Appendix 1

FIELD SURVEY FORM

PROTECTED NATURAL AREAS PROGRAMME

Department of Conservation
Te Papa Atawhai

TOKATOKA ECOLOGICAL DISTRICT **(Northland Conservancy)**

NATURAL AREA NAME:	**PNA NO.:**
RECORDER:	**SURVEY DATE:**
GRID REF.:	**SSBI NO.:**
HABITAT TYPE(S):	
GEOMORPHOLOGICAL TYPE(S):	

ECOLOGICAL UNIT(S):

Vegetation/ Habitat Structure	**Landform**	**% of Total Area**	**% Percentage Canopy Cover**			
			Abundant (50-100)	**Common (20-50)**	**Frequent (5-20)**	**Occasional (0-5)**

NATURAL AREA NAME:				PNA NO.:		
Vegetation/ Habitat Structure	Landform	% of Total Area	% Percentage Canopy Cover			
			Abundant (50-100)	Common (20-50)	Frequent (5-20)	Occasional (0-5)

COMMENTS:

Appendix 2

LETTER TO RATEPAYERS (KAIPARA AND WHANGAREI DISTRICT COUNCILS)

Department of Conservation
Te Papa Atawhai

Kaipara District Council
December 1998

Dear Landowner

Department of Conservation officers are currently surveying and updating information on ecologically significant areas, e.g. bush, wetlands, gumland, etc., within the Kaipara District. This has involved mapping ecological areas from roadsides, or (with the permission of landowners) from other viewpoints, and recording information on their type and condition.

You may well have already been contacted by Departmental staff, or are currently engaged in discussions with them on the subject. If this is not the case, you may at a later stage, be contacted by someone for permission to enter your land to gather more detailed information on the property's natural areas.

Why are we doing this survey: Northland's natural areas, especially bush pockets, make a significant contribution to the character and quality of the region. Many of these areas are habitat for some of our increasingly rare native wildlife and plants. The Department's existing database on natural areas is now out of date, and because of this may no longer be accurate. The information will be valuable as a reference point for assessing habitat changes over time.

The Resource Management Act 1991 requires District Councils to consider the natural areas they administer when preparing or reviewing District Plans. The information complied from this updated survey will be given to Kaipara District Council to provide them with a "snap shot" of the distribution and condition of ecological significant areas within the district at a single point in time. The information will be valuable as a reference point for assessing habitat changes over time.

Perhaps the principal value of this survey will be to provide you, the landowners, with information on the significance and make-up of ecological areas that you have had preserved on your property, so you can better plan ways of managing these areas.

If you have any questions or concerns about the survey process, please contact your local Department of Conservation (Attention: Mr Peter Anderson), at their Whangarei Office, phone (09) 438 0299, fax. (09) 438 9886.

If you wish to contact the Kaipara District Council about this aspect of the District Plan, please phone Derek Wright at the Dargaville Office, phone (09) 439 7059, fax. (09) 439 6756.

Gerry Rowan
Northland Conservator
Department of Conservation

Jack McKerchar
General Manager
Kaipara District Council

Department of Conservation
Te Papa Atawbai

WHANGAREI DISTRICT COUNCIL

Dear Landowner

Department of Conservation officers are currently surveying and updating information on ecologically significant areas, eg bush, wetlands, gumland etc within the Whangarei District. This has involved mapping ecological areas from roadsides or (with the permission of landowners) from other viewpoints, and recording information on their type and condition.

You may well have already been contacted by departmental staff or are currently engaged in discussions with them on the subject. If this is not the case you may, at a later stage, be contacted by someone for permission to enter your land to gather more detailed information on the property's natural areas.

Why are we doing this survey? Northland's natural areas, especially bush pockets, make a significant contribution to the character and quality of the region. Many of these areas are habitat for some of our increasingly rare native wildlife and plants. The Department's existing database on natural areas is now out of date, and because of this may no longer be accurate. The information will be valuable as a reference point for assessing habitat changes over time.

You may be aware that the Whangarei District Council has decided to protect some native bush and wetlands under its new District Plan. The Council has written to all landowners affected about this. The results of the survey to be carried out by the Department of Conservation will be given to the Council and used to update and correct the Council's maps and information about the plants and wildlife present in particular locations.

Perhaps the principal value of this survey will be to provide you, the landowners; with information on the significance and makeup of ecological areas that you have had preserved on your property so you can better plan ways of managing these areas.

If you have any questions or concerns about the survey process, please contact your local Department of Conservation (attention Peter Anderson) at their Whangarei Office, telephone 09-438 0299, fax 09-438 9886.

If you wish to contact the Whangarei District Council about this aspect of the District Plan, please phone Neil Taylor at the Whangarei Office 09-438 4879.

per Mr J. Gardiner

Gerry Rowan
REGIONAL CONSERVATOR
Department of Conservation

LR Jacobson
GENERAL MANAGER
Whangarei District Council

Appendix 3

CATEGORIES OF THREAT

In this report, the categories of threat are based on the New Zealand Threat Classification developed by Molloy et al. 2002. The classification system was reviewed in 2007, resulting in several new threat categories, and redefinition of some existing categories (see Townsend et al. 2008). This redefined system is a uniquely New Zealand-based conservation assessment tool, which has been used to assess the conservation status of vascular plants and birds only. The process of applying it to bats, marine mammals, frogs, reptiles, freshwater and marine fish, freshwater, marine, and terrestrial invertebrates, bryophytes, macro-algae, and fungi which are indigenous to New Zealand is underway (Hitchmough et al. 2007; Townsend et al. 2008). In the meantime, this report has used threat categories from Molloy et al. (2002) to cover rankings for everything other than plants and birds, and 'Threatened' and 'At Risk' categories from Townsend et al. 2008 for plants and birds.

The text below (sections 3 and 7 from Molloy et al. 2002 and sections 8, 9 and 10 plus Fig. 1 from Townsend et al. 2008) explains the refined classification system.

Classification structure—Molloy et al. 2002

Introduced and Naturalised

Introduced and Naturalised taxa are those that have become naturalised in the wild after being deliberately or accidentally introduced to New Zealand by human agency. If an Introduced and Naturalised taxon has an IUCN Red Listing in its country (or countries) of origin, the IUCN category and source of the listing are shown after the taxon's name in the New Zealand list. Current examples of this include the cress *Lepidium hyssopifolium* and the southern bell frog (*Litoria raniformis*), both of which are listed as Endangered in Australia; and the Parma wallaby (*Macropus parma*), listed as Lower risk/ Near threatened.

Vagrant

For the purposes of this document, vagrants are taxa that are found unexpectedly and rarely in New Zealand, and whose presence in our region is naturally transitory. These are taxa that do not establish themselves beyond their point of arrival because of reproductive failure or for specific ecological reasons. Examples include the red-kneed dotterel (*Erythrogonys cinctus*) and the blue moon butterfly (*Hypolimnas bolina nerina*), both from Australia, and the spotted sawtail (*Prionurus maculatus*) from the tropical south-west Pacific Ocean. If a taxon in the Vagrant category has been listed in an IUCN Red List in its country of origin, the IUCN category and source of the listing are shown beside the taxon's name in the New Zealand list.

