DESIGNED ECOLOGIES

BREAKING AWAY FROM ISLANDISED CONSERVATION

BY
ELVINA QUARTERMAIN

DESIGNED ECOLOGIES

BREAKING AWAY FROM ISLANDISED CONSERVATION

the role of **designed ecologies** in the
management of our ecosystems
and natural resources

BY
ELVINA QUARTERMAIN

A 120-point thesis written toward a
Masters in Landscape Architecture

Victoria University of Wellington
School of Architecture
2016

ABSTRACT

This research investigates the role of designed ecologies in the management of our ecosystems and natural resources. It argues that society has adopted a 'protectionist' approach toward the planning of our landscapes which in turn has had a detrimental effect on the integration between conservation and occupation. The topic of diminishing landscapes has become increasingly more apparent within recent years and has had a significant contribution toward such approach. With concerns around global warming, climate change and an increase in population, methods of counteraction toward the decline of our native species has become of fundamental importance. It is evident that ecosystems and natural resources provide a vital component toward our livability and therefore planning their resilience is crucial. Various policies have been established to constrain and restrict development in order to protect these ecologies, often within areas of national significance e.g. national parks. These implications have proven to be successful in their intention however, the focus of concern lies in the lack of integral thinking on approach to these spaces. Conservation, as it stands, is weighted significantly toward the islandisation of areas with little to no interaction or benefit to those who are expected to protect them. Looking toward theories centred around productive landscapes and the balance of untouched nature verse those that are interpreted, this research seeks understanding of compromise and compliment. It aims to define a new design approach which 1) engages with traditional aims to ensure our enjoyment of these ecologies is sustained for future generations, and 2) makes more efficient use of such asset in the way these spaces are utilised on a day to day basis. Four different approach methods have been tested and are outlined as follows in an attempt to determine a framework for integration. Though the following was formulated from a design perspective, the critique should not be constricted to simply one discipline but instigate a dialogue of discussion between architects, planners, ecologists, environmentalists, politicians and so forth. These methods should be critiqued on the success of integration between conservation and occupation in order to establish a design process which enables hybridised ecologies to coexist and function simultaneously. Successful implications of such model will use landscape architecture as a means to breathe new life back into these spaces, breaking away from islandised conservation and into a new era of dual functioning resilient outcomes.

fig2. Artyfilms Tumblr - View of Kapiti Island, New Zealand. Online Image. Sep 2015

ACKNOWLEDGEMENTS

This piece of work would not have been possible if it weren't for the following amazing people;

Martin Bryant
Sam Kebbell
Bruno, Penny, Peter, Carles
My family
Dange, Liam, William
My other family aka the Lone Star team
Landscape crew
Team Kapiti
General advise givers
All the students I have either taught or mentored

You have all inspired me.

RESEARCH PROGRESSION

	Title Page	i
	Abstract	ii
	Acknowledgements	iii
	Table of Contents	iv
01	RESEARCH INTRODUCTION PROBLEM AND PROPOSITION ISLANDISED CONSERVATION	2 4-5
02	PRESERVATION OF OUR SYSTEMS THE PRODUCTIVE LANDSCAPE LITERATURE REVIEW	9-10 14-15
03	INTRODUCTION TO KAPITI SITE AT MACKAY'S CROSSING CONTEXT ANALYSIS	20 26
04	PRELIMINARY DESIGN REINVENTING THE APPROACH	31
	i site analysis approach	33
	ii kpi approach	41
	iii spatial approach	61
	iv method approach	67
05	DEVELOPED DESIGN WORKING ECOLOGIES	79
	i restoration nurseries	82
	ii market gardens	86
	iii ecoduct	90
	iv forestry nurseries	94
	v forestry pockets	98
06	REFLECTION CONCLUSION AND CRITIQUE	104
	References	v
	Fig sources	vi

O ISLANDISED 1 CONSERVATION

01.1

RESEARCH INTRODUCTION

INTRODUCTION TO CONSERVATION AND IT'S CURRENT INITIATIVES, THE TENDENCIES IN APPROACH

fig3. DOC - Karearea. Online Image. Dec 2015

KEY DISCUSSION:

- Decline of native flora and fauna in New Zealand
- Conservation and Biodiversity values
- Production and preservation methods
- The problems associated with Islandisation
- Proposition of Hybridisation
- Methodology

"It is the nearest thing to studying life on another planet" - Jared Diamond (Author, physiologist, evolutionary biologist and biogeographer, on New Zealand's native plants and animals).

The history of conservation in New Zealand generally follows the sequence of abundance, decline and attempt toward resurrection. Abundance was gifted to New Zealand on segregation from Gondwana land, leaving an untouched sanctuary that allowed many indigenous flora and fauna species to evolve and flourish in isolation. Predominantly, and most remarkably, was the apparent bird life found in New Zealand which included many large and flightless species unknown to anywhere else in the world. The unique and endemic formation, or in fact islandisation, ironically mirrors the problem we are faced with at the regional scale today. After millions of years in isolation, the inevitable reality of occupation finally came about and with that an introduction to a lot of adverse effects instigating the first wave of slow decline of our indigenous species. Their inability to adapt to the strains of outer influence and the ignorance of those involved in early settlement saw the dwindling of species and a rapid loss of habitat within our environments, in some cases eventuating in extinction. Here we can observe the obvious tensions rising between the conservation of natural systems and the adverse effects that are present through human occupation. It wasn't until the mid-19th century that awareness surrounding these adverse effects became evident through the second wave of massive decline to both indigenous Maori and European settlers. This saw not just our native forests be cleared for grassland but the extensive destruction of wetlands, dune lands, river and lake systems, and coastal areas. Use of the term conservation was introduced and actions were taken from both parties to resurrect these effects in order to ensure the longevity of our natural entities.

The terminology of conservation took presence in the form of both production, aligning more commonly today with the term sustainable use or reviewed in association to the 'working landscape', and preservation, which involved the restriction of use and the ever contested notions of leaving nature as it was and should always be. The forestry industry, for example, were self-governed conservators for ensuring timber supplies were made abundant for the benefit of future generations. Maori practices of tikanga (protocols), tapu (sacred prohibitions) and rahui (temporary restrictions), to enable food source to regenerate before further harvest, was actioned by many tribes in order to sustain supplies that were traditionally plentiful within the land. Sustainable use of resource is and will always be a key aspect in the environmental management and planning for Maori. The ideology also gave life to the first national park, Tongariro, passed over to the crown by Ngati Tuwharetoa in 1887 in an attempt to protect the national asset whilst give opportunity for others to admire it. The Scenery Preservation Act was established in 1903 in accordance with the growing aspect of tourism in New Zealand which aided in the protection of existing reserves as well as facilitating the ability to make additional reserves. This shift was amplified further toward preservation in the second half of the 20th century with an increase in protest due to the undeniable lack of original native forest left in New Zealand and the effects of such reality at both the local and global scale. Further human occupation and associated influences saw the extinction of 32 percent of our indigenous land and freshwater birds, 18 percent of endemic sea birds, various frogs and invertebrates as well as some of our animals and plants (Biodiversity govt). The discovery of the takahe, a native bird thought already to be extinct, was made in Fiordland in 1948 raising heightened awareness specifically toward the severity of the risk that native fauna species are faced with. In 1986 the Ministry for the Environment was set up to look after any environmental issues and establish the necessary planning methods to counteract the concerns voiced by the public. The following year saw the formation of the Department of Conservation and the 1987 Conservation Act

"Conservation means the preservation and protection of natural and historic resources for the purpose of maintaining their intrinsic values, providing for their appreciation and recreational enjoyment by the public, and safeguarding the options of future generations." - Conservation Act 19

fig4. Biodiversity NZ - Native versus introduced vascular plants. Online Image. Feb 2016

fig5. Biodiversity NZ - Trends in biodiversity decline. Online Image. Feb 2016

to provide the on-going support and maintenance required to enable outcomes set out by the government.

01.2

PROBLEM WITH ISLANDISATION

ISLANDISATION AND THE ADVERSE ASSOCIATED EFFECTS; WHERE IS THE HUMAN INTEGRATION?

Today, as previously outlined, sees conservation weighted significantly toward the islandisation of areas with little to no interaction or benefit to those who are expected to protect them. Likewise, these ecologies are left in a state of preserve and are unable to adapt and evolve at the pace essential if we are to reach an equilibrium.

By continuing along the current tendencies of planning and management methods toward conservation, we are in fact delaying the inevitable of which we have been faced with right from the beginning. The rapid decrease in land available to host these natural ecologies is of great concern and leaving ecologies again in a vulnerable position of compromise. As human population grows and the demand for further development becomes more and more apparent, native forest and protected land areas are increasingly under threat of reduction.

fig6. Conservation and Occupation divide diagrams. Author's Own.

01.3

HYBRIDISATION PROPOSITION

A NEW ERA OF CONSERVATION; HYBRIDISATION OF ECOLOGIES AND HUMAN OCCUPATION

The current approach to the contingency (when it is too late) can be defined by a two-step process; 1) identify the situation of decline, and 2) relocate the endangered or implement structured restoration of site toward its original form. It is therefore imperative throughout this research to find ways in developing a design approach which looks at occupational development as a way to enable the functioning of ecologies right from the get go, particularly those that are endangered or of great cultural significance. It aspires to push for a third step in the process that allows integration of occupation among these restored areas of significance.

It aims to enable a view on approach toward conservation that both compliments production and preservation requirements and puts the question out there. The intension is a shift in approach toward these spaces by breaking away from the original ideology of islandisation and toward a new model of **hybridisation**. This research therefore intends to; 1) explore hybridised approach methodologies between the integration of conservation and occupation, and 2) design appropriate ecological solutions that accommodate the integration of conservation and occupation.

fig7. Hybridised model diagram. Author's Own.

The following starts by looking into theories surrounding various methods of conservation both in the context of preservation and in the context of productive landscapes. Both form arguments which need to be understood in full before the process of design begins in order to inform a methodology which progresses from past failures and builds upon past success. Critique is made based on the strengths and weaknesses of both methods and looks at various case studies to enable inspiration. We then draw attention to Kapiti Coast, New Zealand, where this research will be focused. It will look toward landscape architecture as a means to break away from islandised conservation and begin by outlining key issues relevant within the context of the coastal area. These include its past and existing ecologies, the increase in development and associated strains on its environment, and the potential areas for conservation experimentation. It further concentrates on Queen Elizabeth Park and Whareroa Farm as the primary site to host these experiments, finding where these tensions lie and how they may be addressed through the process of design methodology. Undertaking four different design-led approach methods in relation to the site at MacKay's crossing, it will attempt to better understand our natural systems and the way they can coexist and function simultaneously with occupation. The research employs various design agents to determine site choice across the four approaches in relation to natural ecologies and human occupation before the construction of the working detailed design is developed.

