

Development of Māori Owned Indigenous Forests

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Executive Summary

The Ministry of Agriculture and Forestry Land Cover Database has been used as the basis for this study. This has allowed accurate definition of the area of New Zealand that actually supports high indigenous forest. Cadastral information has then been overlaid to define the areas of the natural forest estate that are in Māori ownership. Subsequent to this, forest class data has been used to define areas of indigenous forest that have current commercial timber potential in terms of the requirements of the Amended Forests Act.

This analysis indicates that (with the exception of SILNA land), Māori land that supports indigenous forest, is found almost exclusively in the North Island and is approximately 614,000 hectares in size. Within this land base, there are areas that are either too small to be viable prospects for sustainable forest management, are too far from infrastructure, or support forest classes that have little or no timber potential in the near term. In addition there are areas that are under various forms of reservation such as Nga Whenua Rahui.

Once all these deductions are removed, the area of land that supports indigenous forest that has current timber production potential is estimated at 204,900 hectares. The standing volume on this land is then estimated at 9 million cubic metres. This is a very significant resource with considerable economic worth. Further, there are very large areas of regenerating forest that have the potential to significantly increase the sustainable harvest in the longer term.

While it is difficult to place a value upon this resource, even using a nominal stumpage of \$20/cubic metre, it has a liquidation value of over \$180 million. Current legislation prevents such a liquidation value being realised. A more accurate reflection of value is the net value of a sustained yield harvest. Based upon an increment of 0.35 cubic metres /hectare/year, the increment potential is 71,000 cubic metres/year. Again using a nominal stumpage of \$20/cubic metre this has a potential net value of \$1.4 million annually assuming the entire increment is harvested. In reality the net stumpage being achieved from indigenous timber is significantly above this level and is continuing to rise. Current anecdotal evidence indicates the stumpage to be around \$100/cubic metre across all species indicating a potential total annual stumpage of around \$7 million.

In addition to the strict economic worth of this asset, there is considerable potential to develop a range of employment and environmental opportunities based on this resource.

Employment potential comes from forest management and downstream processing. In order to maximise both the opportunity and the likelihood of long-term success, Māori must have considerable involvement and ownership of the process. Central and local Government may be able to provide guidance in certain areas, but the energy should come from the owners. Any proposal should be based upon a viable business case with sound long-term prospects.

Key environmental benefits of sustainable forest management of these forests have also been identified. Most important of these is the management of plant and animal pests within these forests. At present this work is largely ignored and the forests are suffering accordingly. If a forest is to be managed under a sustainable forest management plan the requirement of sustainability within the legislation and the probable elevation of the value of the forest to the owners will result in a considerably greater focus on pest management.

The conservation ethic is strong within Māori, particularly in relation to their forests. If sustainable forest management is seen as being a means by which the forest can help to

sustain the people, and consequent pest management can help to sustain the forest, there is likely to be significant buy-in to the concept.

A sustainable harvest of timber from these forests will require approval of a Sustainable Forest Management Plan by MAF. Each proposal must be examined on its merits in order to ensure that all criteria are met. This includes the need for detailed inventory for each forest being considered and addressing any issues raised in local government plans. At this stage of the development of any forest management proposal there is a need for significant technical input in both in the forest information and the development of business plans

A considerable level of distrust exists among Māori owners of forests. This distrust is towards Government (local and central), and towards people who may be perceived as simply trying to make a “fast buck” at the expense of the forest.. This is to be addressed if Māori are to be convinced that development of their forests can proceed with a probability of success.

1. Background

1.1 BACKGROUND

Prior to the arrival of humans in New Zealand the majority of the land area (estimated at 75 percent, Purey-Cust) was covered with forest. Two successive waves of colonisation have seen that figure decline to around 25 percent of the land area supporting indigenous forest and about 6 percent supporting planted forest.

The first wave of colonisation saw the arrival of Polynesian people around 1000 years ago. This was followed by the arrival of European people about 200 years ago. These two groups of people each had a dramatic impact upon the forest cover.

The first colonisers used fire as a tool for a range of purposes, resulting in widespread removal of forest, particularly from the drier eastern side of the both main islands. Whether this was deliberate removal or accidental is open to debate, and in terms of this study is not relevant. What is relevant is that by the time the second wave of colonisers arrived the forest cover had been reduced to around 50 percent of the land area.

The arrival of European settlers saw the removal of large tracts of forest throughout the country with the notable exception of the western parts of the South Island and areas of remote or difficult terrain. In addition to the complete removal of large areas of forest, modification of significant areas of remaining forest occurred through the selective removal of timber of sought-after species, and the introduction of a range of animals and plants. Much of the forest that was totally removed was cleared to allow the development of agriculture. Timber production was very much a secondary driver of forest destruction to demand for agricultural land. The notable exceptions to this were the kauri forests of Northland where timber demand drove forest destruction.

These colonisation processes have given rise to the current distribution and quality (from a timber potential viewpoint) of the remaining indigenous forests. The majority of remaining forests are located in areas remote from infrastructure, or areas of higher altitude and difficult terrain.

This pattern of change has occurred almost regardless of land ownership. The same forces with similar results have modified all Crown, freehold and Māori title forest. Even the National Parks and other early reserves do not escape this change pattern.

Until the 1970s there were few controls upon the removal of indigenous forest. Such controls as did exist were motivated by concerns of soil erosion and water quality rather than the intrinsic value of the forest. With the emergence of concerns for the environment in the 1970s, removal of indigenous forest came under increasing scrutiny. This resulted in pressure on Central Government to protect indigenous forest. Initially this pressure was focused on publicly owned forests that led to the cessation of harvesting in Crown forest. Firstly, kauri in the 1970s, then podocarp forests in the North Island in the 1980s and in more recent times all Crown owned forests in the South Island have had all harvesting and management activities halted.

In the 1990s the pressure moved to control harvesting in privately owned forests. This led to the Forest Act being amended in 1993, requiring all harvesting of private indigenous forest to be approved by a Government Agency (currently Ministry of Agriculture and Forestry) and to

be carried out in a sustainable manner. Sustainability is a complex issue but for the purposes of indigenous forest management it is defined in the legislation.

Privately owned forest includes forest on Māori land with the exception of SILNA land. SILNA lands were land given as compensation under the South Island Landless Natives Act (1906). These lands are located predominantly in Southland and Stewart Island, with smaller areas located on the West Coast, Otago, Marlborough, and Nelson. The SILNA lands were exempted from the 1993 Amendments to the Forests Act, thereby allowing the continued unsustainable harvesting of indigenous timber from these lands.

With the exception of SILNA land, the amended Forests Act requires the extraction of indigenous timber from privately owned land to take into account the existing merchantable volume within the forest, and the ability of that forest to replace any volume removed.

1.2 INTRODUCTION

Collectively Māori have under their control, in various forms of ownership, significant natural assets including significant indigenous forest areas. Many of these assets are not used, for the economic benefit of the owners, or are only partially used, for a wide range of reasons.

The objective of this study is to examine the indigenous forest assets owned by Māori, their potential to yield a harvest of indigenous timber, and how they might be developed into economic assets.

Some parts of this report are by necessity generic in nature, and are applicable to all indigenous forests, not just those owned by Māori. It is necessary to have an understanding of these issues so that the potential to develop Māori owned forests can be put in perspective.

The initial part of the study determines the physical location and extent of the forest areas. These have been impacted on by many factors over the past few hundred years, and where appropriate these factors have been brought into the discussion.

The next part of the study examines the potential of the identified forests to produce a harvestable volume of timber, within the current legislative framework. Again a number of issues impact upon this. Some of these can be quantified while others are either subjective or will change through time. The study considers the implications of these issues as they impact on the present productive capability of the forest. In completing an analysis of this nature there is by necessity a need to make some arbitrary cut-offs or assumptions.

The outcome of these parts of the study is to determine the potential for a harvest of indigenous timber from Māori owned forest resources. From here the study looks at what benefits may be delivered to the owners and the wider community from such a harvest, and also considers issues that could impact upon the delivery of these benefits.

The final part of the study explores the factors that can increase or decrease the likelihood of the development of a sustainable harvest of timber from Māori resources and considers what assistance is required to develop such an industry.

It is important to note that this study focuses exclusively on the North Island, as the research shows the extent of Māori land in the South Island, that supports indigenous forest with any commercial potential, and is not part of the SILNA lands, to be almost non-existent.

1.3 LEGISLATIVE FRAMEWORK

This section provides a brief overview of the significant legislation that impacts on the ability of a forest owner to extract timber from their indigenous forest. The two key pieces of legislation are the Forests Act and the Resource Management Act.

Numerous other Acts and Regulations, such as the Health and Safety in Employment Act, also impact on an owner wishing to harvest timber, but these are generally more concerned with the management of the business than with the management of the forest.

The following discussion is therefore restricted to the implications of these two key laws.

1.3.1 Resource Management Act 1991

The single most influential law governing the physical management of natural resources in New Zealand is the Resource Management Act 1991, generally referred to as the RMA. When enacted, the RMA was seen as a revolutionary change from prescriptive management by local authorities and Government, to being an Act that empowered communities to manage their resources in the way they thought best. A key thrust of the Act was to allow people to manage resources to achieve agreed environmental outcomes, thus it was outcome driven not input driven, and was permissive in philosophy.

As with most legislation the devil is in the detail. The implementation of the Act over the past 10 years has seen a wide variety of approaches adopted by the different Authorities involved. These have ranged from very hands off to very prescriptive approaches.

For the owner of an indigenous forest, the RMA impacts on how they can manage their resource through matters such as the ecological and environmental significance that forest has both locally and nationally. Specific considerations under the RMA include the potential impact of activities on soil, water, landscape and Māori cultural values.

Generally the required performance standards the owner must meet are included in plans prepared by regional councils and unitary authorities covering management of soil, air and water in particular, and district plans prepared by district councils, addressing a wide range of issues, including land management and infrastructure.

The owner of an indigenous forest must conform to the requirements of these plans as well as the sustainable management requirements of the Forests Act.

The Ministry of Agriculture and Forestry takes this into account when considering an application for a Sustainable Forest Management Plan or Permit. Its general requirement is that the application meets the requirements of the RMA as determined by Government in the Region/District in which the forest is located.

Ironically, an application under the Forests Act for a Sustainable Forest Management Plan or Permit actually commits the owner to ensuring the forest remains intact for the life of the Plan or Permit, whereas the RMA can allow the forest to be destroyed completely, provided this action conforms with the local District and Regional Plans.

Thus a Plan under the Forests Act can afford the forest a higher level of protection than the RMA. This may be a significant point when considering impediments to the development of Sustainable Forest Management Plans and Permits for the harvest of timber on Māori land as discussed later in this report.

1.3.2 Forests Act 1949

The Forests Act 1949, as amended in 1993 by the Forests Amendments Act (commonly referred to as the FAA), controls the harvest of indigenous timber from all privately owned indigenous forest with the exception of SILNA land.

The FAA sets out the process by which a landowner is able to apply to harvest timber, the controls that will be implemented, the volumes of timber that can be legally extracted, the information required when applying to harvest timber, and the documentation required to accompany timber harvested under the terms of the Act.

The Ministry of Agriculture and Forestry has available the detailed requirements of the FAA, but a brief overview of harvesting options is given here.

A forest owner is able to apply for timber harvest under several categories, with the three most significant in terms of this study being as follows:

- **Personal Use** – The owner of an indigenous forest can apply to harvest a small volume of timber from that forest for their personal use. This is restricted to a maximum of 50m³ once every 10 years. The timber or logs cannot be sold. This clause is included in the Act to allow for personal use of timber without the need to go through a complex inventory of standing timber. As the volume allowed is small, and the wood cannot be sold, this mechanism is of little interest to this study as a means of developing commercial management of Māori owned indigenous forest. It is however important for such matters as the restoration or repair of Marae.
- **Sustainable Forest Management Permit** – A Sustained Yield Permit allows the owner to extract an agreed volume of timber for the forest. The volume allowed under a Permit cannot exceed 250m³ of podocarp or kauri roundwood or 500m³ of hardwood roundwood, provided the volume does not exceed 10 percent of the standing timber on that landholding. Further the volume removed is all that will be permitted in a ten year period. After the ten-year period, no further harvest will be allowed unless it can be shown that the volume removed has been replaced by increment and recruitment. For a forest owner to operate under these provisions they must apply to MAF and have the permit approved. The process for obtaining a permit is not as difficult or expensive as for obtaining a Plan (as discussed below). It is appropriate for forest owners with smaller blocks who do not wish to manage their forest for harvest of larger quantities of timber.
- **Sustainable Forest Management Plan** – This allows the forest owner to apply for approval to harvest indigenous timber at a rate not greater than the ability of the forest to replace the volume removed, either annually or periodically. The most significant points about a Sustainable Forest Management Plan are that it requires sound inventory data on the forest; it is registered against the title of the land for a minimum of 35 years; it requires detailed management planning and implementation; and allows a harvest level up to the limit the forest can sustain. Clearly then, this is the most expensive option for timber harvest and requires a high level of commitment to the philosophy of sustainable management. It also offers the greatest level of harvest and is the most appropriate system for large areas of indigenous forest.

While there may be some potential for owners of smaller forest areas to seek Sustainable Forest Management Permits and hence generate some timber volume, the greatest hope of developing any significant economic opportunities based upon Māori owned indigenous timber lie with the Sustainable Forest Management Plans.

Within the context of this study, the focus needs to be on forest areas large enough and with sufficient timber volume to support approvals for Sustained Forest Management Plans. This will provide the opportunity to both justify the expenditure involved and to develop a business that is sustainable in the long term.

2. Location of Forests

2.1 EXTENT AND LOCATION OF PRODUCTIVE FORESTS

This section of the study sets out the location of the main areas of Māori owned indigenous forest and describes the size of the resource along with a discussion on the ability of that resource to sustain production of timber.

A number of key assumptions are required in order to quantify some of the variables. These are discussed, with, where appropriate, some attempt to determine the sensitivity of the variables on the final outcome. Clearly for a study of this nature there will be potential to debate some of the assumptions and the sensitivities. However without having some clear assumptions, the results tend to lose some credibility.

2.2 METHODOLOGY

A project such as this requires a number of approaches in an attempt to get the data as robust as possible.

The raw information is stored in a number of formats, locations and agencies, and is generally incomplete. Further, the information that is held, is generally at a macro level and lacks the necessary detail to be of much value in producing site-specific outcomes.

This study has attempted to bring together as much historical data as possible, and to combine this with more recent data, which has been captured through various initiatives.

The most significant and valuable initiative is the Land Cover Data Base (LCDB), (Thompson) which has been used as the basis for this study. This has allowed accurate definition of the area of NZ that actually supports high indigenous forest. The LCDB also has the added advantage of being able to be interrogated, allowing parameters to be adjusted, and hence providing some measure of the sensitivity of the information.

Cadastral information has then been overlaid to define the areas of the natural forest estate that are in Māori ownership.

From this base of knowing the areas where Māori land supports indigenous forest, the study then considers factors that impact on the ability of those forests to be managed for a harvest of timber.

The LCDB was a project initiated by the Ministry of Forestry in the 1990s to quantify the vegetation cover of New Zealand through the capture of satellite images, which could then be interpreted through ground truthing and other techniques. This provides a very recent snapshot of the vegetation cover of New Zealand at a macro level. The project defined areas of natural forest, pasture, planted forest etc. Within each of these broad classifications, further refinement was possible, such as for example classifying planted forest by age class and species.

The result of the project is that the vegetation cover of the country is known with a high level of confidence. However, within each classification the desire and ability to further refine vegetation types is variable. For assets of economic significance, there are strong economic reasons for providing greater detail within each broad classification. This is further assisted by the simplicity (in an ecological sense) of most of our economically significant vegetation types. For example, most agricultural and planted forestry crops consist of one or a very small

number of species. This makes interpreting the satellite images reasonably straightforward. On the other hand, natural ecosystems such as indigenous forest tend to have a much more diverse range of species in generally uncertain proportions, or even in a continuum of species mix, that makes a mockery of arbitrary categorisations. There has been less financial support so far, for more specific refining of the LCDB for areas considered to have relatively low economic importance.

This results in the necessity to use other techniques, including simple ground and aerial truthing of LCDB information, seeking expert advice about specific forests, and comparative studies of other areas with known parameters.

2.3 LOCATION OF MĀORI OWNED FORESTS

This section examines the physical location of the Māori owned indigenous forest estate by region. For ease of analysis, Regional Council boundaries have been adopted as logical regions. While there may be cases where a given area of land is split between two regions, the incidence of this is not considered to be high and therefore the impact upon the outcomes of this study is very limited. Further, the Regional Council boundaries are generally established along major catchment boundaries, and these often also form legal land boundaries.

Table 2.1 provides the areas of Māori owned forest in each of the regional council boundaries along with the percentage of the region this area represents. This is a gross figure that has been captured in the 1990s from satellite imagery, and can be considered to be reasonably accurate.

The satellite analysis was down to an area of 1 hectare, so all areas of significance that supported indigenous forest have been captured. There is however the matter of definition of indigenous forest.

The LCDB categorised indigenous vegetation into five categories, being high forest, scrub, tussock, wetlands, and mangrove. The areas classified as wetlands and mangrove have little bearing on this study and therefore are not considered in any depth. The other categories are the focus of this study.

There may be some blurring of the boundaries between tussock and scrub, however the definition of forest versus scrub has always been open to debate and is usually a reflection of the position of the people debating the matter.

As discussed above, the LCDB used satellite imagery to classify the vegetation covers. In order to do this, the categories had to be readily distinguishable from each other in the imagery. To accommodate this requirement, the classifications used were biomass driven rather than botanically driven, and were derived for ease of interpretation.

The definition of indigenous high forest was: “*forest cover dominated by indigenous tall forest canopy species*”. Thus to be classified as high forest the area had to consist of greater than 50 percent tall canopy species.

Scrub was defined as: “*woody vegetation in which the cover of scrub and trees in the canopy is greater than 20 percent, and in which scrub cover exceeds that of any other growth form or bare ground*”.

Given the above definition, the forest area is shown below, followed by a brief discussion about each region.

An analysis of the information available shows the extent of Māori land in the South Island that supports indigenous forest to be very limited. When areas that are classified as SILNA lands are removed, along with those areas that support non-commercial indigenous forest, the potential resource falls close to zero.

For this reason, the South Island does not feature in the results of this study

Table 2.1 – Area of Māori Owned Forest, Total Regional Area and Percentage of Region that is Māori Owned Forest

Region	Nthlnd	Aklnd	Wkto	BOP	Gisbn	H/Bay	Tnki	Mwtu/ Wang	Wgtn	Total
Area (ha)	76,185	2808	120,802	193,771	93,347	99,405	3520	68,288	4163	662,289
Total Regional Land Area (ha)	1,269,000	1,614,100	2,500,000	1,300,000	826,500	1,416,000	723,610	2,217,900	813,000	12,680,110
% of region that is Māori-owned forest	6	<0.1	5	15	11	7	0.5	3	1	5

As can be seen from Table 2.1, some regions have very substantial areas of Māori land supporting indigenous forest, while in others the areas are relatively small. The narrative below provides brief details of each of the regions under consideration.

2.3.1 Northland

Kauri and other softwoods originally dominated the forests of Northland. Following the arrival of European settlers, the value of kauri timber was quickly recognised and an extensive industry developed around the harvesting and processing of these trees.

So thorough was the exploitation of kauri that today little forest remains unmodified by harvesting. The pursuit of land for agriculture also contributed to the forest loss in Northland, as it did elsewhere in the country, but it was the desire for kauri that really drove the forest removal.

The result is a relatively small area of indigenous forest, of which approximately 76,185 hectares is on Māori owned land. Much of the forest remaining in Northland is second growth forest, with some of this already almost capable of supporting a small but sustainable harvest. Further, this regenerating resource can be expected to significantly increase the potential size of any sustainable harvest in the future, provided it is properly managed.

2.3.2 Auckland

As in Northland, the pursuit of kauri timber impacted severely on the forests of what is now the Auckland Region. This region is relatively small in terms of land area and is even less significant in terms of both indigenous forest area and Māori owned indigenous forest area.

The expansion of the Auckland urban area has been a significant driver of forest removal in earlier times, and while today there is general public support for the retention of indigenous forest, this has not always been the case. Clearance for agricultural land close to the early-established towns and ports has left the region with relatively limited natural forest. The urban population increasingly values these forests for non-economic reasons.

This region is unlikely to be the source of any significant timber industry.

2.3.3 Bay of Plenty

The Bay of Plenty region has the largest area of Māori owned indigenous forest of any of the regions in New Zealand. The region can be split into three distinct areas, generally based upon topography and land use. Generally the low-lying plains have been almost completely cleared of indigenous forest and now support intensive agriculture and horticulture. These same areas were in many cases alienated from Māori ownership through confiscation following the land wars in the 1860s.

The second significant areas are the inland plateaux and associated valley systems that proved unsuitable for agriculture in the early days due to (at that time undiscovered) cobalt deficiency. These areas now support the extensive plantation forests of the region.

The third area is the hill country that supported extensive indigenous forest. These forests have remained to the present day albeit in a modified form in many cases. Some areas were cleared for agriculture, but the majority of the modification came in the form of harvest of timber, and in particular removal of the softwood element.

Within this hill country there are large areas of land in public ownership, including Te Urewera National Park and Whirinaki, Kaimai-Mamaku, and Raukumara Forest Parks. Interspersed in these areas, and in particular within the Urewera Tract, are considerable areas of Māori Land, many of which support indigenous forest. Appendix 1 contains photos of some areas of indigenous forest found in these areas.

