

## **B. KEY SPECIES FOR CONSERVATION AND ECONOMIC DEVELOPMENT IN NEW ZEALAND**

By T. R. PARTRIDGE

### **B.1 Summary**

A list of plant species considered to be either 'key' for ecological reasons or for socio-economic reasons is presented in this report. An introductory section outlines the application of these concepts to the New Zealand situation, with special emphasis on problems.

### **B.2 'Key' ecological and socio-economic species in New Zealand**

#### **B.2.1 *Framework and overview***

New Zealand ecologists are unaccustomed to the concept of 'key ecological species', that is, those that contribute a disproportionate role to the maintenance of the quality of life on this island group. There are a number of clear reasons for this, that apply to both 'ecological key species' and 'socio-economic key species'.

The flora and fauna of New Zealand are made up of plants and animals of two very distinct origins. There are firstly the native species that existed in New Zealand before human settlement some 800 years ago. The Polynesian inhabitants modified large areas of New Zealand, but introduced few species of plants and animals. In contrast, 150-200 years of European settlement has seen the introduction of a vast number of new species that have had a massive impact upon the landscape. In New Zealand's agriculturally based economy this has meant the replacement of native species of little economic value with the agricultural species that have become the source of food for New Zealanders. Conservation priorities are therefore concentrated on the native species that are threatened by those that are introduced. As some habitats are more threatened than others, ecologists tend to associate with 'key habitats' that have been especially depleted or threatened. These include, for instance, wetlands, lowland forest, sand dunes, and hard tussock grassland. Preservation of habitat is therefore the priority, irrespective of whether or not they contain 'key' species.

The indigenous Maori people are now no longer reliant on traditional foods. These foods are used, and have great spiritual value, but for regular nourishment, they consume the same foods as eaten by Europeans. Therefore, 'key socio-economic'

species are more based on spiritual value or use as fibre rather than value as food.

We are, however, able to categorise a number of species as being perceived as 'key'. It is unlikely, however, that by doing so conservation priorities need to be changed. These species will be protected as we protect key habitats or in situations where they are, for instance, valuable for land stabilisation. The indigenous people are well aware of the need to conserve resources of their culturally important species.

During compilation of the list it became apparent that species of certain kinds of habitats were more likely to be 'key' ecologically. Dominant species were especially obvious, more so when the vegetation was species poor as well. Monocultures are the obvious extreme of this situation. These habitats are often stressed, including estuaries, dunes, dry forest, wetlands, etc. New Zealand does, however, have an extensive alpine flora where, apart from in snow-tussock grassland, there tends to be less dominance despite the obvious stress.

The report presented emphasises plants. For a list of 'key' animals, other agencies should be contacted. It is important to note that (a) apart from bats, there are no native mammals, and (b) the insect fauna is very poorly understood, especially from an ecological viewpoint. As a result of their differing origins, native and introduced species are presented as separate lists. Otherwise the habitat system of presentation is followed.

The species are listed as 'key' for perceived positive values. New Zealand has a large number of introduced (and a few native) weeds that have considerable impact upon other species to such an extent that they are considered noxious. Some species are of 'key' status in certain situations, but a threat to other 'key' species in others. For instance, the introduced grass marram (*Ammophila arenaria*) is of immense value in stabilising wandering dunes, yet threatens the native pingao (*Desmoschoenus spiralis*) on coastal dune systems where that species is found and used for fibre. Likewise, certain ecological 'key' species are frequent agricultural problems, for instance manuka (*Leptospermum scoparium*) which is an important coloniser after fire, but at the same time is a hindrance to the conversion of land for agriculture.

