The Styx

Pūrākaunui

Colin D Meurk

Greenspace Unit
Christchurch City Council

CCCECO00/03

May 2004

Styx Report: 2004/1

Vegetation & Landscape Potential
Styx River Catchment
Christchurch

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Contents

Preface

The Styx River, and its associated waterways and wetlands, provides an important natural asset to the north of the city. This springfed river originates in the Harewood area and meanders northwards through reserves, rural pastures, croplands, orchards and residential developments on its way to the sea at the Waimakariri River mouth. With changing land-uses and the expansion of the city northwards, there will be increasing pressure on the Styx River catchment and the many values associated with waterways and wetlands in this locality.

The Christchurch City Council, Environment Canterbury, the Department of Conservation, and the Fish and Game council have varying responsibilities under the Resource Management Act (1991) for the long-term sustainable management of this important waterway and wetland system. Part VIIA of the Local Government Amendment Act 1974 also requires the Christchurch City Council to develop a long-term financial strategy for the management of drainage and waterways and wetlands within its boundaries, including those associated with the Styx River and its environs. Council is using a values based approach (drainage, landscape, ecology, recreation, heritage and culture) in the development of its Asset Management Plans, together with the formulation of visions based on these values. To assist in the development of these visions, the City has been divided up into coherent project areas reflecting the nature of the land and water system, land-uses and the make up of the local communities. The Styx River and its catchment area comprises two of these areas.

The development of a vision for the Styx River and its environs will be an evolving process as more is understood about the nature of the land and water resource in this area and the various values and issues are explored.

This report adds to our overall understanding of the landforms, soils, vegetation (past, present and potential) and land-uses within this catchment. It provides a framework for ecological restoration, wherever it might occur, along the Styx River and its tributaries.

Christine Heremaia
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Christchurch City Council

1 Background

A review of natural resources of the Styx River catchment has been undertaken by the Christchurch City Council as a basis for achieving pre-emptive and integrated planning of this population growth area. As part of this exercise, Basher (2000) prepared the report entitled 'Styx River Catchment Data Review: Geology, Soils, Vegetation, and Land Use'. Recommendations relating to indigenous habitat restoration and enhancement are largely derived from a knowledge of landforms, hydrological regime, the underlying soil physical characteristics, and corresponding species lists from Lucas *et al.* (1986). This information is now available on the New Zealand Ecological Restoration Network (NZERN) website at www.bush.org.nz/planterguide. You can 'use Planter guide' and consult 'Christchurch Streamside Planting Guide' and 'Plants for Lawns and Rockgardens'. The Lucas maps are presented on a 1:65 000 scale, which provide broad guidelines for indigenous revegetation. These mapping units apply well on extensive, uniform, plain surfaces, but where there is micro-topographic variation there is a need for survey and interpretation of conditions on site at an appropriate scale. Basher referred to the soil variation that exists in the catchment at a finer scale than current maps show.

A useful way of presenting this complex variation is in the form of idealized, cross-sectional gradient diagrams that show change in vegetation condition or potentials as topography and soils vary. These features can be interpreted at finer scales than can be practically depicted on a map. In the end, an experienced ecologist may be needed to assist with placement of plants for restoration projects to ensure microsite variation is validly interpreted. This involves, not only discerning subtle undulations in the terrain and anticipating the effect on water and cold air drainage (frost risk), but also digging a soil pit and interpreting the texture, depth, fertility and degree of waterlogging. This type of careful siting is more crucial in Canterbury than in other, higher rainfall areas because there are such sharp changes in soil moisture conditions over short distances. For example soils can change from elevated stony, droughty ridges to river floodplains that are permanently saturated within the space of a few metres. The hot, dry winds of Canterbury exacerbate these differences, whereas higher rainfall in other regions tends to even them out.