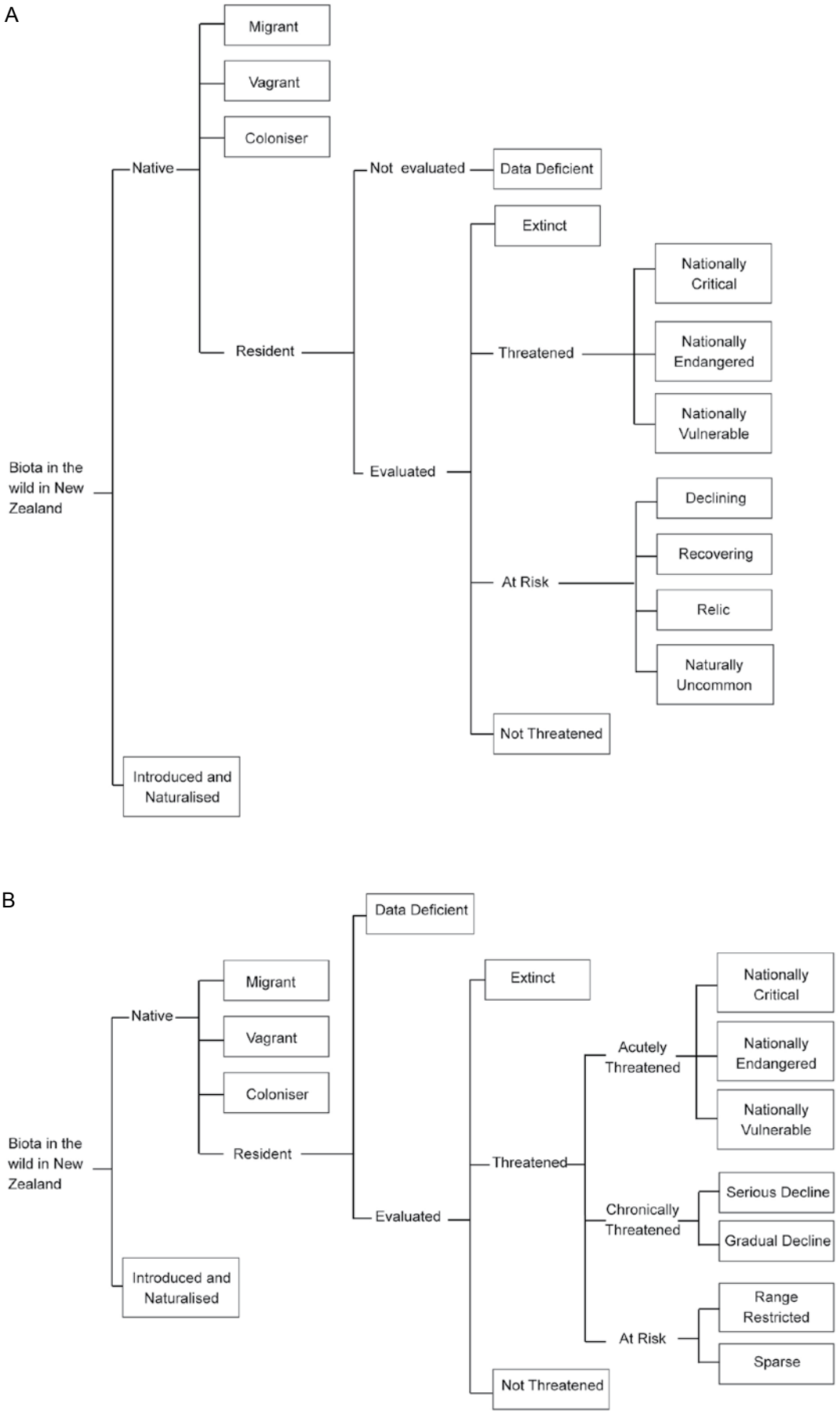

Figure A3.1. A. revised (2007) and B. original (2002) structure of the New Zealand Threat Classification System (Figure 1 from Townsend et al. 2008).

Coloniser

Colonisers are taxa that have arrived in New Zealand without direct or indirect help from humans and have been successfully reproducing in the wild for less than 50 years. Three examples are the Nankeen night heron (*Nycticorax caledonicus*), the scoliid wasp *Radumeris tasmaniensis* and the orchid *Cryptostylis subulata*. The IUCN Red List category and source of the listing is included where this exists.

Migrant

Taxa that predictably and cyclically visit New Zealand as part of their normal life cycle, but do not breed here are included in the category Migrant. Examples include the Arctic skua (*Stercorarius parasiticus*) and striped marlin (*Tetrapturus audax*). In contrast, taxa that either breed here and migrate beyond New Zealand during their life cycle, e.g. Chatham Island albatross (*Thalassarche eremita*), or taxa that are resident in New Zealand for most of their lives, such as longfinned eels (*Anguilla dieffenbachii*), are not included in this category. The IUCN Red List category and source of the listing is included where this exists.

Data Deficient

The amount of information available for assessing the threat of extinction is highly variable between taxa and groups of taxa. At one extreme there are taxa such as kakapo, *Gunnera hamiltonii* and *Tecomanthe speciosa* where every wild individual is known, while at the other extreme there are taxa whose ecology and biology is virtually unknown (e.g. *Koeleria riguorum*, a recently described grass). Certain criteria and/or definitions must be met for a taxon to be listed in a category. Where information is so lacking that an assessment is not possible, the taxon is assigned to the Data Deficient category. If a taxon is listed in a category other than Data Deficient but confidence in the listing is low due to poor quality data, then the listing can be qualified with the letters DP (Data Poor) to indicate this.

Extinct

A taxon is listed as Extinct when there is no reasonable doubt, after repeated surveys in known or expected habitats at appropriate times (diurnal, seasonal and annual) and throughout the taxon's historic range, that the last individual has died. Examples include huia (*Heteralocha acutirostris*) and Adams's mistletoe (*Trilepidea adamsii*). Only taxa that have become extinct since 1840 are included in the list. Taxa that are extinct in the wild but occur in captivity or cultivation are not listed in this category. These are listed as Critically Endangered and are qualified with the letters EW (Extinct in the Wild).

Threatened

The threatened categories are grouped into three major divisions: 'Acutely Threatened', 'Chronically Threatened' and 'At Risk'.

Acutely Threatened

The categories in the 'Acutely Threatened' division—Nationally Critical, Nationally Endangered and Nationally Vulnerable—equate with the IUCN categories of Critically Endangered, Endangered and Vulnerable. Taxa in these three categories are facing a very high risk of extinction in the wild, as defined by criteria that quantify:

- Total population size
- Area of occupancy
- Fragmentation of populations
- Declines in total population
- Declines in habitat area
- Predicted declines due to existing threats

Although the criteria (described in Section 6) measure similar population features as those in the IUCN Red List criteria, numerical limits and timeframes are tailored to suit New Zealand circumstances. These were set through a process of testing and refinement by the project team and as a result of feedback from New Zealand species experts. Criteria that attempt to predict declines due to possible future threats are not included because of the highly speculative nature of this type of assessment.

Chronically Threatened

Taxa listed in either of the two categories in the 'Chronically Threatened' grouping (Serious Decline and Gradual Decline) also face extinction, but are buffered slightly by either a large total population, or a slow decline rate (see Section 6).

At Risk

Taxa that do not meet the criteria for Acutely Threatened or Chronically Threatened, but have either restricted ranges or small scattered sub-populations, are listed in one of two categories (Range Restricted and Sparse) that fall under the division 'At Risk'. Although these taxa are not currently in decline, their population characteristics mean a new threat could rapidly deplete their population(s). Range Restricted taxa either occur in a small geographic area (e.g. Three Kings Islands), are restricted to a particular habitat (e.g. geothermal areas), or require very specific substrates (e.g. ultramafic rock), and for colonial breeders, have fewer than 10 sub-populations. Taxa that have naturally restricted ranges and taxa that have become restricted as a result of human activities are both included in this category. This is because both would face the same risk of extinction in the face of a new threat. The two groups are differentiated by the use of a qualifier (see Section 4). Sparse taxa have very small, widely scattered populations, e.g. New Zealand spinach (*Tetragonia tetragonoides*). As with the Range Restricted category, taxa that are either naturally sparse or have become sparse as a result of human activities are included in this category.

Not Threatened

Taxa that are assessed and do not fit any of the Threatened categories are listed in the Not Threatened category.

Criteria for the Acutely Threatened and Chronically Threatened categories—Molloy et al. 2002

A taxon must meet specific criteria to be listed in one of the Acutely Threatened or Chronically Threatened categories. The criteria for each category are set out below.

Nationally Critical

Very small population or a very high predicted decline

A taxon is Nationally Critical when available scientific evidence indicates that it meets any of the following three criteria:

1. The total population size is <250 mature individuals.
2. Human influences have resulted in <2 sub-populations and either:
   a. <200 mature individuals in the largest sub-population, or
   b. the total area of occupancy is <1 ha (0.01 km^2).
3. There is a predicted decline of >80% in the total population in the next 10 years due to existing threats.

Nationally Endangered

A: Small population and moderate to high recent or predicted decline

A taxon is Nationally Endangered when available scientific evidence indicates that it fits at least one Status criterion and one Trend criterion as follows:

Status criteria

1. The total population size is 250–1000 mature individuals.
2. There are <5 sub-populations and either:
   a. <300 mature individuals in the largest sub-population or
   b. the total area of occupancy is <10 ha (0.1 km^2).

Trend criteria

1. There has been a decline of >30% in the total population or habitat area in the last 100 years.
2. There is a predicted decline of >30% in the total population in the next 10 years due to existing threats.

B: Small to moderate population and high recent or predicted decline

A taxon is Nationally Endangered when available scientific evidence indicates that it fits at least one Status criterion and one Trend criterion:

Status criteria

1. The total population size is 1000–5000 mature individuals.
2. There are <15 sub-populations and either:
   a. 300–500 mature individuals in the largest sub-population or
   b. the total area of occupancy is 10–100 ha (0.1–1 km^2).

Trend criteria

1. There has been a decline of >60% in the total population or habitat area in the last 100 years.
2. There is a predicted decline of >60% in the total population in the next 10 years due to existing threats.

Nationally Vulnerable

Small to moderate population and moderate recent or predicted decline

A taxon is Nationally Vulnerable when scientific evidence indicates that it fits at least one Status criterion and one Trend criterion:

Status criteria

1. The total population size is 1000–5000 mature individuals.
2. There are <15 sub-populations and either:
   a. 300–500 mature individuals in the largest sub-population or
   b. the total area of occupancy is 10–100 ha (0.1–1 km^2).

Trend criteria

1. There has been a decline of 30–60% in the total population or habitat area in the last 100 years and the total population or habitat area is still in decline.
2. There is a predicted decline of 30–60% in the total population in the next 10 years due to existing threats.

Serious decline

A. Moderate to large population and moderate to large predicted decline

A taxon is listed in Serious Decline when scientific evidence indicates that it fits at least one Status criterion and the Trend criterion:

Status criteria

1. The total population size is >5000 mature individuals.
2. There are >15 sub-populations and either:
   a. >500 mature individuals in the largest sub-population, or
   b. the total area of occupancy is >100 ha (1 km^2).