Within the montane to alpine scrublands and grasslands of New Zealand, there are groups of large numbers of closely related plant species occupying similar habitats and ecological niches in different regions. These groups are considered to have speciated relatively recently, sometimes to such an extent that some species are confined to individual mountain ranges. Characteristic genera include *Dracophyllum*, *Hebe*, *Coprosma*, *Celmisia*, *Chionochloa*, *Aciphylla*, *Raoulia*, *Olearia* and *Senecio*. If this speciation had not taken place, some related groups of species (eg shrubby *Dracophyllum*) would have qualified as a single 'key' species. This contrasts with the widespread shrub *Cassinia leptophylla*, which has not undergone such speciation, and which although not considered a 'key ecological' species, is certainly very close. Nor is it possible to group these situations as single entries as the number of species is large and there are many that are excluded. Because this situation is such a feature of these habitats, there are few entries of 'key' species for them. A similar situation exists within the lowland drought-tolerant grass species of *Rytidosperma*. The difficulty here though is mainly of identification, which is difficult, so the actual

species contributing to the core 'key' group are essentially unknown.

The list of adventive plant species is comparatively short. Many do, however, play a critical role in agricultural and pastoral production. Pasture grasses such as *Lolium perenne* and pasture legumes such as *Trifolium repens* are the mainstay of New Zealand's meat and wool production, but they are not strictly 'key' ecological or socio-economic species as defined in the CSC report. Similarly, the large number of agricultural crops are excluded. Also important are the many trees that are the mainstay of New Zealand's increasing timber industry. One adventive tree (*Pinus radiata*) does, however, stand out as also being of particular value in stabilisation, especially of sand and has been included in the list. Of difficult status are the many adventive tree species used for land stabilisation. Many of these are species of *Salix* and *Populus* that have been planted on slumps, roadside cuttings, screes, etc, and play locally important roles.

B.3 List of key ecological and socio-economic plant species in New Zealand

B.3.A *Indigenous species*

| Plant Species<br>(Common name<br>in parentheses)              | Region<br>(where<br>important)  | ECOLOGICAL FUNCTIONS  |                          |                      | SOCIO-ECONOMIC FUNCTIONS |           |                     |          | Reasons for inclusion |                                                                                                     |
|---------------------------------------------------------------|---------------------------------|-----------------------|--------------------------|----------------------|--------------------------|-----------|---------------------|----------|-----------------------|-----------------------------------------------------------------------------------------------------|
|                                                               |                                 | Primary<br>Production | Nutrient<br>Accumulation | Habitat<br>Structure | Colonisation             | Commodity | Genetic<br>Resource | Cultural |                       | Environmental<br>Management                                                                         |
| COASTAL SPECIES                                               |                                 |                       |                          |                      |                          |           |                     |          |                       |                                                                                                     |
| TREES                                                         |                                 |                       |                          |                      |                          |           |                     |          |                       |                                                                                                     |
| <i>Metrosideros excelsa</i><br>(Pohutukawa)                   | New Zealand                     |                       |                          | X                    |                          |           |                     | X        |                       | Trees of great cultural significance. Food supply for birds. Threatened by opossums                 |
| <i>Corynocarpus laevigatus</i><br>(Karaka)                    | New Zealand                     |                       |                          |                      |                          | X         |                     | X        |                       | Important spiritual tree. Nuts of great nutritive value (but potentially poisonous). Also inland    |
| <i>Myoporum laetum</i><br>(Ngao)                              | New Zealand                     |                       |                          | X                    |                          |           |                     |          | X                     | Important tree for coastal shelter                                                                  |
| SHRUBS                                                        |                                 |                       |                          |                      |                          |           |                     |          |                       |                                                                                                     |
| <i>Avicennia resinifera</i><br>(Mangrove)                     | New Zealand                     | X                     |                          | X                    |                          | X         |                     |          | X                     | Crucial species in estuarine food chain, sediment and coastal protection. Threatened by reclamation |
| <i>Olearia traversii</i><br>(New Zealand<br>(Chatham Island)) | New Zealand<br>(Chatham Island) |                       |                          |                      |                          |           |                     |          | X                     | Coastal protection on Chatham Island. Threatened by exploitation for firewood                       |
| HERBS                                                         |                                 |                       |                          |                      |                          |           |                     |          |                       |                                                                                                     |
| <i>Zostera novae-zelandiae</i><br>(Eel grass)                 | New Zealand                     | X                     | X                        | X                    |                          | X         |                     |          | X                     | Important in estuarine food chain and sediment holder in estuaries                                  |

