

Planning for urban nature in New Zealand

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ABSTRACT

Urban nature remains overlooked and undervalued in New Zealand and nowhere is this more concerning than in the area of urban planning. This paper explores some of the reasons why New Zealand has not embraced urban nature in the way other countries have and the implications this has for urban conservation. It looks at the role of planning and planners in urban nature. Planners' work includes the development of plans, policies, strategies and specific environmental projects all of which can be vital in ensuring not only the protection of areas of natural significance in urban areas but also in planning for more natural cities for the future. It is thus essential that conservationists and those with an interest in urban nature work together gain a better understanding of the role of planners and planning and vice versa.

The second part of this paper presents the findings of a project undertaken in the city of Dunedin to develop an ecological mapping methodology for use in mapping urban habitats. The project was undertaken with the Dunedin City Council who had two particular concerns: to avoid the incremental loss of open space to development and to develop a strategic approach to open space planning. The project results show that whilst Dunedin does indeed have a wealth of natural habitats, in few of these do indigenous species predominate.

This paper concludes by evaluating the project and considering its relevance in planning for urban nature in New Zealand cities.

URBAN NATURE — A CHALLENGE FOR PLANNERS

In New Zealand as elsewhere planners working in the urban area face a number of exacting and often competing demands. Their decisions influence the character, form and function of urban areas. If the natural potential in urban areas is to be cherished and promoted it is essential that planners themselves recognise the significance of the natural environment and work with and through those whose work is intimately connected with the natural — ecologists, conservationists, recreation managers, horticulturists and the local community. The first part of this paper presents the case for planners to give much greater consideration to the natural in urban planning, and to recognise the integrated nature of urban habitats across the whole of the built environment and for all land use types. The

second part presents the findings from a project undertaken to map the ecology of Dunedin city.

TRENDS IN 'NATURAL' URBAN PLANNING

Recent developments in urban theory have brought thinking about the natural in the city to the fore in urban planning. The sustainable cities and associated green city and eco city agendas have been instrumental in causing planners to think again about how they conceptualise urban areas. However, whilst these recent agendas have emphasised the necessity for planners to incorporate the natural into their thinking, plans, policies, strategies and decisions, in itself, the concept of nature in the city is not a new one. In his 1870 address on 'Public Parks and the Enlargement of Towns' for example, Olmsted laid out the political and philosophical case for

public parks as being central to the welfare of urban dwellers (in Le Gates & Stout 1997). His parks in New York, Illinois, Boston, Washington DC and elsewhere, are still highly valued and much admired by planners and the society as a whole today. His influence is seen in the work of Ebenezer Howard whose seminal work 'Garden Cities of Tomorrow' (1902) argued the integration of town and country as essential in promoting urban well being (in Le Gates & Stout 1997). The ideas of Howard and their relevance to New Zealand were keenly debated by participants at the New Zealand Town Planning Conference and Exhibition (NZTPCE) in 1919, who were concerned to avoid the despoliation associated with cities of industrialized Europe (NZTPCE 1919). At the conference there were also pleas to recognise the benefits of New Zealand's own natural heritage:

'In New Zealand nature has been bountiful and bestowed great forests, beautiful flora, magnificent coastlines and mountain scenery with lavish hand. But in our towns and cities the immediate advantage of this bounty has been lost and congested areas and haphazard planning make us rue the conditions that pioneers unthinkingly created ... The existence of open spaces in our cities is of supreme importance...' (NZTPCE 1919, p. 245)

Early settlers and planners saw New Zealand as an opportunity to experiment and to create the best possible urban environments. Urban planning forms that proclaimed the urban green by integrating urban parks, providing large private gardens, pleasantly landscaped streets and grounds of public institutions such as schools and hospitals were imported and developed on New Zealand's urban landscape. The early garden city concept was supported later in the twentieth century by the importation of a range of ideals regarding urban form. In New Zealand, planners were aware of wider developments in urban form, such as those associated with British new towns and the growth of interest in housing layouts, such as the Radburn layout in the USA. Both emphasised the provision of recreational and amenity green space adjacent to where people

lived. Whilst these forms were themselves not directly transferred to New Zealand they certainly brought to the forefront of planning, recognition of the relationship between built and natural land use. Unfortunately, the character of this natural land use and the ideals regarding its ecology were strongly influenced by imported rather than local perceptions.

