15 INDIGENOUS BIODIVERSITY

Summary

RPS Objectives

- Maintenance of the biodiversity of the Northland region.
- Protection of the life supporting capacity of ecosystems through avoiding, remedying or mitigating (in that order of priority) the adverse effects of activities, substances and introduced species on the functioning of natural ecosystems.
- Protection of areas of significant indigenous vegetation and the significant habitats of indigenous fauna.

Pressures

- Pest animals and pest plants threaten a number of indigenous species and ecosystems.
- Land development through subdivision and intensification of agricultural land use threatens habitats.
- Potentially climate change will further threaten indigenous species and also allow some new pest species to establish as well as allowing some existing pest or native species to expand their range.

State

- Less than 5% of Northland's wetlands remain as a result of drainage and disturbance. Some wetland types are now close to being lost forever. Remaining wetlands are under pressure from drainage, invasion by pest plants, fertiliser run-off and animal wastes, water abstractions, clearance of riparian and catchment vegetation, pine planting and logging, weir and dam construction, reclamation for urban development, grazing and trampling of littoral vegetation by stock.
- Overall the biodiversity of indigenous vegetation is declining with a decrease in the land area covered in indigenous vegetation from 1997 to 2002 and indigenous plant species becoming nationally or regionally threatened with some species already extinct in Northland. Many once common habitat types, such as riverine floodplain forest and dunefields, are now critically threatened due to land development pressures. However a significant proportion of this remaining indigenous vegetation is legally protected.
- Many "nationally critical" threatened species (those most under threat of extinction) are found in Northland, including 28 plants, 36 terrestrial animals and five freshwater or marine animal species.

- Kiwi populations are currently being managed at about 30 sites across Northland, covering approximately 53,000 ha. This predominately involves pest control and public education. Due to these efforts, the kiwi population in Northland in these managed areas is increasing. Since 1999, kiwi call rates have stabilised, with an increase in call rates at one of the four areas monitored.

Doing well

- There is excellent co-operation between agencies in Northland, particularly through the Northland Biodiversity Enhancement Group.
- Good community support for the NRC Environment Fund, with $1.5 million allocated to various biodiversity protection and enhancement projects since the fund was established in 1996.
- Of the 416,900 ha of indigenous vegetation land cover in Northland in 2002, approximately 36% of it was legally protected in 2006.
- There are over 50 active environmental land care groups in the region.
- There is a large number of landowners carrying out active biosecurity management and biodiversity enhancement on their properties throughout Northland.

Areas for improvement

- Better identification of biodiversity in Northland including more data collection and storage of baseline information.
- Proactive approach to protecting priority areas as well as consolidating and connecting fragmented areas already protected.

15.1 Introduction

The Northland region contains a wide diversity of habitat types and ecosystems and an unusually high number of indigenous species, a number of which are found only in Northland. Some of these species are restricted to single sites, e.g. North Cape, and some of these special sites are on private land.

Throughout this chapter where biodiversity is stated it refers to **indigenous** biodiversity. However as introduced pests and weeds are a significant pressure on indigenous biodiversity this chapter also includes information on biosecurity in Northland.

Regional Policy Statement objectives

The Regional Policy Statement (NRC 2002) contains a range of objectives relating to biodiversity. These objectives seek to maintain the biodiversity of the Northland region.

The Regional Policy Statement (RPS) objectives are:

- Maintenance of the biodiversity of the Northland region.
- Protection of the life supporting capacity of ecosystems through avoiding, remedying or mitigating (in that order of priority) the adverse effects of activities, substances and introduced species on the functioning of natural ecosystems.
- Protection of areas of significant indigenous vegetation and the significant habitats of indigenous fauna.

Environmental results anticipated

The following is the anticipated environmental results after the implementation of the policies for ecosystems and biodiversity in the RPS:

- An increase in the areas of significant indigenous vegetation and the significant habitats of indigenous fauna which are formally protected.
- No significant increase in the number of threatened species in the region.

Other relevant legislation

The Wildlife Act 1963 protects certain species of native animal wherever they occur and the Conservation Act 1987 which is for the protection and enhancement of biodiversity on crown land. However there is no legislative equivalent which protects native plant species on private land.

RMA Amendments

The 2003 amendment to the Resource Management Act 1991 emphasised the responsibilities of local government in biodiversity under section 30. This included the following additional functions for Regional Councils:

An additional reason for controlling the use of land for the purpose of:

> *"maintaining and enhancing ecosystems in water bodies and coastal waters"*

and a new function:

> *"the establishment, implementation and review of objectives, policies and methods for maintaining indigenous biodiversity."*

15.2 What are the pressures on biodiversity?

Habitat loss

Habitat loss in Northland over the last 160 years of European settlement includes over 95% of both forests and wetlands. Wetlands and coastal habitats are already under represented and these are the areas that are currently under a lot of pressure. Other areas which are critically under-represented in Northland include volcanic broadleaf forest, riverine floodplain forest, dunelands and gumlands.

These areas are home to many of the most critically endangered plant and animal species in Northland. Habitat loss does not just occur through vegetation clearance or wetland drainage. Nutrient and sediment run-off into wetlands, lakes and rivers can easily alter the characteristics to the point that conditions are no longer suitable for the species that would be naturally present. Animal pests and weeds can also lead to major habitat modification.

Habitat fragmentation

As large contiguous areas of indigenous habitat become fragmented due to activities such as land clearance and subdivision their vulnerability to damage from pests, diseases and environmental influences increases and their biodiversity value decreases. Exposed edges provide opportunities for weed species to establish that are then able to invade the forest remnant; small isolated areas are also more vulnerable to wind damage. Isolated fragments may not be large enough or diverse enough to support many species and the isolation from other areas of suitable habitat may prevent the movement of species between areas.

Fragmentation comes about for a number of reasons. Intensification of land use often involves the clearance of regenerating vegetation such as manuka and kanuka; these areas often buffer and increase the value of adjoining areas of more mature forest. Subdivision of land can also lead to fragmentation as some properties are developed.

Pests and weeds

Northland's warm temperate climate and high rainfall provide conditions that make it vulnerable to a wide range of animal pests and weeds. A wide suite of pests and weeds are already established in the region. A number of pest species such as possums and ferrets have established in Northland relatively recently when compared to other regions of New Zealand, however favourable conditions mean that their numbers have risen rapidly. Northland is vulnerable because of:

- Warm temperate climate;
- An established, wide suite of plant, animal, insect and aquatic pests;
- A predicted climate change forecast which will see the region warming and becoming more dry;
- New organisms are impacting on agriculture, horticulture, the environment and marine ecosystems;

- Declining water quality means that some aquatic ecosystems are more vulnerable to invasive pests.

Disruption of natural processes

A number of native plants and animals are coloniser species or species which occur in sites where natural disturbance such as flooding, wind throw, fire or mass movement of sand or soil are common and sustains these species. In addition all ecosystems and species communities change over time.

There is a poor understanding amongst landowners and land managers of the role of natural habitat dynamics in maintaining biodiversity. Current practises seek to prevent such disturbance and encourage a more stable environment. For this reason many of these species or species communities are now rare and a high proportion of our nationally threatened species are associated with disturbed or regenerating habitats, e.g. Northland green gecko, fernbird, sun orchids and *Hebe speciosa.* In many parts of the world management techniques using controlled disturbance of habitats containing rare disturbance species are often undertaken as a surrogate for natural disturbance.

Agriculture

The landscape of New Zealand, including Northland, has been dramatically modified due to developments for agriculture, exotic forestry and horticulture. Much of this change has occurred in the last 160 years. Despite the level of development that has been undertaken many farms in Northland still retain significant remnants of indigenous habitat, more so than many other regions. These areas, though frequently small and fragmented, play an important role in providing habitat for a range of indigenous species and in some cases help to provide corridors that link larger areas of indigenous habitat together.

A range of government incentives in the 1970's and early 1980's to encourage the development of marginal land for agriculture and forestry resulted in the clearance of large areas of regenerating forest. The withdrawal of subsidies and low commodity prices in the mid-1980's and 1990's saw a lot of these areas again regenerating in either native or exotic woody species such as manuka, kanuka, gorse and woolly nightshade or planted in *Pinus radiata*. Increasing land prices and commodity prices in the recent years has again led to intensification of landuse and a resulting increase in pressure on indigenous biodiversity.

Agricultural development threatens indigenous habitat and biodiversity in a number of ways. Clearance of indigenous vegetation results in direct loss of biodiversity. Vegetation clearance also leads to habitat and food supply loss for other species. In steeper areas vegetation clearance and grazing development will likely result in increased erosion with resulting detrimental downstream impacts on wetlands and waterways from sediments and nutrients. Where stock have direct access to waterways they reduce water clarity and increase nutrient inputs, which can be to indigenous flora and fauna.

Where stock have direct access to areas of native forest and indigenous wetlands their presence will impact in a number of ways. Grazing and trampling destroy ground covers and emerging vegetation. Damage to the ground cover creates increased opportunities for exotic weed species to become established. Grazing animals also act as a vector for the transfer of weed species from one site to another. In infertile habitats, such as gumlands, peat bogs and dune lake margins, input of nutrients from stock urine and

faecal matter can change the nutrient status of the soils and the composition of associated plant communities.

Climate change

The Intergovernmental Panel on Climate Change (IPCC) presented its fourth assessment in 2007. This report projected that New Zealand's climate is "virtually certain" (greater than 99% probability) to be warmer with noticeable changes in extreme events (IPCC 2007). Heat waves and fire risk are virtually certain to increase in intensity and frequency. Floods, landslides, droughts and storms are likely to become more frequent and intense. Eastern Northland is likely to have lower than average soil moistures.

Natural ecosystems are identified as one of the sectors most vulnerable to these projected changes. Projected rates of climate change are likely to exceed rates of evolutionary adaptation in many species, and habitat loss and fragmentation are very likely to limit species migration in response to shifting climatic zones. Projected changes are likely to increase the threat posed to Northland ecosystems by wildfires, weed species, pest species, storm impacts and reduced water availability. Any sea level rises and increased storm surges will impact on coastal dunes and other coastal ecosystems.

An increase in the frequency of high intensity, short duration rainstorms will result in more slipping and debris avalanches within forested areas. There is an increased risk of these bare areas being re-vegetated by more aggressive weed species than by indigenous colonisers, particularly if the indigenous species are also under stress due to climate change.

15.3 What is the state of biodiversity?

The overall state of biodiversity in Northland is difficult to assess by any simple measure. However, there are key species which are good indicators of environmental change and are straight-forward to monitor. These include species such as freshwater fish, kiwi and some plants which are vulnerable to pressure and are relatively sedentary or occupy narrow habit ranges.

In addition we also have sufficient information about most non-cryptic species to be able to assign them a population status and threat ranking based on the International Union of the Conservation of Nature (IUCN) threat categories.

Indigenous vegetation

Overall the biodiversity of indigenous vegetation is declining with a decrease in the land area covered in indigenous vegetation between 1997 and 2002, indigenous plants becoming extinct and many species becoming nationally or regionally threatened.

However a significant proportion of this remaining indigenous vegetation is legally protected. There is also evidence that restoration and pest control work can ensure the survival of a rare species, as is the current case for Holloway's crystalwort.

