

SUMMARY OF ECOLOGICAL SURVEY RESULTS

As outlined above for each ecological district, an impressive range of native ecosystems remain on private land throughout North Marlborough. Despite the high degree of past modification and loss of a lot of the primeval vegetation and much of the fauna, there are still excellent opportunities for ecological protection, restoration and enhancement. North Marlborough's topography and climate favour rapid natural regeneration of native vegetation. Once suitable habitats are restored, recovery of native fauna is possible.

Table 8 shows the number of properties surveyed in each ecological district, along with the number of identified sites and their total area. Overall, nearly three-quarters of the landowners approached voluntarily participated in the ecological surveys (73%). 365 ecologically significant sites were identified, with a combined area of 21,549 hectares, approximately 7.4% of the total land area.

TABLE 8 – SUMMARY OF ECOLOGICAL SURVEY RESULTS

Ecological Districts	No. Properties Surveyed	No. Properties Declined	No. of Sites	Combined Area (ha)	SNA Sites as a % of total land area
D'Urville	20	9	46	3,582.0	12%
Cook Strait	2	0	6	695.0	12.5%
Sounds	61	16	182	11,479.0	9.5%
Pelorus	18	10	43	1,467.5	1.4%
Para	18	7	55	2,975.0	6.2%
Fishtail	6	2	33	1,350.5	3%
Totals	125 (73%)	44 (27%)	365	21,549.0	7.4% (average)

Table 9, following page, shows the main ecosystem types identified, and their distribution and extent across the six ecological districts. The sites together contain a substantial amount of the remaining habitats for native fauna and flora in the lowlands and mid-altitude lands of North Marlborough. They complement the protected public lands (reserves and conservation areas), providing lowland elements that are somewhat lacking in the public lands.

CHARACTERISTICS OF REMAINING ECOSYSTEMS

The sites identified by the survey extend from the coast to the high ridges and peaks. The ecosystems include shore communities, wetlands, valley floor and riparian communities, rock outcrop, scree and cliff communities, ultramafic communities, forest tracts and remnants, and regenerating native vegetation at various stages of development.

Some ecosystems have been severely depleted, such as towering forests on valley floors and coastal flats, ultramafic forests and wetlands. Others, like kanuka forests, tree fern communities and early successional shrublands, have greatly increased in extent due to clearance of the primeval forest cover and prolific regeneration following the waning of pastoral farming. If not unduly disturbed, the kanuka forests and tree fern communities will in time be overtaken by larger native trees and become diverse forests resembling the primeval forest cover. The same applies to the shrublands too, although they may go through a kanuka stage on the way. These natural successional changes can be disrupted by weed invasion (especially wilding pines) and high levels of feral animals such as deer, goats and pigs.



**TABLE 9 – DISTRIBUTION AND EXTENT OF ECOSYSTEM TYPES SURVEYED
(PRIVATE LAND ONLY; AREAS IN HECTARES)**

Ecosystem Types <i>(in alphabetical order)</i>	D'Urville	Cook Strait	Sounds	Pelorus	Para	Fishtail	Totals (ha)
Alluvial valley and coastal flats forest	3.0		37.5	12.0			52.5
Beech forests	1,449.0		1,333.0	1,031.0	1,628.0	1,135.5	6,576.5
Bracken fernlands				9.0			9.0
Broadleaved forests (coastal gullies)	131.5		542.0				673.5
Broadleaved forests (inland gullies and faces)	255.0		209.0	42.0	319.0		825.0
Broadleaved-tree fern communities			126.0		109.0		235.0
Coastal dune and flat communities	7.0	12.0	22.0				41.0
Coastal rock and stonefield communities			2.0				2.0
Coastal rocky scarp and cliff communities	141.0	17.0	174.5				332.5
Coastal wetlands	88.5	10.0	28.5				127.0
Dry shrublands						2.5	2.5
Estuarine vegetation			2.0				2.0
Inland wetlands			8.0	13.5	8.0	8.5	38.0
Kanuka forests	638.5		5,988.0	18.0	230.0	153.0	7,027.0
Kohekohe forests	71.5	13.0	115.0				200.0
Lowland podocarp-beech forests			341.0	122.0	2.0		465.0
Lowland podocarp-broadleaved forests			561.0	42.0			603.5
Lowland shrublands	58.5	643.0	487.0	23.0			1,164.5
Manuka forests	82.0		235.0		24.0	45.0	386.0
Montane and subalpine shrublands	4.0						4.0
Podocarp-broadleaved-beech forests	223.0		497.5.0	112.0	651.0		1,483.5
Riparian communities			9.0	35.0		6.0	50.0
Treelands				8.0	5.0		13.0
Ultramafic communities	421.0						421.0
Upland podocarp-beech forests			760.0				760.0
Upland shrublands	8.5						8.5
Totals	3,582.0	695.0	11,479.0	1,467.5	2,975.0	1,350.5	21,549.0

