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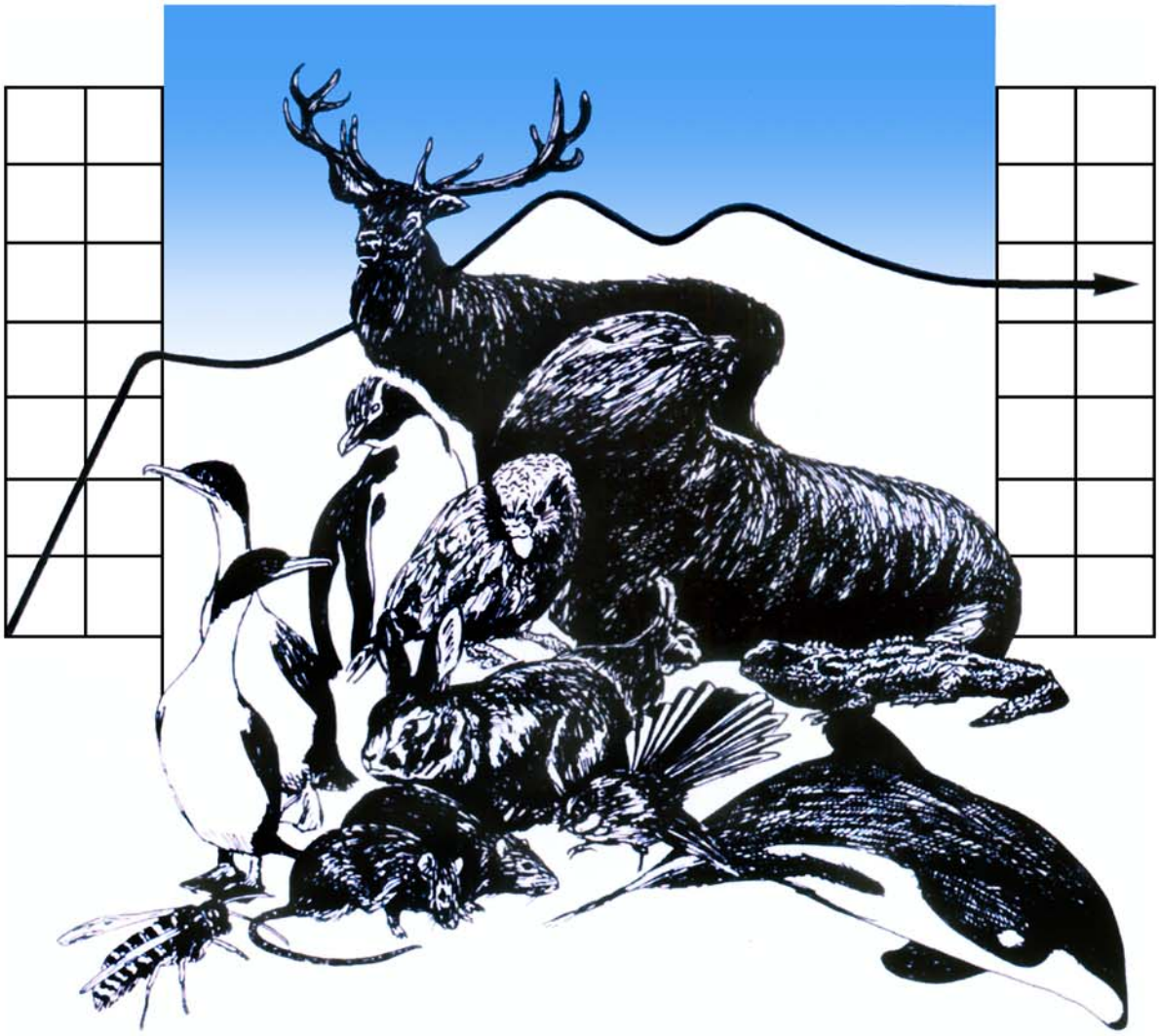

WILDLIFE MANAGEMENT

Identification of regionally significant marine receiving environments for seabirds and shorebirds in the Auckland region

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IDENTIFICATION OF REGIONALLY SIGNIFICANT MARINE RECEIVING ENVIRONMENTS FOR SEABIRD AND SHOREBIRD SPECIES IN THE AUCKLAND REGION

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RESEARCH ARTICLE

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CONTENTS

1. EXECUTIVE SUMMARY

- The coastal systems throughout the Auckland region are under constant potential threat by activities in their adjacent catchments. Coastal zones adjacent to urbanised areas are especially prone to disturbance from land use change.