In the past, the topography has restricted the opportunities for some of these areas to be harvested, which is why they have endured to the present. The restrictions were both of a physical nature and legal constraints such as soil and water protection requirements. It is these areas that offer some of the best potential to develop a sustainable yield of indigenous timber from Māori land.

2.3.4 Waikato

The Waikato region extends from south of Auckland to the central North Island and from coast to coast. As a result it encompasses a wide range of land types and where present, indigenous forest covers. The region also has a significant area of Māori owned indigenous forest.

The landforms are in many cases similar to those found in the Bay of Plenty, with a similar resulting pattern of land use. Much of the Māori land supporting indigenous forest is found in the more remote hill country of the region and especially in the west coast areas, east and west Taupo, and in Coromandel.

While many of these forests have been logged at some point, many have a significant residual timber volume as most of the initial harvest was for softwoods, while others have significant levels of regeneration occurring.

2.3.5 Hawkes Bay

Much of the original forest in Hawkes Bay was removed prior to the arrival of European settlers, who then rapidly removed much of the remainder. This left a pattern of forest cover existing predominantly on the ranges, with the lowland having been converted to agriculture.

This region has a significant area of Māori owned indigenous forest, with the majority of it located in the main ranges between Napier and Taupo. This area, by virtue of its large, almost contiguous nature, offers some potential for management.

2.3.6 Gisborne

Unlike most other regions, Gisborne does not have extensive lowland areas. Almost the entire region is hill country, with reasonably difficult access. This would have made timber extraction a less attractive option than in other parts of the country.

However the entire East Coast area was extensively cleared for agriculture in the early 1900s, which has resulted in the majority of the remaining natural forest being restricted to the more remote and difficult parts of the region, or to areas that have reverted from earlier farming attempts. In some parts of the region such as around Ruatoria, there are large areas of reverting farmland, much of it on Māori land.

The difficult soils and underlying geology may have also had some effect on the pattern of residual forest distribution, through the difficulty of access and the need to protect soils from erosion.

In terms of percentage of the region in Māori owned forest, this region is second only to the Bay of Plenty.

2.3.7 Manawatu-Wanganui

This region in the lower North Island consists of a range of land types including the axial ranges and extensive areas of very broken hill country in the inland Wanganui area. Most of the remaining indigenous forest is restricted to the hill country and the ranges due to the difficulty of access in the past.

There is a significant area of Māori owned indigenous forest within the region totalling over 68,000 hectares, much of which is located in the upper Wanganui River area and around Taumaranui.

2.3.8 Taranaki

The Taranaki Region is characterised by the volcanic cone of Mount Egmont and its associated ring plain. The mountain itself is contained within a National Park, while the ring plain has been almost entirely converted from forest to agricultural use.

Inland from these features there is an extensive area of broken hill country, much of which has been cleared for farming, but much also continues to support indigenous forest. There are large areas of Māori land in the region, but only a relatively small area supports indigenous forest.

2.3.9 Wellington

The Wellington Region also has extensive areas of indigenous forest with a significant proportion in public ownership. The area of Māori land supporting indigenous forest is relatively small at 4163 hectares. These forest areas are located predominantly around the southern coast area.

2.4 OWNERSHIP PATTERNS

The data presented in Table 2.1 provide the gross area of Māori owned indigenous forest. This however gives little indication of the ownership parameters for this land. Table 2.2 below shows the number of individual land “titles” in which this area is held, and the average size of those holdings.

Table 2.2 – Number of Titles and Average Area of each Title

Region	NthInd	AkInd	W'kato	BOP	Gisbn	H/Bay	Tnki	Mwtu/ Wang	Wgtn	Total
Area (ha)	76185	2808	120,802	193,771	93,347	99,405	3520	68,288	4163	662,289
Number of Blocks	4667	194	6783	10599	5648	2953	359	3854	335	35,392
Average Area per Block (ha)	16.3	14.4	17.8	18.3	16.5	33.7	9.8	17.7	12.4	18.7

As can be seen from the table, there are large numbers of individual Māori land holdings that support indigenous forest, which in turn gives rise to a very low average land area per holding. These values indicate that a significant number of blocks are likely to be very small in area, and that there are likely to be a relatively small number of large land holdings.

What this data does not tell is the commonality of ownership between blocks. For example it is not uncommon for several blocks (which could all be adjoining) to have a degree of common ownership. This could be a significant issue worthy of further investigation.

No attempt has been made to quantify either the commonality of ownership or the actual distribution of title sizes. This becomes a more significant matter when an individual block is considered for the development of a Sustainable Forest Management Plan.

Section 3 describes the potential size of the forest resource, and in doing so removes blocks that are less than 10 hectares in extent, as these are considered to be too small to support a Sustainable Forest Management Plan. If however, a number of adjoining sub-10 hectare blocks with a commonality of ownership could be managed as a single “forest”, the justification for a Sustainable Forest Management Plan would be enhanced.

The total forest area where this could occur is not, however, considered to be significant, and is unlikely to materially alter the findings of this study.

3. Timber Potential

3.1 DETERMINATION OF PRODUCTIVE POTENTIAL

In order to derive meaningful and useful information from this work some restrictions on what is deemed to be of economic significance are required. If this is not done the study will show numerous small blocks of land that have insignificant timber volumes, which only serve to mask the areas where real potential exists.

The restrictions that have been incorporated into this study are detailed below. Once the forest areas have been defined and typed, a series of reductions are applied to remove from the gross resource those areas that are not available or are not practicable within the framework of the study. These include very small areas of forest, areas that are too remote from infrastructure to be economically viable, and areas not available due to reservation in various forms.

While this process has the potential to capture a significant proportion of the official reservations and removals, it cannot account for unofficial removals from the potential resource, such as the desire by a specific owner not to harvest their forest, but equally not to impose any form of formal reservation on that forest. There is a wide range of reasons for such a move, the majority of which are likely to be purely personal.

3.2 AREA RESTRICTION

The Forests Act (see Section 1.3.2) places a requirement on forest owners seeking a Sustainable Forest Management Plan or Permit to harvest no more than a prescribed volume (or percentage of the standing volume) of timber from the land within given timeframes. The volumes allowed by the Act are deliberately small to ensure that the timber potential of the forest is not diminished over time, nor are the ecological values denigrated.

The prescribed volume permitted to be harvested is calculated for each forest, and in broad terms is no more than the annual or periodic increment.

For the Ministry to approve a Plan or Permit, the owner or their agent is required to undertake some intensive inventory and planning work, which generally incurs significant cost. For this reason, and the fact that for most indigenous forest the standing volume of merchantable timber is not high, an arbitrary area restriction of 10 hectares has been incorporated in the analysis. It is considered that an area of 10 hectares or less would not justify the costs incurred in obtaining a Sustainable Forest Management Plan, and would not provide a meaningful volume of timber.

Thus blocks that have an area of less than 10 hectares have been excluded from the data analysis. However, as shown in Table 3.1, the area represented by these small blocks is in some regions a significant proportion of the total area of Māori owned indigenous forest, and thus collectively may support a significant indigenous timber volume. The total area included in these blocks is 47,371 hectares, as shown below.

Table 3.1 – Area Of Māori Owned Indigenous Forest on Land Holdings of Greater than 10 Hectares

Region	NthInd	AkInd	Wkto	BOP	Gisbn	H/Bay	Tnki	Mwtu/ Wang	Wgtn	Total
Total Area ha)	76,185	2808	120,802	193,771	93,347	99,405	3520	68,288	4163	662,289
Area of blocks < 10ha	6	351	9392	16,159	9652	4941	494	6149	497	47,641
% of total area in blocks 10ha	0	13	8	8	10	5	7	9	12	8
Area of forest on land holdings >10ha	76,179	2457	111,410	177,612	83,695	94,464	3026	62,139	3666	614,648

In addition to the simple economic and timber volume issues surrounding small blocks of land, there tend to be far more emotional and philosophical matters to deal with. People who have only a small area of forest are often far more inclined to seek its permanent preservation than to develop it as an economic asset, especially if the economics are at best marginal.

On the other hand, those owners with larger holdings are often more inclined to wish for some development of the asset to overcome the holding costs, and because in many cases this asset is a very significant part of their asset base. Larger blocks also have significant economies of scale when it comes to developing a Sustainable Forest Management Plan or Permit.

An arbitrary cut off of 10 hectares does create the situation where there could be several sub-ten hectare blocks which are contiguous but with different owners. The interrogation of the databases will have excluded each block as an individual ownership. The owners, however, may be happy for their several blocks to be treated as one for the purpose of developing a Sustainable Forest Management Plan, giving them the necessary economies of scale, and the necessary timber volume to justify developing a Plan.

The number of blocks where this situation occurs is not considered to be high. The implications to the overall outcomes of the study are not considered to be significant.

3.3 DISTANCE FROM ROADS

The second restriction placed on the data is the distance from infrastructure. In any consideration for developing an economic asset based on the extraction of timber, there is a need to consider the cost and means of physically extracting the wood from the growing site.

As with anything involving the economics of an activity, there is always change through time. What was economic once may not be now and vice versa. With indigenous timber extraction the economics have changed dramatically over the past 50 years, and that rate of change has accelerated over the past 3 years, as more accessible resources are no longer available.

In particular, the recent Government decision to end all harvest of indigenous timber from the Crown estate has dramatically changed the economic viability of many areas of forest. The Crown harvest (through Timberlands West Coast Limited) made up over half the native timber harvested in New Zealand in recent years. Its removal from the market in mid 2001 has seen a scramble by timber users and processors to obtain their resources from the non-Crown estates, with consequent rises in the value of the resource.

For the purpose of this study, a limit of 2km from the nearest road has been used. Thus any area of Māori land that supports indigenous forest, which is greater than 2km from a road, has been excluded from the study area.

The use of any figure for distance is open to debate and there is no blanket distance that can be defended in every circumstance. What is known however is that the economic haul distance (i.e. the extraction distance to a road) has been increasing over time. Further, whereas previously the haul distance was a measure of the over ground distance from stump to road, inclusive of topographical obstacles, the measure today is more commonly a map distance due to extraction by helicopter for most indigenous forest harvests.

The current environment would preclude haul distance of greater than 2km except for the most valuable of products. For example mature kauri may be able to tolerate haul distances of greater than 2km due to its value, however the volume available is so low as to make this very much the exception rather than the rule. At present a distance of up to 1km would be considered economic, with many operations working between 1 and 2km haul distance quite economically, provided the trees are of sufficiently good quality.

A distance of 2km has been used to allow for possible changes in the near future and to give some indication of the resource size that exists. For comparative purposes the area of forest within 5km of a road has also been extracted from the data. This provides some indication of the sensitivity of the distance parameter and an indication of what resource could become economically available in the future if the cost structure of the industry changes.

Table 3.2 – Breakdown of Forest Area that is Greater Than 10 Hectares and within 2km and 5km of the Nearest Road

Region	NthInd	Auck	Wkto	BOP	Gisbn	H/Bay	Tnki	Mwtu/ Wang	Wgtn	Total
Area of forest on land holdings >10ha	76,179	2457	111,410	177,612	83,695	94,464	3026	62,139	3666	614,648
Area within 2km of a road	65785	2424	95397	151,635	73,835	44,471	1954	34,109	2588	472,198
% of area within 2km of a road	86	99	86	85	88	47	65	55	71	77
Area within 5km of a road	68,053	2457	109,360	165,810	82,928	75,526	2151	47,974	3666	557,925
% of area within 5km of a road	89	100	98	93	99	80	71	77	100	91
Area between 2km and 5km of a road	2268	33	13,963	14,175	9093	31,055	197	13,865	1078	85,727

As can be seen from the table, for most regions a large percentage of the total estate is within 2km of a road and almost all the estate is within 5km of a road. It is considered that at this time and in the foreseeable future, any area beyond 5km is not an economic proposition.

What the data is not able to tell us is the condition of the road from which the distance has been measured.

In many areas roads that were built in the 1950s, '60s, '70s, and '80s to harvest timber from indigenous forests are now falling into disrepair or are no longer passable. Examples of these are common in the Urewera forests where large areas of Māori land were logged in the 1960s and 1970s. Access to these stands was developed for the harvesting operations at the time. Once the harvest was finished, the roads were in many cases no longer maintained, and many are now in a very poor state of repair.

Some of the access to these blocks of land crossed Crown land and access had to be negotiated. In recent times the management of these areas has transferred to the Department of Conservation. In some cases the Department has closed off the access in a reasonably permanent manner. Whether this can be reinstated would need to be examined on a case-by-case basis.

The issue and cost of access will have a significant bearing on the economic viability of some blocks and needs to be borne in mind. However, for a study of this nature it is not possible to determine what overall impact access could have.

3.4 NGA WHENUA RAHUI

Nga Whenua Rahui covenants were developed as a means of “preserving” significant indigenous ecosystems that existed on Māori land without a change of ownership or other difficulties.

The covenants operate in a similar manner to the QE2 Trust process that can be applied to any land in NZ. The land remains the property of the owner but with restrictions on what modifications the owner can make to the indigenous ecosystem being protected. In the case of Nga Whenua Rahui, the owners can also seek compensation for income forgone by implementing the protective covenant. For example if the land supports merchantable indigenous forest, the owners can be paid “compensation” for the value of the timber on the land that they would otherwise have been able to harvest. Generally the covenant has a “life” after which the owners can reconsider their options.

For the owners, the covenants offer significant benefits. The owners get to retain ownership of their trees and to derive some of the economic benefits that would have accrued from harvesting them. Further the risks associated with harvesting are forgone as the owners get a lump sum, up front payment. There is no risk of not being paid at harvest time, of not being able to extract the timber due to any number of reasons, of market downturns etc.

The covenants impact upon this study in that areas that have already been covenanted must be excluded from the potential area of merchantable forest on Māori land. In addition, forest that is already well advanced in the covenant process should be excluded at this time as being unlikely to be available.

For land under consideration for a covenant, considerable work will have been done to quantify the timber volumes available and the value of that timber on the land in order to negotiate the quantum of compensation. It also shows that the owners have considered the option of harvesting the timber. Should the negotiations for a covenant fail, there is a reasonable likelihood of the owners progressing an indigenous harvest plan themselves or in conjunction with a sawmiller or harvest operator. Thus the issue of indigenous forest on Māori land not being utilised as an economic asset is overcome.

Currently there are a small number of covenants in place where there is significant merchantable timber, although some of these have considerable timber resources and may, in terms of regional timber resources on Māori land, be important. In addition there are a small number of applications currently under negotiation, although again, some of these are significant in the context of the region they are situated in.

The majority of large covenants are in the eastern Bay of Plenty and in Gisborne. In addition there are a small number in Northland, Waikato and the Manawatu areas. These include the

Aorangi-Awarua Block (5000 hectares) in the northern Ruahine Range, although not all of this has merchantable forest cover.

In the eastern BOP and Gisborne areas over 30,000ha is covered by covenants.

A further 20,800 hectares is under negotiation, with the majority of this in the Gisborne Region.

The current reserved areas have been deducted from the potential harvestable resource figures, but the area under negotiation has been retained in the data, as there is no guarantee that they will ultimately be reserved.

3.5 FOREST TYPES

During the 1940s and 1950s, the New Zealand Forest Service undertook an extensive survey of the indigenous forests of New Zealand to primarily to determine their timber potential. This survey, known as the National Forest Survey (NFS), took 10 years to complete, but gave a very detailed picture of the timber resources the country had, and to the present day remains one of the most comprehensive surveys undertaken by any country in the world.

From the extensive network of plots put in around the country, a range of forest types (known as the NFS type) was developed. These were a description of the species present in that type from a perspective of their timber potential.

The Nicholls classification system used in this report (Appendix 1) was developed through the amalgamation of NFS forest types into a smaller number of classes with a brief description of each class. As Nicholls developed the maps to accompany his work, he updated the information to take into account areas that had been modified between the time of the NFS and the time he was producing his maps.

The Nicholls maps were published from the early 1970s through to the mid 1990s. Therefore the most recent maps are relatively up to date; however timber harvesting may have modified the forests shown on the earlier maps further.

3.6 FOREST AREA BY FOREST CLASS

Using the information outlined earlier in this report, Table 3.3 below shows the forest area in each region by Forest Class. These areas are those that are greater than 10 hectares in area and within 2km of a road.

Table 3.3 – Regional Māori Indigenous Forest Area by Forest Class

Region	NthInd	AkInd	Wkto	BOP	Gisbn	H/Bay	Tnki	Mwtu/ Wang	Wgtn	Total
Beeches	0	0	3548	950	295	11512	0	244	59	16608
General Hardwoods	269	820	11601	8491	618	6114	0	6231	91	34235
Highland Softwood	0	0	87		779	0	0	0	0	866
Beeches										
Highland and										5781
Steepland Softwood	0	0	1148	4087	127	111	308	0	0	
Beeches										
Rimu-general	0	0	1390	2004	602	5380	0	918	20	10314
hardwoods- Beeches										
Kauri Softwood	14792	429	8136	45	0	0	0	0	0	23402
Beeches										
Rimu General	217	0				0		101	295	613
Hardwoods										
Rimu-tawa	516	49	8395	8016	2468	413	386	3610	12	23865
Rimu Tariare Tawa	3833	107	0	0	0	0	0	0	0	3940
Rimu Matai	0	0	1897	11999	0	1564	0	1062	0	16522
Hardwoods										
Tawa Beeches	0	0	51	13833	3742	0	80	1137	0	18843
Rimu Tawa Beeches	0	0	0	52207	4945	436	669	4142	0	62399
Softwoods	0	0	225	55	0	266	0	30	0	576
Tawa	0	0	14025	22810	2110	169	292	4370	0	43776
Taraire Tawa	1182	0	84	0	0	0	0	0	0	1266
Others	22530	383	16405	18495	4851	5827	43	3295	95	71924
Scrub	22445	635	28409	8640	53297	12677	176	8968	2015	137262
Total	65785	2424	95397	151635	73835	44471	1954	34109	2588	472198

Notes:

- Some amalgamation of Nicholls' classes has occurred due to the very limited areas involved. For example Kauri-Softwoods-Hardwoods-Beeches has been included in the Kauri Softwood Hardwood class as there are only 14 hectares of the former on Māori land.
- Scrub is not a Nicholls class but has come from the LCBD work. This is a very significant area that in many cases will develop into high forest containing a range of merchantable species over the next 100 – 200 years. At present however it has no timber potential.
- The class defined as “other” has been identified in the LCBD as high forest, but had not been classified by Nicholls. A number of possibilities exist to explain this, including the possibility that as the forest is not on Crown land, permission to survey the forest during the NFS was withheld, or that the vegetation that is now forest was regenerating scrub when surveyed by the NFS. In the intervening period (of up to 50 years) the scrub has been succeeded and replaced by high forest species. These areas offer long term timber potential as many of the species present will be timber species, but they do not have any short-term timber potential. The evidence points towards the latter being the explanation for the majority of the area. Thus for the purposes of calculating timber potential it has been assumed that this area has no significant volume currently available.

An explanation of the various forest classes is given in Appendix 1.

3.6.1 Maps

Appendix 2 contains maps by Regional Council area of the forest on Māori land by forest class. These classes have been incorporated into the tables shown in 3.6 – 3.17.

One of the most significant classes (by area) shown on the maps is titled “undescribed”. This classification includes that shown in the tables as “scrub” and “other”.

Nicholls' work did not classify these areas, as discussed in Section 3.6. It has been the re-definition through the LCDB, which has allowed this classification to be further, subdivided within Table 3.3, using the definitions provided in Section 2.3. Both “scrub” and “other” are considered to have no potential for indigenous timber production in the foreseeable future, and as a result have not been refined further. It should however be noted that these two classes total as much area as the “productive” forest classes on Māori land. As such, they offer the potential for substantially increase the sustainable yield in the medium to long term, if the growing stock of timber species can be protected or even enhanced.

The Nicholls classes are reasonably broad and thus cover a wide range of smaller forest types. For some classes, there are large differences in the types that have been amalgamated. For example, “beech” covers everything from lower altitude, high volume stands of red and silver beech, to montane stands of silver and mountain beech that offer no potential for a sustained yield of timber.

These variations have been accounted for in the regional tables by lowering the weighted volume (m^3/ha) used to derive the standing volume.

As discussed in Section 3.4, a number of areas are either under Nga Whenua Rahui covenant, or are under consideration for covenanting. These have not been specifically identified on the maps, but the forest classes associated with them have been deducted in Table 3.4. Thus the total area shown in Table 3.3 includes all productive and non-productive areas greater than 10 hectares and within 2km of a road. Table 3.4 then removes areas known to have no timber potential, or to have been formally protected, leaving the productive forest class areas shown in the regional tables (Tables 3.5 – 3.11).

While the area shown on the maps is considered to be accurate, some of the forest classes shown for a given area may contain inaccuracies. Several reasons can exist for this including changes that have occurred since the mapping was last updated, and the inability of the scale of the maps to accommodate small areas of a different forest class.

Around the Bay of Plenty in particular there are a number of blocks that have been heavily cut for firewood in the very recent past and now contain little or no merchantable forest. In the Urewera there are a number of blocks that show on the maps as being rimu-matai-hardwood class, when in reality some parts of these blocks have had some of the softwood component removed and could more correctly be described as hardwood forest. In the overall scheme of things these changes are not major, but need to be considered.

3.7 PREVIOUS FOREST MODIFICATION

Throughout New Zealand many of the more accessible forests have been subject to various levels of timber extraction over the past century. Most of the forests logged in the early 1900s were later cleared for farming, but from the 1950s on, many forests were logged purely for their timber, and were not subsequently cleared and converted to farming. Much of this activity, ie harvesting merchantable species and leaving a residual forest, occurred on Māori land in the North Island

Other tenures of land (private and Crown especially) were commonly harvested and subsequently cleared for farming or converted to plantation species. During the 1970s and 1980s large areas of previously logged forest were re-logged and then cleared for other land uses. Significant areas of Māori land were treated in this manner also, but large areas continued to be left in their post harvest state.