Sites range in size from less than a hectare to hundreds of hectares. The vegetation is mostly forest, the most extensive types being beech forest and secondary kanuka forest. Also well represented are mixed podocarp-broadleaved-beech forests and lowland shrublands. Of particular note are kohekohe forests, confined to the outer Sounds and mostly reduced to small remnants in gullies. Those on D'Urville Island and Arapawa Island are of national importance because they are possum-free and therefore have healthy canopies.

Ecosystems that are naturally rare in the region are dunes and coastal wetlands (including estuarine vegetation). Ultramafic communities (nationally rare) only occur in D'Urville Ecological District.



■ CONSERVATION MANAGEMENT ISSUES, OPPORTUNITIES AND RESTORATION GUIDELINES

Despite the high degree of past destruction and modification of the original vegetation cover and native wildlife, there are still excellent opportunities for ecological protection, enhancement and restoration in North Marlborough. Understanding which native habitats and species are still present is the first step in securing their protection and restoration. The second step is to identify what is needed, both in terms of encouraging natural processes such as regeneration and in the removal or mitigation of threats. The third step is to provide the means.

North Marlborough has suffered large-scale land clearance, mainly involving loss of the native forest, but much forest remains and conditions are highly favourable for speedy natural regeneration. The main threats to regeneration are weeds (notably wilding exotic conifers), browsing mammals and feral pigs. The native fauna is threatened by a suite of introduced predators as well as by habitat loss. However, an array of effective techniques to deal with these problems is available.

DOMESTIC STOCK

Domestic stock (sheep, cattle, deer, horses, goats, etc) in general destroy native vegetation and undergrowth - particularly in forest and wetland sites - and prevent regeneration. They also favour certain plant species over others as food and therefore considerably modify the composition of the vegetation. For instance, areas purely of kanuka or manuka are invariably the result of selective browsing of the broadleaved plants and ferns that would otherwise be present in substantial quantities. Fencing to exclude stock is therefore essential within a productive farming landscape if natural remnants or areas for restoration are to remain and flourish. Fencing is proceeding in several key sites and in many instances can provide benefits for both the farming operation and conservation, particularly around the coast, on erosion-prone slopes and in gullies and swamps. However, in situations where severe weeds such as old man's beard and wilding pines are present, continued grazing by stock can prevent their spread so can be beneficial for the time being.



The forest is devoid of any regenerating understorey to eventually replace the older vegetation.



Prolific regeneration can occur if farm stock are fenced out and feral animals are kept at low numbers.

FERAL ANIMALS

Feral pigs, deer, goats, possums and hares are present throughout North Marlborough, and are a general problem. Their populations appear to have built to quite high densities in recent years. All have serious impacts on native flora and fauna, and in combination their effects can be devastating. As a result, much of the bush has a “hollowed out” structure, lacking undergrowth. Pigs are extremely destructive of soil and litter and have nearly eliminated the large land snails. Goats can inflict intensive local damage.



Feral goats and pigs can occur in very high numbers in localities in North Marlborough and can cause significant damage through grazing and ground disturbance.

Possoms are general browsers but target species such as kohekohe and southern rata, doing severe damage in places. Deer and hares live throughout but can be locally damaging and significantly affect the high country vegetation. Extensive bark-stripping of trees such as five-finger by deer has recently been observed on D’Urville Island. Chamois are present in the Richmond Range and contribute to degradation of high country vegetation.



Left: Evidence of possum damage on kohekohe trees, favoured food along with other broadleaved species like five finger.

Right: Dieback and complete destruction of areas of kohekohe forest can occur in the worst case scenario.

Mustelids (ferrets, stoats and weasels), rodents (rats and mice), feral cats and hedgehogs are throughout the region. Largely uncontrolled, they are responsible for great damage to the small native fauna (birds, lizards and larger invertebrates). Rabbits are beginning to spread into the Sounds and are already having a negative impact on the native vegetation, even well within bush remnants.



