

MARLBOROUGH REGIONAL FORESTRY FOREST MANAGEMENT PLAN

For and on behalf of Marlborough Regional Forestry

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1 Management Plan Introduction

This management plan has been produced in accordance with our commitment to the good Environmental Principles. It contains Merrill and Ring's general approach to forest management applied to certified forests under our management. Our management of Marlborough Regional Forestry (MRF) is covered in this plan.

1.1 Management Objectives

The primary management objective of FMU is to **maximise investment returns by increasing the net present value of the estate**. This will be achieved by progressing the following secondary objectives:

- Optimising biological growth to maximise value,
- Optimising tree crop expenses to maximise value,
- Maximising residual stumpage,
- Managing legal, commercial, and physical risks,
- Ensuring that the forest asset is accurately described and modelled,
- Operating in a sustainable and ethically responsible manner.

2 Related Documents and Systems

1. Integrated Pest and Weed Management Strategy
2. M&R Environmental Manual
3. M&R Health and Safety Manual
4. M&R Emergency Plan
5. Monitoring Plan
6. High Conservation Value Assessment and Management Plan
7. Complaints and disputes process
8. Chain of Custody Procedure
9. Contracts and Prescriptions
10. Geographic Information System (GIS)
11. Stand Records System (Geomaster)
12. Tigermoth
13. Forest stewardship council / Merrill and Ring policies and procedures.

3 Forest Description

3.1 Forest Statistics

The Blenheim Estate of 5,011 hectares consists of 6 Forests, located in New Zealand's Marlborough region. Of that total, 3,355 hectares are occupied by standing crop or are in the process of being replanted following harvest, and together are classed as the actual productive forest area. 1,438ha hectares is indigenous vegetation (ranging from stream side reserves, native scrub to tall forest) managed for conservation purposes. The balance is considered unstocked (unplanted gaps in stands including skids, firebreaks, etc.) or unplantable (roads, water bodies, transmission corridors, etc.) and land that is due to be subdivided. *Pinus radiata* is the predominant species and make up 98% of the production forest. The 2% remaining is made up of minor species, such as eucalyptus and Poplar, *Pinus Patula*, Douglas fir and *Macrocarpa*.

FOREST NAME	OWNERSHIP (HA)					PREDOMINANT SPECIES
	Joint Venture	Iwi Licence	Crown Licence	Freehold	Forestry Right	
KOROMIKO		182		805		P. RAD
STRACHAN PEAK				369	3	P. RAD
PUKAKA				1052		P. RAD
SPEEDS	16.5		419	102		P. RAD
WAIKAKAHO				953		P. RAD
PARA				1104	6	P. RAD
TOTAL	16.5	182	419	4385	9	

3.2 Forest Layout

The property is large and complex. It lies on the north bank of the Wairau River, either side of the Kaituna Valley. It is foothill country.

There are four tracts of land, and six forestry blocks. The largest tract is to the east of the Tuamarina Valley and includes three forestry blocks: Koromiko, Strachan and Pukaka. It encompasses the south end of the Robertson Range, about half of the Pukaka Stream catchment and foothills east of the Tuamarina River. On the western side of the river are two blocks: Speeds and Para. They are composed of hill country rising from the valley floor to the mountainous conservation land behind. To the south-west is the Waikakaho Block, an area of hill country that spans both sides of the lower Waikakaho River.

3.3 Socio Economic Conditions

Over the last few decades the Marlborough region has faced a dramatic change. Historically the rural landscape comprised of sheep and beef farming on the flats with forestry in the hills, now the poor gravely soils lend themselves to viticulture. The Marlborough wine industry accounts for 2,350 direct jobs and an 2,500 indirect jobs to support the industry. Overall the Wine sector provides 10% of employment to the region¹. In contrast it is estimated that the NZ forest industry as a whole provides 9,500 jobs nationally, with up to 300 jobs in the Marlborough region².

71,084 ha of New Zealand's production forests are located within the Marlborough region with a combined Nelson / Marlborough region of 166,230 ha³. This equates to 9.7% of New Zealand's production forests. Forestry is an important industry to the New Zealand economy, with expected export earnings of \$5.66 billion with an increase to \$6.27 billion in 2021. With 8% of the total cubic metres shipped from Picton and Nelson.

In contrast the viticulture industry has a combined area of 24,000 ha of intensively farmed annual grape crop, which equates to 75% of the wine produced in New Zealand⁴.

At the last census the population of Marlborough was 43,400, or 1% of New Zealand. The majority of the population is made up those claiming European ethnicity (89.2%) followed by Maori (11.5%), this is lower than the New Zealand average (14.9%).

With a relatively low population and industry vying for workers, contractors find it is difficult to attract employees and retain them, this falls in line with an unemployment rate of 4.4%, which is lower than the national average of 7.1%. The unemployment rate for Maori is also lower in Marlborough than for the national average, 11.1% versus 15.6%.

Tourism is an important part of the Marlborough economy with visitors enjoying the Marlborough sounds, fine sunny weather and the wineries playing a key role in bringing tourists to the area, with annual spend of \$387 million⁵.

¹ <http://www.wine-marlborough.co.nz/about-marlborough/regional-overview-presentation/>

² <https://www.nzfoa.org.nz/resources/file-libraries-resources/discussion-papers/602-nzierreport-2017/file>

³ National Exotic Forest Description as at 1 April 2017 – Published by MPI

⁴ <http://www.wine-marlborough.co.nz/about-marlborough/key-statistics/>

⁵ <http://www.mbie.govt.nz/info-services/sectors-industries/tourism/tourism-research-data/monthly-regional-tourism-estimates>

3.4 Profile of Adjoining Lands

Merrill and Ring manages forests predominantly on private land within Marlborough. Land adjoining the FMU is used for a broad range of purposes, including reserves, agriculture, residential, recreational uses and forestry.

4 Environmental Management

All Merrill and Ring forest operations are undertaken in accordance with the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017, relevant Regional Plans and National legislation and other voluntary requirements, including certification obligations for THE Forest Stewardship Council.

M&R is committed to maintaining a high standard of environmental and social performance throughout its forest plantation activities. The company recognises the importance of the environment and society for the future of its business, for the future of its people and for the future of the communities in which it operates (See Merrill and Ring NZ Environment and Social Policy). M&R operates an environmental management system primarily designed to comply with the Resource Management Act, NZ Environmental Code of Practice for Plantation Forestry, Marlborough District Council plans and the National Environmental Standards (NES).