Many forests have also been subject to multiple harvests through time. In these cases the tendency is for each return harvest to extract increasingly poorer quality trees and/or species, and to increasingly severely damage any natural regeneration present.

Māori owned forests have been treated in much the same manner, resulting in a wide range of forest “quality”, from unmodified to extremely heavily modified, due to several episodes of logging.

For a study such as this, it is important to be able to accurately reflect the level of modification the forest has undergone.

For many areas this has been done through the forest typing work completed by Nicholls. In particular, Nicholls developed several “new” forest types to reflect the impact of harvesting. For example, forest that had originally been classified as rimu-general-hardwood forest was reclassified as general hardwood forest due to the almost complete removal of the rimu (and sometimes some of the hardwood) component through logging.

The effect of this harvesting is to either reduce (or completely remove) the most valuable softwood component and in many cases diminish the residual hardwood value through damage to the remaining stems. Combined with these adverse effects, there is often the introduction of plant pests that can have an impact upon the regeneration capability of the forest. This harvesting, while destructive in the short term, does in many cases provide the sites necessary for the next crop of timber species to grow. These trees will take many decades to become part of the standing volume, but it is important to recognise that previous harvesting does not necessarily result in the permanent destruction of the forest.

For the purposes of this report, areas that have been heavily modified are considered to have no timber potential in the short to medium term.

In addition to harvesting there are also natural influences that have severely reduced the ability of a forest area to contribute a sustainable yield of timber. Some very good examples of this are the cyclone-damaged forests of the Urewera and East Cape areas. Cyclones in the 1980s (Bernie in 1983 and Bola in 1988) had considerable impact on the large trees that were present resulting in widespread wind throw and hence standing volume reduction. Where possible these effects have been recognised in the standing volumes calculated.

3.8 FOREST CLASSES WITH NO IMMEDIATE PRODUCTIVE POTENTIAL

From the table and the information in Appendix 1, several classes can be eliminated from further consideration, as they contain no merchantable timber at the present time. This is often due to past harvesting activity, and in many cases this land is supporting an actively regenerating forest cover, that given sufficient time and protection (from fire, clearing and pests) will once again become a forest capable of supporting a timber harvest.

The classes that can be removed from the study and the area they occupy on Māori land are shown in Table 3.4 below.

Table 3.4 Area of Indigenous Forest on Māori Land with No Current Productive Potential ⁽¹⁾

Region	NthInd	AkInd	Wkto	BOP	Gisbn	H/Bay	Tnki	Mwtu/ Wang	Wgtn	Total
General Hardwoods	269	820	11601	8491	618	6114	0	6231	91	34235
Highland Softwood Beeches	0	0	87	0	779	0	0	0	0	866
Scrub	22,445	635	28,409	8640	53,297	12,677	176	8968	2015	137262
Others	22,530	383	16,405	18,495	4851	5827	43	3295	95	71924
Nga Whenua Rahui etc ⁽²⁾	600	0	0	16,700 ⁽⁴⁾	3946	0	0	1728	0	22974
Total (without harvest potential)	45,844	1838	56,582	52,326	63,491	24,618	219	20,222	2201	267,261
Area Remaining with harvest potential ⁽³⁾	19,941	586	38,899	99,309	10,344	19,851	1735	13,887	387	204,939

Notes:

1. This is Māori land blocks greater than 10 hectares and within 2km of a road.
2. The area included in this value has been rounded due to the small number of covenants that exist and the relative ease of identifying which blocks they apply to. While many small areas exist, this study has focussed on the large areas only. Many of the covenants cover large areas of land, only some of which supports merchantable forest. Where possible the values included here are for the area of merchantable forest only, not the total area of the covenant.
3. The forest area contained in the table above represents the resource potentially available to support a sustained yield of timber and other forest benefits, with known non-productive and non-available areas deducted. Owners desire and attitudes to a sustained yield of timber have not been incorporated in these values.
4. A large area in the Bay of Plenty of around 2000 hectares has been under consideration for a covenant, but harvesting has recently started in the block so it has been excluded from the Nga Whenua Rahui figures and included in the total productive area available. As discussed in Section 3.12, a reduction in available volume has been made to allow for the harvest that is currently underway.

3.9 CURRENT PRODUCTIVE POTENTIAL ON MĀORI LAND

The section below considers what timber potential exists within this area of forest. The discussion has been divided into either individual regions or a grouping of two regions (where the area in those regions is not large).

It should be noted that the estimated merchantable volume per hectare is not high for most species. There are a large number of variables that must be accounted for within any estimation, and it is prudent to err on the side of caution. Factors that influence this estimation include:

- The Nicholls classes are broad classes and are not able to fully adjust for the natural variation that occurs over a forest area due to natural features. For example within most forest types it is normal for the vegetation in the gullies to be different to that existing on ridges. In much of the North Island it is common for gullies to have a range of scrub hardwoods and pungas, with few if any timber trees present. The total area represented in that class will include areas of low timber volumes, such as these gullies, which in turn will reduce the average volume per hectare over the entire class.
- In many areas there are site-specific issues that adversely impact on the potential of the forest to support a sustainable harvest of timber. These have been addressed in each regional discussion where they are known to exist.
- While best endeavours have been used to ensure the accuracy of the data, not all areas can be ground truthed. In a resource such as this there will be areas that have been harvested, but are still represented in the data as having a full complement of timber, when in reality they will have significantly lower volumes.

- The requirements of the FAA include the need to reserve some areas and to be confident that any yield from the forest is sustainable. Thus any approved Plan will tend towards the side of caution to ensure the forest is not being overexploited.
- Many of the trees that make up the forest are defective in terms of timber potential. Thus there can be a significant difference between the standing volume, and the merchantable volume. Clearly any proposal for harvesting must be based around the merchantable volume. Under the terms of any Plan approved through the FAA process, trees that are felled and subsequently found to be defective are still considered to be part of the volume allowed in the annual harvest.
- Some of the classes contain a range of species making up the canopy. A distinction between the volume of merchantable species and non-merchantable species is required. For example of the five beech species present in New Zealand two (red and silver) are considered as merchantable while two more (hard and black) have some potential as timber species, but are significantly more difficult to process. This issue is further compounded by the effect of altitude. A species such as silver beech growing at low altitude is considered as merchantable, but if growing at high altitude is generally of poor form and non-merchantable.

Given the factors above, the volumes provided in the following tables should generally represent a conservative estimate. In order for a Sustainable Forest Management Plan to be approved for any given area of indigenous forest, the FAA requires a detailed inventory of the timber present in the forest, and forest-specific calculations of the yield that forest can sustain. This study cannot in any way replace that requirement.

3.10 NORTHLAND AND AUCKLAND

Table 3.5 below provides an estimation of the volume of timber currently standing on Māori land in the Northland and Auckland Regions as a combined total. It should be noted that the Auckland Region is only a minor contributor to the total.

Table 3.5 – Estimation of Volume of Timber on Māori Land in Northland & Auckland Region

Forest Class	Area (hectares)	Estimated Timber Volume Range (m ³ /ha)	Weighted Volume (m ³ /ha)	Estimated Volume (m ³)
Kauri-softwood-hardwoods	14,921	0-95	35	522,235
Rimu-general hardwoods	217	0-60	30	6,510
Rimu-tawa	565	30-80	50	28,250
Rimu-taraire-tawa	3,640	30-80	50	182,000
Taraire-tawa	1,182	0-60	25	29,550
Total	20,525			768,545

A significant proportion of the Auckland Region resource is located on Great Barrier Island. This may pose some particular issues should a proposal to develop a management system be contemplated.

As can be seen from the table the major forest class contains some kauri. A significant proportion of this is likely to be second growth kauri that does not have the same properties as the old growth with which most people are familiar. In particular, these trees do not contain the heartwood of the old trees. As such they do not command the price premium associated with old growth kauri.

3.11 WAIKATO

Table 3.6 below provides an estimation of the volume of timber currently standing on Māori land in the Waikato Region, along with a discussion of some important issues that could impact upon the size of the resource.

Table 3.6 – Estimation of the Volume of Timber on Māori Land in the Waikato Region

Forest Class	Area (hectares)	Estimated Timber Volume Range (m ³ /ha)	Weighted Volume (m ³ /ha)	Estimated Volume (m ³)	
Beeches	3548	0-100	55	195,140	<i>Note 1</i>
Highland & Steepland Softwood Beeches	1148	0-50	15	17,220	
Rimu-general hardwoods-Beeches	1390	40-150	75	104,250	<i>Note 1</i>
Kauri Softwood Beeches	8136	0-90	50	406,800	
Rimu-tawa	8395	50-150	75	629,625	
Rimu Matai Hardwoods	1897	20-200	30	56,910	
Tawa Beeches	51	40-100	50	2,550	
Softwoods	225	50-350	100	22,500	
Tawa	14025	0-100	35	490,875	
Taraire Tawa	84	0-100	40	3,360	
Total	38,899			1,929,230	

Note:

1. Much of the land that supports these classes is associated with the Lake Taupo Forest Trust (LTFT), which also has extensive involvement in plantation forestry. At present it is considering the potential offered by seeking Forest Stewardship Council (FSC) certification of its forest assets. While the majority of this process will focus on whether the Trust is sustainably managing its plantation forests, part of the Certification process will consider what, if any, impact its activities have on any indigenous resource it also has. The FSC process does not preclude the management of indigenous forests *per se*, but if the majority of the asset is plantation, FSC are likely to look unfavourably on any proposal to also harvest timber from the indigenous estate. FSC would prefer to see the indigenous part of the estate protected. The LTFT have thus indicated that it may not wish to consider sustained yield proposals for these indigenous forests at the present time.

In view of these comments, it is deemed prudent to reduce the potential volume available by the amount standing on this land. Thus a reduction of 300,000m³ from the total volume would bring the available volume to 1,629,230 m³.

3.12 BAY OF PLENTY

The Bay of Plenty Region contains the largest area of Māori land that continues to support indigenous forest. Table 3.7 below provides an estimation of the volume of timber currently standing on Māori land within the region.

Table 3.7 – Estimation of the Volume of Timber on Māori Land in the Bay of Plenty

Forest Class	Area (hectares)	Estimated Timber Volume Range (m ³ /ha)	Weighted Volume (m ³ /ha)	Estimated Volume (m ³)	
Beeches	950	0-150	30	28500	<i>Note 1</i>
Highland & Steepland Softwood Beeches	4087	0-150	25	102,175	
Rimu-general hardwoods-Beeches	2004	10-200	35	70,140	<i>Note 2</i>
Kauri Softwood Beeches	45	0-100	30	1350	
Rimu-tawa	8016	50-150	70	561,120	<i>Note 3</i>
Rimu Matai Hardwoods	11999	20-200	60	719,940	
Tawa Beeches	8833	40-100	50	441,650	
Rimu Tawa Beeches	40507	30-150	55	2,227,885	<i>Note 3</i>
Softwoods	55	50-350	100	5500	
Tawa	22810	0-100	30	684,300	<i>Note 3</i>
Total	99,306			4,842,560	

Notes:

1. Much of the region's beech forest is in the East Cape area, which suffered significant damage from Cyclone Bola in 1988. Many ridges had the majority of their forest cover destroyed during this event. In addition much of the remaining beech resource is of reasonably low quality from a timber perspective. Thus the standing merchantable volume is not high.
2. The beech component of much of this resource is hard beech. This species has traditionally been very difficult to successfully saw and dry. As there is a significant hard beech resource throughout NZ, work on resolving this issue is continuing with good prospects of the species becoming suitable for processing. In the meantime however, the volumes have been lowered to reflect the lack of markets for this species.
3. Harvesting of a significant Māori owned block of around 2000 hectares has been occurring in the Tauranga area under a Sustainable Forest Management Permit. This area had also been under consideration for a Nga Whenua Rahui Covenant. Either of these events effectively restricts any future volume of timber that can be harvested from the land. As a result it is deemed prudent to reduce the volume available by an amount to reflect the size of this area. The volume involved is estimated to be 66,000m³, which, for simplicity is spread over the rimu-tawa, rimu-tawa-beech, and tawa forest classes. This leaves a volume for the Region of 4,776,560 cubic metres.
4. Appendix One has details of the forest classes and photos of some for the common classes found in the Bay of Plenty area.

3.13 GISBORNE

Extensive land clearing activity in the early 1900s has seen the forest cover in the Gisborne Region dramatically reduced and this is reflected in the area of indigenous forest remaining on Māori land. Table 3.8 below provides an estimation of the volume of timber currently standing on Māori land in the Region.

Table 3.8 – Estimation of the Volume of Timber on Māori Land in the Gisborne Region

Forest Class	Area (hectares)	Estimated Timber Volume Range (m ³ /ha)	Weighted Volume (m ³ /ha)	Estimate d Volume (m ³)	
Beeches	295	0-100	30	8850	
Highland & Steepland Softwood Beeches	127	0-50	10	1270	
Rimu-general hardwoods -Beeches	0	30-100	0		<i>Note 1</i>
Rimu-tawa	1234	40-120	70	86,380	<i>Note 2</i>
Tawa Beeches	3742	20-70	20	74,840	<i>Note 3</i>
Rimu Tawa Beeches	4945	20-100	50	247,250	<i>Note 3</i>
Tawa	0	0-70	0		<i>Note 1</i>
Total	10,343			418,590	

Notes:

1. Areas of these forest classes are found within the area under consideration, but a significant proportion are currently within Nga Whenua Rahui Covenants and have therefore been deducted from the potential volume available for harvest.
2. Approximately half the area of this forest class is within Nga Whenua Rahui Covenants and has therefore been deducted from the potential volume available for harvest.
3. Much of this forest class contains hard beech, which as discussed elsewhere in the report, has limited current potential for management due to processing difficulties. This could change with improved technology.
4. An additional area that contains significant timber volume is currently under consideration for either a covenant or a Sustainable Forest Management Plan.

3.14 HAWKES BAY

Table 3.9 below provides an estimation of the volume of timber currently standing on Māori land in the Hawkes Bay Region.

Table 3.9 – Estimation of the Volume of Timber on Māori Land in the Hawkes Bay

Forest Class	Area (hectares)	Estimated Timber Volume Range (m ³ /ha)	Weighted Volume (m ³ /ha)	Estimated Volume (m ³)	
Beeches	11,512	0-300	25	287,800	<i>Note 1</i>
Highland & Steepland Softwood Beeches	111	0-80	5	555	<i>Note 2</i>
Rimu-general hardwoods- Beeches	5380	10-150	45	242,100	
Rimu-tawa	413	50-150	60	24,780	
Rimu Matai Hardwoods	1564	20-200	55	86,020	
Rimu Tawa Beeches	436	30-130	60	26,160	
Softwoods	266	50-250	100	26,600	
Tawa	169	0-80	30	5070	
Total	19,851			699,085	

Notes:

1. A significant proportion of the Hawkes Bay beech resource is higher altitude forest containing varying percentages of mountain beech. Thus the average volume per hectare has been adjusted to reflect this. By comparison, much of Maungataniwha Forest in Hawkes Bay carries a standing volume of over 200m³ per hectare. This is considered to be some of the best beech forest in Hawkes Bay. This volume is considerably higher than the values used in the calculations in the table, but these levels of reductions are justified to ensure that these estimates are conservative.
2. Most of the highland and steep-land softwood-hardwood class is at higher altitudes and thus contains few, if any, merchantable trees per hectare.

3.15 MANAWATU-WANGANUI

Table 3.10 below provides an estimation of the volume of timber currently standing on Māori land in the Manawatu-Wanganui Region. Much of this resource is in the upper Wanganui River-Taumaranui area

Table 3.10 – Estimation of Volume of Timber on Māori Land in Manawatu-Wanganui Region

Forest Class	Area (hectares)	Estimated Timber Volume Range (m ³ /ha)	Weighted Volume (m ³ /ha)	Estimated Volume (m ³)	
Beeches	244	0-200	60	14640	
Highland & Steepland Softwood Beeches	0	0-50	0	0	<i>Note 1</i>
Rimu-general hardwoods- Beeches	0	20-100	0	0	<i>Note 1</i>
Rimu-tawa	3610	40-130	60	216600	
Rimu Matai Hardwoods	354	20-200	45	15930	<i>Note 2</i>
Tawa Beeches	1137	0-100	20	22740	
Rimu Tawa Beeches	4142	30-120	45	186390	<i>Note 3</i>
Softwoods	30	50-300	100	3000	
Tawa	4370	0-80	30	131100	
Total	13887			590400	

Notes:

1. No area is included for these classes as the majority of the class is contained within a Nga Whenua Rahui Covenant and is thus currently precluded from harvest.
2. A significant reduction in the area of this class has been applied to account for Nga Whenua Rahui Covenants.
3. The species of beech found within this class is predominantly black, which has limited current merchantable value. Thus no volume has been attributed to beech within the class. There will in fact be pockets of beech of merchantable species within the region, but they make up a small part of the total resource.

3.16 TARANAKI AND WELLINGTON

Table 3.11 below provides an estimation of the volume of timber currently standing on Māori land in the Taranaki and Wellington Regions combined. These two regions have been combined primarily due to the small area of Māori land that supports indigenous forest within each region.

Table 3.11 – Estimation of Volume of Timber on Māori Land in Taranaki & Wellington Regions

Forest Class	Area (hectares)	Estimated Timber Volume Range (m³/ha)	Weighted Volume (m³/ha)	Estimated Volume (m³)	
Beeches	59	0-200	0	0	
Highland & Steepland Softwood Beeches	308	0-75	35	10780	
Rimu-general hardwoods- Beeches	20	10-200	30	600	
Rimu general hardwoods	295	10-100	30	8850	
Rimu-tawa	398	40-140	50	19900	
Tawa Beeches	80	0-100	20	1600	
Rimu Tawa Beeches	669	20-120	50	33450	<i>Note 1</i>
Tawa	292	0-80	30	7300	
Total	21			82,480	

Note:

1. The major beech species in this class is hard beech, which presently is not considered merchantable. As a result no volume has been attributed to the beech component of this class.

3.17 SUMMARY OF STANDING VOLUME ESTIMATES

Table 3.12 below shows the area of indigenous forest on Māori land that has a productive potential and is not currently constrained by reserves, to be about 204,000 hectares. The forest estate has a conservative standing volume of over 9 million cubic metres.

Table 3.12 – Estimation of the Volume of Timber on Māori Land by Region

Region	Area (hectares)	Estimated Volume (m³)
Northland and Auckland	20525	768,545
Waikato	38899	1,629,230
Bay of Plenty	99306	4,776,560
Gisborne	10343	418,590
Hawkes Bay	19851	699,085
Manawatu-Wanganui	13887	590,440
Taranaki and Wellington	2121	82,480
Total	204,932	8,964,930

Table 3.12 above shows the area of indigenous forest on Māori land that has a productive potential and is not currently constrained by reserves or similar issues to be about 204,000 hectares. This forest estate has a conservative standing volume of about 9 million cubic metres.

Another way of looking at the resource is by forest class. This is useful when considerations of growth and the class of forest that is available. Table 3.13 below provides a summary by forest class.

Table 3.13 – Summary of Forest Area on Māori Land by Forest Class

Forest Class	Area (hectares)	Estimated Timber Volume Range (m ³ /ha)	Volume Range Used (m ³ /ha)	Estimated Volume (m ³)	
Beeches	16608	0-300	25 – 60	339790	Note 1
Highland & Steepland Softwood Beeches	5781	0-150	0-35	132000	
Rimu-general hardwoods	512	0-100	30	15360	
Rimu-general hardwoods- Beeches	8794	10-200	0-75	312840	
					Note 1
Rimu-tawa	22613	40-130	60	1544655	Note 1
Rimu Matai Hardwoods	15814	20-200	45	938795	
Tawa Beeches	13843	0-100	20	543380	
Rimu Tawa Beeches	50699	30-120	45	2699135	Note 1
Softwoods	576	50-300	100	57600	
Tawa	41666	0-80	30	1480820	Note 1
Kauri softwoods Hardwoods	23102	0-100	30-50	930385	
Taraire tawa	1266	0-100	30-40	32910	
Rimu taraire tawa	3640	30-80	50	182000	
Total	204914			9209670	

Note:

1. The volumes shown in this table have been adjusted to allow for areas that are not formally reserved, but at this stage appear unlikely to be available for management due to other considerations such as FSC requirements as discussed in Sections 3.11 and 5.3.2.

While this resource is spread over a large number of owners and over a wide geographical area, it nevertheless is a very significant asset, which even at minimal stumpages has a very considerable value in economic terms as discussed in Section 4.7.1.

A forest estate of this magnitude also has a very significant ecological value that can be protected and enhanced provided correct management is applied. The process of developing and implementing a Sustainable Forest Management Plan can be a major step towards ensuring that the asset is valued for both its economic and ecological worth.

3.18 FOREST HEALTH

Any analysis of the potential for a forest to yield a sustainable harvest of timber needs to examine the health of the existing forest resource. This report is only able to comment on the health of Māori owned forests in a very generic manner. It will become more important as any work progresses towards developing proposals for a specific forest area, to examine in detail the health of the forest resource, and to consider what, if any, action is required to improve the health of the forest.

In this sense it is necessary to elevate the discussion above the health of single trees and to consider the health of the total ecosystem, inclusive of the trees. Further when considering the tree component of the forest, this must be inclusive of all levels within the forest and of all species, not just those that contribute to the timber potential. The requirement of the FAA is the long-term sustainability of the forest as a viable ecosystem, capable of *inter alia*, a harvest of timber in perpetuity.