This importation can be clearly seen in the influence of the acclimatisation societies with the release of birds such as blackbirds, songthrush, goldfinch and skylark, recreating birdsong familiar to the Europeans. The botanic gardens prevalent in so many New Zealand cities, the town belts, the city squares and other formal open spaces were seen as opportunities to proclaim in this 'new' land the benefits of uniting the best of Europe's natural heritage with New Zealand's. A process simultaneously displacing and 'improving' on the untamed and wild character of indigenous pre-colonial New Zealand. Towns and cities in New Zealand are thus characterised by being highly planned, placing a high value on green space and the inclusion of nature into the urban form but also by a denial of their own natural heritage. For planners, the focus has been on urban form and the provision of functional greenspace. There has until recently been little concern with the natural character of that greenspace and its relation to New Zealand's own heritage and wildlife.

NATURE OVERLOOKED IN URBAN NEW ZEALAND

The development of international agendas, especially those such as the biodiversity conservation agenda, emanating from the United Nations Conference on Environment and Development at Rio in 1992 have been acknowledged and addressed by the New Zealand government. However, until recently they have not been seen as having any real relevance to urban environments. The lack of attention given to the urban context can most clearly be seen in the Resource Management Act 1991, New Zealand's primary planning legislation. The Act does focus on the physical and natural character of the environment but in no way acknowledges these in relation to the

urban context. It thus provides no guidance or support to planners engaging with urban biodiversity or even more generally with urban environments. At policy level there has been a similar vacuum with reference to urban nature. This omission is indicated most distinctly in the New Zealand Biodiversity Strategy which completely ignores the urban context (DOC & MfE 2000). The focus of attention with regard to biodiversity continues to be on the rural, the indigenous, the pristine, and the endangered. Government publications such as *Bio-What?* (Ministerial Advisory Committee 2000), and the Parliamentary Commission for the Environment's¹ *Weaving Resilience* (PCE 2001) are clearly indicative of the ongoing rural, indigenous species-based focus of conservation and are characterised by approaches that whilst important for conservation generally, have limited relevance for the urban environment. Only since the late 1990s has government's attention on environmental concerns been directed at the urban environment at all. Publications such as 'Cities and their People' (PCE 1998), 'People + Places + Spaces' (MfE 2002); 'Sustainable Development for New Zealand: Programme of Action' (New Zealand Department of the Prime Minister and Cabinet 2003) implicitly recognize the value of nature in the city and are a welcome if limited and rather late recognition of urban biodiversity.

The interest in urban nature and the burgeoning urban wildlife movements characteristic of Europe and USA from the 1980s have not therefore, been paralleled in New Zealand. In Europe, for example, there is a strong movement promoting urban nature at both the neighbourhood and the strategic level:

'many European cities are attempting to bring nature into the city center and to develop physical and ecological connections between built-up areas of the city and the surrounding natural areas and greenspaces' (Beatley 2000, p. 199).

Within urban areas in New Zealand, the lack of attention on biodiversity is compounded by the fact that the little attention that it is given, tends to be focused on relic habitats, i.e., indigenous habitats encapsulated within the urban fabric, or regenerating indigenous habitats. A quick perusal of city and district plans shows that whilst recognition is given to the need to include policies and rules directed at protecting and conserving habitats, the focus is on predominantly indigenous natural areas. Whilst these, as the examples of Riccarton Bush in Christchurch and the Karori Wildlife sanctuary in Wellington indicates, are extremely valuable sites ecologically and as natural amenity spaces for people to engage with nature, they are but one element of the natural urban landscape. Few plans² provide for the full range of urban habitats and their associated species or their full range of uses. There is little reference to relationships natural areas have with each other, with the wider natural environment and ecosystems, with regard to ecological linkages, and to future strategic natural area planning. Unless these areas and habitats are provided for and recognised as part of a wider integrated natural ecosystem network, their ability to maintain and enhance their natural character diminishes. Table 1 indicates some of the diverse range of urban habitats that merit consideration. The need to take a wide approach to nature is not new but one identified by McHarg. In his seminal work 'Design with Nature' (1969) he emphasised the need for the adoption of ecological thinking in the planning and development of urban areas. In particular he argued 'that natural processes, unitary in character, must be considered in the planning process: that changes to parts of the system affect the entire system...' (McHarg, in Le Gates & Stout 1997, p. 140). It is this inter-relatedness between natural process and the role of the totality of urban habitats which should form the basis of planning for nature.