Trend criterion

1. There is a predicted decline of >30% in the total population in the next 10 years due to existing threats.

B: Small to moderate population and small to moderate predicted decline

A taxon is listed in Serious Decline when available scientific evidence indicates that it fits at least one Status criterion and the Trend criterion:

Status criteria

1. The total population size is <5000 mature individuals.
2. There are <15 sub-populations and either:
   a. <500 mature individuals in the largest sub-population, or
   b. the total area of occupancy is <100 ha (1 km^2).

Trend criterion

1. There is a predicted decline of 5–30% in the total population in the next 10 years due to existing threats.

Gradual Decline

Moderate to large population and small to moderate decline

A taxon is listed in Gradual Decline when available scientific evidence indicates that it fits at least one Status criterion and the Trend criterion:

Status criteria

1. The total population size is >5000 mature individuals.
2. There are >15 sub-populations and either:
   a. >500 mature individuals in the largest sub-population, or
   b. the total area of occupancy is >100 ha (1 km^2).

Trend criterion

1. There is a predicted decline of 5–30% in the total population in the next 10 years due to existing threats, and the decline is predicted to continue beyond 10 years.

Threatened and At Risk categories—Townsend et al. 2008

'Threatened' taxa are grouped into three categories: 'Nationally Critical', Nationally Endangered' and 'Nationally Vulnerable'.

Taxa with populations that are small (<250 mature individuals) are considered highly susceptable to stochastic events and so are listed as 'Nationally Critical', regardless of whether their small population size is due to human-induced or natural causes.

Nationally Critical

A. Very small population (natural or unnatural)

A taxon is 'Nationally Critical', regardless of population trend and regardless of whether the population size is natural or unnatural, when evidence indicates that:

1. There are fewer than 250 mature individuals; or
2. There are ≤2 sub-populations *and* ≤200 mature individuals in the largest sub-population; or
3. The total area of occupancy is ≤1 ha (0.01 km^2).

B. Small population (natural or unnatural) with a high ongoing or predicted decline

A taxon is 'Nationally Critical' when evidence indicates that it fits at least one Status criterion *and* the Trend criterion as follows:

Status

1. The population comprises 250–1000 mature individuals; or
2. There are ≤5 sub-populations *and* ≤300 mature individuals in the largest sub-population; or
3. The total area of occupancy is ≤10 ha (0.1 km^2).

Trend

There is an ongoing or predicted decline of 50–70% in the total population due to existing threats, taken over the next 10 years or three generations, whichever is longer.

C. Population (irrespective of size or number of sub-populations) with a very high ongoing or predicted decline (> 70%)

A taxon is 'Nationally Critical' when the population has an ongoing trend or predicted decline of > 70% in the total population due to existing threats taken over the next 10 years or three generations, whichever is longer.

Nationally Endangered

A. Small population (natural or unnatural) that has a low to high ongoing or predicted decline

A taxon is 'Nationally Endangered' when evidence indicates that it fits at least one Status criterion *and* the Trend criterion as follows:

Status

1. The total population size is 250–1000 mature individuals; or
2. There are ≤5 sub-populations *and* ≤300 mature individuals in the largest sub-population; or
3. The total area of occupancy is ≤10 ha (0.1 km^2).

Trend

There is an ongoing or predicted decline of 10–50% in the total population due to existing threats, taken over the next 10 years or three generations, whichever is longer.

B. Small stable population (unnatural)

To trigger this pathway to 'Nationally Endangered', taxa must have current population sizes that result from unnatural causes. Such taxa are defined as 'Nationally Endangered' when evidence indicates that they fit at least one Status criterion *and* the Trend criterion as follows:

Status

1. The total population size is 250–1000 mature individuals; or
2. There are ≤5 sub-populations *and* ≤300 mature individuals in the largest sub-population; or
3. The total area of occupancy is ≤10 ha (0.1 km^2).

Trend

The population is stable (± 10%) and is predicted to remain stable over the next 10 years or three generations, whichever is longer.

C. Moderate population and high ongoing or predicted decline

A taxon is 'Nationally Endangered' when evidence indicates that it fits at least one Status criterion *and* the Trend criterion as follows:

Status

1. The total population size is 1000–5000 mature individuals; or
2. There are ≤15 sub-populations *and* ≤500 mature individuals in the largest sub-population; or
3. The total area of occupancy is ≤100 ha (1 km^2).

Trend

There is an ongoing or predicted decline of 50–70% in the total population due to existing threats, taken over the next 10 years or three generations, whichever is longer.

Nationally Vulnerable

A. Small, increasing population (unnatural)

To trigger 'Nationally Vulnerable', taxa must have current population sizes that result from unnatural causes. Such taxa are defined as 'Nationally Vulnerable' when evidence indicates that they fit at least one Status criterion *and* the Trend criterion as follows:

Status

1. The total population size is 250–1000 mature individuals; or
2. There are ≤5 sub-populations *and* ≤300 mature individuals in the largest sub-population; or
3. The total area of occupancy is ≤10 ha (0.1 km^2).

Trend

The population is increasing (>10%) and is predicted to continue to increase over the next 10 years or three generations, whichever is longer.

B. Moderate, stable population (unnatural)

To trigger 'Nationally Vulnerable', taxa must have current population sizes that result from unnatural causes. Such taxa are defined as 'Nationally Vulnerable' when evidence indicates that they fit at least one Status criterion *and* the Trend criterion as follows:

Status

1. The total population size is 1000–5000 mature individuals; or
2. There are ≤15 sub-populations *and* ≤500 mature individuals in the largest sub-population; or
3. The total area of occupancy is ≤100 ha (1 km^2).

Trend

The population is stable (±10%) and is predicted to remain stable over the next 10 years or three generations, whichever is longer.

C. Moderate population, with population trend that is declining

A taxon is 'Nationally Vulnerable' when evidence indicates that it fits at least one Status criterion *and* the Trend criterion as follows:

Status

1. The total population size is 1000–5000 mature individuals; or
2. There are ≤15 sub-populations *and* ≤500 mature individuals in the largest sub-population; or
3. The total area of occupancy is ≤100 ha (1 km^2).

Trend

There is an ongoing or predicted decline of 10–50% in the total population due to existing threats, taken over the next 10 years or three generations, whichever is longer.

D. Moderate to large population and moderate to high ongoing or predicted decline

A taxon is 'Nationally Vulnerable' when evidence indicates that it fits at least one Status criterion *and* the Trend criteria as follows:

Status

1. The total population size is 5000–20 000 mature individuals; or
2. There are ≤15 sub-populations *and* ≤1000 mature individuals in the largest sub-population; or
3. The total area of occupancy is ≤1000 ha (10 km^2).

Trend

There is an ongoing or predicted decline of 30–70% in the total population due to existing threats, taken over the next 10 years or three generations, whichever is longer.

E. Large population and high ongoing or predicted decline

A taxon is 'Nationally Vulnerable' when evidence indicates that it fits at least one Status criterion *and* the Trend criterion as follows:

Status

1. The total population size is 20 000–100 000 mature individuals; or
2. The total area of occupancy is ≤10 000 ha (100 km^2).

Trend

There is an ongoing or predicted decline of 50–70% in the total population or area of occupancy due to existing threats, taken over the next 10 years or three generations, whichever is longer.

Criteria for 'At Risk' taxa—Townsend et al. 2008

Taxa that qualify as 'At Risk' do not meet the criteria for any of the 'Threatened' categories. However, they are declining (though buffered by a large total population size and/or a slow decline rate), biologically scarce, recovering from a previously threatened status, or survive only in relictual populations.

Four 'At Risk' categories exist: 'Declining', 'Recovering', 'Relict' and 'Naturally Uncommon'. Definitions are provided below.

Declining

'Declining' taxa do not qualify as 'Threatened' because they are buffered by a large total population size and/or a slower decline rate. However, if the declining trends continue, these taxa may be listed as 'Threatened' in the future.

A. Moderate to large population and low ongoing or predicted decline

A taxon is 'Declining' when evidence indicates that it fits at least one Status criterion *and* the Trend criterion as follows:

Status

1. The total population size is 5000–20 000 mature individuals; or
2. The total area of occupancy is ≤1000 ha (10 km^2).

Trend

There is an ongoing or predicted decline of 10–30% in the total population or area of occupancy due to existing threats, taken over the next 10 years or three generations, whichever is longer.

B. Large population and low to moderate ongoing or predicted decline

A taxon is 'Declining' when evidence indicates that it fits at least one Status criterion *and* the Trend criterion as follows:

Status

1. The total population size is 20 000–100 000 mature individuals; or
2. The total area of occupancy is ≤10 000 ha (100 km^2).

Trend

There is an ongoing or predicted decline of 10–50% in the total population or area of occupancy due to existing threats, taken over the next 10 years or three generations, whichever is longer.

C. Very large population and low to high ongoing or predicted decline

A taxon is 'Declining' when evidence indicates that it fits at least one Status criterion *and* the Trend criterion as follows:

Status

1. The total population size is >100 000 mature individuals; or
2. The total area of occupancy is >10 000 ha (100 km^2).

Trend

There is an ongoing or predicted decline of 10–70% in the total population or area of occupancy due to existing threats, taken over the next 10 years or three generations, whichever is longer.

Recovering

Taxa that have undergone a documented decline within the last 1000 years and now have an ongoing or predicted increase of >10% in the total population or area of occupancy, taken over the next 10 years or three generations, whichever is longer. Note that such taxa that are increasing but have a population size of <1000 mature individuals (or total area of occupancy of <10 ha) are listed in one of the 'Threatened' categories, depending on their population size.