2 Landscape and historical context

The former natural habitats of the Styx catchment have been greatly fragmented by natural and human events. Past catastrophic flooding has buried vegetation under tonnes of sediment, whereas human activity has encompassed earthworks and cutting, burning, grazing, cultivation and clearance of the land for both buildings and farming. Buried totara logs, a few thousand years old, were observed in excavations at Styx Mill Conservation Reserve and Janet Stewart Reserve. These are all that remain of the podocarp forests that adorned the catchment in past times, although a stand of such totara-matai-kahikatea forest (Papanui Bush) did survive nearby until the late 1800s (Molloy 1995). At the time of European settlement there would have been sparse dry woodland, shrubland and grasslands, extensive wetlands of raupo, reeds, NZ flax/harakeke, tussock sedges, manuka and cabbage trees, with salt marsh species (oioi, sea rush, marsh ribbonwood) in the tidal reaches. A perspective on the natural habitats of Christchurch can be seen in the City Council publication *Christchurch Naturally* (2000).

Today, only fragments remain with limited regeneration occuring in undisturbed sites. However rural hedgerows and shelterbelts in the upper catchment frequently feature remnant, self-established or planted native species such as bracken fern, scrambling pohuehue, cabbage trees, pittosporums, karamu, and poroporo. These are now valuable, recovering elements of the natural heritage. Bracken fern is an indicator of fire and harks back to the Maori fires that swept through Canterbury about a millennium ago. Pohuehue is recognised as an important foliage food source for native butterflies/caterpillars and the fruits are eaten by waxeyes and other birds. Cabbage trees, pittosporums, poroporo and karamu also produce valuable fruits for native birds, and thus the mutually reinforcing recovery of indigenous habitat and wildlife is possible.

3 Potential vegetation restoration

The idealised diagrams, Figures 1 & 2, indicate original landforms, soils (formal names italicised) and dominant or potential native vegetation of two hypothetical, representative transects across the lower and upper reaches of the catchment. The lower catchment transect incorporates salt marsh, sand dunes, ephemeral wetlands, floodplain backswamps, and riparian vegetation. The upper catchment transect incorporates freshwater riparian vegetation, floodplain backswamps and peatlands, terrace scarps, and upper terraces with either deep, relatively moist, loamy soils or stony, shallow droughty soils. The illustrated species and their usual associates provide a template and target for habitat restoration. Each of these mature states of vegetation would be preceded by pioneering or nursery plants. Such lower growing herb, tussock and shrub forms may be managed indefinitely, especially where land is limited, as in a residential garden. Louisa Davies is gratefully acknowledged for preparing the illustrations.

4 Planning for landscape function

The Styx catchment planning exercise, with support for integrated management from the local community, provides the opportunity for restoring natural and functional ecosystems. This can be at both the local habitat and larger landscape scale, on both public and private lands. For nature to be truly integrated within the working landscape, functionally viable and prominent, and part of the character and identity of the district, it needs to be visible and linked or connected. This can be achieved through physically continuous corridors, such as along waterways (Meurk *et al.* 1997), streets, or railway lines, or by stepping stones that are close enough together that allow wildlife to easily move between them and disperse seed along the way.

A greater range of large fruit and nectar bearing species, such as kowhai, harakeke, kahikatea, totara, matai, broadleaf, hinau and pokaka, will greatly enhance the amount and continuity of food supplies for native forest wildlife. Divaricating shrubs on drier sites and forest margins will afford secure homes and fruit for lizards, and riparian tussocks will provide cover for waterfowl. It should be acknowledged that Australian gums are currently an important nectar source for bellbirds – which are seasonally reported at the Gardiners Rd nursery.

Public ownership of floodplain corridors provides the obvious opportunity for the main arterial linkage through the whole catchment, but integration and connectivity across the city will depend on extending the planting of indigenous species along streets, road verges and in private gardens (where there is personal interest), and ideally in accord with local substrate conditions. The Parliamentary Commissioner for the Environment (2001) endorses this concept of a cultural landscape with natural character that integrates human use with viable populations of indigenous plants and animals.

5 Vision for natural and cultural integration

A landscape vision for the Styx catchment depends on natural character boldly developed on public lands supported by personal choices of native plants in the residential matrix. It would comprise a mosaic of saline, riparian and freshwater wetlands, large sanctuary areas of tall podocarp[1] forests, coastal bush on the dunes, and woodlands or shrublands on inland dry terrain. The same vegetative theme would penetrate the developing residential areas as urban shrubberies or woodlands on private sections and specimen trees or clumps in larger private lots, on streets or in neighbourhood parks. These terrestrial habitats would support viable populations of native birds, lizards and invertebrates and contribute to the health of the environment and to a quality of life for people enriched by a special, local identity steeped in the history of the land.