02 LITERATURE REVIEW

02.1

PRESERVATION OF OUR SYSTEMS

THE TYPICAL VIEW ON CURRENT CONSERVATION AND THAT WHICH IS UNREALISTIC

Human's themselves have always had an obsession with the wilderness or getting back to nature. There is something very primal and attractive about an untouched, unmodified landscape that has been imbedded into our bones and passed down through our ancestors who once lived, hunted and gathered the land. The terminology around the word landscape, and many a definition, is noted by that of the picturesque and by that which is seen and not touched. This conflicts with notions of occupation and inhabitancy as human desires lead more toward invasion and settlement within these spaces. Due to certain aspects of resource and habitat opportunity, this particular terminology toward landscape also grants similar appeal and success rates toward the preservation of our natural ecologies. The natural reaction in fact toward preservation, or today's general view of conservation, is that which is present within these isolated masses in the form of relief or refuge. These notions mimic those of nature as it were in isolation or solitude and is apparent in the direct enforcement taken when acting upon conservation. (Cosgrove, 2004)

When humans are faced with concerns of environmental decline or possible extinction of our native species, the rule to enforce this distance upon ourselves takes action. The compromise made by alienating these processes is by all means an inefficient use of space,

particularly in this day and age where landscape in its entirety is a precious commodity. Unfortunately due to the imbalance between human occupation and conservation we have given ourselves the ultimatum between the two. This approach concedes the first aim throughout this research in that it engages with traditional aims to ensure our enjoyment of these ecologies is sustained for future generations. However, this poses questions toward enjoyment of these spaces or simply observation and appreciation of these spaces. (Stolton and Dudley, 1999)

The islandisation of conservation also wrongly assumes that we have infinite land to isolate or 'put on hold' for ideals toward preservation. This is again both impractical and inefficient, particularly with the growing numbers in population and further need for more space as development becomes high in demand. Landscape, which was once something that we could hide away (or hide away in), is a thing of the past and it is important that through the constructs of sufficient planning and management methods we are able to integrate more efficient use of such asset on a day to day basis. Two forms of conservation are evident through the notion of preservation; 1) the literal sense of the word 'islandise', where ecologies are allocated to an island with no or to little restricted access by human occupation, and 2) the boxed mainland model which looks to constraints of man-made implementation intended toward the same outcome e.g. the fence.

Discussed in “Partnerships for Protection” is the critical challenges faced in the 21st century to ensure that successful protected areas, or conservation in this regard, are treated as integral parts of the landscape. It discusses the clashes between the needs of biodiversity and the needs for people as well as the strategic goal requirements around matching necessities between the two. It calls out the areas deemed for protection, or conservation, as that of convenience opposed to importance and looks at problems associated with cutting off ecosystem processes, in turn aligning with resilient initiatives we aim to achieve through this research.

Also reflective is the reference toward ‘strategic spaces’ however, outlined is the likely possibility of trade-offs being in occurrence between biodiversity conservation and those of human requirement and economy demand. It outlines some new approach initiatives which indicate that protected areas need to; Expand, in size, in concept, in the number of partners involved, in vision (from island to a system), and Connect, to each other, to the wider landscape, to society and the economy and to other countries. These initiatives also align with the aims and objectives set out on beginning this research in that they are all integral ways of defining an approach which works toward a hybridised outcome between conservation and occupation. A portion of the paper refers to the importance surrounding the selection of these protected areas and enlightens some insight toward the design process taken throughout. It reiterates the fact that,

“Selection of protected areas was often made on scenic grounds or because of ease of availability”. It then goes on to say that the challenges associated with the selection of protected areas lies in refining the methodologies taken. Outlined below are two definitions sourced from “Partnerships for Protection” in relation to the protectionist approach;

Category II: National Park:

Protected area managed mainly for ecosystem protection and recreation - natural area of land and/or sea designated to (a) protect the ecological integrity of one or more ecosystems for rent and future generations, (b) exclude exploration or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible. (Stolton and Dudley, 1999)

Category IV: Habitat\species management area:

Protected area managed mainly for conservation through management intervention - area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats to meet the requirements of specific species. (Stolton and Dudley, 1999)

fig8. Arkinthepark.org - Map outlining targeted buffer zone.
Online Image. Dec 2015

Ark in the Park depicts what is known as a successful model of the typical conservation initiative within mainland, New Zealand. Situated in the rain forests of the Waitakere Ranges in the upper most part of New Zealand's north island, the park is a joint partnership between both the Auckland Council and the Forest and Bird organisation. The conservation site itself is deemed revolutionary in that it is fence-free enabling

the natural ecologies to be restored, connect to adjacent forests and reform to their original state. These connections establish a greater network of ecologies and inclusion of router bodies as discussed in "Partnerships for Protection" however fail to identify with the element of human occupation. It is configuration still referred to as a "mainland island" which facilitates an eco-restoration project that focuses on the planning and management around restriction. The restriction is mainly toward that of introduced pests and predators in the adjacent areas opposed to that of people however the same overview of constraint applies. The methods involved in regulating this restriction is in the form of a matrix like system generating a grid of bait stations systematically placed apart in order to counteract these threats. What is interesting more so, and the attraction to this case study in the first place, is the effective planning regimes in accordance with the "Ark in the Park Buffer Zone". Here we see 800 hectares of forest owned by private investors assisting in the provision of control toward the successful habitat of these native species. This affords a secondary sub space for which the park becomes progressively integrated back into areas of conservation and occupation highlighting the importance of neighbouring land owners.

fig9. Ecogecko Consultants - Waitakere Ranges. Online Image. Dec 2015

ARK IN THE PARK PROJECT OVERVIEW

fig10. Janwillemvanaalst - Plan of Oostvaardersplassen. Online Image. Oct 2015

Oostvaardersplassen is a national park site situated in the Netherlands just a small distance from Amsterdam. The site itself was born out of surprise as it was discarded by previous human utilisation and over years reconfigured naturally into what is known today. The area consists of extensive wetland, marsh, reed plains, rugged grasslands and various ponds. These environments provide a snippet of what once occupied most of the area and thus depicts the reason it has been left to propagate uninterrupted. Left to be observed and admired, the park gives yet another typical characteristic of the islandised conservation model in the form of preservation. The park is generally used for that of recreational purpose, which positively expresses and informs its occupants of the natural systems in occurrence throughout the area. Home to many bird and wild life species, the park is successful in its intended conservatory initiative however, due to its extensive population in large herbivore species, the park has suffered from an exhaust of resource. Growing population of particular species that were confined within the restricted areas of Oostvaardersplassen, sharing the same food source, rapidly began to perish in accordance with starvation particularly in winter months. Although this has been contested as a ‘way of nature’, many expressed uproar toward animal welfare in the nature of the park and now management regimes are set in place to counteract suffering. This outlines an interesting paradox between the preservation of natural ecologies and those determined by unavoidable natural cycle and discourse. It brings to question ideals also involving areas of conservation being allocated due to ease of availability however discard the extensive systems in which they should be a part of and those of future evolvments. This informs the importance of context in designing ecologies.

fig11. EM Kintzel, I Van Stokkum - Image of wildlife at Oostvaardersplassen. Online Image. Oct 2015

fig12. NY times link - Walking tracks through Oostvaardersplassen. Online Image. Oct 2015

OOSTVAARDERSPLASSIN

PROJECT OVERVIEW

02.2

THE PRODUCTIVE LANDSCAPE

ANOTHER TAKE ON CONSERVATION AS A MEANS OF SECURITY TOWARD OUR NATURAL RESOURCES

The notion of the productive landscape can be seen quite simply as one that is formed out of human guilt and contingency. The attempt to counteract and resurrect environmental effects of the past sees these spaces of sustainable practice born and the sigh of relief had by many. However, the planning of such spaces sees this concept weighted more toward the landschaften side in the ideologies centred around the landscape verse landschaft contest. Instead of landscape being viewed in a traditional sense, that to be left and admired, these ideals suggest a strong sense of landscape as one which is owned and serves some form of contribution back into society. In conjunction, discussed in "Landscape and Landschaft", is the addition of supply and demand in the contextualisation of settlement patterns and observational aspects forming the land. It is here that we may determine the necessity for people and the importance in human needs within these spaces, often compromised by the protectionist approach toward conservation. This engages with notions of occupation through reference to 'culture' as a medium and the cultural landscape being constituted. Also relevant is the use of mapping patterns of occupation on approach to methods of site analysis, noting particular movement and land use affordance at a suitable scale. (Cosgrove, 2004)

Again faced with concerns of environmental decline or possible extinction of our native species, the notion of conservation shifts back toward the resources involved in human consumption. This approach looks to

embody sustainable use of resource into our landscapes and programs by incorporating environmental systems and the security over these aspects of national 'reserve'. It too concedes the first aim throughout this research in that it engages with traditional aims to ensure our enjoyment of these ecologies is sustained for future generations. However, unlike that of the protectionist approach, it focuses on sustainability of ecologies primarily in the aspect of human use and affordance. This means that the processes and systems which are protected are singled out to those that can be utilised for future consumption or reward. This can see ecologies that have no direct impact toward human resource simply cast aside or ignored, with little consideration of their overall affordability in the greater context taken into account. Due to the success of both people and nature coexisting primarily within these spaces, this concept however expresses the achievement in levels of efficiency through its planning. Weighted heavily on the integration of the system back into society, there are still notable levels of compromise apparent thus this theory is critiqued also on its methods of after-thought. (Yandle, 2001)

Discussed in "Amenity Landownership, Land Use Change, and the Re-Creation of Working Landscapes" is the current trend to resort back to ways of our early ancestors. These methods align with the concept of the productive landscape in that our spaces were, and in massive part still are, a platform for production methods and active stewardship. Likewise are the aligning methods in Maori tradition known as kitiakitanga which surround notions of people playing an active role in the guardianship over our assets. Through the means of landscape architecture these spaces have seen a vast range of ecosystem services again brought back into our

occupied areas, in this sense production and rural landscapes. Active human presence and management within these areas poses to be a vital component as within this integration comes the need for on-going maintenance and observation. Due to ownership constraints differing from one example to the next, it also poses questions in relation to attitude and approach. Integration at a community level is also contested as the relationship between production and supply and demand are apparent. (Abrams and Bliss, 2013)

Also more evident is the activities society has adopted toward smaller self-sufficient methods in their own backyards. These align with productive conservation at the most intimate and more personal scale whilst they also prompt awareness toward varying environmental factors. Here we may see the benefit of personal or direct contact with these systems and the governed responsibility of its livelihood. Slightly larger more communal systems are also in existence in the form of community living or community gardens. While both schemes work in their own integrity, both are still in constant compromise of the alternative due to the weight toward own personal affordance or social aspects. Noted as a valuable potential for the way in which to integrate biodiversity conservation and sustainable use of our natural resources (Phillips 1999),

this research looks toward working, or productive, landscapes for inspiration. Again it is paramount to find a way in approach to designing of these initial spaces around a more hybridised solution that works in conjunction or in compliment of the other. Outlined below is a definition sourced also from “Partnerships for Protection” in relation to the productive approach;