¹ The PCE is not technically government but has government influence.

² Christchurch, Waitakere, and Wellington's plans are indicative of plans that have tried to incorporate a more strategic perspective by recognising linkages and relationships between natural areas but these plans are the exception rather than the norm.

Table 1 Types of urban habitats. (From Freeman 2003).

Formal greenspace	
<ul style="list-style-type: none"> • Parks; from central public parks to neighbourhood play areas • Street trees and plantings • Formal landscaping; from tubs to traffic islands • Market gardens, nurseries • Sports; golf-courses, sports grounds, playing fields • Cemeteries and church yards 	<ul style="list-style-type: none"> • Public grounds; schools, colleges, hospitals, institutions • Business parks • Botanical gardens • Educational; urban farms, ecological parks, school nature areas • Forest/woodland plantings, shelterbelts, hedges.
Informal greenspace	
<ul style="list-style-type: none"> • Vacant and derelict land, including abandoned sections • Private gardens • River and stream sides • Remnant native vegetation • Waste disposal, sewage treatment, landfill sites, contaminated land 	<ul style="list-style-type: none"> • Communication links, railway corridors, power lines • Land awaiting development • Gullies, cliffs, and steep or wet land not favourable to development.
Both formal and informal	
<ul style="list-style-type: none"> • Rural fringe development, e.g., lifestyle blocks, riding schools • Road verges 	<ul style="list-style-type: none"> • Water supply areas, lakes, dams, ponds • Town belts.

PLANNING FOR URBAN NATURE

In planning for urban nature, planners, conservationists, architects, urban designers, town centre managers, housing managers, property developers and all those professionals whose practice influence the shape of our urban environment need to be aware of and incorporate the diversity of open space types into their planning and decision making. The tendency to date has been to recognise urban nature within the confines of designated open spaces such as reserves, parks, botanic gardens, ecological corridors and golf courses. The focus in conservation has been on the role of identifiable conservation bodies and agents such as the Department of Conservation, local authority ecologists, landscape architects in protecting and enhancing urban nature within these designated spaces. What is needed though and what we are now starting to see in cities like Waitakere³ is a recognition of the multiplicity of green spaces both formal and informal and their connectivity. Recognition of the potential for promoting New Zealand's native habitats and species, within environments

that encompass both natural and built land uses, and both native and exotic habitats and species, is similarly expanding. New Zealand with its considerable parkland, its geographical advantages such as low population density, proximity to rivers, the sea, hills and cliffs and the predominance of large (by international standards) gardens presents excellent opportunities for the promotion of urban nature, both indigenous and exotic. Planners can play an important role in the re-naturalisation of the urban environment. A number of possible methods are available to planners interested in supporting nature in the city, for example:

- Inclusion of policies promoting urban nature into statutory plans namely district plans, city plans and regional policy statements
- Inclusion of areas with potential for development as nature areas in plans, together with policies supportive of their development
- Development of environmental strategies, open space strategies, structure plans and other non-statutory plans that support urban nature

³ Editor's note: see the paper by Chris Ferkins in these proceedings. Further information is on the Waitakere City Council website at <http://www.waitakere.govt.nz>.

- Incorporation of nature into development proposals, through landscaping and locating developments in areas which minimize ecological damage and enhance natural potential
- Planners can use their public consultation role and processes to promote understanding of and support for urban nature
- Planners can use their networks to liaise and work with conservation organisations, land use professionals, academics, Crown Research Institutes and others with an interest in nature and biodiversity.

