Phase II Research Proposal

A.	PROJECT TITLE	Enhancing implementation of EBM in the Hawke's Bay
	"SHORT" TITLE	Hawke's Bay case study
B.	THEME / PROGRAMME	Synthesis: Ecosystem-based management and blue economy in action

C. PROJECT KEY RESEARCHERS (CVs for all listed to be provided in SharePoint container using template provided in SharePoint)

Role	Name	Institution / company	Email
Project Coordinator	Carolyn Lundquist	NIWA	Carolyn.lundquist@niwa.co.nz
RC Coordinator	Anna Madarasz-Smith	Hawkes Bay Regional Council	
RC Policy staff	TBD to replace recently resigned staff member	Hawkes Bay Regional Council	
Systems Mapping specialist	Justin Connolly	Deliberate	
Fisheries scientist	Ian Tuck	NIWA	
Māori scientist	Kelly May	NIWA	

Additional team members to added in Phase 2 once HBMaC priorities are identified.

D. CO-DEVELOPED WITH

Name	Role	Organisation / company / agency	Level of partnership
Hawke's Bay Marine and Coastal Group (HBMaC)	Partner	Multi-stakeholder group including Ministry for Primary Industries, Department of Conservation, Hawke's Bay Regional Council, Ngāti Kahungunu, Ngāti Pāhauwera, Te Taiwhenua o Tamatea, Ngati Kere, Fisheries Inshore NZ, Legasea, Napier Fisheries Association, eCoast, Te Ohu Kaimoana	Co-development of project aims through integration with project implementation

E. ABSTRACT

The Hawke's Bay case study has been selected as one of the Challenge's Phase 2 case study areas for research on implementing ecosystem-based management in a real-world context using tools, processes and analyses developed within Challenge research. The case study was initiated following discussions with the Hawke's Bay Regional Council, and an initial meeting with the Hawke's Bay Marine and Coastal Group (a non-statutory multi-stakeholder group with representation from government agencies, tangata whenua, recreational and commercial fishing interests) was held in November 2018 to determine aligned interests, and identify a suitable focus for a co-developed case study project. Examining overlapping stressors and associated impacts in the Hawke's Bay and the potential impacts of these two stressors as key drivers of habitat degradation in the coastal Hawke's Bay was selected as the case study project objective.

In the first six months of this project, we will perform a systems mapping exercise to develop a conceptual map of stressors and their impacts and importance to reversing environmental degradation in the Hawke's Bay marine environment. This will facilitate a longer-term objective of identification of mechanisms and levers to inform critical levels of these stressors and their interactions. Within the final 18 months of the project, based on priorities identified by HBMaC in consultation with the project team, we will adapt tools from Phase 1 of the Challenge to identify and prioritise potential management or policy options, and/or fill gaps in both scientific and mātauranga knowledge identified by the conceptual map of the system.

F. RELEVANCE TO CHALLENGE OBJECTIVE

This project will examine overlapping stressors and associated impacts in Hawke's Bay, connecting the identification and quantification of multiple uses with potential policy and management options to address the perceived decline in ecosystem health. This EBM case study will inform options and levers available within a policy and management framework to understand the biological and environmental constraints associated with the Hawke's Bay marine environment, to enable an abundant and sustainable fishery. The stakeholders in the case study area have already identified that the perceived threshold of environmental and biological constraints to maintain ecosystem health has already been exceeded. This project is envisioned to assist in determining a suite of potential options that could be actioned to address ecosystem degradation, restore ecosystem health and the enhance resource utilisation of the Hawke's Bay marine ecosystem. The Challenge objective is directly aligned with the HBMaC vision: to achieve a healthy and functioning marine ecosystem that supports an abundant and sustainable fishery.

G. OUTPUTS	This project will produce the following Outputs:	Linked to which Theory of Change Outputs:	Explain briefly your plan to ensure uptake by iwi and stakeholders:
	• A better understanding of the relative contribution and interaction of multiple stressors in the marine environment of Hawke's Bay, including land-based impacts and the effects of fishing activities.	(a) Biophysical and social-ecological knowledge that supports the development of understanding and tools that underpin EBM	Systems mapping exercise and ongoing hui and direct project co-development with HBMaC partners, along with prior information as provided by a summary report via HBMaC.
	• A method for navigating the social tensions inherent with a process discussing management options in a multi-use and multi-sector space such as the marine environment.	(b) Traditional, local and other cultural knowledge that supports EBM is captured/ understood/ recognised	Systems mapping exercise and ongoing hui and direct project co-development with HBMaC partners.
	• An evidence-based tool that explores the interaction of different management options to address cumulative and multiple stressors in order to progress towards a healthy and functioning marine ecosystem in Hawke's Bay that supports enhanced utilisation of marine resources.	(f) Tools for predicting and managing cumulative and multiple stressors developed, assessed and demonstrated	Systems mapping exercise and ongoing hui and direct project co-development with HBMaC partners, including selection of Phase 1 tools for predicting and managing cumulative and multiple stressors.