Category VI: Managed resource protected area:

Protected area managed mainly for the sustainable use of natural resources - area containing predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while also providing a sustainable flow of natural products and services to meet community needs. (Stolton and Dudley, 1999)

fig13. Freshkillspark.org - Design entry for Master Site Plan. Online Image. Oct 2015

fig14. Freshkillspark.org - Image of defined zones. Online Image. Oct 2015

Freshkills Park is a model example of an integral design process which looks at the accommodation of a large scaled landfill with applications of environmental sustainability and human program. Situated in Staten Island, New York, the park comprises of a transformation master plan involving 2,200 acres of parkland, designed by Field Operations, which aims to be implemented over the course of 30 years. Because of its extensive size, the park's design begins phasing from the outside in so as to involve and entice people to occupy the park along the edges on commencement of construction. This process is in conjunction with the aim to cultivate new habitats over time and we see progression and use of forecast applied through conceptual design. We also see applied the use of determining frameworks for phasing and implementing specific site locations which will generate life through program early into development. Owned and operated by the New York City Department of Parks and Recreation, the park also focuses its design objectives around current environmental issues and public awareness. A combination of both natural and engineered beauty is intended with creeks, wetlands and expansive meadows alongside notable views of the city scape. The design excels in the way ecologies and program coincide with each other in a hybridised model of integration. Although these spaces are utilised mainly for recreation, they also serve environmental purpose whilst successfully conducting a series of programmatic function.

Connections to adjacent parks on Staten Island can also be commended as well as the use of defined zones in order to optimise different environments and categorise program. These are seen in the form of; 1) The Confluence, 2) Creek Landing, 3) The Point, 4) North Park, 5) South Park, 6) East Park, and 7) West Park.

FRESHKILLS PROJECT OVERVIEW

1 mile

03

CONTEXT
ANALYSIS

03.1

INTRODUCTION TO KAPITI

A LOOK INTO KAPITI COAST, THE DECLINE AND ITS OPPORTUNITIES FOR RESILIENCE

The Kapiti Coast poses a unique opportunity to experiment with issues in context of conservation versus occupation with its vanishing environment, growing population and desperate needs for preservation. Situated along the west coast of New Zealand's north island, Kapiti has seen the effects of global warming and climate change begin to take their toll by its slowly eroding coastlines and concerns around water scarcity. With around forty percent of the world's population settled within 100 kilometres of coastline, Kapiti is a highly desired location with a prominent history of occupation. An extremely popular destination for early Maori and European settlers due to its sufficient resource opportunities and access to the coast for transportation methods, Kapiti is credited a considerable amount due to its historical, cultural and environmental value.

Modifications to the land to provide easy utilisation of such entities and additional advances to further these has over time exhausted the land and the native flora and fauna has unfortunately received the bulk of its repercussions.

What was once a composition of extensive wetland, dune lowland, swamp lowland, generous forest, and various river channels, now comprises of small snippets of boxed conservation areas either in isolate or on the edges of agriculture or forestry. Due to the tendencies in current conservation efforts having focus on native forest areas, the lowland areas like those which frequent Kapiti, are left in a critical condition. This is a typical depiction of New Zealand's more extensive ecosystem reality and one that has seen the decline in our water availability, soil stability and species habitat.

The bird life and the plant communities which once richly occupied all areas from coast to ridge line are now to a small representation of what was once a playground of biodiversity. Snuggled within the shelter of the Tararua Ranges, Kapiti accommodated a migratory zone and still maintains the potential to afford these attributes within its proximity.

fig16. Diagram outlining the decline in continuous ecosystems along Kapiti Coast. Author's Own.

SITUATION OF DECLINE IN CONTEXT

PEKAPEKA TO OTAKI

KAPITI ISLAND

MCKAYS TO PEKAPEKA

I. ISLANDISE

II. BOX-IT-UP

LINDEN TO MCKAYS

WILSONS CREEK PARK

03.2

KAPITI ON CONSERVATION

ISLAND VS. MAINLAND TYPOLOGIES;
INTRODUCTION INTO QUEEN
ELIZABETH PARK AND
WHAREROA FARM

fig18. Wellington.govt - Kapiti birdlife. Online Image. Feb 2016

Two models of conservation, as they stand in preservation sense, are apparent within the scope of Kapiti. These are Kapiti Island, segregated off the west coast and, Queen Elizabeth Park and Whareroa Farm, owned and managed by a mixture of the crown, the Regional Council and the Department of Conservation. Kapiti Island, already isolated, is currently utilised for biodiversity and conservation driven projects with various threatened birds bred in captivity and restricted access permits in place. This highlights the initiative toward the protection of native bird species specifically within Kapiti and the opportunity to expand or conjoin to these current applications. It is here where the focus of this research turns to the mainland model due to its accessibility and vulnerability to outer risk and influence. Situated slightly north of Paekakariki and south of Raumati, the site has around 1,200 hectares of potential coverage and is in further threat of development with the addition of transmission gully currently in the works.

fig19. Diagram of two models of conservation. Aurthor's Own.

THE EXTENSIVE HISTORY OF OCCUPATION WITHIN QUEEN ELIZABETH PARK AND WHAREROA FARM

Both Queen Elizabeth Park and Whareroa Farm have extensive histories of occupation for both Maori and European settlers dating back to the beginning of settlement in New Zealand. For Maori, the site was host to many waterways that channelled between sand dunes and it was said that the people inhabiting the area used waka (Maori canoes) as transportation within these channels from Paekakariki to Waikanae. Crops were also in abundance as Maori cultivated the land for potato, kumara (sweet potato), wheat, maize and flax. Many battles over land ownership and their fertile soils occurred between several tribes and the destruction of crops and abuse of these environments took place in the attempt to gain power. Occupancy of the two sites was taken by European settlers in the early 19th century for safe anchorage of both sailing and transportation ships. Edward Bolton was known as one of the first to take up residence in Whareroa who employed Maori people to assist in logging productions within what he called the 'big swamp'. A beach road was established perpendicular to the coast around 1839 in accordance with the more intensive settlement which was in happening and the demand for an arterial route. This was utilised as the main access and thoroughfare within the area for many

years to come and accommodated small villages taking residence at the mouth of both major waterways now known as Whareroa and Smith streams.

People of both Maori and European descent shared and occupied the land simultaneously until the late 1850's when a majority of the tribe who resided in the area agreed to the handing over of land to the government of around 34,000 acres for a, then substantial, price. This piece of land stretched from Whareroa stream south to the hills and due to some coinciding uproar given by several tribe members, a portion of the land was set aside as a reserve. As farmers began to occupy the area in the second half of the 19th century, including that of Arthur MacKay who brought about the naming of MacKay's crossing, a road which now resembles the current expressway was made as a communication route. An offset connected the road to the original beach road and the creation of the railway which ran from Wellington through the Ngaio Gorge to Johnsonville and finally through to Paekakariki would also be constructed. World War II came around and in the May of 1942 the land was converted into a camping facilities to be used by the United States marine troops. This was an ideal location seeing as the space was the closest rural coastline to Wellington and training regimes centred on beach landing and defence pursuits. With this development also came a series of small commerce enterprises however, these were evidently wiped out when the troops cleared and a commemoration established at what is now MacKay's crossing.

fig20. Kapiti Coast pastperfect - Paekakariki 1953. Online Image. Jan 2016

fig21. Kapiti Coast pastperfect - Paekakariki 1965. Online Image. Jan 2016

fig22. Kapiti Coast pastperfect - Paekakariki 1956. Online Image. Jan 2016

fig23. Steve Attwood - Coastal dune shrubland, Kapiti Coast. Online Image. Jan 2016

03.3

QE PARK AND WHAREROA FARM

THE POTENTIAL AT MACKAY'S CROSSING WITH DEVELOPMENT TO INTEGRATE OCCUPATION

fig24. Stuff - MacKay's Crossing revamp development. Online Image. Oct 2015

Whareroa Farm is currently offered to the public as a recreational park which connects the coast to the prominent Akatarawa Forest, a spur of the Tararua Ranges. A series of tracks can be found for various walking abilities as well as mountain biking, horse riding and general picnicking activities. Likewise, Queen Elizabeth Park has a recreational focus however, unlike Whareroa Farm contains certain areas of restriction to enable for restoration activity to occur along the coast and dune land. These environmental factors within Queen Elizabeth Park can ultimately dictate all notions of land use however, this research will aim to incorporate these issues into the design process establishing for more enhanced systems. Diminishing landscapes, as stated, are an inevitable and it is imperative as a designer to approach site potentials in a way that utilises effective hybridisation of conflicting matter in order to create resilience. Optimisation of affordance given by both conservation and occupation initiatives is key if we are to determine an effective approach. Landscape architecture has the means to apply these principles through a design-led process and to do so in the most practical and most efficient way possible. The design of spaces to be occupied as well as conserved is a somewhat contradictory task however, the site of MacKay's crossing and the adjacent park lands offer the opportunity to do so through creative design application. The first step is to look into the way we approach potential 'conservation' space as a means for conceptual design.

fig25 Queen Elizabeth Park and Whareroa Farm, outlining potential at MacKay's. Author's Own.

03.4

SHIFTING ENVIRONMENTS

CURRENT: SITUATION

1/3 OF DUNES STILL REMAIN UNMODIFIED in QEP
SCATTERED REMNANTS OF OLD SYSTEMS
85% HAS BEEN MODIFIED FOR PRODUCTION
SMALL RESTORATION PROJECTS WITH MINIMAL FUNDING

PAST: BASELINE

MOSAIC OF PLANTING COMMUNITIES
THRIVING WETLANDS AND DUNE SHRUBLAND HABITAT
ESTABLISHED PODOCARP/BROADLEAF FOREST
DIVERSE BIRD POPULATIONS

FUTURE: PROJECTION

1,200 HECTARES OF POTENTIAL
RESTORE AND SHOWCASE DIVERSE PLANTING COMMUNITIES
STABILISE BIRD POPULATIONS ON THE MAINLAND
INTEGRATION OF PROPOSED DEVELOPMENT
INCREASE AMENITY
POTENTIAL EXTERNALISES

fig26. Perspective of site. Aurthor's Own.

0 REINVENTING THE APPROACH 4

04

PRELIMINARY DESIGN

RE-INVENTING THE APPROACH TOWARD THE HYBRIDISATION OF CONSERVATION AND OCCUPATION

fig27. Diagram of current situation with little to no access. Aurthor's Own.

This chapter looks into re-inventing the approach in the planning and management methods taken toward sites allocated for conservation. It considers the role of designed ecologies as a tool for enabling design-led concepts and experimentations which 1) engages with traditional aims to ensure our enjoyment of these ecologies is sustained for future generations, and 2) makes more efficient use of such asset in the way these spaces are utilised on a day to day basis.

The current approach, however successful in its customary intention, has been proven unsuccessful in determining a balance between increased occupation and on-going conservation of these natural systems. The experimentation examines four different design-led approach methods in relation to the site at MacKay's crossing in an attempt to better understand our natural systems and the way they can coexist and function simultaneously with occupation. Again, these methods are generated to focus highly on the integration of both these two entities and enable better resilience of our spaces in dictating a more efficient use of our diminishing landscape. Through the process of preliminary design this investigation aims to find balance and compliment in the form of a hybridised design model that is equally beneficial to both natural ecologies as it is to people. This will be done by the means of environmental provision and localised intervention and success will be determined on whether it meets the brief of breaking away from the impulse of islandisation and toward more dual functioning outcomes.

The four preliminary design approaches which are to be considered and critiqued in conjunction to achieving the aims and objectives of this research are as follows 1) Site Analysis Approach, 2) KPI Ecology Approach, 3) Spatial Approach, and 4) Method Approach. The strengths and weaknesses of each methodology is then analysed with the positives toward the overall objective extracted in order to determine an approach toward the detailed design in the following chapter.

04

i. SITE ANALYSIS APPROACH

ANALYSIS OF CONTEXT IN ORDER TO GENERATE DESIGN THROUGH ITS IMMEDIATE ENVIRONMENT

The preliminary design phase begins by experimenting with a site analysis approach in order to determine current and past ecological and programmatic logistics. These will form a basis for future design development and implementation. Notable features of Whareroa Farm and Queen Elizabeth Park include Whareroa and Smith streams which provide a subtle guideline for the catchment of the area as well as identifying important water drainage systems.

Due to the necessity of fresh water and its affordance to ecological systems, as well as its long history as a resource throughout occupation, these streams will provide a more intimate scope within the context of both parks from which to design in. The parks existence as the last remaining continuous mass running between the coast and ridge line is of paramount importance and in accordance key environments have been analysed which are in occurrence through this connection. It is clear from this mapping that the environments shift systematically from the coast toward the ridge line and from here we can assume that the different primary habitual ecologies would follow this same procession.

For ease of this research these have been categorised into six different environment zones; coastal, wetland, dune lowland, swamp lowland, forest and riverine.

In interesting contrast, the procession of urban development running through the centre of the site in the form of the expressway takes the perpendicular. Symbolically this outlines the tensions we are faced with and literally marks a cut in our continuous natural land mass. This is also shown through the development in adjacent towns as constrained by the natural surrounding environment. This discovery touched on is expanded further through the third 'spatial approach' experiment. Here we focus on the transition between different zones, identifying key bird ecologies across each environment in context with Kapiti's history in bird life and observation. By forming an in depth understanding of the different environmental typologies existing across the site, extracting those features of significance whether it be due to their history or current prominence within the area, we are able to start forming ideas around design intervention.

fig28. Initial hunch sketch of environmental zones. Aurthor's Own.

It is important to make note of these apparent 'features' within each environment in order to instigate interest toward the public and again drive occupational outcomes. Programmatic options that align with ecology, sustainable use and management can then be determined and applied within a more intimate context through use of this methodology.

Critique: Through this process we were able to identify and define key environments of which design could build upon or around. These provided a base structure toward the implementations that would be occurring at the smaller scale in focus on one separate environment at a time to better understand each environment's affordabilities. In terms of design we were able to generate options deemed appropriate for intervention or land use that were in conjunction with environmental benefit. This engages with traditional aims to ensure our enjoyment of these ecologies is sustained for future generations however, the lack of occupation through these programs fail to define more efficient use of such asset in the way these spaces are used every day. These spaces will need to engage more with the public.

fig31. Diagram outlining environments and catchment zone with perpendicular development. Author's Own.

fig32. Site perspective with environments and diagram elevation from coast to ridge. Author's Own.

fig33. Diagram outlining individual environmental zones to generate design. Author's Own.

I. COAST

COASTAL PROTECTION
WIND/EROSION

II. WETLAND

FLOOD CONTROL
BOTANICAL NURSURY

III. DUNE LOWLAND

EVACUATION
TIKOUKA GROVES

fig34. Abstraction of bird typologies and ground conditions apparent. Author's Own.

IV. SWAMP LOWLAND

PEAT MANAGEMENT
SEED DISTRIBUTION

VI. RIVER

SLOPE STABILISATION
WATER STORAGE

V. FOREST EDGE

REGENERATIVE BUSH
REMNANT PLANTING

04

ii. KPI ECOLOGY APPROACH

THE UTILISATION OF SIX KEY STONE BIRD SPECIES TO DRIVE DESIGN DECISIONS AND ENABLE WORKABLE SPACES

The second experiment takes a KPI (key performance indicator) ecology approach and applies parameters around specific key ecologies to drive the design around these spaces. Working in with the six environments outlined in the site analysis approach, this research identifies six (or seven as it stands) key stone bird species to provide enlightenment. Due to the history of bird life occupation and community engagement in the observation of bird life throughout Kapiti, these birds should be used as a further tool in determining design. These key stone species have been chosen in accordance with their own specific environmental demands, current population statistics and their cultural and historical significance to Kapiti Coast and its associations. They are that of; korora (little blue penguin), kotuku (white heron), kereru (wood pigeon), kokako and tieki (saddleback), kakariki (green parakeet), and whio (blue duck). Information on each individual specie is as follows outlining their characteristics, history within New Zealand, status of threat and breeding regimes.

Design of each environment will take heavily into account the design interventions needed to encourage such specie toward populating that specific area and not elsewhere. Therefore the design will focus closely on amplifying the necessities such as food and habitat.

By looking at the success of such species within each given environment, we will be able to determine and provide an insight into the overall environmental performance of the area. By heightening the likelihood of such key stones and designing specifically for healthy habitat, we assume the roll-over effect in livability for other linked secondary or sub species, e.g. plant species that provide nesting capabilities as they too are indicative a design agent. We are then able to identify areas which may be of particular interest to human occupants, for example, an increased chance in spotting a rare bird inhabiting one particular area of wetland. Each environment is therefore developed and potential human 'hot spots' identified. An overlay of all the environments and potential occupation begins to determine affordance at the larger scale in the means of safe passage and strengthened continuous water corridors.

Critique: Through this process we were able to identify and define key attributes to stem design from in the form of key stone bird species. These key stone species would also act as key performance indicators for the functioning of the environments in their entirety. In this sense, these environmental allowances have a beneficial impact on human occupation through adjacent settlements and include provision of water and strengthened security of New Zealand's ecological past times. In terms of design we were able to identify areas where there are crossovers in attraction toward ecologies and people and pose to implement within these areas to gain greater appreciation to the site. This again engages with traditional aims to ensure our enjoyment of these ecologies is sustained for future generations however, still struggles to define a more efficient use of such asset that affords more than the typical recreational aspect to the public.

[Korora] - little blue penguin

biggest threat: Dogs - education (leashes)

Potential structures to enable shelter

Estuaries provide easy access for penguins onto beach from ocean.

0.5km distance from coast; nesting

String of dense vegetation for nesting/shelter

(Food foraging km. territory extends from just past Kaiti Island (north) to just before Porirua harbour)

I. COASTAL

KORORA: little 'blue' penguin

Eudyptula minor

LITTLE CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN WILD	EXTINCT

STATUS

- known for their ornamental feathers
- distinct 'S' shaped neck which kinks in flight
- elaborate courtship displays
- more range out of breeding season
- long featherless legs for wading muddy waters
- commonly seen in wet habitats

HISTORY

spotted in Kapiti's coastal wetlands when conditions are optimal

HABITAT

- in breeding season mass food abundance and minimal disturbance is required
- dispersal among wet habitats like streamsides or coastal lagoons in the off-breeding seasons for abundant food supplies is common
- nesting occurs in the crowns of native species such as kowhai, kamahi and the mamaku

FOOD

Anguilla dieffenbachii
- Manaaki Tuna

Leiopelma pakeka
- Pepeketua

Galaxias maculatus
- Inanga

Deleatidium mayfly
- Mayfly

Zosterops lateralis
- Silvereye

Mus musculus
- Field mouse

- feeding requires shallow, muddy waters around active wetland or swamp areas which can often become blocked having massive effect on major migratory food sources

- most aquatic insects are a favourite although larger fish and frogs are also eaten regularly

- will forage for land dwellers nearby along the likes of smaller bird species and rodents

BREEDING

- during courtship males will build a small platform from which they perform a series of actions for a potential female mate
- once inticed the pair proceed to preen each other while intertwining their long necks, wings and bill

- during breeding seasons long, loose plumes grow from the back and wings while the normally yellow bill turns dull black and the facial skin between the eye and bill brightens to a bluish-green

NESTING		
LAYING		
VULNERABLE		

[Kotuku] - White Heron

biggest threat: Shovels, Possums
- pest control programs

II. WETLAND

KOTUKU: white heron

Ardea alba modesta

STATUS

- long lived, slow breeding
- large flyer weighing around 650 grams
- about 51cm from tail to beak at maturity
- loud wing beat distinctive in NZ forest
- only disperser for many large seeding natives
- can range over great distances for food

HISTORY

native flora species are effected by their distribution

HABITAT

- found throughout the country however are most commonly found in the lowland forests of Northland, the King Country, Nelson and the West Coast
- inhabiting a wide variety of forest types; podocarp-broadleaf forest, beech forest, second growth native forest regenerating after forest excursions, small forest remnants and even exotic plantations which host an understorey and/or streamside of native shrubs and trees
- can also commonly be found occupying human adapted areas such as in farmland shelterbelts, urban parks and rural and suburban gardens

Podocarp-broadleaf forest with understorey species

FOOD

- their large appetites include the fruit of native plants varying both seasonally and regionally such as miro, tawa, taraire, kahikatea as well as nikau and coprosma
- while ripe fruit is to be the preferred food it is sometimes unavailable throughout the year so important leaf sources become favourable like those of kowhai

- the consumption of these species is paramount to the regeneration of a lot of native flora

BREEDING

- being slow breeders one egg is common however if fruits are in abundance this cycle can occur up to three times with chicks not fully fledging for sometimes up to 1 year
- young are fed a protein-rich milky secretion from the walls of the parents' crops mixed with fruit pulp often referred to as 'pigeon milk'

- key breeding signals are the spectacular display flights performed mainly by territorial males

1-3 OFFSPRING PRODUCED p/season

NESTING			
LAYING			
VULNERABLE			

[Kereru] - Wood Pidgeon

biggest threat: Cats

III.

KERERU: wood pidgeon

Hemiphaga novaedeelandiae

	LITTLE CONCERN
	NEAR THREATENED
	VULNERABLE
	ENDANGERED
	CRITICALLY ENDANGERED
	EXTINCT IN WILD
	EXTINCT

STATUS

STATUS

- tieke copper markings representing a 'saddle'
- kokako known for clarity and volume in song
- orange/blue fleshy wattles either side of throat
- kokako males and females around 230 grams
- tieke males 80 grams, females 70 grams
- involved in territorial and mating disputes

HISTORY

decline in population
due to forest clearance
and predation

in the late 1900's the first successful translocation of both species was carried out

innovative use of
tall podocarps to
project from

the species rely on
the understory of
forest layers

once widespread
throughout NZ's mature
podocarp forests

by this century all species were close to extinction with extinction on the mainlands

current population live
either in conservation
captive or on islands

HABITAT

- defending large nesting territories of up to 1km year round is done by complex singing and can limit density of the species with juveniles travelling many kilometres around local territories before settling

- frequently found in coastal and inland forests around the middle and lower layers particularly in scrubby regenerating areas which range from sea level to more than 600m above sea level but will only exist where sites are completely free of pest threats

- frequent ground dwellers where probing through dead wood and leaf litter is common habit however their strong legs allow them to climb to canopy and emergent tree layers giving them multiple choice for nesting in tree holes, within rock crevices, within tree crowns, epiphytes and in dense vegetation

FOOD

*Podocarp-broadleaf forest
with understory species*

Coprosma repens
- Taupata

Taraire

Macropiper exce.
- Kawakawa

Cyathea medullaris
- Mamaku fronds

- their diet consists mainly of invertebrates, fruits and nectar with weta, grubs and other insects as well as various forest trees, such as kawakawa and coprosma being a favourite

- extremely active foragers utilising everywhere from the forest floor to the canopy above using their bill and strong legs to chip away at rotten wood, investigate under cabbage tree skirts and epiphytes, burrow into leaf litter and glean branches, trunks and leaves

BREEDING

- commonly around one to four eggs are laid and this has had the potential to occur up to 3-4 times in a season; typically 1-2 in established populations

- the female will incubate the eggs throughout the nesting duration but both parents feed and care for young until chicks fledge with their new markings at 32-50 days old and are very vulnerable for first months

3-9 OFFSPRING PRODUCED
p/season

NESTING						
LAYING						
VULNERABLE						

[Tieke] + [Kokako]
 - Saddleback - NZ crow

IV. SWAMP LOWLAND

TIEKE: saddleback; KOKAKO

Philesturnus carunculatus; *Callaeas cinerea*

STATUS

- pleasant song makes for great neighbours
- weighing 65 grams
- about 25-28cm in length at maturity
- distinguished by their bright green colour
- only native to be legally held and bred in captivity
- many sub-species formed from breeding

HISTORY

enjoy relatively open spaces in and around forest

HABITAT

- generally nesting in tree holes they are also known to sometimes nest in crevices of cliffs or among rocks, in burrows in the ground and in dense vegetation
- prefers to inhabit relatively open spaces in and around forest areas and frequently forage on the ground in preferred lower altitudes

FOOD

- feed consists mainly of berries, seeds, fruit and insects and any other item they may salvage when foraging

- natural foraging behaviour and abilities mean they feed on the ground where they scratch in leaf litter, rapidly pushing it aside with their feet in search for edible items as well as in trees and shrubs

BREEDING

- typically five to nine eggs are laid and if food is abundant will also lay over winter period, after around 2 months chicks fledge as ground dwellers before flight leaving them vulnerable to predators

- both birds assist with feeding however the male collects food supplies and transfers it to the female by regurgitation for the consumption of herself and their young

- often used as foster parents by breeders for other species of parakeet

5-9 OFFSPRING PRODUCED
p/season

	NESTING	LAYING	VULNERABLE
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
51			
52			
53			
54			
55			
56			
57			
58			
59			
60			
61			
62			
63			
64			
65			
66			
67			
68			
69			
70			
71			
72			
73			
74			
75			
76			
77			
78			
79			
80			
81			
82			
83			
84			
85			
86			
87			
88			
89			
90			
91			
92			
93			
94			
95			
96			
97			
98			
99			
100			

[Kakariki] - Green Parrot
biggest threat: Rats - 1080

V. FOREST EDGE

KAKARIKI: green parakeet

Cyanoramphus novaezelandiae

fig39. Kakariki applications to site. Author's Own.

- [illegible]

VI. RIVER

WHIO: blue duck

Hymenolaimus malacorhynchos

fig40. Whio applications to site. Author's Own.

*fig41. Diagrams outlining the key stone's habitats overlaid and social potentials.
Author's Own.*

I. COASTAL

fig44. Habitat iteration sketch. Author's Own.

II. WETLAND

fig45. Habitat iteration sketch. Author's Own.

III. DUNE LOWLAND

fig46. Habitat iteration sketch. Author's Own.

IV. SWAMP LOWLAND

fig47. Habitat iteration sketch. Author's Own.

V. FOREST EDGE

fig48. Habitat iteration sketch. Author's Own.

VI. RIVER

fig49. Habitat iteration sketch. Author's Own.

04

iii. SPATIAL APPROACH

SPATIAL ARRANGEMENTS IN SITE TO PUSH DEVELOPMENT AND INTEGRATE OCCUPATION

The third experiment takes form in the means of a spatial approach that incorporates parameters surrounding restoration and implementation. This can also be described by a hybridisation between conservation and occupation and will be formed by determining guidelines around how much space is needed for each entity. The site itself is around 1,200 hectares and accommodates six different environments as outlined in previous approach methods. We begin by looking toward areas with potential for development as well as those with potential to accommodate intensified ecologies. Establishing a minimum quota, or a baseline as you will, for the amount of restoration needed to fully accommodate the natural ecologies which once occupied this piece of land is essential. If we are to build upon previous works then this experiment will use the aid of the areas left when designing around the key stone ecologies as guidelines to determine areas for intervention. We can determine a proportion will enable restoration effects and left is that which can be used in modification or in potential development.

This experiment now shifts to the discovery of the matrix configuration and the junctures at play between natural ecologies and urban form. We take a look into the edge effects of such a development and how they can be manipulated in accordance with the natural ecologies running throughout the site in a spatial

manner. Attention is drawn to the natural ecology transitions running now parallel to the urban development in the crossovers between each environment. These ecotones align with the parameters set out as well as give the public opportunity to encounter the two ecologies at the one time. Two theories of ecotone were discovered in accordance to the aims and objective of this research and that was; Clement's (1905) referral to ecotones as the maximum limit in which species can extend to, and Leopold's (1933) reference to peaks in ecology and the notion of greater richness of wildlife at the edges.

Critique: Although short, through this process we gained the discovery of the ecotone terminology from which we can begin to accommodate intervention around. Although the use of such space aligns with a more efficient use of such asset, the program surrounding these areas is still unclear opposed to that of just recreational purpose. The benefits of designing within ecotones are able to reduce the space taken to display key environments which will engage with traditional aims of enjoyment of these ecologies however, lacked the integration of direct occupation of these systems and their enhancement. In terms of design we were able to determine new parameters within these ecotones from which to design in following both the procession of natural ecologies and that of urban development. We can see opportunity around maximum limits that these spaces can afford enabling relief to these ecologies. We also see opportunity in the peak of different ecologies heightened through this crossover and are able to become involved through development within these areas.

fig50. Site iterations. Author's Own.

ECOLOGICAL ZONES

EDGE EXTENTS

fig51. Diagram extracting the eco-tone from environments. Author's Own.

04

iv. METHOD APPROACH

APPLICATIONS OF PARAMETERS TO DEFINE SCOPE AND PROGRAM; DEVELOPING A MAGNET

The final experiment adapts a method approach where we begin by the application of parameters sought out from previous design experiments in order to drive the design outcome. A certain emphasis is placed on the introduction of program into the site as this is one element of design which has been lagging until this point. These parameters are as follows;

- Spatial approach to determine ecotone in which intervention will take place.
- Ecology approach to determine proximity requirements to primary natural systems in order for key stone species to flourish.
- Site Analysis approach (Context Analysis) to determine appropriate working ecology in accordance with ground and site specifications as well as the identification of man-made systems to enable accessibility from the public realm.

Here we see five ecotone zones which embody at least two environments at any given time which are both heightened in terms of biodiversity and vulnerable due to ecology limitation. It is then assumed to be effective in the way that two key stone species can be associated to the one site maximising on space afford ability and an integrated habitual design drawn out.

This process may enlighten new discovery of more hybridised solutions around ecological incorporation. Also is the vulnerability of such ecologies and the power of design implementation and intervention to ease the tensions through sustainable practice and to make for a more attractive and suitable experience to be had by both. By use of the previous experiments and thorough site and context application we may make recommendation toward working ecologies that both provide to the ecologies functionality as well as provide use and asset to the general public.

Critique: Through this process we can provide a clear framework to the approach of such spaces which demonstrate the strengths found in previous approach methodologies. By placing emphasis on provision that design aids for both ecologies and occupation at the point of intervention we generate intimate spaces which act like magnets to attract natural and public ecologies. By also reducing the scope by placing parameters around allocation of space and intervention, we can focus on determining strong associations between the two entities and use this model as a basis for future endeavours outside of this site context. Key to this approach is to enhance the attractive or 'pull factor' toward these spaces for both natural ecologies and human occupation. By providing a successful habitat, natural ecologies (in particular bird ecologies) are more likely to occupy the space and further maintenance can be determined by the observation of these ecologies. By providing appropriate working ecologies in accordance with place and context, people will be drawn to site and grow appreciation to these systems not just at an environmental awareness level but at a sense of resilient wellbeing.

fig53. Initial sketch enabling connections. Author's Own.

fig54. Minimising scope, identifying parameters exploded. Author's Own.

SITE PLAN 1:5,000
 fig54. Exploded site plan in occurance to process. Author's Own.

AMENITY

RESTORATION

fig55. Site iterations. Author's Own.

RECREATION

PRODUCTION

PLANTING NURSURY

PUBLIC FACILITIES

CONNECTION TO DEVELOPMENT

NATIVE FORESTRY

fig56. Methodology scheme. Author's Own.

Aa CONNECTING AMENITY 1:200 @A1

Bb HABITAT FOSTERING 1:200 @A1

Cc OPEN SPACE PLACEMENT 1:200 @A1

Dd PRODUCTION PLAY 1:200 @A1

fig58. Exploded site plan with sections outlining phasing scheme. Author's Own.

04 REFLECTION

THE BIG PICTURE: HOW DOES THIS PROCESS INTEGRATE OCCUPATION AND CONSERVATION?

On reflection to the four approaches undertaken we are able to see progression in generating design by attraction. Through design experimentation and mapping it is clear that these interventions must appeal to both natural ecologies and human program. The most common approach to date is that of site analysis however, this can restrict design outcome by scale specifications and generalisation. Through the preliminary design process we were able to define a narrowed scope by segregating each environment however the outcomes were still removed from the detail of how intergration was accomodated. This also eventually brought light to site specific program and contextulised demands which drove the occupational elements of design. Through use of KPI ecology we were able to establish a key drivers for design through use of key stone bird species as site performance indicators. This enabled ecologies to be paramount and conservation initiatives to continue. Spatial experimentation lead to the discovery of ecotone methodology and formed basis for the magnet designs outlined through the next phase. Method permitted the process of defined parameters.

Outlined are two diagrams which show; 1) the current situation of development that repels natural systems and works outside ecotone areas, and 2) the new approach in which we attempt to define that looks at intervention as a key element of attraction to both.

fig59. Current situation. Author's Own.

fig60. Intended situation. Author's Own.

05 WORKING ECOLOGIES

05

DEVELOPED DESIGN

THE DEVELOPMENT OF WORKING ECOLOGIES IN ATTEMPT TO SOLVE THE ISSUE OF CONSERVATION

fig61. Photograph of contour model. Author's Own.

This chapter introduces the finalised design scheme and an approach toward detailed working ecologies which are in occurrence throughout the site along a main amenity and ecological strip. This development has been derived by extraction from all four preliminary design approaches 1) Site Analysis Approach, 2) KPI Ecology Approach, 3) Spatial Approach, and 4) Method Approach.

It is important to note that due to the linearity of the process taken and follow-on effect from one approach to the next, the final design is weighted significantly toward the outcomes of the final approach.

These are however a combination of the strengths and weaknesses of each methodology that has arose and has been analysed throughout the entire process. Considerations have consistently been taken to determine the role of designed ecologies as a tool for enabling design-led concepts and experimentations. Each detailed intervention is intended to align with the original aims and objectives set out that 1) engages with traditional aims to ensure our enjoyment of these ecologies is sustained for future generations, and 2) makes more efficient use of such asset in the way these spaces are utilised on a day to day basis. Likewise to the parameters set out in previous workings, the individual site approach toward the detailed working ecologies follows a systematic framework outlined below;

- Outline the necessities of both key stone bird species from each environment operating in relevant ecotone as well as outlining the necessities for the associated working ecology.
- Individual sites chosen which are current in the provision of these necessities or capable of enabling these necessities through their natural capacities.
- Identify potential crossover areas where requirements for both can be reached through one medium of intervention, optimising both space and resource.

The five developed design concepts which are to be considered and critiqued in conjunction to achieving the aims and objectives of this research are as follows 1) Restoration Nursery, 2) Community Gardens, 3) Ecoduct, 4) Forestry Nursery, and 5) Native Pocket Parks. Recreational routes throughout the site are intended to interconnect these working ecologies and to form a fluent experience of the park's overall capacity and encourage further occupation to occur.

RESTORATION NURSERY

COMMUNITY GARDENS

ECODUCT

FORESTRY NURSERY

NATIVE POCKET PARKS

05

i. RESTORATION NURSERIES

COASTAL | WETLAND Korora & Kotuku

fig64. Plan sketch of site1. Author's Own.

Ecotone one has been allocated the function of **Restoration Nursery** to allow the community and other environmental enthusiasts to invest toward the restoration of the coast and wetland systems. The coast and wetland areas are, in particular, faced with elevated environmental concerns so it is imperative to provide a working means which aids in their restoration. The two species which drive the ecological design are the korora (little blue penguin) and the kotuku (white heron). The korora, being a flightless species, is vulnerable to ground conditions and therefore safe passage to the designed habitat from the coast, and the bird's food source, must be provided and uninterrupted by substantial man-made intervention. The kotuku too must have unrestricted access to wetland water bodies for food source and wading habits. Due to the fertile soil conditions and relatively low lying plant species situated around these water bodies, the chosen site governs maximised sun access and regulated wind flow for the nursery. The structures which house the juvenile plants have the opportunity to also provide nesting and shelter for both species therefore detailed elements of this intervention could be explored further.

fig65. Sketch of potential intervention. Author's Own.

fig66. Site1 requirements for ecologies and intervention. Author's Own.

fig67. Sketched section of site1. Author's Own.

i. RESTORATION NURSERY 1:200

fig68. Sectional elevation. Author's Own.

05

ii. COMMUNITY GARDENS

WETLAND | DUNE LOWLAND Kotuku & Kereru

fig69. Plan diagram of site2. Author's Own.

Ecotone two has been allocated the function of Community Gardens to enable the adjacent township(s) access to the experience of cultivating their own harvest. The wetland and dune lowland areas were historically used to propagate food for those occupying the surrounding areas. This intervention engages with the historical and cultural association to food source within the site as well as providing key food source implements for the kotuku (white heron) and the kereru (wood pigeon). Ironically the kereru was also a prominent food source for maori and although numbers have dwindled the demand to restore the species to enable for continued consumption is an on-going aim to the indigenous people. The kereru plays an important role in the distribution of our native seeder trees so accessibility to these species is optimal. The kotuku again must have unrestricted access to wetland water bodies for food source and wading habits so location must be determined around these requirements. Similar conditions of fertility form the basis of this chosen site which too governs maximised sun access as well as more public access. Due to the fluctuating nature of some of the wetlands further inland, irrigation systems and water regulators are required to monitor water supplies for the gardens. These structures which host water control, located both in the wetlands and among the gardens, have the opportunity to also provide for perch habits and regulated feeding therefore detailed elements of this intervention could be explored further.

fig70. Sketch of potential intervention. Author's Own.

fig71. Site2 requirements for ecologies and intervention. Author's Own.

fig72. Sketched section of site2. Author's Own.

ii. COMMUNITY GARDENS 1:200

fig73. Sectional elevation. Author's Own.

05

iii. ECODUCT

DUNE | SWAMP LOWLAND Kereru & Tieke / Kokako

fig74. Plan diagram of site3. Author's Own.

Ecotone three has been allocated the function of Ecoduct to provide a sense of arrival on entrance to the overall amenity and ecological scheme at MacKay's crossing. The area is currently under development to accommodate more traffic thoroughfare due to works around transmission gully and will cause strain on the ecologies migrating from coast to ridge line. The dune lowland and swamp lowland areas have the ability to host a majority of ecologies of which occupy the whole site due to its general positioning, marking the centre of the park, and its notable size. Also, due to the various water bodies available to both environments, this ecotone already accommodates heightened habitat opportunity for bird species. The two species which in retrospect drive the ecological design are the kereru (wood pigeon) and the two wattle species, kokako and tieke (saddleback). The kereru again plays an important role in the distribution of our native seeder trees so both accessibility to these species and safe passage across the expressway is vital. The wattles are somewhat interesting in that they are adaptable climbing species so the structure must allow for continual connection and assist in diving facilities to enable flight. The site here was chosen in accordance to the connecting lowland wetlands and the swamp that meets the stream. Also just as importantly the site is determined due to its public afford ability located adjacent to the entrance deemed 'MacKay's Crossing' and provides an eye catching landmark on entrance or transition through the area. The Ecoduct provides for both natural ecologies and occupation in the form of association therefore detailed elements of this intervention could be further explored.

fig75. Site3 requirements for ecologies and intervention. Author's Own.

fig76. Sketched section of site3. Author's Own.

iii. ECODUCT 1:200

fig77. Sectional elevation. Author's Own.

05

iv. FORESTRY NURSERY

SWAMP LOWLAND | FOREST Tieke, Kokako & Kakariki

fig78. Plan diagram of site4. Author's Own.

Ecotone four has been allocated the function of Forest Nursery to further enhance the user groups in occupation of the site and have the potential for internalised funding. This area has been cleared in the past for both forestry and pasture demands due to its fertile soils and proximity to road networks. The two species which drive this ecological design are the wattles once again, kokako and tieke (saddleback), and the kakariki (green parakeet). The wattles again possess an interesting behavioural characteristic in that they are adaptable to climbing and use this method to enable flight. They are expert ground foragers and use their strong feet not only to climb but to dig up organic matter on peat matted swamp grounds. Unfortunately these species have become extremely rare in the wild although once inhabited Kapiti in masses and it is for these reasons that these particular species have been chosen and provision of their natural habitat accommodated. The kakariki is in similar decline however also has a strong association to the site and the naming of adjacent town Paekakariki, meaning 'perching place of the kakariki' in Maori. Kakariki used to utilise the small clearances too for foraging and nested in the tall podocarp trees or adjacent cliffs near the town. The site was chosen due to the availability of fertile soils enabling the nursery to flourish as well as its proximity to the forest for potential transfer of maturing plant species. It too governs maximised sun access and regulated wind flow for the nursery however will require further water storage to enable the irrigation of production demands. These structures have the capability to enable both cliff-like nesting facilities as well as flight enabling properties and therefore detailed elements of this intervention could be further explored.

fig79. Site4 requirements for ecologies and intervention. Author's Own.

fig80. Sketched section of site4. Author's Own.

iv. FORESTRY NURSERY 1:200

fig81. Sectional elevation. Author's Own.

ECOTONE

ht enabling

small clearence
foraging

RESTORATION

PODOCARP FOREST
HABITAT BUFFER

05

V. NATIVE POCKET PARKS

FOREST | RIVER Kakariki & Whio

fig82. Plan diagram of site5. Author's Own.

Ecotone five has been allocated the function of Native Pocket Parks to likewise further enhance the user groups in occupation of the site and intensify the potential for internalised funding. This area also within the Whareroa Farm side has been cleared in the past for production means and by that of selective harvest we see a tradition continued in a sustainable manner. Selective harvest will be a dominant factor within the development in a 10-15 year cycle rotation, giving each space a chance to regenerate. However, the two species which drive this ecological design are again the kakariki (green parakeet) and the whio (blue duck). The kakariki is an adaptable forager and, as stated previously, utilises the small clearances for foraging so can be naturally equipped to the potentials of selective harvest and clearance. The whio on opposite end of the spectrum is very vulnerable to disturbance so even the slightest shift in river health can cause the bird to vacate or perish. The site was chosen due again to the availability of fertile soils situated close enough to the river with the addition of buffer zones which enable both the privacy of the whio as well as accommodating for sufficient water filtration from land clearance run off. The process of selective harvest involves the rotation of plant plots so that whole forests are never wiped out all at once. This opportunity of clearance and temporary infrastructure gives affordance to maintenance and management of these spaces as well as aids to the habits of the kakariki. Therefore, detailed elements of both the temporary spaces involved in selective harvest as well as regulatory buffer zones of this intervention could be further explored.

fig84. Sketched section of site5. Author's Own.

V. POCKET PARKS 1:200

06 CONCLUSIONS AND CRITIQUE

06

REFLECTION

HAVE WE BROKEN FREE OF ISLANDISED CONSERVATION AND TOWARD HYBRIDISATION SOLUTION?

fig86. Hybridised model diagram. Author's Own.

The issues surrounding the topic of conservation throughout this research has been brought to light and in accordance evidence that design can achieve alternative outcomes. With the various growing concerns of global warming, climate change and an ever increasing population, such protectionist methods, as outlined, have been implemented to ensure the resilience and security over our native species. Through the understanding of such negative impact on the way we view these systems, design can drive discussion around the integration of occupation as a means to coexist within them, heightening resilience for both. The negative impact on the ecosystems themselves in current

contradictory effects do not afford this and evidently prevent their natural abilities to slowly adapt to on-going change. Using landscape architecture as a medium, we are able to bring to surface different approach methods toward the way conservation is viewed in an attempt to revolutionise the matter. We are enabled as creatives with decision making around various planning methods and management of these natural systems and therefore obligated to develop methods which facilitate optimal outcomes from all perspectives. A platform of discussion, centred on the integration of human occupation amongst these natural systems, can be enabled through design outcomes by looking into the detail of designed ecologies to drive hybridisation.

The focus of this research aims to break away from the deemed 'islandised conservation' and toward an integrative hybridised model that sees natural ecologies driving design for our social and productive areas. Due to the nature of conservation as it stands, the role of 'designed ecologies', and ultimately that of designing for ecologies, has played an imperative part throughout this research. What is currently viewed as land appropriate for conservation, simply shows the lack of experimentation toward an alternative. It also expresses the lack of knowledge and ability to envision options for the future of which design-led methodologies afford. Through the detailing of designed ecologies we are able to develop an understanding of natural systems away from the broad sense which is often undertaken. Landscape architecture and this research may facilitate a shift in mind-set among those that are faced with the ultimatums of land use and program. By integrating tested design tools applied throughout the approach methodology, we are able to imagine a series of components that have the capacity to work in compliment to those that are usually left to be compromised.

The concerns around the demand to isolate these systems are able to shift toward that of optimism and motivation through these hybridised solutions. Integral thinking and future conceptualising is imperative in approaching design around conservation and too is the importance to form arguments against traditional approaches so they are constantly reconsidered and adapted, as too is our forever evolving environment.

Critiqued is the effectiveness of designed ecologies in the approach toward conservation at the detailed scale and as a means to integrate the preservation of our ecologies with more workable spaces for human occupation. The integration of program at a detailed design scale posed interesting outcomes and has indeed brought to light ways in which these systems can operate in conjunction with occupation and in affordance to each other. By applying programmatic requirements to that of key habitat necessities for bird species we begin to develop a dialogue between the two entities. For example on pages 86-89, we can adapt the required irrigation systems to elements capable of hosting feeding or nesting criteria to the kereru and kotuku species. However, achieved in some degree in the theoretical sense, this only gives potential to achieve dual functioning outcomes. Critique and observation of these implementations in reality must be further tested and conducted to establish the overall competence of such scheme. This may evidently be in the form of trial and error which involves more risk, a concept which is intimidating and which current conservation initiatives aim to eliminate. So, is it really worth it? To avoid these experiments would be once again avoiding the inevitable and shutting out those objectives for both us and our ecologies to integrate, experiencing site at its full extent.

Due to the scope of the research, sufficient detail through design testing has not been achieved as previously seen feasible. The process of conceptual design however, has given opportunity to depict and attempt theoretical scenarios and place emphasis on those that instigate thought provoking conclusions. The researcher has gained particular insight in the preliminary design section, looking toward the approach methods for conservation sites. The use of design to determine an approach toward hybridised models of conservation and occupation proved to be a different outlook on the tradition. The process of an informed and built upon methodology looking into a range of contradicting variables gave the topic definite contrast to approaching site from either a preservation or productive sense.

Likewise due to the time frame constraints, the detailing of specific design elements in each intervention were left yet to be examined to the full extent in the aim to resolve and reflect on probability. Left open for discussion, and potentially another whole research, is the investigation of dual functioning infrastructure within the scope of working ecologies that both aid in habitat affordance toward certain bird species as well as conveying levels of function to programmatic systems. The outer connections to that of Kapiti Island and Akatarawa Forests have also been left aside for ease of completion time frames and yet to be developed further. If we were to sum up the conclusions drawn from the case studies, theories and investigation outlined, it would be that the future approach to conservation initiatives must be linked more effectively to detailed design through spaces of occupation and resource provision. Underlining this new approach is the affordance toward necessity and the form of complimentary and dual functioning implementations.

WORKS CITED

- Cosgrove, Denis. "Landscape and Landschaft". GHI Bulletin No. 35. 19 February 2004: 57-71. Print
- Yandle, Chris. "The Corner connection: studio experimentation". Landscape Review 2001:7(1). 2001: 68-75. Print
- Abrams, Jesse and Bliss, John C. "Amenity Landownership, Land Use Change, and the Re-Creation of Working Landscapes". Society and Natural Resources 26:7. 2013: 845-859. Print
- Stolton, Sue and Dudley, Nigel. "Partnerships for Protection: New Strategies for Planning and Management for Protected Areas". Earthscan Publications Ltd, London, UK 1999. Print
- Aitken, Den. "Urban connection." Landscape Architecture New Zealand: Issue 22, June 2014.
- Berg, Per G, et al. Green-blue Infrastructure in Urban-Rural Landscapes - introducing Resilient Citylands. Uppsala: Swedish University of Agricultural Sciences, 2013.
- Brockerhoff, Eckehard G, et al. Plantation forests and biodiversity: oxymoron or opportunity? Unknown: Springer Science+Business Media B.V., 2008.
- Chieh, Huang. "Urban Regeneration: Foresting Vacancy In Philadelphia." Spring 2014. Scenario Journal. November 2014. <<http://scenariojournal.com/article/urban-regeneration/>>.
- Clough, Peter and NZIER. "Encouraging Private Biodiversity - Incentives for Biodiversity Conservation on Private Land." December 2000. The Treasury. November 2014. <<http://www.treasury.govt.nz/publications/research-policy/wp/2000/00-25>>.
- Connell, C. A. "Forestry and Landscape Design." Tandy, Clifford R.V. Landscape and human life: The impact of landscape architecture upon human activities. Amsterdam: Djambatan Publishers and Cartographers, 1966. 25-29.
- Council, Kapiti Coast District. Open Space Strategy. Wellington: Author, 2012.
- EnvirohistoryNZ. "envirohistory NZ." June 2012. November 2014. <<http://envirohistorynz.com/2012/06/09/totaranui-the-many-totara-of-te-horo/#more-10186>>.
- Forman, Richard T. T. . Land Mosaics: The ecology of landscapes and regions. Cambridge: Cambridge University Press, 1995.
- Forman, Richard T. T. . "Some general principles of landscape and regional ecology." Landscape Ecology vol. 10 no.3 (1995): 133-142.
- Government, New Zealand. Resource Management Act. Wellington: Author, 1991.
- Ignatieva, Maria, Glen H Stewart and Colin Meurk. Planning and deisng of ecological networks in irban areas. Uppsala: Swedish University of Agricultural Sciences, 2010.
- Kato, Dr. Seihei. "The recreational use of forests." Tandy, Clifford R. V. Landscape and human life: The impact of landscape architecture upon human activities. Amsterdam: Djambatan Publishers and Cartographers, 1966. 33-34.

Levins, Richard. "Some demographic and genetic consequences of environmental heterogeneity for biological control." *Bulletin of the Entomological Society of America* (1969): 15: 237-240.

—. "The strategy of model building in population biology." *American Scientist* (1966): 54: 421-431.

Lindenmayer, David B and Joern Fischer. *Habitat Fragmentation and Landscape Change: An Ecological and Conservation Synthesis*. Washington DC: Island Press, 2006.

Morley, Phillip, et al. *Past, present and future landscapes: Understanding alternative futures for climate change adaptation of coastal settlements and communities*. Gold Coast: National Climate Change Adaptation Research Facility, 2012.

Norton, David A. *Indigenous Biodiversity Conservation and Plantation Forestry: Options for the future*. Unknown: NZ Forestry, 1998.

O2. *Landscape Patterns Environmental Quality Analysis*. Alberta: O2 Planning and Design, 2013.

P. A. Handford, Associates. *Protection of Locally Native Trees*. Wellington: Kapiti Coast District Council, 2011.

Tandy, Clifford R. V. . "Japan's forests and forestry." Tandy, Clifford R. V. *Landscape and human life: The impact of landscape architecture upon human activities*. Amsterdam: Djambatan Publishers and Cartographers, 1966. 30-32.

Taylor, A.D. and S. Harrison. "Empirical evidence for metapopulation dynamics." Hanski, A. and M.E. Gilpin. *Metapopulation Biology*. San Diego: Academic Press, 1997. 27-42.

Wakelyns. "Agroforestry at Wakelyns." n.d. Wakelyns: Agroforestry in Suffolk UK. November 2014. <http://wakelyns.co.uk/?page_id=20>.

—. November 2014. <http://wakelyns.co.uk/?page_id=20>.

Forman, Richard T. T. . *Land Mosaics: The ecology of landscapes and regions*. Cambridge: Cambridge University Press, 1995.

Forman, Richard T. T. . "Some general principles of landscape and regional ecology." *Landscape Ecology* vol. 10 no.3 (1995): 133-142.

Government, New Zealand. *Resource Management Act*. Wellington: Author, 1991.

Hanski, Ilkka and Michael Gilpin. "Metapopulation dynamics: brief history and conceptual domain." *Biological Journal of the Linnean Society* (1991): 42: 3-16.

Ignatieva, Maria and Per G Berg. *The Cityland Manual*. Uppsala: Swedish University of Agricultural Sciences, 2011.

Ignatieva, Maria, Glen H Stewart and Colin Meurk. *Planning and design of ecological networks in urban areas*. Uppsala: Swedish University of Agricultural Sciences, 2010.

Kato, Dr. Seihei. "The recreational use of forests." Tandy, Clifford R. V. *Landscape and human life: The impact of landscape architecture upon human activities*. Amsterdam: Djambatan Publishers and Cartographers, 1966. 33-34.

Aitken, Den. "Urban connection." Landscape Architecture New Zealand: Issue 22, June 2014.

Berg, Per G, et al. Green-blue Infrastructure in Urban-Rural Landscapes - introducing Resilient Citylands. Uppsala: Swedish University of Agricultural Sciences, 2013.

Brockerhoff, Eckehard G, et al. Plantation forests and biodiversity: oxymoron or opportunity? Unknown: Springer Science+Business Media B.V., 2008.

Chieh, Huang. "Urban Regeneration: Foresting Vacancy In Philadelphia." Spring 2014. Scenario Journal. November 2014. <<http://scenariojournal.com/article/urban-regeneration/>>.

Clough, Peter and NZIER. "Encouraging Private Biodiversity - Incentives for Biodiversity Conservation on Private Land." December 2000. The Treasury. November 2014. <<http://www.treasury.govt.nz/publications/research-policy/wp/2000/00-25>>.

Connell, C. A. "Forestry and Landscape Design." Tandy, Clifford R.V. Landscape and human life: The impact of landscape architecture upon human activities. Amsterdam: Djambatan Publishers and Cartographers, 1966. 25-29.

Council, Kapiti Coast District. Open Space Strategy. Wellington: Author, 2012.

EnvirohistoryNZ. "envirohistory NZ." June 2012. November 2014. <<http://envirohistorynz.com/2012/06/09/totaranui-the-many-totara-of-te-horo/#more-10186>>.

Inc, Masterston Business Enterprises. "Forestry in New Zealand: Wairarapa Forestry." Unknown. Forest Enterprises LTD. November 2014. <<http://www/foresterprises.co.nz/fgen/finz/wairarapa.htm>>.

Hanski, Ilkka and Michael Gilpin. "Metapopulation dynamics: bried history and conceptual domain." Biological Journal of the Linnean Society (1991): 42: 3-16.

Ignatieva, Maria and Per G Berg. The Cityland Manual. Uppsala: Swedish University of Agricultural Sciences, 2011.

Inc, Masterston Business Enterprises. "Forestry in New Zealand: Wairarapa Forestry." Unknown. Forest Enterprises LTD. November 2014. <<http://www/foresterprises.co.nz/fgen/finz/wairarapa.htm>>.

Reed, Stanley. "Energy & Environment". Green Column - The New York Times, September 2013.

Dierenvriend, D. Van. "Dutch Nature Reserve 'The Oostvaardersplassen' True Nature?". Episode 1. Oct 2015. <<https://www.youtube.com/watch?v=tofJFxKOVao>>

—. 2015. Forest and Bird. <<http://forestandbird.org.nz>>

—. 2015. Department of Conservation. <<http://www.doc.govt.nz>>

—. 2015. Te Ara Net. <<http://www.teara.govt.nz/en>>

—. 2015. Biodiversity NZ. <<https://www.biodiversity.govt.nz/index.html>>

—. 2015. Wellington City Council. <<http://www.wellingtonnz.com/discover/>>

FIGURE SOURCES

- fig1. Abstraction of native tree ecologies. Author's Own, 2015.
- fig2. Artyfilms Tumblr - View of Kapiti Island, New Zealand. Online Image. Sep 2015. < [HTTP://ARTYFILMS.TUMBLR.COM/](http://ARTYFILMS.TUMBLR.COM/) >
- fig3. DOC - Karearea. Online Image. Dec 2015. < <http://www.doc.govt.nz> >
- fig4. Biodiversity NZ - Native versus introduced vascular plants. Online Image. Feb 2016. < <https://www.biodiversity.govt.nz/picture/doing/nzbs/part-one/challenges.html> >
- fig5. Biodiversity NZ - Trends in biodiversity decline. Online Image. Feb 2016. < <https://www.biodiversity.govt.nz/picture/doing/nzbs/part-one/challenges.html> >
- fig6. Conservation and Occupation divide diagrams. Author's Own, 2015.
- fig7. Hybridised model diagram. Author's Own, 2015.
- fig8. Arkinthepark.org - Map outlining targeted buffer zone. Online Image. Dec 2015. < http://www.arkinthepark.org.nz/maps/locating_the_ark/adjacent_projects_buffer_zo.html >
- fig9. Ecogecko Consultants - Waitakere Ranges. Online Image. Dec 2015. < <http://www.ecogecko.co.nz/council.php> >
- fig10. Janwillemvanaalst - Plan of Oostvaardersplassen. Online Image. Oct 2015. < <https://commons.wikimedia.org/w/index.php?curid=25854684> >
- fig11. EM Kintzel, I Van Stokkum - Image of wildlife at Oostvaardersplassen. Online Image. Oct 2015. < <https://commons.wikimedia.org/w/index.php?curid=4494700> >
- fig12. NY times link - Walking tracks through Oostvaardersplassen. Online Image. Oct 2015. < <http://www.holland.com/global/tourism/article/oostvaardersplassen-2.htm> >
- fig13. Freshkillspark.org - Design entry for Master Site Plan. Online Image. Oct 2015. < <http://freshkillspark.org> >
- fig14. Freshkillspark.org - Image of defined zones. Online Image. Oct 2015. < <http://freshkillspark.org> >
- fig15. Freshkillspark.org - Area depicting size of Freshkills park. Online Image. Oct 2015. < <http://freshkillspark.org> >
- fig16. Diagram outlining the decline in continuous ecosystems along Kapiti Coast. Author's Own, 2015.
- fig17. Context plan of Kapiti Coast and current conservation initiatives. Aurthor's Own, 2015.
- fig18. Wellington.govt - Kapiti birdlife. Online Image. Feb 2016. < <http://www.wellingtonnz.com/discover/things-to-do/sights-activities/kapiti-bird-tours/> >
- fig19. Diagram of two models of conservation. Aurthor's Own, 2015.
- fig20. Kapiti Coast pastperfect - Paekakariki 1953. Online Image. Jan 2016. < <http://kapiticoast.pastperfectonline.com/media/2FF4BD6B-2D7F-4F46-A97D-856538614550> >
- fig21. apiti Coast pastperfect - Paekakariki 1965. Online Image. Jan 2016. < <http://kapiticoast.pastperfectonline.com/photo/0CC404B6-7CCA-4A11-9A2C-671496544300> >
- fig22. Kapiti Coast pastperfect - Paekakariki 1956. Online Image. Jan 2016. < <http://kapiticoast.pastperfectonline.com/photo/E776AE8D-F18F-4827-B010-081009771489> >
- fig23. Steve Attwood - Coastal dune shrubland, Kapiti Coast. Online Image. Jan 2016. < <https://www.flickr.com/photos/stevex2/6971667299> >
- fig24. Stuff - MacKay's Crossing revamp development. Online Image. Oct 2015. < <http://www.stuff.co.nz/dominion-post/news/local-papers/kapiti-observer/7665265/Queen-Elizabeth-Park-to-get-2m-revamp> >
- fig25. Queen Elizabeth Park and Whareroa Farm, outlining potential at MacKay's. Aurthor's Own, 2015.
- fig26. Perspective of site. Aurthor's Own, 2015.
- fig27. Photograph of site contour model. Aurthor's Own, 2015.
- fig28. Initial hunch sketch of environmental zones. Aurthor's Own, 2015.
- fig29. Site contours. Aurthor's Own, 2015.
- fig30. Two streams. Aurthor's Own, 2015.
- fig31. Diagram outlining environments and catchment zone with perpendicular developement. Aurthor's Own, 2015.
- fig32. Site perspective with environments and diagram elevation from coast to ridge. Aurthor's Own, 2015.
- fig33. Diagram outlining individual environmental zones to generate design. Author's Own, 2015.
- fig34. Abstraction of bird typologies and ground conditions apparent. Author's Own, 2015.
- fig35. Korora applications to site. Author's Own, 2015.
- fig36. Kotuku applications to site. Author's Own, 2015.
- fig37. Kereru applications to site. Author's Own, 2015.
- fig38. Tieke and Kokako applications to site. Author's Own, 2015.
- fig39. Kakariki applications to site. Author's Own, 2015.
- fig40. Whio applications to site. Author's Own, 2015.
- fig41. Diagrams outlining the key stone's habitats overlayed and social potentials. Author's Own, 2015.
- fig42. Planting schemes. Author's Own, 2015.
- fig43. Ecology scheme. Author's Own, 2015.
- fig44. Habitat iteration sketch. Author's Own, 2015.
- fig45. Habitat iteration sketch. Author's Own, 2015.
- fig46. Habitat iteration sketch. Author's Own, 2015.
- fig47. Habitat iteration sketch. Author's Own, 2015.
- fig48. Habitat iteration sketch. Author's Own, 2015.
- fig49. Habitat iteration sketch. Author's Own, 2015.
- fig50. Site iterations. Author's Own, 2015.

fig51. Diagram extracting the eco-tone from environments. Author's Own, 2015.
 fig52. Diagram showing eco-tone and potential parameters. Author's Own, 2015.
 fig53. Initial sketch enabling connections. Author's Own, 2015.
 fig54. Minimising scope, identifying parameters exploded. Author's Own, 2015.
 fig55. Initial sketch enabling program. Author's Own, 2015.
 fig56. Methodology scheme. Author's Own, 2015.
 fig57. Sections. Author's Own, 2015.
 fig58. Exploded site plan with sections outlining phasing scheme. Author's Own, 2015.
 fig59. Current situation. Author's Own, 2015.
 fig60. Intended situation. Author's Own, 2015.
 fig61. Photograph of contour model. Author's Own, 2015.
 fig62. Diagram showing recreational route and intensified development along amenity and ecological strip. Author's Own, 2015.
 fig63. Master plan outlining working ecologies. Author's Own, 2015.
 fig64. Plan diagram of site1. Author's Own, 2015.
 fig65. Sketch of potential intervention. Author's Own, 2015.
 fig66. Site1 requirements for ecologies and intervention. Author's Own, 2015.
 fig67. Sketched section of site1. Author's Own, 2015.
 fig68. Sectional elevation. Author's Own, 2015.
 fig69. Plan diagram of site2. Author's Own, 2015.
 fig70. Sketch of potential intervention. Author's Own, 2015.
 fig71. Site2 requirements for ecologies and intervention. Author's Own, 2015.
 fig72. Sketched section of site2. Author's Own, 2015.
 fig73. Sectional elevation. Author's Own, 2015.
 fig74. Plan diagram of site3. Author's Own, 2015.
 fig75. Site3 requirements for ecologies and intervention. Author's Own, 2015.
 fig76. Sketched section of site3. Author's Own, 2015.
 fig77. Sectional elevation. Author's Own, 2015.
 fig78. Plan diagram of site4. Author's Own, 2015.
 fig79. Site4 requirements for ecologies and intervention. Author's Own, 2015.
 fig80. Sketched section of site4. Author's Own, 2015.
 fig81. Sectional elevation. Author's Own, 2015.
 fig82. Plan diagram of site5. Author's Own, 2015.
 fig83. Site5 requirements for ecologies and intervention. Author's Own, 2015.
 fig84. Sketched section of site5. Author's Own, 2015.
 fig85. Sectional elevation. Author's Own, 2015.
 fig86. Hybridised model diagram. Author's Own, 2015.

Ecology fact sheets. DOC - Individual specie images. Online image. July 2015. Configuration and diagrams. Author's Own, 2015.