Extent of indigenous vegetation and legal protection

In 2002 approximately 416,900 hectares (33%) of Northland's land area was covered in indigenous vegetation, as shown in table 1 (below). There was a slight decrease in the land area covered in indigenous vegetation from 1997 to 2002, which was approximately 419,100 ha in 1997. This is mostly through a decrease in the following vegetative land covers: broadleaved indigenous hardwoods, indigenous forest and manuka/kanuka. However, more concerning is the loss in fernland, although only 19 hectares were lost; this was 25% of the fernland habitat that existed in 1997.

However, since 2002 it is possible that this trend has stabilised or changed to a slightly increasing trend, due to the significant amounts of protection and enhancement of indigenous biodiversity that is being carried out in Northland.

Of the 416,900 ha of indigenous vegetation land cover in Northland in 2002, approximately 36% of it was legally protected in 2006, as shown in table 1 (above) and figure 1 (below). Legally protected land includes Department of Conservation reserves, QEII covenants, WDC covenants, wildlife refuge or district council reserves, where the land has been set aside as a reserve for the protection of flora, fauna or wildlife reasons. This does not include the protection mangroves are given within section 9 of the Regional Coastal Plan (RCP) for Northland (NRC 2004) and therefore mangroves have been presented separately on figure 1 (below).

The indigenous land cover protected in Northland in 2006 was predominately indigenous forest and manuka/kanuka. Of the 57 hectares of fernland remaining in 2002, only five hectares was legally protected in 2006.

Table 1: Estimated area of indigenous land cover in Northland in 1997 (LCDB1) and 2002 (LCDB2), the percentage chance over these five years and the area of each land cover class in legal protection

Indigenous land cover class	Area (Hectares)			Area legally protected in 2006	
	1997	2002	% differ	Hectares	% of 2002
Broadleaved indigenous hardwoods	18176	17710	-2.56	2360	13.3
Depleted tussock grassland	7	7	0.00	0	0.0
Fernland	76	57	-25.43	5	9.5
Flaxland	168	168	0.00	70	41.5
Grey scrub	341	339	-0.40	134	39.5
Herbaceous freshwater vegetation	7053	6993	-0.85	2045	29.2
Herbaceous saline vegetation	3368	3368	0.00	358	10.6
Indigenous forest	256585	255724	-0.34	106822	41.8
Mangrove	14614	14614	0.00	1259[1]	8.6
Manuka and/or kanuka	118706	117930	-0.65	34815	29.5
Total native vegetation cover	**419094**	**416910**	**-0.52**	**147868**	**35.5**
Estuarine open water	24727	24727	0.00	188	0.8
Coastal sand and gravel	16217	16163	-0.34	8216	50.8
Lake and pond	4140	4159	0.45	706	17.0
Landslide	16	16	2.16	6	38.5
River	1968	1968	0.00	44	2.2
River/lakeshore gravel and rock	34	34	0.00	13	37.7
Total other native land cover	**47103**	**47068**	**-0.08**	**9173**	**19.5**
Total native land cover	**466197**	**463978**	**-0.48**	**157041**	**33.8**

1. As discussed above this does not include the protection given to mangroves in the RCP.

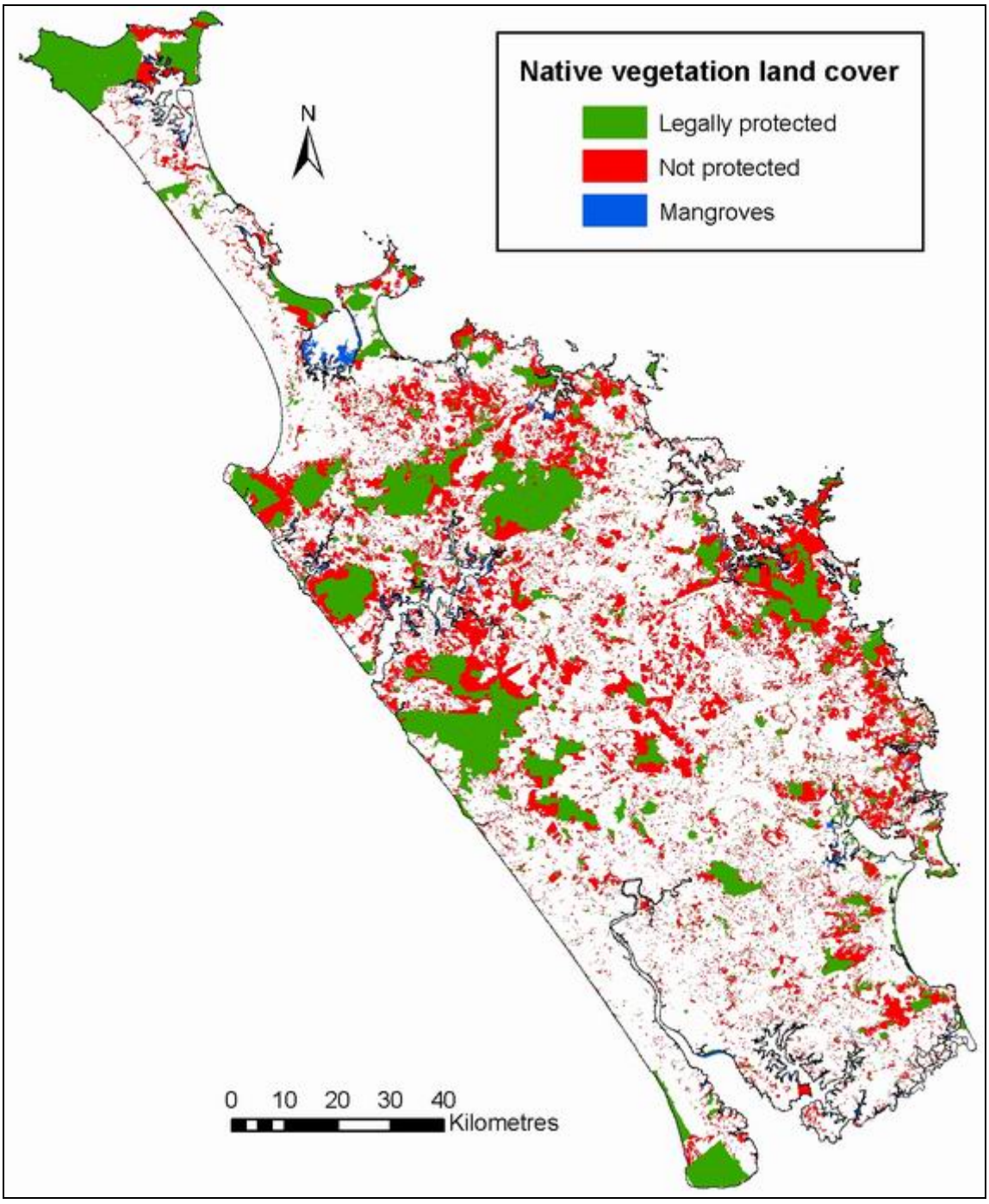

Figure 1: Native vegetation based on land cover classes from the LCDB2 (MfF 2002) that are legally protected, including QEII covenants, WDC covenants, wildlife refuge, DOC reserves and District Council reserves for the purpose of wildlife protection.

Plant extinctions

There are around 179 native vascular plant species listed as threatened in Northland Region (Forester and Townsend 2004), as shown in table 2 (below). This does not include fungi, bryophytes or other non–vascular species. Of the species listed one plant, Adams mistletoe (*Trilepidea adamsii*), which was known from Waipoua Forest, Hoteo River and Wellsford, is extinct, whilst at least a further eight, including kakabeak (*Clianthus puniceus*), helmet orchid (*Anzybas carsei*) and quillwort (*Isoetes kirkii*) are presumed locally extinct in Northland.

Painting of Adams mistletoe by Fanny Osbourne (right).

There are a large number of other plant species which, although not nationally threatened, are listed as rare or are believed to be locally extinct in Northland. These include plants which are at the northern limits of their distribution, plants which are naturally rare and plants such as wire rush (*Empodisma minus*) which have become rare in Northland as a result of land clearing or other anthropogenic changes.

The regionally threatened and uncommon plant list currently being developed for Northland will assist with management of these species.

Table 2: Number of threatened plant taxa in Northland by threat category

Threat category	Number of plant taxa
Extinct	1
Acutely Threatened	
Nationally critical	24
Nationally endangered	17
Nationally vulnerable	3
Chronically threatened	
Serious decline	13
Gradual decline	25
At risk	
Range restricted	52
Sparse	31
Data deficient	13
Total	**179**

Restoring an extremely rare plant population

Holloway's crystalwort (*Atriplex hollowayi*) is a small NZ annual plant which grows near the high tide level over summer, as shown in the photograph (right). It use to grow on the east coast as far south as Wellington but over 100 years ago it began a Northwards retreat and by the 1970's was restricted to the Far North. Possible reasons for its decline include browsing and trampling of its delicate stems by rabbits, stock, horses and pigs, vehicles on beaches, competition by exotic beach plants, sandmining and alteration of beach profiles by land development. By the turn of the century annual crystalwort numbers were down to just a few plants and it was almost certainly heading for extinction.

This sparked a massive rescue effort by Department of Conservation staff and the local Far North community. A Recovery Plan was written and fencing, weeding, stock control and a big replanting programme were undertaken every summer.

The aim was for plants to produce as much seed as possible on the beaches so it would be available in the sand seed bank for years to come.

The rescue was spectacularly successful with many wild plants coming up in subsequent years and by 2003 plants were being seen on beaches further south of where it had grown for many years. In the last two years there have been thousands of wild plants on the beaches in the Far North and the replanting programme has been scaled down. The crystalwort project is one of few recovery programmes for plants that has been successful but this plant will require ongoing management if it is to survive into the future.

Threatened species

Plant and animal species in New Zealand can be given a population status and threat ranking based on the International Union of the Conservation of Nature (IUCN) threat categories.

Of the 169 plants classified as nationally critical (under the most threat of extinction) in 2002, 28 (17%) were present in Northland and three had become extinct from Northland, as shown in table 3 (below). While 36 of the 120 (30%) terrestrial animals classified as nationally critical and 5 of the 21 (24%) freshwater and marine animals classified as nationally critical were present in Northland in 2002.

Table 3: Number of threatened taxa of Northland and New Zealand – 1994 and 2002 categories. (Hitchmough 2002)

Number of taxa (species and sub species combined)		Northland Locally extinct	Northland Present	Nationally Present	Northland % Present
Plants	Nationally critical	3	28	169	**16.6**
	Nationally endangered	0	22	77	**28.6**
	Nationally vulnerable	0	3	23	**13.0**
	Serious decline	1	11	30	**36.7**
	Gradual decline	2	20	84	**23.8**
	Sparse	0	32	149	**21.5**
	Range restricted	0	69	523	**13.2**
Terrestrial Animals	Nationally critical	4	36	120	**30.0**
	Nationally endangered	5	31	117	**26.5**
	Nationally vulnerable	1	3	18	**16.7**
	Serious decline	0	7	25	**28.0**
	Gradual decline	1	19	69	**27.5**
	Sparse	0	31	94	**33.0**
	Range restricted	1	154	440	**35.0**
Freshwater and Marine Animals	Nationally critical	0	5	21	**23.8**
	Nationally endangered	0	2	6	**33.3**
	Nationally vulnerable	0	1	2	**50.0**
	Serious decline	0	2	6	**33.3**
	Gradual decline	0	4	17	**23.5**
	Sparse	0	2	29	**6.9**
	Range restricted	0	84	288	**29.2**

Over the last few years since the last review of threat rankings the status of most Northland species have not moved up to higher threat rankings indicating that the state of biodiversity, at least in the short term, has remained fairly stable. However in the case of many of our most chronically threatened species neither has there been an improvement.

