

# THE FACTS ON FOREST FRAGMENTS



Forest fragments are usually the patchy remains of larger native forests. They were left standing, often in gullies or on steep slopes, when the land around them was cleared. Some fragments are new areas of forest that have grown back on cleared land.

Fragmented and isolated pockets of native vegetation are vulnerable to pests, and may be too small to support some native plants or animals. However, we need to manage and protect fragments because in some areas they are all that is left. This factsheet explains the special problems that forest fragments face and gives tips to help them survive.

## WHY ARE FOREST FRAGMENTS IMPORTANT?

- Some forest types now only occur as fragments. For example 95 per cent of the Waikato's kahikatea stands are smaller than 30 hectares.
- Forest vegetation helps prevent soil erosion, store carbon and maintain water quality.
- Birds can use them as 'stepping stones' to move between larger forest areas.
- Even small fragments may contain threatened species such as king fern.
- They can act as windbreaks to shelter stock in nearby paddocks.
- They can be core areas for habitat restoration or sources of plant material for restoration.
- They provide a source of native seeds that birds or wind can carry across the landscape to replenish other natural areas.
- They can support native insects that may help pollinate nearby crops or control pests.
- They can provide resources for cultural or educational use.
- They may be the only natural areas remaining (in Hamilton city, for instance, 79 per cent of the remaining indigenous forest vegetation exists as small fragments, each less than 25 hectares).



**When people arrived in the Waikato it was probably almost entirely covered by forest.**

## FRAGMENTING THE WAIKATO

When people arrived in the Waikato it was almost entirely covered by a few massive tracts of native forest. Today, following land clearance, native forest covers 20 per cent of the region. It has been fragmented into over 8100 individual forest patches, separated by pasture, plantation forestry, orchards or urban areas.

Although 95 per cent of all the region's native forest vegetation remains within blocks bigger than 25 ha, the vast majority of the individual patches (92 per cent of them) are small fragments less than 25 hectares.

There are over 7500 such fragments in the Waikato region. These small forest patches tend to occur on private land, usually farmland, and have specific management needs.

They are generally on south- or west-facing slopes, and on strongly rolling to moderately steep land. This means that they are helping to hold our hills together, but are probably exposed to the prevailing winds. Many are not fenced, and are regularly damaged by stock.



**The boundaries of small fragments are susceptible to pest invasions, stock damage and different microclimates.**



## To maintain and restore fragments you need to think about . .

### EDGE EFFECTS

The environment at the edge of a native forest is quite different from the inside. When you walk from an open area into fenced native bush, you may notice:

- how thick the understorey vegetation is at the edge compared to a few metres in
- that grasses and weeds like foxglove or gorse growing at the forest edge disappear a short way in
- it gets darker, cooler and more humid as you walk into the forest
- a change in the types of birds, from blackbirds, sparrows and finches at the edge to tūī, grey warblers and fantails inside.

These are the 'edge effects' that often occur at the boundary between two ecosystems (such as native forest and pasture).

Edge effects often extend up to 50 metres into the forest in the Waikato, sometimes further, especially if the bush is unfenced. If a patch of bush is 1 hectare (about 2 acres), the entire stand will be affected by edge effects. In a 10 hectare stand of a compact shape, about half of the bush will be affected.

The boundaries of small fragments are susceptible to pest invasions, stock damage and different microclimates. The higher light, wind and temperature extremes and lower humidity at boundaries favour some plant species over others. This can make the combination of species present near the boundary different from that in the fragment interior.

**Seal the edges of areas of bush by planting a dense band of shrubs.**

### LIMIT EDGE EFFECTS IN YOUR FRAGMENT

- Fence stock out – they keep the edges open by eating and trampling small plants. Place your fence a couple of metres out from the bush edge so there is room for a dense shrub layer to develop and buffer the forest from edge effects.
- Seal the edges of areas of bush by planting shrubs that can cope with high light levels, such as coprosmas, pittosporums, mānuka or kānuka – particularly on the windward side. Often, fenced forest fragments will do this themselves, forming a dense layer around their edges.
- Reduce the amount of 'edge' by planting areas between fingers of bush (for example over the ridge between gullies). If you have a number of small fragments close together, plant in between to reconnect them.
- Consider planting a woodlot next to the fragment, particularly on the windward side.