Without the entire ecosystem being healthy and viable there can be no permanent sustained yield of timber and other forest product from the forest. Bearing this in mind however, it is important to remember that a forest being managed to provide a sustained timber yield will be manipulated to favour the timber species. Provided the scale of forest management activity is within the ability of the forest to recover, a subtle change of species composition over a period covering decades or even centuries is unlikely to be interpreted as being unsustainable.

As discussed above this is an issue to address on a case-by-case basis when developing Sustainable Forest Management Plans.

What is required for this report is to consider what macro issues exist that could adversely affect the ability of Māori owned forests to produce a sustained yield of timber.

The current environment existing within the indigenous estate in NZ (both private and State) can at best be described as perilous and at worst approaching a disaster. The impact introduced pests (plant and animal) have had on the forests has been enormous and largely continues unchecked. There are obvious signs such as the decline in some bird species (due to predation and competition for resources) and general poor health of canopy trees due to possum browse in particular in many areas. What is less obvious is the long-term effect of these changes on the ability of the ecosystem to sustain itself whether there is a harvest of timber or not. These issues may well be compounded if the threat of global warming and other macro influences come to pass.

On the positive side of the ledger, the management of many of the larger animal pests and of invasive plant pests in areas under Sustainable Forest Management Plans will support the forest ecosystems inherent ability to sustain itself.

In many cases the extraction of small volumes of timber have resulted in a more diverse range of indigenous species within the forest and thus a wider range of habitats for other flora and fauna.

Studies in old growth forest in Whirinaki showed the number of bird species present increased after small volumes of timber were harvested due to the increase in habitats and food sources available. In particular, the presence of many seral plant species was advantageous to bird species that relied on the additional food sources that these seral species provided.

Significant areas of Māori owned forest have been harvested in the past and these forests will require additional resources to manage plant pests that are already established and to assist the development of timber species in the regenerating forest. In the past there was generally little care taken to ensure weed pests were not brought into a forest on machinery or in road metal. Thus species like gorse and broom have become established in many areas of natural forest.

It is clear that throughout NZ there is a need to focus on improving the health of indigenous forests and in particular managing the introduced pests. The implementation of a Sustainable Forest Management Plan within a forest is likely to be an important step in providing the owners with an incentive to achieve this.

Many of these forests have also suffered significant changes to their wind profile and in some areas this is having an adverse effect on the residual forest. Tawa in particular can suffer from significant dieback within the canopy due to greater exposure to wind and possibly frost.

There is little that can be done to alter this situation in forests that have been previously harvested apart from monitoring the health of the residual stand, and if harvesting is to continue on a sustainable basis, to attempt to preferentially harvest those trees that are most severely affected. By preferentially harvesting trees that are in poor health the overall stand should become more resilient through time. The planning of any management operations should also be completed with these problems in mind and means of mitigating them sought.

Within beech forests a significant forest health issue is the impact of pinhole borer. These are naturally occurring insects throughout most of our beech forests but appear to be more prevalent in the South Island. These borer feed on dead wood within the forest. Following any harvest operation there is an increase in the amount of wood (ie food) within the forest, which allows the borer population to expand. Following such a population expansion there is a strong possibility of the insects turning their feeding attention to the residual live trees. While such an attack is unlikely to kill the trees, it can severely degrade the value of the timber from these trees.

The message here is that very good forest hygiene is required if there is to be any sustainable harvest of timber from beech forests. There is also a strong likelihood that any Māori owned beech forest that has a previous history of harvest may have already suffered some attack from pinhole. This needs to be checked within the forest as part of the process of developing a Sustainable Forest Management Plan.

3.19 RECOVERABLE VOLUMES

The potential of any forest land to support a sustainable harvest of indigenous timber ultimately comes down to the volume of merchantable timber currently standing on the land, which is both available (ie not protected) and within certain economic constraints, and the ability of that forest to replace the volume removed by harvesting.

For many areas of Māori land, a proportion of the potential volume has already been removed during previous harvesting activity. The effect this has on the ability of a given forest to produce a sustainable harvest needs to be considered on a case-by-case basis. In the big picture though there are some regional and forest class differences.

In the north, the kauri forests were in general harvested quite early (eg in the late 19th and early 20th century), and have thus had time to regenerate to a significant extent. For the rimu forests of the central North Island, the harvesting was more recent and thus the recovery of the forest is not as advanced. In addition, for some of these latter forests the forest class has changed as a result of the removal of the softwood component.

It is against this background of forest modification that we must consider the ability of the remaining forests to support a sustained harvest of timber.

The ability of the forest to produce a harvest is influenced by the current basal area status of the forest and the diameter distribution of the trees present. For the second growth kauri stands in Northland, they will be producing a lot of increment, but much of this will be too small in diameter to give an immediate harvest. As the trees grow into larger diameters, the opportunity to extract a sustainable harvest will improve.

For the more recently harvested rimu-tawa stands found in the Bay of Plenty, the ability of the forest to produce a harvest is a lot more dependent on the residual old growth trees. Any regeneration that is present will in many cases be too small at this stage to contribute much to the standing volume.

When examining the literature for studies of growth rates for indigenous species most studies consider the ability of an individual species to grow, rather than how that species reacts in a mixture of species as is commonly found in a forest. The table below shows the growth rates exhibited by some of the species studied as pure stands.

Table 3.14 – Growth Rates in Pure Stands

Species	Rotation length (years)	Increment (m ³ /ha/yr)
Kauri	150	5 –12 (or more on some sites)
Rimu*	200	1 - 2
Totara	100 -150	1 –8 (or more in plantations)
Tawa	200	0.5 - 1
Beech - Red	60 - 80	6 - 9
Beech - Silver	80 - 100	4 - 7

- This is for North Island rimu, not West Coast terrace rimu.

In a natural forest it is unusual to have pure stands with the exception of the beech species. More commonly the forest is made up of a range of species that interact with each other to give a variety of growth rates.

The forests under consideration in this report cover the full range of classes over a very wide range of sites. Very significant areas are of beech species that has had little or no modification and are able to achieve higher growth rates than the rimu – tawa forest and associated forest classes. In addition the kauri stands are also able to add increment at a very good rate. Against this must be offset the areas where the forest has little or no growth potential in the foreseeable future due to either environmental factors or to past exploitation.

As suggested in the book “Indigenous Forestry - Sustainable Management” by the Ministry of Forestry and the farm Forestry Association, it is wise to err on the side of caution when calculating what the sustainable harvest of a natural forest might be. It is relatively easy to increase the harvest level in the future if the early estimates are low. On the other hand, if the early cut has been too high, decreasing the cut can be far more difficult if there are now markets and businesses reliant on the supply.

Newton in his address to the “Māori and the Business of Forestry Conference 1998” suggested a “safe sustainably harvestable annual increment is in the range of 0.5 – 1.5 m³ per hectare per annum”. Given the diversity of forest classes present on Māori land and the highly variable history of harvesting they have been subjected to it would indeed be wise to be cautious when estimating the potential for these forest to provide a sustained yield.

It would take a considerable research effort to quantify the increment of these forests with any degree of confidence. This level of research would be better directed at individual forests once the owners had decided they wish to consider the potential of developing a Sustainable Forest Management Plan.

For the purposes of this study it is useful to gain an appreciation of the magnitude of sustainable yield over the estate. To achieve this it is necessary to make assumptions about the increment that the forests can produce. From the data provided above a conservative increment allowance of 0.35m³/ha/year has been used. This is based upon 75 percent of the lower end of Newton’s values and is well under the ranges of values provided for single species stands.

It must be recognised that the different forest classes have different increment potential. For example the kauri stands in Northland may well have increments of 2 – 5 m³/ha/year and the beech stands could also achieve levels approaching this. Conversely the rimu-tawa stands may well be below that 0.5m³/ha/year level and in some cases may have no increment at all. (In severe cases or in over-mature stands there may even be decrement of total volume). The

rimu-tawa forests and the pure tawa forests where the rimu has been removed make up a significant percentage of the total forest area and thus have a commensurate effect on the weighted average increment that can be produced. Stands that have been subjected to earlier harvests are likely to be supporting basal areas below the “carrying capacity” of the site. This can offer the opportunity for the site to add higher levels of increment if there are sufficient stems. Conversely if the early logging has been intense, there may be insufficient stems to fully utilise the growth potential and thus increasing basal area is reliant upon regeneration.

Table 3.15 below provides an indication of the increment that could be potentially available for harvest from Māori owned indigenous forests, based upon an increment of 0.35m³/ha/year. The table also provides some indication of the sensitivity of these figures.

Table 3.15 – Estimation of Annual Increment produced by Indigenous Forests on Māori Land (204,000 hectares)

Increment (m ³ /ha/year)	Theoretical Harvestable Volume (m ³ /year)
0.2	40,800
0.35	71,700
0.5	102,425
0.75	153,000
1.0	204,800

It can be seen from the table that the annual increment produced within a forest has a very large impact upon the total available resource. It should also be noted that the annual increment is in effect the volume that can be harvested in perpetuity with no loss of standing volume in the forest. For these forests, the extent of regeneration occurring and the fact that the basal area is below that the site is able to support (due to earlier harvests), it is likely that not all the annual increment can be harvested. This is due to some of the increment being on trees that are not large enough to be considered merchantable. It is therefore reasonable to assume the total annual increment could increase through time as more of the standing volume is within the merchantable size classes.

This is a strong incentive for the forest manager to optimise their management in ensuring the health and vigour of the forest. As the table shows a very small increase in the annual increment can give significant gains in available volume over an estate.

3.20 REGENERATION POTENTIAL

The major requirements of the FAA are threefold. Firstly there is the matter of how much timber can be removed from the forest; secondly there is the requirement to ensure the ecological values of the forest are not lost or unduly compromised; and thirdly the Act requires the forest manager to ensure there is adequate regeneration of the species removed through harvest to replace the volume removed.

The regeneration issue can be addressed primarily in two ways. In some forests there is significant natural regeneration of the timber species that is able to replace the removed trees. In other forests there is little or no advanced regeneration present at the time of harvest. In these forests, the manager must take action to replace the harvested trees, either through encouraging natural regeneration, or by artificial means such as planting seedlings.

There can be many reasons for the lack of natural advanced regeneration in these forests. The most common reasons are outlined below:

- The activity of introduced animals such as deer and possums feeding on the seedlings as they grow, generally resulting in the development of an under storey consisting of unpalatable species.
- Rats and mice that eat the seed as it falls thus preventing the development of regeneration.
- The ecological and environmental conditions being such that they prevent the development of regeneration of the timber species. This often results in a change of forest type through time, from a forest dominated by one species to a forest dominated by another species. A good example of this is found in the dense podocarp stands in the Whirinaki area where there is little regeneration of podocarp species within the existing forest, but instead an under storey of hardwoods is developing. Through time the forest will change from a podocarp forest to a hardwood forest.

Given the requirements of the FAA to ensure regeneration, the pre-harvest status of the regeneration and the factors that impact upon this become very significant to the manager. Clearly there is a significant cost associated with the artificial establishment and management of seedlings, but even in forests where natural regeneration is present there remains a need to control and manage introduced animal populations and weed pests.

The development of a Sustainable Forest Management Plan should include a determination of what regeneration is present, how this can be managed, and how additional natural regeneration can be encouraged. In addition the question of what changes to management techniques are required to support the growth of timber species and what if any supplementary planting will be required will also need to be addressed.

The Act also prescribes the size of any coupes that are to be used during harvesting. For the softwoods and kauri only single trees (or very small groups of trees) can be removed during a felling cycle. No further harvest can occur adjacent to this site until the site has recovered from the harvest and the next crop of trees is established.

For beech, small coupes (preferably no bigger than 0.2 ha, but legally up to 0.5 ha) are permitted. This recognises the significant response of the beech species to openings in the canopy and subsequent increased light levels. In this situation all trees within the coupe are likely to be removed in a single harvest. As with the softwoods no further harvest in the immediately adjacent forest is permitted until the coupe has been successfully regenerated. For the forest owner wishing to harvest using small coupes, it is essential that regeneration of harvested areas occur as quickly as possible. If this does not happen future harvests will become severely constrained.

For light sensitive hardwoods (such as tawa), harvest is only permitted by means of single trees or very small groups in a similar way to the softwoods.

For all harvests, low impact harvesting is required to minimise the impact upon the residual forest, and to enhance the ability of the forest to recover.

While all this may seem to be very prescriptive, without a focus on the long-term replacement of the trees harvested, the forest cannot be sustained and therefore the Plan cannot be supported or approved.

It is in these technical areas that any owner contemplating the development of their natural timber resource is most likely to require professional assistance.

4. Economic Opportunities

This section of the study examines the potential for the development of economic opportunities around the existing natural timber resource standing on Māori land.

4.1 METHODOLOGY

While the first parts of this study are based upon data that has been captured and analysed, as we move into this part of the study there is a need for a greater number of assumptions. As many of these assumptions revolve around human behaviour, there is a need to recognise that they represent a possible outcome from a given set of circumstances, but by no means do they represent the only outcome for those circumstances.

The process used in this section has been to take some “average” situations and use these as a model for developing the potential outcomes. Where appropriate, some discussion of the sensitivity of these “averages” is given.

In any venture based on the management of indigenous forests, there are a wide range of potential employment opportunities, including the development and implementation of plans, the actual harvest and extraction operations, and ongoing forest management. The next phase of the operation could include sawing the timber, drying and marketing or even development of further value adding in the form of manufacture of finished products. These issues are discussed below.

4.2 OPTIONS FOR SUSTAINABLE FOREST MANAGEMENT

Should the owners of an area of indigenous forest decide that they wish to pursue sustainable forest management, a number of options are open to them. These include the following as broad scenarios that are seen as the most likely options. It is always possible however that some other combination is developed that is not listed here.

- 1) The owners’ sign over the opportunity to develop a Plan to another party and simply receive a royalty for the timber recovered. This has the least cost and risk to the owners, and is likely to produce the lowest return to the owners. The owners have no need to source capital or skills to make it happen. It is also the option that is least likely to lead to long-term employment opportunities or availability of resource to the owners should they wish to develop value added processing. The most likely scenario is that an existing miller would buy the rights to the wood to keep a supply available to an existing mill.
- 2) The owners take full responsibility for developing and implementing the Sustainable Forest Management Plan. This way they retain total control over the resource and the employment opportunities associated with the project. This option requires the owners to source both the capital required and the skills to get the Plan in place and to then begin managing the forest. It is thus the course of highest risk and greatest difficulty from the owner’s perspective, but also offers the best potential for returns. The owners must also ensure they have a sound Business Plan in place before proceeding too far with the forest management plan.
- 3) The owners develop a joint venture (JV) arrangement with either a sawmiller or other outside party. The owners put in both the forest resource and a range of other inputs (such as the labour required to develop and implement the Plan) while the JV partner puts in the capital (and possibly the professional skills required to get the Plan approved). This has the advantage for the owners of ensuring a market for the timber produced while at the

same time giving them a greater level of control over what is happening to their forest, and a greater share of the returns.

The majority of the discussion that follows looks at the second option – where the owners take full responsibility for the project. There are several reasons for this, including the observation that if Government were to consider involvement in any process to facilitate the development of Sustainable Forest Management Plans on Māori land, they would almost certainly require the maximum benefit to be delivered to the owners rather than to some already established business.

As discussed further in Section 5 below, there already exists among some owners a significant level of mistrust of sawmillers and of various JV arrangements.

4.3 HARVESTING AND FOREST MANAGEMENT.

4.3.1 Business Planning

Prior to proceeding very far with the development of a Sustainable Forest Management Plan, it is important that the business case be carefully examined. It is outside the brief of this report to explore this issue in depth, but it would be remiss if it were not mentioned.

The owners of any forest area must be sure of their objectives when setting out to manage their forest assets. This applies equally to planted or natural forests. If the objective includes deriving an economic return from the asset, then the business case must be explored thoroughly and honestly. If this research shows the case is not compelling then some hard decisions are required which may mean the venture does not proceed.

For owners of natural forest on Māori land, there are a number of avenues that can assist with this process, and these should be explored.

4.3.2 Forest Planning

The development of a Sustainable Forest Management Plan for native forest harvest requires considerable planning and management. Included within this is the need for inventory work to determine the standing volumes present within the forest, whether there are areas of significance (such as archaeological sites, rare or endangered flora or fauna, significant landscape issues, wahi tapu etc) how any harvest will occur, what the impact of that harvest might be on the residual forest, the volumes that the forest can sustain (including the assessment of increment and recruitment into the growing stock), and how regeneration will be managed.

Often this requires some professional assistance, although there is no reason why the owners of the forest cannot be involved, and assist or even complete the work required. If they are to become involved they may wish to undertake some training in relevant fields to ensure that the Plans produced are sufficiently robust as to meet the requirements of the Act and MAF as the administrators of the Act.

The development of the Sustainable Forest Management Plan is a one off activity, in that once in place it does not have to be redone. It does require updating and monitoring. What is required however, is the production of an annual Harvest Plan for the approval of MAF, and the preparation of periodic reports updating progress in the forest.

It is reasonable to assume that given the technical nature of this planning work, outside professionals will be used to assist with, if not complete the entire process. This is discussed

elsewhere in terms of how Government might be able to assist this process, for example in a manner similar to the Northland Project.

4.3.3 Harvesting

Once the Sustainable Forest Management Plan has been approved and the Annual Plan filed, the work of selecting and preparing trees for extraction can begin. This involves considerable skilled labour input within the forest. Trees must be selected according to the predetermined criteria, felled to minimise damage to the residual forest, and prepared for extraction. In addition, the slash created (such as the heads and branches for the trees) will generally require some treatment to ensure rapid decay and regeneration of the replacement trees.

The method of extraction can have a very significant impact on the labour input required. In general, extraction is either labour or capital intensive. The extremes are flitching of logs with chainsaws into pieces able to be manhandled from the forest, through to the use of heavy-lift helicopters where the whole tree is extracted to a road in one or two pieces. The manhandling option is very labour intensive and is only appropriate for very small volumes close to roads, while the heavy-lift helicopter is most suited to operations where large volumes are to be extracted in a single lift generally some distance from a road (say 0.5-2km). Heavy-lift helicopters are extremely expensive to locate and operate (\$3000 plus/hour) and therefore require large volumes to spread the cost over.

For many of the forest areas under consideration in this study, the optimum solution may be somewhere between the two. For example this may require the flitching in situ of logs into pieces that a smaller helicopter can extract to a road. This involves a lot more labour than a heavy-lift, the hourly rate for the smaller helicopter is much lower, and as these smaller helicopters are far more common, the location costs for the machine are reduced. A further advantage of this type of approach is that the wood flow can be much smoother than the very lumpy flow achieved with a heavy lift approach.

The skill sets required for this part of the operation include very skilled “bushmen” confident in working in very variable indigenous timber, sound planning skills, tree selection skills, and mensuration (measurement) skills to ensure the volumes removed are correct and load sizes for extraction do not exceed the safe limits for the machinery.

4.3.4 Forest Management

Following the harvest operation, a range of other activities is required. Of particular importance here is the need for animal and plant pest control, mensuration (ongoing inventory and permanent sample plots), and for the management of regeneration whether this be through natural processes or through planting of seedlings to replace trees extracted.

These activities are very labour intensive and are required intermittently on a year round basis. The importance of these activities cannot be understated, as without close attention to these issues the sustainability of the forest management activities can be jeopardised. Should this occur, the owners would be in breach of their Plan requirements and would most likely have to cease operations.

People who have some knowledge of natural forests can complete many of these activities and would not require a large investment in training or capital. The oversight of these operations can be under the guidance of a more fully trained forest manager or a professional adviser.

4.3.5 Further Processing

Once logs or flitches have been extracted from the forest they must be further processed, (eg sawing), the timber dried to make it useable by end-users such as furniture manufacturers, and finally manufactured into marketable products.

In general there are significant requirements for capital and skills to pursue these further steps. There is also a considerable time period between the commencement of, say, drying the timber, and the completion of this process. This can be sped up by the investment of further capital in kilns or contract drying.

The skill sets required for much of this work are outside those normally associated with forest management, but ultimately form part of the value chain. For the owners of the forests, there are advantages in retaining control further down the value chain. There is however also increased risk associated with moving down the value chain. The use of professional assistance is likely to prove a good investment in this area if the skills are not currently held.

One option that does exist is to contract out the drying (and sawing if desired). This reduces the demand for capital plant and retains a high level of control in the hands of the owners. It does however increase the level of working capital required.

4.4 EMPLOYMENT POTENTIAL

As outlined above, in managing natural forests and the subsequent processing of the timber, there is considerable potential for employment, and the entire process is reasonably labour intensive. Considerable potential also exists to substitute capital for labour, and vice versa. For example increasing the size of the helicopter used for extraction can significantly reduce the in-forest labour demands.

For these reasons there is no firm rule that can be used to predict labour requirements per cubic metre of timber produced, but some approximations are possible. This has been broken down in the table below to employment related to the forest side of the business, as separate from the processing side of the business.

Table 4.1 – Employment Generation from Indigenous Forest Management and Processing

	Forest Management & Harvesting (Labour units/1000m ³ of log)	Sawing & Processing (Labour units/1000m ³ of raw log)
Labour Intensive System	2-4	2-3
Capital Intensive System	1	3

Assumptions:

1. Forest management and harvesting includes the planning, inventory harvesting, and post-harvest management of the forest.
2. Sawing and processing are those activities that occur outside the forest gate.
3. Labour intensive systems assume flitching of logs in the forest for extraction by smaller helicopter, while capital-intensive systems assume the use of larger helicopters and will in general only be viable for larger operations.
4. Processing labour requirements have been converted back to cubic metres of log as extracted from the forest so that comparisons can be made.
5. Labour requirements in the labour intensive system are highly variable depending upon the system used and the degree of flitching that occurs within the forest.