ECOLOGICAL FUNCTIONS      SOCIO-ECONOMIC FUNCTIONS

| Plant Species<br>(Common name<br>in parentheses) | Region<br>(where<br>important) | Primary<br>Production | Nutrient<br>Accumulation | Habitat<br>Structure | Colonisation | Commodity | Genetic<br>Resource | Cultural | Environmental<br>Management | Reasons for inclusion                                                                              |
|--------------------------------------------------|--------------------------------|-----------------------|--------------------------|----------------------|--------------|-----------|---------------------|----------|-----------------------------|----------------------------------------------------------------------------------------------------|
| <b>HERBS continued</b>                           |                                |                       |                          |                      |              |           |                     |          |                             |                                                                                                    |
| <i>Ruppia megacarpa</i>                          | New Zealand                    | X                     | X                        | X                    |              |           |                     |          | X                           | Major food supply for animals using brackish lagoonal waters                                       |
| <i>Sarcocornia quinquefolia</i> (Glasswort)      | New Zealand                    | X                     |                          | X                    | X            |           |                     |          | X                           | Primary coloniser on estuarine muds. Important in estuarine food chain                             |
| <i>Juncus maritimus</i> (Sea rush)               | New Zealand                    | X                     |                          | X                    | X            |           |                     |          | X                           | Important salt marsh species for stability                                                         |
| <i>Spinifex sericeus</i> (Spinifex)              | New Zealand                    |                       |                          | X                    | X            | X         |                     | X        | X                           | Significant coastal sand binder on dunes                                                           |
| <i>Desmoschoenus spiralis</i> (Pingao)           | New Zealand                    |                       |                          | X                    | X            | X         |                     | X        |                             | Sand binder on dunes. Leaves used for fibre in traditional weaving. Threatened by spread of marram |
| <i>Lepidium oleraceum</i> (Scurvey grass)        | New Zealand                    |                       |                          |                      |              | X         | X                   |          |                             | Source of vitamin C. Species is now rare and endangered and virtually confined to offshore islands |
| <i>Poa</i> species (Tall subantarctic tussocks)  | New Zealand – Subantarctic     |                       |                          | X                    |              |           |                     |          | X                           | Source of shelter for significant subantarctic birds (eg. albatross)                               |
| <b>WETLAND SPECIES</b>                           |                                |                       |                          |                      |              |           |                     |          |                             |                                                                                                    |
| <b>TREES</b>                                     |                                |                       |                          |                      |              |           |                     |          |                             |                                                                                                    |
| <i>Dacrycarpus dacrydioides</i> (Kahikatea)      | New Zealand                    | X                     | X                        | X                    |              | X         |                     |          | X                           | Tall tree of swamp forest. Exploited for use as quality wood. Also on drier soils. Food for birds  |
| <i>Laurelia novae-zelandiae</i> (Laurel)         | New Zealand                    | X                     | X                        | X                    |              |           |                     |          | X                           | Important sub-tropical forest tree with buttress roots. Threatened by land clearance               |

