

Key Native Ecosystem Plan for East Harbour Northern Forest

2014-17



greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao



Contents

1. Key Native Ecosystem plans	1
2. East Harbour Northern Forest Key Native Ecosystem	2
Landowner and stakeholders	2
Ecological values	3
Key threats to ecological values at the site	4
3. Objectives and management activities	7
Objectives	7
Management activities	7
4. Operational plan	10
5. Funding summary	14
GWRC budget	14
Appendix 1: Site maps	15
Appendix 2: Threatened species list	21
Appendix 3: Regionally and locally threatened species list	24
References	26

1. Key Native Ecosystem plans

New Zealand's indigenous biodiversity continues to decline nationally, and in the Wellington region. Major reasons for the decline are that native species are preyed on or outcompeted by invasive species, and ecosystems and habitats are lost or degraded through human resource use and development. Active management to control threats is required to protect indigenous biodiversity. Regional councils have responsibility to maintain indigenous biodiversity, as well as to protect significant vegetation and habitats of threatened species, under the Resource Management Act 1991 (RMA).

Greater Wellington Regional Council's (GWRC's) vision for biodiversity is:

"The Wellington region contains a full range of naturally occurring habitats and ecosystems that are in a healthy functioning state and supporting indigenous biodiversity"

GWRC's Biodiversity Strategy 2011-2021¹ provides a common focus across the council's departments, and guides activities relating to biodiversity. One of its goals is: High value biodiversity areas are protected.

In order to achieve this vision and goal, the Key Native Ecosystem (KNE) programme seeks to protect some of the best examples of ecosystem types in the Wellington region by managing, reducing, or removing threats to their values. Sites with the highest biodiversity values have been identified and then prioritised for management. Active management of KNEs can involve control of ecological weeds and pest animals, fencing to exclude stock, restoration planting and helping landowners to legally protect these areas.

KNEs are managed in accordance with three-year KNE plans, such as this one, prepared for each area by the GWRC's Biodiversity department in collaboration with the landowners and other stakeholders. These plans outline the ecological values and threats specific to each KNE, set out objectives for biodiversity management, and prescribe the operational actions and budget required to work towards achieving the objectives.

Much of the work planned in KNEs will be carried out by GWRC staff or contractors engaged by GWRC. For example, the Biosecurity department carries out ecological weed and pest animal control to achieve the objectives set out in KNE plans.

GWRC also recognizes that working relationships between the management partners are critical for achieving the objectives for the KNE. Under the KNE programme, GWRC staff also work with landowners and volunteer community groups involved in protection or restoration work within KNEs.

KNE plans are reviewed regularly to ensure the activities undertaken to protect and restore the KNE are informed by experience and improved knowledge about the site.

2. East Harbour Northern Forest Key Native Ecosystem

East Harbour Northern Forest KNE is one of the most significant forest ecosystems in the Wellington region² and is highly representative of the Tararua Ecological District³. It is located on the eastern side of Wellington Harbour, in the hills between the eastern bays and the Wainuiomata River valley (see Appendix 1, Map 1). It is large at 1647 hectares, still relatively intact, and home to a number of threatened species.

The forest is bounded by urban properties to the north and west, and farmland and a golf course to the south and east. Most of the KNE is legally protected as Scenic Reserve or Recreation Reserve and one small area has a QEII National Trust Open Space Covenant on it (see Appendix 1, Map 2).

Most of this KNE (excluding three small privately owned areas) has been managed by GWRC as part of the East Harbour Regional Park since 2004. East Harbour Northern Forest is one of three KNEs within this Regional Park. The other two are Baring Head/Ōrua-pouanui and Parangarahu Lakes.

An area within the KNE has been managed intensively by GWRC since 2005 as a Mainland Island. This concept has been adopted by conservation agencies to focus effort on ecosystem restoration at specific sites. The East Harbour Northern Forest Mainland Island is one of two Mainland Islands managed by GWRC, the other being nearby at Wainuiomata.

Landowner and stakeholders

GWRC takes a collaborative approach to managing Key Native Ecosystems. This means we will seek to work with landowners and other interested parties (stakeholders) where appropriate to achieve shared objectives for the site. In preparing this plan GWRC has sought input from landowners and relevant stakeholders, and will continue to involve them as the plan is implemented.

Landowners

The KNE includes areas of public and private land. The public landowners are GWRC, Hutt City Council (HCC) and the Crown (Department of Conservation). The private landowners are George and Kina Gibbs, Dion and Liz Ross and the Waitohu Property Trust (see Appendix 1, Map 3).

GWRC is responsible for the ongoing management of East Harbour Regional Park because the Crown has vested its land in GWRC, and HCC has transferred its administering body powers and responsibility for management to GWRC. The Parks Network Plan⁴ guides the recreational and amenity uses of the park and identifies opportunities to protect biodiversity. This KNE Plan is consistent with the wider objectives and policies of the Parks Network Plan. The Biodiversity and Parks departments work collaboratively to efficiently deliver the activities in both of these plans.

Key stakeholders

The GWRC Biodiversity department coordinates biodiversity management in this KNE, while the Parks department is responsible for the overall management of the wider

Park, and the Biosecurity department delivers the on-the-ground pest control operations.

Mainland Island Restoration Operation (MIRO), a local community group, delivers a large component of the restoration activities in this KNE and has led a recent reintroduction of North Island robin (*Petroica longipes*). They are the principal partner to this Plan. Private landowners who grant access to their properties for the implementation of this Plan are regarded as project partners.

Other key stakeholders are: East Harbour Environmental Association (EHEA), Eastbourne Forest Rangers, Taranaki Whānui ki Te Upoko o Te Ika and QEII National Trust.

Ecological values

Ecological values are a way to describe indigenous biodiversity found at a site, and what makes it special. These ecological values can be various components or attributes of ecosystems that determine an area's importance for the maintenance of regional biodiversity. Examples of values are the provision of important habitat for a threatened species, or particularly intact remnant vegetation typical of the ecosystem type. The ecological values of a site are used to prioritise allocation of resources to manage KNEs within the region.

Site description

East Harbour Northern Forest covers hilly topography from close to sea level near Eastbourne to the top of Mt Lowry (372m). It includes several ridgelines and deep incised valleys with clean streams running through them.

The dry and less fertile ridges and hill faces are covered in open forest dominated by kāmahī (*Weinmannia racemosa*), black beech (*Fuscospora solandri*) and hard beech (*Fuscospora truncata*) with patches of northern rātā (*Metrosideros robusta*) and an understory of mingimingi (*Leucopogon fasciculatus*) and prickly mingimingi (*Leptecophylla juniperina*). The rātā growing in this area are unique because most of the trees have a terrestrial form in contrast to the more common epiphytic growth form. Rātā would have once been a more abundant and widespread component of this forest but its range has been reduced by possum browsing and selective logging⁵.

The wetter and more fertile valleys contain lush lowland podocarp/broadleaf forest dominated by large miro (*Prumnopitys ferrunginea*), mataī (*Prumnopitys taxifolia*), kahikatea (*Dacrycarpus dacrydioides*), pukatea (*Laurelia novae-zelandiae*) and rimu (*Dacrydium cupressinum*). In the past some of the edges of this KNE were cleared by burning⁶ and are now covered in regenerating kāmahī, mānuka (*Leptospermum scoparium* var. *scoparium*) and gorse (*Ulex europaeus*).

Small, healthy lowland streams run along the valley floors. They are well shaded, have cobbled bottoms and contain a number of native freshwater species. Good populations of giant kōkopu (*Galaxias argenteus*), longfin (*Anguilla dieffenbachia*) and shortfin (*Anguilla australis*) eel, common bully (*Gobiomorphus cotidianus*), banded kōkopu (*Galaxias fasciatus*) and kōura (*Paranephrops planifrons*) have been found here⁷.

The Gollans Stream area is classified as “Chronically Threatened” by the LENZ Threatened Environment Classification⁸ and the western edge of the KNE is classed as “At Risk”. This is because there is 10-20% and 20-30% of native vegetation remaining (respectively) on these types of land in New Zealand (see Appendix 1, Map 4).