A. Moderate population

A taxon is eligible for listing as 'Recovering (A)' if its total population size is between 1000 and 5000 mature individuals or its area of occupancy is ≤100 ha (1 km^2).

B. Moderate to large population

A taxon is eligible for listing as 'Recovering (B)' if its total population size is between 5000 and 20 000 mature individuals or its area of occupancy is ≤1000 ha (10 km^2).

Relict

Taxa that have undergone a documented decline within the last 1000 years, and now occupy less than 10% of their former range and meet one of the following criteria:

A. Have 5000–20 000 mature individuals and are stable (± 10%)

B. Have more than 20 000 mature individuals and are stable or increasing at > 10%

The range of a relictual taxon takes into account the area currently occupied as a ratio of its former extent. 'Relict' can also include taxa that exist as reintroduced and self- sustaining populations within or outside their former known range. (See definition of sub-population, Appendix 1.)

Naturally Uncommon

Taxa whose distribution is naturally confined to specific substrates (e.g. ultramafic rock), habitats (e.g. high alpine fellfield, hydrothermal vents), or geographic areas (e.g. subantarctic islands, sea-mounts), or taxa that occur within naturally small and widely scattered populations. This distribution is not the result of past or recent human disturbance. Populations may be stable or increasing. Note that a naturally uncommon taxon that has fewer than 250 mature individuals qualifies for 'Nationally Critical'. Taxa that have more than 20 000 mature individuals are not considered 'Naturally Uncommon', unless they occupy an area of less than 100 000 ha (1000 km^2).

Other categories—Townsend et al. 2008

Introduced and Naturalised

Taxa that have become naturalised in the wild after being deliberately or accidentally introduced into New Zealand by human agency. If an 'Introduced and Naturalised' taxon has an IUCN Red Listing in its country or countries of origin, then the IUCN category and source of the listing are shown after the taxon's name in the New Zealand list. Current examples of this include the southern bell frog (*Litoria raniformis*), which is listed as 'Endangered' in Australia; and the parma wallaby (*Macropus parma*), which is listed as 'Lower Risk/Near Threatened' there. These taxa are thus listed as: southern bell frog (*Litoria raniformis*) Introduced and $Naturalised_{TO}$, EN A2ae (IUCN 2006); and parma wallaby (*Macropus parma*) Introduced and $Naturalised_{SO}$, LR/nt (IUCN 2006). Note the use of qualifiers 'TO' (Threatened Overseas) and 'SO' (Secure Overseas) as subscripts after 'Introduced and Naturalised'.

Migrant

Taxa that predictably and cyclically visit New Zealand as part of their normal life cycle (a minimum of 15 individuals known or presumed to visit per year), but do not breed here. Where the number of individuals visiting per annum is uncertain, the evidence used by the relevant Expert Panel to determine whether a taxon is either 'Migrant' or 'Vagrant' will be documented and held on file by DOC.Examples include eastern bar-tailed godwit (*Limosa lapponica baueri*) and striped marlin (*Tetrapturus audax*).

In contrast, taxa that either breed here and migrate beyond New Zealand during their life cycle, e.g. Chatham Island albatross (*Thalassarche eremita*), or taxa that are resident in New Zealand for most of their lives, such as longfin eel (*Anguilla dieffenbachii*), are not included in this category. If a taxon in the 'Migrant' category has been listed in an IUCN Red List in its country or countries of origin, the IUCN Red List category and source of the listing is included. For example, southern bluefin tuna (*Thunnus maccoyii*) has an IUCN listing of Critically Endangered (CR) and is a migratory visitor to New Zealand. This taxon would then be listed as: southern bluefin tuna (*Thunnus maccoyii*) $\text{Migrant}_{\text{TO}}$, CR A1bd (IUCN 2006). Note the use of the qualifier 'TO' (Threatened Overseas) as a subscript after 'Migrant'.

Vagrant

Taxa that are found unexpectedly in New Zealand and whose presence in this region is naturally transitory, or migratory species with fewer than 15 individuals known or presumed to visit per year.

These are invariably taxa that have failed to establish themselves beyond their point of arrival due to reproductive failure, because they typically breed elsewhere, or for other specific ecological reasons (see de Lange & Norton 1998).

Examples include the red-kneed dotterel (*Erythrogonys cinctus*), blue moon butterfly (*Hypolimnas bolina nerina*) and ant orchid (*Myrmechila trapeziformis*) from Australia, the spotted sawtail (*Prionurus maculatus*) from the tropical southwest Pacific Ocean, and the broad-billed sandpiper (*Limicola falcinellus*), a holarctic migrant.

If a taxon in the 'Vagrant' category has been listed in an IUCN Red List in its country or countries of origin, the IUCN category and source of the listing are shown beside the taxon's name in the New Zealand list. For example, green turtle (*Chelonia mydas*) has an IUCN listing of Endangered (EN), and the bristle-thighed curlew (*Numenius tahitiensis*) has an IUCN listing of Vulnerable (VU); both are vagrants in New Zealand. These taxa would then be listed as: green turtle (*Chelonia mydas*) $\text{Vagrant}_{\text{TO}}$, EN A2bd (IUCN 2006); and bristle-thighed curlew (*Numenius tahitiensis*) $\text{Vagrant}_{\text{TO}}$, VU C2a(ii) (IUCN 2006). Note the use of the qualifier 'TO' (Threatened Overseas) as a subscript after 'Vagrant'.

Coloniser

Taxa that otherwise trigger 'Threatened' categories because of small population size, but have arrived in New Zealand without direct or indirect help from humans and have been successfully reproducing in the wild since 1950.

Three examples are the Nankeen night heron (*Nycticorax caledonicus*), the scoliid wasp *Radumeris tasmaniensis*, and the herb *Achyranthes velutina*.

If a taxon in the 'Coloniser' category has been listed in an IUCN Red List in its country or countries of origin, the IUCN category and source of the listing are shown beside the taxon's name in the New Zealand list. For example, Indian yellow-nosed albatross (*Thalassarche carteri*) has an IUCN listing of Endangered (EN) and is a coloniser in New Zealand. This taxon would then be

listed as: Indian yellow-nosed albatross (*Thalassarche carteri*) $\text{Coloniser}_{\text{TO}}$ EN A4bde (IUCN 2006). Note the use of the qualifier 'TO' (Threatened Overseas) as a subscript after 'Coloniser'.

Data Deficient

The amount of information available for assessing the threat of extinction is highly variable between taxa and groups of taxa. At one extreme there are taxa such as kakapo (*Strigops habroptilus*), *Gunnera hamiltonii* and *Tecomanthe speciosa*, where every wild individual is known, while at the other extreme there are taxa for which we have no population data, e.g. New Zealand storm-petrel (*Oceanites maorianus*) or the strap fern (*Grammitis gunnii*).

Certain criteria and/or definitions must be met for a taxon to be listed in a category. Where information is so lacking that an assessment is not possible, the taxon is assigned to the 'Data Deficient' category. If a taxon is listed in a category other than 'Data Deficient' but confidence in the listing is low due to poor-quality data, then the listing can be qualified with the letters 'DP' (Data Poor) to indicate this. Some data deficient taxa that have not been seen for many years may well be extinct.

Collection of sufficient demographic data to allow evaluation is a high priority for 'Data Deficient' taxa, as such data may confirm whether these taxa are 'Threatened' or 'At Risk'.

Extinct

There is no reasonable doubt, after repeated surveys in known or expected habitats at appropriate times (diurnal, seasonal and annual) and throughout the taxon's historic range, that the last individual has died.

Examples include huia (*Heteralocha acutirostris*) and the shrub *Logania depressa*. Taxa that have become extinct since human settlement (here defined as the last 1000 years) are included in the list. Taxa that are extinct in the wild but occur in captivity or cultivation are not listed in this category; these are listed instead as 'Nationally Critical' with qualifier 'EW' (Extinct in the Wild).

Not Threatened

Taxa that are assessed and do not fit any of the other categories are listed in the 'Not Threatened' category.

Appendix 4

CATEGORIES OF IMPORTANCE FOR GEOLOGICAL AND SOIL SITES

Geological sites

Ranking criteria for important geological sites and landforms in the Northland Region follow Kenny & Hayward (1996).

1. **International**—site of international scientific importance.
2. **National**—site of national scientific, educational or aesthetic importance.
3. **Regional**—site of regional scientific, educational or aesthetic importance.

Soil sites

Ranking criteria for New Zealand soil sites of international, national and regional significance, from Arand et al. (1993).

Soil sites are listed under three levels of importance:

1. International

- Contains the best example of a soil (generally a soil group) or soil-vegetation or soil-landform association that is unique to New Zealand (or these latitudes)
- Contains a soil that is naturally uncommon or greatly reduced in extent in other parts of the world
- Contains a wide range of extensive soils with a relatively unmodified vegetation cover
- has been studied in detail and is known internationally.

2. National

- Contains the best or a 'classic' example of a soil (either a soil group or a mapping unit) or a soil-vegetation or soil-landform association in New Zealand
- Contains a soil or soil-vegetation or soil-landform association that is nationally uncommon or reduced in extent
- Contains a moderate range of extensive soils with a relatively unmodified vegetation cover
- Has been studied in detail and is known nationally.