Environmental management also includes the identification and management of important values such as rare, threatened and endangered species, protection of reserve areas and waterways, carbon management and the control of pests and weeds. The social perspective includes ensuring that contractors and their workers adhere to health and safety standards, and that engagement and consultation with neighbours and stakeholders in respect of operations on the forest is undertaken. The cultural perspective includes consultation with the appropriate iwi and ensuring that cultural and historic sites and values are identified and protected. The economic perspective refers to the selection of a species, management and harvesting regime, which provides an adequate return on investment while minimising the risks of investment.

4.1 Environmental limitations

There are a number of environmental limitations to plantation forestry within the Marlborough region but most are related to the steep slopes and rugged nature of the topography. The soils within the region vary with some being more erodible than others. Under the NES most sites within MRF include areas designated high under the erosion susceptibility classification.

These sites provide a challenge to harvesting operations, requiring tracks to be end-hauled and close supervision of water controls to manage sedimentation.

Permanently flowing streams limit stream crossing constructions dependant on fish spawning and so careful harvest planning needs be done to ensure operations are not occurring within certain time constraints.

North-westerly winds are a common feature to Marlborough and can cause significant windthrow within forests.

4.2 The Environment and Forestry Activities

Forestry activities encompassing silvicultural and harvesting operations can have both beneficial and adverse impacts on the environment, depending on the quality of environmental and operational management. Well-managed forests can:

- Enhance water quality
- Stabilise and conserve soil
- Provide a buffer against flood flows during storms,
- Shade waterways for fish life
- Contribute to biodiversity and wildlife habitats
- Manage carbon appropriately
- Provide recreational, economic and social benefits to the community.

On the other hand, poorly managed forestry activities can have harmful impacts. M&R aims to identify the potential adverse impacts that its activities may have, and to institute environmental safeguards to prevent or to minimise the adverse impact from its operations.

In general our approach to environmental management falls into two inter-connected categories:

1. Compliance where M&R work to ensure rules are met and values are protected from our operations.
2. Active management of environmental values, specifically:
 - a. Biodiversity, including of:
 - i. Rare and threatened species management
 - ii. Management of conservation areas
 - iii. Integrated pest management
 - b. Waterways and land
 - c. Carbon
 - d. Herbicide management
 - e. Cultural and historical sites.

4.3 Compliance

Compliance is focused on meeting District Council rules and industry best practices. Operational compliance is managed by the relevant M&R staff member and contractor from planning through to post operation remediation. Compliance is then audited by an M&R staff member and territorial authorities. The Technical Forester provides an overview of operational environmental management and in particular plans audits for high risk operations and council resource consent conditions.

M&R also operate a system to identify any site specific environmental risks such as streams, adjacent natural vegetation, archaeological sites, etc., which may not be covered by following the generic BEPs. Depending on the operation this is completed in the harvest planning stage and requires the Harvest Co-ordinator to identify environmental or social risks and then implement measures to minimise potential adverse effects. For establishment operations this is completed as part of the site assessment. Furthermore, there are safeguards should an environmental risk be discovered during the operation such as archaeological sites.

4.3.1 Risk Management When Planning and Undertaking Operations

At the beginning of the planning phase of operations staff determine what values may be at risk from an activity. This is undertaken through our Harvest Planning Checklist or Establishment Plan where the operation planner considers if the following values may be affected and if so how management can take these into account:

- If a Resource consent required
- Archaeological sites present
- Adjacent to Native areas - Rare species are present.
- Adjacent to (within 10m – i.e. the Riparian Zone) a perennial stream, river, lake or wetland.
- Harvesting undertaken by hauler.
- Adjacent land owners.
- Public utilities such as powerlines, public roads, etc.
- Registered easements
- Maori or cultural issues.
- People are likely to be adversely affected by the proposed operation.
- Landscape sensitivity or other restriction indicated in the GIS.
- Covenants or easements.

The consequent action will depend on the values and risks identified and may include engagement with affected stakeholders, a change of operation or approach, protection measures, monitoring or following one of our Best Management Practices.

A Prescription is developed prior to the commencement of operations which details the work requirements and standards to operators. Any conditions for the activity, details about the site terrain, stand data, a description of the job, specific environmental, health and safety requirements, as well as any specific reporting requirements are incorporated into the prescription. Reference is also made, where necessary, to the company's Geographic Information System (GIS) or other key document or procedure.

Environmental hazard identification is completed, and control measures are documented and communicated to the operator along with the Prescription. During operations, operators are required to follow the Prescription. Where there is potential for soil loss or sediment discharge onto sensitive environmental sites, the operator is required to implement correct water control procedures.

4.4 Environmental Impacts and Safeguards

In order to manage Environmental impacts Merrill and Ring undertakes environmental assessments at the landscape level and on a site or operational specific basis. It is recognised that environmental components such as soil, water and underlying geomorphology are an essential part of the forest and broader ecosystem and need sensitive management and safeguarding.

Environmental safeguards have been developed into management prescriptions and operational procedures, based on a combination of company assessments, external assessments and operational experience. Each operation is individually assessed and a plan produced detailing site specific management prescriptions.

Compliance with legal and other regulatory frameworks is monitored both internally and externally through Council Compliance Officers.

The FMU has numerous operational constraints that arise from environmental compliance. Merrill and Ring maintains a Geographic Information System (GIS) which records spatially information relevant to the protection and maintenance of production, environmental and cultural values. The GIS delineates exclusion and reserve areas and contains environmental information such as known localities of threatened species and additional biodiversity values, Erosion Susceptibility Classification, stream catchments, stream widths and visual landscape features. Areas of productive plantations are also incorporated into the coverage. This information is used during operational planning primarily in the development of site specific operational management prescriptions.

Sedimentation is a key component that forest operations must manage and limitations around operations are directed by the Erosion Susceptibility Classification, which is legislated under the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017. This legislation also sets out key requirements forest managers must meet when managing operations during fish spawning and nesting periods for protected birds. Working around streams and various set backs are legislated nationally to ensure stream banks are protected and slash is removed from waterways to prevent damming.

Merrill and Ring have developed an Integrated Pest and Weed Management Strategy, and an Environmental Management Manual (EMM) to protect indigenous species and protect the soil and water resources within its estate.

The Integrated Pest and weed Management Strategy allows for the containment and control of unwanted pest species which has a direct effect on the welfare of remaining indigenous resources within the estate. For example the pro-active control of cats helps to protect indigenous native birds.

It outlines the types operations where chemicals are used and the mechanisms for recording the type and quantity of chemicals used in forest operations through the use of a chemical register and

chemical reconciliation system. The Environmental Manual and also provides guidelines and protocols for the proper use of chemicals and environmental incidents.