Newton in his conference paper makes a suggestion that 130 hectares of sustainably managed forest will create one full time job. While it is not clear exactly what this “job” consists of, nor how far down the value chain he was looking, it still demonstrates that sustainable management of indigenous forest has the potential to create employment opportunities in the regions.

4.5 CAPITAL REQUIREMENTS

Any venture involving management of indigenous forests has a capital requirement. The level of that requirement is very dependent upon the scale of the operation and the level to which capital is substituted for labour.

At one extreme is a very labour focused process where the largest capital items are a large chainsaw (and associated equipment) and a vehicle. The trees are felled and processed on site into pieces that can be manhandled out to a road. Production is very low and is by necessity restricted to small areas close to roads. This also ignores the cost and time required getting a Plan or Permit approved.

While the cost and time required to get a Plan approved can be considerable, the scale involved for a very labour intensive process such as this would generally be so small as to only justify seeking approval of a Permit. This can be done much more quickly and cheaply than a Plan.

At the other extreme are the Maungataniwha and West Coast scale operations where heavy-lift helicopters extract whole trees (or large parts of) out to roads that may be 1-2 km away. The logs are then trucked to a permanent sawmill for processing. These operations are usually harvesting several thousand cubic metres of wood per year and have very large capital needs. Even though the helicopter is contracted in to do the lifting, there is a need to pay for this extraction work months ahead of receiving an income for the wood, thus requiring significant working capital.

To have an annual (or even periodic) harvest of this size requires very large areas of forest over which the Plan is based. (As a broad rule of thumb, indigenous forest has an annual increment of 0.5 – 1.5 m³/ha/year. Thus a forest area of 1000 – 2000 hectares is required to achieve an annual harvest of 1000 cubic metres).

As discussed Section 3.19, the potential increment for many of these forests may be well below these values in the short term. This will become apparent on a case-by-case basis as the inventory and planning work is completed.

4.5.1 Capital Requirements – Labour Intensive System

The financial requirements of a small scale Sustainable Forest Management Plan are outlined below. Each case will be different, with the largest unknown being “working capital” required until income begins to be received.

The cost for establishing a small scale (say 100-500 hectare) Sustainable Forest Management Plan is made up of:

- inventory costs;
- development of a Sustainable Forest Management Plan;
- commencement of harvesting, requiring chainsaws and equipment;
- some means of capturing and recording data.
- development of the Business Plan

The direct expenses, assuming some technical assistance is employed in the inventory and planning stages, may be in the order of \$25000 - \$30000. This cost does not allow for:

- the owner's input (or wages);
- extraction costs;
- post-harvest costs, such as planting and pest control;
- vehicles required for transport etc;
- working capital until income is received.

As the size of the forest increases, the cost per hectare of inventory and management generally decreases.

The amount suggested above is seen as insufficient if the operation is to be regarded as a fully commercial venture, as it does not immediately pay for the owner's input, or provide for working capital.

It must also be recognised that there is generally a significant time delay between commencing the development of a Sustainable Forest Management Plan and the receipt of the first income. The length of that delay is dependant on many things, including:

- the determination of the owners to progress matters quickly;
- any sensitive issues which could result in the need for additional consultation with local authorities and DOC;
- the thoroughness of the inventory and plan preparation;
- the point of sale – if the owner simply sells the stumpage (standing trees), the income begins much earlier than if they wish to sell extracted logs or flitches, which in turn generates income before sales of dried, sawn timber or finished product
- the ability to attract the necessary capital
- the availability of the skill sets required, including inventory, forest management and business management and possibly marketing.

The shortest time frame from commencement to income is likely to be several months, while the value added route could extend this to a year or longer.

4.6 VALUE ADDED PRODUCTS

People in New Zealand have had changing tastes in timber products through time. In the 1800s the premium timbers were either imported or kauri. As the resources of kauri diminished the taste turned to rimu for furniture and other higher value end uses, as well as a utility timber for construction etc. At the same time certain imported timbers (eg oak) continued to hold the premium end of the market.

By the 1980s, rimu was increasingly recognised as being a species with properties that justified it occupying the high value end of the market. Even at this time other native species (eg tawa and matai) were generally shunned. As the available resource of indigenous timber further diminished through a combination of closure of Crown owned forests and changes to legislation impacting on privately owned resource, prices and perception of all native timbers increased.

By the 1990s, recycling of native timber (especially kauri and rimu) was a thriving industry, as was the recovery of salvage timber. The price of these species has risen markedly over the past decade and is continuing to climb as availability declines.

The current situation is that native timber use is reserved for the highest value products and is keenly sought after. So significant is the demand and the price premium on native timbers, that there are significant volumes of timber being imported and sold as “surrogate” native timbers.

In addition to these changes, there have been major changes in utilisation and grade recovery. In the past there was a significant premium attached to “clean heart” grades, while sap grades and lumber with knots in it was severely downgraded. With changes to the perception and availability of these timbers the knotty grades are now sought after and marketed as “coloured”, and achieve very good prices. Much of the furniture that is now available in New Zealand contains either recycled timber or coloured grades.

Products from both these sources sell well. At present there is still sufficient timber available for there to be no shortage of products for consumers to choose from. However all people in the industry, from sawmillers through to furniture manufacturers through to retailers give the same story – that they are largely surviving on material already in stock and that new timber is almost impossible to acquire.

This has also seen a significant rise in the number of cases of timber theft or illegal logging of native timber trees, including some taken from the DoC estate. This timber appears to be finding a ready market, and once processed is almost impossible to detect.

A further trend that is emerging is the rise in acceptance and availability of timber from native beech species. Traditionally these species have been by-passed or considered suitable only for utility uses (with the exception of some limited markets for high grade Southland silver beech). Improved sawing and drying technology, better marketing and the diminishing availability of traditional softwood native species have all contributed to the increasing acceptance of beech as a high quality (and hence high value) species.

This is important in the context of a study such as this, as the largest indigenous resources available are the beech species. If these were not considered high value species, the potential for management of indigenous forests on Māori land is severely curtailed.

The price that consumers are paying for native timber furniture has also risen steadily in the recent past. While some of this is due to various cost increases, a very large contributor is the rising price of the raw material from which these products are being made.

For example, a simple rimu corner unit that contains approximately 0.15m³ of timber (which equates to perhaps 0.35m³ of log before sawing and drying) has risen in retail price by over 10 percent in the past few months to around \$2500. While timber is only one part of the cost of the unit, the price rise has been attributed almost entirely to the increasing timber cost.

At the wholesale level much of the cost of such a unit is made up of timber and labour. It then becomes clear that relatively small volumes of native timber can be converted into a considerable value of finished product by the addition of skilled labour and some capital. Developing a cottage level industry around even relatively small volume Sustained Yield Plans becomes feasible provided sufficient skills and capital can be made available in the initial set up.

All the market indications point to a supply deficit of native timber suitable for high value uses. This deficit has been increasingly filled by imported timber, and native timber recovered

from previous use. In addition there has been the adaptation of technology to make the supply go further in the market.

For a long time native timber, especially rimu has been sliced into veneer for laminating onto substrates for doors and furniture. This veneer is relatively thin (less than 1mm). More recently some manufacturers have developed the ability to slice thicker veneer for laminating onto timber that can then be used for higher value doors and other wooden joinery. This is a substitution for solid rimu (or beech) joinery. The motivation is more associated with making the timber go further than simply trying to produce a lower cost product.

4.7 POTENTIAL ECONOMIC BENEFITS FROM INDIGENOUS FOREST MANAGEMENT

As has been discussed in previous sections of this report, collectively on Māori owned land there is a significant asset in the form of growing indigenous forest. Under current legislation, the owners of this resource are able to manage these forests to produce a sustainable harvest of indigenous timber, provided the forest is managed in such a manner as to ensure the long term sustainability of the resource.

This is a far cry from the circumstances that have existed in the past, where Māori often sold cutting rights to the timber on their land and were left with the funds so generated, and a degraded forest which had very limited potential for further economic return for many generations unless it was converted to some other form of landuse (such as farming or plantation forestry).

Many of the indigenous forests owned by Māori that have not been previously harvested have been left due to access and cost difficulties, rather than an earlier desire not to harvest the timber present.

Ironically those forests that previously were only marginally economic to harvest now offer some of the greatest potential to provide a long-term return to the owners. This has come about due to the slow decline of readily accessible forest, and continuing demand for indigenous timber. The decision of the Government to stop all further harvest on Crown land has further significantly enhanced the value of indigenous timber, and hence private (ie non Crown) indigenous forest that has the potential to provide a sustainable supply of timber.

Often, the economic benefits of any project are measured in terms of employment generated, and subsequent downstream benefits.

For any project involving the sustainable management of indigenous forests, many of the economic benefits accrue to regional rather than urban economies, where the downstream benefits are often greater. For small communities, the addition of one or two additional jobs can be a significant increase in the numbers employed, with flow-on to other parts of the community.

It is important, however, that any project such as this can provide more than simply an extra job or two. Regional New Zealand has an extensive history of “job creation schemes”, which in some cases have been destructive of both wealth and assets in the long term.

The development of such projects must be sustainable both in economic and environmental terms.

4.7.1 Harvest Value

Any determination of the value of any forest harvest is dependent upon a number of factors. Many of these are overcome by using a common point of sale. For sales of forest produce, the usual convention is to use stumpage.

Stumpage is the net return to the forest grower (owner) after paying for harvest, transport and associated costs.

For indigenous forests stumpage is dependent upon many factors including species, location, extraction method and wood quality. It is therefore difficult and potentially misleading to quote a single value. This is further compounded by the increasing value of native timber as the supply diminishes. The highest stumpages are achieved for old growth kauri and rimu while beech and other hardwoods tend to achieve lower stumpages.

Anecdotal evidence indicates the stumpage currently being achieved across all species to be around \$100/m³, with the evidence pointing to a steady improvement in returns to the grower. (Indigenous Forestry Unit *pers comm.*).

For planted forests the use of a stumpage value to determine forest value usually assumes the harvest of the entire stand, ie the liquidation value of that stand. For indigenous forest, liquidation of the asset is not permitted under the terms of the FAA and thus it is more appropriate to consider value in terms of the potential value of an annual harvest. As discussed in Section 3.19, the annual harvest volume is generally the increment the forest is able to produce.

The table below shows the stumpage value of the potential annual harvest from Māori owned indigenous forest. It assumes the annual increment to be 0.35 cubic metres/hectare/year, and that varying proportions of the entire annual increment is harvested each year. The purpose of this table is simply to demonstrate the magnitude of the value of any harvest and does not indicate what if any, the ultimate volume harvested from Māori land will be. Further it does not take into account the potential increasing increment that could be available from Māori land over time if sound management is applied to the forests.

Stumpage Value (\$/m ³)	25,000 m ³ /year harvest (\$) Note 1	50,000m ³ /year harvest (\$) Note 2
20	500,000	1,000,000
50	1,250,000	2,500,000
75	1,875,000	3,750,000
100	2,500,000	5,000,000
120	3,000,000	6,000,000

Notes:

1. This equates to 35% of the estimated annual increment potential within Māori owned indigenous forests
2. This equates to 70% of the estimated annual increment potential within Māori owned indigenous forests

An important consideration when discussing stumpage is that it is the net return to the grower. Thus even small increases in stumpage flow directly to the bottom line and substantially increase the rate of return on the asset.

4.8 POTENTIAL ENVIRONMENTAL BENEFITS FROM INDIGENOUS FOREST MANAGEMENT

The opportunity afforded under the FAA to sustainably manage indigenous forests for a yield of timber can create benefits, both in terms of economic outputs, and improved environmental management.

The improvement in environmental management is a result of two main factors. The first of these is the requirement of the Act to ensure that the timber harvested is replaced either through natural regeneration or by the planting of seedlings. Clearly, ensuring that adequate regeneration is present through natural processes will be cheaper than having to either raise or purchase seedlings and the associated costs of planting and releasing.

For many forests a significant impediment to natural regeneration is the presence of introduced animals, especially deer, goats, possums, and rats. These animals tend to eat both the seedlings as they emerge, and in the case of rats, the seed before it has the opportunity to germinate.

It is therefore in the owners' interests to ensure that introduced animal populations are kept at sufficiently low levels to maintain adequate regeneration of timber species and their ultimate recruitment into the growing stock of the forest.

These issues of lack of seed being available to germinate, or seedlings being eaten before they grow into significant individuals, is compounded by the presence of other introduced animals, particularly the predators, which can have significant effect on the natural ecological processes within the forest. For example, the seed of many tree species has much higher germination rates after passing through the gut of a bird. If the birds have been predated to the point of near extinction in a given forest, their contribution to the ecology of the forest is then lost. In the long term, these impacts will be far more devastating to the viability of the forest than the periodic removal of some of the standing timber.

There is slow but increasing recognition that forest clearance is no longer a significant issue for New Zealand's natural ecosystems, but the adverse effects of introduced pests is now the major long-term threat. Several documents have in recent times focused on some of these issues such as the "Biodiversity What Now?" document from DoC.

Timberlands West Coast Ltd in its proposals for the management of West Coast forests, recognised the seriousness of the threat posed to the ecological sustainability by introduced predators, and as a result concentrated a lot of effort into the management of these pests. It is ultimately only with a healthy forest ecosystem capable of being self-sustaining, that there will be the opportunity to have an ongoing harvest of timber.

The second significant factor is a result of the forest becoming an economic asset for the owner rather than the liability it may have been before a Plan was approved. As such it has become part or even the entire livelihood of the owner, and therefore a desire exists to maintain the ability of the asset to produce in the long term. (Māori land is often seen as a liability in a financial sense in that it can incur rates and other costs on the owners with little or no opportunity to produce an income. This is not to infer the land itself is a liability).

These two issues tend to become intermingled, but the net result is a reduction in the number of animal pests in the forest, and hence an improvement in its long-term economic and ecological viability.

Reduction in animal pests can be achieved by a number of means, including broadcast poison operations and intensive ground trapping to target different animal species. For many owners of indigenous forest, it is common to focus on the use of trapping and hunting to control animal numbers. While this is labour intensive, there are good reasons for this and there can be improved environmental outcomes.

One of the key reasons for using labour intensive methods is the perceived cost. Owners who don't place a dollar value on their labour view the cost of a poison operation as far greater than the time value of their input doing the work "by hand". As they also tend to spend quite a bit of time in their forest, they are happy to incorporate the pest control into their schedule of operations.

In an environmental sense, this intensive trapping and hunting approach allows targeting of species that may be very difficult to target with a single poison operation, and allows more intensive and regular control work, resulting in better outcomes for the forest. Many would also argue that trapping is more environmentally acceptable than broadcast poison and is certainly more labour intensive.

It should however be noted that the reverse can also occur should the owner become complacent about the requirement to control animal pests. It is therefore important to ensure that the owners or agents remain committed to the management of the forest ecosystem.

A further benefit of this "hands on" approach is that the owner gains an increasingly greater understanding and knowledge of their forest. They tend to see and learn things that no amount of "formal" inventory type work can expose. They are also more able to respond to events such as a wind-throw event in a timely manner, allowing wood to be salvaged before it can deteriorate. In small forest areas under a Plan this can be an important asset, as a single tree or small group of trees can represent both considerable value and a significant proportion of the volume allowed to be harvested. Additionally, species such as tawa (which is a significant proportion of the total volume available) will deteriorate quickly once on the ground. Thus early detection and response to wind-throw will improve both the overall quality of the management and the volume of timber that can be harvested.

The discussion above relates to what is occurring within the forest being managed for a sustainable yield of timber. What it does not address is the benefit to surrounding forests that may be of different tenure. Much of the forest standing on Māori land is contiguous with the DoC estate, especially in the Urewera tract. This is also where the majority of the total timber resource on Māori land is standing.

Pest control on one estate will clearly have an effect on the pest numbers in the neighbouring estate. If control work on both estates can be co-ordinated, there are major synergies to be achieved both in environmental improvement and in economic terms. Of special importance is the significance of these very large contiguous areas of forest when considered in ecological sustainability terms. It is in these large areas where our indigenous biodiversity has its greatest opportunity to flourish, if the pest issues can be successfully addressed.

It has been apparent to Maori for some time that DoC does not have the resources available to control pests over the very large estate it manages to the level necessary to provide an adequate level of protection. The opportunity of working in conjunction with a neighbouring landowner to enhance the Department's work would significantly improve the effectiveness of control operations for the greater benefit of both parties and most importantly the environment.

4.9 POTENTIAL ADVERSE EFFECTS OF TIMBER HARVEST

Any discussion about the harvest of indigenous timber in New Zealand tends to invoke rather heated debate, much of which is based more upon ideology than science and fact. In considering how indigenous forest standing on Māori land could be developed to provide the owners with economic benefits, it is likely that some of the same debate will ensue. The major issues that are generally raised relate to some form of “uniqueness” of the forest in question, the presence of rare or endangered indigenous species, landscape, recreation and aesthetic values, and the most difficult one – philosophical opposition to natural forest management.

In researching this study there is nothing to suggest that in general the forest on Māori owned land differs significantly from forest standing upon other tenures. There are no doubt specific blocks where the forest is of such ecological value that there is a case for either preservation or even more intensive management than elsewhere, but this is the exception, not the norm. In most cases the boundary between different tenures are rather arbitrary and in many cases are as absurd as a straight line drawn on a map in an office, with no reference to either the practicality or ecological significance of such a line.

Much of the forest under consideration also has some previous harvesting history and is thus in an already modified form.

If the debate is restricted to matters of science and fact, concerning matters of uniqueness, the case for additional reservation of forest on Māori land is very tenuous indeed. Large areas of land adjoining blocks of Māori land are already in the Crown estate, within which extraction of timber is proscribed. Additionally some of the more significant indigenous areas of Māori land are already under covenant, such as Nga Whenua Rahui.

Various legislation in place requires the protection of a range of significant natural assets and also addresses matters such as landscape impact. In particular the RMA places a duty upon Territorial Authorities to protect areas that are deemed significant. The FAA goes further in that it can require reservation of representative forest areas as part of the process of obtaining a Sustainable Forest Management Plan. This representation can cover unusual ecological associations and habitats of rare or endangered species. The Sustainable Forest Management Plan itself requires the owner to sustain the forest in the long term and to control the destructive impact of animals – which is generally more than is legally required in adjoining Crown estates, and is certainly more than actually occurs on much of the Crown Estate.

In the process of developing a Sustainable Forest Management Plan, consultation with DoC is required. This gives the Department the opportunity to comment on issues such as ecological importance, the presence of endangered species, and the impact such a plan may have on adjoining areas (much of which is the DoC estate). The Department can also have input into any reservations that are required as part of the Plan approval. Further they can, if appropriate seek to have “constraints” placed upon the timing and method of harvest if there is perceived to be a conflict with, say, heavy recreational use of the neighbouring land at certain times of the year.

The issue of recreational use of Māori land is one for the owners to address. In many cases recreational use of the land by non-owners is by custom and practice, not as of right. As the land is privately owned in the same sense as Fee Simple land, the owners can at any time revoke the opportunity for people to use that land for recreation. This usually causes a small

media frenzy and causes angst among those people that are affected, but this should have no bearing on the outcome of any application for a Sustainable Forest Management Plan.

There is no simple means of addressing the philosophical objection to the harvesting of native timber. In most cases the argument goes that this is an asset that should be shared amongst all New Zealanders. As such, the economic response is to say if the asset is to be protected for society, then society should pay for that protection and not impose that responsibility onto the landowner. In a round about way, the use of Nga Whenua Rahui covenants is one means by which society can contribute to the protection of what is actually a private resource. The degree to which Government is willing to fund Nga Whenua Rahui covenants can be seen as a surrogate measure of the willingness of society to protect privately owned forest assets for the benefit of all society.

The fact that society has seen the value in creating the opportunity for private landowners to manage their indigenous forests in a sustainable manner provides the mandate for Māori owners to pursue this on their land. The opportunity afforded Māori owners should be no different to that available to owners of land in Fee Simple.

The low impact harvesting techniques and sustainable management requirements that must be used under a Plan, and the requirements of Regional Plans to protect soil and water resources, further ensure that the integrity of the forest remains intact in perpetuity, and takes precedence over short term financial outputs.

5. Potential Impediments to the Development of These Resources

This section of the study considers why these natural timber resources have not been developed to date; explore what, if any, impediments exist to the development of these resources; and to briefly consider what actions could assist in overcoming any identified impediments. These impediments include a range of issues, some of which can be described as physical, such as access, some are cultural, such as the multiplicity of ownership of most Māori land, and others are either economic or structural, such as the need for skills and capital to develop these assets. There is also in many cases a degree of inter-relationship between these issues.

As a broad generalisation it is fair to say that the reason much of this indigenous timber resource still exists is that it has either been easier to get the timber from other areas, ie, the difficulties associated with each individual area of land have resulted in a decision by saw-millers to target another area for harvest, or the species present have not been sought after, such as beech and tawa. As the timber has become increasingly scarce, those involved in the harvest have been forced to address the impediments that previously prevented them harvesting a particular block.

For example, areas that had good access were harvested before those where expensive roading was required. As the easier blocks were cut out, the saw-millers then had to build the more expensive roads. This could only be justified as the entire supply of native timber tightened up, resulting in increased prices. One of the more graphic examples of this process at work is the recent move to helicopter extraction. This has only been economically feasible as the timber available for extraction by cheaper means was “used up”.

It is anticipated that, provided the demand for native timber continues, this process will also continue.

The issues raised in this section have been derived from a variety of sources, the most important of which has been discussions with a wide range of people who have knowledge of, or an interest in these matters. Appendix 3 contains a list of people consulted during the development of this report.

