Hawke's Bay
**Marine & Coastal Group
Research Roadmap**

Hawke's Bay
marine & coast
HEALTHY COAST, HEALTHY OCEAN - HE TAHATIKA ORA, HE MOANA ORA

Inner Harbour Mouth sunrise: Shane Gilmer
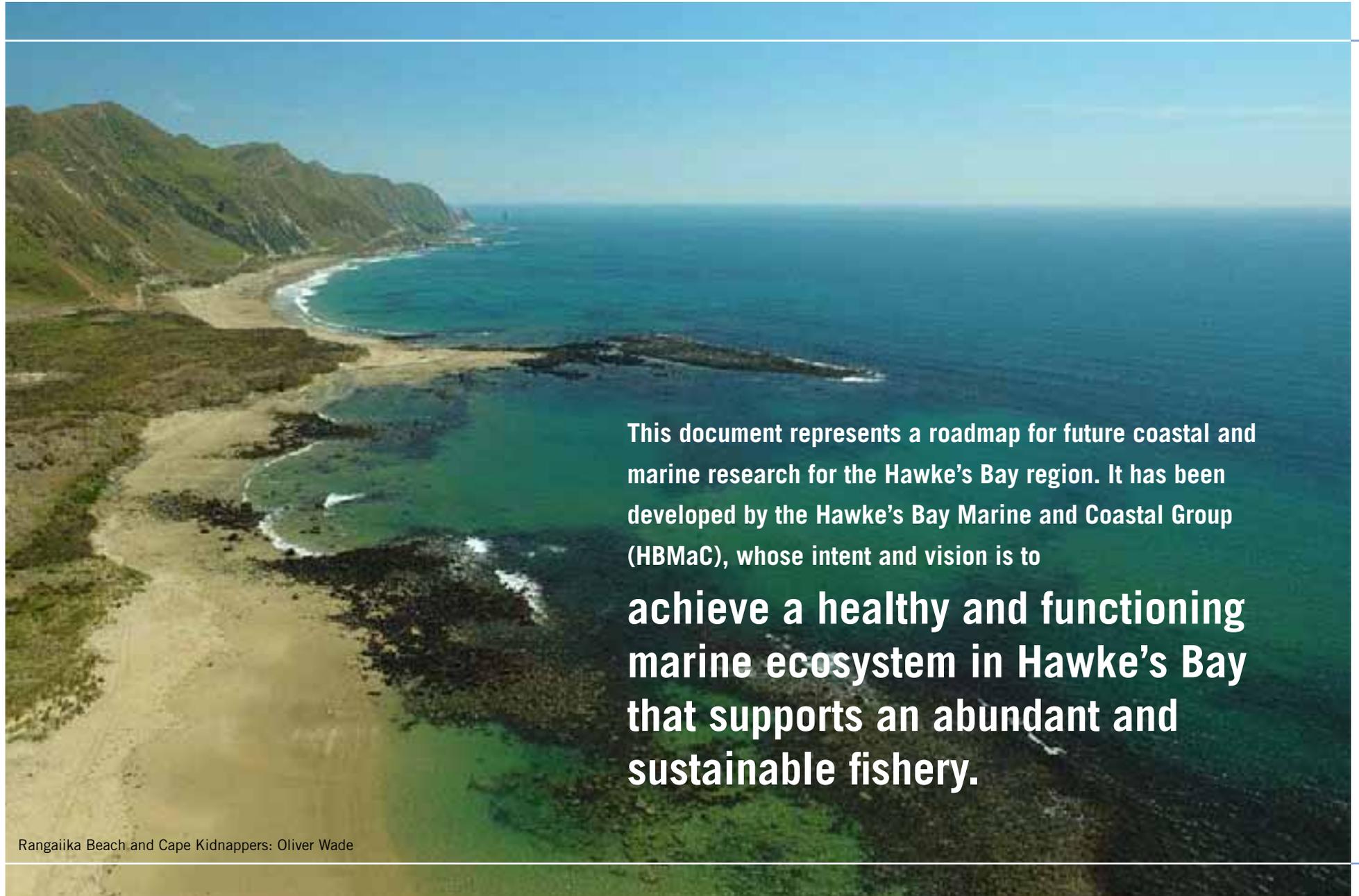
This document represents a roadmap for future coastal and marine research for the Hawke's Bay region. It has been developed by the Hawke's Bay Marine and Coastal Group (HBMaC), whose intent and vision is to

achieve a healthy and functioning marine ecosystem in Hawke's Bay that supports an abundant and sustainable fishery.

Rangaiika Beach and Cape Kidnappers: Oliver Wade

The Hawke's Bay Marine and Coastal Group (HBMaC) is a multi-stakeholder group with representation from government agencies, tangata whenua, recreational and commercial fishing interests[1].

The group was established in 2016 around concerns over the perceived localised depletion of inshore finfish stocks and environmental degradation in the Hawke's Bay marine area. Key values and research priorities of HBMaC underpin the strategy as eight principles (page 6).

This roadmap follows on from a review of coastal and marine information for Hawke's Bay[2] that sets out what we presently know and, more importantly, do not know. Research is required in many areas of the coastal domain in order to bridge these knowledge gaps and guide the management of our activities to realise the intended vision of HBMaC. The review also highlighted a wider community perception of continuing degradation of the coastal marine area.

1. This roadmap reflects the collective views expressed by those individuals who have participated in the production of this document. This does not necessarily reflect the views of all members of the organisations or groups they represent.

2. Haggitt and Wade, 2016: Hawke's Bay Marine Information: Review and Research Strategy.

Ministry for Primary Industries

Ngāti Kahungunu Iwi Inc.

Te Ohu Kaimoana

Legasea Hawke's Bay

Department of Conservation

to achieve a healthy and functioning marine ecosystem in Hawke's Bay that supports an abundant and sustainable fishery

Fisheries Inshore New Zealand

Tangata whenua

Pania Surfcasting Club

Hawke's Bay Regional Council

Napier Port Fishermen's Association

ρ3

This roadmap has been developed to ensure the

restoration and ongoing health of the Hawke's Bay marine environment including an abundant fishery

for present and future generations.