M&R concedes that under current best practice, chemical applications are necessary to procure even and quality tree-crops as well as prevent increment loss through the competitive effects of weeds and the destructive effects of animal pests such as possums. However M&R will always actively seek management practices that reduce the amount of chemical entering the environment in its estate. This is of benefit not only to the environment but also M&R as chemicals are expensive to procure and apply so reducing these activities would have a substantial financial as well as environmental benefit to the FMU

The EMM outlines company procedure and policy on best practice guidelines in road construction, harvesting and maintenance operations that change soil or landscape properties and affect the quality of water flowing in streams and rivers (as well as the downstream effects).

5 Maintenance and Enhancement of Forest Services

Forests provide a number of services that enhance our environment. These services are managed in a way that will maintain or enhance them, and include biodiversity, waterway management, soil conservation and social and economic benefits.

5.1 Biodiversity

5.1.1 Wilding Control

In response to the proposed Marlborough Regional plan Merrill and Ring NZ do not plant Douglas fir, which is a high risk wildling spread species in the region. M&R are committed to managing the spread of wildlings into reserve areas and undertake an annual control program. Control measures are dependent on the size of the trees involved, but generally involve a combination of poisoning, thinning or manual plant pulling.

Other wilding species and pest plants are dealt when they occur in reserve areas or in accordance with Regional Pest Plans.

5.1.2 Riparian enhancement

Prior to forest establishment Kites Creek, in the Waikakaho forest block, was grazed and little native vegetation is present along this waterway. Native plantings are planned for 2019 and 2020 along the creek riparian area with the goal to provide a permanent vegetation cover to the stream. This will allow the water temperature to remain more constant and help manage the stream health.

5.2 Waterways and Soil conservation

Our attention to waterways (including hydrological flows) is imbedded in our general practices, in particular Best Environmental Practices. These take into account regional and National rules and regulations that cover water quality and yield, erosion, compaction and other mechanisms to protect land and water values. Some key factors or process M&R use to protect land and water values include:

- Retaining a mosaic of well spread age classes that minimise effects of forest operations. This includes reestablishment.
- Through application of BEPs that, for example, prescribes re-plant setbacks and water controls for earthworks that relate slope.
- Operational planning where high risk situations are identified and taken into account as operations are planned.
- Operational audits that focus on soil and water values.
- Engagement with regional authorities to ensure compliance with rules and permitted standards and advise on appropriate activities in high risk areas.
- Increased setbacks above what is required under BMPs where streams are at risk of felling debris
- Riparian planting or managed native reversion along streams

5.3 Social and Economic benefits

Marlborough Regional Forestry is a located close to Blenheim and Picton, so is strategically placed to offer access to the public for hunting, walking, trail bike riding, firewood gathering, horse riding and mountain biking. Access to the forest is by way of a permit and is out lined in the Forest Access Policy.

The FMU provides economic benefit to the local community though direct employment of contractors and indirect employment of industry support services to contractors and employment of staff at local timber manufacturing, to which logs are supplied. In addition, as the enterprise is owned by Marlborough District Council and Kaikoura District Council, profits are feedback in to the local community by way of public projects and services.

5.4 Forest Resource

Forest establishment is key to ensuring a future crop to harvest, so care is taken to implement Best practice for site prep, mechanical and chemical, planting and release spraying. Quality control and survival surveys are a key tool in ensuring the FMU is well stocked. Foliage sampling is undertaken to ensure deficiencies that could impact on crop growth are identified and remedied. Good silviculture leads to increased asset value, the FMU is committed to pruning areas that yield high growth rates and undertake to prune the best crop. The pruned component of the standing crop has the benefit of supplying the local market. Thinning the crop is key to generating good standing crop volume at the end of the rotation, and is programmed each year dependant of the age class.

6 Forest Management & Operations

6.1 Introduction

M&R manages the FMU in the Marlborough region of New Zealand to provide logs for its customers derived from fast growing, sustainable *Pinus radiata* forestry plantations. The extent to which the business will prosper in the future depends greatly on the quality of the natural and physical resources that provide the foundation for our business. The company is committed to sustaining the natural resource base, not only for the future of the company, but also for the future of the communities in which M&R operates.

The forest estates are managed consistent with the forest management policy and to meet the five Year Plan, in particular to ensure that the management of the forest is sustainable, from an environmental, social, cultural and economic perspective.

M&R aims to intensively manage the forest estate to supply a range of log products. Intensive management involves best practice land preparation, planting of tree stocks, risk management, forest health and thinning.

The evaluation and selection of a silvicultural system for the FMU, is based on recognised forest practices and guidelines, taking into account management objectives for the specific site. The primary objectives in selecting a fit for purpose silvicultural system is to maximise the value of wood products grown and harvested from the land whilst maintaining the long term productivity of the land and other environmental values.

In determining the appropriate silvicultural system, a number of factors need to be considered. These include, but are not limited to:

- Plantation management objectives;
- Species and regime selection;
- Rotation length;
- Site environmental factors;
- Natural and cultural values;
- Fire management requirements;
- Commercial / marketing factors;
- Plantation investment requirements;
- Lease agreement terms and conditions;
- Operational constraints; and
- Community expectations.

6.2 Species Selection

Pinus radiata is the forest species selected over decades of trials in New Zealand and is grown primarily as a sawn timber resource and provides logs to local mills. It is frost resistant, tolerant of dry sites and capable of satisfactory rates of growth on less fertile sites. Other minor species can be grown in the regions and the FMU contains minor areas of *Macrocarpa* and Douglas fir. However, under the Marlborough District Plan Douglas Fir is no longer permitted to be planted.

6.3 Establishment and Silviculture

The following table outlines the typical establishment and silvicultural regime currently practised in the FMU. The regime often varies depending on site (terrain, soil, elevation, weeds) and risk (environmental, community, safety) factors.

Year	Operation	Description
-1	Land preparation	On flat to rolling areas - line rake / windrow slash
-1	Weed control	Prior to planting generally with a mix of metsulfuron and glyphosate by air.
0	Planting	1,000 stems per hectare <i>pinus radiata</i>
1	1 st Release	Undertaken to release from weed competition and to reduce frosting. Usually with a mix of hexazinone and terbuthylazine applied by ground. Where steep terrain makes it unsafe to apply by knapsack, it is applied aurally.
1	Regen pull	Only on areas with high regeneration. Undertaken by hand.