3. Regional

- Contains the best regional examples of a soil (generally a mapping unit) or a soil-vegetation or soil-landform association
- Contains a limited range of soils under vegetation that is relatively unmodified.

Appendix 5

CHECKLIST OF PLANT SPECIES IN TOKATOKA ECOLOGICAL DISTRICT

This species list was compiled by the author with records coming from this survey; the Department of Conservation, Northland Conservancy, Sites of Special Biological Interest (SSBI) information system; Auckland Botanical Society; Champion & Townsend 2008; and Auckland Museum Herbarium (AK). The AK reference, if available, is provided for any species identified.

(i) Indigenous species

Ferns and fern allies

Adiantum aethiopicum maidenhair fern AK 294664
Adiantum cunninghamii common maidenhair
Adiantum diaphanum
Adiantum hispidulum rosy maidenhair
Adiantum viridescens
Arthropteris tenella
Asplenium bulbiferum hen and chicken fern
Asplenium flaccidum hanging spleenwort
Asplenium gracillimum AK 221747
Asplenium oblongifolium shining spleenwort, huruhuruwhenua
Asplenium polyodon sickle spleenwort, petako
Blechnum chambersii rereti
Blechnum discolor
Blechnum filiforme thread fern, pānako
Blechnum fraseri
Blechnum membranaceum AK 294660
Blechnum novae-zelandiae kiokio
Ctenopteris heterophylla AK 302261
Cyathea dealbata ponga, silver fern
Cyathea medullaris mamaku, black tree fern
Cyathea smithii Smiths tree fern
Deparia petersenii subsp. *congrua*
Dicksonia squarrosa wheki
Diplazium australe
Doodia australis rasp fern, pukupuku
Doodia mollis
Gleichenia dicarpa tanglefern
Gleichenia microphylla tanglefern
Grammitis billardierei AK 302263
Grammitis ciliata AK 302262
Histiopteris incisa water fern, mātātā
Huperzia varia
Hymenophyllum demissum filmy fern, irirangi
Hymenophyllum dilatatum filmy fern
Hymenophyllum flabellatum filmy fern
Hymenophyllum frankliniae (ferrugineum) filmy fern
Hymenophyllum revolutum filmy fern

Hymenophyllum sanguinolentum filmy fern, piripiri
Hypolepis ambigua
Hypolepis distans AK 234755
Isachne globosa swamp millet
Lastreopsis glabella smooth shield fern
Lastreopsis hispida hairy shield fern
Lastreopsis velutina
Leptopteris hymenophylloides heruheru, crepe fern
Lindsaea linearis
Lindsaea trichomanoides
Lycopodiella cernua
Lycopodium deuterodensum clubmoss
Lycopodium volubile climbing clubmoss
Lygodium articulatum mangemange
Microsorum pustulatum hound's tongue fern, kōwaowao
Microsorum scandens mokimoki, fragrant fern
Paesia scaberula mātātā
Pellaea rotundifolia tarawera, button fern AK 294661
Polystichum neozelandicum subsp. *neozelandicum*
Pneumatopteris pennigera gully fern
Psilotum nudum
Pteridium esculentum
Pteris comans bracken, rārahu
Pteris macilenta
Pteris saxatilis
Pteris tremula shaking brake, turawera
Pyrrosia eleagnifolia leather-leaf fern
Rumohra adiantiformis leathery shield fern
Tmesipteris elongata
Tmesipteris lanceolata
Trichomanes elongatum
Trichomanes reniforme kidney fern
Trichomanes venosum

Gymnosperms

Agathis australis kauri
Dacrycarpus dacrydioides kahikatea
Dacrydium cupressinum rimu
Libocedrus plumosa kawaka
Phyllocladus trichomanoides tānekaha
Podocarpus totara var. *totara* tōtara
Prumnopitys taxifolia matai
Prumnopitys ferruginea miro

Dicotyledons

Acaena sp. piripiri
Alectryon excelsus var. *excelsus* titoki
Alseuosmia banksii var. *banksii* AK 202297
Alseuosmia quercifolia
Alseuosmia × *quericifolia*
Aristotelia serrata wineberry
Beilschmiedia tarairi taraire AK 220723
Beilschmiedia tawa tawa

Brachyglottis repanda rangiora
Callitriche muelleri
Callitriche petriei
Calystegia paniculata
Calystegia tuguriorum AK 294658
Cardamine debilis agg.
Carmichaelia australis native broom
Carpodetus serratus putaputawētā AK 120118
Centella uniflora
Clematis paniculata puawānanga
Clematis cunninghamii
Coprosma arborea māmāngi
Coprosma areolata
Coprosma grandifolia kanono
Coprosma macrocarpa subsp. *minor* AK 258664
Coprosma parviflora
Coprosma propinqua var. *propinqua*
Coprosma propinqua × *C. robusta*
Coprosma rhamnoides
Coprosma rigida
Coprosma rotundifolia round-leaved coprosma AK 294665
Coprosma robusta karamū
Coprosma spathulata
Coprosma tenuicaulis
Coriaria arborea var. *arborea* tutu
Corynocarpus laevigatus karaka
Cotula australis
Crassula decumbens
Crassula ruamahanga
Crassula sieberiana
Daucus glochidiatus
Deyeuxia avenioides
Dichondra repens Mercury Bay weed AK 294663
Dracophyllum latifolium neinei
Dracophyllum lessonianum
Drosera auriculata
Drosera peltata
Dysoxylum spectabile kohekohe
Elaeocarpus dentatus hīnau
Elaeocarpus hookerianus
Elatostema rugosum parataniwha
Entelea arborescens whau
Epacris pauciflora
Epilobium rotundifolium
Euchiton collinus
Fuchsia excorticata kōtukutuku
Galium propinqum
Gaultheria antipoda snowberry AK120226
Geniostoma rupestre var. *ligustrifolium* hangehange
Geranium homeanum
Geranium solanderi
Gnaphalium audax
Gnaphalium limosum
Gnaphalium involucratum

Gonycarpus micranthus
Griselinia lucida puka
Haloragis erecta subsp. *erecta*
Hebe macrocarpa var. *macrocarpa* AK 302259
Hebe saxicola AK 301052
Hebe stricta var. *stricta* koromiko AK 302257
Hedycarya arborea pigeonwood, porokaiwhiri
Helichrysum lanceolatum
Hydrocotyle heteromeria
Hoheria angustifolia AK 233184
Hoheria populnea houhere AK 296948
Hydrocotyle dissecta
Hydrocotyle moschata
Hydrocotyle novae-zelandiae
Hydrocotyle pterocarpa
Hypericum pusillum
Knightia excelsa rewarewa
Korthalsella salicornioides AK 232713, AK 300261
Kunzea ericoides var. *ericoides* kānuka
Lagenifera lanata
Lagenifera pumila
Laurelia novae-zelandiae pukatea
Lemna minor common duckweed referenced in AK 302244
Leptospermum scoparium mānuka AK 120233
Leptostigma setulosa
Leucopogon fasciculatus mingimingi
Leucopogon fraseri pātōtara
Litsea calicaris mangeao
Lobelia angulata AK 294662
Lobelia anceps
Lophomyrtus bullata ramarama
Lophomyrtus obcordata rōhutu
Luzula picta var. *picta*
Macropiper excelsum var. *excelsum* kawakawa
Melicope simplex poataniwha AK 294659
Melicytus micranthus AK 296950
Melicytus ramiflorus subsp. *ramiflorus* māhoe
Mida salicifolia willow-leaved maire
Metrosideros carminea carmine rātā
Metrosideros perforata aka
Metrosideros robusta northern rātā
Muehlenbeckia australis pōhuehue
Muehlenbeckia complexa pōhuehue
Myriophyllum propinquum AK 243770
Myrsine australis māpou
Myrsine divaricata weeping māpou
Myrsine salicina
Nertera depressa
Nertera dichondrifolia
Nertera scapanoides
Nestegia cunninghamii black maire AK 301489
Nestegis lanceolata white maire
Olearia furfuracea akepiro
Olearia rani var. rani heketara

Olearia solandri AK 92409
Oxalis exilis
Parietaria debilis
Parsonsia capsularis NZ jasmine, akakiore
Parsonsia heterophylla NZ jasmine
Passiflora tetrandra kohia, NZ passionfruit
Pennantia corymbosa kaikōmako AK 294666
Peperomia urvilleana
Persicaria decipiens swamp willow weed
Picris burbidgeae AK 232960
Pimelea orthia
Pimelea prostrata pinātoro
Pittosporum crassifolium karo
Pittosporum cornifolium perching pittosporum
Pittosporum eugenioides tarata, lemonwood
Pittosporum tenuifolium kōhūhū AK120201
Plagianthus regius subsp. *regius* mānatu, lowland ribbonwood AK 232713
Pomaderris amoena
Pomaderris kumerahou kūmarahou
Pomaderris phylicifolia var. *ericifolia* AK 119989
Potamogeton cheesemanii red pondweed (referenced in AK 302243)
Pseudognaphalium luteoalbum agg.
Pseudopanax arboreus var. *arboreus* five finger, whauwhaupaku
Pseudopanax crassifolius lancewood, horoeka
Ranunculus reflexus maruru
Raukaua anomalus AK 228982 AK 235999
Rhabdothamnus solandri taurepo AK 120214
Rubus australis bush lawyer, tātarāmoa
Rubus cissoides bush lawyer, tātarāmoa
Rubus schmidelioides var. *schmidelioides* bush lawyer, tātarāmoa
Rubus squarrosus leafless lawyer
Schefflera digitata patē
Senecio scaberulus AK 233091
Senecio glomeratus
Senecio hispidulus
Senecio minimus
Sophora microphylla kōwhai
Streblus heterophyllus small-leaved milk tree
Vitex lucens pūriri
Wahlenbergia littoricola
Wahlenbergia violacea
Weinmannia silvicola tōwai
Wolffia australiana AK 302242
Viola cunninghamii
Viola lyallii
Viola filicaulis