Left: Native land snails are very vulnerable to predation by possums, rodents, mustelids, cats and hedgehogs.

Right: Domestic cats and dogs are an added threat to weka, listed as nationally threatened and the last of our remarkable flightless native birds. North Marlborough is one of the last strongholds for these birds.

Some feral animal control is carried out on most properties, but this is highly variable. The extensive hinterland of public conservation lands and the wide roving habits of several of the pest species (especially if regularly hunted), means that continual re-invasion is an issue. Control may require a collaborative programme in the region. Deliberate introduction is another problem. The pest-free status of many of the islands in the Sounds is vital to their value as sanctuaries for native flora and fauna. The lack of possums on Arapawa Island, and the lack of both possums and goats on D'Urville Island also contributes much to the sanctuary quality of North Marlborough.

Several "mainland island" type sanctuaries are in the process of being established on private land in the Sounds, taking advantage of peninsulas with narrow necks that can be intensively managed or fenced to exclude farm stock and feral animals. Full exclusion could result in areas which offer the opportunity to re-introduce rare land birds, burrowing sea birds, tuatara, skinks, geckos and land snails. Kaipupu Point near Picton, jointly administered by Port Marlborough NZ Ltd and the Department of Conservation, is also being managed as a "mainland island", with Council encouragement and strong community involvement.

FERAL ANIMAL CONTROL

Many landowners are motivated to carry out pest control in an attempt to lessen the impact of feral animals in their surrounding area. While any control effort is useful, to be effective in reducing the impact of feral animals over time, comprehensive pest control programmes are likely to be needed. Because every situation is different, expert advice is probably required to set up these more comprehensive programmes. The information provided here gives a general overview of basic accepted control methods for the various feral animal pest species. Further detailed information is available from organisations such as:-

Landcare Research www.landcareresearch.co.nz

Department of Conservation www.doc.govt.nz

Biosecurity New Zealand www.biosecurity.govt.nz

Pigs, deer and goats

The purpose of controlling these species is to reduce the impacts of grazing, browsing, bark stripping and ground disturbance on forest vegetation and habitat. High to moderate densities of these feral animals can significantly affect the habitat quality available for native animal species and over-time potentially change the entire forest structure. Pigs also prey on ground dwelling organisms (insects, worms etc) and of particular significance, the threatened native land snail species.



Control methods: Control of these three species is best achieved through intensive ground hunting with appropriately trained dogs (ideally trained for the individual pest species). Initially an intensive hunting effort (2-4 hectares per hour) by experienced hunters carried out in a systematic and planned way can effectively reduce populations of these species, although migration of animals from non-hunted neighbouring areas is a factor to be considered. Ongoing follow up control is likely to be required. Experience has shown that for native vegetation to show significant recovery, the animal population needs to be reduced to a level where one experienced hunter and dog will encounter only one animal per hunting day. Control that does not achieve this level will still reduce the pressure on the native habitat but not to the extent that full recovery will be able to occur.

Possums

The purpose of controlling possums is to reduce general browsing pressure on native vegetation as well as targeted browsing pressure on some favoured species such as kohekohe and five finger which can ultimately kill these species. Possums also prey on nesting birds, taking eggs and chicks over the spring and summer months.

Control methods: Possums can be controlled through a variety of both trapping and poisoning methods.

1 Trapping

Kill traps – the animal is killed almost instantly so traps do not have to be checked daily. These traps are generally more expensive but are suitable for small scale use.

Non kill traps (cage traps and leghold traps) - have to be checked daily to meet animal welfare guidelines and require that the animal is then humanely killed. Recent legislation has banned various leghold traps. Information on approved leghold trap types can be found at

www.biosecurity.govt.nz/regs/animal-welfare/stds/traps

For both types of traps if weka are present it is recommended that traps are positioned a minimum of 700mm off the ground. It is an offence to kill weka.

2 Poisoning

Anticoagulant type poisons are most commonly used in small scale possum control around smaller properties and baches. However some are highly lethal to mammals and birds, and extremely lethal to fish. Strict adherence to label recommendations is necessary, to minimise secondary poisoning and prevent entry to the food chain, especially in scavenging feral pigs. The use of bait stations is a condition of use to prevent access to the toxin by wildlife and livestock. Weka are particularly vulnerable to this. Anticoagulants do not produce signs of poisoning for several days after the toxic dose has been consumed therefore bait stations should be kept baited for 3-4 days and then bait removed for up to 5 days. Then they should be rebaited. This helps to prevent “over ingestion” of bait, beyond that required to kill the possum. Those animals requiring a greater dose will receive it in the second baiting.