5.1 PHYSICAL ISSUES

5.1.1 Access

Access to some blocks may be a significant impediment to the development of a sustainable business based upon the extraction and possible processing of indigenous timber. Given the range and location of the individual blocks, there can be no simple solution to this issue and each case will need to be addressed separately.

What may be of assistance in some cases is the cooperation of any Government departments whose land needs to be crossed to gain access to the forest. In particular this would require the cooperation of DoC, as in many cases, especially in the Urewera, the DoC estate surrounds Māori land.

There may also be a role here for a Central Government agency (such as TPK) to provide assistance with the process of gaining access through other land. This can be a time consuming, confusing and expensive process, with considerable potential for work to be

repeated in different forms and for the tasks to proceed down blind alleys if those involved are not experienced in knowing what is required.

The current Ministry of Economic Development Taskforce working on the development of the plantation forest industry in the Tairāwhiti Region may provide a useful model for such Central Government assistance. The approach is to bring all the affected Government agencies together to attempt to seek a workable solution within a reasonable time frame. Further, there are often processes available within Government agencies that are not widely known outside that agency, and this can be a way of ensuring the benefits of these can be captured.

This latter issue of assistance being available but not widely known was raised by many of the people spoken to, and is discussed in more detail below.

5.2 CULTURAL ISSUES

A range of cultural issues has emerged from discussions held with many people, and it is often difficult to separate out the themes of the issues as they can be intertwined with personal issues, experience or agendas. This however is always the case when dealing with matters that contain a significant level of “politics”.

5.2.1 Multiplicity of Ownership

The implications of land ownership systems are always raised when there is a discussion relating to the management of forests on Māori land, whether they are planted or natural. As with other issues raised in this section of the report, there is a considerable gap between the perception and the reality, and as discussed elsewhere, there is a need for considerably improved communication. In this case it is the non-owners who have a poor understanding of the real as opposed to the perceived situation.

The general concept that most non-owners have is that to get a project progressed on Māori land you need to deal with large numbers of owners, and it can be difficult and time-consuming to get agreement. The use of Trusts and the powers delegated to the Trustees goes a long way to overcoming this issue. These Trustees are able to make decisions regarding the use of that land, which can provide an efficient mechanism for achieving an agreement. This process needs to be communicated to parties contemplating the development of any project involving Māori land.

There is however an issue that has been raised by some Trustees in that they require greater authority to develop these projects and to retain some or all of the funds derived for further investment. In many cases the landowners want the early return of income, leaving little if anything for reinvestment.

The actual validity of this matter is not for this report to determine, but it is recorded as an issue coming forward as a reason why there is limited interest in a project that is seen as very long term, regardless of how significant that project might be.

5.2.2 Previous Experiences

5.2.2.1 Harvesting

Discussion with a number of people drew attention to the fact that significant areas of Māori owned land has in the past supported indigenous forest, much of which has been now heavily logged. In many cases the owners felt that they had in some way been “ripped off” in

the process. The comment that “now we have neither the timber nor the money” is not uncommon.

Whether or not these comments are justified is somewhat academic. What is important is the fact that there is now a significant level of distrust among some owners and there will be a significant barrier to overcome if there is to be any further development of these forest assets.

This distrust can be directed at several parties. In some cases it is the saw-miller who originally logged the area, while in others it is directed at Trustees or owners who allowed the harvest to proceed, or at various arms of Government for a variety of reasons. Regardless of who the distrust is directed at, the result is considerable reluctance to even consider that an economic opportunity may exist within these assets.

5.2.2.2 Government

Some of the people approached also questioned the degree to which Government’s intentions in this area could be relied upon if owners were contemplating entering into a long-term commitment for their forests. The two major issues raised were:

- The risk that Government might change its commitment to allowing the ongoing harvest of indigenous timber, even though this is sustainably produced. This could be seen as fallout from the decision to cease harvesting in the West Coast Crown forests, especially as this was carried out before resource consents could be considered by the Environment Court. The matter of Article Two of the Treaty of Waitangi was suggested as the owners’ defence of any attempt to alienate their property rights with regard to their forests. It was equally recognised that while they were confident of “winning” such a case, there would be considerable cost, delay and angst involved in such an issue. It was clear that this was not seen as desirable but there does exist a concern that it may come down to a legal battle.
- The second major issue, identified by Maori, is the degree to which owners can rely on Government agencies (both central and local) to complete their obligations as neighbours. The particular issue relates to pest control. Owners and their advisors are saying, “What is the point in us carrying out pest control on our land if our neighbours do not complete similar work on their land? Our pest free area will be like a magnet to the neighbours’ pests and we will have to deal with them as well.” This is a particular concern where Māori land adjoins part of the DoC estate.

There are no short-term solutions to the matters raised by these people but they need to be recognised as valid concerns that have been raised. The matter of Government Policy towards management of indigenous forests is a particularly significant issue casting doubt in the minds of owners.

5.2.3 Conservation Ethic

Discussions with owners and their representatives also showed a significant level of desire to protect any forest assets from any form of management. There are twin threads to this philosophy. The first is the Māori spiritual association with the land and with the forest. As stated by one person interviewed “it is almost umbilical – a reverence for the native forest”.

While it was not directly stated, the second message that was coming through between the lines was that “we have been ripped off over our forests before so why risk it happening again? Why not just let the forest be?”

When discussed further there was also the scarcity issue to consider. Many of the people who are either economic leaders or opinion leaders have lived through a period where the forest with which they are associated has been logged, cleared or otherwise modified to a significant degree. These are the people who are saying the cultural and scarcity value of the forest is such that they see economic development as an unlikely or undesirable option.

No attempt was made to determine whether there was a pattern to who was saying these things, but anecdotally it would appear to be older people (who have seen the changes wrought by the first harvest), and some younger people with less direct association with the land in question. For these latter people it is the conservation ethic *per se* speaking, more than a specific issue with a given forest. The older people may be thinking that “we have lost the trees and we did not see enough benefits from that harvest to justify any further manipulation of the forest”.

This philosophical stance is difficult to argue with, especially given the experiences of some of these people and the low level of understanding of the difference between the current requirements for sustained yield management and what has been done in the past. There may however be an opportunity to show these people that in fact without management (especially of pests), the forest is likely to be in very poor condition in the relatively near future. Thus careful management as required by the current provisions in the Forest Act will actually provide benefits to both the owners (economic returns) and the forest (environmental improvements through pest management).

This message came through very forcefully from some quarters where it is believed that the issue is **conservation** not **preservation**. Further and importantly in the context of this debate, is the concept that “the total restriction on use of a natural resource is never *in perpetuity*, rather, as the resource becomes more capable of a sustained yield then there is the opportunity to begin using that resource again”.

What was clear from many of the discussions was that few understood the extremely adverse impact that introduced pests were having on their forest. From several people came the response that if they could see that sustained yield management had the potential to increase the “quality” and “quantity” of the forest as well as providing a timber resource, then they would consider this to fit very well with the conservation ethic they strongly believe in.

The definition of “quantity” and “quality” is open to interpretation. but could include an increase in the indigenous fauna, especially birds, an increase in the size and number of large trees (especially economically important species), an improvement in the health of the forest, and possibly an increase in the area of forest (say as scrub develops into forest).

The Māori concept of conservation is that natural resources have an obligation to sustain people, and that people have an obligation to sustain the natural resource, hence the “umbilical” concept.

This is a very powerful message and it is the author’s opinion that it needs to be clearly understood before any decisions are taken as to what to do from here. Of all the issues raised, this one strikes at the very core of resource management for Māori. Failure to understand this and to simply tout economic benefits (and associated employment prospects) is likely to meet with a somewhat lukewarm response.

In considering the issues raised here, there is a considerable need for improved communication. In particular the objectives and requirements of the Forest Act as it applies to

the management of indigenous forest, and the benefits such management can impart on the forest will be seen as more important than the economic benefits that may accrue. To quote one person “the implications of pest control will resonate with Māori more than the economic benefits”.

5.3 ECONOMIC AND STRUCTURAL ISSUES

This section attempts to identify some of the issues that control the way any proposal for the development an indigenous resource should be pursued.

5.3.1 Skills and Finance

In considering the economic and structural issues that may be impeding progress, a number of people suggested that the obvious matters of skills and finance were the biggest hurdles to address. Other commentators however suggested that this may be an issue on the surface, but the reality in their opinion was not lack of skills or money, but rather a communication, and in some cases a motivation, matter.

This latter group of people was in several instances intimately involved in matters not dissimilar to the idea of creating an indigenous timber industry based around the sustainable harvest from Māori land, and thus had a good idea of what was available in terms of both skills and money. The key issue they identified was lack of information about what was available, or perhaps more importantly, lack of appropriate communication of that information. The comment was made that printing a pamphlet or creating a web site does not automatically get the information to those who need it. In their opinion there is no substitute for face-to-face meetings if this information is to be adequately communicated.

These people stated that in their view, if the skills were not already in place, there was no shortage of opportunities to gain those skills, and similarly there was funding available through agencies such as TPK if people knew how to access that funding.

Despite the belief in some quarters that the funds can be accessed if you know how, there is still a significant demand for up front cash to get a project such as this underway and there is a significant time lag between commencement of expenditure and the first financial returns. This time lag would commonly be a year or even longer. This requires a source of funding that is accepting of the poor early cashflows such a project has.

In addition to the cashflow issue there is the need to develop the skill sets required to complete the range of tasks involved. Some of these may well exist in many of the communities that may consider such a project. These would include the general forestry skills and the animal and plant pest control skills. The more advanced inventory work and preparation of Sustainable Forest Management Plans may be more efficiently managed by employing specialist help in the early stages until those skills were better developed within the community.

Outside these direct forest related skills there is a need for a set of business management skills. In combination with the development of a Sustainable Forest Management Plan for a forest the business case needs to be developed. It is important that the business plan demonstrate the viability of the project in the long-term, not simply as a short-term generator of a few jobs. This must be based on sound business case developed through market research and analysis that shows the project can be self-supporting, and not requiring ongoing external funding or support.

Discussions with Forest Industries Training (FIT) have indicated that there is an opportunity to develop one or more qualifications for those interested in the management of natural forests (as separate from planted forests). FIT believes that some of the necessary units are already available, but there is a requirement to explore the demand for such training, and to determine what if any additional units would require developing.

FIT has indicated that the cost of completing this work is not high, but at this time they do not have the necessary budget.

There also exists an opportunity to explore the concept of an indigenous timber producers marketing brand where several forest owners could work cooperatively to support market research and development while at the same time retaining their independence. This is an area that could be explored if sufficient owners decided that they wished to develop Sustainable Forest Management Plans for their forests and that they wished to retain control of the resource so created some distance down the value chain.

5.3.2 Forest Certification

Forest Certification such as Forest Stewardship Council (FSC) Certification attempts to give consumers of wood and wood based products confidence that the products they are buying have come from sustainably managed forests, as opposed to forests where there is no regard for matters other than low cost timber production. On the face of it this is a laudable process and has certainly gained acceptance in some markets to the point where in those markets (especially the US and Europe) retailers are now specifying that they will not purchase product unless it comes from FSC certified forests.

This in turn has led to a rush in New Zealand to get forests certified to FSC standards. The vast majority of these forests are planted forests. A few indigenous forests have also pursued certification. FSC however makes it very difficult, if not impossible, for the owner of a planted forest to also manage for timber production any indigenous forest within the total estate.

This has significant implications for some forest owners. The proportion of the planted estate that is on Māori land is significant and increasing. In addition, there is an ongoing process of land return to Māori. This land includes areas that have been leased to forestry companies and especially the Crown, and more significantly, ex State Forest lands that are being returned as part settlement of Waitangi claims. Within those forests there are in some cases quite substantial areas of indigenous forest, some of which could have potential for a sustained yield of timber.

For present forest owners that are seeking FSC certification, the general view is that the majority of their asset value lies in the planted part of the estate, and hence the requirements of this take priority over the residual indigenous forest. Management of the indigenous areas for sustained yield timber production is inherently smaller scale, less profitable and significantly more demanding on resources.

Of even greater significance is the FSC requirement of (almost) mutual exclusivity. By this they mean that if you are managing a planted forest, any indigenous forest within that estate must be managed for biodiversity and conservation purposes, and not for timber production.

There is no simple solution to this dilemma and the response to date has been to conform to the requirement rather than seek a special case for what after all is a small part of the asset. Even in the bigger picture, the forest industry as a whole tends to hope the matter of

indigenous management could be settled elsewhere and have no bearing on the management of planted forests.

The only real solution is a change in thinking that sees all forests treated as different parts of a continuum and that all require management for various outcomes and that all can contribute to economic and environmental outcomes. Management of indigenous forests does not mean that they cannot contribute to biodiversity and conservation objectives, and in fact there is increasing evidence that shows that unless there are significant levels of management (particularly of animal and plant pests), the values seen as desirable in our indigenous estate will soon be lost.

Given the above discussion, it is reasonable to assume that few indigenous forests that are managed in conjunction with planted forests are likely to be available for indigenous timber production in the short term. This will be significant in some areas such as the Taupo Basin and the East Coast.

There is however another side to this coin for Māori forest owners. FSC requires forest managers to adequately cater for the needs of indigenous peoples. This concept was originally developed around people who lived within the forest and relied on it for their daily needs (such as within the Amazon). There is no distinction made that would suggest Māori cannot use this principle to further any desire to manage their indigenous forests either as part of a planted estate or independent of any planted estate.

This would need to be considered on a case-by-case basis.

5.4 UNDERSTANDING THE OPPORTUNITY

Throughout the discussions with people, one message that came through clearly was that few understood that management of indigenous forests for timber harvest was still permitted, and even those that did found the issues daunting.

Most people believed that they could no longer carry out any form of extractive management of their forests. While this is not the case, there are a number of agencies and organisations that are happy to allow this fallacy to prevail as it supports their objectives. The message that this is not the case has not been widely heard, particularly by those who could influence the management decision for their forests.

For this situation to change there is a need for communication with the key leaders, both economic and opinion, within the major forest owning groups. Such communication needs to traverse a number of areas. This includes the principles of sustained yield management, the relationship between the RMA and the Forests Act, compliance with territorial plans, and most importantly the potential benefits, both environmental and economic.

A second message that came through in this area was that much of the impetus needed to come from within, rather than be imposed from externally. The interpretation of this is that people are seeking ideas and information, but they need to develop the energy for such a development from within their people. This can be complemented by assistance (such as technical information) from other sources, but without internal commitment the likelihood of success is diminished.

By simply saying to the owners that there is an opportunity here, and we can give you the recipe to make this happen will cause some interest among owners that is likely to wane quite quickly. The challenge is to assist the owners and their advisers in developing such initiatives

largely from within. This results in ownership of the project, and a higher level of long-term energy and commitment.

5.5 MENTORS

The concept of management of indigenous forest for sustained yield timber production is new to most people and thus needs resources to both champion the case (as the Indigenous Forestry Unit does), and to assist forest owners to develop their case. For Māori this may well be in the form of a expert who has responsibility for some of the technical matters (such as the inventory work and initial plan development) and for guiding the owners through the process and ensuring high standards are set and maintained.

In the late 1990s the Government sponsored the preparation of management proposals for the development of planted forest on under-utilised Māori land in Northland. In this situation the Government recognised that it did not want to get involved in forest ownership or management but was willing to facilitate communication between Māori landowners and private sector investors, with a view to developing commercial plantation forests. In part this recognised that Māori did not have the resources necessary to do this work themselves at the time, and this was a means by which Government could assist without becoming involved in the business aspects of any venture. The concept was to bring in expertise to assist in the development of management plans for each block of land that the owners could then use to assist in attracting private investment.

For the development of Sustainable Forest Management Plans, a similar process could be used, whereby a plan was developed to a certain point under the guidance of an “expert”. This could then be used by the forest owners to take the project to the next step either themselves or with another party.

The need for improved communication is very evident whenever the issue of sustained yield management of natural forest is raised. It became very clear in discussions with people that few understood the current legislative framework that surrounds the management of natural forest. Even Trustees of very significant areas of natural forest were under the impression that the Government had effectively removed any opportunity to derive economic outputs from this land or forest through legislation. There is a widely held belief that there are no circumstances under which native timber can be legally harvested from Māori land. Further there is considerable confusion over the roles of the RMA and the Forests Act.

These communication issues must be overcome before any attempt to develop Sustainable Forest Management Plans begins. Those people in positions of responsibility for decisions concerning this land (such as Trustees and the Māori Land Court) need to be made fully aware of what the options are. Once this is done they can then communicate the potential to the actual owners of the land. This again points to the potential of having mentors or a champion to ensure that any message is received by the right people in a format that is appropriate.

5.6 SHORTCOMINGS IDENTIFIED BY THIS STUDY

Any study of this nature will highlight areas where either the data is not particularly robust, or areas where there are additional dimensions that, if researched will add considerably to the body of knowledge or options available for decision-making.

Through the course of this work a number of issues have been identified which are briefly outlined in this section.

From a technical perspective, the most pressing need is more detailed resource descriptions at an individual forest or grouping of forests level.

Before any application for a Plan can proceed, detailed inventory data is required for the forest in question. This work will be completed as required for each forest, should the owner wish to proceed.

Improved resource descriptions would assist this process by identifying specific areas with the greatest potential for sustained yield management. This will also help to ensure that scarce resources are not applied to forests with lower potential for management, and that owners are not given unrealistic expectations of what potential their resource may have.

From a project development perspective, the greatest weakness appears to be a communication issue. The people who either make decisions relating to Māori owned indigenous forest, or who are able to influence those decisions, appear to be largely unaware of the opportunity. More seriously, many in fact believe that there is no opportunity available to them. They have been lead to believe that they are not able to develop their indigenous forests under any type of active management, and that all that can happen is the forest remains locked up. This has come about through a combination of rapid change in the legislation affecting the management of natural resources over the past 10 years, and a lack of “champions” for any view other than a preservation one.

If sustainable management of indigenous forest on Māori land is seen as desirable, the lack of information and assistance that owners are aware of and can access needs to be addressed. Considerable attention to the means of delivery of this information is required to ensure those in a position to use the information receive the right signals.

Further down the track the option of direct assistance may wish to be considered. Any attempt to do this should be carefully considered. While some assistance with some of the technical detail may be appropriate, there will be little long-term success unless it is driven from within the owners’ structure, and can be shown to have a sound business case with a high potential for success.

5.7 CONCLUSION

This study has identified the extent of Māori land that supports natural high forest and has estimated some volumes of timber that are supported on that land. The numbers point to a significant resource that could have potential for sustainable forest management, should that be the owners’ desire.

Given that the resource exists, it becomes necessary to explore what if any development of that resource could occur, what may be required to assist that process and what may impede the process.

A number of matters have been raised that require further work, but none of them indicate that the development of an indigenous timber industry based on sustainable forest management of the natural forest on Māori land is not an achievable outcome.

The next step must be to initiate discussions with the owners, their advisors and decision makers and their opinion leaders to determine whether they feel there is an opportunity there that they wish to support. Without support from these people successful development of sustainable forest management for these forests is unlikely.

The opportunity to develop an industry based upon these forests could provide both economic and environmental benefits. The potential environmental benefits to the forest of pest control could be very substantial particularly given the poor state of health of most of NZ's natural forests. These benefits to the forest are not likely to be lost on the owners and are likely to feature strongly in any decisions.

There are some areas where assistance may be required from agencies such as Central Government. These need to be carefully considered and targeted, as ultimately the energy for such development must come from within the owners, not from externally, if there is to be a likelihood of success in the long-term. There are also some areas where Government can assist both Māori and the wider indigenous forest industry through such initiatives as refinement of the data held and development of suitable qualifications.

Appendix 1 - Explanation of Nicholls Forest Types

The descriptions given below are a summarised version of the Nicholls classification. For a more detailed description, the reader is referred to Nicholls (1977) as listed in the references.

The broad classification followed by Nicholls is based around “*the specific association of trees 30cm or more in dbh in high forest (15metres or more canopy height) and 10 to 30 cm dbh in low forest.*” For this study some classes have been further amalgamated due to the very small area of that class represented on Māori land.

The outline given here is adapted to meet the requirements of this study. Thus the focus is on current existing timber potential rather than regeneration capability or botanical complexity.

BEECHES

This class is composed of all types of forest where one or more of the beeches (*Nothofagus spp*) clearly predominate. Softwoods are very rare and while hardwoods may be numerous in some areas, there are few species, always very shrubby and confined to the understorey.

In the North Island the beech species are restricted to mainly red, with some silver, some mountain beech and some hard beech. Many of the forests containing these species are at higher altitudes and as a result the trees are stunted and of generally poor form.

Much of this forest has limited potential for timber production, but some areas do offer that opportunity.

GENERAL HARDWOODS

Most of this forest occurs below the altitudinal limits of rimu but all the types have in common an almost complete absence of softwoods as trees or poles and the normally common lowland hardwoods taraire and tawa are nearly as rare.

This class includes the remnant areas of coastal forest (usually containing pohutukawa), areas of regenerating rewarewa forest, areas of kanuka and areas of rata kamahi forest.

All of these forest classes have in common a complete absence of any current timber production potential, due to the species present. For large areas of this class previous timber extraction and farming have removed the timber that was originally present in these forests.

HIGHLAND SOFTWOODS-HARDWOODS-BEECHES

This class occurs along the main ranges of the North Island and is generally above the altitudinal limit of rimu. The merchantable species of softwoods consist of various mixes of Hall's totara, silver pine, and the occasional miro.

These forests are high altitude forests resulting in trees that are often stunted and of poor form. The few areas of lower altitude forest of this class around Waimarino have generally been logged in the past.