- The Auckland Regional Council aims to avoid urbanisation of the most sensitive and highly valued of these systems. In order to identify these important systems, sites crucial to the sustainability of representative species assemblages of the areas need to be recognized.

- This study aimed to identify sites of regional significance to seabird and shorebird communities in the Auckland coastal region.

- Using a comprehensive literature search, sites used by seabirds and shorebirds around the Auckland coastal region were ascertained and notes made on the species present and their relative behaviour.

- Sites such as Papakanui Spit, found to be an important site for the nationally critical fairy tern, were deemed to be of regional significance as they are used by a threatened species.

- Sites such as Kaipara and Manukau harbours were considered to be of regional significance as they were identified as being critical for the long term sustainability of a non-threatened species; in this case the New Zealand pied oystercatcher.

- Sites such as Farm Cove, used by no less than five distinct seabird and shorebird species, were deemed significant as they provide habitat for a high diversity of seabird and shorebird species.

- These sites identified as regionally significant are believed to be essential to the continued sustainability of a species or a discrete area such as an important feeding ground. Consequently, this study has found these areas warrant a high level of protection.

- Where the importance of a site is ambiguous, a precautionary approach should be used whereby a high degree of protection is granted which can later be reduced if further investigation shows a problem does not exist.

1. BACKGROUND

This study is a work in collaboration with three other research entities aiming to effectively identify the regionally significant marine receiving environments of the Auckland coastal region. The final outcome will recognise the importance of physical processes (ASR Ltd), marine ecology (Coastal and aquatic Systems Ltd), catchment development (Unitec Ltd) and coastal vegetation (Wildland Consultants Ltd) in identifying these significant environments.

3. INTRODUCTION

The coastal systems throughout the Auckland region are under constant potential threat by activities in their adjacent catchments. This potential for degradation has recently received recognition from the Auckland Regional Council (ARC) with regional plans and strategies created which aim to ensure that *'appropriate provisions are put in place recognising that some areas have particularly high values which are vulnerable to change through degraded or contaminated water and sediment'* (ARC 2004).

These plans accept that coastal zones adjacent to urbanised areas will be impacted to some extent and to help balance this impact, an attempt is being made to avoid urbanisation of the most sensitive and highly valued coastal environments such as estuaries, harbours and wetlands. At present, a lack of information on the relative values and sensitivities of these sites has made their identification hard to achieve and, consequently, in many areas the ARC does not have policy directly linked with protection of high value coastal receiving environments from the effects of land use activities (ARC 2007).

In order to ascertain which sites are worthy of protection and to determine where additional controls on land use practices and other methods might be required, the species assemblages who utilise the relevant areas are one aspect recognised as needing to be identified. An understanding of the ecological roles and existence of these communities is essential in ensuring the natural character and ecological functions of identified vulnerable high value areas are sustained.

This study aimed at identifying receiving environments of particular importance to seabird and shorebird communities in the Auckland coastal region and to develop a robust justification for their selection to support the implementation of any necessary additional controls on environmentally risky landuse activities in contributing catchments.

4. METHODS

1. Literature search

The first step in identifying regionally significant sites for seabird and shorebird communities in the Auckland region was to collate all available information on previous avian research relevant to the study area (For map of study area refer to Fig.1). Comprehensive electronic and manual literature searches were carried out of both published and unpublished pieces of writing. These included electronic web based searches, manual searches of libraries and appropriate scientific journals, consultation with Regional Councils, the Department of Conservation, New Zealand's Ornithological Society and meetings with other specialists known to hold information on seabirds and shorebirds in the region.

