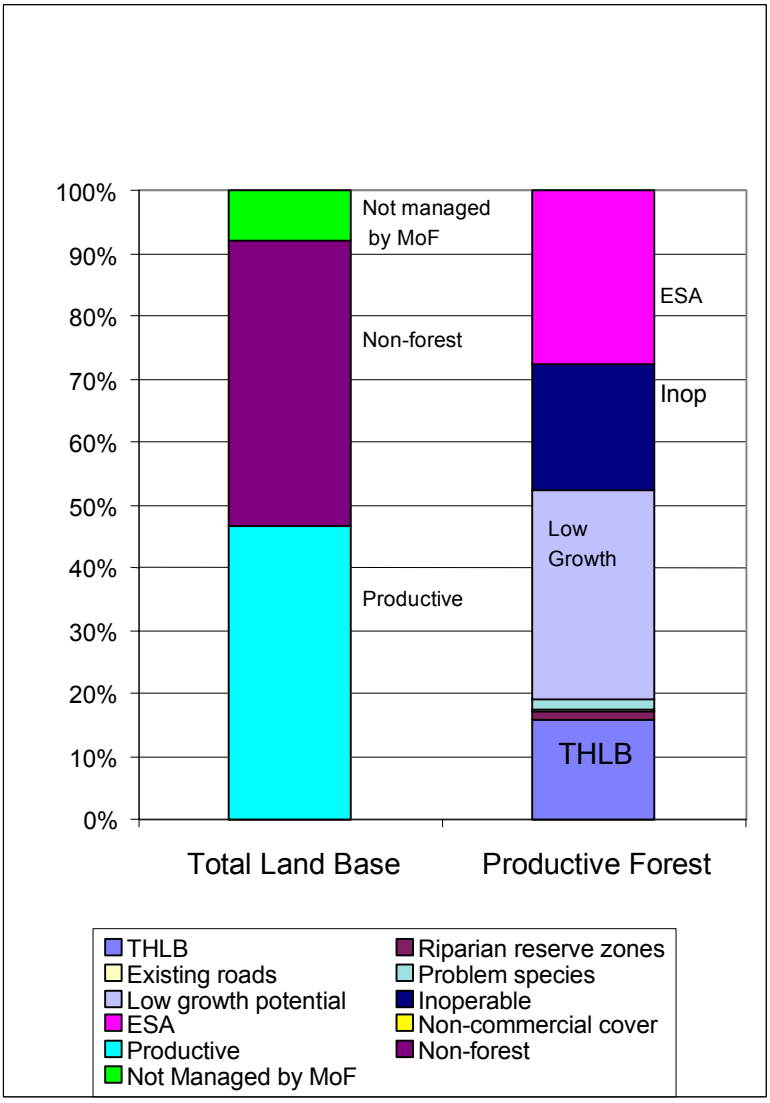

Figure 13. Total and Productive land base if Kitasoo Spirit Bear is available for harvest.