Monocotyledons

Acianthus sinclairii orchid
Adelopetalum tuberculatum orchid
Anzybas rotundifolius orchid
Arthropodium cirratum rengarenga lily
Astelia solandri kōwharawhara
Astelia trinerva

Baumea articulata AK 119875
Baumea rubra
Baumea rubiginosa
Baumea tenax AK 294670
Baumea teretifolia
Bolboschoenus caldwellii AK 36466
Bolboschoenus fluviatilis marsh clubrush AK119873
Bromus arenarius sand brome AK 232706
Caladenia fuscata orchid
Caladenia sp. orchid
Carex "raotest"
Carex breviculmis
Carex dissita
Carex flagellifera manaia
Carex gaudichaudiana
Carex geminata
Carex inversa
Carex lambertiana
Carex maorica AK 294668
Carex ochrosaccus
Carex secta purei
Carex solandri
Carex spinirostris
Carex ustulatus
Carex virgata purei
Collospermum hastatum perching lily, kahakaha
Cordyline australis tī kōuka, cabbage tree
Cordyline banksii
Cordyline pumilio
Corybas cheesemanii orchid
Cyperus ustulatus giant umbrella sedge, upokotangata
Dianella haematica
Dianella nigra tūrutu AK 120125
Diplodium trullifolium orchid
Dracophyllum lessonianum
Earina mucronata peka-a-waka
Eleocharis acuta
Eleocharis gracilis AK 216676
Eleocharis sphacelata
Elymus multiflorus AK 232709
Ficinia nodosa knobby clubrush
Freycinetia banksii kiekie
Gahnia lacera
Gahnia pauciflora
Gahnia setifolia
Gahnia xanthocarpa
Ichthyostomum pygmaeum AK 302260
Isolepis reticularis
Juncus australis
Juncus bufonius var. *bufonius*
Juncus edgariae
Juncus pallidus
Juncus tenuis
Juncus usitatus

Lachnagrostis billardierei
Lepidosperma laterale
Libertia ixioides
Microlaena avenacea bush rice grass
Microlaena stipoides pātītī
Microtis sp. onion orchid
Microtis unifolia onion orchid
Morelotia affinis
Oplismenus hirtellus subsp. *imbecillis*
Orthoceras novae-zelandiae orchid
Petalochilus chlorostylus orchid
Phormium cookianum harakeke, flax
Phormium tenax harakeke, flax
Poa anceps subsp. *anceps*
Pterostylis agathicola orchid
Pterostylis banksii orchid
Pterostylis graminea orchid
Rhopalostylis sapida nīkau
Ripogonum scandens supplejack, kareao
Rytidosperma gracilie
Rytidosperma racemosa
Rytidosperma unarede
Schoenus apogon
Schoenus brevifolius
Schoenus maschalinus
Schoenus tendo
Schoenoplectus tabernaemontani kuta, lake clubrush
Simpliglottis cornuta orchid
Singularybas oblongus orchid
Thelymitra aemula orchid
Thelymitra carnea orchid
Thelymitra colensoi orchid
Thelymitra longifolia orchid
Thelymitra aff. *longifolia* orchid
Thelymitra pauciflora orchid
Thelymitra pulchella orchid
Thelymitra tholiformis orchid
Trisetum arduanum AK 233099
Typha orientalis raupo, AK 119879
Uncinia banksii hook sedge
Uncinia distans hook sedge
Uncinia uncinata hook sedge

Mosses and liverworts

Archilejeunea olivacea AK 302311
Balantiopsis diplophylla var. *bockenii* AK 302315
Cheilolejeunea AK 302312
Chiloscyphus semiteres AK 302308
Ectropothecium sandwichense AK 302264
Fissidens taxifolius AK 235682
Frullania pentapleura AK 302310
Lopholejeunea AK 302309
Pseudocyphellaria dissimilis AK 302250
Pulchrinodus inflatus AK 302247
Schistidium apocarpum AK 302249

Lichens

Caloplaca sp.
Cladia agregata
Cladia confusa
Cladonia enantia
Cladonia exocha
Cladonia floekeana AK 195030
Clathroporina exocha AK 204834
Coccocarpia erythroxyli AK 204833
Coccocarpia palmicola AK 204850
Coccocarpia ?pellita
Degellia sp.
Dirinaria applanata AK 204837
Dirinaria picta AK 204838
Heterodermia AK 195647
Hypogymnia AK 193770
Lecanora sp.
Lepraria sp. AK 192287
Leptogium coralloideum AK 204839
Leptogium cyanescens AK 176562
Leproplaca AK 191419
Ochrolechia AK 191948, 191949
Paramotrema AK 195639, 195640
Paramelia testacea AK 192797
Physcia adscendens AK 204851
Physcia erumpens AK 191974
Pertusaria psoromica AK 192230
Pseudocyphellaria carpoloma
Pseudocyphellaria chloroleuca AK 302246
Pseudocyphellaria coriacea AK 190185
Pseudocyphellaria dissimilis AK 302250
Pseudocyphellaria montagnei AK 204852, 190480
Pseudocyphellaria pickeringii AK 190587, 302245
Pseudocyphellaria rufovirescens
Psoroma allorhizum AK 204847
Punctelia pseudocoralloidea AK 204841, 204842
Ramalina canariensis AK 204832
Ramalina celastri AK 302251
Ramalina peruviana AK 204849
Rhizocarpon geographicum
Rimelea cetrata
Stereocaulon ramulosum
Sticta babingtonii AK 227792
Sticta squamata AK 227791, 192635
Sticta subcaperata AK 202903
Teloschisties flaviscans
Usnea sp. AK 204848
Xanthoparmelia sp. AK 192410
Xanthoria parietina

Fungi

Geatstrum velutinum velvet earthstar

Exotic species

Ferns

Adiantum raddianum

Dicotyledons

Acacia mearnsii black wattle
Agapanthus praecox agapanthus
Ageratina adenophora Mexican devil
Ageratina riparia mistflower
Alternanthera philoxeroides alligator weed AK 276720
Alisma plantago-aquatica water plantain
Anagallis arvensis subsp. *arvensis* scarlet pimpernel
Anthroxanthum odoratum sweet vernal
Arum italicum arum lily
Aster subulatus sea aster
Azolla pinnata ferny azolla AK 302244
Bellis perennis daisy
Bidens frondosa beggars' ticks
Calystegia sepium
Callitriche muelleri
Canna indica Canna lily
Carduus tenuiflorus winged thistle
Centaurium erythraea Centuary
Cerastium glomeratum
Chrysanthemoides monilifera
Cirsium vulgare Scotch thistle
Conyza albida fleabane
Cotoneaster glaucophyllus cotoneaster
Crataegus monogyna hawthorn
Cynosurus cristatus
Cupressus macrocarpa macrocarpa
Daucus carota wild carrot
Digitalis purpurea foxglove
Erica sp.
Erigeron karvinskianus Mexican daisy
Erythrina × *sykesii* flame tree, coral tree
Eucalyptus sp. eucalyptus tree
Euphorbia peplus milkweed
Ficus carica fig
Foeniculum vulgare fennel
Fuchsia magellanica AK 120224
Gallium aparine
Gamochaeta coarctata
Gamochaeta simplicicaulis
Hakea salicifolia willow-leaved hakea
Hakea sericea
Hedychium gardnerianum wild ginger
Helminthotheca echioides
Hypericum androsaemum tutsan
Hypochoeris radicata catsear
Landoltia punctata purple-backed duckweed ref. in AK 302244
Lapsana communis nipplewort

Leontodon taraxacoides hawkbit
Leucanthemum vulgare oxeye daisy
Ligustrum lucidum tree privet
Ligustrum sinense Chinese privet
Linum bienne
Linum trigynum
Lonicera japonica Japanese honeysuckle
Lotus major
Lotus pedunculatus lotus
Ludwegia peploides primrose willow
Ludwegia palustris water purslane
Mentha pulegium pennyroyal
Myriophyllum aquaticum parrot's feather
Nephrolepis cordifolia tuber sword-fern
Oenanthe pimpinelloides
Ottelia ovalifolia referenced in AK 302244
Persicaria hydropiper
Persicaria strigosa
Physalis peruviana cape gooseberry
Phytolacca octandra inkweed
Pinus pinaster maritime pine
Pinus radiata radiata pine
Plantago lanceolata narrow-leaved plantain
Plantago major large-leaved plantain
Polypogon monspeliensis beard grass AK 276721
Prunella vulgaris selfheal
Pyracantha sp. firethorn
Psoralea pinnata blue pine, dally pine
Ranunculus repens creeping buttercup
Ranunculus parviflorus
Ranunculus sceleratus AK 179261
Rubus fruticosus blackberry
Rumex acetosella
Rumex conglomeratus clustered dock
Salix cinerea grey willow
Salix fragilis crack willow
Selaginella kraussiana selaginella
Senecio bipinnatisectus Australian fireweed
Senecio esleri
Senecio glomeratus
Senecio jacobaea ragwort
Senecio mikanioides German ivy
Setaria viridis AK 99461
Silene gallica catchfly
Sison ammonium stone parsley
Solanum nigrum black nightshade
Solanum pseudocapsicum Jerusalem cherry
Sonchus oleraceus sow thistle, puha
Spirodela punctata purple-backed duckweed, AK 302243
Taraxacum officinale dandelion
Torilis arvensis
Tradescantia fluminensis tradescantia
Trifolium repens
Tropaeolum pentaphyllum AK 292420