Threatened environments

In April 2007 the Ministry for the Environment released the Statement of National Priorities for protecting rare and threatened native biodiversity on private land, which identifies the types of ecosystems and habitats most in need of protection. The four national priorities for biodiversity protection are:

1. To protect indigenous vegetation associated with land environments (defined by Land Environments of New Zealand at Level IV), that have 20% or less remaining in indigenous cover.
2. To protect indigenous vegetation associated with sand dunes and wetland; ecosystem types that have become uncommon due to human activity.
3. To protect vegetation associated with “originally rare” terrestrial ecosystem types not already covered by priorities 1 and 2.
4. To protect habitats of acutely and chronically threatened indigenous species.

National priority one

Nationally, close to 468,000 hectares of unprotected native vegetation is in land environments reduced to less than 20 percent of their original extent, of which 5% is in Northland. Northland has 23,202 hectares (about 2% of region) of indigenous vegetation remaining that is not legally protected that falls into priority one land environments.

Figure 2 (below) shows the location of the Priority 1 land in Northland, the areas of remaining indigenous vegetation within the Priority 1 land (Walker et al. 2006) and whether or not this is formally protected (in May 2005). Formal protection in this map includes public conservation (DOC) land and land in QEII covenants.

Of the 23,202 hectares of priority one land remaining in Indigenous vegetation in Northland that is not legally protected (up to 2004), over half (12,204 ha) is in the Far North District and 6,072 and 4,926 ha is in Kaipara and Whangarei District respectively.

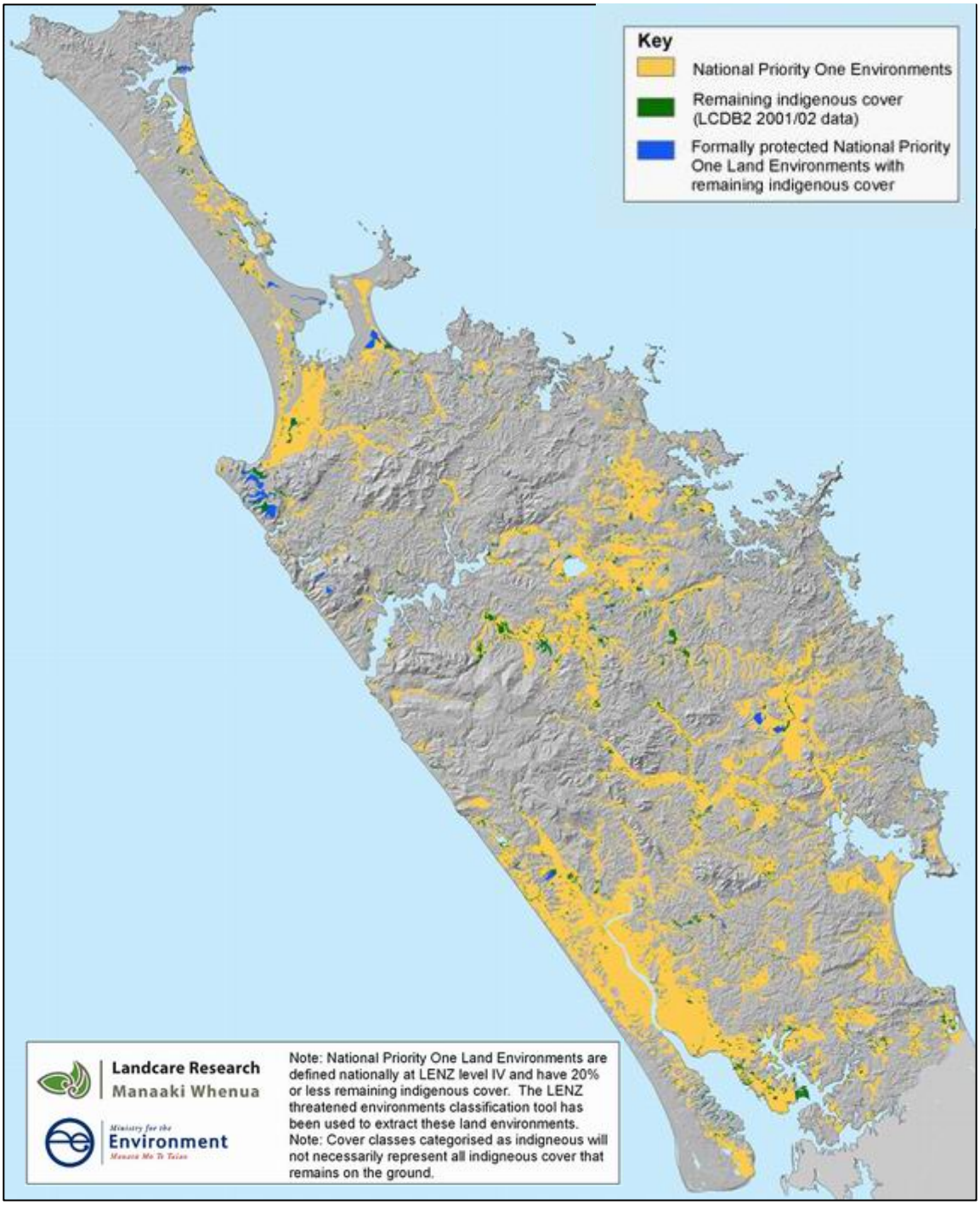

Figure 2: National Priority 1 land environments in Northland and the areas of which are remaining indigenous vegetation (both formally protected in blue and not protected in green).

Key indicator species

The overall state of biodiversity in Northland is difficult to assess by any simple measure. However, there are key species which are good indicators of environmental change and are straight-forward to monitor. These include species such as freshwater fish, kiwi and some plants which are vulnerable to pressure and are relatively sedentary or occupy narrow habit ranges.

North Island kiwi

Northland is a mainland stronghold for North Island or brown kiwi (*Apteryx mantelli)*. There are 25 clusters of kiwi population remaining in Northland, all of which extend across both private and public land.

Kiwi populations in Northland have declined greatly due to loss of habitat, predation by a range of predators and impact of motor vehicles. Kiwi call monitoring showed that call rates declined in all areas during the 1990's with catastrophic declines in some areas, these declines were primarily attributed to the impact of predators. As kiwi are very long lived and slow breeding the populations are very vulnerable to any increases in threats.

This vulnerability is further increased as juveniles are more vulnerable to predation, so many of the existing populations are comprised mostly of older birds. Without active, on-going protection efforts kiwi numbers in Northland will continue to decline with mainland populations likely to become extinct within 50 years. Active management in areas where kiwi are present will increase the number of juveniles surviving through to an age where they can breed.

Kiwi populations are currently being managed at about 30 sites across Northland. This covers at least 53,000 ha and includes most of the identified population clusters. This predominately involves pest control and public education. Due to these efforts, the kiwi population in Northland in these managed areas is increasing. Since 1999 call rates from kiwi monitoring have stabilised, with an increase in call rates at one of the four areas monitored.

For more information on kiwi protection initiatives in Northland refer to case study 1.

New Zealand dotterel

The NZ dotterel (*Charadrius obscurus*) is one of New Zealand's endangered endemic shorebirds. The NZ dotterel consists of two subspecies; the northern subspecies is found on the northern coasts of the north island and the southern subspecies on Stewart Island. The northern subspecies was once widespread and common but now numbers are only about 1700 birds (Dowding & Davis 2007). The NZ dotterel's international status (IUCN) is 'Endangered' and under the New Zealand threat classification is 'Nationally Vulnerable' (Hitchmough 2002). The population is currently considered to be stable but this is dependent on continued conservation management.

The decline of the NZ dotterel is due to a combination of factors, mainly predation by introduced mammalian predators, human-related disturbance during their breeding season, and habitat loss and degradation through coastal development.

The northern NZ dotterel (*C. o. aquilonius*) inhabits the coast of the North Island, north of a line between Taranaki (Kawhia) and northern Hawke's Bay. The birds are most numerous on the east coast of Northland, Auckland, Coromandel and Bay of Plenty, and following a population increase of around 4% between 1989 and 1996 (Dowding 1997) the breeding range has recently expanded into the Gisborne area.

In Northland the dotterel populations have remained relatively stable since 1996 until the latest national census in 2004. The strong-holds in the Northland area are on the east coast at Mangawhai, Waipu, Ruakaka and Mimiwhangata. There are about 600 birds on the east coast. The birds on the west coast number around 150 individuals and often occur as one or two pairs scattered along long stretches of coast, based around the mouths of small streams.

Two of the Northland sites are extremely important for NZ dotterel conservation: Mangawhai Sandspit hosts the second highest number of breeding pairs (about 30 pairs) and a large post-breeding winter flock number of about 150 birds. Waipu Estuary has about 15 breeding pairs and 30-40 post-breeding birds. Both these sites have Wildlife Refuge status and are managed by the Department of Conservation. Summer wardens are employed to carry out monitoring, nest protection, advocacy and predator control. People in coastal communities also 'keep an eye' on the nesting dotterels, often fencing off nests and trapping for predators.

However, as these coastal strips become more highly developed there will be increasing pressure on the dotterels from human-related disturbance, particularly from recreational activities and habitat degradation. Protection of the birds and their habitat, predator control and management of the impact of recreational activities at these sites will continue to be required to maintain the NZ dotterel populations. This is particularly important as research has identified that there are two sub-populations in the North Island: Northland/Auckland, and Coromandel/Bay of Plenty, with little or no interchange. Also the birds productivity (the number of chicks fledged per pair) at managed sites is at least twice as great as at un-managed sites (Dowding 2001).

Northland mudfish

The Northland mudfish (*Neochanna heleios*) is only found in Northland and its distribution is restricted to wetlands in the Kerikeri, Ngawha and Lake Omapere areas, as shown in figure 3 (below). It is classified as nationally endangered. A unique characteristic of mudfish biology is the fish's ability to aestivate in mud during periods of low water levels in wetlands. This means that mudfish activity is greatly affected by water levels in the wetlands.

Photograph showing typical Northland mudfish habitat and a gee minnow trap being checked as part of annual monitoring (right).