To realise the potential of urban areas thus demands a new approach to planning which is strategic in orientation, recognising the totality of urban habitats across the urban area and recognising the value of a multi-sectoral or multi-agency approach. Such an approach needs to be based on a comprehensive understanding of the natural urban context. It is the need to understand this context that was the catalyst for the urban habitat project undertaken in Dunedin.

THE DUNEDIN PROJECT

In 2001 a project was undertaken to map habitats across the city. The map was intended to provide a comprehensive database of habitats across all land use types at a very detailed level for all the built up area of Dunedin. The catalyst for the project was concern expressed by the city council to develop an open space strategy for the city together with concern regarding pressure for incremental development. It was noted that there was no mechanism for planning for open space outside council owned land, and those reserves managed by specific agencies such as the Department of Conservation. The need for an ecological database that would provide information on the ecological value of all land was identified, including privately owned land and informal open space in addition to more standard types of green spaces. The creation of such a database was important for a number of reasons:

- To facilitate identification and comparison of the range of urban habitat types and the

relationship between indigenous and modified habitats (Fig. 1A–Q)

- To facilitate the identification of the degree of fragmentation and connectivity in the open space resource
- To identify areas that are deficient in predominantly native vegetation
- To identify both shorter and longer term changes in the open space resource
- To develop urban amenity indicators to evaluate open space, e.g., type, accessibility, quantity, quality, ownership and so forth
- To inform decision making regarding development
- To guide the future development of open space and natural habitats (after Freeman 2003).

DEVELOPMENT OF THE ECOLOGICAL CLASSIFICATION SYSTEM

In developing the database the first requirement was to develop a habitat classification method for application to Dunedin but with potential application to the wider New Zealand urban context. Habitat classification methodologies have been developed internationally, and are in use in countries such as Germany (e.g., Frey 1998; and Seidling 1998) and in the UK (in urban areas such as those used in Leicester, Birmingham). Classifications for London are loosely based on that developed by the UK Nature Conservancy Council (1993). However, no such methodology currently exists for application to urban areas in New Zealand, though a number of habitat classifications have been applied to more rural landscapes (e.g., Newsome 1987; Owen & Park 1984) and through the Protected Natural Areas Programme. By combining elements of international ecological mapping methods; methods developed for New Zealand's habitats and with reference to the work of Lucas Associates (1997), Meurk & Hall (2000), Meurk & Swaffield (2000), and others on urban biodiversity in New Zealand, an ecological classification applicable to urban areas was derived.

APPLICATION TO DUNEDIN

A comprehensive mapping of all habitats in the city at a scale of 1:3000 was carried out.

A total of 1100 separate habitat parcels were mapped (Fig. 2A,B). The smallest area unit mapped was 0.5 ha. Habitats were mapped onto a geographic information system (GIS), ArcView 3.2. Mapping was achieved through a combination of field surveys and use of the city council’s aerial photographs taken in 2000, which were available in digital form. One area of the city that was of particular concern to the city council due to high development pressure related to the demand for additional student housing, was mapped at a scale of 1:1500. In mapping the city the intention was to provide complete coverage with all land use types being mapped, including gardens which form possibly the largest area of natural habitat in many cities. However, there was no ecological classification available that could offer any guidance on the process of mapping private gardens. A three-tier residential classification system was, therefore, developed for gardens (Fig. 1O–Q). Residential I areas are characterised by gardens with mature and mixed vegetation elements such as large trees, and by contrast Residential III gardens possess no larger vegetational complexes and comprise mostly lawns and flower beds. The survey found that those areas of the city where Residential III predominates are also areas with least access to natural habitats of any sort, indicating multiple natural deprivation for residents.