Awatoto Beach

Wairoa

Napier

Hastings

● Study area

••• 12 nautical mile limit

Central to the research thinking is the establishment of baselines so that future changes can be measured, and managed accordingly.

The roadmap hinges on three core research themes with associated sub-themes, prioritised by HBMaC. These are:

TERRESTRIAL AND COASTAL LINKAGES
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ECOSYSTEMS AND HABITATS
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FISHERIES
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The stated intent of HBMaC and the purpose of the roadmap is larger than any single authority tasked with managing specific parts of the coastal marine area.

The approach therefore is a collaborative one, recognising that the process must continue to involve regulatory authorities, advocacy groups and members of the community all working together.

The research presented here is not a panacea for all uncertainties and concerns surrounding the Hawke's Bay marine environment, nor does it supersede any of the ongoing work by various groups and organisations in Hawke's Bay. Rather, HBMaC envision this as the first step in a transformational process for Hawke's Bay: as we improve our understanding of the marine environment, including the effects of land-use, the impacts on it can be managed more effectively.

It is anticipated that the research will help achieve the group's vision to achieve healthy and functioning marine ecosystem in Hawke's Bay that supports an abundant and sustainable fishery and guide our decision making and policy for coastal resource management by:

● Setting future direction and priorities for ongoing research and monitoring

● Improving our knowledge, communication and education of the coastal marine area

● Guiding our decision making and policy for coastal resource management

● Improving social, economic and environmental sustainability for future generations

● Providing supporting information for the Hawke's Bay biodiversity forum, the Cape to City project and other initiatives.

The roadmap will link directly to an implementation plan that will detail how the various research themes and sub-themes will be undertaken, including prioritisation, timing, resourcing and expected outputs.

RESEARCH PRINCIPLES

The roadmap and accompanying research is underpinned by eight principles.

Supporting these principles are numerous values that define HBMaC participants' connection to and aspirations for the coastal marine area. These are embedded in the roadmap as part of the objectives, and anticipated outcomes of the various research themes and sub-themes.
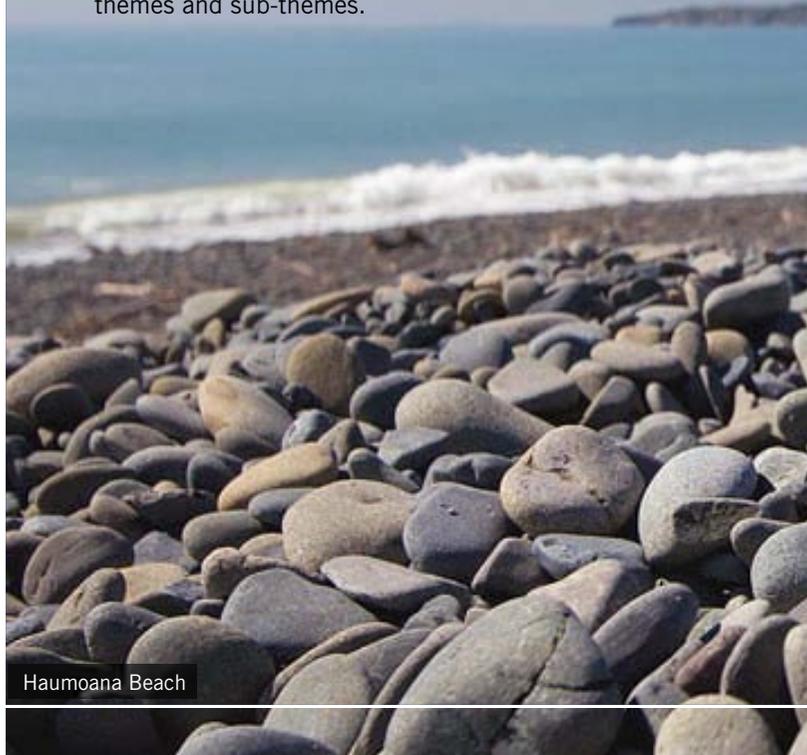
Haumoana Beach

PRINCIPLES	DESCRIPTION
Collaboration	We work together to identify our research needs and share information
Mātauranga Māori and kaitiakitanga	We acknowledge mātauranga Māori, the relationship tangata whenua have with tangaroa, and support Māori kaitiakitanga practices
Integrated management	We acknowledge the relationship between environment, people and species
Sustainable and well-managed fisheries	We support the collection of better fisheries information to promote sustainable and well-managed fisheries
Ecosystems, habitats and biodiversity	Management should be adequately informed to ensure resilient and functioning ecosystems that protect and enhance biodiversity
Conservation	We support conservation initiatives and recognise these as being an integral part of a well-managed coastal marine area
Adaptive management	We will promote research that informs management and management that informs research
Transparency	The transparency of decision making is underpinned by robust information

The roadmap sets out each research theme in terms of their broader objectives, anticipated outcomes and associated sub-themes.

Collectively, the research will: span multiple coastal and marine environments; acknowledge the diversity of cultures and associated perspectives and expectations around the coastal marine area; require an interdisciplinary scientific approach to implement; and require various levels of funding depending on the different research themes and sub-themes.

The principles of mātauranga Māori and kaitiakitanga and acknowledging the potential effects of climate change will encompass all research themes.

Mātauranga Māori and kaitiakitanga

**The inclusion of mātauranga Māori concepts and the principles of kaitiakitanga will be fundamental to achieving many of the desired research outcomes.** This includes working with tangata whenua to recognise traditional knowledge alongside western-based science, including supporting tangata whenua customary monitoring and research development.