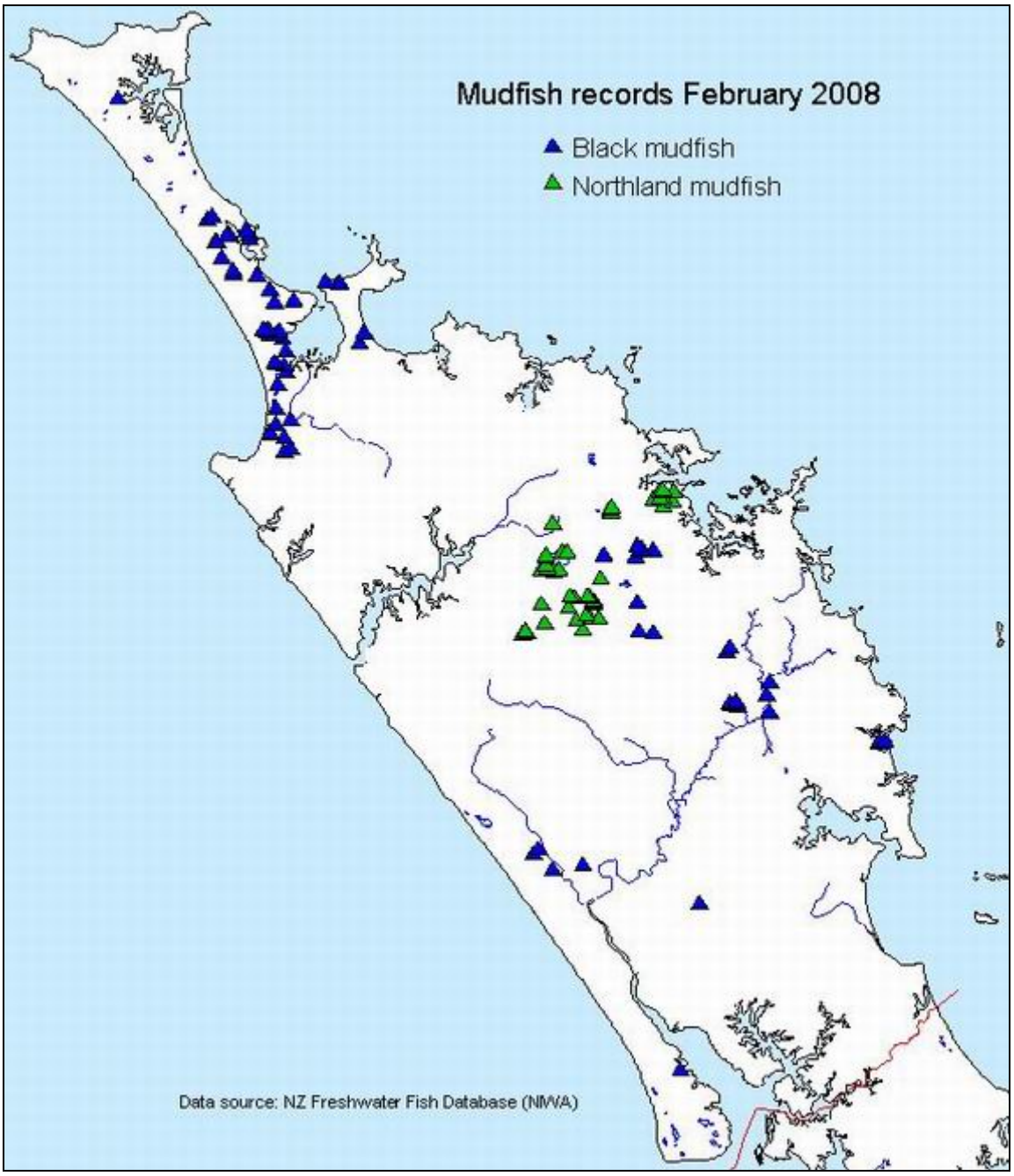

Figure 3: Mudfish records for Northland

The total number of mudfish caught at two of the monitoring sites is shown in figure 4 (below). The Ngawha sites shows very little variation in the number of fish caught, while at the Kerikeri site there has been significantly less mudfish trapped in the last two years.

As discussed above this is likely to be attributed to environmental conditions and it is too early to assess whether this is a decline in the population. Department of Conservation will continue with annual monitoring of Northland mudfish.

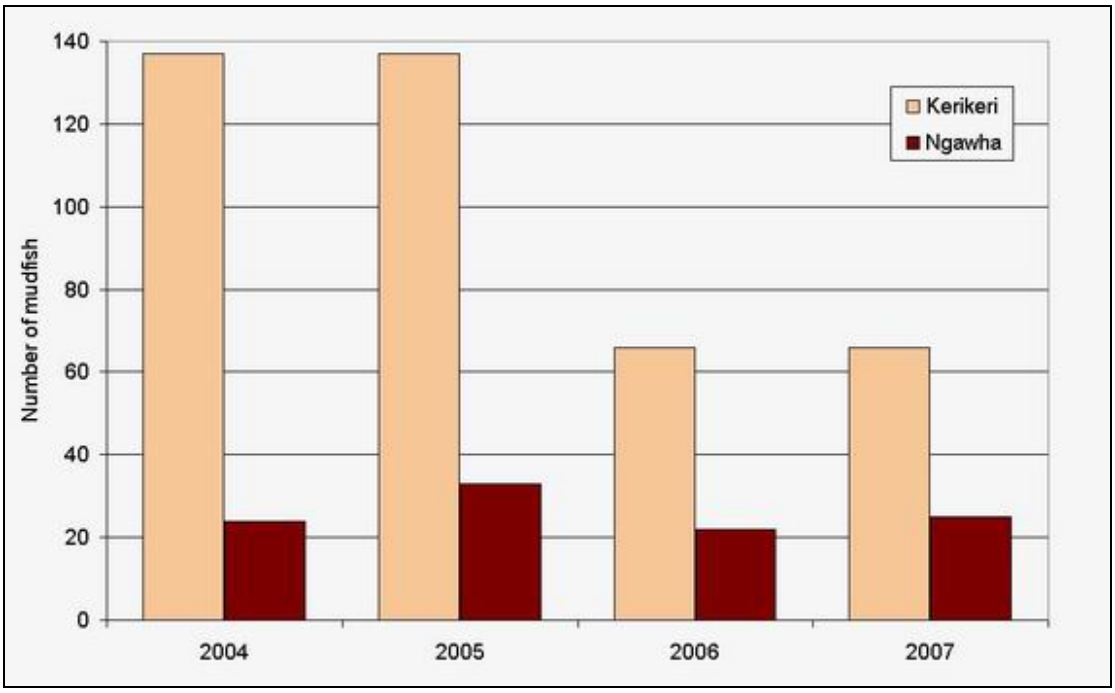

Figure 4: Total number of Northland mudfish caught along the transects at both Kerikeri and Ngawha C monitoring locations in each annual survey.

Freshwater biodiversity

The status of aquatic vegetation and fish in Northland lakes, including both native and exotic species, is covered in the Lakes section of this SOE report. Note that the fish data is restricted to what has been recorded in the NIWA managed New Zealand Freshwater Fish Database.

There is currently very little biological monitoring carried out on Northlands rivers. Stream macroinvertebrates are monitored annually at the Regional River Water Quality Monitoring Network sites and used as an indicator of water quality. For more information refer to the surface water quality chapter of this report.

There is currently no routine state of the environment monitoring of freshwater aquatic vegetation, freshwater fish species or wetland habitat quality.

Fish monitoring in Northland is currently restricted to:

- rare species such as the Northland mudfish, dwarf inanga, dune lake galaxiids and short jaw kokopu, mostly by the Department of Conservation inline with recovery plans.
- presence/absence monitoring by consent applicants for environmental impact assessment reports to gather background information for resource consent applications.

Most of this information is recorded in the New Zealand Freshwater Fish Database (NZFFD), managed by NIWA.

Native fish

As of December 2007 there were 20 native freshwater fish species recorded in Northland (see table 5 in Appendix A). The most frequently recorded are short fin and long fin eels.

Many of these species are important to Northlands', New Zealand's and international freshwater biodiversity. Many of our native freshwater fish species are endemic to NZ (not found anywhere in the world). The Northland mudfish (as discussed above) is only found in Northland, and is classified as 'nationally endangered' on the threatened species list (Hitchmough 2002).

Dwarf inanga and dune lake galaxias are only found in the Kai Iwi and Pouto dune lakes in Northland, as shown in figure 5 (below). Other than this they are only found in a couple of dune lakes on the South Head of the Kaipara Harbour in the Auckland Region. They are classified as 'nationally vulnerable'. Note that dune lake galaxias are different to dwarf inanga as they have been geographically separated for so long.

In Northland, giant kokopu have only been found in one dune lake, as shown in figure 5 (below) and have a national classification of 'gradual decline'. Short jaw kokopu are also relatively rare in Northland, being recorded at about 10 different locations. They have a national classification of 'sparse'.

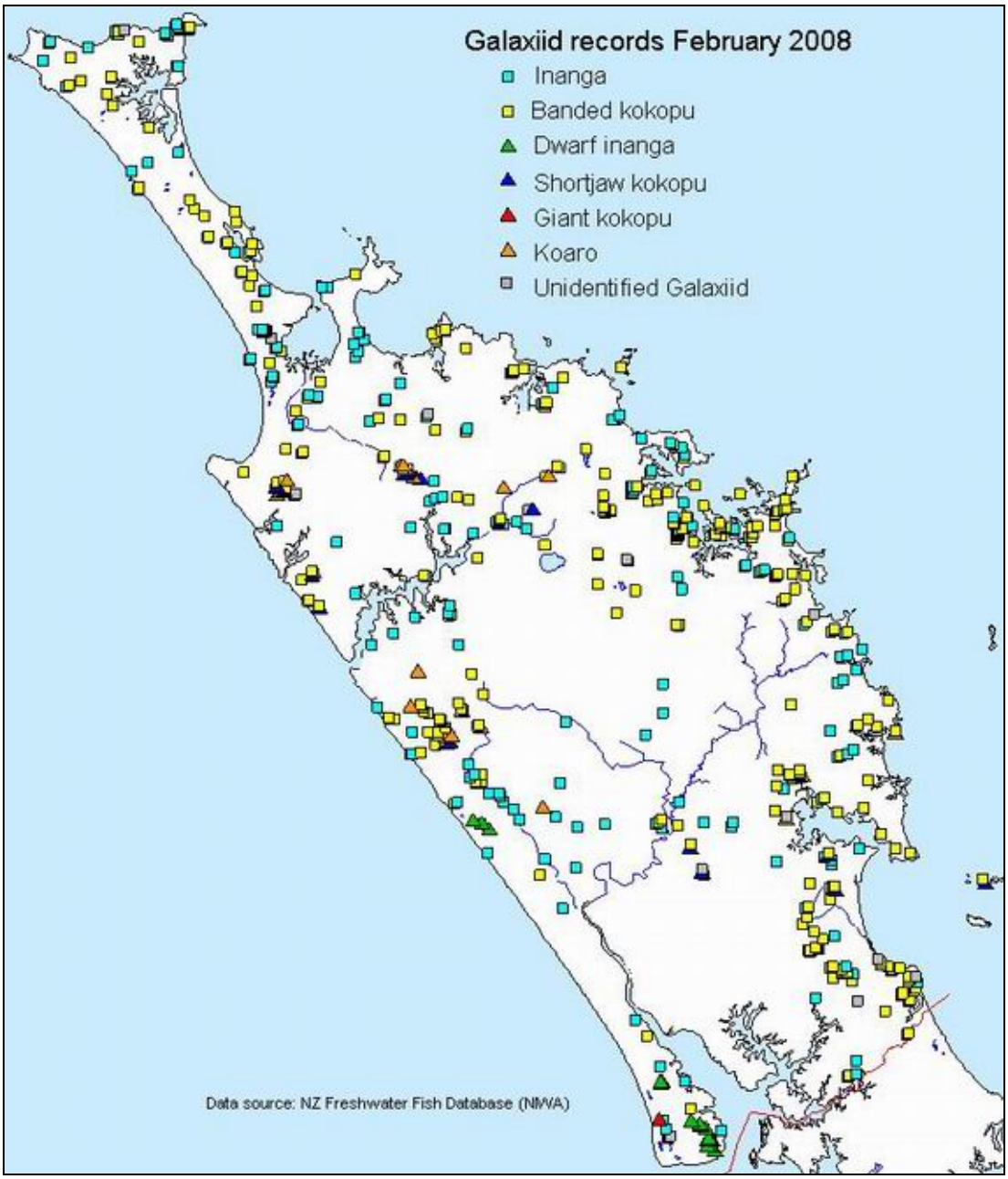

Figure 5: Records of Galaxiid species in Northland.