Ulex europaeus gorse
Verbena bonariensis
Verbena litoralis AK 276726
Veronica persica speedwell
Vicia lathyroides
Vicia sativa
Vinca minor periwinkle

Exotic Monocotyledons

Agrostis capillaris
Agrostis tenuis
Aira caryophyllea silvery hairy grass
Alisma plantago-aquatica water plantain
Anthoxanthum odoratum sweet vernal
Arum italicum
Briza minor shivery grass
Bromus arenarius
Bromus hordaceus
Bromus wildenowii
Carex divulsa
Carex eragrostis
Carex vulpinoidea AK 294669
Cortaderia jubata
Cortaderia selloana pampas
Cynosurus cristatus
Cyperus eragrostis umbrella sedge
Dactylis glomerata cocksfoot
Festuca arundinacea tall fescue
Holcus lanatus Yorkshire fog
Juncus articulatus
Juncus effusus soft rush
Lolium perenne perennial ryegrass
Paspalum dilatatum paspalum
Pennisetum clandestinum kikuyu
Schoenoplectus californicus Californian bulrush
Sporobolus africanus ratstail
Stenotaphrum secundatum buffalo grass
Zizania latifolia Manchurian rice grass AK 276083

Appendix 6

COMMON PLANT NAMES USED IN THE TEXT

This is not a definitive list of common names used for plants from the Tokatoka Ecological District. Rather, it is a guide to the reader as to exactly which species is referred to when the common name is used in the text.

Indigenous

black maire *Nestegis cunninghamii*
bracken *Pteridium esculentum*
bush lawyer *Rubus* sp.
hangehange *Geniostoma rupestre*
harakeke *Phormium tenax*
heketara *Olearia rani*
hīnau *Elaeocarpus dentatus*
native grass *Oplismenus hirtellus* subsp. *imbecillis*
houhere *Hoheria populnea*
kahikatea *Dacrycarpus dacrydioides*
kaikōmako *Pennantia corymbosa*
kanono *Coprosma grandifolia*
kānuka *Kunzea ericoides*
karaka *Corynocarpus laevigatus*
karamū *Coprosma robusta*
kauri *Agathis australis*
kawaka *Libocedrus plumosa*
kohekohe *Dysoxylum spectabile*
kōhūhū *Pittosporum tenuifolium*
kōwhai *Sophora microphylla*
lancewood *Pseudopanax crassifolius*
māhoe *Melicytus ramiflorus*
mamaku *Cyathea medullaris*
māmāngi *Coprosma arborea*
mānatu *Plagianthus regius* subsp. *regius*
mānuka *Leptospermum scoparium*
māpou *Myrsine australis*
matai *Prumnopitys taxifolia*
mingimingi *Leucopogon fasciculatus*
miro *Prumnopitys ferruginea*
nīkau *Rhopalostylis sapida*
northern rātā *Metrosideros robusta*
NZ jasmine *Parsonsia* sp.
patē *Schefflera digitata*
pigeonwood *Hedycarya arborea*
ponga *Cyathea dealbata*
puawhananga *Clematis paniculata*
puka *Griselinia lucida*
pukatea *Laurelia novae-zelandiae*
pūriri *Vitex lucens*
putaputawētā *Carpodetus serratus*
ramarama *Lophymyrtus bullata*

rangiora *Brachyglottis repanda*
raupō *Typha orientalis*
rewarewa *Knightia excelsa*
rimu *Dacrydium cupressinum*
round-leaved coprosma *Coprosma rotundifolia*
ponga *Cyathea dealbata*
small-leaved milktree *Streblus heterophyllus*
small-leaved māhoe *Melicytus micranthus*
Smiths tree fern *Cyathea smithii*
swamp millet *Isachne globosa*
tānekaha *Phyllocladus trichomanoides*
taraire *Beilschmiedia tarairi*
tawa *Beilschmiedia tawa*
thin-leaved coprosma *Coprosma areolata*
tī kōuka, cabbage tree *Cordyline australis*
tītoki *Alectryon excelsus*
tōtara *Podocarpus totara*
tōwai *Weinmannia silvicola*
white maire *Nestegis lanceolata*

Exotic

alligator weed *Alternanthera philoxeroides*
blackberry *Rubus fruticosus*
black wattle *Acacia mearnsii*
blue pine *Psoralea pinnata*
boneseed *Chrysanthemoides monilifera* subsp. *monilifera*
buttercup *Ranunculus repens*
carrot weed (cow parsley) *Daucus carota*
Chinese privet *Ligustrum sinense*
cotoneaster *Cotoneaster glaucophyllus*
crack willow *Salix fragilis*
dally pine *Psoralea pinnata*
dock *Rumex* sp.
gorse *Ulex europaeus*
hawthorn *Crataegus monogyna*
macrocarpa *Cupressus macrocarpa*
Manchurian rice grass *Zizania latifolia*
pampas *Cortaderia* sp.
parrot's feather *Myriophyllum aquaticum*
paspalum *Paspalum dilatatum*
pennyroyal *Mentha pulegium*
pine *Pinus radiata*
plaintain *Plantago* sp.
poplar *Populus* sp.
primrose willow *Ludwigia peploides*
privet *Ligustrum* sp.
soft rush *Juncus effusus*
tradescantia *Tradescantia fluminensis*
willow weed *Persicaria* sp.

Appendix 7

CHECKLIST OF FAUNA IN TOKATOKA ECOLOGICAL DISTRICT

Birds

Compiled by the author and Dr Ray Pierce; * = introduced.

*Acridotheres tristis** common myna
*Alauda arvensis** skylark
Anas gracilis grey teal; tete
*Anas platyrhynchos** mallard
Anas rhynchotis variegata Australasian shoveler; kuruwhengi
Anas superciliosa grey duck; pārera
Anthus n. novaeseelandiae NZ pipit, pīhoihoi
Apteryx australis mantelli NI brown kiwi
Ardea novaehollandiae white-faced heron
Botaurus poiciloptilus Australasian bittern; matuku
Bowdleria punctata vealeae NI fernbird, mātātā
Callipepla californica California quail*
*Carduelis flammea** redpoll
*Carduelis carduelis** goldfinch
*Carduelis chloris** greenfinch
Chrysococcyx lucidus lucidus shining cuckoo; pīpīwharauroa
Circus approximans Australasian harrier; kāhu
Cyanoramphus novaeseelandiae red-crowned kākāriki; kākāriki
*Cygnus atratus** black swan
*Emberiza citrinella** yellowhammer
*Fringilla coelebs** chaffinch
Gallirallus philippensis assimilis banded rail; moho-pererū
Gerygone igata grey warbler, riroriro
*Gymnohina tibicen tibicen** Australian magpie
Halcyon sancta vagans NZ kingfisher, kōtare
Hemiphaga novaeseelandiae kūkupa; NZ pigeon, kererū
Himantopus himantopus leucocephalus pied stilt; poaka
Hirundo tahiti neoxena welcome swallow
Larus dominicanus black-backed gull, karoro
*Meleagris gallopavo** wild turkey; feral turkey
Ninox novaeseelandiae novaeseelandiae morepork; ruru
*Passer domesticus** house sparrow
Phalacrocorax carbo novaehollandiae black shag; kawau
Phalacrocorax melanoleucos brevirostris little shag, kawau paka
Phalacrocorax varius pied shag; kāruhiruhi
*Phasianus colchicus** ring-necked pheasant
*Platycercus eximius** eastern rosella
Poliocephalus rufopectus NZ dabchick; weweia
Porphyrio porphyrio melanotus pūkeko
Porzana tabuensis plumbea spotless crake; pūweto
Prosthemadera novaeseelandiae novaeseelandiae tūī
*Prunella modularis** dunnock; hedge sparrow

Rhipidura fulignosa placabilis NI fantail, piwakawaka
*Sturnus vulgaris** starling
*Synoicus ypsilophorus** brown quail
Tachybaptus novaehollandiae Australasian little grebe
Tadorna variegata paradise shelduck; putangitangi
*Turdus merula** blackbird
*Turdus philomelos** song thrush
Vanellus miles spur-winged plover; masked lapwing
Zosterops lateralis silvereye; tahou, whiteye

Other fauna recorded in the Ecological District

Indigenous land snails

Amborhytida dunniae
Liarea hochstetteri hochstetteri
Liarea turriculata turriculata
Paryphanta busbyi busbyi kauri snail

Indigenous reptiles

Hoplodactylus granulatus† forest gecko
Hoplodactylus pacificus pacific gecko
Naultinus elegans elegans Auckland green gecko
Oligosoma aenum copper skink
Oligosoma ornatum ornate skink

Indigenous fish

Amarinus lacustris freshwater crab
Anguilla dieffenbachii shortfin eel
Hyridella spp. freshwater mussel
Mugil cephalus grey mullet
Neochanna diversus black mudfish
Parenephrops planifrons koura

Introduced fish

Carassius auratus goldfish
Gambusia affinis gambusia
Perca fluviatilis perch

Indigenous invertebrates‡

Peripatus sp. velvet worm

Introduced mammals

Bos taurus cattle
Canis familaris feral dog
Capra bircus goat
Erinaceus europeus occidentalis hedgehog

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† Unconfirmed

‡ DOC has not carried out any detailed surveys of invertebrates within the Tokatoka Ecological District. DOC's SSBI (Sites of Special Biological Interest) surveys have only noted a small range of species with their common name only i.e. carabid beetle, cicada, native cricket, centipede, grey pill millipede etc. and not specific scientific species names.