Given the altitude, the history of harvesting, general location (upper mountain areas), the generally poor tree form, very low volumes per hectare and the very limited extent of this class on Māori land, this class has been assumed to have no current productive potential.

LOWLAND STEEPLAND AND HIGHLAND SOFTWOODS-HARDWOODS

This class contains many different mixtures of softwoods and hardwoods. Both the softwoods and hardwoods can range from occasional to locally abundant. The class occurs mainly where beech is absent on the high country and above the altitudinal limit of rimu. In this situation, it is usually low forest with stunted softwoods, malformed hardwoods and shrub hardwoods often prominent in the canopy.

Also included in this class is softwood-hardwood forest below the altitudinal limit of rimu on steep broken country or exposed ridges; that is to say, on sites where kauri or beeches are normally present.

Where rimu occurs it is usually small and outnumbered by miro, Hall's totara, or tanekaha. Tawa usually persists on these sites but several characteristic lowland hardwoods do not.

On Māori land there are significant areas in the Waikato, Bay of Plenty and Manawatu regions. These forests have often not been harvested previously due to the difficult terrain they occupy. With the advent of aerial extraction this constraint can be overcome without adverse environmental impact. As a result there exists some timber potential in this forest class.

RIMU-GENERAL HARDWOODS-BEECHES

This forest class is well represented in Hawkes Bay on Māori land, with smaller areas in the other central North Island regions.

As a rule beeches are abundant with occasional to frequent softwoods in the canopy, and small hardwoods form a large proportion of the understorey. Most of this class is confined to fairly narrow belts above the altitudinal limits for tawa.

Only limited areas of this class have been logged in earlier times.

KAURI -SOFTWOODS-HARDWOODS-BEECHES

For the purposes of this study two classes have been combined into this one class. In Nicholls work he recognised three classes that contained kauri. These were a class of abundant kauri (of which none remains on Māori land), a class that included softwoods and hardwoods but excluded beech, and the third that included beech. The area of forest that includes beech on Māori land totals 14 hectares and as a result has been amalgamated with the class that did not include beech.

This group of classes can be described as containing occasional to frequent kauri among rimu, miro, Hall's totara plus a range of hardwoods. The hardwood component varies with location but often includes tawa and several other species that have some commercial value.

This class has potential to produce a timber volume consisting of several species and in many areas has the added advantage of containing a range of regeneration of the species which are likely to be removed during any timber harvest.

RIMU-TAWA

This class is one of the most well represented classes remaining on Māori land. The softwood component tends to be very occasional with rimu being the most common, and often as very large individuals. Rata is the only other large tree in this class and in most areas is dying out (commonly from the ravages of possum attack). Hardwoods are always abundant with tawa predominating almost throughout and a range of other commercial species also present.

The largest areas of this class occur between Mt. Pirongia and Wanganui, and in the Ureweras.

RIMU-TAIRE-TAWA

This is a relatively small class in a national sense but is well represented on Māori land in Northland. It is a class that contains occasional softwoods with abundant hardwoods. The main softwoods are rimu and miro, while the hardwoods are tairare, tawa and kohekohe.

TAIRE-TAWA

Formally rimu-taire-tawa, this class consists of forest that has had the softwoods removed usually through logging, or occasionally fires. The hardwoods may have been damaged during logging but remain numerous. The commercial potential of this forest class on Māori land is considered limited due to the slow growth rates of the dominant species (tawa and tairare) and the reasonably small resource in existence.

TAWA

This class is composed of former softwood-hardwood forest containing tawa that has been reduced to a hardwood residue by the harvesting or other removal of the softwoods. As with other classes that have been modified by harvesting, the residual hardwoods have often been logged or damaged but remain plentiful and predominant.

Large areas of this class occur on Māori land in the Bay of Plenty and Waikato regions with lesser areas in the Gisborne and Manawatu regions.

Photo 1:

Aerial view of tawa class in the Bay of Plenty foothills. As can be seen, there is an almost complete canopy of hardwoods remaining after the removal of the softwood component. The canopy is also showing signs of dieback, possibly as a result of the earlier harvest and the subsequent exposure of the hardwoods to frost and wind.



RIMU-GENERAL HARDWOODS

This forest class occurs immediately above the altitudinal limits for tawa and tairare so these species are not present. Softwoods, most commonly rimu, but including miro and Halls totara, range from occasional to frequent, with abundant hardwoods.

The most common hardwood is kamahi (of no commercial value at present), much of which has died. The majority of other hardwoods present are of minor or no commercial value. Thus any short term potential for timber production is focused upon the softwoods.

This class is not widely represented on Māori land.

RIMU-TAWA-BEECHES

This class is a rimu-tawa forest with irregular mixtures or frequent pockets of beech. The class occurs mainly in the eastern Bay of Plenty and between the Mokau River and Wanganui in Taranaki.

As a class it is very well represented on Māori land especially in the Bay of Plenty, Gisborne and Manawatu regions.

Several softwood species may be present especially rimu, Hall's totara, miro and sometimes tanekaha. Included in the hardwoods are many of the commercial species currently utilised in NZ.

All the beech species are present in different locations, with red and silver offering the greatest commercial potential.



Photo 2:

Aerial view of rimu-tawa-beech class in the East Cape area. Large emergent rimu are seen in the centre of the photo with beech and hardwoods to the left and right. This forest class has suffered significant damage from cyclones in recent years, resulting in large areas of regenerating forest.

TAWA-BEECHES

This class is largely forest that has been modified from the Rimu-tawa-beech class. The modification has been the removal of the rimu component usually by harvesting or occasionally by fire. In the case of forest that has been harvested there is likely to be some damage to the hardwood and beech component, but as a general rule these trees are still present.

The residual forest offers a diminished potential for timber production in the short term, but often supports good regeneration of timber species.

SOFTWOODS

This class is restricted to high forest where softwoods dominate and to pole stands that are potential high forest. The species present include the major softwood timber species, often in quite high numbers. Thus on a per hectare basis, this forest class can support a significant timber volume.

Due to the limited original extent of this class, and its attractiveness for timber production in the past, the remaining extent of this forest is limited. On Māori land it is restricted to a few hundred hectares, some of which is in the form of regenerating poles rather than mature timber trees.

The relative scarcity of this class may also require some areas to be reserved under the terms of any approved Sustainable Forest Management Plan.

RIMU-MATAI-HARDWOODS

Similar to the softwood class, this class is dominated by rimu and matai, but also contains a hardwood component in the canopy.

Almost all the canopy species present have a commercial value, making this forest class an attractive management proposition. The class is well represented on Māori land and is an important class in the Bay of Plenty and Waikato regions.

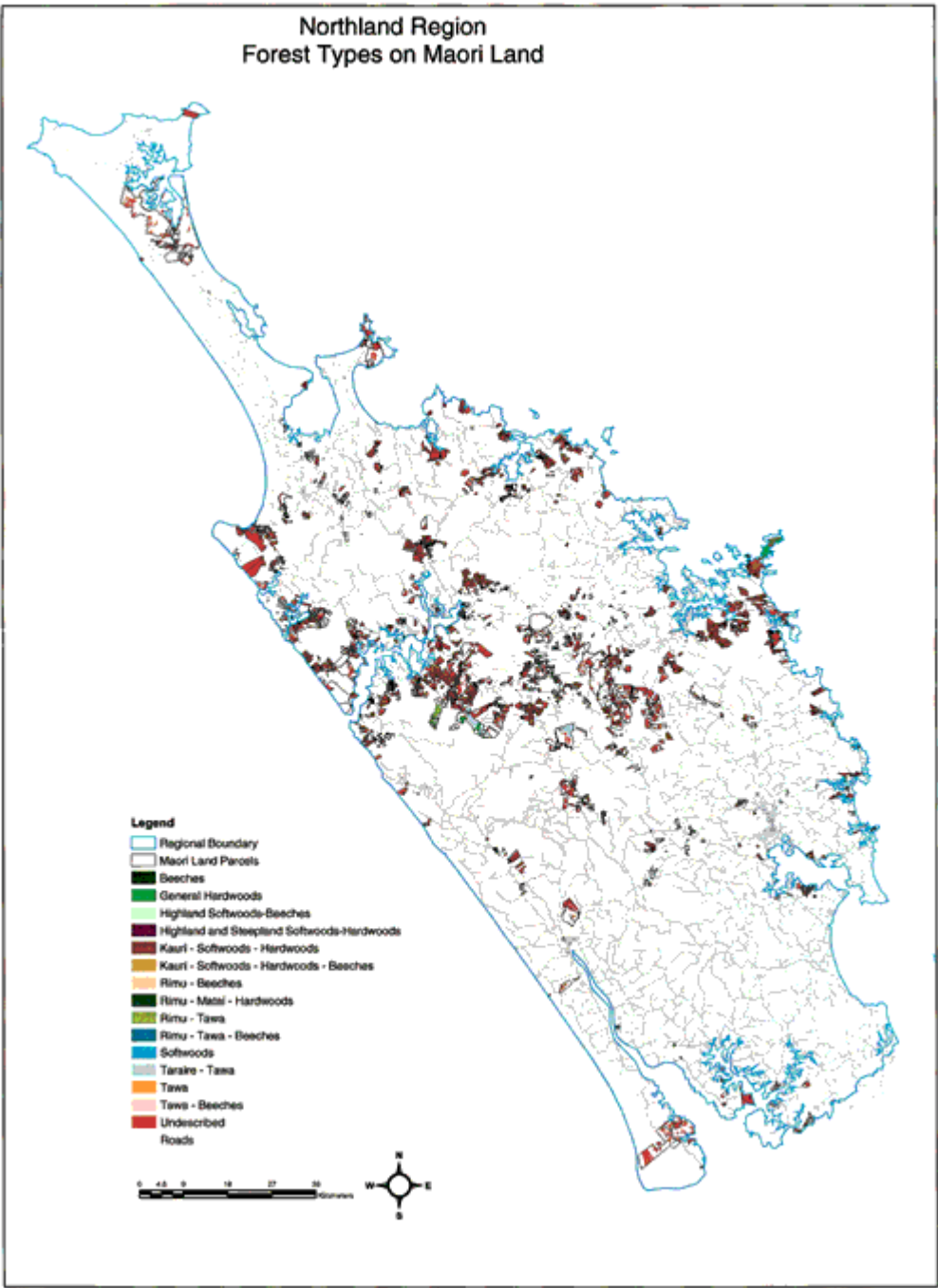
Appendix 2 - Maps – Forest Classes of Māori Land by Region

The accompanying maps have been derived from the LCDB and other sources, and show the following:

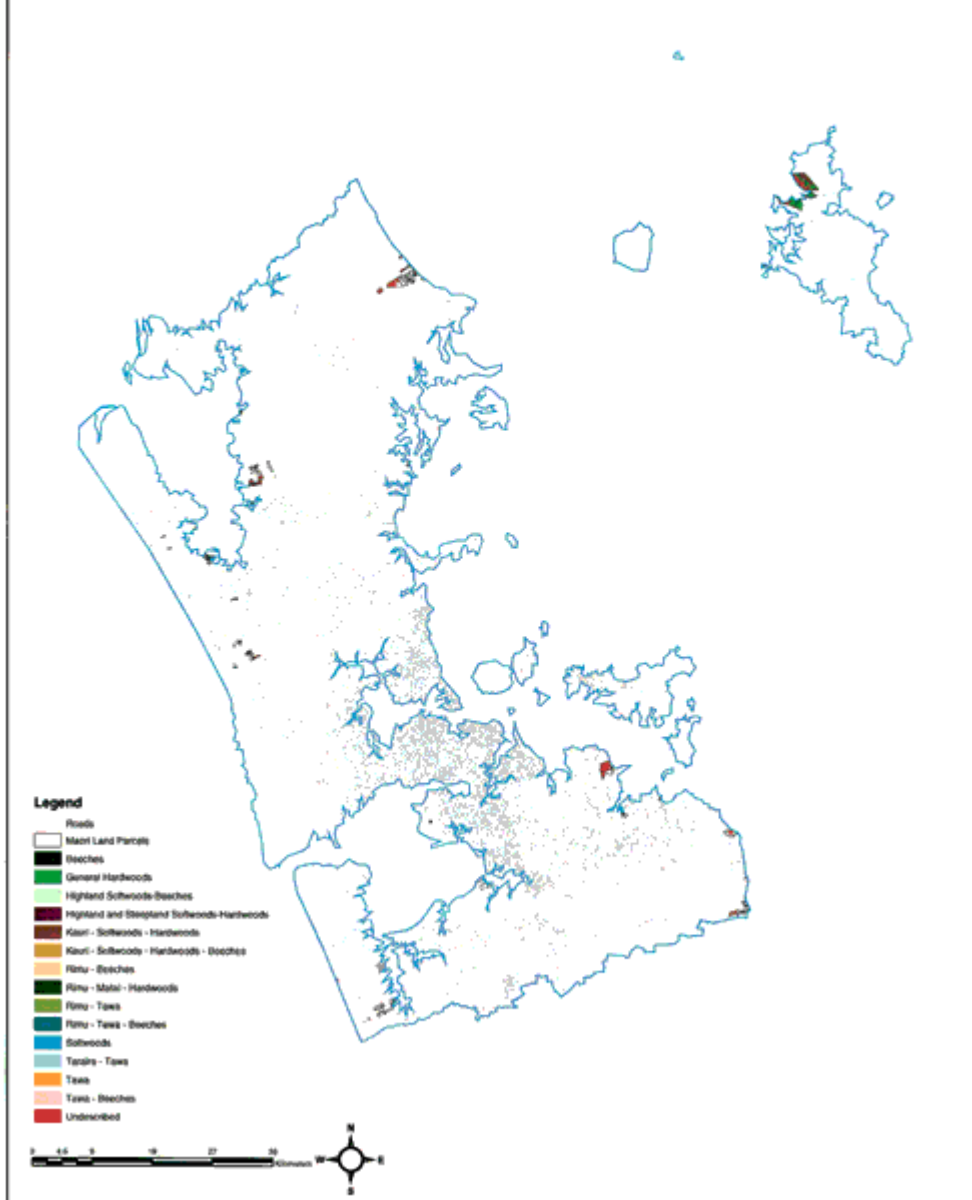
- regional boundary;
- Māori land;
- Māori land supporting indigenous forest by forest class.

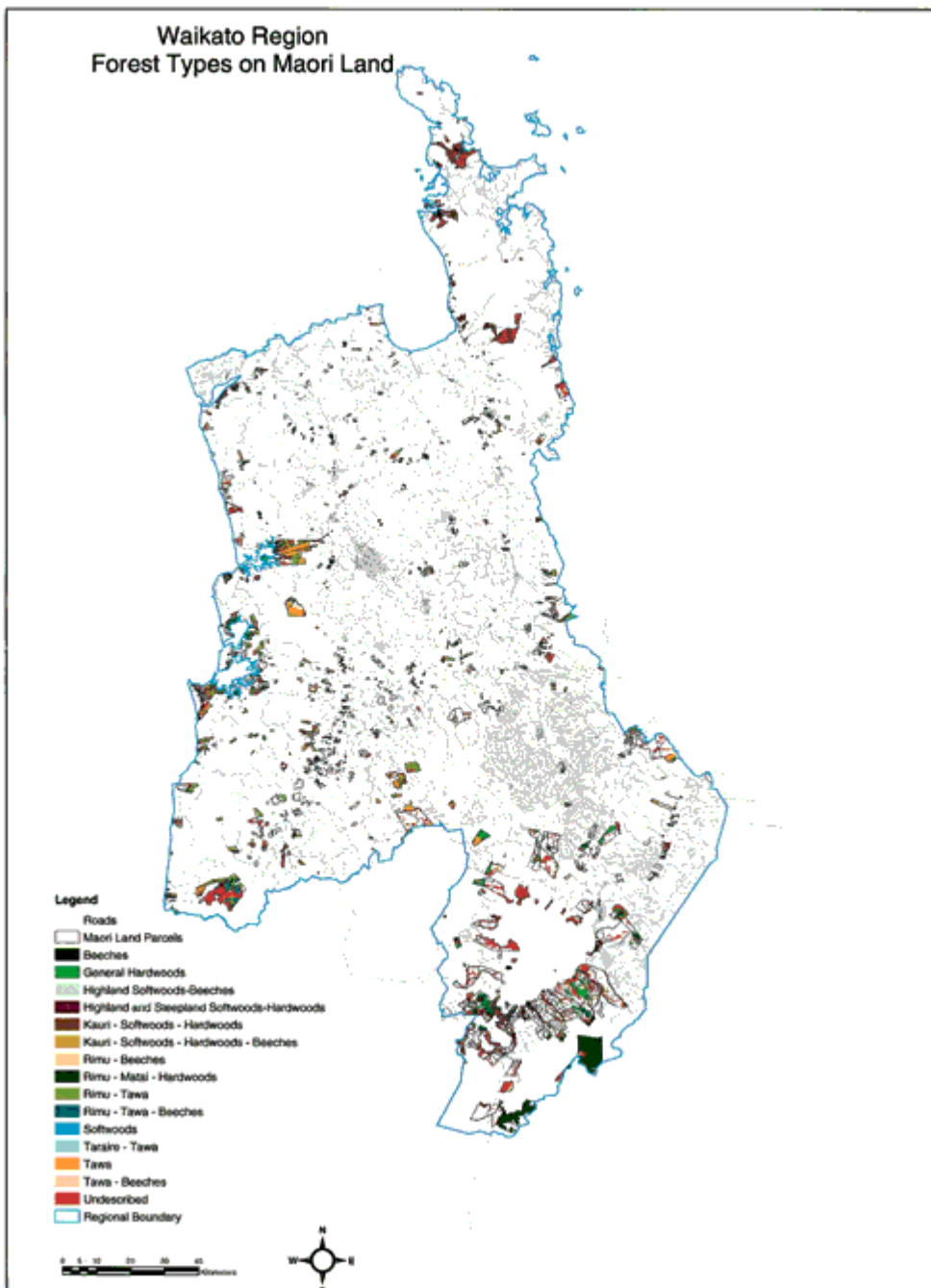
The tables provided in Section 3 of this report relate directly to the information from these maps.

It should be noted that while the boundaries of Māori land are accurate, some of the forest classes shown might have changed since the base data from which the maps were compiled was developed. In particular some areas around Rotorua have been heavily exploited for firewood in recent years leaving almost no residual forest. In parts of the Urewera the softwood component on parts of many of the Māori blocks has been removed. Thus for a block that is shown as rimu-matai-hardwood, there are parts of the forest that are now more correctly hardwood forest.