H. OUTCOMES	This project will contribute to the following Theory of Change Outcomes:
	• (2) Decision making practices that are more inclusive, multi-sectorial and account for the effects from cumulative and multiple activities are adopted
	• (3) Knowledge from the Challenge (science and mātauranga) is used in decision making to improve ecological health and influences marine management and policy
	• (8) Researchers and iwi and stakeholders involved during the life of the Challenge continue to actively promote, research in, and use knowledge from the Challenge

I. INTRODUCTION

One of many activities within Phase 2 of the Challenge is to facilitate case studies that enhance the implementation of EBM in NZ. These case studies allow for evaluation and further refinement of learnings of the Challenge research projects in both Phase 1 and Phase 2 to ensure that they are fit for purpose, and further enhance NZ's ability to utilise an EBM approach. Ideal characteristics of case studies are that they:

- Address a real-world EBM issue
- Co-designed with willing partners
- On-the-ground champion(s) committed to driving progress
- Access to existing data and knowledge useful for the case study
- Opportunity to trial tools
- Ability to demonstrate EBM in action
- Supported through I&O fund with form(s) of co-investment

The Hawke's Bay has been identified as a potential case study area that satisfies all of these criteria.

Sediment deposition from land-based impacts and trawl fisheries impacts to the seafloor have been identified as key stressors to the Hawke's Bay marine ecosystem. These multiple stressors are likely to be acting both singularly and in combination, and the cumulative impact of these stressors and their interactions on the Hawkes Bay coastal marine environment and the values held for it are unclear. Management of these effects is complex, with different statutory agencies exerting different roles. As such, an imperative part of this project is identifying policy levers and management options that could be used to reconcile these multiple impacts, facilitating decisions of which interventions (and where to implement them) will result in the best management outcomes.

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. It was established in 2016 due to concerns over the perceived localised depletion of inshore finfish stocks and environmental degradation in the Hawke's Bay marine area. HBMaC and partners at HBRC have highlighted that there is general consensus that there has been a degradation of the marine environment of Hawke's Bay, however the scale, direction and underlying causes of this change is unclear.

A workshop with HBMaC and the Challenge Leadership Team in Nov 2018 clarified alignment of the stakeholder group's objectives with the Challenge and their willingness to participate as partners with the Challenge, identifying a set of priorities for case study research to address EBM in action in the Hawke's Bay.

Both regional and central government directly support HBMaC through their participation, and HBRC agrees to provide in-kind cofunding via contribution of personnel (Anna Madarasz-Smith, marine policy personnel TBD) to faciliate codevelopment and implementation of this project with HBMaC. HBRC also is contributing direct cofunding to address data gaps. An initial review of available information in the Hawke's Bay has been performed (Haggitt and Wade, 2016), and GIS layers have been collated of all available information. These layers are being further enhanced with a contract from HBRC to NIWA to address gaps in ecological datasets available from a national collation of key ecological areas (KEA) dataset previously funded by DOC ($40,500), a NIWA glider voyage funded through Envirolink ($20,000), an additional inventory of marine biospatial information including multibeam surveys of known significant areas (>$200,000), funding for a PhD position to develop a hydrodynamic model looking at sediment source, transport and fate ($150,000), and an updated NIWA sediment map funded by HBRC's Hotspot programme.

J.   AIMS

We propose a holistic approach to enable consideration of multiple and cumulative stressors on marine ecosystems, including scientific and mātauranga knowledge, to evaluate options and assess risk and uncertainty in decision making around multiple stressors in the Hawke's Bay marine environment. The short-term objective of the project is to develop a conceptual map of stressors and their impacts and importance to reversing environmental degradation in the Hawke's Bay marine environment. This will facilitate a longer-term objective of identification of mechanisms and levers to inform critical levels of these stressors, their interactions, and adapting tools from Phase 1 of the Challenge to identify and prioritise potential management or policy options. Scientific and mātauranga knowledge will be used to populate a conceptual systems model, identify knowledge gaps, and develop scenarios to evaluate and prioritise management and policy options.