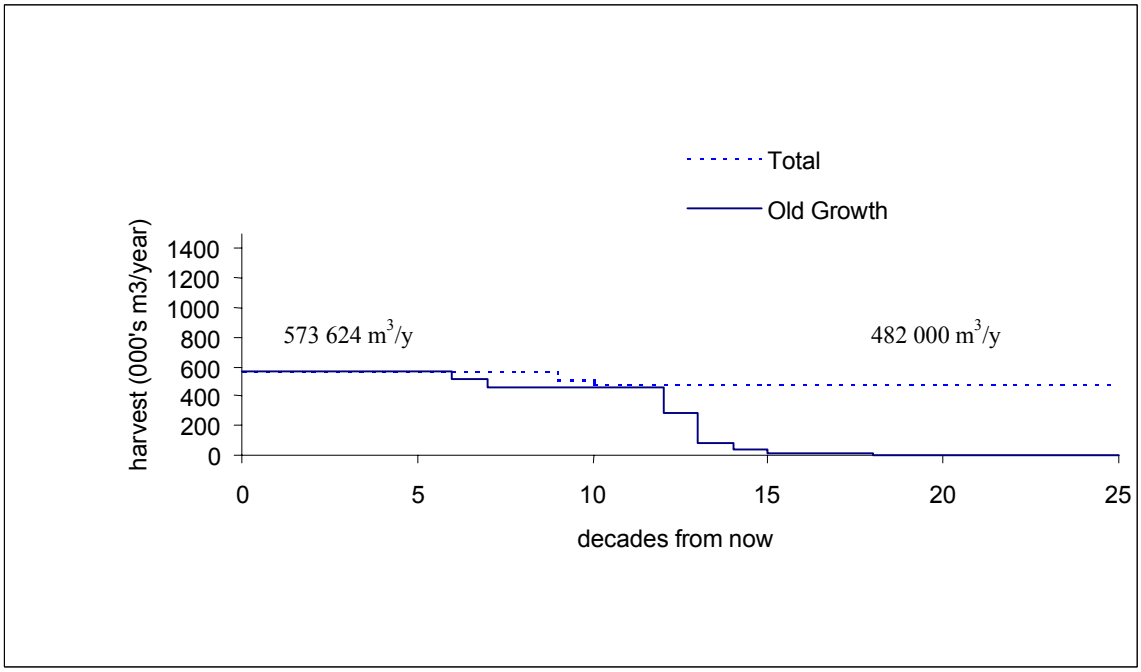

Figure 14. Harvest forecast if Kitasoo Spirit Bear is added to the timber harvesting land base.

Figure 14 shows that the current allowable annual cut can be maintained for two decades longer than in the base case before beginning to decline to a long-term harvest level of 482 000 cubic metres per year, which is 20 000 cubic metres per year higher than in the base case forecast. Although the area that would be in the timber harvesting land base represented by the Kitasoo Spirit Bear is small (1 650 hectares), it is highly productive and therefore does have an impact on the timber supply.

6.3 Site Productivity Sensitivity Analysis

The productivity of a site largely determines how quickly treees will grow, and therefore affects the timber volumes in regenerated stands, the time to reach green-up height and the age at which stands will reach merchantable size. Estimating the future productivity of the existing mature forest is difficult in that it is not possible to know with certainty how the productivity of a regenerated stand will compare to the productivity of the existing stand it replaces.

The results of recent research suggest that the future productivity of regenerated stands may be significantly underestimated in the North Coast. However, the site productivity adjustments suggested by this research reflect maximum potential site productivity, which assumes full but not excessive competition with brush, and no damage by pests. The adjustments also assume a clearcut harvesting regime. Employing partial cutting regimes (including variable retention) may result in lower site productivity values. A more detailed explanation of the adjustments can be found in the report, *North Coast LRMP Description of Data Inputs and Assumptions for the Timber Supply Analysis (base case) for the North Coast TSA, May 16, 2002.*

This sensitivity analysis attempted to show the impacts of using higher estimates of site productivity obtained from recent research. Figure 15 shows that the harvest level can be increased to 884 000 cubic metres per year, and can be maintained at that level over the next 250 years. This is potentially possible in the North Coast because there is currently an abundance of merchantable stands of trees, primarily old growth, that can more than satisfy the current AAC. Because the harvest level is being increased, the old growth stands can be harvested over a shorter period of time, and the conversion to harvesting second-growth stands can occur sooner. This is reflected in Figure 15 as it shows the harvest level from all merchantable stands (total) and old growth stands separately. Stated simply, the sooner the old growth stands are harvested, the sooner the future stands can take advantage of the site's growing potential. However, if the harvest level of 884 000 cubic metres per year is not met, the second-growth stands will not become available sooner and therefore will not be able to take advantage of the site's growing potential. In this case, the increased harvest level would not be able to be maintained.

Note that the area of the timber harvesting land base is the same as in the base case. This sensitivity analysis only considers stands within the timber harvesting land base. Old growth stands that are outside the timber harvesting land base will not be harvested.