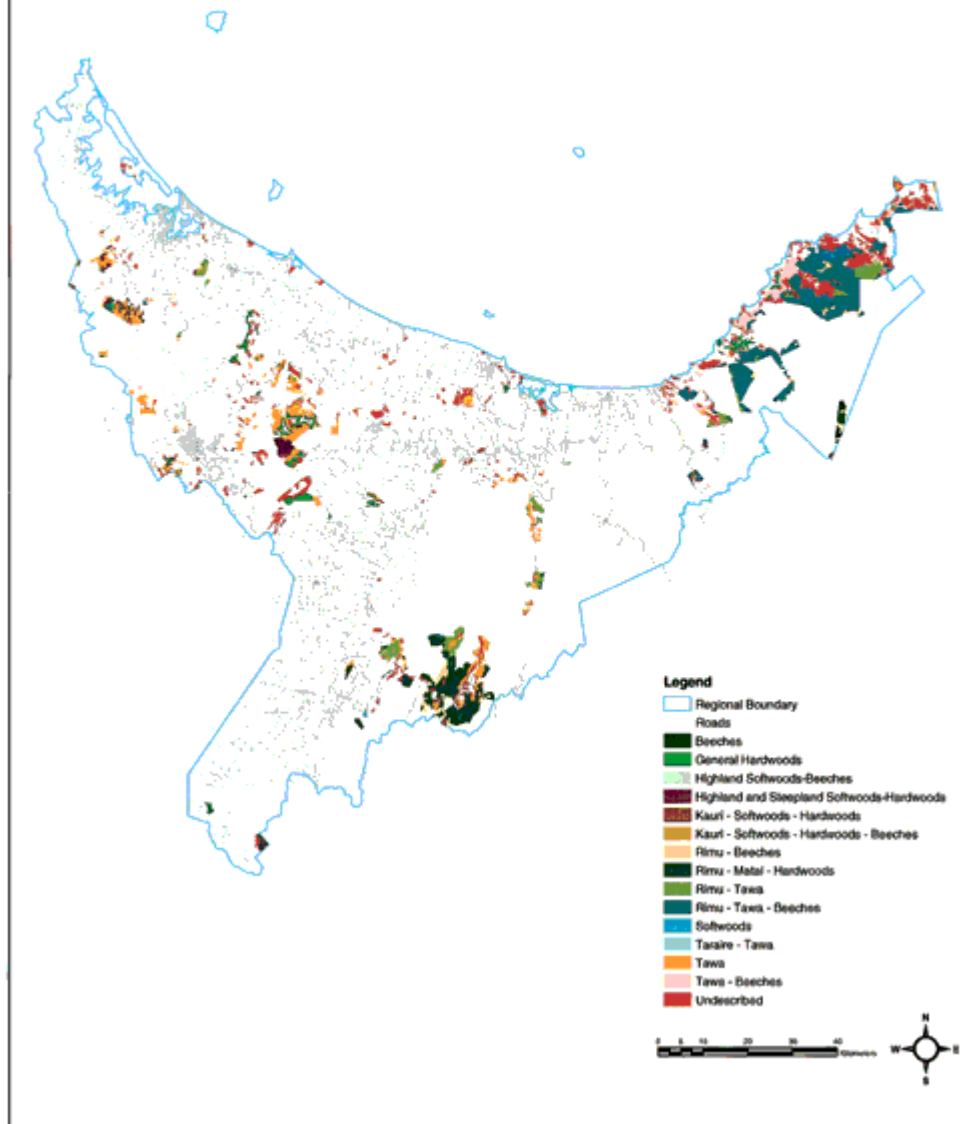


Auckland Region Forest Types on Maori Land

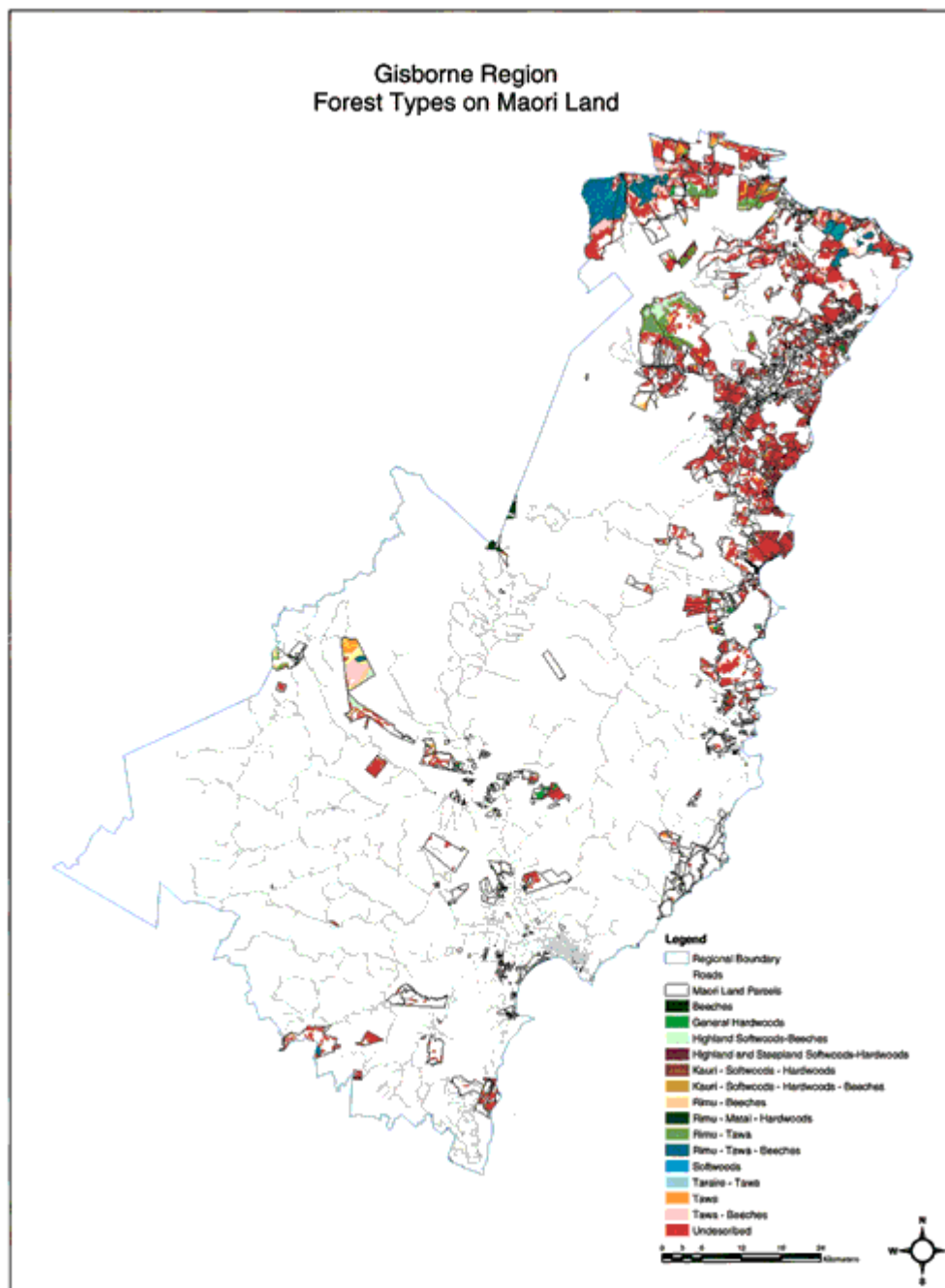


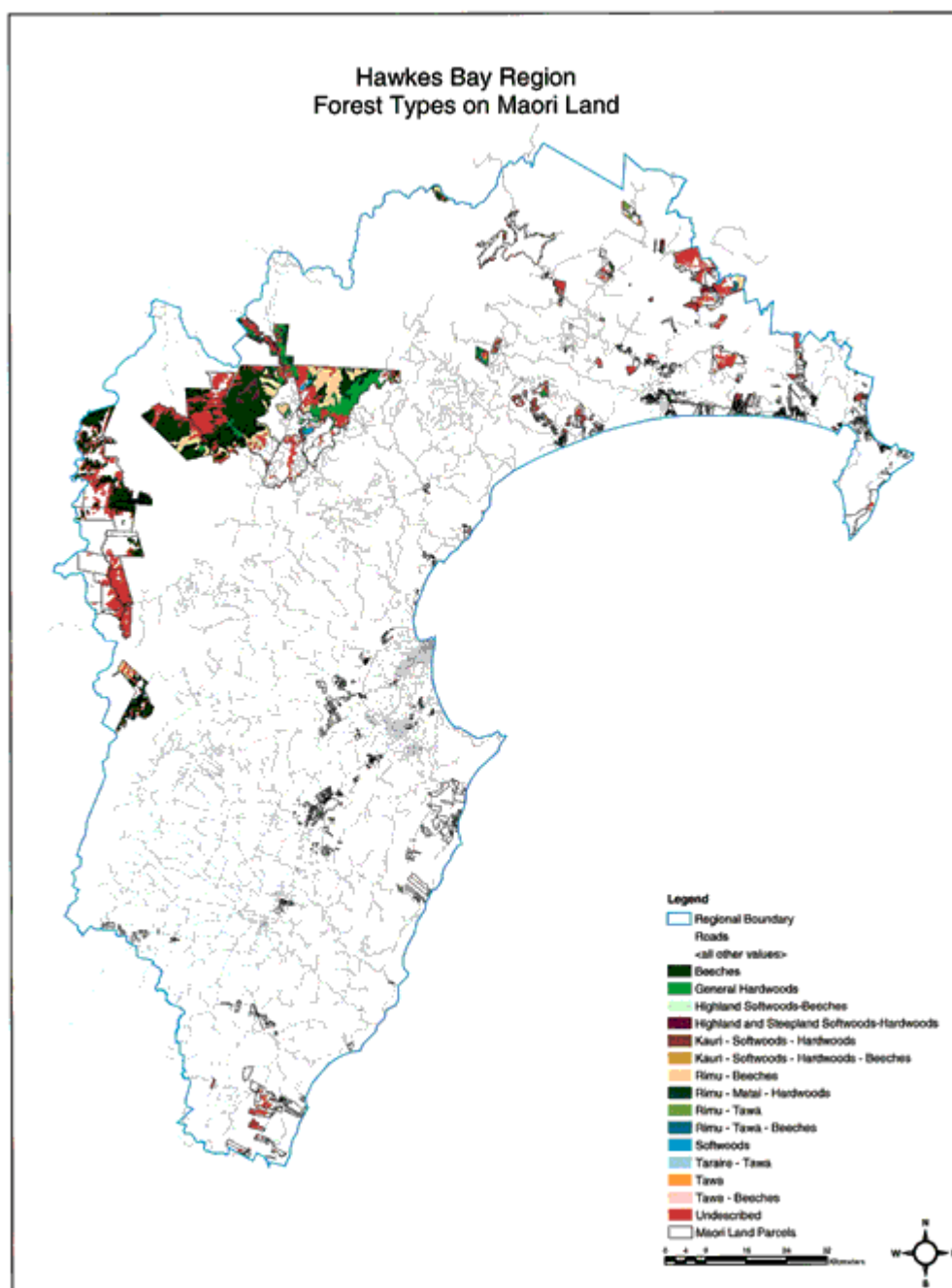


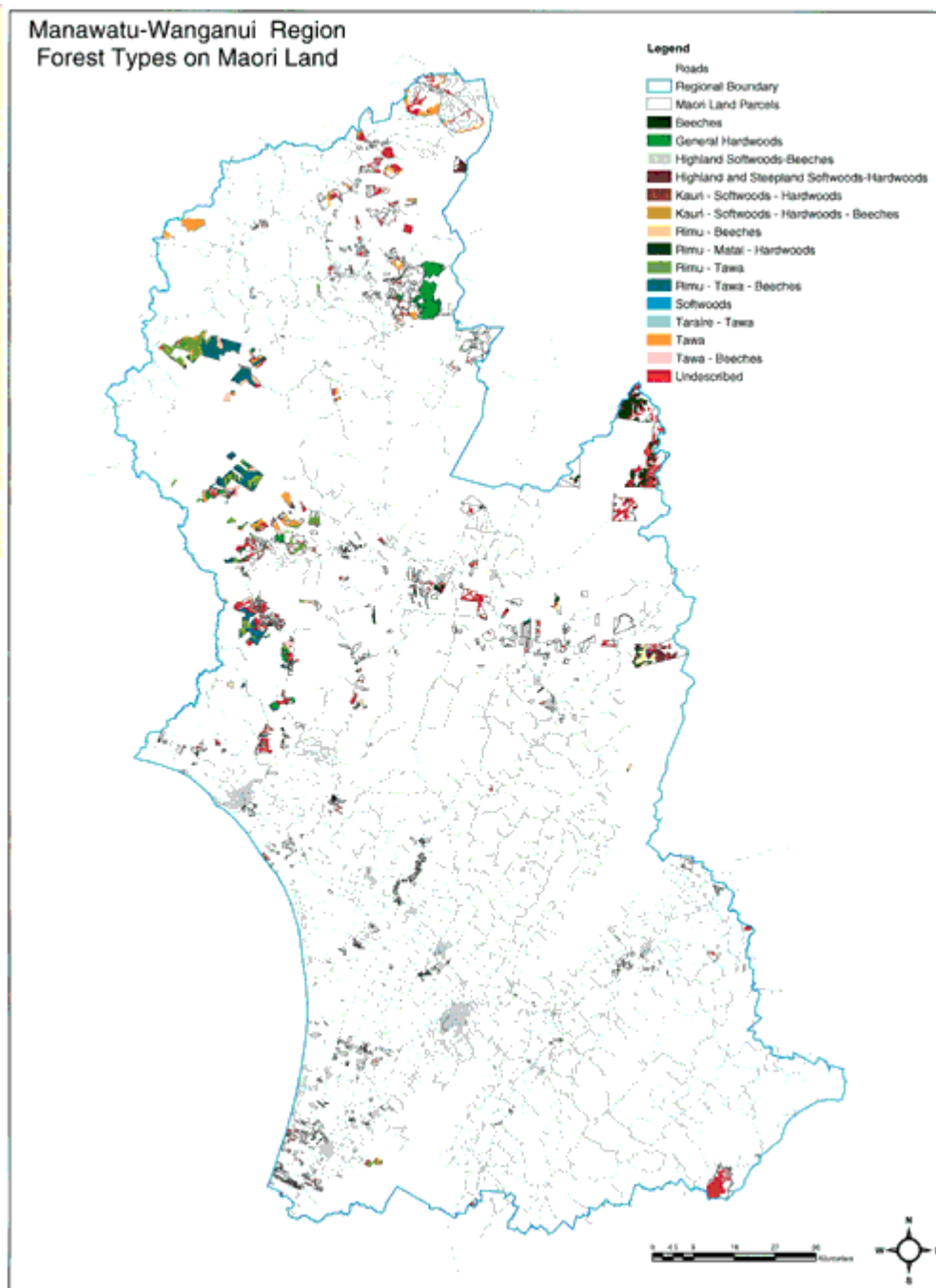
Bay of Plenty Region Forest Types on Maori Land



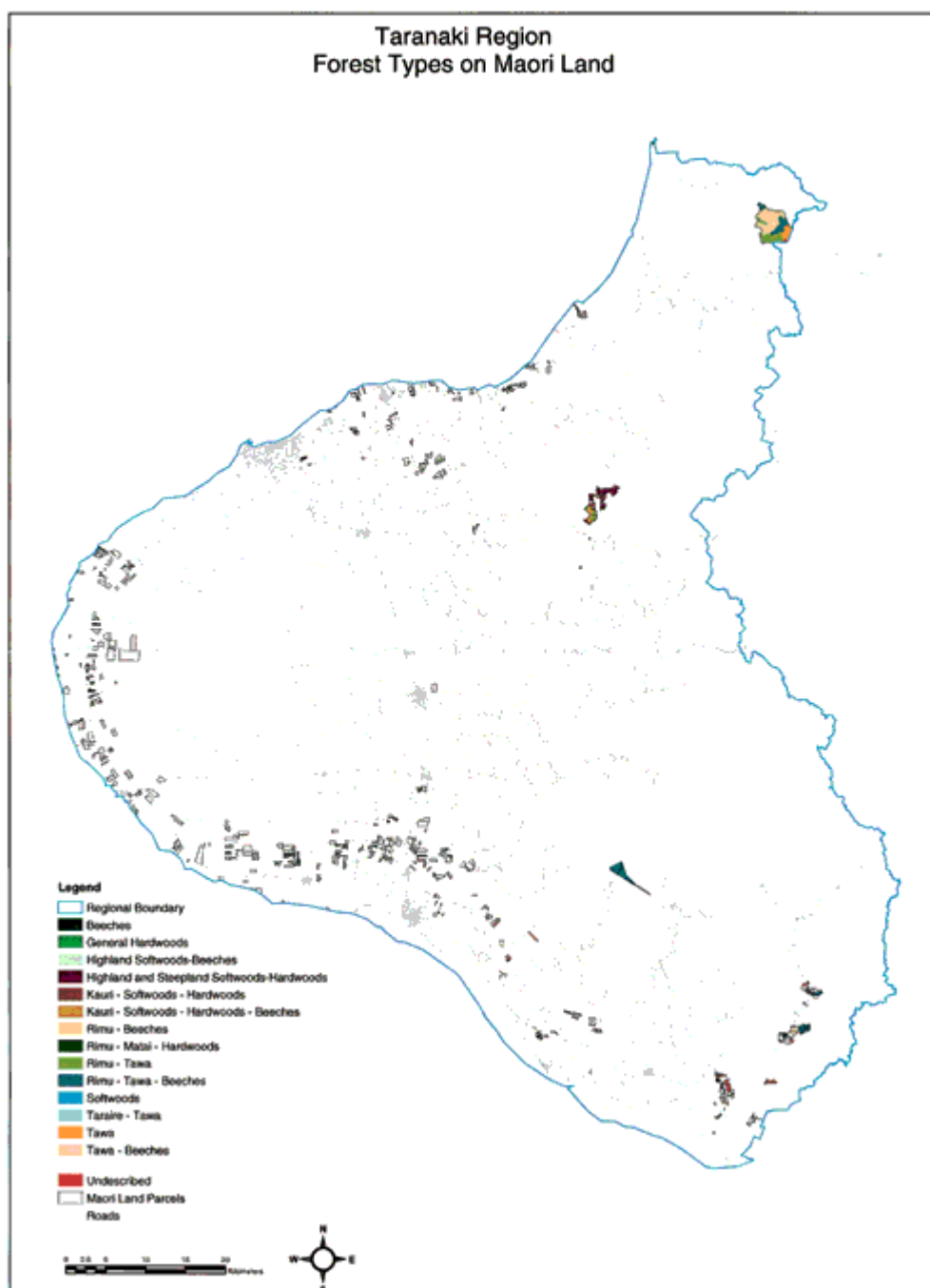
Gisborne Region Forest Types on Maori Land



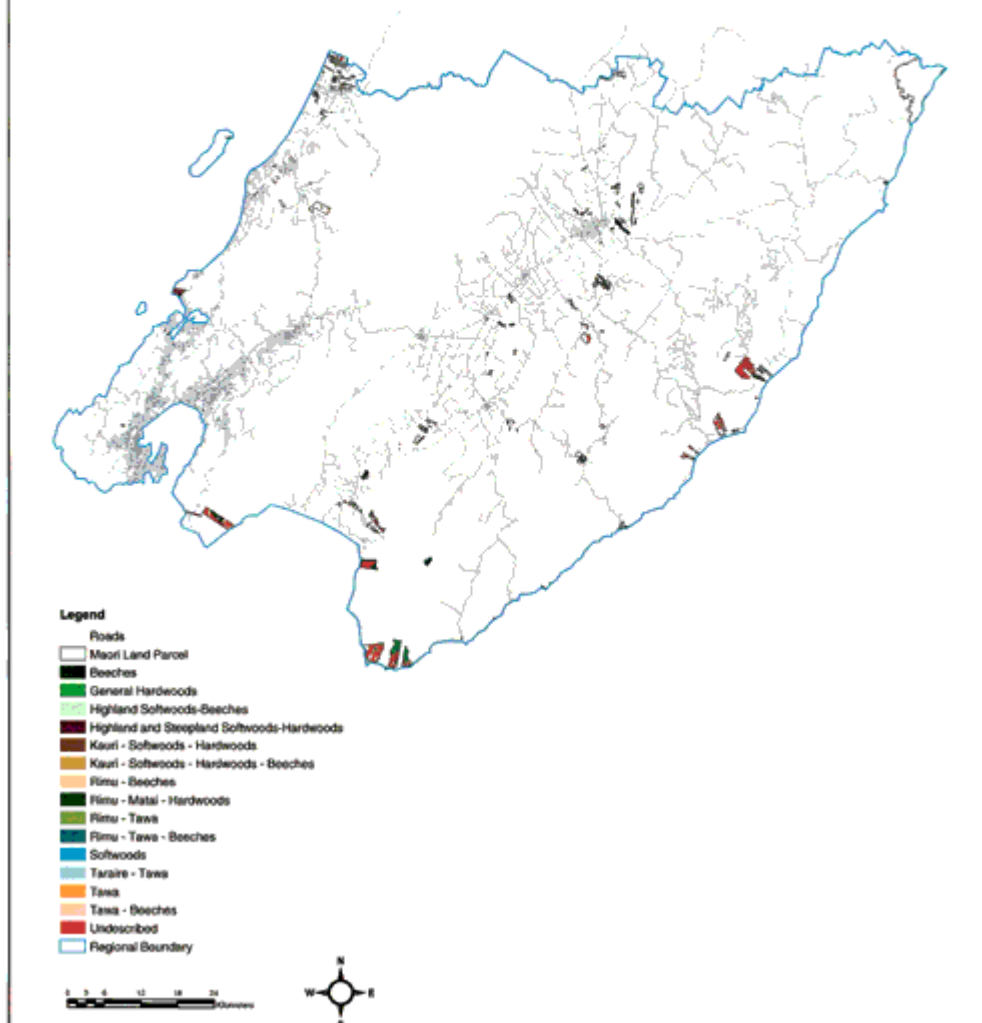




Taranaki Region Forest Types on Maori Land



Wellington Region Forest Types on Maori Land



Appendix 3 People Approached to Provide Input to the Study

Geoff Thorp	Taupo
Dave Pye	Maungataniwha
Bryan McKinlay	Gisborne
Derek Lowe	Murupara
Mike Mohi	Nga Whenua Rahui
RY (Bob) Collins	Rotorua
Bob Grubner	Tauranga
Euan McKenzie	Rotorua
Willy Ngamoki	Omaio
John Nicolls	Rotorua
Kit Richards	Hokitika
Andy Kohiti	Te Whaiti
Tama Nikora	Rotorua
Nu Callahan	Rotorua
Stoney Parpara	Tokoroa
Whaimutu Dewes	Rotorua
John Ruru	Gisborne
David Bergin	Rotorua
Mark Smale	Hamilton
Alan Griffiths	Christchurch

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Appendix 5 - Ground Truthing of Areas Recovered from the LCDB

As discussed in the report, the information provided from the LCDB can contain differences in terms of the forest types recorded (particularly by the Nicholls work) and what currently exists on the ground. It is therefore important that physical inspections of the forest are carried out to ensure the data captured in the LCDB accurately reflects what actually exists on the ground.

For a project of this nature, it would clearly be an enormous undertaking to physically review every area of forest under consideration and the cost would be prohibitive.

With this in mind some areas of forest have been inspected from either the ground or the air to provide an indication of how well the LCDB data reflects what actually exists on the ground.

It should be noted that at a macro level, the LCDB is more than adequate. That is to say that the definition of indigenous forest comes through clearly in the LCDB data. The difficulties arise when attempts are made to classify the indigenous estate by forest type. This incorporates other data sets that are not as current as the LCDB information, and can be open to either interpretation (e.g. as to what is deemed to be merchantable) or modification. An example would be through physical intervention in the forest (e.g. harvest of some or all of the timber).

The ground truthing undertaken was concentrated in those areas where the greatest area of Māori owned forest was located (and hence the more likely areas to support a sustainable forest management industry).

Aerial inspections of parts of the Urewera and East Coast forests (in both the Gisborne and Bay of Plenty regions), some of the Bay of Plenty forests and some South Auckland areas were undertaken.

The aerial inspections were supported by ground observations of some forest areas in the Gisborne Region and the Urewera and Rotorua areas.

The general outcome of this work was to reduce the volume that may be available for management due to either previous harvesting that had occurred or the effects of events such as Cyclone Bola and Cyclone Bernie. In many areas these adverse weather events have resulted in a significant reduction in the standing volume over parts of the forest, leaving other parts reasonably intact.

These events have occurred subsequent to the Forest Class work completed by Nicholls and hence the forest classes can over-state the volume present. Where this has been evident, adjustments have been made within the report to the standing volume for that region.