RESULTS

Table 2 indicates the relative frequency of habitat types in Dunedin. On the positive side it clearly indicates the diversity of habitats in the city, that substantial areas of the city have natural habitats, and the potential for development of a significant ecological network within the city and possibilities for linkages with the major reserves on the urban fringe. Less positively there is a definite lack of predominantly indigenous habitats in the city, even where a habitat for example, comprises bush and forest much of this is dominated by exotic species. The use of GIS provides a number of technical benefits in urban ecological mapping. These are primarily related to the potential for integration with other databases such as the councils’ district plan data, the city council’s publicly accessible property data web

map, satellite and aerial photographic data and census data. GIS also provides the opportunity for potential modelling of data such as distance modelling (Fig. 3), 3D terrain modelling, and the modelling of alternative ecological scenarios. The GIS database has been used to map the movements of kererū (native pigeons) across different city habitats. The map does provide a comprehensive database for the city. Its construction was, however, extremely time consuming and choices had to be made regarding the level of detail, the number of field surveys and the extent of the Dunedin City Council area to be surveyed. Whilst the current map is an excellent resource, to be

Table 2 Summary of habitat types in Dunedin. (From Freeman & Buck 2003).

Habitat type	Area in ha	% total land area
Built	3277.5	54.48
Pasture	840.5	13.97
Bush and forest	690.3	11.48
Exotic lawn	373.0	6.20
Plantation	195.7	3.25
Exotic scrub	180.3	3.00
Tree group	73.0	1.21
Park/woodland	68.3	1.14
Mixed scrub	45.9	0.76
Bare ground	40.8	0.68
Exotic shrubland	40.3	0.67
Rough grassland	37	0.62
Coastal sand and gravel	31.8	0.53
Native scrub	31.0	0.52
Coastal water	30.1	0.50
Dune grassland	14.1	0.23
Native shrubland	11.5	0.19
Mixed shrubland	9.4	0.16
Sand dune	9.3	0.15
Cliff/rock outcrop	5.7	0.10
Standing water	4.3	0.07
Vineland	2.2	0.04
Wetland	2.6	0.04
Total area	6015.5	100.00

able to realise its potential it is essential that the next phase of the project be undertaken, which is to map the surrounding rural areas within the Dunedin City local authority. This will enable the relationship between the city and its hinterland to be fully understood and incorporated in to planning and decision making for the local authority. It is also the rural-urban fringe where development pressures, especially on the Peninsula are likely to be most acute if the current property boom continues.

CONCLUSION

The development of a comprehensive database such as that developed for Dunedin illustrates both the diversity and interconnectedness of natural habitats. It particularly highlights the importance in both quantity and diversity of habitat types, those informal spaces not included in standard plans, management strategies and general thinking around open space. The need for multi-agency and multi-sectoral involvement in open space planning to overcome the current fragmentation is paramount in planning Dunedin's open space resource. Good planning is also dependent on good information. The Dunedin project reveals the potential benefits to planning of such a database. It can be used for example, in development control to limit the creeping expansion of housing on the urban fringe along the Otago Peninsula, and to assess the cumulative impacts of subdivision of Residential 1 gardens. Ecological data at a detailed level is thus an essential prerequisite for effective planning decision making that curbs the process of incremental loss of open space and natural habitats prevalent in many New Zealand cities today. Conversely, the database can identify potential development areas and strategies for protecting and enhancing urban nature. On a wider note though, funding for urban ecological research is limited and recognition of the significance of urban biodiversity on the part of government and conservation agencies has yet to be acknowledged. In New Zealand a shift in thinking is required if the full value and promotion of nature in our urban areas is to be realised. The RNZIH urban biodiversity conference provided a welcome opportunity to debate how we plan for and manage nature

in the city and is a very timely step towards mapping out a path towards creating more natural urban environments.