Climate change

Climate change is likely to impact on many areas of the coastal environment. Meteorological and oceanographic changes may influence how ecosystems function and alter species distributions. Social and economic effects may arise from these biophysical changes. Climate change related issues (perceived and predicted) will need to be considered, either directly or indirectly, across all research themes. Many of the predicted effects of climate change - sea level rise, variation in sea surface temperature and increased intensity and frequency of storms - either singularly or collectively - represent an unknown factor for coastal management and use. The increased research and modelling proposed in this document aims to provide greater understanding of these uncertainties.
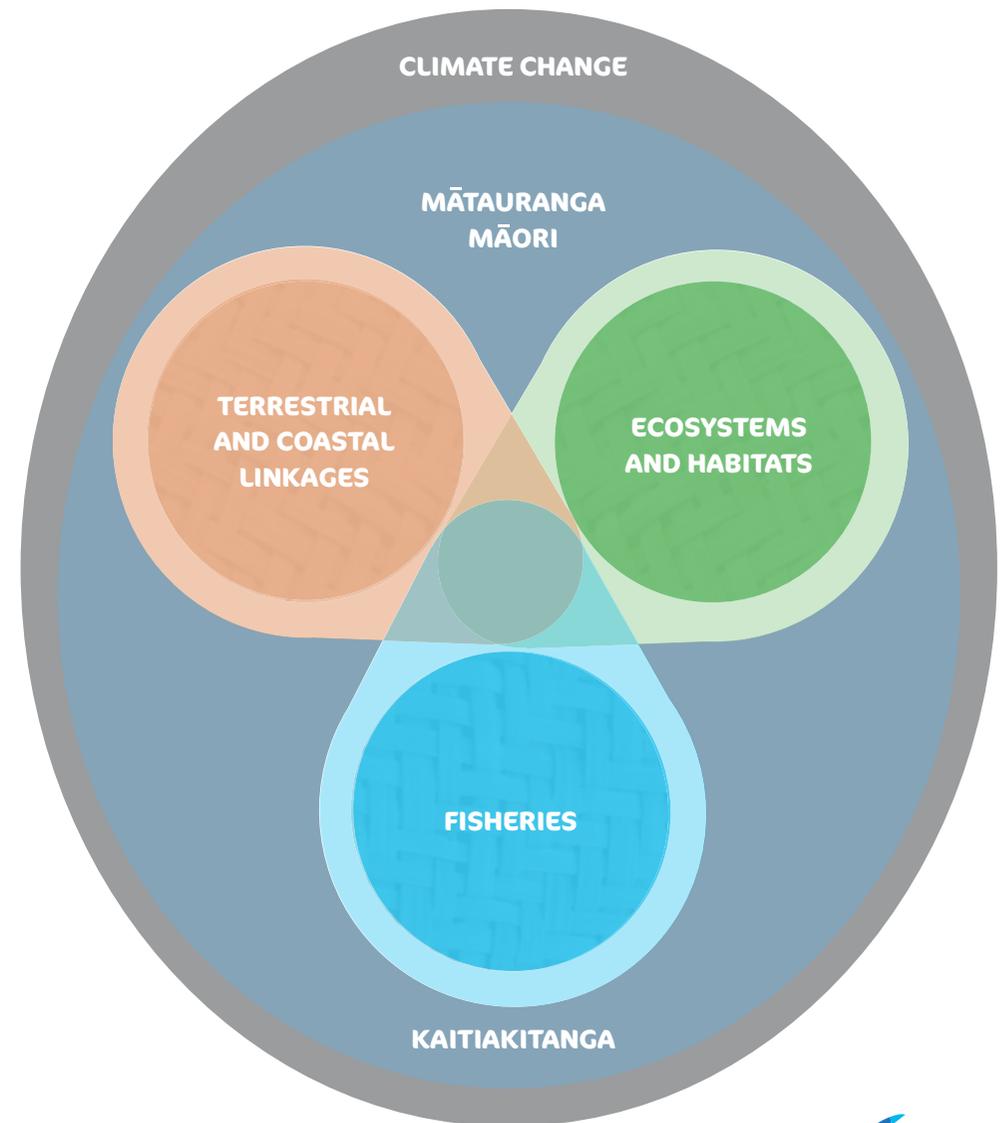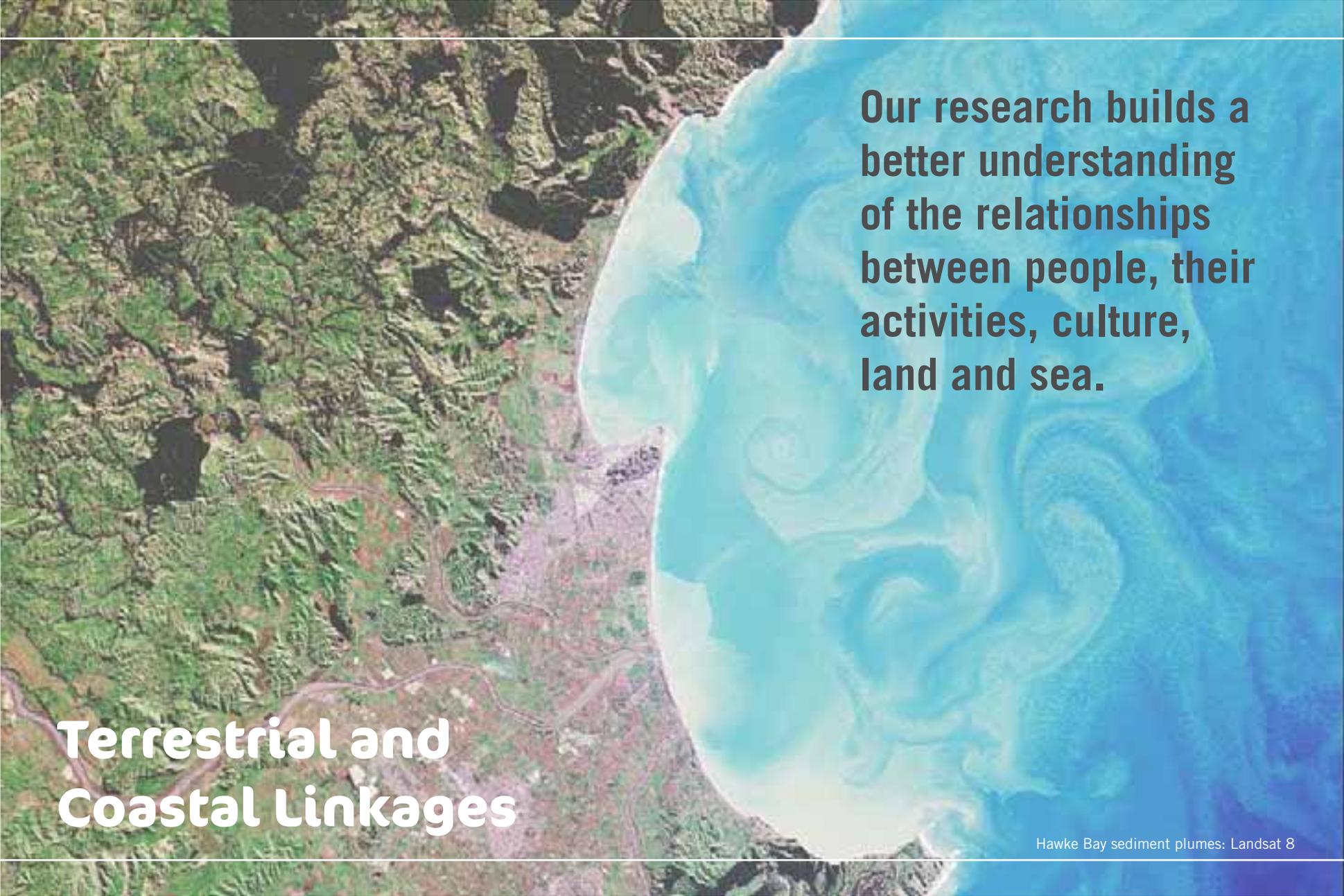
Our research builds a better understanding of the relationships between people, their activities, culture, land and sea.