Acute poisons such as cyanide in both encapsulated pellet (Feratox) and paste form are commonly used for possum control but require a licensed operator.

A summary of poison types can be viewed at;

www.landcareresearch.co.nz/publications/infosheets/possums/pros_cons_of_poisoning.pdf

Mustelids (ferrets, stoats and weasels) and rats, also cats

The purpose of controlling these species is to provide some relief from predation for breeding birds, as well as insect and lizard populations over the spring/summer months. Stoats and ship rats, in particular, are key pests in forest ecosystems. There can be quite a complex relationship between the various predators with impacts on one affecting another and this needs to be considered when control programmes are planned. Cats for instance, while preying on native species, also prey on both rats and stoats. Cats should be particularly targeted when numbers are known to be generally high or particular species are at risk – eg, penguins at nesting time.





Stoats prey on nesting birds, including larger species like kereru and kaka. They have a large range being able to travel many kilometres per day.

Rats also prey on nesting birds with particular known impacts on robins, tomtits and kereru, but also prey heavily on invertebrates and feed on seeds and fruit, potentially reducing forest regeneration. Rat numbers build up seasonally in response to food availability, numbers can also build when there is effective control of stoats, as rats are preyed on by stoats. Rats have smaller home ranges (100 – 200m) and high productivity when conditions are favourable and therefore control must be periodic to be effective and monitoring is required.

Cats are difficult to target but can be caught in leghold or kill traps. They can also be caught in cage traps and then shot.

Control methods: Mustelids and rats can be controlled through both trapping and poisoning methods.

Stoats - Trapping for stoats includes approved kill traps such as the Fenn or DOC 250s, 200s or 150s set at approximately 200m intervals along tracks ridges and prominent points. For larger operations trap lines should be 1km or less apart. Rats are also likely to be trapped in these also, but not to the extent that the rat population will be significantly reduced.

Rats - The current best practice for controlling rat populations involves installing bait stations on a 100m x 100m grid and using an anticoagulant poison (such as “Talon”). Typical active ingredients are: brodifacoum, diphacinone, warfarin, and others. Most of these products include green dyes to deter birds; however, dogs and cats have poor colour vision and to them these pellets may look like pet food.

Anticoagulant rodenticides do not produce signs of poisoning for several days after the toxic dose has been consumed therefore bait stations should be kept baited for 3-4 days and then bait removed for up to 5 days and the stations then rebaited. This helps to prevent “over ingestion” of bait, beyond that required to kill the rat. Those rats requiring a greater dose will receive it in the second baiting.

However, in North Marlborough there is a problem with weka taking baits and eating poisoned rats. Bait stations are the most prudent way to apply the bait as it gives a measure of protection to birds from eating the bait.

Trapping of rats can be done in smaller areas using 100m x 50m grids or ideally 50m x 50m grids, checked weekly or as frequently as possible. Several kill trap types are available and need to be set up in a weka-proof tunnel.

Rat numbers can rebuild very rapidly, so to maintain them at low levels programmes need to be repeated at least every third year and if possible more frequently. Some mice will also be poisoned/trapped using these methods. Mustelids will also be reduced following a rat poison operation as a proportion of them die by feeding on the poisoned rodents.

Feral Cats – Cats can be trapped in any of the three trap types – kill traps, leghold traps or cage traps. Cage traps are only suitable for control in small areas but are useful in that they avoid pet cats being injured or killed. For more serious control operations, an extensive network of either leghold or kill traps can be used on 100-200 metre lines. Cat control is quite complex and currently there is no effective monitoring technique for feral cat control operations. The Department of Conservation has detailed fact sheets on feral cat control using the three trapping techniques available.

WEEDS

Along with feral animals, introduced plants are placing North Marlborough's natural ecosystems under pressure.

Wilding Conifers

Wilding conifers (mostly *pinus radiata*) have become the greatest weed threat in North Marlborough, proliferating since the wind-down of pastoral farming and the advent of commercial exotic forestry in about the mid 1970s. They are throughout the region and are rapidly invading regenerating vegetation and sensitive places such as coastal scarps and ultramafic areas. Relatively easy to control at the early stages, they have the ability to rapidly proliferate and destroy the integrity of the native vegetation. Control programmes are underway in several places in the Sounds, where individual landowners are carrying out work. The Marlborough Sounds Restoration Trust is an independent organisation established in 2006 to work on a larger scale programme of wilding pine control in the Queen Charlotte Sound with the backing of the Marlborough District Council and the Department of Conservation.