## Key species for conservation and economic development in New Zealand

| Plant Species<br>(Common name<br>in parentheses) | Region<br>(where<br>important) | ECOLOGICAL FUNCTIONS  |                          |                      | SOCIO-ECONOMIC FUNCTIONS |           |                     |                        | Reasons for inclusion |                                                                                                                           |
|--------------------------------------------------|--------------------------------|-----------------------|--------------------------|----------------------|--------------------------|-----------|---------------------|------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------|
|                                                  |                                | Primary<br>Production | Nutrient<br>Accumulation | Habitat<br>Structure | Colonisation             | Commodity | Genetic<br>Resource | Cultural<br>Management |                       |                                                                                                                           |
| HERBS                                            |                                |                       |                          |                      |                          |           |                     |                        |                       |                                                                                                                           |
| <i>Typha orientalis</i><br>(Raupo)               | New Zealand                    | X                     | X                        | X                    | X                        |           |                     |                        | X                     | Important stabiliser and nutrient accumulator                                                                             |
| <i>Carex secta</i><br>(Tussock sedge)            | New Zealand                    | X                     | X                        | X                    |                          |           |                     |                        | X                     | Significant wetland species in a range of situations. Threatened by drainage                                              |
| <i>Chionochola rubra</i><br>(Red tussock)        | New Zealand                    | X                     | X                        | X                    |                          |           |                     |                        | X                     | Important species maintaining water quality in lowland and montane wetlands. Threatened by drainage                       |
| <i>Phormium tenax</i><br>(Flax)                  | New Zealand                    | X                     | X                        | X                    |                          | X         | X                   | X                      | X                     | Important wetland species. Significant source of weaving fibre. Nectar used by birds. Great source of genetic variability |
| <i>Empodisma minus</i><br>(Wire rush)            | New Zealand                    | X                     | X                        | X                    | X                        |           |                     |                        | X                     | Coloniser of nutrient poor wetlands, especially after fire. Important in soil conservation                                |
| <i>Schoenus pauciflorus</i>                      | New Zealand                    | X                     | X                        | X                    |                          |           |                     |                        | X                     | Significant in maintaining water quality and flows and wetlands                                                           |
| FOREST SPECIES                                   |                                |                       |                          |                      |                          |           |                     |                        |                       |                                                                                                                           |
| LARGE TREES                                      |                                |                       |                          |                      |                          |           |                     |                        |                       |                                                                                                                           |
| <i>Agathis australis</i><br>(Kauri)              | New Zealand                    | X                     |                          | X                    |                          | X         |                     | X                      |                       | A vast tree of great value for its wood and gum. Of great cultural significance. Overexploited                            |
| <i>Dacrydium cupressinum</i><br>(Rimu)           | New Zealand                    | X                     |                          | X                    |                          | X         |                     |                        | X                     | Significant lowland forest tree. Quality wood has resulted in overexploitation                                            |