Introduced fish

There are 12 introduced fish species recorded in Northland (see table 5 in Appendix A). The most widespread is the mosquito fish (Gambusia affinis), as shown in figure 6 (below), which is an extremely aggressive pest fish that is known to attack native fish. Gambusia are prolific breeders that give birth to live young, allowing population size to increase rapidly.

The coarse fish species such as koi carp, goldfish, tench and rudd, are also very destructive to freshwater ecosystems, by predating on or competing with native fish for food and habitat and depleting native vegetation in lakes. These pest fish are also prolific breeders. The known extent of these pest fish species in Northland is currently limited to records in the NZFFD and is likely to be under-estimated.

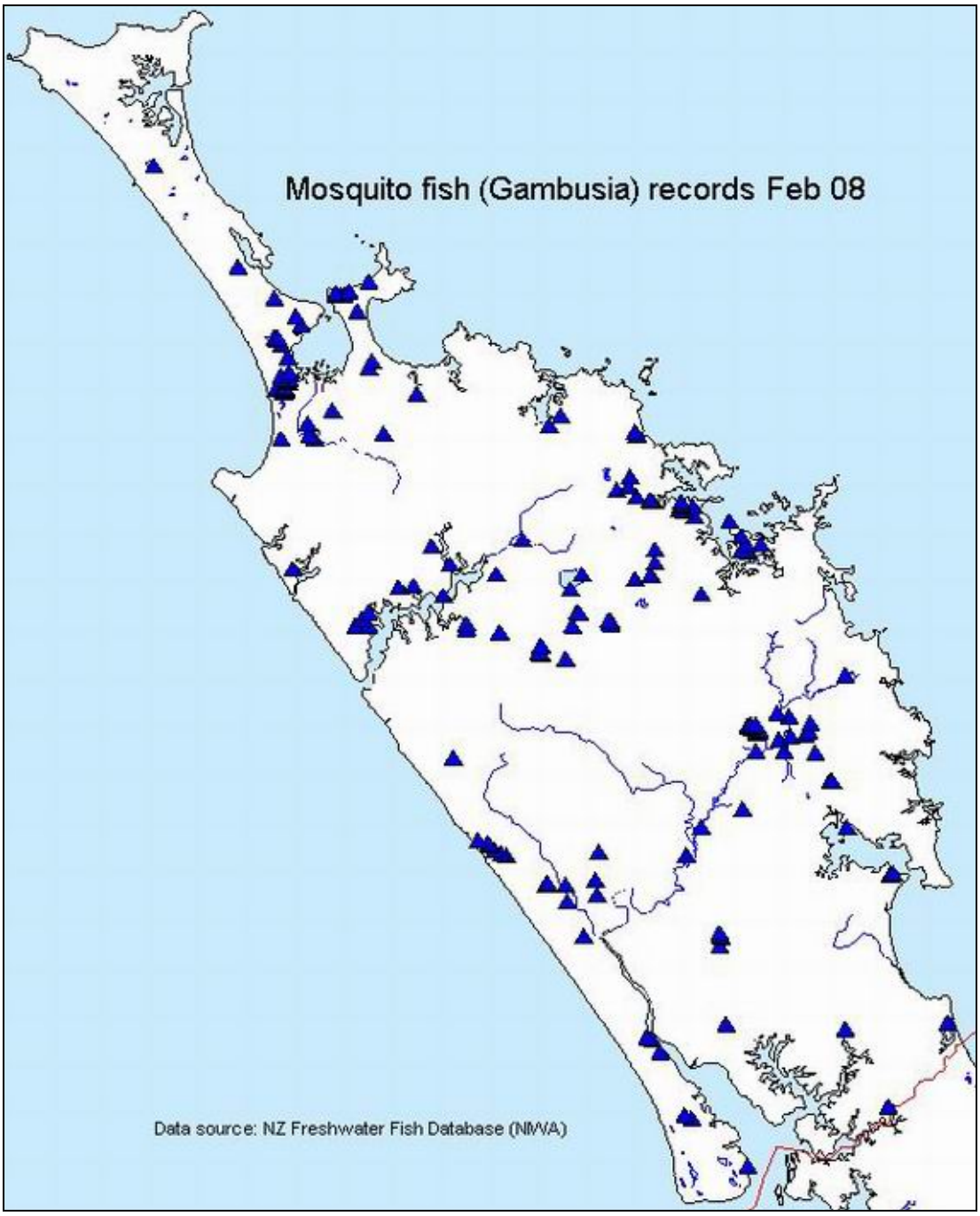

Figure 6: Mosquito fish (Gambusia) records for Northland (left).

The most widespread freshwater game fish species in Northland is the brown trout, which has been released in many of Northlands waterways for the purpose of recreational fishing. Brown trout eat mostly aquatic invertebrates, so can compete with native fish species such as galaxiids for food.

Aquatic plants

The tiny native rush–like plant *Hydatella inconspicua* lives in the shallows on the edges of Northland dune lakes which are in good condition. It is also found in the South Island. It is known from two lakes in the Far North, all three Kai Iwi lakes and two lakes at Pouto. However due to competition from aquatic weeds it has disappeared recently from a further two lakes at Pouto highlighting the need for vigilance in preventing the spread of weeds into new lakes.

15.4 What is being done?

Policy documents

Regional Policy Statement

The Northland Regional Council has undertaken a five year review of the efficiency and effectiveness of the Regional Policy Statement (RPS). This review identified that the ecosystems and biodiversity section is a priority for review, particularly given the new functions for Councils under the 2003 amendment of the RMA. The NRC is currently investigating a plan change to the ecosystems and biodiversity chapter of the RPS. The Regional Policy Statement and the efficiency and effectiveness report is available on the Council website at the following link:

http://www.nrc.govt.nz/Resource-Library-Summary/Plans-and-Policies/Regional-Policy-Statement/

Regional Water and Soil Plan

There are a number of rules within the Regional Water and Soil Plan that help to protect aquatic and terrestrial biodiversity in Northland. Although the primary purpose of a number of these rules is not the protection of biodiversity it is frequently an additional outcome. Rules concerning the taking of water from rivers and lakes and also the discharge of contaminants into these waters help to protect these ecosystems as do rules concerning the damming and diversion of waterways. Indigenous wetlands are protected by separate rules. Rules around vegetation clearance and land disturbance on erosion prone land and in the Riparian Management Zone aim to limit the impact that these activities have on water quality and therefore aquatic biodiversity. The Regional Water and Soil plan is available on the Council website at the following link:

http://www.nrc.govt.nz/Resource-Library-Summary/Plans-and-Policies/Regional-plans/Regional-Water-and-Soil-Plan/

Long Term Council Community Plan (LTCCP)

The Northland Regional Council Long Term Community Plan is a document put together by the Regional Council and the community that sets a strategic direction for the Council. The plan outlines a direction for a ten year time frame but within this time it is reviewed and evaluated every three years.

There a number of priorities identified for the 2007-2009 time period that set a framework for the biodiversity protection work that the Council is involved with. Detail can be found in 'Section 3: Northland's natural environment is sustainably managed' in the LTCCP available on the Council website at the following link:

http://www.nrc.govt.nz/Resource-Library-Summary/Plans-and-Policies/Community-Plan/Community-Plan/

Regional Pest Management Strategies

The Northland Regional Council utilises a number of different strategies for managing pest plants and pest animals in Northland. In July 2006, the Regional Council, after public consultation, adopted the Regional Pest Management Strategy for aquatic pests. In addition to aquatic weeds previously contained in the RPMS, the new strategy includes pest fish such as koi carp, rudd, tench, orfe and catfish.

These strategies are available on the council website at the following link:

http://www.nrc.govt.nz/Resource-Library-Summary/Plans-and-Policies/Pest-management/Northland-Pest-Management-Strategies

A review of all Regional Pest Management strategies will be undertaken during 2008. Public input is a statutory requirement of the review and for new pests to be included community support will be required.

National policy

In April 2007 the Ministry for the Environment released the Statement of National Priorities for protecting rare and threatened native biodiversity on private land, which identifies the types of ecosystems and habitats most in need of protection. The statement supports the government's pledge to maintain and preserve New Zealand's natural heritage and will be of particular use to local government, which has the primary role of protecting native biodiversity on private land − a role assigned to them under the Resource Management Act (RMA) 1991. Along with clear priorities, the statement provides a national perspective which councils can use in planning and decision-making.

Four national priorities for biodiversity protection have been set:

1. To protect indigenous vegetation associated with land environments that have 20% or less remaining in indigenous cover.

2. To protect indigenous vegetation associated with sand dunes and wetland; ecosystem types that have become uncommon due to human activity.

3. To protect vegetation associated with "originally rare" terrestrial ecosystem types not already covered by priorities 1 and 2.

4. To protect habitats of acutely and chronically threatened indigenous species.

For more information on the Statement of National priorities refer to the following websites: http://www.biodiversity.govt.nz/land/guidance/

http://www.mfe.govt.nz/issues/biodiversity/initiatives/private-land/work-programme.html

Protected Natural Areas Programme

The Protected Natural Areas Programme (PNAP) is a process whereby all remaining natural areas of significance throughout New Zealand are identified, evaluated and mapped by field survey by the Department of Conservation. This fulfils Section 3(b) of the Reserves Act 1977 with the specific aim that over time representative areas of a full range of representative biological and landscape features are protected nationally.

Published PNAP information compliments the information requirements of the RMA and is used widely by planners and land managers. It identifies areas of significant indigenous vegetation and significant habitats of indigenous fauna which need to be protected. Some of the Northland PNAP information has been digitised and is now readily available as a mapping tool for planners and land managers.

PNAP surveys have been undertaken for most Ecological Districts throughout Northland. There are 13 published reports with three others written due to be published soon. An additional three areas have surveys either complete or almost complete including Manaia, Tokatoka and Tangihua Ecological Districts. The first Ecological Districts were surveyed more than 14 years ago, so some of the information is out of date, especially for

districts such as Kerikeri where there has been a lot of recent development. There is a need to keep this information up to date by checking or resurveying sites. An Envirolink funded research project has been approved to recheck sites surveyed in two ecological districts, to see what habitats have been lost or gained over the last 10 years. The districts proposed for this work are Kerikeri where there has been a lot of recent growth and development, and its neighbour Kaikohe which has remained relatively rural.

Wetland habitat quality monitoring

The Regional Council intends to set up a formal long term wetland monitoring programme for Northland, using national methodology designed by Landcare Research. Approximately 20 wetlands in good condition across the region, covering a range of wetland types, will be monitored. This involves putting in permanent vegetation plots as well as undertaking water and soil sampling. In addition several Northland wetlands are already included in the national network of wetlands routinely monitored by Landcare Research.

There are two components to wetland monitoring: initial assessment and long term monitoring. A number of wetlands in Northland have had initial assessments carried out. These wetlands were all surveyed and assigned scores based on their relative condition i.e. closeness to being pristine versus level of disturbance. These condition scores enable the wetlands across the region to be compared, ranked and prioritised.