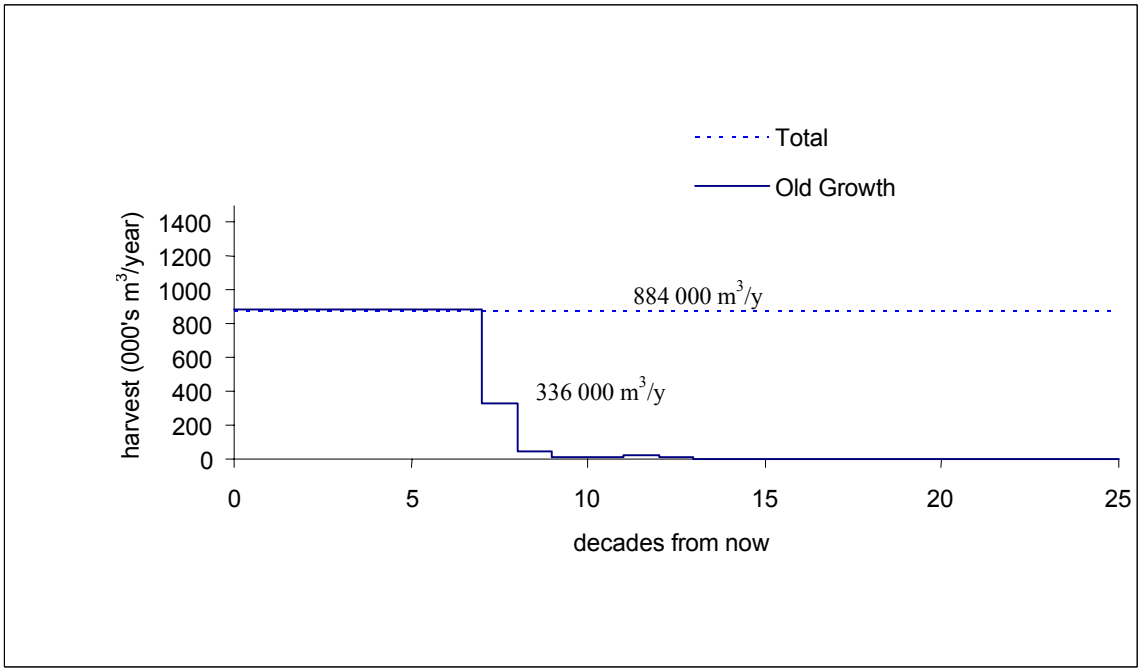

Figure 15. Harvest forecast if site productivity estimates are adjusted for old-growth stands upon regeneration – North Coast TSA, 2002.

Figure 16 shows the average annual area harvested by decade when increased estimates of site productivity are applied. In this situation, we are assuming that the trees will grow faster when they are regenerated. Therefore, the model shows that we can harvest more area at a higher rate than in the base case. As the regenerated stands start to be harvested around decade 7, less area is required because of higher average stand volumes in managed stands. The trend over the analysis horizon is towards less variation in the area harvested as the variation in stand volume decreases.

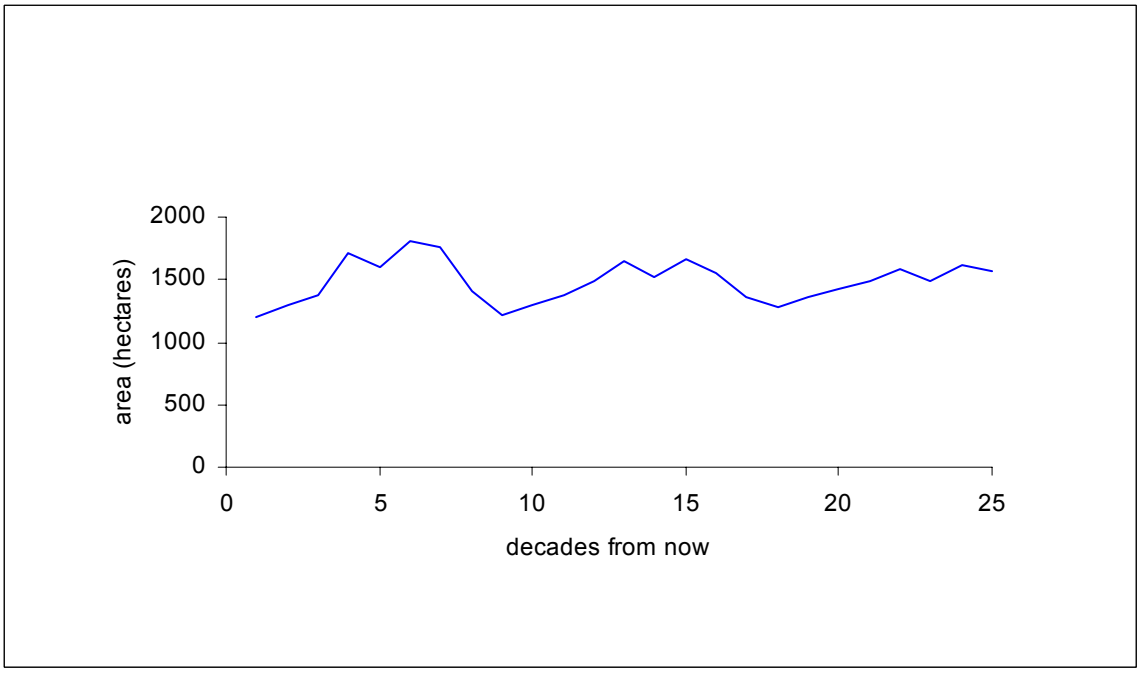

Figure 16. Average annual area harvested by decade if site productivity estimates are adjusted for old-growth stands upon regeneration – North Coast TSA, 2002.