Control methods- the most effective way to control large wilding pines where they are located within regenerating native vegetation and away from areas where people could be endangered by falling branches, is to poison them standing and allow them to die and break down over a period of several years. This method does not create gaps in the vegetation where seeds in the ground can germinate and become an ongoing problem. The method involves drilling from 2-8 holes (depending on the size of the tree), on a downward angle into the growth layer of the tree under the outer bark layer (about 100mm), and filling with a chemical mix of high concentration metsulfuron based herbicide like Meturon, Escort or Matrix (200g per litre of water).

For more detailed information see Factsheet 174 "Poisoning Wilding Radiata Pine - using metsulfuron" from the Department of Conservation or the Marlborough District Council.

Young, smaller pre-coning trees can be felled with a hand or chainsaw.



Left: Scattered wilding pines within regenerating kanuka forest that could be relatively easily controlled by poisoning at this stage.



Right: Example of very good control of wilding pines in the Sounds. The trees have been killed by drilling and poisoning, the most effective technique for mature trees where the risk of falling material is not an issue. The regenerating native vegetation beneath the dead pines continues to grow and the shade provided by these plants prevents any further pines from emerging.



Old man's beard

Old man's beard is also a major and burgeoning problem. It is beyond the capacity of individual landowners to control in several places, even though biological control agents are present. The main control tools are grazing, or cutting stems and painting the cuts with herbicide. Preventing the spread of this weed should be a regional aim.

Control – the most effective control method is to find and cut the vines near the ground and paint the stumps with herbicide, either Vigilant gel, 1 part Glyphosphate to 4 parts water or 1 part Grazon to 20 parts water. Ongoing control will be required for some years to continue removing seedlings. Hand pulling and grubbing is possible with smaller plants. As plants can re-grow from stem fragments ensure these are not left on the ground.



Left: Old man's beard plants showing prolific wind spread seeds after flowering.

Right: Old man's beard smothering native vegetation – the weed can take over areas of native vegetation if left uncontrolled.

Other weed species

Banana passionfruit, Japanese honeysuckle and climbing asparagus are also becoming severe problems, though as yet they are more localised.

Willows threaten natural riparian sites and wetlands. They can be controlled by drilling and poisoning using similar methods outlined for wilding pine trees. Willows spread vegetatively, so if they are going to be mechanically removed they should still be killed by poisoning first, otherwise any pieces left on the ground are likely to re-grow.

Cotoneaster, agapanthus and shrubby stonecrop (*Sedum praealtum*) - all garden escapes - are threats to coastal scarps and should be controlled wherever they become established in the wild.

Banana passionfruit, Japanese honeysuckle and climbing asparagus (left to right), all weeds that could become major problems if allowed to spread.





Gorse and broom are threats to areas where native vegetation regeneration is slow, for instance ultramafic areas and some coastal scarps; otherwise they are benign and are generally quickly outstripped by regenerating native vegetation.

Flowering gorse on Sounds hillsides which will eventually be out-competed by native vegetation although this will take 20-30 years.



Spanish heath, hawthorn, barberry, Himalayan honeysuckle and blackberry are localised but widespread; they are not usually a threat to the native vegetation. For many of these weeds, exclusion of stock and prevention of fire and other disturbance may be sufficient for the regeneration of native vegetation to prevail.

On the few sand dunes, marram grass has invaded and is a severe threat to the natural sand dynamics, as well as to the last remnants of native sandbinding vegetation and mat daisy populations. Control of marram and planting of native sandbinders will be necessary for these special communities to survive long into the future.

“Exotic natives” – New Zealand native plants not naturally occurring in North Marlborough – also pose threats to the natural integrity of the region. They include beloved species such as pohutukawa, kauri, puriri and karo. Pohutukawa and karo have become established in the wild in several places in the Sounds. In terms of ecological integrity it is better not to plant these species but to plant the local equivalents instead: southern rata, totara, kohekohe and kohuhu. Even then, it is preferable to use plants raised from the nearest available source, rather than what can be obtained “off the shelf” from a commercial nursery.

Pohutukawa, although a native species and attractive to native birds is not natural to Marlborough and is spreading in places. From an ecological perspective it is better to plant southern rata, which is natural to the region.