The results from both initial and long term monitoring of wetlands will be recorded in the Regional Council's Biodiversity and Wetlands database, which was constructed in 2007.

Threatened plants

A list of regionally threatened and uncommon vascular plants have been drafted by a group of local and national plant experts and will be put out for public comment. There are over 300 species on this list which equates to over 40% of Northland's indigenous flora. This list, combined with survey information about sites, is a good tool for planning and prioritising management as well as providing good information for use when issuing resource management consents, allocating funding for projects and recommending land protection.

Biosecurity management

Animal pests and plant pests both pose major threats to indigenous biodiversity in Northland. The climate is favourable for the establishment of many exotic species; stress placed on natural ecosystems from factors such as land clearance, grazing and nutrient enrichment increases their vulnerability to these pests.

Biosecurity needs to be focused at high valued conservation sites on private land, under-represented ecosystems, protecting threatened species and pre-border control. There is a need to support the Crown (both DOC and MAF) in their attempts to control biosecurity threats on land they administer within the region and pre-border.

Community Pest Control Areas

Community Pest Control Areas (CPCA) is one of the strategies that the Regional Council utilises for managing plant and animal pests in Northland. The establishment of a CPCA requires an agreement between the Council and a group of landowners on how to manage a particular pest or range of pests in a defined area. The agreements vary from group to group and set out how initial control will be carried out, how ongoing maintenance will be managed and who is responsible for the different stages.

The CPCA approach enables the Council to provide advice, training, monitoring and funding over several years. In return the landowners undertake to continue management of pests longer term. For a proposed project to qualify as a CPCA it is necessary that the area is defendable in order to minimise reinvasion, that there is a high level of landowner support within the proposed area and that the values being protected are significant as listed in Section 72(c) of the Biosecurity Act 1993.

There are currently 21 either proposed or active Community Pest Control Areas (CPCA) in Northland. This includes 22,000 hectares of private land under management, of which 2,500 hectares is protected habitat (forest and wetland) and over 600 ratepayers are involved.

The range of pests that can be included for control within a CPCA agreement are listed in the Community Pest Control Areas brochure available from the Northland Regional Council or from the Council website at the following link:

http://www.nrc.govt.nz/Environment/Weed-and-pest-control/Community-Pest-Control-Areas/

Other agency support

In addition to funding biosecurity projects through the Council Environment Fund and the Community Pest Control Areas the Council also supports other agencies that are involved in biodiversity protection work in Northland - QEII, NorthTec (formerly Northland Polytech), private trusts, and universities have been financially supported to achieve environmental outcomes for the region.

Research funding

The Northland Regional Council has instigated applications to secure funding for a number of research projects around issues of importance to Northland. More than $200,000 of Crown funded Science advice funds have been granted to address biosecurity issues in Northland.

Weed control initiatives

- The control of all Manchurian wild rice sites in the region and the inclusion of this pest plant on the list of “pest plants of national importance” by Biosecurity New Zealand (BNZ). Funding from BNZ to assist containment of this plant, with the aim of halting its spread to other regions is expected during 2008.
- More than half of the African feather grass sites have now reached a clear status and 90 percent of the remaining outlying sites are predicted to be at low to nil infestation levels within the next four years.

- The continued control of lantana in urban centres halting its spread, and a targeted campaign to stop this pest plant reaching Far North reserves.
- All spartina will be under management by the end of next year. In addition all known sites will either be fully eradicated or remaining areas of spartina will be negligible in a further four years.
- Control of the invasive aquatic plant hornwort in high value dune lakes has been initiated.

National Pest Plants Accord

This Accord is a cooperative agreement between nursery and garden associations, regional councils and government departments with biosecurity responsibilities. It identifies plants that are unwanted organisms under the Biosecurity Act 1993 and these plants cannot be sold, propagated or distributed within New Zealand.

Northland Regional Council staff give regulatory and/or control advice to landowners and nursery managers. All plant retail premises in Northland have been inspected with the outcome of total compliance with the sales ban of plants included on the National Accord list.

The Northland Regional Council also contributes to a national collective of councils and agencies so that the biological control of plants listed on the Accord can be researched and solutions to their control found.

Other biosecurity work

In addition to work carried out under the strategies outlined above the Northland Regional Council is involved in a number of other biosecurity projects that help to protect biodiversity values in Northland, including:

- A number of successful releases of agents for environmental weeds such as mistflower and funded biocontrol research of boneseed and tradescantia.
- A 6,000 hectare community led scheme to eradicate goats at Mt Tiger - Pataua area.
- Establishment of an intensive stoat trapping regime at the Oneriri Peninsula as a precursor to the reintroduction of North Island brown kiwi.
- 49 releases of new biological control agents for agriculture plant pests.
- Maintenance of the region's "wild deer free" status, jointly with Department of Conservation and the Animal Health Board; wild red, fallow and wapiti deer have been removed from the region and farmed deer escapes minimized.

Biodiversity enhancement

Northland Biodiversity Enhancement Group

Northland Biodiversity Enhancement Group (N–BEG) was formed in 2001 and was New Zealand's first regional biodiversity forum. It is convened by NZ Landcare Trust and its partners are agencies and organisations with a role in biodiversity protection in Northland. These include Northland Regional Council, NZ Landcare Trust, Department of Conservation, district councils, Queen Elizabeth II National Trust, Fish and Game NZ, Farm Forestry Association, NZ Kiwi Recovery and BNZ Kiwi Recovery.

N–BEGS's goal is to "promote the protection of biodiversity in Northland" recognising that working collaboratively increases the effectiveness of each partner especially when promoting and assisting biodiversity enhancement on private land.

The group has been successful and continues to grow and build momentum. Projects to date include:

- Displays at field days, shows and workshops.
- Landowner self help "*Restoring the Balance*" kit (assisted by Biodiversity Advice Fund).
- "*Your Land Our Support*" pamphlet (about N–Beg and where to get information).
- Strategic interagency approach and workshops.
- Whole of Northland Project (see below).

Whole of Northland Project

The Whole of Northland Project was initiated by N–Beg in 2005 and was funded jointly by the Biodiversity Advice Fund, Northland Regional Council and Department of Conservation (Northland Conservancy). The project aimed to develop and implement an integrated approach to biodiversity enhancement in Northland. Stage one of the project finished in August 2007.

The key outcomes of the project are:

- Liaising with Landcare and other community initiatives, organisations and agency staff to identify information needs, gaps and opportunities to resource further biodiversity work.
- Encouraging provision of information and advice in a way that meets needs of landowners and agencies.
- Sourcing and collating information on current biodiversity management activities in Northland into 'The Whole of Northland Report' (Mullouly 2007).
- Present information as a series of layers within a GIS framework where possible

The completion of an inventory on biodiversity activities will meet a number of needs. It will identify the contribution that the region is making to New Zealand's overall biodiversity outcomes, help to grow the understanding and appreciation of the extent of biodiversity values in the region, and lever further community support for work to protect and enhance these values. The process will also provide a benchmark for the basis of further work in Northland.

The detailed report is available on the Regional Council website at the following link:

http://www.nrc.govt.nz/Resource-Library-Summary/Research-and-reports/Biodiversity/Whole-of-Northland-Project-/

Environment care groups

There are currently more than 55 Landcare and community groups operating in Northland many of which are involved in a range of biodiversity focused projects from small scale possum control, plant pest eradication to large ecosystem protection projects. There are at least 52,000 hectares of land being actively managed for kiwi protection in Northland by Landcare groups and the Department of Conservation. 60% of the actively managed area for kiwi is on private land.

Regional Council Environment Fund

The Northland Regional Council's Environment Fund is a contestable fund that was established to assist land owners and community groups carrying out work that assists with the protection or enhancement of indigenous biodiversity. The Northland Regional Council recognises that biodiversity protection work carried out on private land has benefits for the wider community; the fund is a means of acknowledging this.

The fund accepts applications through an annual round; the fund will meet a percentage of the costs of projects of the successful applicants. A range of different projects are eligible for funding including pest and weed control, bush protection, riparian protection and enhancement, coastal protection and re-vegetation projects. The importance of protecting wetland and dune ecosystems is recognised through the allocation of funding targeted specifically at these criteria.

In addition to the funding from Council, money from the Honda Tree Fund and from court fines received by the Council have been allocated and administered through this fund mechanism.

Since 1996 the fund has allocated $1.5 million to various projects. For the 2007/08 financial year $505,000 has been allocated from this fund to the following areas:

- General projects ($185,000)
- Wetland protection ($100,000)
- Pest control projects ($75,000 from the biosecurity budget for areas outside Community Pest Control Areas)
- Coastal dune protection ($25,000)
- Stock exclusion from the CMA ($100,000).

Additional funding administered through the fund includes:

- Native re-vegetation projects with the Honda NZ Tree Fund ($22,400); and
- Projects within the Ruakaka area funded from a court fine ($20,000).

Biodiversity Advice and Condition Funds

The establishment of the Biodiversity Advice Fund (BAF) and the Biodiversity Condition Fund (BCF) by central Government in 2001 has allowed for active management of biodiversity throughout New Zealand. These funds currently allocate over $3 million nationally each year for biodiversity on private land. Information on these funds is available on the biodiversity New Zealand website at the following link:

http://www.biodiversity.govt.nz/land/nzbs/pvtland/condition.html

Since 2002 (including funding rounds 2 - 8) Northland has received nearly $308,000 (9.3%) from the total amount of Biodiversity Advice Funding that has been allocated and $1.28 million (17.8%) from the total amount of Biodiversity Condition Funding allocated. This reflects Northland's relatively high residual biodiversity.

There have been a number of projects that have been jointly funded by the NRC Biodiversity Condition Fund and landowners. The Biodiversity Condition Fund provides the Council with an opportunity to apply for additional funding for Environment Fund projects that it sees as of regional or national significance. Projects that have been jointly funded using this approach, and frequently also supported by QEII National Trust, include

the protection of coastal forest remnants around the margins of the Kaipara Harbour, stock exclusion from a number of indigenous wetlands throughout Northland and the protection of a number of significant bush remnants.

Legally protected land

Of the 416,900 ha of native vegetation land cover in Northland in 2002, approximately 36% of it was legally protected in 2006 as either Department of Conservation reserve, QEII covenants, WDC covenants, wildlife refuge or District Council reserves, where the land has been set aside as a reserve for the protection of flora, fauna or wildlife reasons.

Department of Conservation

The Department of Conservation (DOC) manages the Crown Estate in Northland. It is the main agency responsible for the management of indigenous vegetation and fauna and provides an advocacy role on private land. This is carried out under the Conservation Act 1987, created to promote the conservation of New Zealand's natural and historic resources. DOC manages approximately 167,250 hectares of land in Northland, including pastoral farming blocks such as Te Paki farm in the Far North.

Nga Whenua Rahui

This fund is managed by the Department of Conservation and will fund the protection of indigenous ecosystem on Maori land. This includes biodiversity and ecosystem protection and can be used to meet the costs of survey work, fencing, plant nursery development, and pest and weed control. Land area in Northland protected under Nga Whenua Rahui is approximately 5,400 hectares as of November 2007.

District Councils

Since 1998 the Whangarei District Council has contributed $30,000 per annum to the QEII National Trust for the establishment of new open space covenants within the Whangarei District. To date 100 new covenants have been established. Whangarei District Council approved a contestable Environmental Enhancement Fund in August 2007 that is available to both individuals and community groups. The sum available is $20,000 per annum and can be applied to a range of projects that benefit biodiversity primarily on private land including (but not limited to) weed and animal pest control, restoration planting, and fencing.