K.   PROPOSED RESEARCH

This $300,000 Challenge case study project is envisioned to have two stages, with an initial stage which including a number of pre-contract hui in the Hawke's Bay region ($75,000; Jul 2019 – Jun 2020) to support scoping, collation of data, and further co-development of project activities over the first 6 months of the project, and the second stage of the project ($225,000; Jul 2020 – Dec 2021) to involve the application of tools to support EBM decision making, and addressing of information gaps as identified during the first project stage).

Stage 1
Step 1: **project scoping and further co-development of proposed project objectives and activities**, building from an initial workshop with HBMaC in November 2018. Key components of the proposal were presented to HBMaC at a workshop held in July 2019, and the project proposal was further iterated and codeveloped based on feedback from HBMaC, with a final version submitted in August 2019 to the Challenge leadership team. Further high level meetings have occurred to resolve potential risks identified during the project scoping. An introductory hui was held in Nov 2019, and draft project work plan developed for Phase 1 of the project (Milestones 1-4, July - Dec 2019).

Step 2: **compile available information,** building on prior research identifying and compiling the existing knowledge base of the Hawke's Bay marine environment (Haggitt and Wade, 2016), additional cofunding to address data gaps, and other outputs of Phase 1 (i.e. ecological information on multiple stressor interactions from the Tipping Points project, methods to quantify stressor footprints from the Stressor Footprints project) that can be applied to Hawke's Bay. For example Haggitt and Wade (2016) summarise in their Table 7.2 the primary land-based and water-based stressors, including land use (pasture grazing, horticulture, and forestry), storm water discharge, waste water outfalls, dredging and dredge spoil disposal, fisheries trawling, and other smaller impacts (gravel extraction, vehicle disturbance to the foreshore, 'fish removal' impacts of fisheries, coastal development/infilling). (**Milestone 5: Sep 2019 – Feb 2020**)

Step 3: **initiate systems mapping exercise** to develop a conceptual map of the known stressors and impacts and how they are connected and interact, and to connect these stressors through to potential levers or policy actions. This systems map will identify who is responsible for managing these stressors, and what is actionable within current legislation, policy and practice, to assist in prioritising further work within the proposal. An initial hui was held to introduce the systems mapping exercise in Nov 2019, with systems workshops tentatively scheduled for Feb/Mar 2020. A summary report will be provided. (**Milestones 6-7: Nov 2019 – Apr 2020**)

Step 4. **Populate the systems map** to identify information gaps required to enhance the implementation of EBM. Map existing information and tools available from Phase 1 of the challenge to the conceptual systems map to determine what can be actioned, and prioritise information gaps. (**Milestone 8: Mar – May 2020**)

Step 5. **Prioritise actions for Stage 2** of the project (**Milestone 9, June 2020, and subsequent Stage 2 Milestones to be co-developed and approved in June 2020 for work to Dec 2021**). Based on the identified priorities and information gaps, HBMaC and the research team will co-develop the workplan for the second part of the project. At this stage, we envision Stage 2 to involve a combination of activities including:

1) **Mapping of stressor footprints** and their impacts on marine ecosystems. HBMaC has already listed as a priority activity the need to better understand land-based effects by quantifying contaminant and sediment loads, and mapping of contaminant fates and impacts across the coastal marine area. Phase 1 of the Challenge has developed approaches to map stressor footprints and quantify impacts. In the Hawke's Bay, land-use modification via the removal of native forest, and replacement with exotic grassland for sheep and beef production, forest, and other uses, in combination with geology and topography that are prone to erosion, have resulted in high levels of transport of sediment from terrestrial to coastal landscapes. This sediment transport has modified coastal habitats through both deposition and increased muddiness of local estuaries as well as increased water column turbidity. Nitrogen inputs from point source (municipal outfalls) and non-point source pollution from rivers and streams have been associated with eutrophication on the coast and extensive phytoplankton blooms and water column hypoxia. Spatial quantification of these layers is one task anticipated in stage 2, as well as updated layers of fishing footprints, and including knowledge of cumulative fishing impacts and interactions between fishing and sediments as developed in one modelling approach for the Tasman Golden Bay case study (via the Spatially Explicit Decision Support Tools project in Phase 1). Stressor mapping will be enhanced through collaboration with the PhD student (supervised by Prof Karin Bryan, UoW) to provide additional detail and resolution to contaminant dispersal and inform on spatial and temporal variability in stressor footprints. A GIS database of available information on different habitat types and their spatial extent was prepared by Haggitt and Wade (2016), with additional contracts currently in process to fill gaps.