FIRE

Natural fires would have been an infrequent feature of North Marlborough, resulting in fairly small areas of scorched forest, quickly repaired by natural regeneration. Maori probably used burning in the past for localised forest clearance. European settlement was characterised by wholesale felling and burning of the bush to make way for pastoral farming. Fire was then used as a routine tool for clearing regrowth of bracken, manuka, kanuka and tauhinu, and is still used on some farms and forestry blocks. Small-scale judicious use of fire can be a useful alternative to herbicide application, but in North Marlborough fire is generally damaging to soil and regenerating vegetation and creates conditions that favour the proliferation of weeds such as gorse, broom and wilding pines. Avoidance of fire in the early stages of vegetation regeneration (when it is most vulnerable) helps ensure a rapid transition back to native forest.





LAND DEVELOPMENT AND SUBDIVISION

Intensification and changes in land-use and land subdivision may create pressure on natural areas and ecology within the region. Changes in the economics of commercial forestry may encourage more land development in some areas and the abandonment of forestry in other areas of North Marlborough. Weeds can be spread by trucks and roading machinery.

Coastal subdivision has occurred throughout the Sounds to create ribbons and clusters of small holdings by the shore. Most are visited during holidays; few have permanent residents. Almost all have gardens of lovingly tended exotic plants, frequently creating weed problems (see above). Pets (cats and dogs) are often present, and disturbance and deaths of penguins, oystercatchers, herons, shags, gulls, weka and lizards - especially when breeding - is an inevitable and unfortunate result. The proliferation of motorboats and jet skis makes life difficult for coastal birds and seals. Nevertheless, with awareness and sensitivity, native biodiversity and people can co-exist. In places, landowners are collaborating to control weeds and animal pests, supported to varying degrees by the Council, Department of Conservation and/or QEII National Trust.

RIPARIAN MARGINS

The presence of intact native vegetation in riparian margins alongside waterways is particularly important in North Marlborough as many of the native fish species found in the waterways rely on native riparian margins as a source of terrestrial insects as a food supply. Also, the banded kokopu and shortjaw kokopu have adopted the unique behaviour of spawning in the damp leaf litter on the riparian margins during stream freshes. The eggs remain there in the damp leaf litter until the next fresh when they are washed back into the stream. Riparian margins can include native vegetation like flax, tussock sedges, overhanging broadleaved species (five-finger, mahoe etc), but exotic species, even weeds and overhanging pasture grasses along the edges of waterways are better than bare sides with no vegetation of any kind.

A Sounds waterway with overhanging riparian vegetation (above left) providing suitable habitat for a variety of native fish and invertebrate species as seen in the bucket in the photo below.





RESTORATION

There are good opportunities for active ecological restoration throughout the region although in many cases removing impediments may be enough, as natural regeneration can be vigorous. For instance, fencing to remove stock or discourage feral animals where grazing and disturbance is the limiting factor, or weed control where weeds are a serious problem, may be the best course of action.

Active restoration could include:

- re-watering and planting around wetlands (native trees including cabbage tree, lowland ribbonwood and kahikatea, shrubs and harakeke);
- restoration of populations of native coastal plants such as pingao, spinifex, sand tussock, sand coprosma and mat daisy;
- restoration of populations of threatened and local plants such as large-leaved milk tree (*Streblus banksii*), fierce lancewood (*Pseudopanax ferox*), Cook Strait kowhai (*Sophora molloyi*), swamp maire (*Syzygium maire*), white maire (*Nestegis lanceolata*), native verbena (*Teucrium parvifolium*) and mistletoes;
- restoration of shrublands, forests, coastal scarp and ultramafic vegetation through encouragement of regeneration (including exclusion of stock, fire prevention and control of weeds and animal pests);
- planting to enhance and complement bush and shrubland remnants, for instance plants such as totara, rimu, rewarewa and southern rata;
- intensive local control of animal pests to allow the return of native birds and other small fauna to selected locations.

Because of the degree of endemism and highly localised climatic conditions, planting should ideally use only locally sourced plant material. That way the special nature of each ecological district will be celebrated and the plants best suited to the conditions will make the restoration more likely to succeed.

General restoration planting where landowners want to speed up natural regeneration processes will depend to some extent on the specifics of the site. However the following species are local to the North Marlborough area and relatively hardy and easy to grow.