2. Information notation

The located information was recorded in spreadsheet format to include notes indicating the site identified, which species were utilising the area, the threat classification of these species, the activity being undertaken at the site (breeding, feeding, roosting), the maximum total population using the site at any one time, any current threats the site is facing to its long term potential as a site of importance to seabirds and shorebirds, what conservation management is currently being undertaken to mitigate these identified threats, and additional notes were also made of any miscellaneous features deemed relevant to the study i.e. previous identification of a site as being of ecological importance (For full layout see Appendix 1).

3. Data formatting

The collected data was then converted to GIS format using ARC GIS 9 ARC MAP v9.2. All identified sites were digitally mapped using ARC GIS layering to create basic polygons illustrating the separate sites used by individual species and the activities being undertaken at the site. Mapped layers were digitised using information provided by the citation source including written descriptions, maps, photographs and illustrations. Consequently, precision of polygons was dependent upon the accuracy of the site descriptions (see Appendix 1: Geographic specificity). All mapped sites were based upon existing high resolution colour aerial photographs derived from a number of sources including the ARC. Attached to each composed GIS layer was an accompanying attribute table identifying each of the previously mentioned information records (citation, species, threat classification and so forth).

4. Analysis

To analyse the completed layers and determine if a site was of regional significance, a set of criteria were devised to allow for each site to be ranked accordingly. If the criteria were met, then the site was deemed regionally significant and, therefore, included in the study as a location where increased future protection is recommended. (For full criteria see Appendix 2).

5. RESULTS

1. Habitats of regional significance to threatened species

Habitats identified as being utilised by threatened shorebird and seabird species within the Auckland coastal region, and therefore acknowledged as being worthy of regional significance status, include Papakanui Spit and Mangawhai Beach. These two sites are used as important breeding sites by the nationally critical New Zealand fairy tern (*Sterna nereis davisae*).

Motuora Island is used by the nationally critical New Zealand shore plover (*Thinornis novaeseelandiae*) as an important breeding site while the nationally critical black stilt (*Himantopus novaezelandiae*) has important feeding spots at the Manukau and South Kaipara Harbours (For a more comprehensive list of sites refer to Table 1).

2. Critical or key habitats of regional significance for non-threatened species

Sites identified as being of key or critical importance to the long term sustainment of non-threatened seabird and shorebird species around the Auckland coastal region include important sites within the Kaipara and Manukau Harbours for New Zealand pied oystercatcher (*Haematopus finschi*) and variable oystercatcher (*Haematopus unicolor*). The Kaipara Harbour also holds key significance for Auckland's pied stilt communities (*Himantopus himantopus leucocephalus*). Important breeding sites exist at the Noises Islands and Erangi Point for the spotted shag (*Stictocarbo punctatus*) and around Hobson Bay for the little shag (*Phalucrocorax melunoleucos brevirostris*) (For a more comprehensive list of sites refer to Table 2).

3. Habitats of regional significance due to high species diversity

Sites around the Auckland coastal region identified as being of regional significance due to the high diversity of species which utilise the area include Browns Island; a site inhabited by at least four distinct seabird and shorebird species; the Australasian gannet (*Morus serrator*), Northern New Zealand dotterel (*Charadrius obscurus aquilonius*) pied shag (*Phalacrocorax varius varius*) and red-billed gull (*Larus novaehollandiae*). Also recognized as being of regional significance is the Farm Cove locality which is utilised by at least five recognised seabird and shorebird species; the pied stilt (*Himantopus himantopus leucocephalus*), red-billed gull (*Larus novaehollandiae*), white-faced heron (*Ardea novaehollandiae*), southern black-backed gull (*Larus dominicanus dominicanus*) and pied shag (*Phalacrocorax varius varius*) (For a more comprehensive list of sites refer to Table 3).

N.B. A full analysis of the data cannot be undertaken at this stage as the GIS layers are still under construction. Once complete, the layers will be analysed collectively to determine sites of regional significance based upon the pre-determined criteria (See Appendix 2).

6. DISCUSSION

1. Significance of study

The Auckland coastal region has a finite set of natural resources which are under continual pressure from human based impacts. These pressures are large and noted to be growing (ARC 2007). As such, the need for protection is only becoming more acute as time passes. The largest pressures are concerned with changes in land use activities in the surrounding environment which often entails complete modification and removal of habitats and increases levels of sediment and nutrient loads into neighbouring areas (ARC 2007). These catchment developments as a rule tend to be unidirectional e.g. once an area becomes urbanised, it rarely returns to another land use type. Yet taken as separate entities, land use modifications can often appear negligible in their impacts. Individual land use activities on the environment are, however, cumulative in their effects.