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REFERENCES

- Beatley, T. 2000: Green urbanism: learning from European cities. Washington DC, Island Press. 491 p.
- Department of Conservation (DOC) and the Ministry for the Environment (MfE) 2000: The New Zealand biodiversity strategy: our chance to turn the tide. Wellington, Department of Conservation and Ministry for the Environment. 144 p. Available at <http://www.biodiversity.govt.nz/picture/doing/nzbs/contents.html>.
- Freeman, C. 2003: Design with nature: the greening of New Zealand's towns and cities. *In: Freeman, C.; Thompson-Fawcett, M. ed. Living space: towards sustainable settlements in New Zealand.* Dunedin, Otago University Press. Pp. 147–165.
- Freeman, C.; Buck, O. 2003: Development of an ecological mapping methodology for urban areas in New Zealand. *Landscape and Urban Planning* 63: 161–173.
- Frey, J. 1998: Comprehensive biotope mapping in the city of Mainz — a tool for integrated nature conservation and sustainable urban planning. *In: Breuste, J.; Feldmann, H.; Ulman, O. ed. Urban Ecology.* Berlin, Germany, Springer. Pp. 641–647.
- Le Gates, T.; Stout, F. 1997: The city reader. London, Routledge. 608 p.
- Lucas Associates 1997: A guide for planting and restoring the nature of Waitakere City. Waitakere City Council, Waitakere, New Zealand. 44 p.
- McHarg, I. 1969: Design with nature. New York, Doubleday. 197 p.
- Meurk, C.; Hall, G. 2000: Biogeography and ecology of urban landscapes: ecological principles and causes of vegetation patterns, their importance to wildlife, opportunities and barriers to dispersal establishment and succession, and how to accelerate positive

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- trends. *In*: Stewart, G. H.; Ignatieva, M. E. *ed.* Urban biodiversity and ecology as a basis for holistic planning and design. Proceedings of a workshop held at Lincoln University, 28–29 October 2000. *Lincoln University International Centre for Nature Conservation Publication No. 1*. Christchurch, Wickliffe Press. Pp. 34–45.
- Meurk, C.; Swaffield, S. 2000: A landscape ecological framework for indigenous regeneration in rural New Zealand-Aotearoa. *Landscape and Urban Planning 50*: 129–144.
- Ministerial Advisory Committee 2000: Bio-What? Addressing the effects of private land management on indigenous biodiversity. Wellington, Ministry for the Environment. 103 p. Available at <http://www.mfe.govt.nz/publications/biodiversity/>.
- Ministry for the Environment (MfE) 2002: People + Places + Spaces: a design guide for urban New Zealand. Wellington, Ministry for the Environment. 64 p. Available at <http://www.mfe.govt.nz/publications/rma/>
- Nature Conservancy Council 1993: Handbook for phase I habitat survey — a technique for environmental audit. Peterborough, UK, England Field Unit, Nature Conservancy Council. 78 p.
- New Zealand Department of the Prime Minister and Cabinet 2003: Sustainable development for New Zealand: programme of action. Wellington, Department of Prime Minister and Cabinet. 30 p.
- New Zealand Town Planning Conference and Exhibition (NZTPCE) 1919: Town planning conference and exhibition: official volume of proceedings. Wellington, Marcus F. Marks, Government Printer. 303 p.
- Newsome, P. F. G. 1987: The vegetation cover of New Zealand. Wellington, National, Water and Soil Conservation Authority. 153 p.
- Owen, J. M.; Park, G. N. 1984: A classification of natural ecosystems in New Zealand. Biological Resource Centre Publication No. 4. Biological Resource Centre, New Zealand. 104 p.
- Parliamentary Commissioner for the Environment (PCE) 1998: The cities and their people: New Zealand's urban environment. Wellington, Office of the Parliamentary Commissioner for the Environment. 89 p.
- Parliamentary Commissioner for the Environment (PCE) 2001: Weaving resilience into our working lands: future roles for native plants on private land. Wellington, Office of the Parliamentary Commissioner for the Environment. 90 p.
- Seidling, W. 1998: Derived vegetation map of Berlin. *In*: Breuste, J.; Feldmann, H.; Ulman, O. *ed.* Urban Ecology. Springer, Berlin, Germany. Pp. 648–652.



Fig. 1 Range of habitat types in Dunedin — illustrative examples. **A**, Department of Conservation reserve; **B**, regenerating landfill, now a wetland area; **C**, community nature reserve; **D**, botanic gardens; **E**, formal park; **F**, regenerating bush subject to logging; **G**, urban farm; **H**, lifestyle block urban fringe; **I**, railway embankments;

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(Fig. 1 ctd.) **J**, mixed use pine plantation; **K**, beach reserve; **L**, a cross section of habitats from tussock hillslopes and alpine vegetation to urban mixed habitats of the town belt; **M**, regenerating section dominated by cabbage trees; **N**, regenerating section dominated by scrub; **O**, Residential I, well vegetated gardens with high degree of natural elements; **P**, Residential II, well vegetated but highly structured; **Q**, Residential III, low levels of vegetation.