2	2 nd Release	Only on high weed growth. Undertaken to release from weed competition. Usually with a mix of hexazinone and Terbutylazine applied by aircraft. Other herbicides and application methods used dependant on weed species and risks.
3	Boron treatment	Following foliage sampling, areas identified that are deficient in boron receive an aerial application of ulexite
6	Prune	Determined on a case by case assessment
10	1 st Thin to waste	10m mean crop height
All	Pest control	Generally undertaken by permit.
28	Harvesting	Dependant on stand characteristics. See harvesting for more detail.

6.4 Establishment

Each year M&R examines the areas available for establishment to determine land preparation, which includes cultivation, raking, skid rehabilitation, and weed control, taking into account the needs of each site.

The establishment phase is crucial to obtaining a quality crop. As such we aim for high seedling survival and initial growth rates in order to compete with other on-site vegetation. Key objectives at establishment to ensure a good crop are:

- High quality and healthy tree stock properly handled to the site
- Cultivation of the soil;
- Placing the tree roots in the soil in a position that encourages stability;
- Reducing competition from other vegetation in the first years of growth.

6.4.1 Weed control

Herbicides are used for weed control and are usually confined to the year of planting and the following year. Successful establishment means that herbicides are only required to be used up to two times every 25 to 30 years. Applications by aircraft are carried out prior to planting and in secondary release programs where broom is present. Due to the highly erodible soils in the Marlborough region spot spraying after planting is typically undertaken in most forests areas. Areas that pose risks to the health and safety of our contractors are release sprayed aerially.

Herbicides are selected based on their ability to desiccate and/or kill the target weed species at the same time as being safe to use (i.e. non-toxic to non-target species, such as animals and humans) and break down quickly in soil and water to a safe organic substance. Application plans include strategies to protect watercourses, wildlife habitats and areas of native forest.

6.5 Silviculture

The basic silviculture regime for radiata pine is thin to a minimum of 500 stems per hectare. Depending on site productivity pruning maybe undertaken, with these stands thinned to 350 stems per hectare.

Stands are thinned in order to provide the optimum growing space for selected crop trees enabling us to maximise their economic return. The aim is to thin out the smaller or poorly formed trees, leaving the bigger, better formed trees to grow on. Thinning to waste operations results in the thinned stems being left on the forest floor to decompose. Due to the type of terrain the forests occupy Production thinning is not a viable option.

Other species that make up the estate include Douglas fir and Macrocarpa. Thinning age differs for these species, with Douglas fir being thinned at age 15 and the macrocarpa at age 10.

6.6 Pests and disease

Currently there are no diseases regularly treated within the forest estate. Merrill and Ring have commenced independent Annual Forest Health surveys to ensure any disease outbreak is identified and managed.

Pests in the forest estate include possum, which can attack the growing tips of trees causing stem malformation and die-back. Furthermore they eat native tree species and predate native wildlife in conservation reserves and parks. Rabbits and hares can also be a pest in the first two years after planting, as they can eat the tops of young trees. Due to historical work undertaken by the Animal Health Board possum numbers are quite low, and any additional control is currently undertaking using traps. Pigs and deer are controlled through hunting.

6.7 Monitoring of Silvicultural Systems

The plantation monitoring program, carried out to ensure acceptable stocking, performance, and quality, involves surveying and assessment of the recently established planted area up until age 3 to ensure successful reforestation has been achieved at these critical early stages of the plantation life cycle. Monitoring includes:

- Site preparation quality control;
- Planting quality control;
- A survival assessment no more than 12 months post establishment to ensure adequate stocking levels have been achieved; and
- Annual plantation health assessments.

Plantation assessments and monitoring occur throughout the rotation (not simply restricted to the early operational phases). For example, growth plots, are being measured and assessed as required to ensure data is collected to validate that sustainable forest management practices are being implemented.

6.8 Harvesting

M&R use a wood flow program called YGen to determine how and when to harvest the tree resource. From this a 5 year harvest plan is developed, and then translated into an annual harvest plan.

6.9 Rate of Harvest

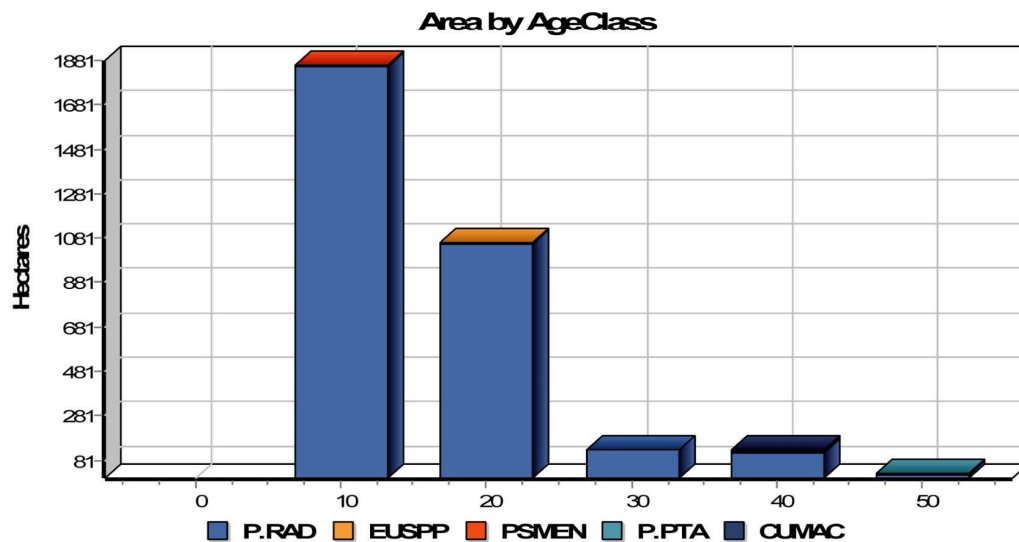
M&R endeavours to harvest its forest resource as closely as possible to the optimum tree age for each stand.

A major determinant on the level of harvest is the age class distribution. Our aim is to harvest close to optimum tree age rather than maintain a set yield. An uneven age class distribution, (with different areas of trees in each age class) is a consequence of the amount of forest established in a given year.

The table below shows the age class distribution.

Age Class Report

Age	Planted	Total NSA	P.RAD	EUSPP	PSMEN	P.PTA	CUMAC	Other	
0	2019	-	-	-	-	-	-	-	
10	2009	1860.0	1852.5	4.8	2.7	-	-	-	
20	1999	1066.9	1051.9	10.3	-	-	-	4.7	
30	1989	128.1	128.1	-	-	-	-	-	
40	1979	124.9	114.6	-	5.4	-	4.0	0.8	
50	1969	21.9	14.5	1.0	0.4	5.1	-	1.0	
Total		3201.8	3161.5	16.1	8.5	5.1	4.0	-	Landbank: 163.1
									Unstocked area within stands 45.0



The ability to alter the harvest to respond to market demand fluctuations from year to year does exist. Harvesting is usually scheduled at 28 for radiata pine and around age 40 for Douglas fir. Actual timing depends on stand and market conditions.