Being at the base of what are often very large water catchment areas, the coastal environment bears the brunt of these cumulative impacts. As such, in order to ensure the long-term functioning of marine ecosystems, the combined influence of these activities needs to be considered when management of these sites is reviewed. Also in need of consideration is what impacts these effects have on the local biotic communities which inhabit the surrounding regions.

The loss of habitat through changes in land use practices has been identified as the most acute threat to the conservation of shorebirds and seabirds worldwide (Asia-Pacific Migratory Waterbird Conservation Committee 2001) and has been observed as a trend seen to exist in the Auckland region, with an unquantified but considerable loss of habitat noted in recent decades (ARC 2007). This loss of habitats leads to increasing pressure on bird communities uplifted from previously used sites as suitable replacement areas continue to dwindle with time.

It is widely acknowledged that seabird and shorebird communities make up an important part of coastal receiving environments, providing many services and functions of social, cultural, economic and environmental importance (Sagar *et al.* 1999; Whelan *et al.* 2003). The degradation of coastal areas directly threatens the continued existence of these ecological services and, as such, it is important to identify where the most important and vulnerable sites of regional significance to seabird and shorebird communities exist around the Auckland region and attempt to mitigate these impacts. It must also be recognised that threats from land use change on coastal fauna are augmented by pressures from direct human disturbance, predation and natural difficulties.

2. Shorebird and seabird species of the Auckland region

The Auckland coastal region is recognised as an important bird habitat for both native and migratory species (Medway 2000). Home to a number of native and endemic shorebirds and seabirds, the Auckland coastline provides vital breeding, roosting and feeding sites, as well as important over-wintering grounds for a number of migratory waders (Heather and Robinson 1996; Dowding and Moore 2006).

Sites identified as being of regional significance to shorebird and seabird communities in the Auckland region included all areas containing habitat utilised by threatened species, sites identified as containing habitat critical to the long term sustainability of a non-threatened species and sites with habitat used by a large diversity of species.

i. Threatened species

A number of acutely threatened shorebird and seabird species were noted to utilise regions of Auckland's coastal environment including the New Zealand fairy tern (*Sterna nereis davisae*) (Aikman *et al.* 2001; Hansen 2006) currently ranked as nationally critical. Two of only three known breeding sites for the species are located within the Auckland region; Papakanui Spit and Mangawhai beach (Taylor 2000). Consequently, protection from future potential land use based threats at these locations will help to reduce pressures placed upon the pairs breeding at these sites. At present, plantings of marram grass and pine plantations on dunes and development of seaside resorts on sand spits favoured by the species for breeding restrict suitable nesting habitat and contribute to the species slow recovery (Taylor 2000).

Other nationally critical species which make use of the region include the New Zealand shore plover (*Thinornis novaeseelandiae*) (Aikman *et al.* 2001) and New Zealand's black stilt (*Himantopus novaezelandiae*) (Dowding and Moore 2006). The shore plover, known to currently breed at Motuora Island, is hoped to be successfully released onto Tiritirimatangi and Mokohinau Islands in the near future (Aikman *et al.* 2001). Enhanced protection of these identified release sites from future land derived threats will help secure the long term success of the relocations. Protection of current breeding sites at Motuora will also assist in ensuring the source population remains stable and the continued existence of the species in the Auckland region.

Both the Manukau and South Kaipara Harbours contain important wintering sites for black stilt; sites used for the last 60 years at least (Veitch and Habraken 1999). The current low population numbers of black stilts indicate a reduced ability to adapt and recover if important habitat sites are lost (Goss-Custard *et al.* 1996). Enhanced protection of identified habitats used during these winter periods is thus paramount in helping to ensure the long term survival of the species (Maloney *et al.*1999).

ii. Non-threatened species

Often overlooked in management strategies are sites of key or critical importance to species not considered as currently threatened. The protection of environments used by these species is nonetheless essential in ensuring these species retain their non-threatened statuses. Waterbird sites are recognised internationally as being of key or critical significance if they regularly support 1% of the individuals in a population of one species or subspecies of shorebird seabird or 20,000 or more shorebirds or seabirds under Ramsar criteria (Forest and Bird 2001).