Terrestrial and Coastal Linkages

Hawke Bay sediment plumes: Landsat 8

TERRESTRIAL AND COASTAL LINKAGES

Adopting a holistic (integrated) view of the Hawke's Bay coastal environment and recognising the sea is inextricably linked to the land are essential steps towards sustainable management for the region.

The Hawke's Bay landscape has been greatly modified through native forest removal.

The majority of land cover is now exotic grassland used for sheep and beef production. Land-use modification along with naturally eroding geology leads to a substantial loss of soil (terrestrial sediment). Much of this sediment ends up in the coastal environment and, through time, has resulted in increased muddiness of estuarine environments and a sustained reduction in nearshore seawater clarity.

The key outcome for the coastal and terrestrial linkages research is to underpin integrated management for better environmental outcomes.

Akashiwo sanguinea bloom, Hardinge Road: Oliver Wade

Research sub-themes themes associated with terrestrial and coastal linkages are:

1. Better understand land-based effects by quantifying contaminant and sediment loads

An important area of research for Hawke's Bay is determining what land-based effects are impacting the coastal marine area, where impacts are occurring and what can be done to minimise their effect, while ensuring sustainable growth can occur.

In particular, a better understanding of both the sources and quantities of terrestrial sediment and other contaminants entering the coastal marine area is an important first step. Contaminants typically reach the coastal marine area during heavy rainfall and flood events.

Catchment modelling

To evaluate the nature and effect of contaminants entering the coastal marine area, we first need to estimate the amounts (loads) coming from catchments that surround estuaries and the adjacent coastal marine area.

This can, in part, be achieved through improved catchment modelling. The purpose of catchment modelling is to quantify the source and extent of any water quality problems in a catchment, based on adjacent land use, soil type, catchment steepness, catchment size, river flows and rainfall/flood frequencies.

The models can be further used to evaluate land management initiatives aimed at reducing contaminants, testing climate-change related scenarios and helping guide restoration and conservation initiatives.

2: Better understand contaminant fates and impacts across the coastal marine area

During rainfall and flood events, typically the first environments of the Hawke's Bay coastal marine area to be impacted are the estuaries and river lagoons, yet we know very little about the fate and transport of contaminants once they reach these environments and their ongoing effects on those habitats and ecosystems.

Tides, currents, swell, and coastal morphology collectively govern where much of the land-based contaminants that enter the coastal marine area end up. We therefore need a better understanding of how these physical components interact to advance our understanding of land to sea linkages across Hawke's Bay. Research and development of a hydrodynamic model will be key to this.

Hydrodynamic model

The purpose of hydrodynamic modelling is to better understand water motion across the range of environments that constitute the Hawke's Bay coastal marine area. In addition to assessing the transport and fate of contaminants throughout the coastal domain, modelling can be used to quantify variation in physical parameters such as temperature, salinity, and nutrients over large spatial scales and under different environmental scenarios. Hydrodynamic models can be coupled to catchment models to provide a link between land and sea.

3: Support tangata whenua monitoring and research across the coastal marine area

Acknowledging the connectedness of the land and sea is integral to mātauranga māori. The roadmap places strong prominence on utilising traditional knowledge to provide better understanding around land to sea linkages. This also includes supporting the development of new initiatives for customary monitoring and research, and working collectively to bridge the gap between customary and western based monitoring, research and conservation.

Key outputs of terrestrial and coastal linkages research include:

- Set baselines and conditions for land use so that impacts to the coastal marine area can be reduced or mitigated

- Provide information for integrated coastal management plans

- Provide information for state of the environment and tangata whenua monitoring and research