## ECOLOGICAL FUNCTIONS      SOCIO-ECONOMIC FUNCTIONS

| Plant Species<br>(Common name<br>in parentheses)                              | Region<br>(where<br>important) | Primary<br>Production | Nutrient<br>Accumulation | Habitat<br>Structure | Colonisation | Commodity | Genetic<br>Resource | Cultural | Environmental<br>Management | Reasons for inclusion                                                                                                                           |
|-------------------------------------------------------------------------------|--------------------------------|-----------------------|--------------------------|----------------------|--------------|-----------|---------------------|----------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>LARGE TREES continued</b>                                                  |                                |                       |                          |                      |              |           |                     |          |                             |                                                                                                                                                 |
| <i>Nothofagus solandri</i><br>(Mountain beech)                                | New Zealand                    | X                     |                          | X                    | X            | X         |                     |          | X                           | Dominant tree of dry hillslopes. Critical in land stability. Quick coloniser. Honeydew feeds forest fauna, but is threatened by introduced wasp |
| <i>Nothofagus menziesii</i> ,<br><i>N. fusca</i> (Silver beech,<br>red beech) | New Zealand                    | X                     |                          | X                    | X            | X         |                     |          | X                           | Important stabilisers of steep slopes. Good colonisers. Quality wood                                                                            |
| <i>Sophora tetraptera</i> ,<br><i>S. microphylla</i><br>(Kowhai)              | New Zealand                    |                       |                          | X                    |              |           |                     | X        |                             | Significant food source for native birds. Trees of cultural significance. Regeneration threatened by grazing, spraying                          |
| <i>Podocarpus totara</i> ,<br><i>P. hallii</i><br>(Totara)                    | New Zealand                    | X                     |                          | X                    |              | X         |                     | X        |                             | Important for wood. Of cultural significance. Depleted by opossums                                                                              |
| <i>Vitex lucens</i><br>(Puriri)                                               | New Zealand                    |                       |                          |                      |              |           |                     | X        |                             | Cultural significance as the tree is used for wood for spears                                                                                   |
| <i>Metrosideros robusta</i> ,<br><i>M. umbellata</i><br>(Rata)                | New Zealand                    | X                     |                          | X                    |              | X         |                     | X        | X                           | Significant ecological and spiritual tree. Under threat from introduced opossums. Honey                                                         |
| <i>Rhopalostylis sapida</i><br>(Nikau)                                        | New Zealand                    |                       |                          | X                    |              | X         |                     | X        |                             | Edible parts. A palm of significant cultural value                                                                                              |
| <i>Fuchsia exorticata</i><br>(Tree fuchsia)                                   | New Zealand                    | X                     |                          | X                    | X            | X         |                     |          | X                           | Coloniser following disturbance. Under threat from opossums in some areas                                                                       |
| <b>SMALL TREES</b>                                                            |                                |                       |                          |                      |              |           |                     |          |                             |                                                                                                                                                 |
| <i>Melicope ramiflora</i><br>(Mahoe)                                          | New Zealand                    | X                     |                          | X                    | X            |           |                     |          | X                           | Ubiquitous tree that is a good coloniser following disturbance                                                                                  |

## Key species for conservation and economic development in New Zealand

| Plant Species<br>(Common name<br>in parentheses)               |             | Region<br>(where<br>important) | ECOLOGICAL FUNCTIONS  |                          |                      |              | SOCIO-ECONOMIC FUNCTIONS |                     |          |                             | Reasons for inclusion                                                                                                                                  |
|----------------------------------------------------------------|-------------|--------------------------------|-----------------------|--------------------------|----------------------|--------------|--------------------------|---------------------|----------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                |             |                                | Primary<br>Production | Nutrient<br>Accumulation | Habitat<br>Structure | Colonisation | Commodity                | Genetic<br>Resource | Cultural | Environmental<br>Management |                                                                                                                                                        |
| SMALL TREES continued                                          |             |                                |                       |                          |                      |              |                          |                     |          |                             |                                                                                                                                                        |
| <i>Weinmannia racemosa</i> , <i>W. silvicola</i> (Kamahi)      | New Zealand | X                              |                       | X                        | X                    | X            |                          |                     |          | X                           | Ubiquitous subcanopy tree of forests. Threatened by opossums. Source of honey                                                                          |
| <i>Solanum aviculare</i> , <i>S. laciniatum</i> (Poroporo)     | New Zealand |                                |                       |                          |                      | X            | X                        | X                   |          | X                           | Pharmaceutical properties. Good colonisers of open areas                                                                                               |
| <i>Beilschmiedia tawa</i> , <i>B. tarairi</i> (Tawa, tarairi)  | New Zealand | X                              |                       | X                        |                      |              |                          |                     |          | X                           | Significant canopy trees in North Island. Quality wood. Threatened by land clearance                                                                   |
| <i>Cyathea</i> species, <i>Dicksonia</i> species (Tree ferns)  | New Zealand | X                              |                       | X                        | X                    | X            | X                        | X                   |          | X                           | Remnant species following forest burning. Some have edible parts                                                                                       |
| <i>Leptospermum scoparium</i> (Manuka)                         | New Zealand | X                              |                       | X                        | X                    | X            | X                        | X                   |          | X                           | Coloniser following fire. Excellent firewood. Also in wetlands and dry areas. A scale insect that has severely depleted this once abundant tree. Honey |
| <i>Kunzea ericoides</i> (Kanuka)                               | New Zealand | X                              |                       | X                        | X                    | X            | X                        |                     |          | X                           | Coloniser following disturbance. Good quality firewood                                                                                                 |
| CLIMBERS                                                       |             |                                |                       |                          |                      |              |                          |                     |          |                             |                                                                                                                                                        |
| <i>Freycinetia baueriana</i> (Kiekie)                          | New Zealand |                                |                       |                          |                      |              | X                        |                     | X        |                             | Edible parts and used in weaving                                                                                                                       |
| <i>Clematis paniculata</i>                                     | New Zealand |                                |                       |                          |                      |              |                          |                     | X        |                             | Culturally significant and showy climber                                                                                                               |
| GRASSLAND AND SCRUB SPECIES TREES                              |             |                                |                       |                          |                      |              |                          |                     |          |                             |                                                                                                                                                        |
| <i>Cordyline australis</i> , <i>C. indivisa</i> (Cabbage tree) | New Zealand |                                |                       |                          |                      |              | X                        |                     | X        |                             | Leaves used for fibre. Shoots and roots as food (high sugar content). Affected by disease in north                                                     |