Sites such as sections of Kaipara and Manukau harbours for instance are considered critical sites for the long term survival of New Zealand's pied oystercatcher being recognised as important wintering sites holding more than the required 1% of the species total population over winter (Veitch and Habraken 1999; Sagar *et al.* 1999). More than 68% of all pied oyster catchers counted in the OSNZ winter census of New Zealand occurred in the Auckland region and thus the loss of sites used during this period could have considerable impacts upon the total population (Dowding and Moore 2006).

The Kaipara Harbour also holds over 1% of the population of both New Zealand's pied stilts (*Himantopus himantopus leucocephalus*) and variable oystercatchers (*Haematopus unicolor*) (Dowding and Moore 2006) while the Manakau Harbour receives further recognition under this status for the variable oystercatcher (Dowding and Moore 2006).

Significant breeding and roosting colonies of spotted shag (*Stictocarbo punctatus*) exist around located around Erangi Point and the Noises Islands (Taylor 2000). An understanding of the ecology for species such as spotted shag is also required when attempting to identify regionally significant sites, with many seabird and shorebird species being known to move roosting and breeding sites on annual basis (Heather and Robertson 1996). This requires a wider level of protection to be provided to ensure that adequate sites are available for site transfers to occur.

iii. High species diversity

Valuable sites for shorebird and seabird communities may however yet be missed if managerial focus is retained at an individual species level. Many sites exist around coastal regions which are utilised by a high diversity of seabird and shorebird species not necessarily under threatened status or deficient in suitable alternate habitats. These sites are important however as their removal would represent a significant loss of what amounts to an important part of the habitats ecological components and may have marked effects on its continued functioning. Protecting biodiversity is an important past of many conservation strategies (Tracy and Brussard 1994). Also important in terms of many coastal regions and the species assemblages found within (Beatley 1991), protecting sites with high diversity provides an efficient means of protecting suitable habitat for a range of species.

The time frame this study considers is also long (~ 100 years), and thus uncertainties about the nature of future land-use, and the risks to the marine environment associated with "getting it wrong", need to assume that every coastal region may undergo development at some stage in the future. As such, the assumption that these birds will continue to have access to suitable alternate habitats is far from assured.

Within the Auckland coastal environment, sites identified as worthy of extra protection due to higher than usual diversity levels include Browns Island; a site inhabited by at least four shorebird and seabird species, and Farm Cove; a site utilised by no less than five shorebird and seabird species. The wider Manukau, Kaipara and Waitemata Harbours also provide an important stopover location for many thousands of migratory waders who utilize the areas as essential feeding grounds (Heather and Robertson 1996; Veitch and Habracken 1999). Around 32 species of migratory waders are known to contribute to these vast flocks using the harbours each year (Veitch and Habracken 1999; Forest and Bird 2001).

N.B. Threatened status of species as determined by Hitchmough *et al.* 2007

7. CONCLUSIONS

The pressures land use changes put on surrounding environments and the impacts they cause to an adjacent region's ecology are often poorly recognised in management strategies. Neighbouring terrestrial and marine environments are especially prone to being thought of, and dealt with, as separate entities yet the ecological functioning and biological composition of each remain highly interrelated.

Land use change cannot be completely avoided in catchment areas adjacent to urbanised land and as such coastal zones in these regions will be faced with potential impacts to some extent. To balance these impacts however, sites of special regional significance and vulnerability can be recognised as worthy of extra protection with stricter controls placed upon land use in the surrounding regions.

In terms of Auckland's coastal region, a unique makeup of seabird and shorebird communities play an important part in identifying regionally significant marine receiving environments. In identifying these sites, it is important to remember that a range of different habitat types require protection according to the different behavioural needs of the species located within the Auckland coastal region. These habitats and locations important to ensuring the long term sustainability of Auckland's seabirds and shorebirds are diverse and poorly acknowledged at present and the level of threat these sites face from surrounding land use pressures also remains unclear.