- Inform conservation and restoration efforts across catchments, estuaries, and the wider coastal domain.
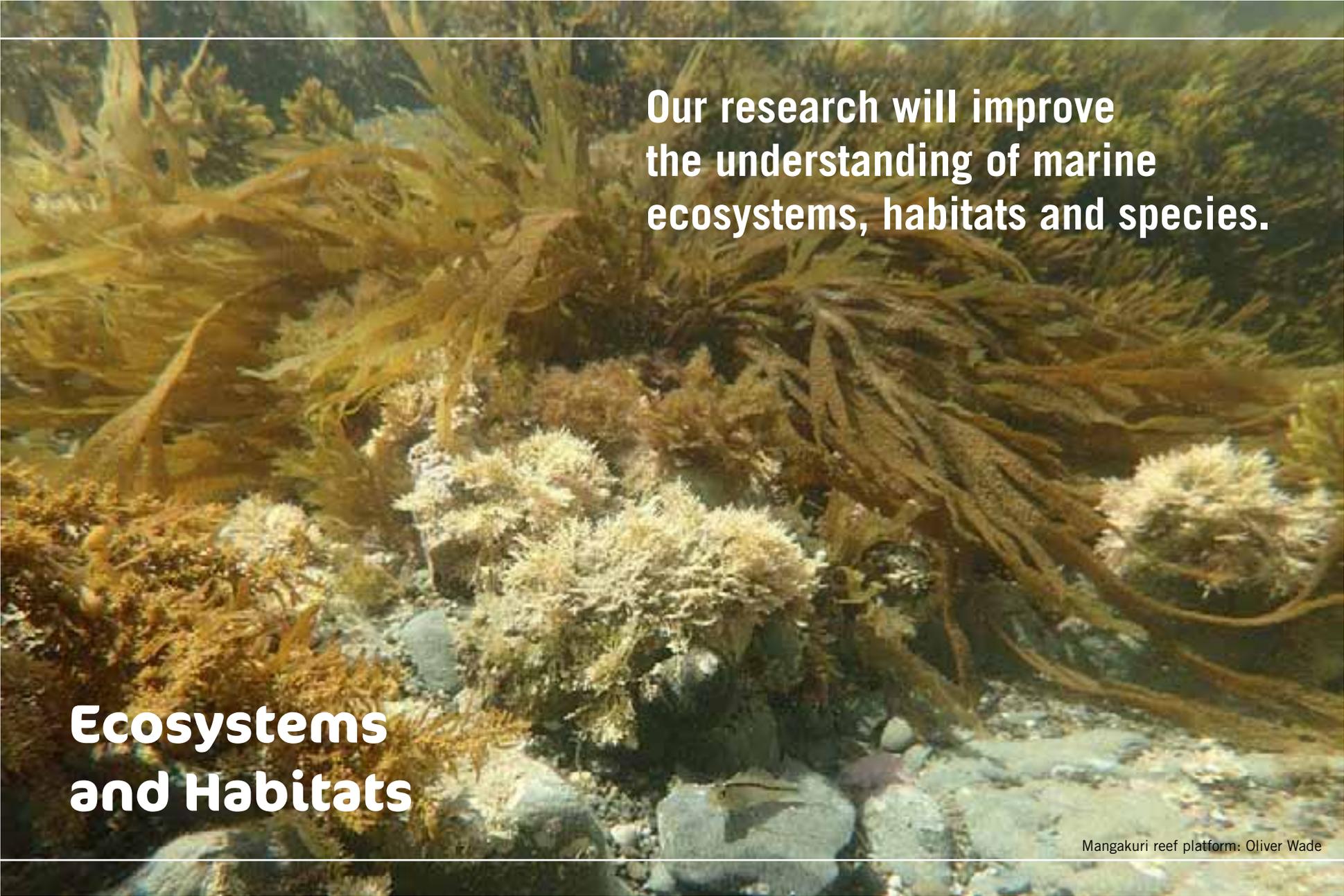
Te Awanga sediment resuspension: Oliver Wade

Our research will improve
the understanding of marine
ecosystems, habitats and species.

Ecosystems
and Habitats

Mangakuri reef platform: Oliver Wade

ECOSYSTEMS AND HABITATS

Due to its location, size and geology, the Hawke's Bay region is comprised of numerous coastal ecosystems and habitat types that are inhabited by a diverse range of species.

Some habitat types have been mapped and studied, but tend to be those that are visible and easily accessible.

The majority of subtidal habitats across the Hawke's Bay remain poorly described, so we have limited knowledge of how habitats and species associated with them may have changed through time.

We need to better understand the present-day diversity of all major habitat types, their quality and their vulnerability, given that many are likely to play a key role in wider ecosystem functioning. Habitat connectivity is also crucial for many species, particularly fish, that may utilise multiple ecosystems (estuaries and open coast) and habitats (mudflats, kelp forest, sponge gardens) over the course of their life cycle.

The key outcome of this research is to underpin the understanding of habitat types and their state for better environmental outcomes.
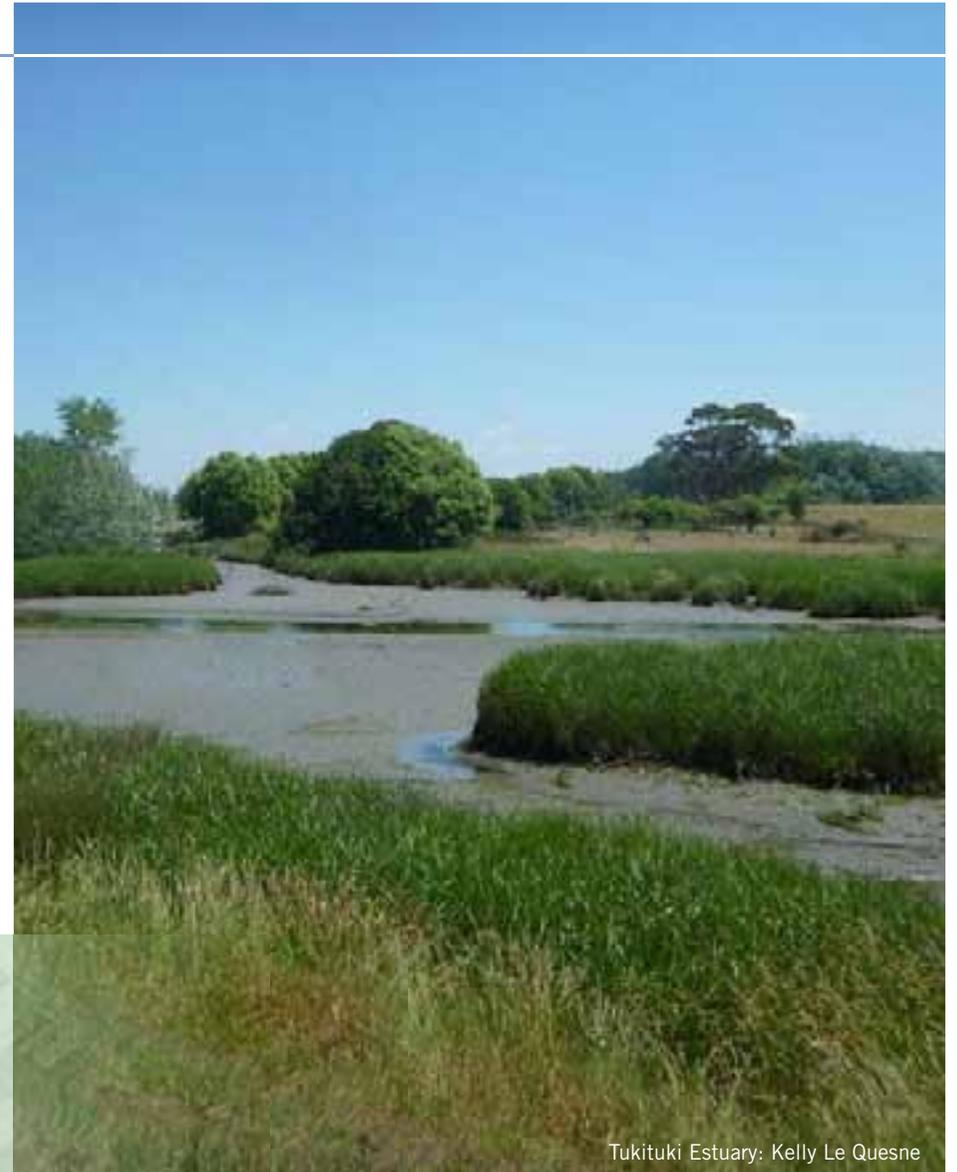
Tukituki Estuary: Kelly Le Quesne