The rate of harvest can be predicted over the rotation of the forest and the graph below shows the volume for the next 60 years.

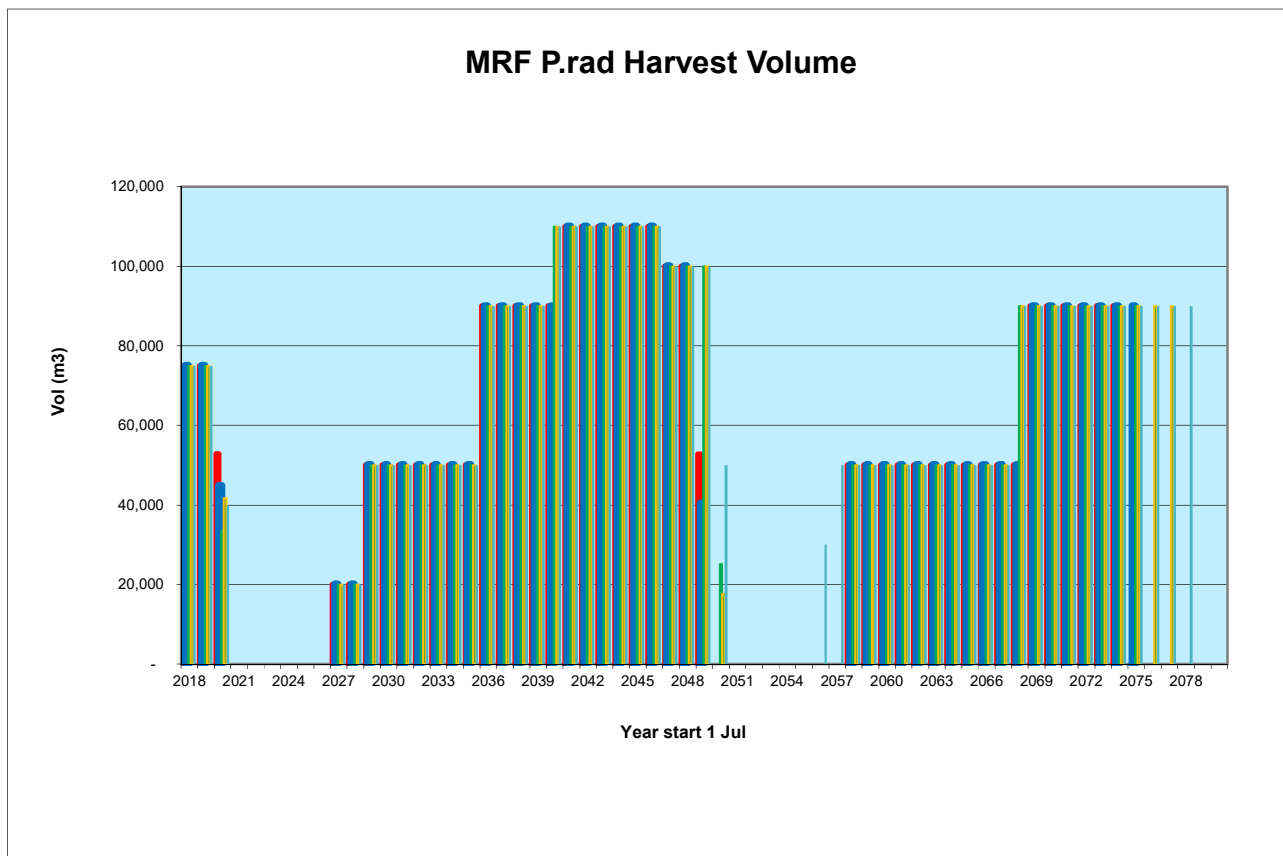


Figure 1 Predicted harvest for the next 60 years

6.10 Extraction Techniques

M&R uses three basic criteria to ensure the right harvesting methods are employed:

- 1. Health and Safety:** the method is the most appropriate for the topography and nature of land so that the potential for injury is minimised.
- 2. Environmental:** the method, which creates the least impact on the environment.
- 3. Economic:** the method, which is the most cost-effective for the area, taking safety and environmental considerations into account.

6.11 Conventional Harvesting

Conventional harvesting is characterised by log making on local skid sites. Various methods are used, including ground based, tethered, swing yarder and hauler tower on steeper areas and selection of these will depend primarily on the terrain.

6.12 Harvesting and Slope Decisions

M&R is committed to adopting harvesting techniques and technology that minimises the impact on the environment and reduce the risk of accidents and injuries.

To meet these objectives, land is divided into five terrain types and use the appropriate machinery configurations on each type, which are typically as follows:

1. *Flat* (FLT 0-20 degrees). A mechanical harvester fells the tree and removes most of the branches, leaving the residues on the cutover land. Logs are removed with rubber-tyred skidders fitted with mechanised grapples.
2. *Rolling, steep* (RST 20-45 degrees). This includes land with areas that are unable to be harvested easily with rubber tyred skidders, and which therefore requires tracked machines either to provide tracks on which rubber tyred skidders can work, or to actually extract the stems. In this type of extraction, traditionally manual (chainsaw) clearfelling was likely to be used, but has been replaced by self-levelling or tethered (by wire cable) harvesting machines. Excavators fitted with logging grapples are sometimes used to “shovel” full length stems to points that the extraction machines are able to work safely.
3. *Steep, short* (SST 30 degrees or more, but less than 500 metres haul distance). This country is too steep for skidders or tracked machines to work safely, and consequently haulers are used in this operation. The predominant hauler used is the “swingyarder”. This is a hauler with a short tower, and it has the ability to work close to the edge of the slope, swinging the stems to one side of the machine before they are moved to a skid site (flat open areas within the forest). The swingyarder is a flexible machine that can be moved and set up relatively easily, and can use a variety of harvesting techniques to suit any given situation or difficulty factor. Falling may be by tethered harvester or manual by chainsaw. If Stands have favourable lower slopes where tracks can be installed for a skidder, then ground based tethered harvesting as above for *Rolling, steep* can be used.
4. *Steep, long* (30 degrees or more but greater than 500 metres haul distance). This country is also too steep for skidders or tracked machines and requires another type of hauler. Tall poles or towers to which the haul ropes are attached are used to provide lift, so that stems are hauled to the landing sites with minimal environmental impact. Falling is generally manual but tethered machines can sometimes be used.