As such, this knowledge gap lends strong support for a precautionary approach to be applied in the future development of these areas and surrounding catchments. i.e. in cases of uncertainty the recommendation should be to provide a high degree of protection, which can be reduced if the further investigation shows a problem does not exist, rather than provide a low level of protection which could degrade nationally or regionally important coastal ecosystems to levels that quickly become irreversible.

8. FUTURE DIRECTIONS OF STUDY

Digitising of bird layers will be first completed. Analysis of completed layers will then commence, looking at layers of sites collectively to ascertain where bird habitats exist that are utilised by threatened species, critical or key to non-threatened species or utilised by a diverse number of species in comparison to other sites of similar habitat type. The vulnerabilities of each site will then be assessed in terms of susceptibility to impacts from land use change (criteria under construction). Sites will then by analysed to determine if they are of regional significance using predetermined criteria with brief field surveys undertaken to address any identified key information deficiencies. Recommendations based on these findings will then be provided to ASR who, in addition to their own findings, will advise the ARC of what marine receiving environments in the Auckland region are worthy of regional significance status.

9. ACKNOWLEDGMENTS

I am indebted to the entire 2006 Wildland Consultants team for their invaluable help and support throughout my industry placement. Special thanks must be made to Willie Shaw for allowing me to help out with this project as well as his superb advice throughout, Richard Gillies for always being on hand to answer my many annoying little queries, Jenny Gillies for her constant advice and help in becoming skilled with GIS, Roger Bowden for helping out every time it became apparent I hadn't quite mastered the GIS as well as I'd like to think I had and Lucy Manning for helping to keep me sane during the long hours spent in the office.

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Figure 1. Map of Auckland Region showing coastal study region