## WHAT'S HAPPENING NEXT DOOR?

Most small forest fragments are surrounded by modified land. Fragments may be next to urban areas (e.g. housing, industry or parkland), agriculture, horticulture or planted forests. The type of neighbouring land use is likely to affect the biodiversity and health of fragments.

In rural areas, animal pests, stock, and agrichemical (e.g. herbicide) application are the major potential threats to fragments. Microclimate effects on edges may be stronger in rural areas where the surrounding land cover is generally of low stature.

In urban areas, weeds, predators (including cats and dogs), litter and diversion of rainwater are probably the greatest threats. The further urban forest fragments are from large natural areas, the fewer native bird species they have.

Pine and other plantations are of similar height and density to native forest and may host plant and animal pest species that can invade a fragment, but they can also support native wildlife and act as a habitat extension, a corridor between fragments. They can even reduce the microclimate extremes often found at fragment edges. Take care with harvest methods and timing to minimise threats to the fragment and its species.



**Neighbouring land use is likely to affect the biodiversity and health of forest fragments.**



## THE PROBLEM WITH FOREST FRAGMENTATION

### Increased proportion of forest edge

*88 per cent of Waikato fragment vegetation is within the 'edge zone'*

- Exposure to wind and sun
- Change in species composition
- More weeds and pests invade from edges
- Different neighbouring land use with exposure to agrichemicals, litter, pets, stock and other new threats

### Loss of native habitat

*20 per cent of the Waikato remains in native forest*

- Some plants and animals die out
- Some forest types lost from the area

### Smaller patches of native forest

*92 per cent of Waikato forest patches are less than 25ha*

- May be too small to support healthy populations of some species
- Support fewer native animals that need large territories
- May lose important species that pollinate or disperse seeds of plants
- Loss of genetic diversity

### Remaining fragments isolated from each other

*Most Waikato fragments are separated by pasture and on average forest patches less than 25ha are 2km away from a larger one*

- Harder for wildlife to find enough food or a breeding partner
- Loss of species that can't travel between fragments
- Less dispersal of native plants

## STOCK DAMAGE

New Zealand's plants and animals evolved without any large grazing mammals. Our soils and plants cannot cope with the trampling, grazing and waste from stock. When stock get into natural areas, they can cause:

- soil compaction and erosion
- reduced seedling and shrub survival
- damage to bark and roots
- changes in the microclimate (by creating gaps and opening the understorey)
- excess nutrient deposits.

Fragments continually visited by stock will become a stand of sick, old trees, with no young plants to replace those that die out. Eventually, the whole fragment will collapse.

## SIZE AND SHAPE

Fragments may be too small and/or too far apart to provide enough habitat for the survival or successful reproduction of some native animals. They may not have the variety or number of plants needed for year-round food, or provide big enough territories for native animals to forage and breed. Small fragments can degrade into areas of low species diversity and poor habitat quality as species die out.

The shape of a fragment affects the amount of edge compared to forest interior. Forests that are more regular in shape (circular or square) have less edge for their size than fragments that are convoluted. Usually fragments in gullies and along streamsides have the most convoluted shapes. Many forest areas along waterways and the coast are long and narrow.

**Fragments may be too small to provide enough habitat for the survival or successful reproduction of some native animals.**

## ISOLATION

As fragmentation occurs, natural areas become increasingly separated from similar sites. Habitat isolation makes it hard for some animals to find sufficient food or a mate, or for plants to disperse their seeds to suitable germination sites.

Some species can successfully move or send their seeds across large areas of agricultural or urban areas. Long-ranging birds such as tūi and kererū can move between fragments spread over a wide area.