Figure 17 on the following page shows how the age class distribution changes from the current time to 50 and 200 years into the future, when increased site productivity estimates for future stands are used. The important thing to note is that by applying increased estimates of site productivity, the area of younger timber harvesting land base is greater than in the base case over time. See Figure 9 for the base case age class distribution graph.

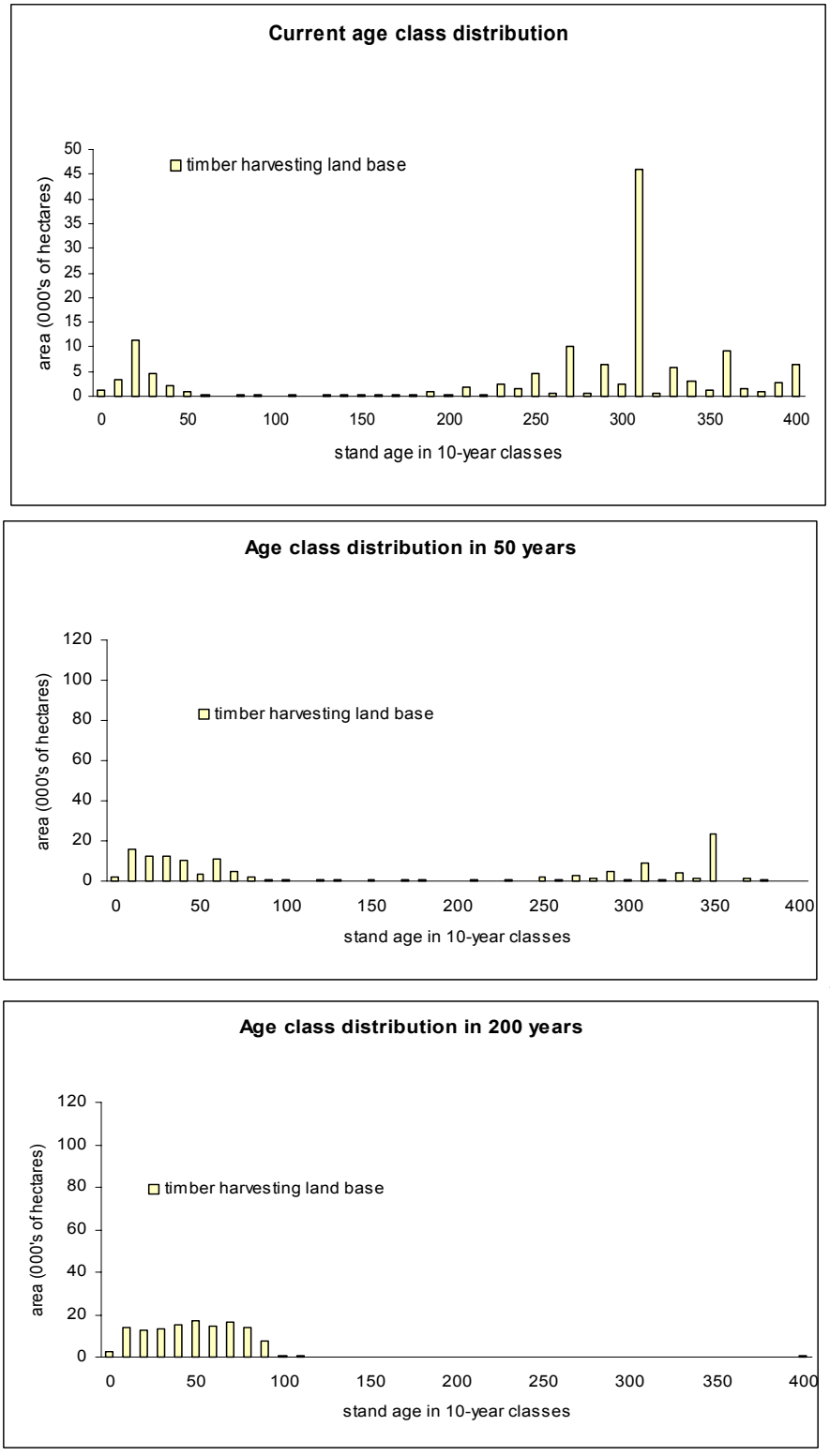

Figure 17. Age class distribution over time for increased site productivity estimates for future stands – North Coast TSA, 2002.