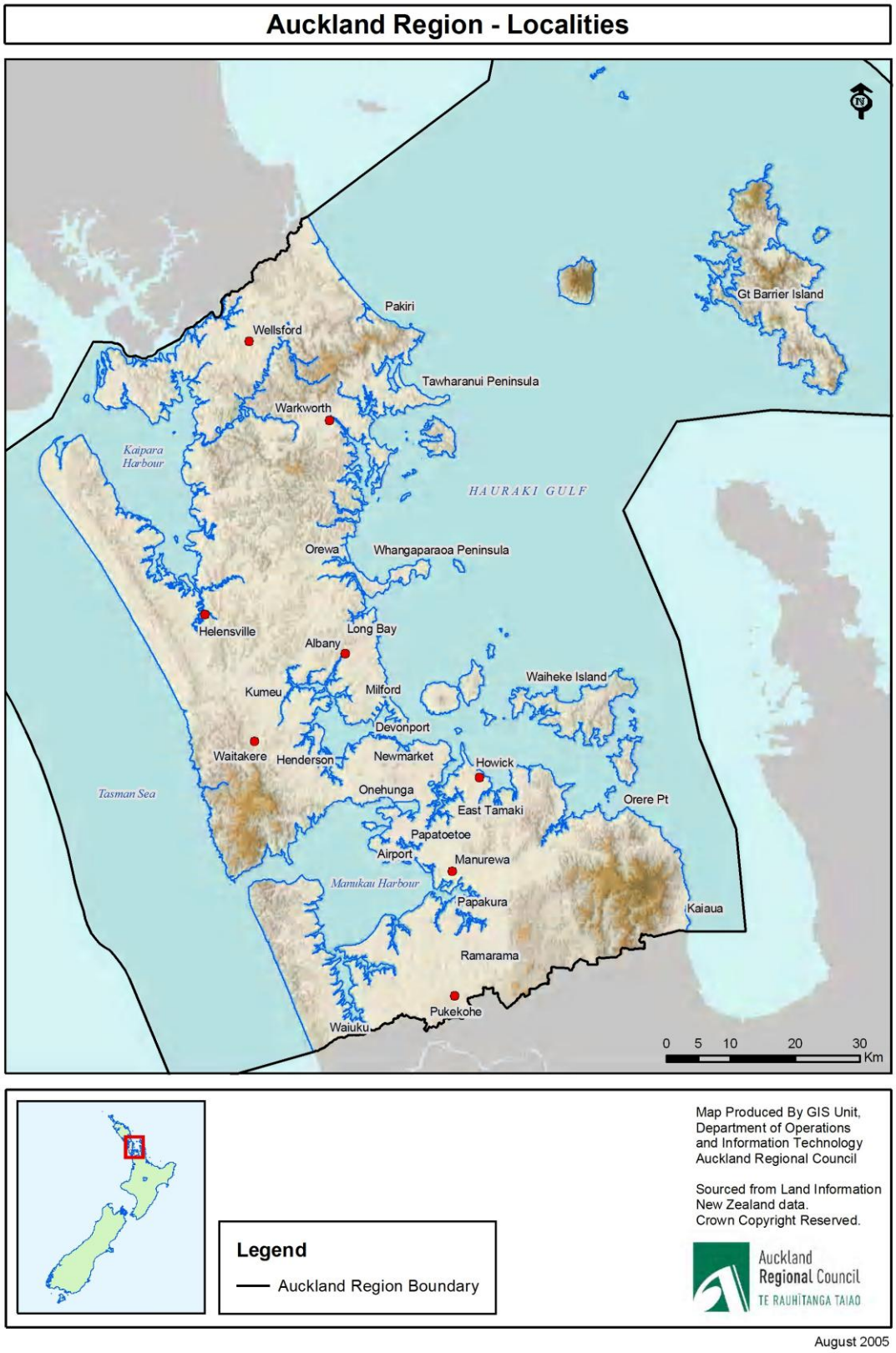

Table 1. Sites utilised by threatened seabird and shorebird communities around the Auckland coastal region judged to be of regional significance.

Species	**Status**	**Sites**
Black stilt (*Himantopus novaezelandiae*)	1 Nationally critical	Manukau Harbour, South Kaipara Harbour
New Zealand fairy tern (*Sterna nereis davisae*)	1 Nationally critical	Papakanui Spit, Mangawhai beach
New Zealand shore plover (*Thinornis novaeseelandiae*)	1 Nationally critical	Motuora Island
Brown teal (*Anas aucklandica*)	2 Nationally endangered	Great Barrier Island
Black-fronted tern (*Sterna albostriata*)	2 Nationally endangered	Tangaihi
Northern New Zealand dotterel (*Charadrius obscurus aquilonius*)	3 Nationally vulnerable	Te Matuku Bay
Caspian tern (Sterna caspia)	3 Nationally vulnerable	Te Atatu Peninsula
Wrybill (*Anarhynchus frontalis*)	3 Nationally vulnerable	Tapora peninsula
Reef Heron (Egretta sacra sacra)	3 Nationally vulnerable	Musick Point

Table 2. Sites of regional significance for non-threatened seabird and shorebird communities around the Auckland coastal region based upon their identification as being of key or critical importance to the long term sustainability of a species.

Species	**Status**	**Sites used**
New Zealand pied oystercatcher (*Haematopus finschi*)	Not threatened	Mataitai and Kawakawa Bay
Spotted shag (*Stictocarbo punctatus*)	Not threatened	Noises Islands and Erangi Point
Little shag (*Phalucrocorax melunoleucos brevirostris*)	Not threatened	Hobson Bay
Variable oystercatcher (*Haematopus unicolor*)	Not threatened	Kaipara Harbour
New Zealand White-faced storm petrel (*Pelagodroma marina maoriana*).	Not threatened	Burgess Island
Fluttering Shearwater (*Puffinus gavia*)	Not threatened	Lots Wife
Pied stilt (Himantopus himantopus leucocephalus)	Not threatened	Kaipara Harbour, Manukau Harbour
White-faced Heron (Ardea novaehollandiae)	Not threatened	Upper Whau Creek

Table 3. Sites of regional significance for non-threatened seabird and shorebird communities around the Auckland coastal region based upon their identification as being utilised by a high diversity of species, relative to other similar habitats in the region.