Other species are very vulnerable in open areas and cannot travel very far. Flightless animals may be killed attempting to move between fragments (e.g. kiwi may be run over by cars or killed by dogs). Native frogs, reptiles, snails and some invertebrates may not even be able to move between two fragments on the same property.

Isolation depends on the type of land use separating fragments. Cleared land between fragments of natural areas may act as a barrier to animals and plants. A continuously forested corridor (even of exotic species like pine) may be used to act as a connection, as it will provide cover, shade and higher humidity.

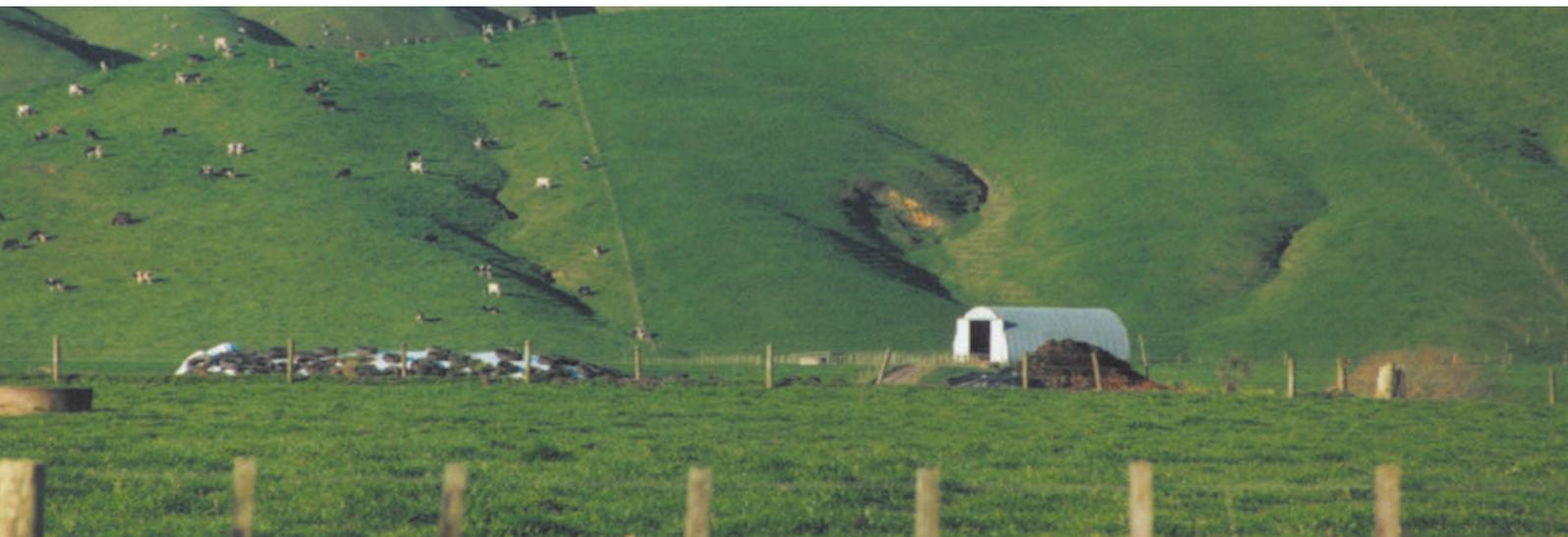


*Photo: Reece Hill*

## PROTECT YOUR FOREST FROM ISOLATION

- Reconnect separated fragments, e.g. by planting along a streamside or over a ridge.
- Provide an artificial corridor by planting a woodlot between fragments. Native plantations, e.g. tōtara, will provide good habitat for native birds and insects. Pine plantations will also be used by native species. Plant a 10-20m buffer of hardy plants between the woodlot and the fragment and leave that to protect the fragment after harvest. When harvesting woodlots, fell trees away from fragments and try to avoid harvesting timber during bird breeding seasons. If you can, stagger planting and harvest around the fragment to retain some connection to other fragments.
- Ensure corridors are 'safe' by controlling pests like possums, rats and mustelids (stoats, ferrets and weasels).