| ECOLOGICAL FUNCTIONS                                                                       |                                |                       |                          |                      | SOCIO-ECONOMIC FUNCTIONS |           |                     |          |                             |                                                                                                                                           |
|--------------------------------------------------------------------------------------------|--------------------------------|-----------------------|--------------------------|----------------------|--------------------------|-----------|---------------------|----------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Plant Species<br>(Common name<br>in parentheses)                                           | Region<br>(where<br>important) | Primary<br>Production | Nutrient<br>Accumulation | Habitat<br>Structure | Colonisation             | Commodity | Genetic<br>Resource | Cultural | Environmental<br>Management | Reasons for inclusion                                                                                                                     |
| SHRUBS                                                                                     |                                |                       |                          |                      |                          |           |                     |          |                             |                                                                                                                                           |
| <i>Discaria toumatou</i><br>(Matagouri)                                                    | New Zealand                    | X                     | X                        |                      | X                        |           |                     | X        |                             | Nitrogen fixer (non-legume).<br>Coloniser of open, stony<br>areas. Also regarded as weed                                                  |
| HERBS                                                                                      |                                |                       |                          |                      |                          |           |                     |          |                             |                                                                                                                                           |
| <i>Raoulia australis</i><br>(Scabweed)                                                     | New Zealand                    |                       |                          | X                    | X                        |           |                     | X        |                             | Coloniser following severe<br>grassland grazing depletion.<br>Critical in soil conservation                                               |
| <i>Chionochloa rigida</i> ,<br><i>C. flavescens</i> ,<br><i>C. macra</i><br>(Snow tussock) | New Zealand                    | X                     |                          | X                    |                          |           |                     |          | X                           | Major dominants of alpine<br>grasslands. Maintain water<br>quality and flow. Important<br>in soil conservation                            |
| <i>Celmisia spectabilis</i><br>(Mountain daisy)                                            | New Zealand                    |                       |                          | X                    | X                        |           |                     |          | X                           | Survivor of overgrazed and<br>overburnt alpine grassland.<br>Significant in soil conservation                                             |
| <i>Festuca novae-<br/>zelandiae</i><br>(Hard tussock)                                      | New Zealand                    | X                     |                          | X                    | X                        |           |                     |          | X                           | Dominant on poor quality<br>montane grasslands.<br>Threatened by <i>Hieracium</i> ,<br>grazing                                            |
| <i>Poa cita</i><br>(Silver tussock)                                                        | New Zealand                    | X                     |                          | X                    | X                        |           |                     |          | X                           | Important lowland grass of<br>many situations                                                                                             |
| <i>Rytidosperma</i> species                                                                | New Zealand                    | X                     |                          | X                    | X                        |           |                     |          |                             | Some of these are<br>significant holders of soil<br>in low nutrient grassland                                                             |
| <i>Pteridium<br/>aquilinum</i><br>(Bracken fern)                                           | New Zealand                    | X                     |                          |                      | X                        |           |                     | X        | X                           | Significant species of<br>burned areas, but can<br>dominate to become a weed.<br>Soil conservation values.<br>Rhizomes a traditional food |
| <i>Poa colensoi</i><br>(Blue tussock)                                                      | New Zealand                    | X                     |                          | X                    | X                        |           |                     |          | X                           | Important alpine grass with a<br>role in water quality and soil<br>conservation. Survives fire                                            |