Tethered harvesting machines are now utilised on slopes over 20 degrees as a safer means to undertake tree falling rather than manual use of a chainsaw.

6.13 Marlborough Regional Forestry Strategic overview

Marlborough Regional Forestry (MRF) is governed by the Marlborough Regional Forestry Joint Committee Agreement, which was necessitated through under Clause 30A of Schedule 7 of the Local Government Act 2002.

6.13.1 Strategic goals

The goals of MRF are set out in clause 6 of the Marlborough Regional Forestry Joint Committee Agreement.

- The primary aim of production forest management is to create a resource that will provide the best financial return from its forests on a sustainable basis.
- Ensuring the undertaking is managed using good forest management, health and safety and environmental practices at all times, including compliance with Marlborough District Council's Resource Management Plan provisions.

An independent Forestry professional sits on the committee and provides guidance on technical forestry aspects at committee meetings and when reviews of Forest Management is required.

Both Tactical and long-term strategic planning is raised from time to time at committee meetings by the Forest Manager and the Committee, this includes such things and the Emissions Trading Scheme, Forest Stewardship Certification, harvest age, land purchase, Joint Venture agreements and major changes that could have a financial impact on MRF.

The committee has the overall responsibility for determining the strategic direction of MRF to meet the goals under clause 6.

7 Monitoring Plan

The purpose of a monitoring program is to assess the condition of the FMU, yields of forest products, chain of custody, management activities and any social and environmental impacts. Those elements to be monitored and the frequency and intensity of the monitoring is set out in the Monitoring Plan.

7.1 Monitoring Forest Growth and Dynamics

A critical component of management planning and continuous improvement is understanding the available forest resource. A key component of this is through forest measurement and mapping. In order to accurately determine the area of net stocked area, reserves, infrastructure and riparian's these must first be mapped using aerial photography.

Data collected early in the rotation during establishment and silvicultural tending quality control assessments is captured in Geomaster and provides base data for future operations.

Preharvest inventory is undertaken at around 3-5 years prior to harvest to determine, to a very detailed level, the predicted yield and product outturn of stands at harvest. This data is then used post-harvest to reconcile the actual yields to those predicted.

The forest growth and dynamics is monitored at several stages of forest development, including:

- QC Following planting, pruning and thinning
- Survival surveys
- Foliage sampling
- Forest health surveys
- Pre-harvest inventory
- Post-harvest reconciliation.

7.2 Social impact assessments

Merrill and Ring understand that forestry operations we undertake can affect our neighbours in a variety of ways. The social impacts of Harvesting and cartage operations are assessed during the harvest planning operation. Due to the small size of the estates managed, Merrill and Ring are able to communicate directly with those neighbours who have the potential to be affected by operations. This is done either face to face or verbally over the phone. Harvest prescriptions, cut cards are updated with any requirements the neighbours have requested, such as calling them when working close to the boundary or if there are trucking restrictions.

Feedback from neighbours during the harvesting operations is generally by phone or face to face. Historically most concerns from neighbours area regarding cartage times, dust and working along boundaries where there are fences or animals present. Any concerns from the neighbours are acted upon in a timely manner.

Dust: complaints from neighbours regarding the level of dust. We work to a restricted speed limit along the access road and from time to time this needs to be reinforced with cartage contractors. Additionally we apply dust suppressant and use a water truck to reduce the level of dust.

Prior to any spray operations Merrill and Ring contact neighbours on the boundary with the affected forest to notify them of the operation. The Forester will discuss the operation and address any concerns they may have. Where there are concerns that need to be addressed these will be added to the prescription. The Forester remains present during the spraying of sensitive boundaries to ensure Merrill and Ring are present to mitigate any neighbour concerns.

A database of social impacts is kept and details the steps taken to manage the impacts of operations.

8 Spatial Information and Decision Support Systems

M&R currently has an integrated GIS system that contains detailed spatial and stand information data layers for all forests in the resource. The current GIS allows M&R to produce a variety of high quality maps with a large array of necessary information displayed including legal and stand boundaries, protected areas, land-use capabilities, tenure and related spatial information, such as contours, hydrology and transportation features, these are stored as an ESRI Spatial database.

The GIS is used to plan harvesting operations, storing locations of landings and planned roads. All maps and mapping systems are generated from these GIS systems and will continue to be so into the foreseeable future.

M&R uses the ATLAS Technology Suite (e.g. ATLAS Geomaster) for our stand record system, forestry and harvesting management systems. Atlas is the leading provider of forestry software within New Zealand and was developed by Scion Research, formerly known as Forest Research Institute. Health, safety and environmental auditing is managed with an online mobile system called Vault. This allows all audits and checklists to be electronic and available without data coverage. Corrective actions can then be tracked and managed to ensure that compliance is achieved.

9 Forest Protection

9.1 Fire Management

There is a restricted fire season operated within the MDFA region, which normally runs from 1 October until 30 April, but this is contingent on weather conditions. During the restricted fire season, all fires require a fire permit issued by a Rural Fire Officer.

9.2 Security

9.2.1 Access, Permits and Events

M&R maintains tight control of access through a thorough permitting system where applications are made on a purpose designed form. All drivers and their vehicles must obtain access permits which are only approved when the following is provided:

1. Valid reason for entry.
2. Valid full drivers licence.
3. Vehicle registration plate number, make and model.
4. Public liability (minimum \$5 million), firefighting (minimum \$1 million) and vehicle liability insurance (minimum \$5 million).

These processes ensure M&R approves only bona-fide and qualified access and can pass on safety and behavioural information. Permits enable M&R to determine if the person is appropriate to enter the forest (i.e.: checking driver license, firearms license, previous history - trespass, etc) and to pass on behavioural information such as safety messages, road rules, closed areas (i.e.: where harvesting activities are happening), hazards etc.

9.2.2 Policy

Recreational access is generally managed through the Access Policy. The policy addresses M&R's right to protect the forest and assets through access control.

The key features of the policy are:

- Provides for the public to hunt within specified forests it manages and access fishing rivers by vehicle, during daylight hours on weekends when the fire danger is low (which includes the period from May to September).
- M&R recovers some of the costs associated with recreational access through a registration fee of \$50 per person per annum. Once registered, a person can enter as necessary during that year.
 - To be valid, the permit holder must sign and accept access and safety conditions.