**Habitat isolation makes it hard for some animals to find sufficient food or a mate.**

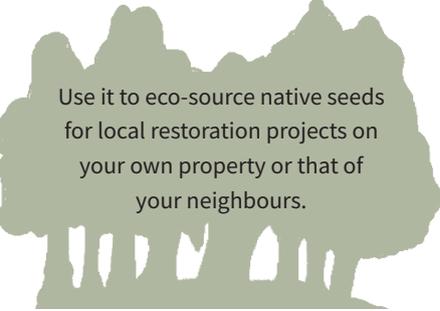




Use as an eco-tourism venture, e.g. link to a bed and breakfast as an extra attraction.



Use it for educational purposes, e.g. allow local schools or university students to study it, or maintain and enhance it.



Use it to eco-source native seeds for local restoration projects on your own property or that of your neighbours.



Maintain it for your children and grandchildren to enjoy – consider a private covenant to protect it for future generations.

## WHAT CAN YOU DO WITH YOUR FOREST FRAGMENT?



Sustainably harvest its natural products, e.g. honey, essential oils, seed stock for native plant nursery, medicinal plants, craft materials.



Seek assistance to help protect it, e.g. from the regional council's Small-Scale Community Initiative Fund or get local schools or Landcare groups to assist with planting, fencing, etc.



Use it to seek rates relief or market your property, if selling.



Enhance it for your own enjoyment, e.g. walking, bird watching, photography.



Use it to help secure consents, e.g. extra subdivision rights.



Let it protect your property by reducing flooding, providing shelter, preventing soil erosion and providing habitat for natural pest control agents.

**Iwi and private landowners have protected over 27,000 hectares of mature and regenerating native forest in the region.**



## REGULATIONS PROTECTING FRAGMENTS

Resource consents may be required from the regional council to clear indigenous forest, particularly in erosion-prone areas. Some district councils also have clearance controls on native vegetation to protect biodiversity or other values.

The Ministry for Primary Industries controls timber harvest in native forests, restricting it to sustainable rates or small scale extraction for personal use.

## WHAT'S HAPPENING IN OUR REGION TO PROTECT FRAGMENTS?

Individuals, community groups, businesses, research agencies and local authorities are working together to restore forest fragments in their area.

- Private landowners and iwi have protected over 29,000 hectares of native forest and regenerating scrub through Queen Elizabeth II National Trust covenants or Ngā Whenua Rāhui kawenata. Many of these are forest fragments.
- Care groups in the region are planting riparian areas with native plants. Planted areas can provide native animals with alternative food sources and accessways between natural fragments.
- Many local community groups are working together to restore small forest patches in reserves. You can find out more on the Ripple Effect or Nature Watch websites.
- Landcare Research has produced a booklet on Māori values and native forest (ngahere) outlining the range of important cultural qualities that forest patches contain.
- Project Kahikatea is a multi-year programme run by the Department of Conservation, Waikato Regional Council, NZ Landcare Trust and the New Zealand Farm Forestry Association. It aims to work with landowners to improve the long term survival of kahikatea stands in the Waikato lowlands. The project received a funding boost from the Waikato River Clean-up Trust in 2016.
- Gullies within Hamilton city contain important habitat fragments. Hamilton City Council has produced a draft Gully Management Plan and a Gully Restoration Booklet to help city residents enhance biodiversity at their backdoor.

See Factsheet 5 for case studies about people who have managed native forest fragments.

**Planted areas provide native animals with sources of food.**

HE TAIAO MAUIORA    HEALTHY ENVIRONMENT  
HE ŌHANGA PAKARI    STRONG ECONOMY  
HE HAPORI HIHIRI    VIBRANT COMMUNITIES

For more information call 0800 800 401 or  
visit [waikatoregion.govt.nz](http://waikatoregion.govt.nz).

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**Waikato**  
REGIONAL COUNCIL  
Te Kaunihera ā Rohe o Waikato