Since 2003 the Far North District Council has provided $50,000 per annum for biodiversity funding to assist and encourage landowners and community groups to protect and enhance indigenous vegetation on private land. The criteria set down for the Significant Natural Areas (SNA) Fund includes:

- fencing
- weed and animal pest programmes
- planting
- advocacy programmes aimed at protecting, maintaining and/or enhancing significant natural areas
- monitor pests, weeds and habitat values.

The Kaipara District Council Biodiversity Improvement Fund was established in 2005 and provides funding to landowners and community groups that will benefit native biodiversity. The Council currently provides $15,000 annually.

The district councils also have formal policies and rules relating to the protection of biodiversity, particularly the clearance of indigenous vegetation and wetlands, and informal incentives such as rates relief for covenanted land.

QEII National Trust

The Queen Elizabeth the Second (QEII) National Trust Act provides a legal mechanism to secure the protection of biodiversity on private land through the creation of an open space covenant. An open space covenant is a legally binding agreement between the landowner and the Trust to maintain an area as open space in perpetuity.

At August 2007, Northland has 442 registered QEII National Trust Open Covenants and a further 92 approved, as shown in table 4 (below). The total land area in registered and approved covenants is 8118 hectares. The largest covenant is 417 ha. However, most covenants in Northland are small, with an average size of 15 ha. Northland has a larger number of smaller covenants than anywhere else in New Zealand, though the total area covenanted is comparable to other similar sized regions. The district with the highest concentration of covenants is Whangarei.

Table 4: Number and area of QEII covenants in Northland by district as of August 2007

		Covenant status		
District		**Approved**	**Registered**	**Total**
Far North	Number of covenants	25	123	148
	Total area (ha)	769	3295	4064
	Average size (ha)	30.7	26.8	27.5
Kaipara	Number of covenants	25	86	111
	Total Area (ha)	397	1362	1759
	Average size (ha)	15.8	15.8	15.8
Whangarei	Number of covenants	42	233	275
	Total Area (ha)	386	1904	2290
	Average size (ha)	9.2	8.2	8.3
Total number for Northland		92	442	534
Total area for Northland (ha)		1552	6561	8113
Average size for Northland (ha)		16.7	14.8	15.2

Nationally Northland has a reputation for being the busiest area for QEII with a steady flow of enquiries and covenant processing for staff. The number of regional representatives in the Northland area has had to be increased from one to three in the last 10 years. There are a total of 27 regional representatives nationally.

There are a number of reasons for the increasing interest in covenanting in Northland. Recent population growth and higher land values have resulted in many new lifestyle subdivisions throughout the region which has resulted in covenants being set aside as environmental benefit lots. In addition higher farm values have put pressure on farmers to subdivide or sell farms and often landowners are keen to see their favourite piece of bush or wetland protected especially when they have owned the property for many years.

There has been a coordinated push between agencies to protect particular areas of land often by pooling funding resources. For example, WDC contributes up to $30,000 annually as a 50% subsidy once QEII has spent $60,000. It is also estimated that around 20% of projects sponsored by the NRC Environment Fund result in covenants either as part of the original project or later on. NRC and district councils do not contribute to covenants as part of environmental benefit lots for subdivision.

Another trend has been a swing towards protection of wetlands and riparian areas rather than forest. This is most likely due to advocacy about the importance of wetland and riparian protection, and clean water, coming from the Regional Council and other agencies.

15.5 Where to from here?

The following are key points towards implementing improved future management of the indigenous biodiversity in Northland:

- Continuation of the coordinated efforts of N–Beg is essential to maintaining and building on the groundswell of biodiversity interest in Northland. Now the groundwork has been done N–Beg can focus its efforts more strategically using information gained from the Whole of Northland Project.

- Completion of the Protected Natural Areas Programme surveys and report publishing for those ecological districts that have yet to be completed. Convert the information from the reports into a digital form where it has not already been done so that the information can be utilised in conjunction with GIS. These reports give a good baseline of biodiversity information for the region, which can be utilised in a number of ways.

- Continued refinement and development of the Northland Regional Council biodiversity database. The database ranks sites according to a range of attributes. This GIS linked database will have a range of applications as it becomes more complete, including as a planning tool and assisting to assess funding applications.

- Ongoing support, both technical advice and financial assistance, to landowners wishing to carry out biodiversity enhancement work on private land. This support acts as an incentive to land owners and acknowledges what are frequently large amounts of time and personal resources committed to projects by landowners.

- Increased biodiversity monitoring in the region. Monitoring is a means of measuring changes occurring to biodiversity in the region and can also be used to measure the success of individual enhancement or protection projects. The development of a wetland condition monitoring programme is underway. Plans are in place to develop a programme to monitor projects previously funded through the Council Environment Fund.

- Recording of all the past Environment Fund projects on the GIS system.

- Instigate a change to the Regional Policy Statement for Northland to bring the Ecosystems and Biodiversity section up to date and relevant taking into consideration the new Regional Council functions for biodiversity management and the information and resources being developed as discussed above.

- Review of the Regional Pest Management Strategies, which will be done in conjunction with the draft LTCCP process during late 2008 – early 2009.

15.6 What can you do to help?

There are several things you can do to protect and enhance biodiversity in Northland.

At home:

- Be a responsible pet owner. Domestic dogs and cats can be major predators of a number of native species including kiwi. Dogs should be kept under control at all times and not allowed to wander. Keeping cats well fed and inside at night will help to reduce the impact that they have.
- Be a responsible gardener. There are approximately 2430 wild exotic plants in New Zealand, nearly all of which are 'garden escapes'. This is now greater than the total number of native vascular plants. It is estimated that around 10% of plants introduced to New Zealand go wild and some become serious pests. The best way to prevent gardens from being a source of weeds is to grow plants that will not become pests. Copies of *'The Good Plant Guide'*, which will help you choose plants not harmful to people and the environment, are available from Regional Council offices.
- Carry out pest and weed control on your own property. NRC publishes a range of information sheets covering control of a number of animal and plant pests. Regional Council biosecurity staff members are also available to offer advice. Information sheets are available from Council offices or can be downloaded from the Council website.
- Find out the value of what you have on your property. Regional Council land management staff can help to identify native species and weed species and will give advice on how to best protect what you have.
- Get involved with a Landcare group near you. The success of Landcare groups in Northland is due to the power resulting from many people cooperating together, including achieving outcomes and gaining funding, all of which leads to enhancing Northland's biodiversity.

On the farm:

- Protect important areas from stock. Grazing stock have a major impact upon the understorey of bush areas and limit regeneration. Fencing bush remnants, wetlands and the edges of waterways protects these areas. Certain weeds may become a problem once stock are excluded; determine what weeds are present prior to fencing and plan how you will manage these weeds.
- The use of nutrient budgets and nutrient management plans can help to reduce the detrimental impact of nutrients lost to waterways as well as providing economic benefits to the land owners.
- Covenant your special areas. Covenanting offers an opportunity to provide long term protection to an area, irrespective of who owns it in the future. For more details on the process of covenanting visit the QEII National Trust website at the following link:

  http://www.nationaltrust.org.nz/

- Develop a restoration plan. Putting a plan in place before embarking on a restoration project will greatly increase the odds of a successful outcome. A self-help kit '*Restoring the Balance'* has been developed for Northland. This kit is useful for individuals and groups embarking on biodiversity protection projects. It is available free of charge from NRC or the New Zealand Landcare Trust.

There are many informative brochures and information available on the Regional Council website at the following links for:

- Biodiversity enhancement and protection:

http://www.nrc.govt.nz/Resource-Library-Summary/Publications/Land/

- Control of pest animals:

http://www.nrc.govt.nz/Environment/Weed-and-pest-control/Animal-pests/

- Control of pest insects:

http://www.nrc.govt.nz/Environment/Weed-and-pest-control/Pest-insects/

- Control of pest plants:

http://www.nrc.govt.nz/Environment/Weed-and-pest-control/Pest-plants/

More information on biodiversity enhancement and weed and pest control, including brochures, fact sheets and knowledgeable staff, are available at the Regional Council offices or by phoning the Council on 0800 002 004.

15.7 Case study 1: Kiwi Protection in Northland

Initiatives to protect North Island kiwi (*Apteryx mantelli*) in Northland are a good example of how various government and non-government agencies, community groups and individuals can work together to protect a species at a regional level.

Kiwi populations in Northland have declined greatly due to loss of habitat, predation and impact of motor vehicles. Predators continue to pose the greatest threat to kiwi populations. Stoats, dogs, ferrets and cats are the key predator species, with possums and pigs also having an impact. Of these stoats and dogs have by far the largest impact on kiwi populations, with stoats being the major predator of kiwi eggs and chicks and dogs being the major killer of kiwi adults. In areas where there is no active predator control underway less than 6% of kiwi chicks will survive to maturity and kiwi will eventually disappear.

Protection initiatives

The report '*Sustainable Management of Brown Kiwi*' was produced in 2006 by Wildland Consultants (contract report No. 1193) for the NZ Landcare Trust and the Department of Conservation. This report highlights existing knowledge of kiwi populations in Northland, threats and management methods, current management efforts underway in the region and suggestions for future management. Much of the information in this case study has been sourced from this report. This document is available on the NZ Landcare Trust website at the following link:

http://www.landcare.co.nz/policies/files5007/Northland%20Kiwi%20Plan.pdf

Kiwi are an iconic species in New Zealand and Northlanders are fortunate that they are still able to see kiwi in the wild. Concerns over the decline in kiwi numbers and the very real prospective of losing kiwi from mainland Northland have led to a massive effort from many in the community to reverse the trend. The efforts that are underway are a good example of how different sectors of the community can work together for a common goal. Protection efforts take place on a number of different levels, it is important that on the ground efforts by landcare groups and individual landowners are supported with technical support, advocacy, research, planning, legislation and funding.

Kiwi populations are currently being managed at about 30 sites across Northland, as shown in figure 6 (below). This covers at least 53,000 ha and includes most of the identified population clusters. Thanks to these efforts, the kiwi population in Northland in these managed areas is increasing. Since 1999 call rates from kiwi monitoring have stabilised, with an increase in call rates at one of the four areas monitored.

The success of protection efforts is dependent upon ongoing collaboration between the various parties involved. Advocacy and education efforts from DOC, BNZ Save the Kiwi, NZ Landcare Trust and NZ Kiwi Foundation help to raise awareness of threats to kiwi and how to reduce these threats. Methods used include working with individual landowners, assisting communities to establish and run landcare groups, offering advice through field days and workshops and working with schools.