9.3 Forest Communications

There is cellular coverage across the estate, however there are areas in each forest where the reception is patchy, therefore communication within the forests is through the M&R Radio Network. This operates on line of sight, and is key in managing safety within a forest.

When working alone in the forest staff carry personal locators have a check procedure to ensure safety.

High Conservation Value (HCV)

Whilst M&R protect and manage all conservation areas, in particular those that meet the NZ Forest Accord we prioritise active management to those with special or particular values. In particular areas with values that meet the high conservation values (HSV). Each site has specific management aimed at their identified or significant values. M&R will progressively assess new areas adjacent to harvest sites for HCV values with the objective to protect and enhance these areas using detailed in the Reserves Management Plan.

The following sections provide definitions of HCV and how they are assessed and managed.

9.4 High Conservation Values

Principle 9 of the Forest Stewardship Council deals with High Conservation Values and places significance on the maintenance and protection of areas identified with these values.

M&R recognises the importance of High Conservation Value areas and are committed to identifying, protecting and where practical enhancing forest that is recognised as having high conservation value. High Conservation Value is identified using the definition (below). Native areas are assessed through reviews of existing relevant assessments, consultation with stakeholders and undertaking assessments in forest areas that may contain high conservation values.

High Conservation Value (HCV) are areas that possess one or more of the following attributes:

HCV1. Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia).

HCV2. Forest areas containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.

HCV3. Forest areas that are in or contain rare, threatened or endangered ecosystems

HCV4. Forest areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control).

HCV5. Forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health).

HCV6. Forest areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).

9.4.1 Indigenous Biodiversity

Within the FMU M&R actively consult with DOC, Council and the QEII National Trust for the management, restoration and conservation of Native areas which is detailed in the MRF High Conservation Value Assessment and the MRF Reserves Management Plan. Identification of high biodiversity values are determined by analysis of the following criteria:

- They contain rare, endangered or threatened ecosystems.
- They contain biodiversity values that are globally, nationally or regionally significant as described by the NZ National Policy Statement on Biodiversity.
- The high biodiversity values are either viable populations or ecosystems.
- Are crucial to the survival of category one endangered species.

9.4.2 Significant Natural Resources

Significant natural resources within the forest estate are identified through the relevant regulatory authority plan as either a municipal water supply catchments or as critical for erosion control.

9.4.3 Community and Cultural Value

Areas of high community or cultural value are identified as having the either of the following characteristics:

- Having high archaeological significance that is of national or regional significance.
- Having community values or significance that is essential to the identity of the wider community in which it exists.

While HCV are determined through this process the identification and management of HCV also includes engagement.

9.4.4 Stakeholder Engagement

Should new areas be identified or reviews of plans undertaken, M&R engages and where relevant inspects, these areas with relevant stakeholders such as (DOC, iwi and local experts) to determine if the identified values meet the definition of HCV. The following steps shall be taken;

- stakeholders with interests in High Conservation Values will be invited to participate in consultation via email or phone with sufficient notice;
- records of these invitations and subsequent consultation will be maintained in a stakeholder engagement register;
- the consultation process will be open to parties claiming an interest in or affected by the implementation of this plan;
- all identified stakeholders will be provided access to sufficient information; and
- Stakeholders will be provided copies of the final plan.
- M&R will use the discussions with these stakeholders to develop management and monitoring procedures for any areas that are agreed to have HCV.