As a goal or target for achieving sustainable nature, it is suggested (Fig. 3; Meurk & Hall 2000) that there should be –

- **large bush sanctuaries (greater than 5 hectares) less than 5 km apart**
  No one would live further than 2.5 km away from such a habitat, that is less than 20 minute cycling distance from any bush sanctuary and 45 minute walking distance.

- **1 ha reserves less than 2 km apart**
  No one would live further than 1 km from such a habitat, that is about a 5 minute cycling and 20 minute walking distance.

- **clumps of 'noble'[1] native trees less than 200 m apart**
  These would occur at most within 1 minute walking distance from every home.

These habitats, in combination with linear corridors and other matrix vegetation (both native and exotic), would support resident iconic wildlife such as bellbirds and kereru. These bird species would ensure native plant seed was dispersed to all receptive intervening spaces.

Human corridors for cycling, walking, boating and horse riding can also be incorporated into these ecological linkages. At strategic intervals, and with sensitivity to neighbourhood identity or village atmosphere, there would be service nodes which would provide for rest, food, drink, cycle hire, transport connections, arts, crafts, displays and information sources. Overall, the theme would be environmental, historical and cultural legibility. Each layer of the geological, biological, Maori, and European influences would be visible as through windows into the past, and celebrated through creative signposting, interpretation and artworks.

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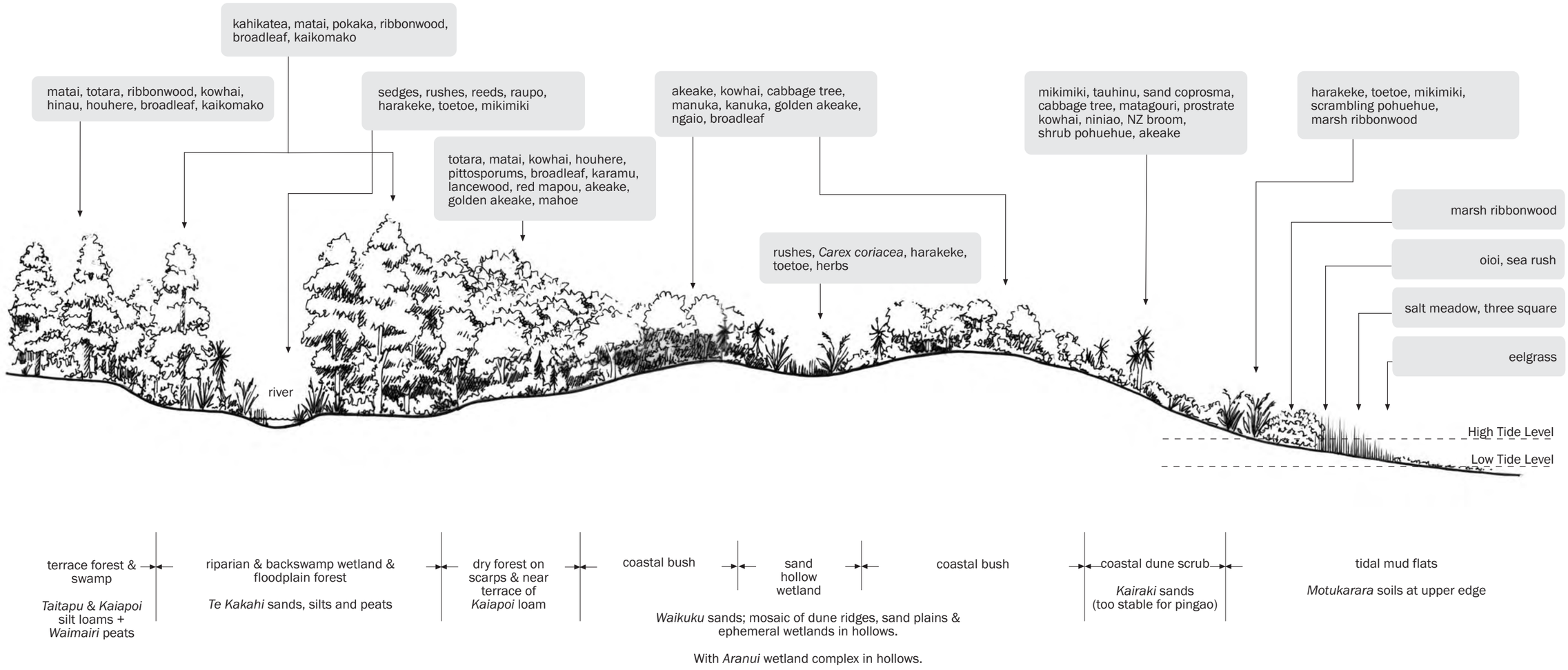
[1] Podocarps are members of the southern conifer family - Podocarpaceae. They include totara, matai, kahikatea, miro and rimu and are distinct from the northern needle pines in having small leaves and yew-like berries, vital to healthy native bird populations. These are some of New Zealand's 'noble' and notable trees. Others in Canterbury are hinau, pokaka, kowhai, broadleaf and lemonwood.

Figure 1

Cross-section lower reaches Styx River

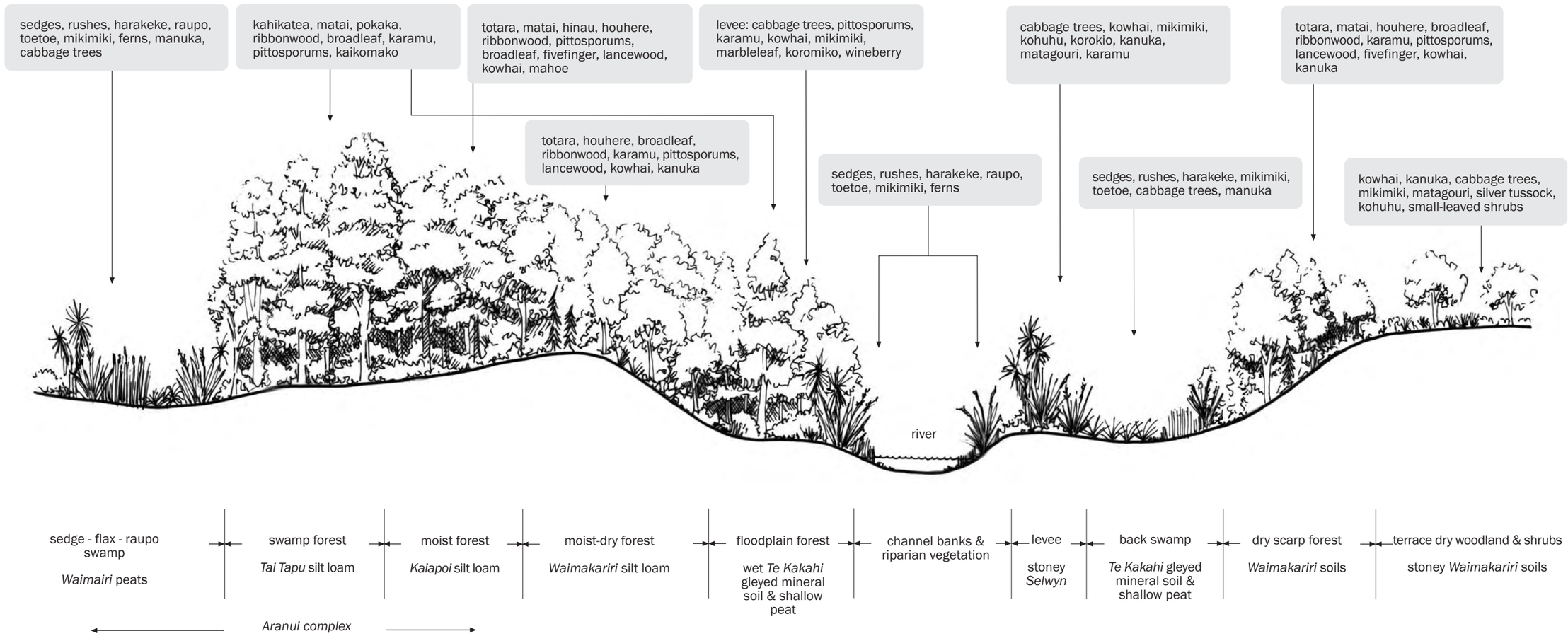


Cross-section of landforms and natural or potential vegetation of lower reaches of the Styx River

the basis for ecological restoration & natural character

Figure 2

Cross-section mid-upper reaches Styx River



Cross-section of landforms and natural or potential vegetation of mid-upper reaches of the Styx River

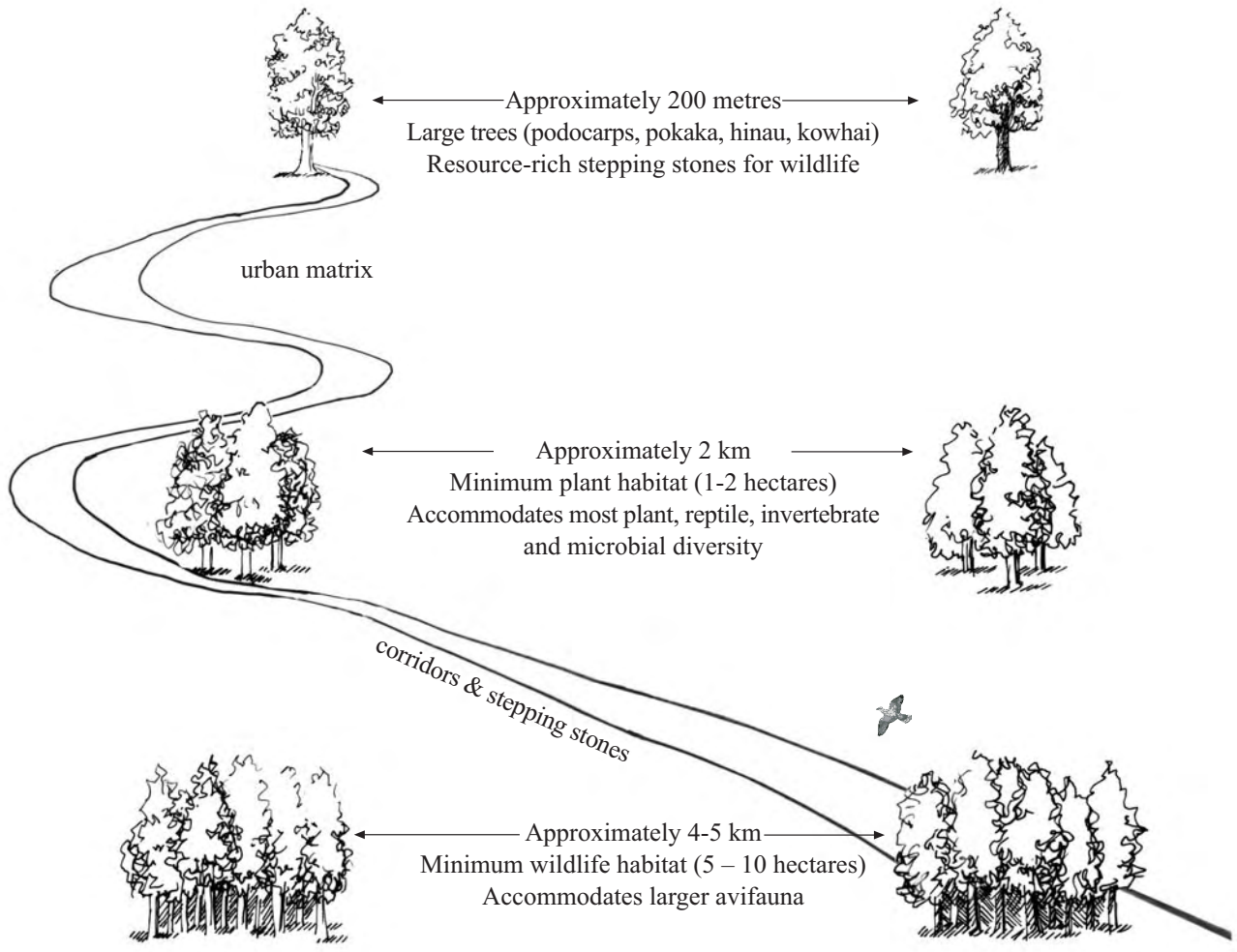
the basis for ecological restoration & natural character

Figure 3

Incorporating ecological values into the city's landscape

The city's ecological values and functional integrity can be greatly enhanced through designing open space/ecological infrastructure according to quantitative guidelines.

The conceptual model indicates optimal size, density and configuration of habitat patches across an urban landscape in order to achieve ecological and cultural sustainability of nature.
This pattern represents only 3.3% of total land area. Riparian and roadside corridors will add a further 1%. Voluntary use of indigenous plants in the residential matrix would also add to the overall natural character and wildlife value of the catchment.



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Appendix - list of plant names

Common and scientific plant names as used in text and figures

Name in text	alternative names	scientific name
akeake		*Dodonaea viscosa*
bracken fern	rahurahu	*Pteridium esculentum*
broadleaf	papaumu	*Griselinia littoralis*
cabbage tree	ti kouka	*Cordyline australis*
Carex coriacea	cutty grass	*Carex coriacea*
eel grass	sea grass	*Zostera novae-zelandiae*
fern	various	*Blechnum*, *Polystichum* spp., etc.
fivefinger	whauwhaupaku	*Pseudopanax arboreus*
golden akeake		*Olearia paniculata*
harakeke	NZ flax	*Phormium tenax*
herbs	non-woody plants	
hinau		*Elaeocarpus dentatus*
houhere	narrow-leaved lacebark	*Hoheria angustifolia*
kahikatea	white pine	*Dacrycarpus dacrydioides*
kaikomako	ducks feet (juvenile)	*Pennantia corymbosa*
kanuka	ti tree	*Kunzea ericoides*
karamu		*Coprosma robusta*
kohuhu	black mapau/tawhari	*Pittosporum tenuifolium*
korokio		*Corokia cotoneaster*
koromiko	willow-leaved hebe	*Hebe salicifolia*
kowhai		*Sophora microphylla*
lancewood	horoeka	*Pseudopanax crassifolius*
lemonwood	tarata	*Pittosporum eugenioides*
mahoe	whitey wood	*Melicytus ramiflorus*
manuka	ti tree	*Leptospermum scoparium*
marbleleaf	putaputaweta	*Carpodetus serratus*
marsh ribbonwood		*Plagianthus divaricatus*
matagouri		*Discaria toumatou*
matai	black pine	*Prumnopitys taxifolia*
mikimiki	small-leaved coprosmas	*Coprosma propinqua* etc.
miro		*Prumnopitys ferrugineus*
ngaio		*Myoporum laetum*
niniao		*Helichrysum lanceolatum*
NZ broom		*Carmichaelia australis*
NZ flax	harakeke	*Phormium tenax*
oioi	jointed wire rush	*Leptocarpus similis*
pittosporums	see kohuhu & lemonwood	*Pittosporum* spp.
porcupine shrub		*Melicytus alpinus*

Appendix - list of plant names - continued

Name in text	alternative names	scientific name
podocarp	southern conifers	*Podocarpus*, *Dacrycarpus*, *Prumnopitys*, etc
pohuehue		*Muehlenbeckia australis,* etc.
pokaka		*Elaeocarpus hookerianus*
poroporo		*Solanum laciniatum*
prostrate kowhai		*Sophora prostrata*
raupo	bull rush	*Typha orientalis*
red mapau	red matipo	*Myrsine australis*
reeds	collective term for tall, robust wetland herbaceous plants with flat or circular cross-section, smooth leaves or stems	
ribbonwood	manatu/lowland ribbonwood	*Plagianthus regius*
rimu	red pine	*Dacrydium cupressinum*
rushes	collective term for wetland herbaceous plants, usually with circular cross-section, smooth leaves or stems; wiwi	
sand coprosma		*Coprosma acerosa*
scrambling pohuehue		*Muehlenbeckia complexa*
sea rush		*Juncus maritimus/J. krausii*
sedges	cutty grasses	*Carex* spp.
shrub pohuehue		*Muehlenbeckia astonii*
silver tussock	wiwi	*Poa cita*
small-leaved shrubs	collective term for twiggy woody plants of coprosma, niniao, korokio	
tauhinu	cassinia	*Ozothamnus leptophylla*
three-square		*Schoenoplectus pungens*
toetoe		*Cortaderia richardii*
totara		*Podocarpus totara*
tussock sedges	pukio	*Carex secta*, *C. virgata*
wineberry	makomako	*Aristotelia serrata*

Note: sp = species, spp = several species