## Key species for conservation and economic development in New Zealand

| Plant Species<br>(Common name<br>in parentheses)                  | Region<br>(where<br>important) | ECOLOGICAL FUNCTIONS  |                          |                      |              | SOCIO-ECONOMIC FUNCTIONS |                     |          |                             | Reasons for inclusion                                                                                                                                                               |
|-------------------------------------------------------------------|--------------------------------|-----------------------|--------------------------|----------------------|--------------|--------------------------|---------------------|----------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                   |                                | Primary<br>Production | Nutrient<br>Accumulation | Habitat<br>Structure | Colonisation | Commodity                | Genetic<br>Resource | Cultural | Environmental<br>Management |                                                                                                                                                                                     |
| MARINE ALGAE                                                      |                                |                       |                          |                      |              |                          |                     |          |                             |                                                                                                                                                                                     |
| <i>Durvillea antarctica</i> ,<br><i>D. willana</i><br>(Bull kelp) | New Zealand                    | X                     | X                        | X                    |              | X                        |                     | X        | X                           | Large seaweed dominant on many coasts. Wave energy absorption delays erosion. Culturally used for bags. Has potential for food and alginate production                              |
| <i>Porphyra</i> species                                           | New Zealand                    | X                     |                          |                      |              | X                        |                     | X        |                             | Important cultural source of food – potential for further use                                                                                                                       |
| <i>Macrocystis pyrifera</i>                                       | New Zealand                    | X                     |                          | X                    |              |                          |                     |          | X                           | Source of food chain for fish – shelter                                                                                                                                             |
| <i>Ecklonia radiata</i>                                           | New Zealand                    |                       |                          |                      |              |                          |                     |          | X                           | Source of food chain for fish                                                                                                                                                       |
| <i>Gracillaria sordida</i>                                        | New Zealand                    |                       |                          |                      |              | X                        |                     |          | X                           | Food for fish. Alginate production                                                                                                                                                  |
| B.3.B Adventive species                                           |                                |                       |                          |                      |              |                          |                     |          |                             |                                                                                                                                                                                     |
| <i>Ammophila arenaria</i><br>(Marram grass)                       | New Zealand                    |                       |                          |                      | X            |                          |                     |          | X                           | Significant introduced sand binder on wandering dunes                                                                                                                               |
| <i>Lupinus arboreus</i><br>(Tree lupin)                           | New Zealand                    | X                     | X                        |                      | X            |                          |                     |          | X                           | Significant sand stabiliser. Nitrogen fixer                                                                                                                                         |
| <i>Agrostis tenuis</i><br>(Browntop)                              | New Zealand                    | X                     |                          |                      | X            |                          |                     |          | X                           | Major grass of nutrient poor areas with soil conservation role                                                                                                                      |
| <i>Ipomoea batatas</i><br>(Kumera)                                | New Zealand                    |                       |                          |                      |              | X                        | X                   | X        |                             | Main crop of Maori people before Europeans, but has been replaced by cultivars derived from elsewhere. Indigenous cultivars are of greater spiritual value than actually cultivated |
| <i>Pinus radiata</i><br>(Monterey pine)                           | New Zealand                    | X                     |                          |                      | X            | X                        | X                   |          | X                           | Principal timber tree that also has value in land stabilisation, especially wandering dunes                                                                                         |

#### **B.4 Acknowledgments**

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