2) Based on the conceptual systems map, **codevelop scenarios and select tools** to use to investigate potential outcomes from different management actions proposed in each scenario. Using lessons from Phase 1 (Our Seas, Managed Seas, and Cross-Programme Enabling EBM), facilitate workshops with HBMaC to identify future visions for Hawke's Bay, and a suite of policy or management actions that could be actioned to reverse environmental degradation or promote restoration. Discuss and select tools appropriate to testing these scenarios.

3) **Utilise decision support tools** to evaluate outcomes of different management scenarios. A number of Phase 1 tools will be presented and their suitability discussed. These include the seafloor disturbance/recovery model which has been applied to multiple stressors in Tasman and Golden Bay, that can inform spatial management options related to seafloor disturbance including both fishing and sediment deposition. Aligned HBRC funding on key ecological areas datasets will perform initial scenarios for biodiversity prioritisations using the Zonation tool which may also be suitable, as a number of options allow it to investigate system connectivity, prioritisations based on habitat quality or condition (i.e. prior trawl history), and incorporating system capacity and resilience to cumulative effects (to be developed in Phase 2 project 1.2) to inform restoration or mitigation. SeaSketch is another tool that will be investigated and is currently being populated for the Tasman Golden Bay case study as well as a new release anticipated by DOC of its key ecological area layers. While this is a static approach to visualising layers, SeaSketch can also be used as more of a game playing 'App', for example allowing for reporting of benefits and costs of different management strategies (as developed and used in the Hauraki Gulf in SeaChange to report on benefits to biodiversity of different protected area designs as well as costs to existing or future resource uses); another potential SeaSketch interactive App that could be developed is one of different land management options and associated costs to each option to inform on, for example, how much fencing is required and where are the optimal locations to fence streams to reduce sediment loads to the bay, in comparison to other management actions. Spatial Bayes net models and other tools that are to be developed in Phase 2 projects will also be considered.

4) **Public participation** in the research. HBMaC will be directly involved in the project, envisioned through both regular workshops and communications, as well as direct participation in research collection and evaluation though citizen science experiments designed to fill information gaps, for example low cost collection of information on sediment and nutrient inputs, and collection of sediment cores to evaluate sediment sources to further identify and prioritise management options based on primary sources of land-based inputs to the Hawke's Bay marine environment. Many of these tools have been developed through NIWA's Estuary Monitoring and SHMAK Toolkits. A further aspect of public involvement is envisioned to involve local communities and school children, building on the 'Unseen' art-science experiment developed for Phase 1's Navigating Social-Ecological Systems with artist Gabby O'Connor to develop and implement new methods for identifying and mapping local knowledge of marine stressors.

5) **Collaboration with other Challenge research**. Phase 2 project T5 is based on the Hawke's Bay, and is envisioned to examine sediment stressors on key kaimoana species. We will work directly with this project to ensure cross collaboration and information sharing.

L.   LINKS TO PHASE I RESEARCH

2.1.3 Measuring ecosystem services and assessing impacts

2.2.2.3 Near real-time forecasting using operational oceanographic forecasting of contamination risk to reduce commercial shellfish harvest and beach closures

4.2.1 Tipping points in ecosystem structure, function & services

4.2.2 Stressor footprints and dynamics
4.3.2 Sediment tolerance and mortality thresholds of benthic habitats
5.1.2 Spatially explicit decision support tools

M.   LINKS TO & INTERDEPENDENCIES WITH PHASE II RESEARCH PROJECTS

1.1 Understanding ecological responses to cumulative effects
1.2 Tools for incorporating ecological responses to cumulative effects into management action
3.1 Perceptions of risk and uncertainty
3.2 Communicating risk and uncertainty to aid decision-making
4.2 Options for policy and legislative change to enable EBM
4.5 Enabling EBM at different scales
T5 He Kāinga Taurikura ō Tangitū: Treasured Coastal Environment).
Synthesis: Ecosystem-based management and blue economy in action; regional case studies

Other interdependencies include collaboration with Prof Karin Bryan (UoW) and a PhD student funded by HBRC to perform hydrodynamic modelling of the Hawke's Bay region. This project will inform dispersal of stressors from land and water-based sources, and enhance understanding of stressor footprints in the Hawke's Bay.