7.0 Conclusion

The results of this timber supply analysis suggest that the current allowable annual cut of 573 624 cubic metres per year in the North Coast TSA can be maintained for six decades without either requiring substantial and rapid future harvest level reductions, or creating severe future timber disruptions. The results show that the current harvest level can be maintained for the next 60 years, if followed by a series of 10% reductions over the next 20 years to a long-term harvest level of 462 000 cubic metres per year. This conclusion can only be made using current inventory and timber growth information, and is based on the data inputs as identified in the report, *North Coast LRMP, Description of Data Inputs and Assumptions for the Timber Supply Analysis (base case) for the North Coast TSA, May 2002*.

The base case results described above reflect current knowledge and information on forest inventory, growth and management. However, uncertainty exists about some of the factors important in defining timber supply. Three sensitivity analyses showed that uncertainties affect timber supply to varying degrees. Figure 18 compares the harvest forecasts from:

1) base case;

2) increased site productivity estimates (SIBEC);

3) removal of the area north of the Nass River from the THLB (Nass); and,

4) inclusion of the Kitasoo Spirit Bear in the THLB (No PA).

All results reported have been for the North Coast TSA, which includes an area that is part of the Central Coast LRMP. Since the North Coast LRMP comprises 90% of the TSA, we can estimate the results for the LRMP area from the TSA results. Future analyses will look specifically at the LRMP area.

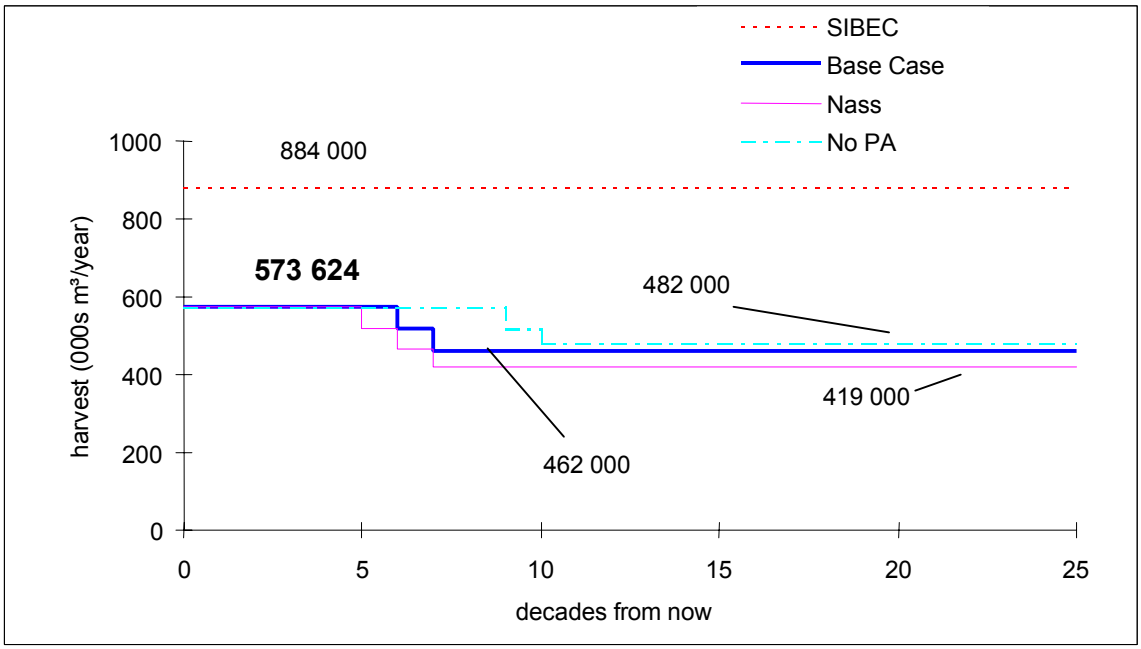

Figure 18. Harvest forecasts for base case and sensitivity analyses – North Coast TSA, 2002.

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