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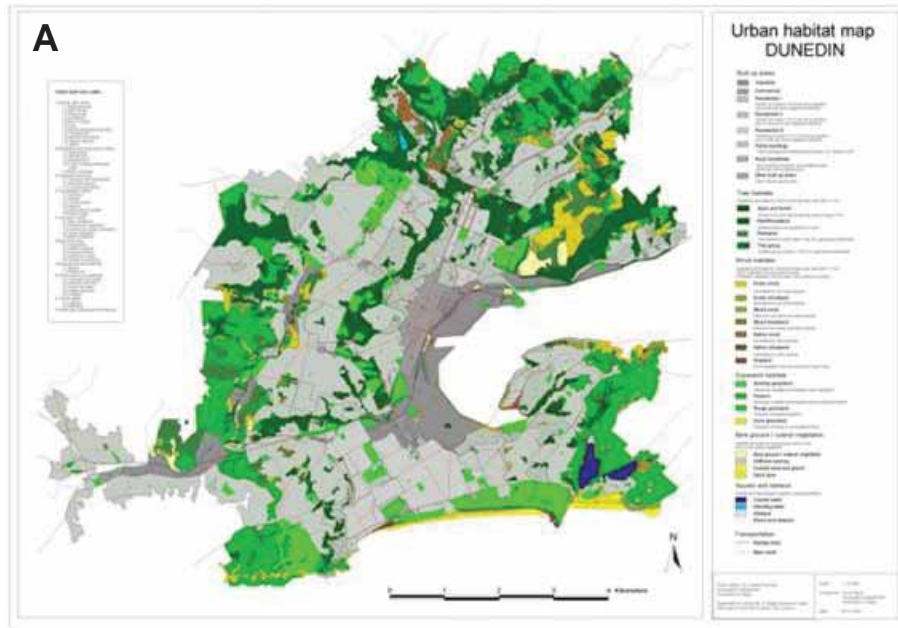
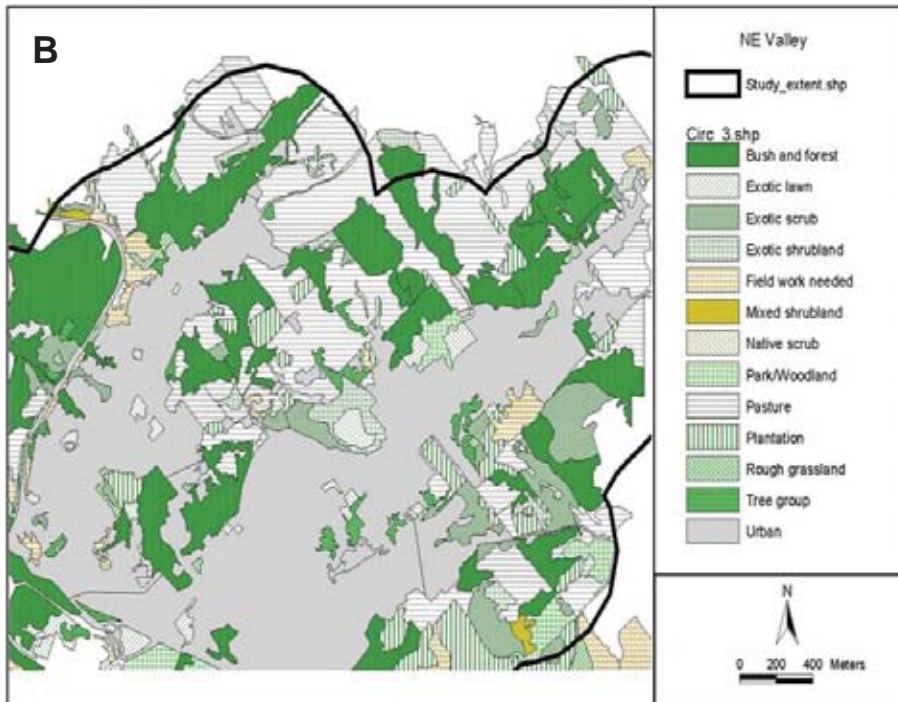


Fig. 2 Urban habitat maps of Dunedin. **A**, all habitats of Dunedin City; **B**, detail of north-east valley.