N.   VISION MĀTAURANGA (VM)

Vision Mātauranga is seeking to unlock the innovative potential of Māori knowledge, resources and people to assist New Zealander's to create a better future. There are four themes in the Vision Mātauranga (VM) policy framework (Indigenous Innovation, Taiao, Hauora/Oranga, and Mātauranga). This project represents an opportunity to apply learnings from Phase 1 and 2 of the Challenge to this case study which will enhance the ability for iwi and hapu, alongside stakeholders, managers and policy makers in the Hawke's Bay region to participate in and implement ecosystem-based management.

Māori continue to express grave concerns regarding the condition of marine environment in their local rohe. Initial workshops that led to identification of the topic of this proposal were co-developed with environmental kaitiaki (guardians) from hapū/iwi (Ngāti Kahungunu, Ngāti Pāhauwera, Te Taiwhenua o Tamatea, Ngati Kere), and ongoing co-development with iwi will occur throughout the project timeframe.

There will be direct incorporation of Māori knowledge, resources and people to generate a distinctive direction and contribution to the research. CRI, University, kaupapa Māori and council researchers will work together with hapū/iwi to co-create innovative responses and participatory solutions to explore how best to enhance implementation of EBM in the Hawke's Bay. Research will be informed by mātauranga Māori in accordance with tikanga Māori practices, and strengthening kaitiakitanga practices through implementing co-developed tools for restoring, monitoring and managing taonga species and associated marine habitats.
Research outcomes will be used to review and strengthen localised mātauranga Māori understandings and practices to inform contemporary management approaches (e.g., 'customary management tools'), and translate best science practice operationally in a way that recognises Māori cultural values, uses and opportunities.

O.   ENGAGEMENT REQUIRED WITH IWI AND STAKEHOLDERS

We envision that HBMaC, as an existing multi-stakeholder entity, will provide a framework for engagement across all interested stakeholder groups. HBRC agrees to facilitate organisation and engagement with the group. Linda Faulkner (Challenge Deputy Director) has been directly involved in early HBMaC hui and is envisioned to be a critical liaison with the multiple iwi and treaty partner organisations involved in this case study project.

P.   PROJECT COMMUNICATIONS

Public participation in the project is envisioned through citizen science projects and an art-science collaboration with local schools. Lay summaries of the project will be codeveloped with HBMaC, following similar design to the HBMaC Roadmap.

Q.   RISK & MITIGATION

Primary risks are with working with a stakeholder group built of diverse iwi and stakeholders, potentially with conflicting objectives. However, the existence of the HBMaC group, its defined objectives and roadmaps, and the initial workshop between HBMaC and the Challenge, suggest a group that has moved beyond initial conflicts to shared objectives and pathways forward.
The project is highly dependent on support from HBRC, particularly with coordination of the interaction with HMBaC, but more importantly, with provision of time of a policy officer to integrate project-derived policy and management options into the actual policy and legislative framework through which these can be implemented. As the current policy officer has recently resigned, filling the gap in this expertise at council level is a key dependency for this project.
Additional meetings have been held with HBRC high level staff and with iwi partners to pre-identify potential risks to allow for their mitigation, and to clarify the non-statutory role of HBMaC. While the involvement of iwi, treaty organisations and regional and central

government organisations provide a pathway toward using case study results to inform future management of Hawke's Bay, we have clarified the Challenge's case study project role as one that is providing scientific advice to a non-statutory advisory body (HBMaC).

R. CONSENTS & APPROVAL required to undertake research	• Depending on the scope of the project once the full co-development process has occurred, if human ethics approval is required for this research, appropriate procedures will be followed and approval will be sought from NIWA's Human Research Ethics Committee.

S. SUBMISSION APPROVAL

Project Name   Enhancing implementation of EBM in the Hawke's Bay

This proposal is authorised for submission by:

Name   Michael Bruce

Role   Regional Manager

Organisation   NIWA Hamilton

Signature   *M. P. Bruce*   **Date:** 29 November 2019