Sub-themes associated with ecosystem and habitats research are:

1: Determine the location, extent and state of subtidal habitats and species

Presently we know very little about the diversity, type, size, health and functioning of subtidal rocky reef and soft sediment ecosystems and species associated with them. This deficiency also extends to how habitats may have changed through time and incursions of exotic species. Habitat change may be due to natural variability or as the result of impacts associated with human activities that result in sedimentation, pollution, disturbance or habitat loss. Information is also required to inform fisheries management by identifying habitats that are of particular significance for fisheries management.

Subtidal rocky reef habitat within Hawke's Bay varies from inshore shallow water reefs close to the coastline, such as Te Mahia, Pania Reef, Blackhead and Aramoana, to nearshore cobble reefs, such as the Wairoa and Clive Hards, and deeper offshore reefs, for example the Lachlan Banks and Lachlan Ridge (which rise from 200 m to 40 m depth). Rocky reef systems within Hawke's Bay have enormous ecological, intrinsic, cultural and recreational value. Unfortunately, there is limited knowledge on the spatial and temporal variability in habitats and species (native and exotic) on these reef systems.

Subtidal soft sediment habitat types are by far the most prevalent habitat within the Hawke's Bay coastal marine area. Much of our understanding of physical and biological properties of these soft sediment habitats have been derived from survey work done in the 1960s. Little work has been done since other than to support resource consents that are typically spatially limited.

Research and monitoring is therefore required to bridge these substantial knowledge gaps and establish baseline conditions so that any future changes can be evaluated in context. Data derived from surveys undertaken can be used to inform and support state of the environment appraisals and the Hawke's Bay Biodiversity Strategy, and to guide conservation and restoration efforts. Fisheries management could also benefit through the identification of habitats that are of significance for commercially fished species.

2: Monitor and research marine mammals and seabirds

Research and monitoring is needed to assess the current status and trends of marine mammals and seabirds in Hawke's Bay.

Seabirds are among the most visible coastal species throughout the region and the Australasian gannet is an iconic species. However, data is very limited on population abundances for many species in Hawke's Bay.

The status and trends of marine mammal distribution and abundance in Hawke's Bay is also data deficient and would profit from increased research to help inform conservation management and activities, such as fishing, dredging and aquaculture that have the potential to impact on their distribution, behaviour and abundance.

Key outputs of the ecosystems and habitats research include:

- Set benchmarks in terms of biodiversity and the distribution and state (quality) of subtidal marine habitats and other coastal species across Hawke's Bay

- Identify factors and processes limiting habitat extent and state

- Identify where restoration efforts can be best directed

- Identify where conservation efforts may be the most effective

- Assist with the Hawke's Bay Biodiversity Forum and Cape to City project through provision of biodiversity and abundance data.

White-fronted tern at Tukituki Estuary: Sandy Haidekker

Our research will better
inform the management of
fisheries in Hawke's Bay.

Fisheries

Napier Inner Harbour: Oliver Wade

FISHERIES

The Hawke's Bay region has traditionally supported a vibrant customary, recreational, and commercial inshore fishery. To ensure this continues we need to significantly improve our understanding of the fishery dynamics.

The Hawke's Bay is known as a "mixed species fishery" where at least 9 finfish species have been targeted since the advent of commercial fishing in the late 1800s.

Commercial fishers primarily use demersal trawls to catch flatfish, gurnard, snapper, trevally, tarakihi, blue moki, and kahawai.

These species continue to be fished today; yet, there is a general consensus amongst fishers that, for many, the abundance and distribution of fish has changed within the region, particularly over the last decade[2].

2. Haggitt and Wade, 2016: Hawke's Bay Marine Information: Review and Research Strategy.

The key outcome for fisheries-related research is to underpin management towards increased abundance of fish species and sustainable fisheries.

Photo: Tony and Jenny Enderby

Research sub-themes associated with fisheries are:

1: Research fisheries species in Hawke's Bay

For many of the commonly fished species within the Hawke's Bay there is little supporting information with respect to where fish originate, their movement and spawning patterns or what main habitats they utilise through their life.

Species that would profit from increased research as identified by HBMaC include, but are not limited to: snapper (karati); gurnard (kumukumu); flatfish (paatiki); hapuka bass and paua. Information sought relates to three areas:

1) juvenile habitat utilisation;

2) adult habitat utilisation including the identification of spawning grounds; and,

3) habitat connectivity and migration patterns and pathways.

2: Promote citizen participation in fisheries monitoring and research

Collaboration between customary, recreational and commercial fishers is important for the effective management of fisheries in Hawke's Bay.