Species	Status	Sites used
Australasian gannet (Morus serrator)	Not threatened	Browns Island
Northern New Zealand dotterel (Charadrius obscurus aquilonius)	Not threatened	Browns Island
Pied shag (Phalacrocorax varius varius).	Not threatened	Browns Island
Red-billed gull (Larus novaehollandiae)	Not threatened	Browns Island
Pied stilt (Himantopus himantopus leucocephalus)	Not threatened	Farm cove
Red-billed gull (Larus novaehollandiae)	Not threatened	Farm cove
White-faced Heron (Ardea novaehollandiae)	Not threatened	Farm cove
Southern black-backed gull (Larus dominicanus dominicanus)	Not threatened	Farm cove
Pied shag (Phalacrocorax varius varius).	Not threatened	Farm cove

APPENDIX 1

METADATA FOR MARINE BIRD GIS LAYERS

Attribute name	Explanation
Species	Common and scientific name as used by Hitchmough *et al.* (2007). - N.B. Old or alternate names used in references updated.
Threat Classification	Current threat classification as listed in Hitchmough *et al.* (2007).
Locality	Locality name provided in reference(s). Where a more a widely known name exists, this may be inserted in brackets.
Breeding	1 = Critical site 2 = Key site 3 = Locally important site Y = Activity noted, but importance of site not noted N = Activity not being undertaken Blank = Unknown if activity being undertaken
Feeding	As for 'breeding' above
Roosting	As for 'breeding' above
Maximum Population	Highest number of individuals recorded at the site, if known. - N.B. Zero indicates an unknown value (not zero individuals)
Predation	Negative impacts from domestic predators (e.g. dogs, cats, etc.) and feral predators (e.g. mustelids, rats, hedgehogs, feral cats, etc.)
Human disturbance	Direct impact by humans on foot, on horseback, or in vehicles (including land and sea vehicles)
Habitat loss	Either complete loss of habitat (i.e. through destruction of the site) or serious habitat degradation (e.g. through weed invasion)
Sediment	Damage to habitat through increased sediment loads (e.g. from development/earth-moving)
Nutrient	Damage to habitat from increased nutrient loads (e.g. from agricultural and residential sources)
Pollution	Damage to habitat from toxic waste (e.g. storm water, industrial pollution, residential pollution, spills, dumping)
Conservation Management	Management undertaken which mitigates some of the threats (e.g. fencing, pest control, signage)
Notes	Any relevant extra information of key importance, especially elaborating on the vulnerability of the population and threats faced
References	All sources used in the creation of the record
Most recent data	Year of most recent data - N.B. Not necessarily related to max. pop. recorded here (max. pop. could have been recorded at an earlier date)
Geographic specificity	1 = Accurate location (e.g. small site size e.g. 'David Rocks', or very specific location identified e.g. 'cliffs at southern end of Bethell's Beach') 2 = General location (e.g. 'Bethell's Beach') 3 = Very general location (e.g. 'Te Henga')

APPENDIX 2

MARINE BIRD HABITAT ASSESSMENT

Is this habitat at least of regional significance?

If any of the criteria in Table 1 are met, then the site is at least regionally significant, and therefore included in this study. If a higher level of significance is warranted (e.g. nationally or internationally significant), then this will be determined by criteria in Table 2.

Table 1: Assessment criteria for areas of marine bird habitat

The area:	Auckland RPS S. 6.4.7 Policies covered
1) is habitat for a threatened species (as listed in Hitchmough *et al.* 2007); or	1 (ii)
2) is <u>critical</u> or <u>key</u> habitat for a non-threatened species[1]; or	1 (ix)
3) has a high diversity of species recorded, relative to other similar habitats in the region (e.g. intertidal feeding grounds where many species congregate); or	

Examples of bird habitat which is not included:

- Habitat for non-threatened species which is only locally important *AND* which is not part of a site with high species diversity (as in point 3 above)
- Habitat which has a moderate or low diversity of species recorded, relative to other similar habitats in the region

<u>Definitions:</u>

Critical habitat

- A site of critical importance to the survival of the species; or
- The only site in the region with a concentration of a particular bird species; or

Key habitat

- One of a few sites with relatively high concentrations of a species

[1] Vagrants and colonisers, as determined by Hitchmough *et al.* (2007), are excluded from the analysis.