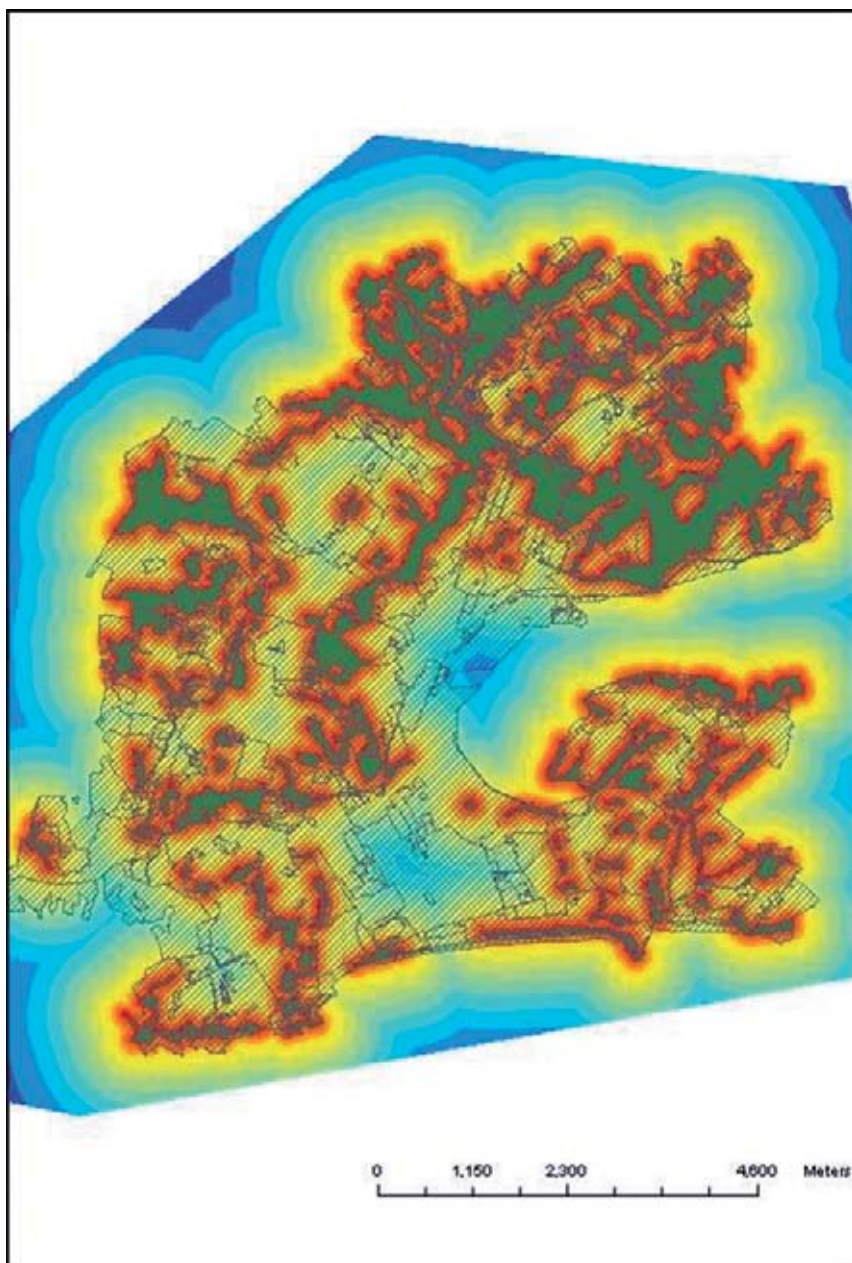


Fig. 3 Identification of core habitat areas using distance modelling techniques.