The development of survey methods and tools that could be used by fishing groups to record and report their catch could provide authorities with better access to data that would otherwise be difficult and costly to collect. This data is likely to encourage and strengthen collaboration across HBMaC stakeholder groups.

3: Identify ways fisheries can be enriched through habitat enhancement, habitat creation or conservation-related methods

Fisheries can be enhanced directly through the creation of new habitats and/or restoration of those that are degraded in nature. Enhancement may be as simple as fencing off existing habitats of importance such as estuarine margins,

e.g. inanga (whitebait) habitat, to more extensive ecosystem restoration, e.g. entire wetland systems and creating artificial structures.

Fisheries can further be enhanced through protection-related initiatives. The implementation of rāhui, that prohibits the taking of certain species for a set period of time, is used as a Māori customary management tool. The creation of no-take marine protected areas, such as Te Angiangi Marine Reserve, may have indirect fisheries benefits. Limiting fishing at certain times and in certain areas may also minimise spawning disruption and have flow-on effects for fisheries abundance.

4: Use traditional knowledge and historical catch information to evaluate how sections of the fishery has changed

Due to limited historical fine-scale information collected on fished species within Hawke's Bay, it is challenging to evaluate how present-day fisheries compare to those of decades earlier. Collation of traditional knowledge and other data held by fishers together with questionnaires, interviews, and workshops are ways of obtaining historical information. Information collated could be used to set reference points (albeit coarse) and help focus further fisheries-related aspirations and research within Hawke's Bay.

5: Research the effects of fishing in Hawke's Bay

Despite its prominence as a fishing method, many of the effects associated with demersal trawls are not well understood. A recent initiative of MPI has seen an integrated electronic monitoring and reporting system developed to record geospatial position of vessels and near real-time catch effort.

Despite the prominence of customary, recreational and commercial fishing in Hawke's Bay, many of the effects associated with these fishing activities are not well understood. Key areas of research include: improving understanding of catch and effort; evaluating benthic disturbance and biomass removal; quantifying levels of bycatch and associated discards; and improving gear selectivity.

Key outputs of the fisheries research include:

- Improved understanding of the biology of commonly fished species

- Improved understanding of the habitats crucial to the survival, growth and productivity of key species

- Identify where conservation efforts may be most effective

- Improved understanding of catch and effort of the Hawke's Bay fisheries

- Better understanding around changes to fish stocks

- Improved understanding of the effects of fishing activities in Hawke's Bay.

Surf casters at Mohaka river mouth: Bonny Hatami
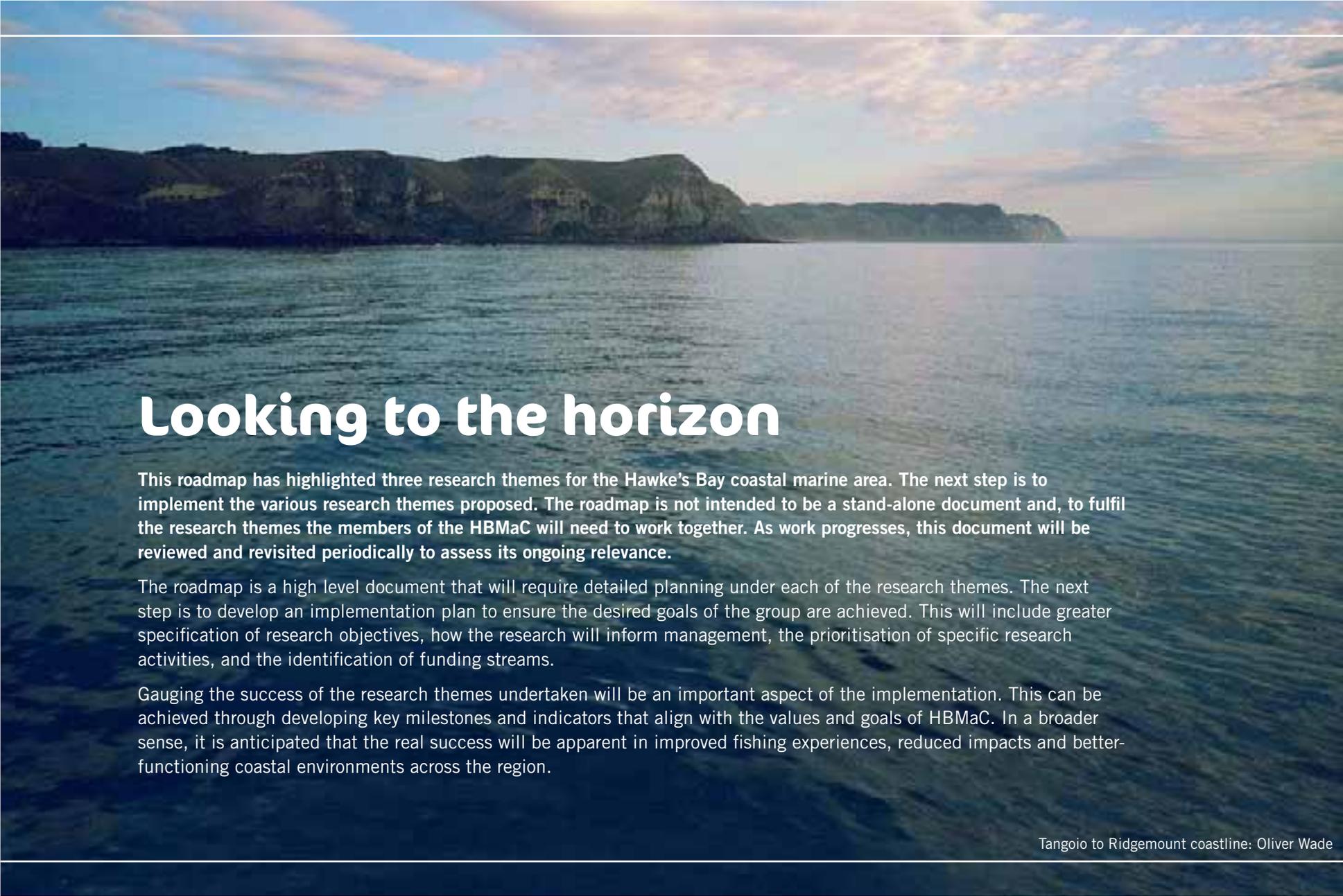
Looking to the horizon

This roadmap has highlighted three research themes for the Hawke's Bay coastal marine area. The next step is to implement the various research themes proposed. The roadmap is not intended to be a stand-alone document and, to fulfil the research themes the members of the HBMaC will need to work together. As work progresses, this document will be reviewed and revisited periodically to assess its ongoing relevance.

