BERMUDA'S
BLUE PROSPERITY PLAN

DRAFT MARINE SPATIAL PLAN

August, 2022

GOVERNMENT OF BERMUDA
Ministry of Home Affairs

BERMUDA OCEAN
PROSPERITY PROGRAMME

Contents

1. Foreword

Walter H. Roban, JP, MP
Deputy Premier, Minister of Home Affairs

Beginning in the early 1600s with the protection of native sea turtles, