

Report on a Workshop on Biodiversity Corridors for Nelson

Held on 2 November 2010

Participants:

- Mike North
- Derek Shaw
- Peter Gaze
- Simon Moore
- Debs Martin
- Martin Rutledge
- Maggie Atkinson
- Shannel Courtney
- Lynne Hall
- Paul Sheldon

Context

The Nelson Biodiversity Strategy sets long terms goals and specific actions for improving the condition of Biodiversity in Nelson City. Action 20. in the Strategy is:

20. Develop and implement plans to enhance the City with continuous **strips of vegetation** (biodiversity corridors) across the urban environment linking the hills to the coast.

The Nelson Biodiversity Forum approached the Nelson City Council with a request to expedite work on this action. The Council Executive responded saying that work would be done as part of an integrated plan for the City over the next few years.

Considering the time that had passed since Councillor Shaw first asked for this work to be done (about 10 years), the Forum decided to proceed on its own initiative and ask knowledge holders to come together and identify what needed to be done. Accordingly a half day workshop was held on 2 November 2010.

Purpose

The purpose of the workshop was to accelerate the work by developing specific proposals that might be adopted by the Nelson Biodiversity Forum in advocating for biodiversity corridors in Nelson City.

Scope

The geographic scope of the work was defined as encompassing the urban and peri-urban fringes of the City, its backdrop and its coastal margins. The core focus of the work was re-introducing indigenous biodiversity to the City and connecting the natural ecosystems of the hill country behind the City with the coast in front of it. At the same time links were to be explicitly made with landscape and recreational values of these areas.

The invitation

Revegetating the City Backdrop and Creating Urban Biodiversity Corridors



City back drop
Biodiversity corridors
Wildlife
Riparian margins

This is your **opportunity** to take practical steps to welcome nature into Nelson City

Be part of defining the biodiversity future of Nelson

- Subdivision and development is proceeding in advance of a comprehensive plan for city development.
- You have unique knowledge and expertise in defining how biodiversity can flourish within the urban area
- You understand how a vegetated backdrop and landscape integrity hills can frame our city
- You have made major contributions in the past
- We need to act now to influence the future

Half day workshop

9.00am to 1.00pm

Tuesday

2 November 2010

Nelson City Council

RSVP to Peter Lawless by 22 October 2010

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Value of Biodiversity Corridors

Participants identified a range of values that biodiversity corridors in the City can contribute to. These included:

- Increasing the flow of indigenous species and biological resources into Nelson City
- Habitat for threatened species and species of regional significance¹
- Maintenance and restoration of threatened ecosystems²
- Contribution to the aesthetic harmony of the City
- Supporting human health (e.g. increasing buffer from pines for pollen sufferers)
- Supporting cultural values and providing cultural resources
- Providing recreational opportunities
- Contributing to carbon sinks and offsetting the effects of global warming including providing buffers for sea level rise
- Providing fish corridors through shading and sustaining base flows in watercourses³
- Changing citizen's concepts of what is possible by seeing indigenous elements in their urban environment
- Iconic species
- Iconic and regionally important landscapes.

Threats

Participants identified threats to urban biodiversity:

- City growth, particularly in the peri-urban areas
- Fragmentation through forestry development
- Weeds and pests
- Missed opportunities through lack of a strategic approach

Opportunities

Participants identified opportunities for establishing biodiversity corridors:

- Roads
- Rivers and streams
- Public lands
- Private gardens
- Management of forestry blocks (Council, Crown and private) (noting possible future Maori ownership of some Crown assets)
- Brook Waimarama Sanctuary and corridor down the valley
- Areas owned by subdivision companies
- Funding from local and national trusts
- Treaty settlements
- Proposed City Development Plan
- Review of the Resource Management Plan (including Structure Plans)

¹ See Appendix 1 for a list of regionally threatened plants for Nelson City.

² See Appendix 2 for a list of nationally threatened terrestrial ecosystems within Nelson City.

³ Target native fish species populations to be enhanced are listed in Appendix 3.

- Promotion of indicator species

Existing Resources

Participants identified a range of work already completed or underway that could support this work:

- Marsden Valley – Enner Glyn – Brook plan changes
- Significant Natural Areas (SNA) survey for RMA purposes
- Graham Ure’s report of Council reserves
- Mike North’s map of possible corridors based on this work
- NCC Living Heritage document and restoration guide
- Regional work on integrated catchment management planning and ways of presenting the results of this
- Nelson revegetation guide
- Work of Andrew Petherham and Martin Conway in developing and implementing ideas for vegetating the City
- DOC work on the WONI and FENS databases identifying waters of importance
- Work of Friends of the Maitai and Native Forests Action Council in proposing an alternative to exotic forestry for Waahi Takaro
- Nelson Urban Growth Strategy
- NCC land purchase policy and strategy
- New networks of tracks for mountain biking and running giving access for restoration work
- Networks of volunteers and community energy
- Marlborough Tui to Town initiative
- Boffa landscape report
- Review of Council exotic forests

Strategic Approach

Participants identified an overall strategic approach:

1. Strengthen indigenous biodiversity on the fringes (both lowland hills and coastal margins) of the City to anchor connections
2. Develop vegetation corridors around key waterways
3. Develop a vegetation corridor on public land through the middle of the City
4. Encourage private landowners into husbandry that brings native biodiversity back into the city
5. Secure, consolidate, enhance and link native biodiversity “anchor” areas

Note that the strategic approach contributes to other actions in the Nelson Biodiversity Strategy, specifically:

- Reducing land based pollution of freshwater and the sea (action 7)
- Buffering for sea level rise (action 8)
- Ecological restoration of the Brook Stream (action 9)
- Recreating critical habitats for longfin eel, giant kokopu, and koaro (action 13)

- Protecting and restoring existing alluvial, riparian and coastal ecosystems (action 15)
- Increasing habitat for lowland totara and kereru (action 18)
- Advocating for biodiversity goals in planning for sustainability and in responding to wider issues such as climate change (action 31).

Mapping

Figure 1 below shows the mapping completed on the day.

Key:

- 1. Red - Coastal edge strengthening**
- 2. Orange – Terrestrial edge strengthening**
- 3. Yellow – High priority remnants to be protected**
- 4. Green solid lines – priority one river corridors**
- 5. Green broken lines– priority two river corridors**
- 6. Mauve- landscape amenity**

The ecosystems referred to in this report are those defined in the DOC/NCC publication Living Heritage – Growing Native Plants in Nelson as set out in Table 1 below.

Table 1 – Matching Map Categories with Ecosystem Types for Restoration

Map category	Living Heritage Ecosystems
Coastal edge strengthening	<ul style="list-style-type: none"> ● Boulder Bank and Islets Ecosystem ● Dunes Ecosystem ● Estuaries Ecosystem ● Coastal Flats Ecosystem
Terrestrial edge strengthening	<ul style="list-style-type: none"> ● Lowland Hill Country Ecosystem
High priority remnants to be protected	<ul style="list-style-type: none"> ● Lowland Hill Country Ecosystem
River corridors	<ul style="list-style-type: none"> ● Freshwater wetlands Ecosystem ● Floodplain Ecosystem ● Lowland Flats Ecosystem
City corridor	<ul style="list-style-type: none"> ● Lowland Flats Ecosystem ● Coastal Flats Ecosystem ● Lowland Hill Country Ecosystem

The Living Heritage document provides guidance on what to plant and on the sequence of planting from establishment to mature forest communities. On the ground and in the water these ecosystems inter-grade and overlap. Each area planned for restoration should have its own planting plan

1. Coastal edge strengthening

Coastal edge strengthening involves revegetating the coastal margins. This includes:

- estuary edge vegetation around the Waimea and Haven estuaries
- dune vegetation at Tahunanui
- coastal forest and shrub land on Haulashore Island
- unique Boulder bank vegetation
- the sand flat/estuarine/coastal shrub land mosaic at Whakapuaka
- securing/acquiring inland buffer areas where possible (e.g. around estuaries) to allow for migration of coastal margins with sea level rise

2. Orange – Terrestrial edge strengthening

Terrestrial edge strengthening involves restoring indigenous lowland hill forests in anchoring areas that connect the native forests of the higher hills to corridors in the City.

This includes:

- Extending the remnant native blocks on the Grampians to become the predominant vegetation in this area
- Replacing the NCC (and Crown following completion of current leases?) exotic forestry in the Waahi Takaro area (and flanks of Fringe Hill?) with native vegetation
- Connecting native vegetation through the Botanic/Malvern Hills area to revegetation along the Kaka ridge behind Atawhai, encouraging re-growth, replanting exotic areas with natives and obtaining maximum reserve contributions on subdivision
- Utilising public land holdings through the cemetery to Neale Park to form a native vegetation connection through the City

3. Yellow – High priority remnants to be protected

Protecting the native remnants through the forestry blocks centred on Sharland's Creek – Central Road and instituting weed and animal pest control.

4. Green solid lines – priority one river corridors

Revegetating around the highest priority river systems of the Maitai River and Poorman's Creek. This would combine bringing native vegetation into the City with providing shading for waterways and reducing flow variability with ponding and swale areas.

5. Green broken lines – priority two river corridors

Planting along the secondary priority watercourses of Orphanage Creek, Reservoir Creek, Saxton Creek, Jenkins Creek, Wairoa/Waimea Creeks and Todd Creek.

6. Mauve- landscape amenity

Protecting the visual backdrop of Stoke through development and land use controls.

Next steps

The next steps identified were to:

- Refine this report through consultation with participants (completed December 2010)
- Circulate to all Forum members for immediate use in submission processes (completed December 2010)
- Seek Forum endorsement at its next meeting (early 2011) (completed 14 March 2011)
- Seek adoption by NCC as strategic direction in City development.

Peter Lawless
Facilitator

Appendix 1

Native plants which are presumed extinct in Nelson City and those which are at risk of extinction

Shannel Courtney
 Department of Conservation
 August 2006

Botanical Name	Common Name	Life form	Main Habitat in Nelson	Status in Nelson City
<i>Adiantum aethiopicum</i>	fine maidenhair	fern	coast	presumed extinct
<i>Alepis flavida</i>	yellow mistletoe	shrub	beech forest	at risk of extinction
<i>Alseuosmia pusilla</i>		shrub	alluvium	at risk of extinction
<i>Anarthropteris lanceolata</i>	lance fern	fern	lowland forest	at risk of extinction
<i>Anemanthele lessoniana</i>	gossamer grass, bamboo tussock	grass	alluvium	at risk of extinction
<i>Arthropodium cirratum</i>	rengarenga	herb	coast	at risk of extinction
<i>Arthropteris tenella</i>	jointed fern	fern	lowland forest	at risk of extinction
<i>Astelia grandis</i>	giant swamp lily	herb	wetland	at risk of extinction
<i>Atriplex buchananii</i>	annual orache	herb	coast	presumed extinct
<i>Atriplex cinerea</i>	grey salt bush	shrub	coast	presumed extinct
<i>Australina pusilla</i>	australina	herb	alluvium	at risk of extinction

<i>Austrofestuca littoralis</i>	sand tussock	grass	dune	presumed extinct
<i>Baumea arthrophylla</i>	clawed twig rush	sedge	estuary	at risk of extinction
<i>Baumea articulata</i>	giant twigrush	sedge	wetland	at risk of extinction
<i>Botrychium biforme</i>	cut-leaved parsley fern	fern	alluvium	at risk of extinction
<i>Brachyglottis rotundifolia</i>	forest tree daisy	shrub	upland forest	at risk of extinction
<i>Brachyglottis sciadophila</i>	climbing groundsel	shrub	alluvium	presumed extinct
<i>Callitriche petriei</i>		herb	wetland	at risk of extinction
<i>Carex dipsacea</i>		sedge	wetland	at risk of extinction
<i>Carex fascicularis</i>		sedge	wetland	presumed extinct
<i>Carex inversa</i>		sedge	wetland	at risk of extinction
<i>Carex lambertiana</i>	coastal forest sedge	sedge	wetland	at risk of extinction
<i>Carex lessoniana</i>	peat rautahi	sedge	wetland	at risk of extinction
<i>Carex litorosa</i>	delta sedge	sedge	estuary	presumed extinct
<i>Carex testacea</i>	bootstrap sedge	sedge	coast	at risk of extinction
<i>Carex traversii</i>		sedge	mineral belt	at risk of extinction
<i>Carmichaelia odorata</i>	river broom	shrub	riparian	at risk of extinction
<i>Celmisia cordatifolia</i>		herb	mineral belt	presumed extinct

Centipeda minima	sneezeweed	herb	lowland open sites	presumed extinct
Coprosma acerosa	sand coprosma	shrub	dune	presumed extinct
Coprosma obconica	base coprosma	shrub	alluvium, mineral belt	presumed extinct
Coprosma rubra	lacy coprosma	shrub	alluvium	presumed extinct
Coprosma virescens	dappled coprosma	tree	limestone	presumed extinct
Craspedia “Hackett”	serpentine woollyhead	herb	mineral belt	at risk of extinction
Craspedia uniflora var. “Hackett”	travertine woollyhead	herb	limestone	at risk of extinction
Cyathea cunninghamii	gully treefern	fern	lowland forest	presumed extinct
Cyperus ustulatus	umbrella sedge, upoko tangata	sedge	coast	at risk of extinction
Daucus glochidiatus	native carrot	herb	lowland open sites	presumed extinct
Deschampsia cespitosa	tufted hairgrass	grass	wetland	presumed extinct
Desmoschoenus spiralis	pingao	sedge	dune	at risk of extinction
Dichelachne inaequiglumis	fine plume grass	grass	mineral belt	at risk of extinction
Dicksonia fibrosa	wheki ponga	fern	alluvium	at risk of extinction
Discaria toumatou	matagouri	shrub	lowland open sites	at risk of extinction
Discaria toumatou var. “prostrate”	prostrate matagouri	shrub	coast	at risk of extinction
Doodia australis	stitch fern	fern	coast	at risk of extinction
Dracophyllum urvilleanum	tree inaka	tree	lowland forest	at risk of extinction

Drymoanthus adversus	perching orchid	orchid	coastal forest	at risk of extinction
Drymoanthus flavus	spotted perching orchid	orchid	mineral belt	at risk of extinction
Dysoxylum spectabile	kohekohe	tree	coastal forest	at risk of extinction
Echinopogon ovatus	hedgehog grass	grass	lowland open sites	at risk of extinction
Elymus multiflorus	coastal wheatgrass	grass	coast	at risk of extinction
Epilobium chionanthum	flush willowherb	herb	wetland	at risk of extinction
Epilobium gracilipes	limestone willowherb	herb	limestone	at risk of extinction
Epilobium hirtigerum	hairy willowherb	herb	lowland open sites	at risk of extinction
Epilobium insulare		herb	wetland	at risk of extinction
Epilobium pallidiflorum	swamp willowherb	herb	wetland	presumed extinct
Eryngium aff. vesiculosum	sea holly	herb	coast	presumed extinct
Euchiton aff. limosum		herb	wetland	at risk of extinction
Euchiton polylepis		herb	riparian	presumed extinct
Euchiton polylepis		herb	riparian	at risk of extinction
Euphorbia glauca	coastal spurge	herb	coast	presumed extinct
Euphrasia cuneata	lowland eyebright	herb	lowland open sites	at risk of extinction
Fuchsia perscandens	scrambling fuchsia	climber	alluvium	presumed extinct

Galium trilobum		herb	lowland open sites	at risk of extinction
Geranium solanderi	lowland geranium	herb	lowland open sites	at risk of extinction
Grammitis pseudociliata	large strap fern	fern	lowland forest	at risk of extinction
Halocarpus biformis	bog pine	shrub	mineral belt	at risk of extinction
Hebe albicans var. "recurva"	limestone hebe	shrub	limestone	at risk of extinction
Hebe rigidula		shrub	open sites	at risk of extinction
Hierochloe redolens	karetu, holy grass	grass	wetland	at risk of extinction
Hoheria angustifolia	narrow-leaved lacebark	tree	alluvium	at risk of extinction
Hydrocotyle hydrophila		herb	riparian	at risk of extinction
Hydrocotyle novae-zeelandiae		herb	wetland	at risk of extinction
Hymenophyllum pulcherrimum	bunched filmy fern	fern	lowland forest	at risk of extinction
Hypolepis dicksonioides	giant	fern	coast	at risk of extinction
Isachne globosa	swamp millet	grass	wetland	presumed extinct
Korthalsella lindsayi	large coral mistletoe	shrub	riparian	presumed extinct
Korthalsella salicornioides	coral mistletoe	shrub	estuary, mineral belt	at risk of extinction
Lagarostrobos colensoi	silver pine	tree	mineral belt	presumed extinct

Lastreopsis microsora		fern	lowland forest	at risk of extinction
Lepidium oleraceum	Cook's scurvy grass, nau	herb	coast	presumed extinct
Libertia peregrinans	sand iris	herb	dune	presumed extinct
Mazus novae-zelandiae		herb	coast	presumed extinct
Mazus radicans		herb	mineral belt	at risk of extinction
Melicope ternata	wharangi	tree	coastal forest	at risk of extinction
Melicytus "Waipapa"	lowland porcupine shrub	shrub	lowland open sites	at risk of extinction
Melicytus aff. obovatus	Cook Strait mahoe	shrub	coast	at risk of extinction
Melicytus crassifolius	coastal porcupine shrub	shrub	coast	at risk of extinction
Melicytus micranthus	swamp mahoe	shrub	alluvium	presumed extinct
Melicytus obovatus	limestone mahoe	tree	limestone	at risk of extinction
Microlaena polynoda	bamboo grass	grass	alluvium	at risk of extinction
Mimulus repens	native musk	herb	estuary	at risk of extinction
Muehlenbeckia ephedroides	leafless pohuehue	climber	coast	at risk of extinction
Myosotis "australis yellow"		herb	limestone	at risk of extinction
Myosotis "minutiflora"		herb	coast	presumed extinct
Myosotis monroi	mineral belt forget-me-not	herb	mineral belt	at risk of extinction

Myosotis pygmaea		herb	coast	presumed extinct
Myosotis spathulata		herb	alluvium	presumed extinct
Myosotis tenericaulis	black forget-me-not	herb	upland forest	at risk of extinction
Nestegis cunninghamii	black maire	tree	lowland forest	at risk of extinction
Nestegis montana	willow-leaved maire	tree	alluvium	presumed extinct
Olearia cheesemanii	riparian shrub daisy	shrub	riparian	presumed extinct
Oplismenus imbecillus		grass	coast	presumed extinct
Oxalis rubens	coastal oxalis	herb	coast	at risk of extinction
Peperomia urvilleana	native peperomia	herb	coast	at risk of extinction
Peraxilla colensoi	scarlet mistletoe	shrub	beech forest	presumed extinct
Peraxilla tetrapetala	red mistletoe	shrub	beech forest	at risk of extinction
Pimelea aff. sericeovillosa	mineral belt daphne	shrub	mineral belt	at risk of extinction
Pimelea arenaria	sand daphne	shrub	dune	presumed extinct
Pimelea longifolia	native daphne	shrub	mineral belt	at risk of extinction
Pimelea tomentosa	hairy daphne	shrub	mineral belt	presumed extinct
Pimelea urvilleana	coastal daphne	shrub	coast	at risk of extinction
Pittosporum patulum	pitpat	tree	upland forest	presumed extinct
Plagianthus regius	lowland ribbonwood	tree	alluvium	at risk of extinction
Plumatochilos tasmanicum	bearded greenhood orchid	orchid	mineral belt	presumed extinct
Podocarpus totara	totara	tree	alluvium	at risk of

				extinction
<i>Polygonum salicifolium</i>	tutanawai, swamp willowleaf	herb	wetland	presumed extinct
<i>Poranthera microphylla</i>		herb	mineral belt	at risk of extinction
<i>Pratia perpusilla</i>	pygmy panakenake	herb	dune	presumed extinct
<i>Pseudopanax ferox</i>	fierce lancewood	tree	limestone	at risk of extinction
<i>Pseudopanax macintyreii</i>	limestone five finger	tree	limestone	at risk of extinction
<i>Pterostylis porrecta</i>	limestone greenhood orchid	grass	limestone	at risk of extinction
<i>Ranunculus acaulis</i>	sand buttercup	herb	coast	presumed extinct
<i>Ranunculus macropus</i>	waoriki	herb	wetland	at risk of extinction
<i>Ranunculus ternatifolius</i>		herb	alluvium	presumed extinct
<i>Raoulia</i> aff. <i>hookeri</i>	coastal raoulia	herb	dune	presumed extinct
<i>Raukawa edgerleyi</i>	raukawa	tree	forest	at risk of extinction
<i>Rorippa divaricata</i>	matangoa, cut-leaved cress	herb	coast	presumed extinct
<i>Rorippa palustris</i>	yellow cress	herb	wetland	presumed extinct
<i>Rubus squarrosus</i>	leafless lawyer	climber	alluvium	at risk of extinction
<i>Rumex neglectus</i>	sea dock	herb	coast	presumed extinct
<i>Ruppia megacarpa</i>	horses mane	herb	estuary	at risk of extinction
<i>Rytidosperma petrosum</i>	Cook Strait bristle tussock	grass	coast	presumed extinct
<i>Schoenoplectus tabernaemontani</i>	lake clubrush	sedge	wetland	at risk of extinction
<i>Scutellaria novae-zelandiae</i>	shovel mint	herb	alluvium	at risk of

				extinction
<i>Senecio scaberula</i>		herb	coast	presumed extinct
<i>Senecio sterquilinus</i>	muttonbird groundsel	herb	coast	presumed extinct
<i>Sonchus kirkii</i>	puha	herb	coast	presumed extinct
<i>Sophora longicarinata</i>	limestone kowhai	tree	limestone	at risk of extinction
<i>Spinifex sericeus</i>	spinifex	grass	dune	at risk of extinction
<i>Streblus banksii</i>	large-leaved milk tree	tree	coastal forest	presumed extinct
<i>Syzygium maire</i>	swamp maire	tree	wetland	presumed extinct
<i>Tetragonia tetragonioides</i>	NZ spinach	herb	coast	at risk of extinction
<i>Teucrium parvifolium</i>	native germander	shrub	alluvium	presumed extinct
<i>Tmesipteris sigmatifolia</i>	curved chainfern	fern	lowland forest	presumed extinct
<i>Trisetum antarcticum</i>		grass	coast	at risk of extinction
<i>Tupeia antarctica</i>	white mistletoe	shrub	lowland forest	presumed extinct
<i>Uncinia leptostachya</i>	tussock hookgrass	sedge	lowland forest	at risk of extinction
<i>Vittadinia australis</i>	fuzzweed	herb	lowland open sites	at risk of extinction
<i>Wahlenbergia ramosa</i>	Cook Strait harebell	herb	coast	at risk of extinction
<i>Zoysia minima</i>		grass	dune	presumed extinct

Appendix 2

The Land Environments of New Zealand (LENZ) system at 500 environments nationally identifies 26 environments in Nelson city. Using the classification system below the data has been analysed by Landcare to identify environments where native biodiversity is at risk. Twelve of the 26 environments in Nelson are included in risk categories.

Category	Acutely Threatened	Chronically Threatened	At Risk	Critically Underprotected	Underprotected
Criteria	<10% indigenous cover remaining	10-20% indigenous cover remaining	20-30% indigenous cover remaining	<10% legally protected	<20% legally protected

The most at risk ecosystems are those where more than 90% of the original native forests, grasslands and wetlands are gone from New Zealand. These are termed acutely threatened. Nelson has portions of the following seven nationally **acutely threatened** native ecosystems (note that the letters and numbers in brackets are national codes for environments under the LENZ system):

1. Undulating hills and plains (B1.1a) have 5% of their native plant cover remaining nationally and less than 1% of this environment is included in protected areas it is thus classified as acutely threatened and critically under protected. In Nelson there are 3,339ha of undulating hills and plains. Indigenous cover remains on 6% (217ha) of undulating hills and plains. There is less than one hectare legally protected. However, 6% of this environment is managed by the City Council as public open space. This is the environment on which the bulk of Nelson City has been built. Natural vegetation occurs as scattered remnants on the margins of the urban area and in the rural Hira landscape.
2. Wet plains (B4.1a) have less than 3% of their native plant cover remaining nationally and less than 1% of this environment is included in protected areas it is thus classified as acutely threatened and critically under protected.

In Nelson there are 624ha of wet plains. Indigenous cover remains on 2% (15ha) of wet plains. There are 12hectares (2%) legally protected by Department of Conservation and Nelson City Council and a further 3ha of this environment is managed by the City Council as public open space. Wet plains are now generally well drained and have become the industrial areas stretching from Tahunau and along the eastern shore of Waimea Estuary. The only remaining native vegetation is found in association with the wet plains area at the Glen.

3. Cooler well drained flood plains (J1.1a) have 9% of their native plant cover remaining nationally and 2% of this environment is included in protected areas it is thus classified as acutely threatened and critically under protected.

In Nelson there are 194ha of cooler well drained flood plains. Indigenous cover remains on 10% (19ha) of cooler well drained flood plains. There is less than 1ha legally protected and this is by Department of Conservation. In Nelson the cooler well drained flood plains are a feature of the valley leading down into Delaware Inlet and a native forest remnant at the head of the estuary is the only remaining stand of native vegetation.

4. Warmer well drained flood plains (J1.1b) have 6% of their native plant cover remaining nationally and 12% of this environment is included in protected areas it is thus classified as acutely threatened and under protected.

In Nelson there are 368ha of warmer well drained flood plains. Indigenous cover remains on 12% (44ha) of warmer well drained flood plains. There is less than one hectare legally protected by Department of Conservation. Twenty two percent (84ha) of this environment is managed by the City Council as public open space. This is the environment of the city centre, the airport, Tahunanui, residential area and behind Corder Park at Atawhai. The remaining native vegetation is mostly on the estuary margins near the airport.

5. Low fertility well drained flood plains (J1.1c) have 8% of their native plant cover remaining nationally and 1% of this environment is included in protected areas it is thus classified as acutely threatened and critically under protected. In Nelson there are 347ha of low fertility well drained flood plains. Indigenous cover remains on 12% (42ha) of low fertility well drained flood plains. There is less than one hectare legally protected by Department of Conservation. Six percent (22ha) of this environment is managed by the City Council as public open space.
6. High fertility recent floodplains (J1.2b) have 2% of their native plant cover remaining nationally and 1% of this environment is included in protected areas it is thus classified as acutely threatened and critically under protected.

In Nelson there are 20ha of high fertility recent floodplains. Indigenous cover remains on 75% (15ha) of high fertility recent floodplains. None is legally protected. Ninety five percent (19ha) of this environment is managed by the City Council as public open space. This is the recently accreted area at Tahunanui beach.

Chronically threatened native ecosystems are those with 10-20% of their native vegetation remaining. Nelson has portions of the following nationally chronically threatened native ecosystems:

7. Rolling hills (B8.1b) have 17% of their native plant cover remaining nationally and 1% of this environment is included in protected areas it is thus classified as chronically threatened and critically under protected.

In Nelson there are 8ha of rolling hills. No indigenous cover remains on rolling hills and none is included in legally protected areas or as public open space. This environment is found in the urban area north of Corder Park.

8. Low fertility hills (E1.1a) have 13% of their native plant cover remaining nationally and 5% of this environment is included in protected areas it is thus classified as chronically threatened and critically under protected

In Nelson there are 768ha of low fertility hills. Indigenous cover remains on 24% (184ha) of low fertility hills. Three percent (23ha) is legally protected by Nelson City Council and QEII. A further one percent (8ha) of this environment is managed by the City Council as public open space. These are the highest hill of the urban area and the lowest hills of Nelson's immediate backdrop. The remaining native forest forms a narrow band in the Sharland's Creek catchment.

9. Imperfectly drained plains (F5.1b) have 19% of their native plant cover remaining nationally and 12% of this environment is included in protected areas it is thus classified as chronically threatened and critically under protected.

In Nelson there are 353ha of imperfectly drained plains. Indigenous cover remains on 16% (58ha) of imperfectly drained plains. There are 16hectares (5%) legally protected by QEII, Department of Conservation and Nelson City Council. The largest areas of imperfectly drained plains are on the floor of the Whangamoia Valley but the main areas of remaining native vegetation are round the Delaware Inlet. Flood plains (H3.2a) have 18% of their native plant cover remaining nationally and 4% of this environment is included in protected areas it is thus classified as chronically threatened and critically under protected.

In Nelson there are 532ha of flood plains. Indigenous cover remains on 11% (58ha) of flood plains. Two percent (9ha) is legally protected by Department of Conservation and QEII.

At risk ecosystems have 20-30% of their native vegetation remaining. Nelson has portions of the following nationally chronically threatened native ecosystems:

10. Warmer low fertility hills (E1.1b) have 25% of their native plant cover remaining nationally and less than 8% of this environment is included in protected areas it is thus classified as at risk and critically under protected.

In Nelson there are 4,430ha of warmer low fertility hills. Indigenous cover remains on 22% (973ha) of warmer low fertility hills. Two percent (72ha) is legally protected by Nelson City Council and QEII. A further two percent (109ha) of this environment is managed by the City Council as public open space.

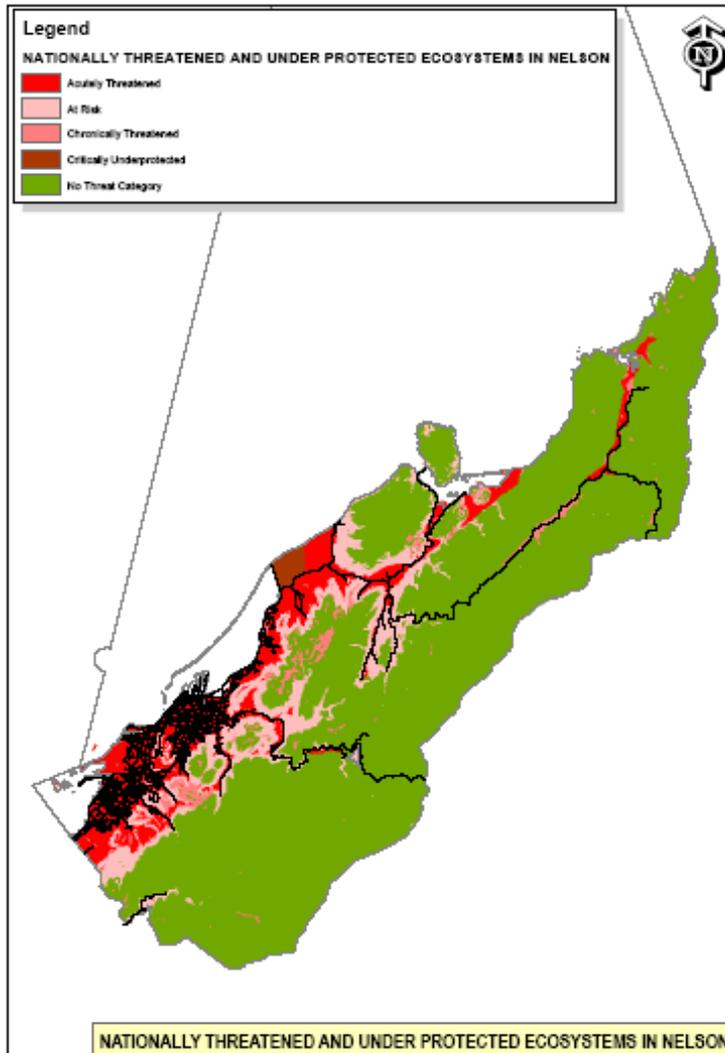
11. Fertile plains (K1.1e) have 24% of their native plant cover remaining nationally and 5% of this environment is included in protected areas it is thus classified as at risk and critically under protected.

In Nelson there are 5ha of fertile plains. Indigenous cover remains on 8% (0.4ha) of fertile plains. None is included in legally protected areas or as public open space.

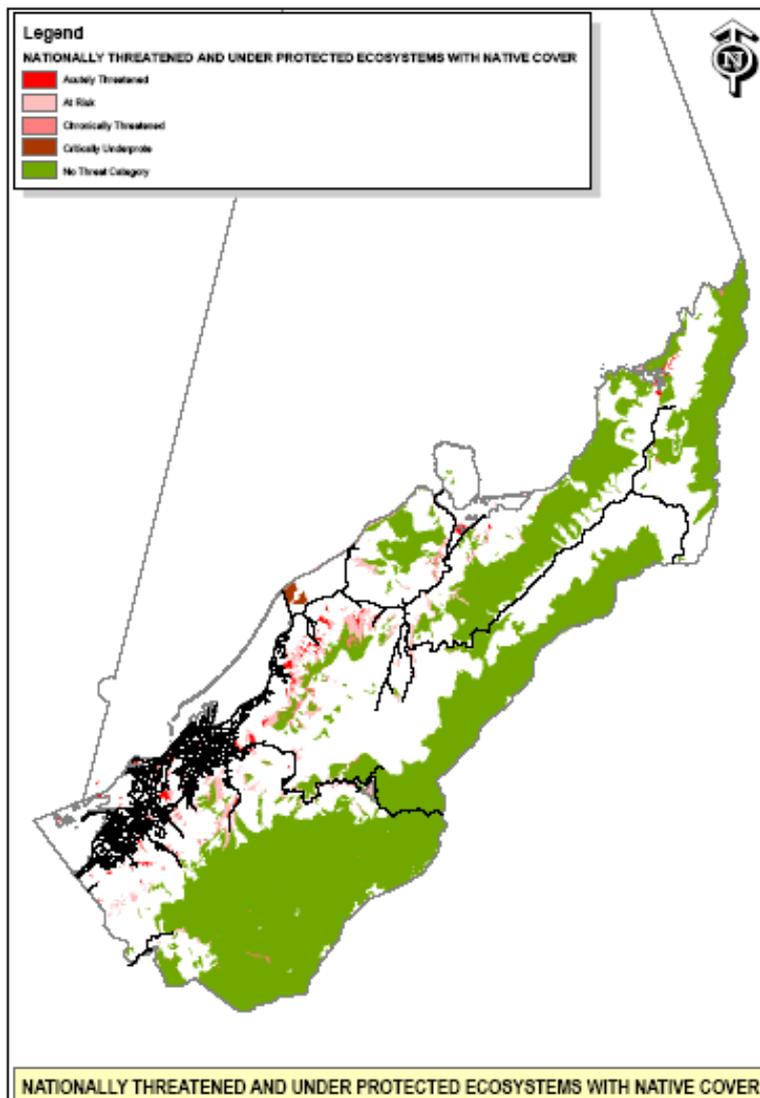
Some ecosystems with more than 30% of their native vegetation remaining are poorly represented in protected areas. They are not considered threatened but are less than 20% legally protected and remain vulnerable to further loss.

12. Flat coastal plains (I1.1b) have 31% of their native plant cover remaining nationally and 12% of this environment is included in protected areas it is thus not classified as threatened but is under protected.

In Nelson there are 272ha of flat coastal plains. Indigenous cover remains on 32% (86ha) of flat coastal plains. Three percent (9ha) is legally protected by Nelson City Council and Department of Conservation. A further ten percent (26ha) of this environment is managed by the City Council as public open space.



Category	Acutely Threatened	Chronically Threatened	At Risk	Critically Underprotected
Criteria	<10% indigenous cover remaining	10-20% indigenous cover remaining	20-30% indigenous cover remaining	<10% legally protected



Appendix 3 – Native Fish Species of Nelson City

Freshwater fish species found in streams of the Nelson City area

Common name	Scientific name
Native	
Yelloweye mullet	<i>Aldrichetta forsteri</i>
Shortfin eel	<i>Anguilla australis</i>
Longfin eel	<i>Anguilla dieffenbachii</i>
Torrentfish	<i>Cheimarrichthys fosteri</i>
Giant kokopu	<i>Galaxias argenteus</i>
Koaro	<i>Galaxias brevipinnis</i>
Banded kokopu	<i>Galaxias fasciatus</i>
Inanga	<i>Galaxias maculatus</i>
Upland bully	<i>Gobiomorphus breviceps</i>
Common bully	<i>Gobiomorphus cotidianus</i>
Giant bully	<i>Gobiomorphus gobioides</i>
Bluegill bully	<i>Gobiomorphus hubbsi</i>
Redfin bully	<i>Gobiomorphus huttoni</i>
Common smelt	<i>Retropinna retropinna</i>