Significant species

East Harbour Northern Forest is ecologically important not only because it has a large and relatively intact forest ecosystem, but also because of the diversity of native plant and animal species that live here. Some of the species of note include:

- 46 nationally, regionally or locally rare or threatened plants and animals (see Appendices 2 and 3 for threatened species lists);
- 33 species of native orchid and one of the richest orchid floras (terrestrial and epiphytic) for any area of an equivalent size in the region⁹;
- All of the native forest bird species that have survived naturally on the mainland in the lower North Island (with most also breeding here)¹⁰;
- Most of the region’s terrestrial rātā population¹¹.

Key threats to ecological values at the site

Ecological values can be threatened by human activities, and by introduced animals and plants, that change the natural balance of native ecosystems. The key to protecting and restoring biodiversity as part of the KNE programme is to manage the threats to the ecological values at the site.

The main threats to the ecological values of the East Harbour Northern Forest KNE are ecological weeds, and a suite of introduced mammalian browsers and predators typical of many sites in New Zealand. Climbing asparagus (*Asparagus scandens*) is arguably the most ecologically damaging weed in the KNE as it smothers native vegetation affecting both the forest floor and the understorey up to a height of about four metres. Once established it can prevent the growth and regeneration of native species and can also strangle and kill some tree species.

Table 1 below shows the identified threats at this site, the operational areas of the KNE they affect, and how they impact on ecological values. The codes alongside each threat correspond to activities listed in the Operational Plan (Table 2), and are used to ensure that actions taken are targeted to specific threats. Map 5 in Appendix 1 shows the operational areas within the KNE.

Table 1: Threats to ecological values present at East Harbour Northern Forest KNE.

Code	Impact on biodiversity in the KNE	Operational area/location
Ecological weeds		
EW-1	Climbing asparagus, Japanese honeysuckle (<i>Lonicera japonica</i>), old man's beard (<i>Clematis vitalba</i>), Elaeagnus (<i>Elaeagnus x reflexa</i>), banana passionfruit (<i>Passiflora</i> sp.), boneseed (<i>Chrysanthemoides monilifera</i>) and English ivy (<i>Hedera helix</i>) are entrenched along the western edge of the KNE. A large number of other weed species are also present however they are less widespread and at lower densities. These species alter forest structure, diversity and function by smothering native vegetation and preventing their regeneration.	Mostly along the western edge of the KNE
EW-2	Ecological weeds are likely to reinvade from outside the KNE. They can be carried by wind, birds (native and exotic), other animals, machinery, bikes and people (including those carrying out management operations).	Whole KNE
Pest animals		
PA-1	Possums browse palatable canopy vegetation until it can no longer recover ¹² . This destroys the forest's structure, diversity and function. Possums may also prey on native birds ¹³ and invertebrates.	Whole KNE
PA-2	Deer browse the forest understorey and can significantly change its vegetation composition ¹⁴ .	Whole KNE
PA-3	Pigs root up the soil and eat roots, invertebrates, seeds and native plants. They are also known to disperse native seeds ¹⁵ .	Whole KNE
PA-4	Goats browse native vegetation, preventing regeneration of the most palatable species and reducing species diversity.	Whole KNE
PA-5	Cats prey on native birds, lizards and invertebrates, reducing native fauna breeding success and potentially causing local extinctions.	Whole KNE
PA-6	Mustelids (stoats, ferrets and weasels) prey on native birds, lizards and invertebrates, reducing native fauna breeding success and potentially causing local extinctions.	Whole KNE
PA-7*	Hedgehogs prey on native invertebrates, lizards ¹⁶ and the eggs ¹⁷ and chicks of ground-nesting birds.	Whole KNE

Code	Impact on biodiversity in the KNE	Operational area/location
PA-8	Rodents (rats and *mice) browse native fruit, seeds and vegetation. They compete with native fauna for food and, if they eat too many seeds or flowers, they can reduce forest regeneration. They also prey on invertebrates, lizards and native birds ¹⁸ .	Whole KNE
PA-9*	Wasps prey on native invertebrates (particularly butterfly and moth larvae) and compete for food resources ¹⁹ .	Whole KNE
PA-10*	Introduced brown trout (<i>Salmo trutta</i>) are present ²⁰ and prey on native fish ²¹ and compete for food resources.	Streams
PA-11	A significant increase in rodent and predator populations following a mast seeding event can have a negative impact on native animal populations in the KNE (see PA-6 and PA-8).	Whole KNE
PA-12*	Pest animals are likely to reinvade from outside the KNE. Unmanaged areas of bush and farmland outside the KNE may act as refuges for pest animals and ecological weeds.	n/a
Human activities		
HA-1	Illegal collection of orchids can cause local extinctions and reduce biodiversity in the KNE.	Whole KNE
HA-2	Uncontrolled or dumped garden waste can spread into the KNE (see EW-2).	KNE boundary (urban section)
HA-3	Unwanted and stray domestic cats prey on native wildlife (see PA-5).	KNE boundary (Burden's gate in particular)
HA-4	Grazing by stock from adjacent properties inhibits most regeneration processes, reducing indigenous plant species richness and in some cases causing local extinctions of palatable indigenous shrubs, terrestrial orchids and ferns ²² .	KNE boundary (rural section)
HA-5	People accessing the park (for recreation, work or research purposes) can damage native vegetation, disturb native fauna and introduce ecological weeds seeds. Light wells along tracks are likely ecological weed reinvasion points.	Whole KNE
HA-6*	A survey conducted in 2002 ²³ showed that most of the native fish found in East Harbour Northern Forest were large adults. This may suggest that structures further downstream are blocking juvenile fish migration from the sea ²⁴ . The barriers affecting fish migration in this KNE are outside the KNE boundary.	n/a

Code	Impact on biodiversity in the KNE	Operational area/location
Other threats		
OT-2	A lack of legal protection can leave a site at risk of development or destruction in the future and resources invested in the site may be wasted. Part of this KNE is designated as Scenic or Recreation Reserve but other parts have no protection status at all. The whole Regional Park is designated as a General Recreation Area in the Hutt City District Plan and any vegetation clearance is considered a Discretionary Activity and needs consent.	Areas without legal protection

*Threats marked with an asterisk are not addressed by actions in the Operational Plan. Not all threats can be adequately addressed. Threats might not be managed for a number of reasons including financial, legal, or capacity restrictions. However, in order to manage the KNE as a whole, it is important to be aware of all threats to ecological values.

3. Objectives and management activities

Objectives help to ensure that management activities carried out are actually contributing to improving the ecological condition of the site.

Objectives

The objectives guiding management activities at East Harbour Northern Forest KNE are:

1. To legally protect the KNE
2. To increase native plant dominance
3. To increase native plant regeneration
4. To increase distribution and abundance of threatened plants
5. To increase abundance of threatened animals
6. To raise community awareness of the ecological values of the KNE
7. To engage the community in management of the KNE

Management activities

Management of biodiversity is achieved most effectively when it is coordinated across landscapes. The management activities set out in this Plan have been developed in the context of other biodiversity management activities being carried out in the wider ecological landscape. Relevant management plans are referred to under the individual sections below. In implementing this Plan, the Biodiversity department will integrate activities that contribute to the objectives of other management plans where possible.

Management activities are targeted to work towards the objectives above by responding to the threats outlined in Table 1. The management activities are described briefly below, and specific actions, with budget figures attached, are set out in the Operational Plan (Table 2). The management activities in East Harbour Northern Forest KNE will focus predominantly on controlling ecological weeds, browsers and predators.

Pest animal control occurs across the whole KNE but is more intensive within the Mainland Island. Ecological weeds occur along the western boundary and weed control is specifically targeted at preventing their spread into the Mainland Island interior (see Appendix 1, Map 5). During the life of this plan the size of the Mainland Island may be extended. Should this happen, the budget required to service this area will also be increased.

Ecological weed control

Ecological weeds will be controlled to increase native plant dominance and regeneration. The ecological weeds listed in the threats section of this plan will be controlled in a buffer zone along the western boundary of the KNE and at other key incursion sites (see Appendix 1, Map 5). GWRC will be responsible for the delivery of most of this work but contractors may also be engaged at times.

In 2005 a pest plant control plan was developed²⁵ to guide ecological weed control efforts in the East Harbour Northern Forest. In 2014/15 this plan will be reviewed and opportunities for improvements will be identified. This review may include an ecological weed survey. A report will be produced as part of the review and will lead to updating of the budget and identified actions/operational areas in this KNE Plan.

Pest animal control

East Harbour Northern Forest has a well-established pest animal control programme²⁶ which is jointly delivered by GWRC and MIRO and aims to increase native plant dominance and regeneration, and increase the abundance of threatened animals. Throughout the whole KNE possums are controlled entirely by MIRO volunteers. These efforts help to keep the costs for this work low. Deer, pigs and goats are controlled by professional hunters.