Basic common pioneer species which can be planted first include:-

Common name	Latin name
Akeake	<i>Dodonaea viscosa</i>
Akiraho	<i>Olearia paniculata</i>
Broadleaf	<i>Griselinia littoralis</i>
Cabbage tree	<i>Cordyline australis</i>
Five finger	<i>Pseudopanax arboreus</i>
Flax species	<i>Phormium tenax</i> , <i>Phormium cookianum</i>
Fierce lancewood	<i>Pseudopanax ferox</i>
Kanuka	<i>Kunzea ericoides</i>
Karamu	<i>Coprosma robusta</i>
Black matipo/kohuhu	<i>Pittosporum tenuifolium</i>
Manuka	<i>Leptospermum scoparium</i>
Narrow leaved lacebark	<i>Hoheria angustifolia</i>
Ngaio	<i>Myoporum laetum</i>
Rewarewa	<i>Knightia excelsa</i>
Totara	<i>Podocarpus totara</i>
Wineberry	<i>Aristotelia serrata</i>



More specialised species that can be added to a planting once the pioneer species above are established include:-

COMMON NAME	LATIN NAME
Black beech	<i>Nothofagus solandri</i>
Ferns	<i>Various species...</i>
Hinau	<i>Elaeocarpus dentatus</i>
Kawakawa	<i>Macropiper excelsum</i>
Kahikatea	<i>Dacrydium dacrydioides</i>
Kaikomako	<i>Pennantia corymbosa</i>
Kohekohe	<i>Dysoxylum spectabile</i>
Lemonwood/tarata	<i>Pittosporum eugenioides</i>
Mahoe	<i>Melicytus ramiflorus</i>
Matai	<i>Prumnopitys taxifolia</i>
Miro	<i>Prumnopitys ferruginea</i>
Nikau	<i>Rhopalostylis sapida</i>
Pigeonwood	<i>Hedycarya arborea</i>
Putaputaweta	<i>Carpodetus serratus</i>
Red beech	<i>Nothofagus fusca</i>
Rimu	<i>Dacrydium cupressinum</i>
Southern rata	<i>Metrosideros umbellata</i>
Swamp maire	<i>Syzygium maire</i>
Tawa	<i>Beilschmiedia tawa</i>
Titoki	<i>Alectryon excelsus</i>
White maire	<i>Nestegis lanceolata</i>

CARBON, BIODIVERSITY AND WATER YIELD “FARMING”

There are developing alternatives to pastoral farming or forestry for deriving an income from the hill country, whilst also nurturing the native flora and fauna. North Marlborough is particularly well placed for these practices, having relatively fertile soils, reliable rainfall and abundant seed sources. They include fostering the regeneration of native forest to capture carbon dioxide from the air and sequester it in growing forests that have long-term security (earning “carbon credits”). That is already well underway on several North Marlborough properties. At the national level, programmes are being developed around the “Emissions Trading Scheme” but international and national approaches to this are still uncertain at the time of writing. The Ministry of Agriculture and Fisheries is the lead government agency involved in developing these programmes.

At the exploration stage are proposals for landowners to gain a financial return for measurably improving indigenous biodiversity and conserving water resources on their land (earning “biodiversity credits” and “water credits”). Meanwhile, commercial return from honey and essential oils is a genuine option for kanuka and manuka vegetation and regenerating native forest. Most ecotourism, holiday and home-stay businesses in the region are founded on the native biodiversity, and anything that protects or enhances the biodiversity will contribute economically.



PROTECTION

Many private landowners in North Marlborough support the concept of protection of natural values on their land. Prior to the initiation of the ecological surveys, some were already protecting special sites. New initiatives underway following the surveys include formal conservation covenants through the QEII National Trust and the Department of Conservation, management agreements, fencing, weed control, animal pest control and restoration planting. They are usually to the benefit of property management and productivity, as well as to ecological conservation.

There are proven methods that can be applied to diminish or remove most of the existing ecological threats to natural sites, as outlined above. Some threats are beyond the resources of private landowners and are a matter of regional concern. These include wilding pines, old man's beard and feral pigs, goats and possums. The Council and the Department of Conservation recognise this and are investigating the control of these pests in some localities.

Practical and financial assistance to protect and enhance areas is available to landowners from the Council through its Landowner Assistance Programme. Assistance for landowners can also be sought from other sources such as central government's Biodiversity Fund and the QEII National Trust, either independently or through a package organised and administered by the Council.