Felis catus house cat, feral cat
Lepus europaeus occidentalis European brown hare
Mus musculus mouse
Mustela erminea stoat
Mustela furo ferret
Mustela nivalis weasel
Oryctolagus cuniculus European rabbit
Ovis aries sheep
Rattus norvegicus Norway rat
Rattus rattus rattus black rat, ship rat
Sus scrofa pig
Trichosurus vulpecula possum

Appendix 9

GLOSSARY OF TERMS

Biodiversity

The variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (IUCN 1993).

Buffer

A zone surrounding a natural area which reduces the effects of external influences on the natural area. For example, shrubland, scrub and exotic trees around native forested areas provide a gradation of habitats from fully modified to a natural state. This effect also applies to waterways—riparian vegetation and wetlands protect both water quality and habitat from influences arising from the surrounding land.

Community

An association of populations of plants and animals which occur naturally together in a common environment.

Divaricating

Plants whose branches are often stiff, intertangled and are at wide angles e.g. *Coprosma propingua*. Some plants, such as *Hoberia angustifolia*, go through a divaricating juvenile stage. In the Tokatoka Ecologiacl District, many divaricating plants are represented within the Manganui River complex.

Diversity and pattern

Diversity is the variety and range of species of biological communities, ecosystems and landforms. Pattern refers to changes in species composition, communities and ecosystems along environmental gradients.

Ecological District

A local part of New Zealand where geological, topographical, climatic and biological features and processes, including the broad cultural pattern, interrelate to produce a characteristic landscape and range of biological communities.

Ecological Region

A group of adjacent Ecological Districts which have diverse but closely related characteristics or in some cases a single very distinctive Ecological District.

Ecological unit

Vegetation type occurring on a particular landform or soil or rock type.

Ecosystem

Any inter-related and functioning assemblage of plants, animals and substrates (including air, water and soil) on any scale including the processes of energy flow and productivity (Myers et al. 1987).

Endemic

Occurring naturally in, and restricted to, a particular country, region or locality.

Exotic

Introduced from outside New Zealand.

Fernland

Dominated by ferns such as *Gleichenia*, bracken, tree ferns, with occasional woody plants.

Forest

A tall, predominantly closed canopy consisting mainly of tree species (a tree being a woody plant which attains a 10-cm diameter at breast height (Atkinson 1985).

Much of Northland's forest consists of or includes secondary growth which has developed following disturbance or destruction of the original forest. This may include secondary mānuka/kānuka forest where those species have reached tree size and may contain other canopy species.

Gumland

Gumlands are infertile wetlands usually characterised by a unique shrubland community dominated by species such as mānuka, *Dracophyllum*, sedges and umbrella fern. Gumlands have hardpan soils formed under old kauri forests; drainage is poor, so they are usually wet in winter, but they can be dry for most of the year.

Habitat

The part of the environment where a plant or animal lives. It includes both the living and non-living features of the area.

Indigenous

Native to and occurring naturally within the New Zealand Biogeographic region.

Landform

A part of the land's surface with distinctive naturally formed physical characteristics e.g. a hill, valley etc.

Linkages/corridors

Vegetated or aquatic areas (can be forest, shrubland, wetland, streams, beach or exotic vegetation such as pine) that link up two or more habitats. With a link between habitats, the gene pool for a species is greater, which enhances the viability of that population. The corridor does not have to be continuous for many species to utilise it. Small remnants can act as stepping stones between two larger habitats, so that birds such as kiwi can move from remnant to remnant up to 500 m apart.

Natural area

A tract of land which supports natural landforms and predominantly native vegetation or provides habitat for indigenous species; identified as a unit for evaluation of ecological quality and representativeness and has potential to be ecologically significant.

Naturalness

The degree to which a habitat is modified and disturbed by human activity or introduced plants and animals and what natural values are retained despite these factors i.e. to what extent native species are functioning according to natural processes.

Rarity

A measure of commonness and may apply from entire ecosystems through to single species. It may refer to the threatened status of a species (see Appendix 3, p. 452) or habitat type in any one of the following ways: formerly common but now rare; rare elsewhere but common in the district; rare in the district but common elsewhere; confined to a limited geographic area; at the limit of its range; or with a contracting or fragmented range. For example, old growth alluvial swamp forests are an extremely rare ecosystem type in Northland, and indeed nationally, even though they contain no species which are regarded as rare in themselves.

Refuge

Native bush enclaves in production forest become a refuge for some native species during the logging phase. For example, they allow bird species, such as kiwi, a retreat from logged areas.

Representativeness

The extent to which an area represents or exemplifies the components of the natural diversity of the ecological district. This implies consideration of the full range of natural ecosystems and landscapes that were originally found in the ecological district, how well they are represented in today's environment, and the extent to which they are included in the protected areas network.

Riparian functions

Riparian vegetation performs important functions such as providing corridors linking habitats and providing shading to streams. This is important in Northland, as many streams have small catchments and the water temperature can rise, depleting the available oxygen, leading to the death of aquatic life. Litter debris enters the nutrient cycle and supports invertebrates such as mayfly, caddisfly and stonefly feeding on it. Riparian vegetation also acts as a buffer for non-point water discharges.

Riparian zone

An area of land immediately adjacent to a watercourse.

Riverine flood forest

Forest associated on the flood plain of rivers that sustain periods of seasonal flooding. In the Tokatoka Ecological District, riverine flood forest is characterised by kahikatea, kōwhai, tī kōuka and mānatu dominant forest.

Riverine forest

Forest on alluvial soils forming a riparian margin immediately adjacent to lowland streams/rivers. In the Tokatoka Ecological District, riverine forest is often represented as a riparian strip and includes kahikatea, tōtara, kowhai and kānuka/mānuka as the most dominant species with a range of less-common species including mataī, tītoki, mānatu, and tī kōuka.

Scrub

Refers to seral communities, often dominated by or with a large component of exotic species such as gorse, *Hakea,* tobacco weed etc. and/or commonly lacking a closed canopy and in which an understorey is either absent or composed primarily of exotic species.

Secondary vegetation

Native vegetation established after destruction or disturbance of the previous vegetation and which is essentially different from the original vegetation. (See succession, below).

Seral

Describes a plant community in the process of succession.

Shrubland

Vegetation in which the canopy is dominated by woody plants less than 10 cm diameter at breast height.

There are 2 main types:

- Successional vegetation dominated by seral species such as mānuka, kānuka, māhoe etc., or shrubs such as hangehange, bracken, kūmarahou. As used in this report, it implies a closed canopy and, in more advanced stages, contains an understorey of indigenous species.
- (ii) Seral vegetation where the rate of further succession is extremely slow, being limited by abiotic factors such as soil structure and fertility, wind shear etc., e.g. gumland mānuka shrubland, *Muehlenbeckia* shrubland on dunes.

Site

An area of habitat identified during the rapid field inventory phase of the PNAP. Its boundaries may be defined by the edge of the habitat (where discrete), catchment or other geographical feature, e.g. river, vegetation type or legal title.

Stepping stone habitat

Linking remnants for species to utilise, e.g. kukupa flying between remnants sustaining taraire and puriri for seasonal feeding.

Succession

The process of change in the appearance, composition and structure of a community over a period of time. Change may be due to natural or human-induced factors, or both. For example, the colonisation of bare rock or soil by algae and lichens ending with a stable climax community in equilibrium with the environment. Secondary succession occurs where the original vegetation has been destroyed; e.g. by fire.

Survey no.

The identifier number given to each site. The first three figures refer to the NZMS 260 topographical map sheet that the habitat is covered by.

Sustainability

The long-term ecological viability of a natural area. This is related to the size and shape of the area as well as to threats from introduced pests.

Vegetation type

Defined by the dominant canopy species and the structure of the vegetation; e.g. taraire forest, mānuka shrubland

Viability

The ability of an area's natural communities to maintain themselves in the long term in the absence of particular management efforts to achieve this. Regeneration and vigour of species within these communities and stability of communities and processes contribute to viability.

Wetland

An area of land that is permanently or intermittently waterlogged and supports flora and fauna adapted to wet conditions. Wetland is used as a broad definition for several types of aquatic systems, e.g. swamps, bogs and ephemerals.

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