The roadmap is a high level document that will require detailed planning under each of the research themes. The next step is to develop an implementation plan to ensure the desired goals of the group are achieved. This will include greater specification of research objectives, how the research will inform management, the prioritisation of specific research activities, and the identification of funding streams.

Gauging the success of the research themes undertaken will be an important aspect of the implementation. This can be achieved through developing key milestones and indicators that align with the values and goals of HBMaC. In a broader sense, it is anticipated that the real success will be apparent in improved fishing experiences, reduced impacts and better-functioning coastal environments across the region.

Tangoio to Ridgemount coastline: Oliver Wade

The roadmap does not supersede research work that is already underway or plans that are already in place. During the planning of the implementation of the roadmap, consideration will have to be given to how the research being proposed aligns with work already being undertaken within Hawke's Bay. Also to be considered is how the research proposed will inform the management of the coastal marine area of Hawke's Bay and ultimately lead to the accomplishment of the HBMaC's vision to

achieve a healthy and functioning marine ecosystem in Hawke's Bay that supports an abundant and sustainable fishery.

Mangakuri reef platform - Tide coming in

Contributors

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Manatū Ahu Matua

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HAWKE'S BAY
REGIONAL COUNCIL
Te Kaunihera ā-Rohe o Te Matau-a-Māui
Enhancing Our Environment Together. Te Whakapakari Tahi I Tō Tātau Taiao.

Ngāti Kahungunu Iwi
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Development Trust

Te Taiwhenua o Tamatea

FISHERIES
INSHORE NEW ZEALAND

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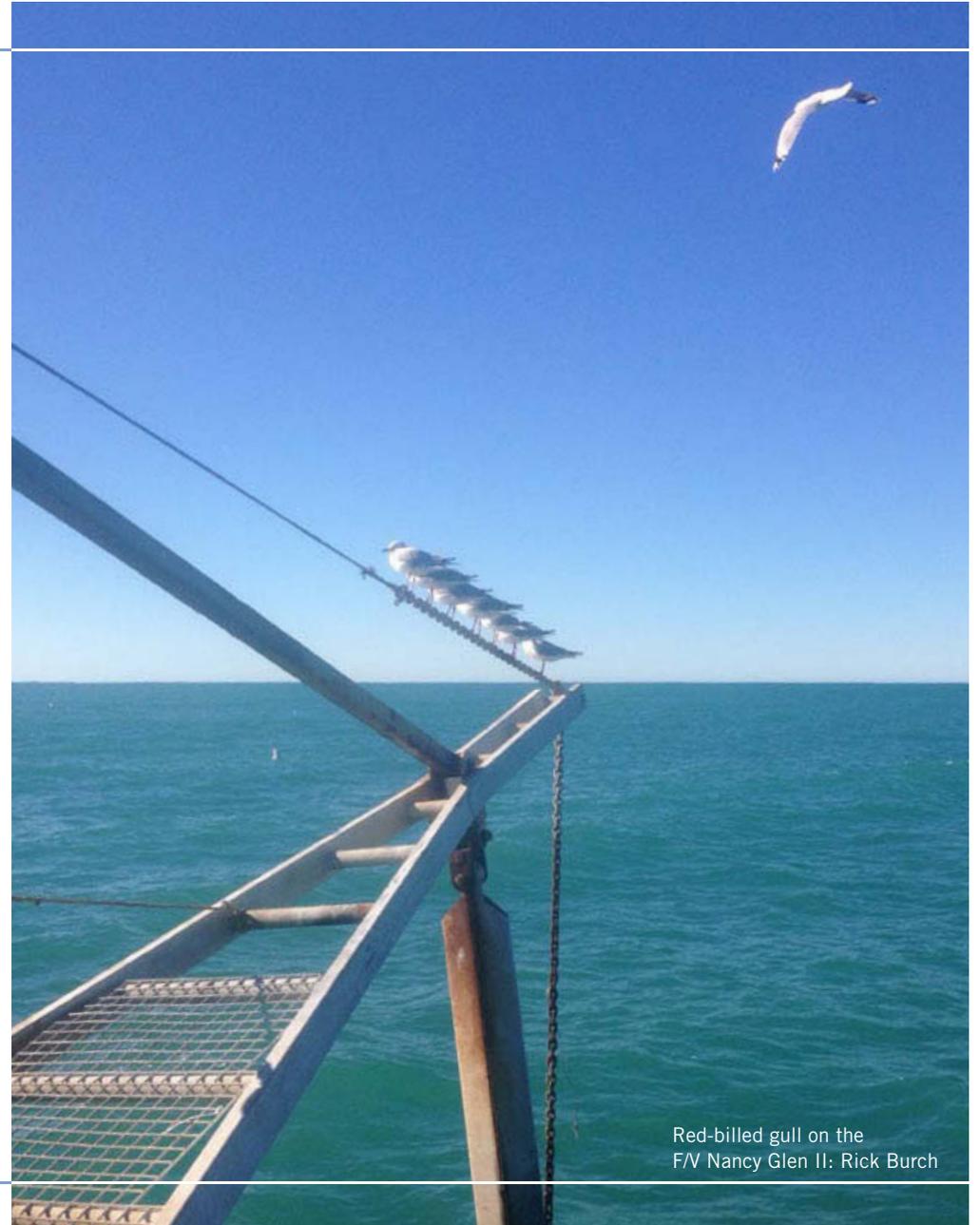
Red-billed gull on the
F/V Nancy Glen II: Rick Burch