The Mainland Island receives a higher level of predator control than the rest of the KNE. Within the Mainland Island possums, deer, pigs, goats, rats, mustelids and cats are controlled. This multi-species approach to predator control is known to be a more effective method of protecting populations of indigenous animals²⁷ than a single predator control programme²⁸. The predator control in the Mainland Island is implemented by GWRC's Biosecurity department using an intensive trap and bait station network (see Appendix 1, Map 6).

To increase the area of "safe" habitat for threatened animals living in this KNE, the size of the Mainland Island may be increased during the life of this Plan. In year one (2014/15), the management partners will develop a strategic approach to the expansion of this area which will involve deciding on the final size of the Mainland Island, how it will be expanded (i.e. incrementally or all at once), and how the bait stations and traps will be distributed. The indicative figures in the operational section of this Plan are estimated based on an incremental increase of 100 hectares per year.

In order to prepare for and manage any significant increases in predator numbers following a mast seeding event, staff will draw on recent research²⁹ that predicts masting events. To ensure that this information is used as effectively as possible, a strategy for responding to a predicted mast event will be developed in 2014/15. This

strategy will include a list of actions that will be taken when a mast event is predicted and the cost of implementing these actions.

Human activities

A community engagement strategy will be developed in year three of this Plan (2016/17) to guide engagement with the community and to increase overall community awareness, understanding and ownership of the biodiversity values and threats to the East Harbour Northern Forest. This strategy may include educational resources such as pamphlets and presentations and will raise awareness of issues such as the illegal collection of native plants and wildlife, ecological weeds and the effects of dumping of cats and garden waste.

To increase native plant dominance and raise community awareness of the ecological values of the KNE, GWRC will continue to manage the impacts of people on biodiversity. A biosecurity procedure for use by staff is being developed by the GWRC Biosecurity department to reduce the chance of new ecological weeds being introduced on machinery used in operations. This information will be supplied to operational staff or volunteers working in the KNE.

To prevent stock from damaging vegetation in the KNE, regular boundary fence checks will be undertaken by the GWRC Park Ranger responsible for this area.

Other activities

To increase the area of the KNE that is legally protected, opportunities for increasing the area that is designated as Recreation or Scenic Reserve or QEII National Trust Open Space Covenant will be investigated and implemented as part of this plan.

Opportunities for the expansion of this KNE into unmanaged adjacent land will be explored as this would increase the size of the KNE and reduce the areas that may act as refuges for pest animals and ecological weeds. Legal protection options will be considered as part of this process. These opportunities will be investigated regularly and the KNE boundary and protection status will be modified to reflect any changes.

4. Operational plan

The operational plan below shows the actions planned to achieve the stated objectives for East Harbour Northern Forest KNE. Their timing and cost are shown over three year period from 1 July 2014 to 30 June 2017. The budget for the 2015/16 and 2016/17 years are indicative only and subject to change as a result of the 2015-25 Long Term Plan process. See Appendix 1, Map 5 for operational areas.

Table 2: Three-year operational plan for East Harbour Northern Forest KNE.

Objectives	Threat	Activity	Operational areas	Delivery	Description/detail	Target	Timetable and resourcing		
							2014/15	2015/16	2016/17
2, 3 and 4	EW-1	Ecological weed control	Ecological weed control areas	GWRC Biosecurity department	Control listed ecological weeds within the defined operational area (this area will be discussed and decided upon at the start of the new financial year).	Reduction in distribution and density of targeted species.	\$79,000	\$81,000 ¹	\$79,000
2, 3 and 4	EW-1, EW-2	Ecological weed control	Whole KNE	GWRC Biodiversity department & MIRO	Review ecological weed control programme and undertake environmental weed surveys as required. Update current approach, ecological weed control areas and set budgets for 2015/16 and 2016/17.	Ecological weed control programme reviewed and budgets updated as necessary. Review report produced.	\$4,000		
2,3, 4 and 5	PA-1	Pest animal control	Whole KNE	MIRO	Service traps to control possums across the KNE (monthly).	Possum densities <5% RTC*.	\$2,000	\$3,000	\$3,000
2, 3, 4 and 5	PA-2	Pest animal control	Whole KNE	Contractors (managed by GWRC Biosecurity department)	Control deer twice a year by shooting (16 hunter days in total).	Contract completed to required standard.	\$6,000	\$7,000	\$7,000

¹ This budget will be amended following the review of the ecological weed control programme at this site.

Objectives	Threat	Activity	Operational areas	Delivery	Description/detail	Target	Timetable and resourcing		
							2014/15	2015/16	2016/17
5	PA-8	Pest animal control	Mainland Island	GWRC Biosecurity department	Service bait stations (monthly) to control rats across the mainland island.	TTI** <5%.	\$34,000	\$34,000	\$34,000
5	PA-5, PA-6, HA-3	Pest animal control	Mainland Island	MIRO	Service existing traps (monthly) to control mustelids and cats.	Traps serviced to required standard.	\$100	\$100	\$100
2 and 3	PA-3, PA-4	Pest animal control	Whole KNE	Contractors (managed by GWRC Biosecurity department)	Control pigs and goats as necessary (rarely).	Completed to standard specified in contract.	Nil	Nil	Nil
2, 3, 4 and 5	PA-11, PA-6, PA-8	Manage mast seeding event	Whole KNE	GWRC Biodiversity and Biosecurity departments and MIRO	Develop a strategy for responding to predicted mast seeding events.	Strategy developed.	Nil	Nil	Nil
2 and 3	HA-4	Prevent stock incursions	KNE boundary	GWRC Park Ranger	Check boundary fences as required to prevent damage of the forest by stock.	Boundary fence checked regularly. Damage repaired as necessary.	Nil	Nil	Nil
1	OT-2	Improve legal protection	Whole KNE	GWRC Biodiversity department	Investigate and take up legal protection opportunities.	The area of the KNE that is legally protected has increased in size.	Nil	Nil	Nil
2, 3, 4, 5, 6 and 7	OT-3	Include unmanaged adjacent land in the KNE	Land adjacent to the KNE	GWRC Biodiversity department	Investigate and take up opportunities to increase the size of the KNE by incorporating adjacent high biodiversity land.	The KNE has increased in size.	Nil	Nil	Nil

Objectives	Threat	Activity	Operational areas	Delivery	Description/detail	Target	Timetable and resourcing		
							2014/15	2015/16	2016/17
6 and 7	HA-1, HA-2, HA-3, HA-5, OT-3	Improve community awareness of the KNE	Whole KNE	GWRC Biodiversity department and MIRO	Develop a communications strategy and supporting information for the public.	Resources developed (pamphlets, presentations, etc).	Nil	Nil	\$2,000
		GPS traps and bait stations	Whole KNE	MIRO and GWRC Biosecurity and Parks departments	GPS all traps/bait stations and enter into digital (GIS) database. Data for updating should include trap/bait station type, trap/bait station number and year of installation.	Spatial information on traps and bait stations is current and complete.	Nil	Nil	Nil
							\$125,100	\$125,100	\$125,100

*RTC = residual trap catch. **TTI = tracking tunnel index

Table 3: Three-year operational plan, if additional funding is available from 2015/16, to extend the Mainland Island in East Harbour Northern Forest KNE.

Objectives	Threat	Activity	Delivery	Description/detail	Target	Timetable and resourcing		
						2015/16	2016/17	2017/18
3, 5	PA-5, PA-6, PA-8,	Pest animal control	GWRC Biodiversity department and MIRO	Develop a strategic approach for the expansion of the Mainland Island.	Report outlining strategic approach to expand the Mainland Island.	\$2,000	Nil	Nil
5	PA-8	Pest animal control	GWRC Biosecurity department	Cut new bait station lines to control rats over an additional 100ha of Mainland Island.	~7.3ha of new line cut to required standard.	Nil	\$12,775	\$14,600
5	PA-8	Pest animal control	GWRC Biodiversity department	Buy 123 new bait stations to control rats in the new 100ha of Mainland Island.	123 bait stations bought.	Nil	\$1845	\$1845
5	PA-8	Pest animal control	GWRC Biosecurity department	Install new rat control bait stations across the new 100ha of Mainland Island.	123 new bait stations installed to required standard.	Nil	Nil	\$4000
5	PA-6	Pest animal control	GWRC Biosecurity department	Buy and install 11 new DOC 200 traps increase size of Mainland Island to control mustelids_	Traps bought and installed.	Nil	Nil	\$750
5	PA-8	Pest animal control	GWRC Biosecurity department	Service bait stations (monthly) to control rats across the Mainland Island.	TTI ** <5%.	Nil	Nil	\$8,000
						\$2,000	\$14,620	\$29,195

5. Funding summary

GWRC budget

The budget for the 2015/16 and 2016/17 years are indicative only and are subject to change as a result of GWRC's 2015-25 Long term plan process.

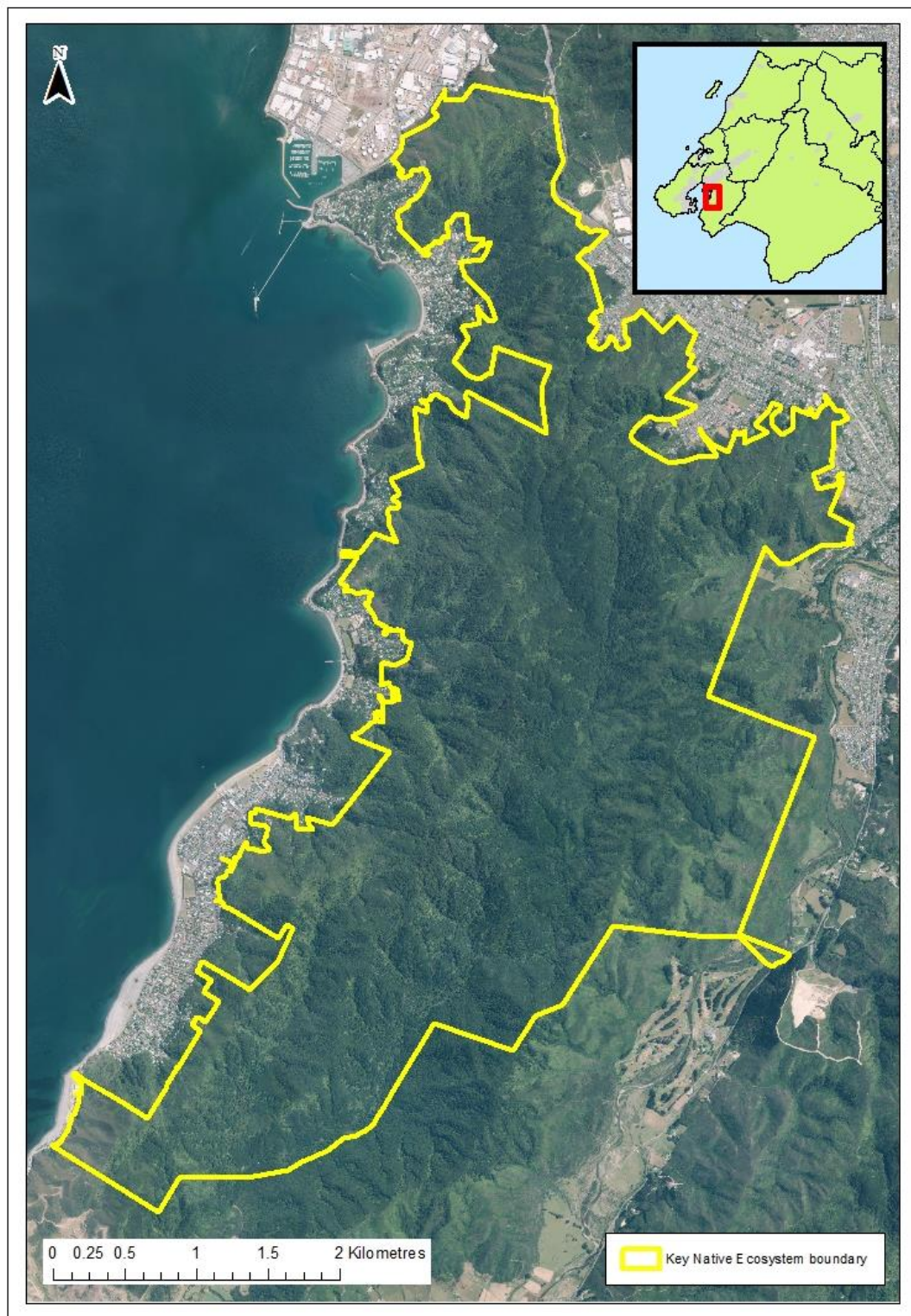
Table 4: GWRC allocated budget for East Harbor Northern Forest KNE. This is not currently planned for in GWRC's budget.

Management activity	Timetable and resourcing		
	2014/2015	2015/2016	2016/2017
Pest plant control	\$83,000	\$81,000	\$79,000
Pest animal control	\$42,100	\$44,100	\$44,100
Other	\$0	\$0	\$2,000
Total	\$125,100	\$125,080	\$125,100

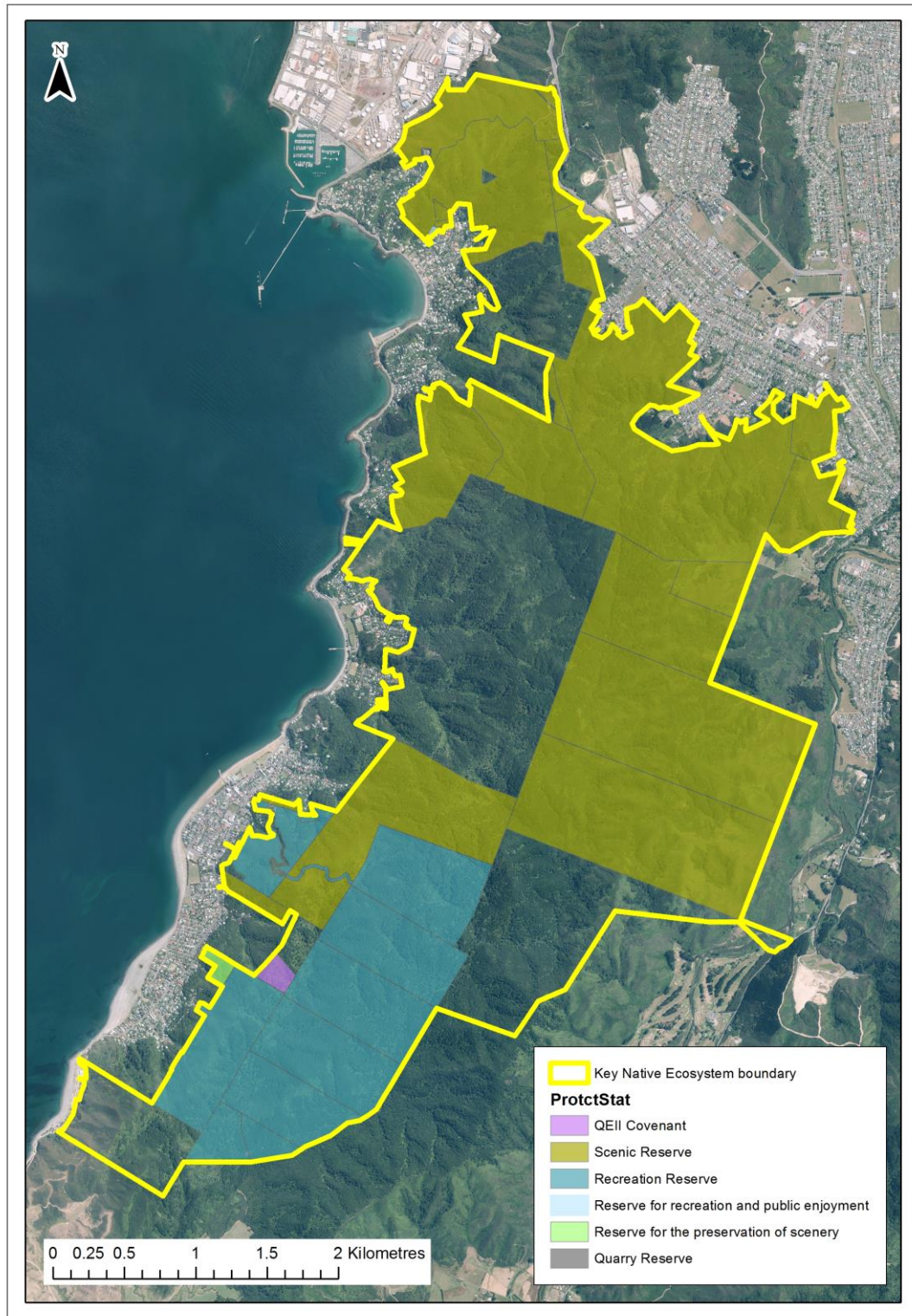
Table 5: The budget required to extend the Mainland Island from 2015/16.

Management activity	Timetable and resourcing		
	2015/2016	2016/2017	2017/2018
Pest plant control	\$0	\$0	\$0
Pest animal control	\$2,000	\$14,620	\$29,195
Other	\$0	\$0	\$0
Total	\$2,000	\$14,620	\$29,195

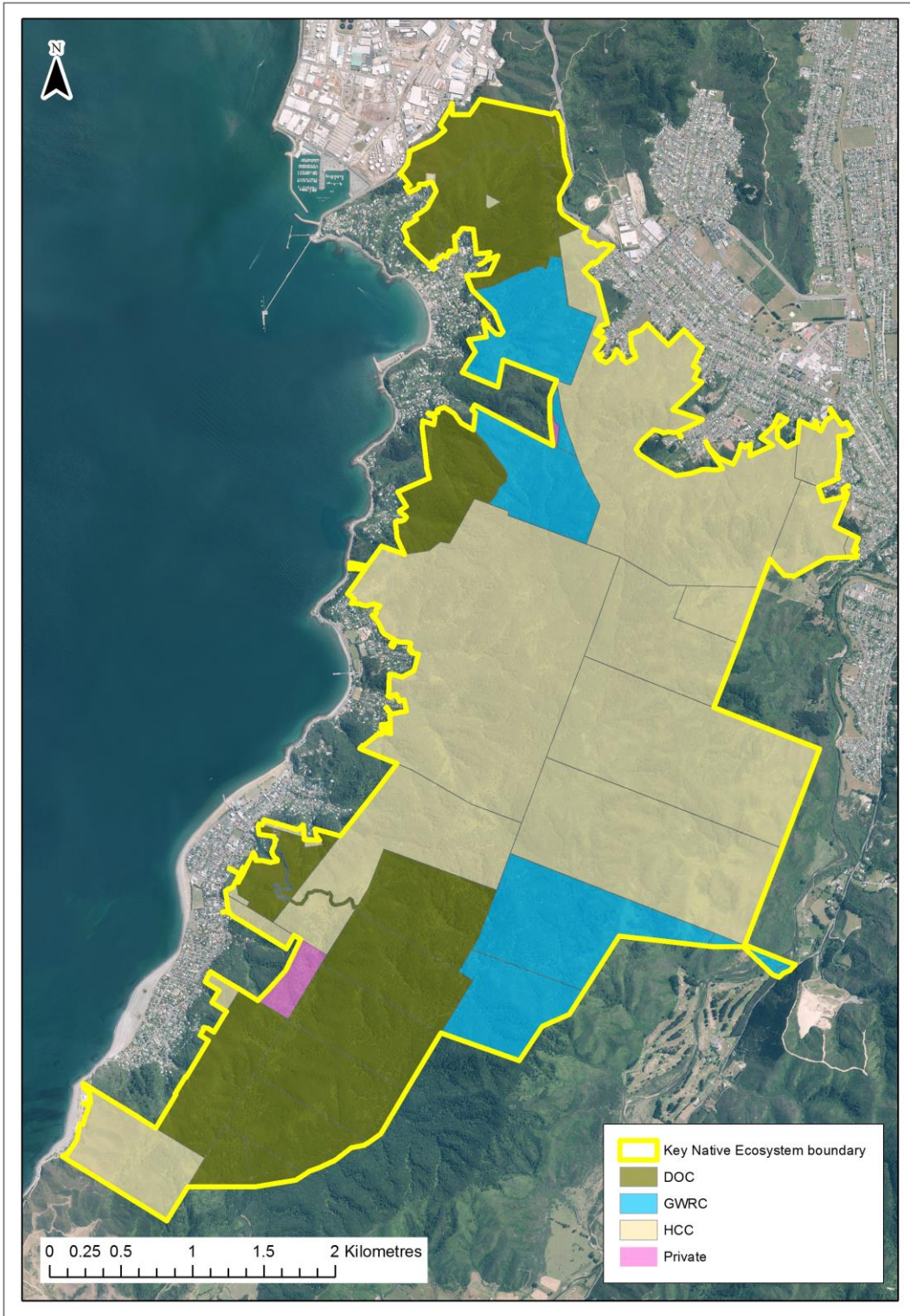
Appendix 1: Site maps



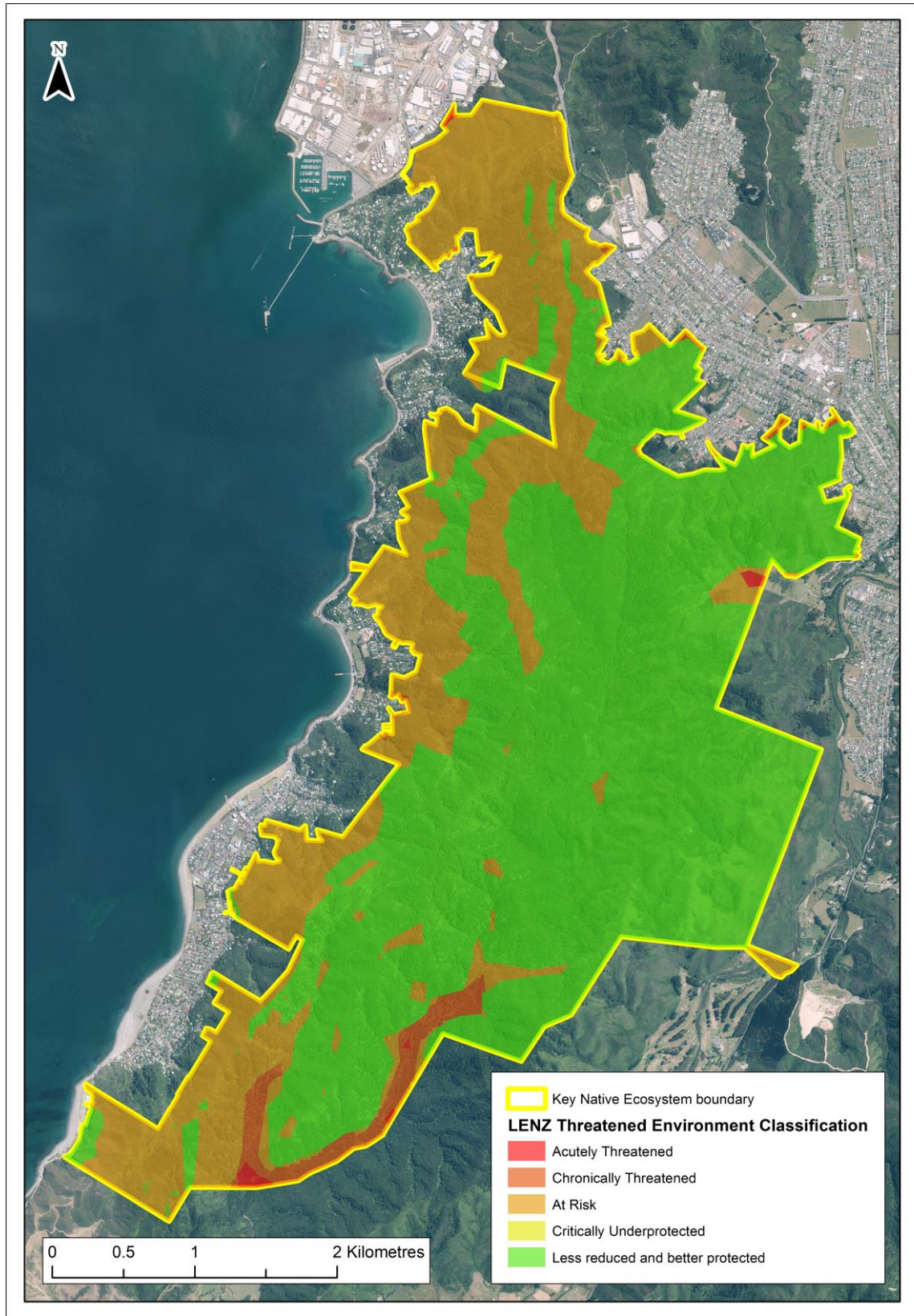
Map 1: East Harbour Northern Forest KNE location and boundary.



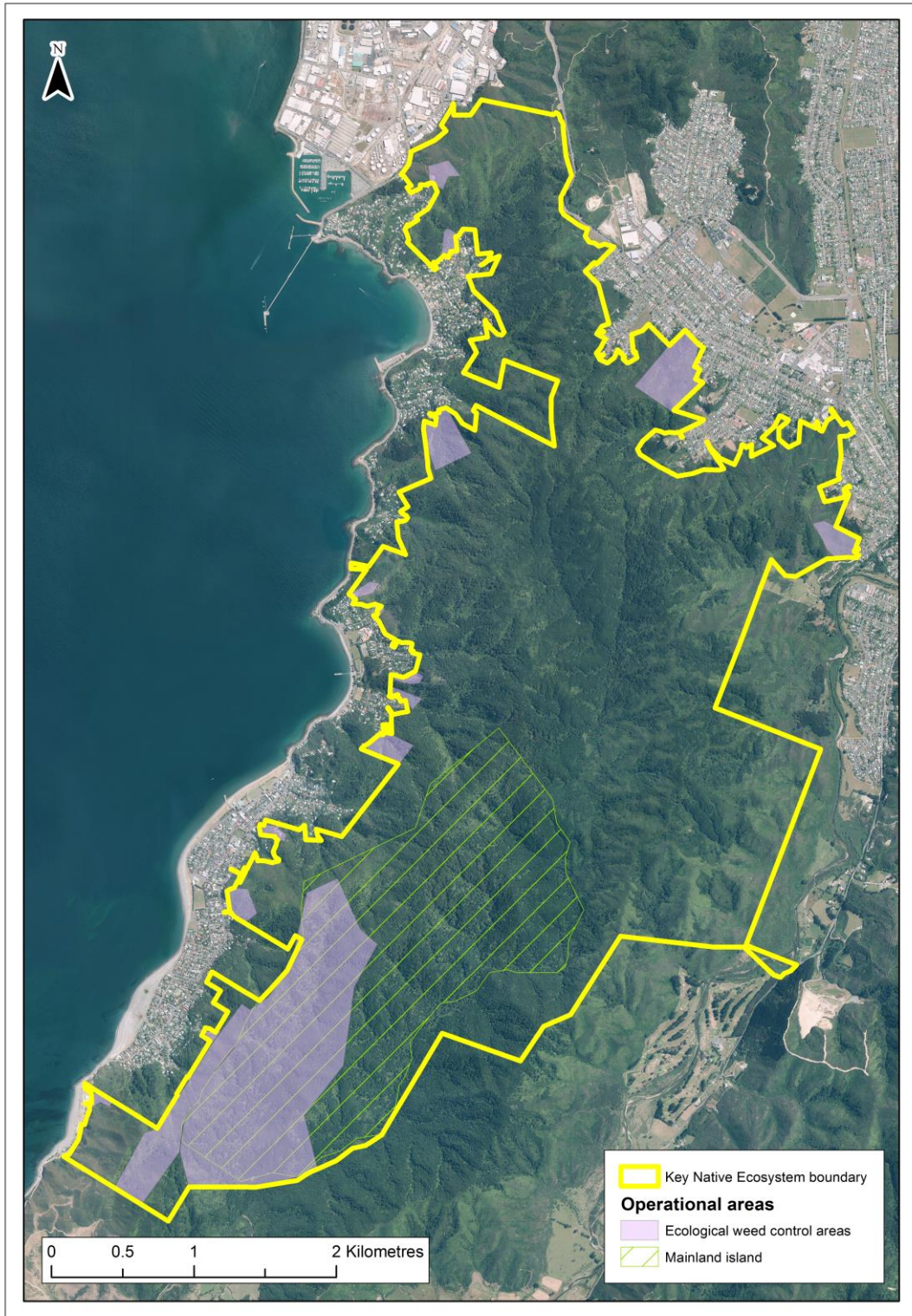
Map 2: Legally protected areas within the East Harbour Northern Forest KNE.



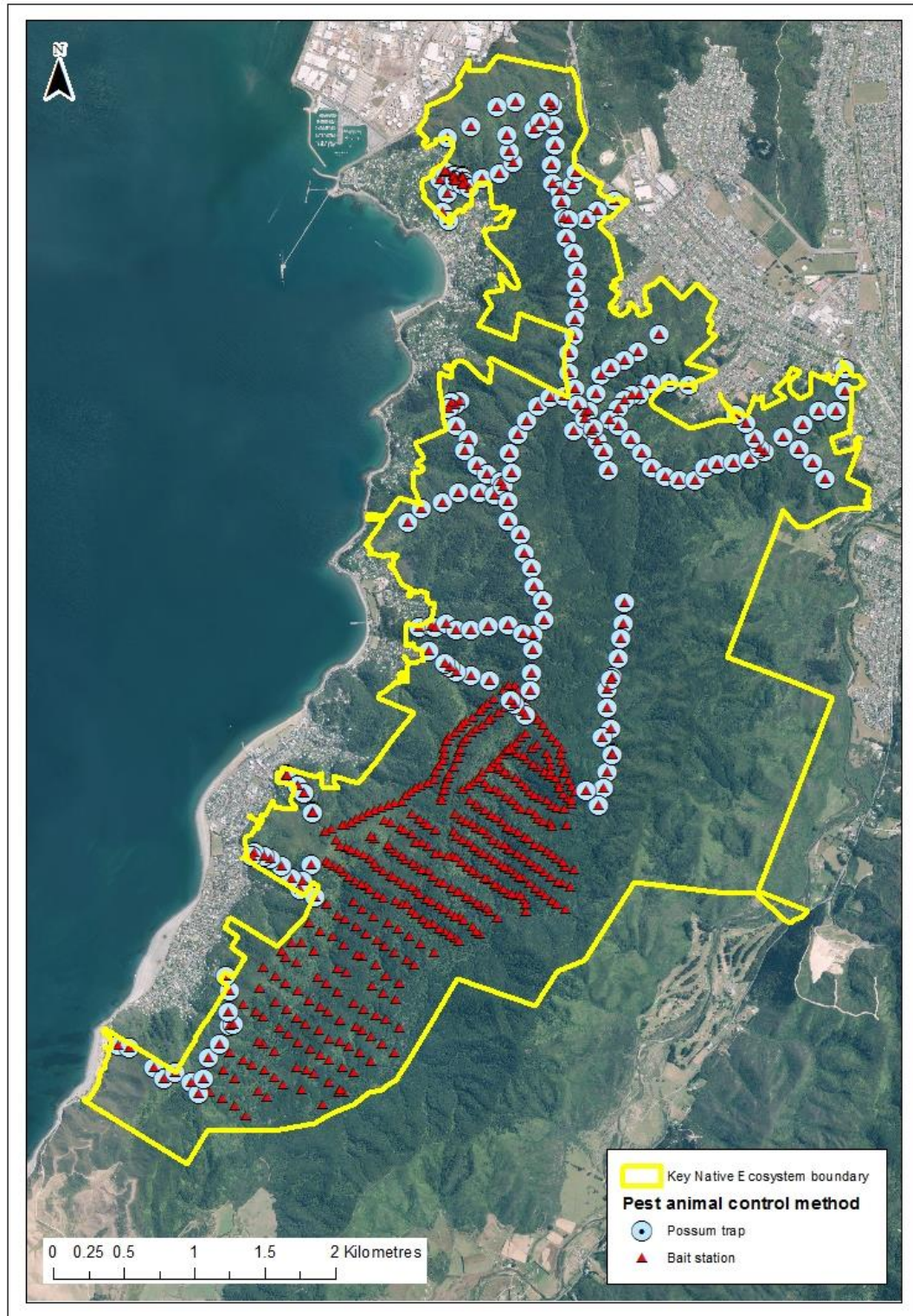
Map 3: East Harbour Northern Forest KNE land tenure.



Map 4: Land Environments of New Zealand Threatened Ecosystems for East Harbour Northern Forest KNE.



Map 5: Operational areas within the East Harbour Northern Forest KNE.



Map 6: Aerial image showing the traps and bait stations that are mapped within the East Harbor Northern Forest KNE prior to implementation of this plan. This map does not show all the traps and bait stations that are currently in this KNE.

Appendix 2: Threatened species list

The New Zealand Threat Classification System lists extant species according to their threat of extinction. The status of each species group (birds, plants, reptiles, etc) is assessed over a three-year cycle³⁰. Species are regarded as Threatened if they are classified as Nationally Critical, Nationally Endangered or Nationally Vulnerable. They are regarded as At Risk if they are classified as Declining, Recovering, Relict or Naturally Uncommon.

The following table lists threatened species that are known to live within the KNE.

Table 5: Threatened species at East Harbour Northern Forest KNE.

Scientific name	Common name	Threat status	Source
Plants(vascular)³¹			
<i>Adelopetalum (Bulbophyllum) tuberculatum</i>	Bulb leaf orchid	Naturally Uncommon	Sawyer, 2005 (Butterfly Creek)
<i>Botrychium australe</i>	Parsley fern	Naturally Uncommon	Sawyer, 2005 (Mt Hawtrey Bush and Butterfly Creek)
<i>Brachyglottis kirkii</i>	Kirk's tree daisy	Declining	Sawyer, 2005 (Lowry Bay and Mt Hawtrey Bush)
<i>Chenopodium allanii</i>		Naturally Uncommon	Sawyer, 2005 (Days Bay)
<i>Corunostylis nuda</i>	Red leek orchid	Naturally Uncommon	Sawyer, 2005 (Days Bay and Muritai Park)
<i>Drymoanthus flavus</i>	Little spotted moa	Naturally Uncommon	Sawyer, 2005 (Days Bay, Point Webb and Rona Bay)
<i>Hypolepis dicksonioides</i>	Giant hypolepis	Naturally Uncommon	Sawyer, 2005 (Mt Hawtrey Bush and Butterfly Creek to Gollans)
<i>Liguella puberula</i>	Dwarf greenhood orchid	Nationally Vulnerable	Sawyer, 2005 (Days Bay)
<i>Melicytus obovatus</i>		Naturally Uncommon	Sawyer, 2005 (Point Howard)
<i>Peraxilla tetrapetala</i>	Red mistletoe	Declining	Sawyer, 2005 (Muritai, Eastbourne, Mackenzie track and Butterfly Creek)
<i>Plumatochilus tasmanica</i>	Plumed greenhood orchid	Nationally Vulnerable	Sawyer, 2005 (Days Bay – very old record)

Scientific name	Common name	Threat status	Source
<i>Ranunculus macropus</i>	Swamp buttercup	Data Deficient	Sawyer, 2005 (Mt Hawtrey Bush and Butterfly Creek)
<i>Rorippa divaricate</i>	New Zealand water cress	Nationally Vulnerable	Enright 2014 (specimen from EHNF held in Allan Herbarium, Lincoln)
<i>Streblus banksii</i>	Large leaved milktree, tūrepo	Relict	Sawyer, 2005 (Lowry Bay)
Birds³²			
<i>Acanthisitta chloris granti</i>	North Island rifleman	Declining	www.ebird.org (December 2012)
<i>Cyanoramphus novaezelandiae novaezelandiae</i>	Red crowned parakeet	Relict	www.ebird.org (December 2012)
<i>Endynamys taitensis</i>	Long-tailed cuckoo, koekoeā	Naturally Uncommon	www.ebird.org (December 2012)
<i>Falco novaeseelandiae sensu stricto</i>	Bush falcon, kārerea	Nationally Vulnerable	www.ebird.org (December 2012)
<i>Phalacrocorax carbo</i>	Black shag, black cormorant, kawau	Naturally Uncommon	www.ebird.org (December 2012)
<i>Phalarocorax melanolettrus breoirostris</i>	Little shag, white-throated shag, little pied shag, kawau paka	Naturally Uncommon	www.ebird.org (December 2012)
<i>Nestor meridionalis</i>	North Island kākā	Nationally Vulnerable	www.ebird.org (December 2012)
Reptiles³³			
<i>Oligosima ornatum</i>	Ornate skink	Declining	Herpetofauna database (June 2010)
<i>Naultinus punctatus</i>	Wellington green gecko	Declining	Herpetofauna database (June 2010)
Freshwater fish³⁴			
<i>Anguilla dieffenbachii</i>	Longfin eel	Declining	NIWA National Freshwater Fish Database (December 2012)

Scientific name	Common name	Threat status	Source
<i>Galaxias argenteus</i>	Giant kōkopu	Declining	NIWA National Freshwater Fish Database (December 2012)
<i>Galaxias maculatus</i>	Inanga	Declining	NIWA National Freshwater Fish Database (December 2012)
<i>Geotria australis</i>	Lamprey	Declining	NIWA National Freshwater Fish Database (December 2012)
<i>Gobiomorphus huttoni</i>	Redfin bully	Declining	NIWA National Freshwater Fish Database (December 2012)
Invertebrates (lepidoptera – butterflies and moths) ³⁵			
<i>Dodonidia helmsii</i>	Forest ringlet butterfly	Relict	Owen Spearpoint, GWRC, pers comm 2009.

Appendix 3: Regionally and locally threatened species list

The following table lists threatened species that are known to live within the KNE.

Table 6: Threatened species at East Harbour Northern Forest KNE.

Scientific name	Common name	Threat status	Source
Plants³⁶			
<i>Adelopetalum (Bulbophyllum) tuberculatum</i>	Bulb leaf orchid	Regionally Data Deficient	Sawyer, 2005 (Butterfly Creek)
<i>Adiantum diaphanum</i>	Small maidenhair	Locally Rare in Wellington	Sawyer, 2005 (Days Bay)
<i>Botrychium australe</i>	Parsley fern	Regionally Critical	Sawyer, 2005 (Mt Hawtrey Bush and Butterfly Creek)
<i>Botrychium biforme</i>	Fine-leaved parsley fern	Regionally Susceptible	Sawyer, 2005 (Butterfly Creek)
<i>Brachyglottis kirkii</i>	Kirk's tree daisy	Regionally Critical	Sawyer, 2005 (Lowry Bay and Mt Hawtrey Bush)
<i>Carex diandra</i>	Sedge	Regionally Data Deficient	Sawyer, 2005 (Eastbourne)
<i>Drymoanthus adversus</i>	Drymoanthus	Uncommon in Wellington and the Hutt	Sawyer, 2005 (Eastbourne hills)
<i>Gonocarpus incanus</i>		Regionally Sparse	Sawyer, 2005 (Mt Hawtrey and between Days Bay and Eastbourne)
<i>Ichthyostomum pygmaeum</i>	Bulb leaf orchid	Rarely recorded in Wellington region	Sawyer, 2005 (Days Bay, Butterfly Creek to Gollans Valley)
<i>Libertia edgariae</i>	Edgars Iris, Edgars Mikoikoi	Regionally Range Restricted	Sawyer, 2005 (Eastbourne hills)
<i>Lindsaea linearis</i>	Fern	Locally Rare in Wellington and in decline	Sawyer, 2005 (Butterfly Creek, Kowhai St track, Lowry Bay Scenic reserve)
<i>Melicytus obovatus</i>		Regionally Critical	Sawyer, 2005 (Point Howard)

Scientific name	Common name	Threat status	Source
<i>Metrosideros robusta</i>	Northern rātā	One of the region's most significant populations of this species	Sawyer, 2005 (Eastbourne hills)
<i>Morelotia affinis</i>	Morelotia	Regionally Sparse	Sawyer, 2005 (Days Bay and Butterfly Creek)
<i>Nestegis montana</i>	Narrow leaved maire	Very rare in Wellington, one of three known sites	Sawyer, 2005 (Muritai)
<i>Pittosporum divaricatum</i>		Widespread throughout the region but never found in abundance	Sawyer, 2005 (Eastbourne hills)
<i>Pterostylis cardiostigma</i>	Greenhood orchid	Regionally Sparse	Sawyer, 2005 (Lowry Bay, Days Bay and Mt Hawtrey Bush)
<i>Schizaea bifida</i>	Forked comb fern	Regionally Critical	Sawyer, 2005 (Days Bay and Eastbourne)
<i>Syzygium maire</i>	Swamp maire, waiwaka	Locally Rare due to destruction and modification of much of the region's wetlands	Sawyer, 2005 (Lowry Bay Scenic Reserve, Mt Hawtrey Bush, Butterfly Creek)
<i>Teleoschistes flavicans</i>	Lichen	A rare lichen often found in association with rare native grasses	Sawyer, 2005 (York Bay)
Birds³⁷			
<i>Nestor meridionalis septentrionalis</i>	North Island kākā	Regionally Rare	www.ebird.org (December 2012)
<i>Phalarocorax melanolettros breoirostris</i>	Little shag, white-throated shag, little pied shag, kawau paka	Regionally Rare	www.ebird.org (December 2012)
<i>Petroica longipes</i>	North Island robin	Regionally Rare	www.ebird.org (December 2012)

References

- ¹ Greater Wellington Regional Council. 2010. Biodiversity Strategy 2011-21.
- ² Crisp P. 2011. Unpublished report: Regionally significant ecosystems: ecological criteria of representativeness, diversity, rarity and ecological context used in the GWRC Regional Policy Statement (2012) to define regionally significant ecosystems.
- ³ McEwen WM (Editor). 1987. Ecological regions and districts of New Zealand. Third revised edition. Department of Conservation, Wellington, New Zealand.
- ⁴ Greater Wellington Regional Council. 2010. Parks Network Plan.
- ⁵ Greater Wellington Regional Council. 2007. East Harbour Regional Park Resource Statement.
- ⁶ Hunt S. 1994. Butterfly Creek. A visitor's guide to the forests between Eastbourne and Wainuiomata. Eastbourne Forest Rangers, Eastbourne, New Zealand.
- ⁷ Joy M, Hewitt A. 2002. Freshwater fish survey of selected sites for Wellington Regional Council. Institute of Natural Resources-Ecology, Massey University.
- ⁸ Walker S, Cieraad E, Grove P, Lloyd K, Myers S, Park T, Porteous T. 2007. Guide for the users of Land Environments Classification. Landcare Research Manaaki Whenua.
- ⁹ Sawyer J. 2005. Native Plants of the Eastbourne Hills, status and conservation management. Department of Conservation, Wellington, New Zealand.
- ¹⁰ Nikki McArthur, GWRC, pers comm 2012.
- ¹¹ Owen Spearpoint, GWRC, pers comm 2012.
- ¹² Pekelharing CJ, Parkes JP, Barker RJ. 1998. Possum (*Trichosurus vulpecula*) densities and impacts on Fuchsia (*Fuchsia excorticata*) in South Westland, New Zealand. *New Zealand Journal of Ecology* 22(2): 197-203.
- ¹³ Sweetapple PJ, Fraser KW, Knightbridge PI. 2004. Diet and impacts of brushtail possum populations across the invasion front in South Westland, New Zealand. *New Zealand Journal of Ecology* 28(1): 19-33.
- ¹⁴ Stewart GH, Wardle JA, Burrows LE. 1987. Forest understorey changes after reduction in deer numbers, Northern Fiordland, New Zealand. *New Zealand Journal of Ecology* 10:35-42.
- ¹⁵ O'Connor S, Kelly D. 2012. Seed dispersal of matai (*Prumnopitys taxifolia*) by feral pigs (*Sus scrofa*). *New Zealand Journal of Ecology* 36(2): 228-231.
- ¹⁶ Spitzen-van der Sluijs AM, Spitzen J, Houston D, Stumpel AHP. 2009. Skink predation by hedgehogs at Macraes Flat, Otago, New Zealand. *New Zealand Journal of Ecology* 33(2): 205-207.
- ¹⁷ Jones C, Moss K, Sanders M. 2005. Diet of hedgehogs (*Erinaceus europaeus*) in the upper Waitaki Basin, New Zealand: Implications for conservation. *New Zealand Journal of Ecology* 29(1): 29-35.
- ¹⁸ Daniel MJ. 1973. Seasonal diet of the ship rat (*Rattus r. rattus*) in lowland forest in New Zealand. *Proceedings of the New Zealand Ecological Society* 20: 21-30.
- ¹⁹ Beggs JR, Rees JS. 1999. Restructuring of *Lepidoptera* communities by introduced *Vespula* wasps in a New Zealand beech forest. *Oecologia* 119: 565-571.
- ²⁰ Joy M, Hewitt A. 2002. Freshwater fish survey of selected sites for Wellington Regional Council. Institute of Natural Resources-Ecology, Massey University.
- ²¹ McIntosh AR, McHugh PA, Dunn NR, Goodman JM, Howard SW, Jellyman PG, O'Brien LK, Nystrom P, Woodford DJ. 2010. The impact of trout on galaxiid fishes in New Zealand. *New Zealand Journal of Ecology* 34(1): 195-206.
- ²² Smale MC, Dodd MB, Burns BR, Power IL. 2008. Long-term impacts of grazing on indigenous forest remnants on North Island hill county, New Zealand. *New Zealand Journal of Ecology* 32(1): 57-66.
- ²³ Joy M, Hewitt A. 2002. Freshwater fish survey of selected sites for Wellington Regional Council. Institute of Natural Resources-Ecology, Massey University.
- ²⁴ Joy M, Hewitt A. 2002. Freshwater fish survey of selected sites for Wellington Regional Council. Institute of Natural Resources-Ecology, Massey University.
- ²⁵ Greater Wellington Regional Council. 2005. Pest plant control plan 2005-2009 (WGN_DOCS271450).
- ²⁶ Greater Wellington Regional Council. 2004. East Harbour possum and predator control programme 2003-2004.
- ²⁷ O'Donnell CFJ, Hoare JM. 2012. Quantifying the benefit of long-term integrated pest control for bird populations in a New Zealand temperate rainforest. *New Zealand Journal of Ecology* 36(2): 131-140.

-
- ²⁸ Spurr EB, Anderson SH. 2004. Bird species diversity and abundance before and after eradication of possums and wallabies on Rangitoto Island, Hauraki Gulf, New Zealand. *New Zealand Journal of Ecology* 28(1): 19-33.
- ²⁹ Kelly D, Geldenhuis A, James A, Holland EP, Plank MJ, Brockie RE, Cowan PE, Harper GA, Lee WG, Maitland MJ, Mark AF, Mills JA, Wilson PR, Byrom A. 2012. Of mast and mean: differential-temperature cue makes mast seeding insensitive to climate change. *Ecology Letters* 16(1): 90-98.
- ³⁰ Department of Conservation. 2008. *New Zealand Threat Classification System manual*.
- ³¹ Lange P, Rolfe J, Champion P, Courtney S, Heenan P, Barkla J, Cameron E, Norton D, Hitchmough R. 2013. Conservation status of New Zealand indigenous vascular plants, 2012. *New Zealand Threat Classification Series 3*. 70p.
- ³² Robertson H, Dowding J, Elliot G, Hitchmough R, Miskelly C, O'Donnell C, Powlesland R, Sagar P, Scofield P, Taylor G. 2013. Conservation status of New Zealand birds 2012. *New Zealand Threat Classification Series 4*. 22p.
- ³³ Hitchmough R, Anderson P, Barr B, Monks J, Lettink M, Reardon J, Tocher M, Whitaker T. 2013. Conservation status of New Zealand reptiles, 2012. *New Zealand Threat Classification Series 2*. 16p.
- ³⁴ Allibone R, David B, Hitchmough R, Jellyman D, Ling N, Ravenscroft P, Waters J. 2010. Conservation status of New Zealand freshwater fish, 2009. *New Zealand Journal of Marine and Freshwater Research* 44: 271-287.
- ³⁵ Stringer IAN, Hitchmough RA, Dugdale JS, Edwards E, Hoare RJB, Patrick BH. 2012b. The conservation status of New Zealand Lepidoptera. *New Zealand Entomologist* 35: 120–127.
- ³⁶ Sawyer J, 2005. *Native plants of the Eastbourne hills, status and conservation management*. Department of Conservation, Wellington, New Zealand.
- ³⁷ Nikki McArthur, GWRC, pers comm 2012.

The Greater Wellington Regional Council promotes **Quality for Life** by ensuring our environment is protected while meeting the economic, social and cultural needs of the community

For more information contact the Greater Wellington Regional Council:

Wellington office
PO Box 11646
Manners Street
Wellington 6142

T 04 384 5708
F 04 385 6960

Upper Hutt office
PO Box 40847
Upper Hutt 5018

T 04 526 4133
F 04 526 4171

Masterton office
PO Box 41
Masterton 5840

T 06 378 2484
F 06 378 2146

Follow the Wellington
Regional Council



info@gw.govt.nz
www.gw.govt.nz

June 2014
eDocs #1369367
GW/BD-G-14/56



Please recycle
Produced sustainably