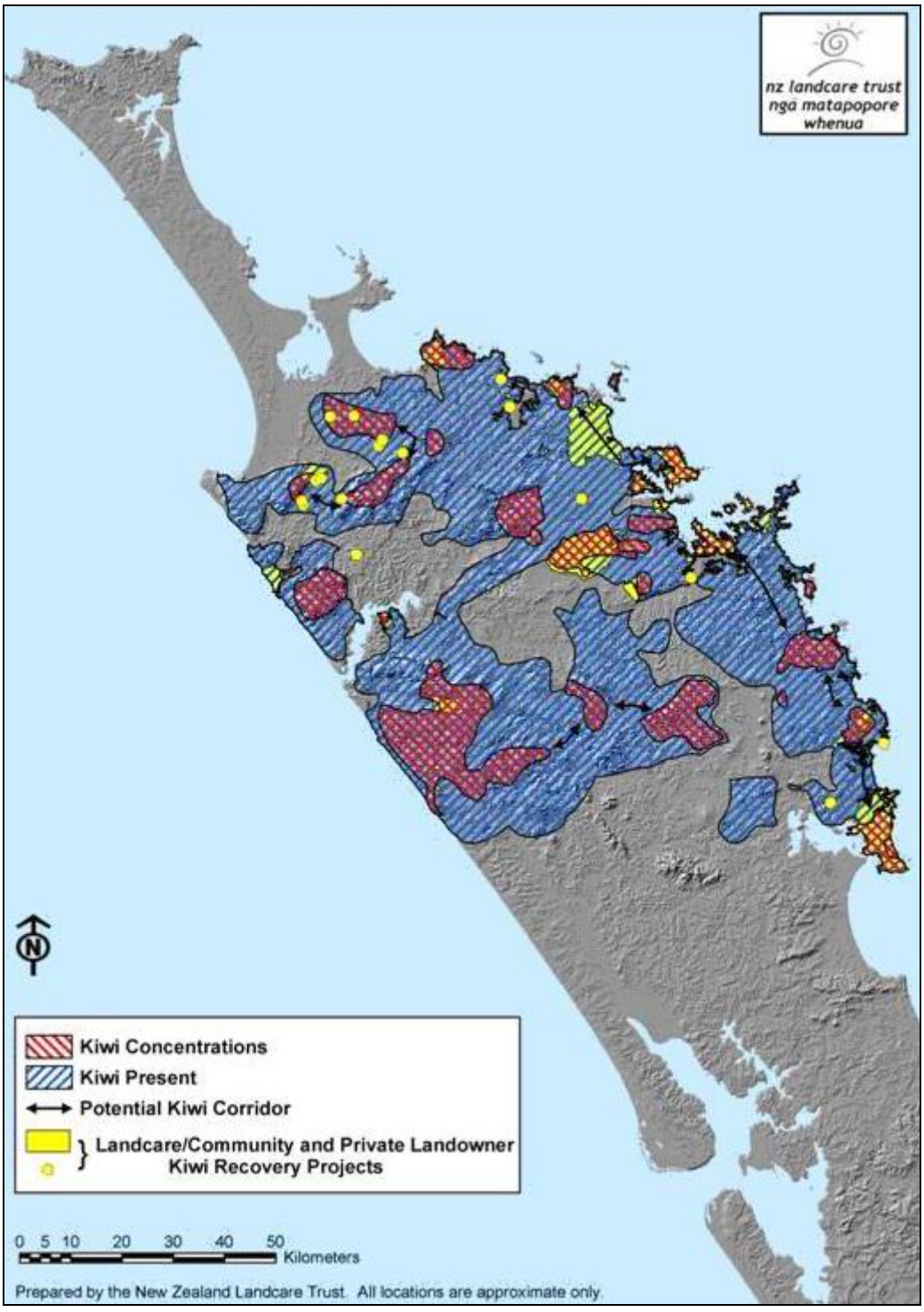

Figure 6: Kiwi clusters and kiwi management areas in Northland. Map courtesy of NZ Landcare Trust (Mullouly 2007).

The success of work on the ground is dependent upon effective predator trapping being carried out over a wide area, in many cases this requires the involvement of multiple landowners. Landcare groups provide a means to coordinate efforts and assist landowners in learning how to effectively carry out predator control and seek funding where needed. Community groups often carry out integrated pest management targeting a range of pest species. Concentrating solely on mustelid control (stoats, weasels and ferrets) is likely to lead to an increase in rats and mice and possibly possums. Targeting possums and possibly rats at the same time will benefit a range of indigenous species but traps and toxins need to be used in a manner that is safe for kiwi.

Funding to assist groups and individual landowners can come from a number of sources. The Northland Regional Council provides funds to assist with predator control through the Environment Fund and through funding of Community Pest Control Areas. Funding for groups to carry out predator control work in Northland has also come from the Department of Conservation Biodiversity Condition Fund, WWF Habitat Protection Fund, Transpower Landcare Trust Grants and BNZ Save the Kiwi. Funding has been used by a number of groups to purchase traps and toxins; some larger groups have managed to obtain funding to employ professional trappers to assist with their projects.

Kiwi being released as part of Operation Nest Egg and the Save the Kiwi initiative. Photograph courtesy of Helen Moodie.

District Councils within the region are utilising the information that is available on Northland kiwi distribution when processing subdivision applications. There are a number of sub-divisions that are either dog free, or cat and dog free.

What can you do?

If you live in an area where kiwi are still present there are a number of steps you can take to help ensure their survival.

- Contact the NZ Landcare Trust or the local DOC area office to find out if there are any community groups already involved in kiwi protection work in the area. You may wish to become involved in kiwi call monitoring or assist with trapping or allow others access to your land to carry out predator control work.
- Control dogs and cats. Dogs in particular are a major threat to kiwi populations and kill large numbers of birds each year. Kiwi have a very strong scent that is attractive to dogs and their lack of sternum and undeveloped chest muscles makes them

particularly vulnerable to being crushed in a dog's mouth. Dogs of all sizes and breeds are capable of killing kiwi, so keep dogs under control at all times. Ask contractors working on your property not to bring dogs to work. Put a dog-free clause in any rental agreement. People pig hunting with dogs in areas where kiwi are present need to take extra care with how they manage their dogs.

- If pine forests are to be harvested or indigenous vegetation cleared steps can be taken to minimise the risk to any birds that are present.
- For additional information on caring for kiwi in Northland phone your local Department of Conservation area office or refer to the following sources:

  http://www.landcare.org.nz

  http://kiwifoundation.org.nz/northlandkiwi.html

  http://www.savethekiwi.org.nz

15.8 Case study 2: Puketi forest

Puketi Forest, including Omahuta Forest, forms one of the most outstanding and largest tracts of native forest in Northland. A total of 21,000 ha are managed by the Department of Conservation. There is old growth kauri forest containing the fourth largest kauri, a large river system and a huge diversity of forest species and habitat types. A network of tracks throughout the forest offers visitors a full range of opportunities from wilderness tramping to high quality wheelchair accessible interpretation walks. The area contains good populations of kiwi, kukupa, native bats and a small remnant population of kokako.

There is a strong network of landowners nearby managing biodiversity on their own properties. The Puketi Forest Trust, which is an incorporated society and registered charity, was formed in 2003. Their goal is to restore the forest life to its condition 30 years ago by controlling predators including rats, cats and stoats intensively whilst the Department of Conservation has agreed to undertake possum control. In the last four years the Trust has spent $600,000 managing predators over 5,000 ha with an intensively managed area of 700 ha. The project is made possible by various grants and charities as well as from voluntary labour.

Puketi Forest Trust's achievements to date include:

- 90km of tracks for trap lines established with 330 Fen traps, 458 DOC 200's, 195 SA cat traps, Conibear traps, 2,500 Victor rat traps and bait stations as backup.
- Rat trapping indices down from 100 to 0% and few cats and stoats now being caught.
- Kiwi counts up 71% in 2006 and still increasing.
- Five minute bird call counts up an average of 45% over all species.
- Remaining Puketi kokako removed to safe locations where they are breeding with proposed reintroduction if rat numbers remain below 5% in the trap index.
- Seeking funding to reintroduce North Island robins.

Northland Regional Council is supporting landowners adjacent to Puketi Forest by funding biodiversity projects through the Environment Fund. This compliments the work of the Puketi Forest Trust as well as linking and extending the network of reserves and covenants in the area. In 2006 eight landowners adjacent to the forest received funding, some of which was supported by the National Biodiversity Condition Fund to fence blocks of forest and waterways on their properties.

NRC have so far supported and promoted the work of the Puketi Forest Trust with:

- Over 500 ha of private mature forest, wetlands, river margins and shrublands fenced.
- Linkage of two reserves of 472 ha and an addition of over 200 ha of fenced habitat to Puketi Forest boundary, which is currently included in the Puketi Trust management area.
- Linkage of several areas of private covenant totalling 150 ha.
- At least four new QEII covenants proposed as a result of fencing and follow up advocacy.
- Water quality improvement as a result of excluding stock from several kilometres of waterways including the fencing of a 7 km section of the upper reaches of Kerikeri River over several farms.

- Exclusion of stock from Kerikeri River compliments proposals from New Zealand Trail to establish walkway along Kerikeri River.
- General engagement of local landowners and community to biodiversity protection around Puketi Forest.
- The project is growing with more local landowners interested in fencing and covenanting around Puketi Forest and several new applications to the NRC Environment Fund in 2007.

NRC have also supported landowner control of pests by:

- Advice and assistance to landowners for pest control work in area.
- NRC biosecurity presence at field days and local workshops.
- Facilitation and transfer of pest based science advice to local community.
- Successful collaboration with other agencies for the release of mistflower biocontrol agents in Puketi area.
- Support local initiatives for proposed community pest plan and/or CPCA.

15.9 References

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15.10 Appendix A: Freshwater fish recorded in Northland

Table 5: Freshwater fish recorded in Northland on the NZ Freshwater Fish Database

Scientific name	Common name	No. of records
Native fish		
Aldrichetta forsteri	Yelloweyed mullet	8
Anguilla australis	Shortfin eel	344
Anguilla dieffenbachii	Longfin eel	320
Anguilla sp.	Unidentified eels	113
Cheimarrichthys fosteri	Torrentfish	90
Galaxias argenteus	Giant kokopu	1
Galaxias sp.	Unidentified galaxiids	24
Galaxias brevipinnis	Koaro	24
Galaxias fasciatus	Banded kokopu	295
Galaxias gracilis	Dwarf inanga	24
Galaxias maculatus	Inanga	218
Galaxias postvectis	Shortjaw kokopu	17
Geotria australis	Lamprey	9
Gobiomorphus basalis	Crans bully	81
Gobiomorphus cotidianus	Common bully	263
Gobiomorphus gobioides	Giant bully	74
Gobiomorphus hubbsi	Bluegill bully	10
Gobiomorphus huttoni	Redfin bully	238
Gobiomorphus sp.	Unidentified bullies	29
Mugil cephalus	Grey mullet	21
Mugil sp.	Unidentified mullet	1
Neochanna diversus	Black mudfish	75
Neochanna heleios	Northland mudfish	51
Retropinna retropinna	Common smelt	108
	Total number of records	**2438**
Exotic fish		
Ameiurus nebulosus	Catfish	10
Carassius auratus	Goldfish	27
Ctenopharyngodon idella	Grass carp	2
Cyprinus carpio	Koi carp	11
Gambusia affinis	Gambusia	160
Hypophthalmichthys molitrix	Silver carp	1
Oncorhynchus mykiss	Rainbow trout	28
Oncorhynchus tshawytscha	Chinook salmon	1
Perca fluviatilis	Perch	1
Salmo	Unidentified trout	2
Salmo trutta	Brown trout	9
Scardinius erythrophthalmus	Rudd	13
Tinca tinca	Tench	4
	Total number of records	**269**
Estuarine/marine species		
Grahamina sp.	Estuarine triplefin	22
Parioglossus marginalis	Dart goby	3
Rhombosolea sp.	Flounders	1
	Total number of records	**26**
Paranephrops	Koura	248
No species recorded		**137**