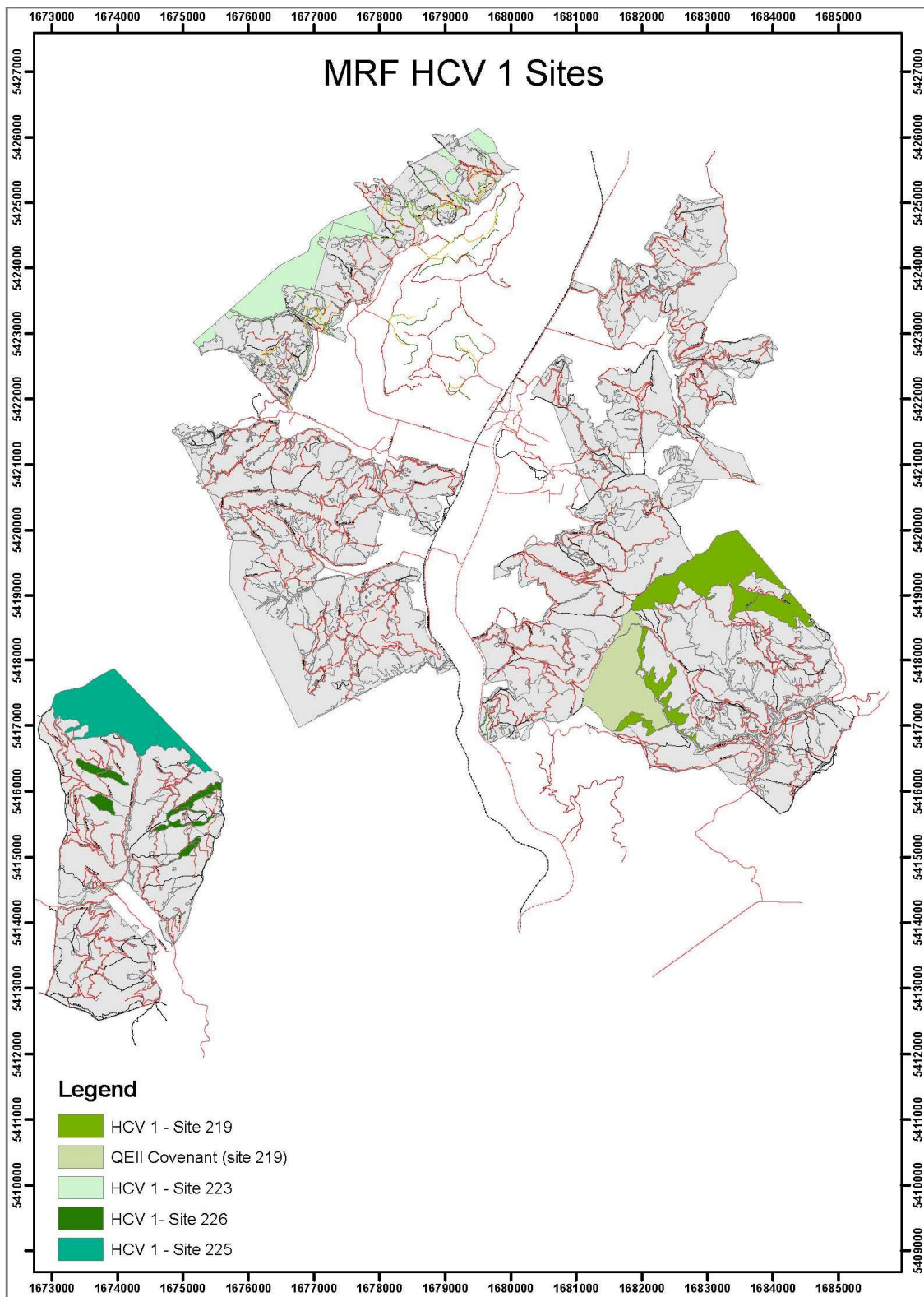
9.4.5 HCV Conservations Areas

Marlborough District Council undertook a review of the SNA areas with MRF, for those sites not reviewed by council an independent assessment was carried out by the local QEII representative. As part of the assessment process, the identification of native fauna and flora was recorded and the threatened status was determined for each species. Threatened species are classified under the New Zealand Threat Classification system and is managed by the Department of Conservation. Under this HCV element, forest areas with significant concentrations and priority sites for these species are considered HCVF. The table below details threatened species within the FMU.

The Management Plan needs to be read in conjunction with the High Conservation Value Assessment and Management Plan and the Reserves Management Plan.

Forest	Location	Species	Common Name	Threatened status
Pukaka Kites Creek	Site 219 Site 225	<i>Dracophyllum urvilleanum</i>	neinei	At risk – naturally uncommon
Pukaka	Site 219	<i>Hebe rigidula</i>		At risk – naturally uncommon
Pukaka	Site 219	<i>Peraxilla tetrapetala</i>	red mistletoe	At risk - declining

Speeds Kites Creek Kites Creek	Site223 Site225 Site226	<i>Kunzea ericoides</i>	Kanuka	Threatened – Nationally Vulnerable
Kites Creek	Site 225	<i>Lophomyrtus b x o</i>		Threatened – Nationally Critical
Kites Creek	Site 225	<i>Lophomyrtus obcordata</i>	ramarama	Threatened – Nationally Critical
Kites Creek	Site 225	<i>Macropiper excelsum</i>	kawakawa	Threatened – Nationally Critical
Speeds Kites Creek Kites Creek	Site223 Site225 Site226	<i>Metrosideros diffusa</i>	white rata vine	Threatened – Nationally Vulnerable
Speeds	Site223	<i>Metrosideros fulgens</i>	red rata vine	Threatened – Nationally Vulnerable
Speeds Kites Creek	Site223 Site226	<i>Metrosideros perforata</i>	white rata vine	Threatened – Nationally Vulnerable



9.5 Other Conservation Reserve Areas

Managing conservation areas (natural areas or reserves) is a key component of environmental management which is primarily undertaken through the Reserve Management Plan

In general reserve management is relatively simple where pest control and wilding removal produce the best biodiversity results.

Pest control is mostly achieved through hunting and trapping. Wilding control will be undertaken within identified reserves.

9.5.1 *Management objectives*

To maintain and where possible enhance the viability of threatened species populations that occur within the FMU.

9.5.2 *Threats to the High Conservation Values*

- Loss of habitat due to operational activity.
- Introduction of weeds, diseases and pests.

9.5.3 *Management Strategies*

- In order to achieve sustainable forest management goals, forest operations comply with the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017.
- Operations that have the greatest potential to affect the environment, such as Harvesting, earthworks, quarrying and stream crossings, require detailed management plans for managing environmental risks and preventing damage to native forests.
- Undertake training and awareness of staff in the identification and management of threatened species.
- Consultation with the Department of Conservation, Queen Elizabeth II Trust and local council, as to best undertake restoration operations where required.
- Ensure plantation operational activities do not impact on natural forest or other non-productive areas within the FMU.
- Undertake active management works as required and identified through monitoring activities.
- Continue to undertake threatened species management in MRF Forests, in consultation with relevant authorities and experts.

- Undertake active management works as required and identified through monitoring activities.
- Implement measures to ensure protection of HCV areas (Precautionary approach, setbacks, etc.), where plantation harvesting or management activities are undertaken in close proximity.
- Protecting biodiversity values, retention of natural forest across the landscape; retention of streamside reserves; management of risks from weeds and diseases.
- Comply with plantation operational procedures and identified thresholds, within the Environmental Manual.
- Where applicable and appropriate develop site specific Management Plans for HCV sites.

9.5.4 Monitoring

Monitoring is undertaken by M&R or at times by engaging an expert. The method of monitoring will depend on the high conservation values and the outcome of consultation with stakeholders. Monitoring is undertaken by visual inspection, in particular for degradation, pest damage, unauthorised activity and wilding pine presence.

5 yearly desktop assessments will be carried out to determine the likely presence and distribution of rare, threatened and endangered species. Marlborough district council monitor the SNA areas and provide reports. Any areas that are covenanted will also be monitored by the QEII trust every two years.

- Complete monitoring activities throughout the FMU in accordance with Merrill and Rings commitments to managing wilding pines and weed species in HCVF
- Monitor operations to ensure compliance with the requirements specified in Harvest Management Plan or Earthworks Management plan. Monitoring results are recorded through the Vault Environmental Checklists for operations.
- Where species change category through legislation, Merrill and Ring will ensure any impacts on the FMU are considered.
- Harvesting and Earthworks are subject to external checks by the Regional Council to demonstrate compliance. Auditing results will be included in Annual Monitoring Report.
- Effective monitoring, management, and research of HCVs is collated and summarised annually within the HCV Monitoring Report.

9.5.5 Responsibility

- Operational Foresters
- Technical Forester

10 Culturally and Historically Significant Sites

The forests were established through burning scrub on hill sites while the flats have been used for farming. No significant cultural sites were identified as being present. However in the event that a site is found or for known sites in other forests under M&R management our approach to such sites or values is to:

- Protect historic sites and features in accordance with the Heritage New Zealand Pouhere Taonga Act 2014
- Known sites (specific and landscape level) are registered in our GIS system for recognition when planning is undertaken. .
- Educate employees and contractors to follow best practices to prevent damage (particularly by earthworks) to archaeological sites.
- Consult with appropriate stakeholders, most critically iwi representatives and where necessary an archaeologist, to develop management options for the protection of significant archaeological sites before commencing operations.
- Delineate known sites in the forest by inserting painted marker posts on the site's perimeter and including in the forest wide GIS system. The system will flag the site to M&R staff when operations are being planned
- Train employees and contractors to identify and report newly discovered sites of significance.

11 Appendix

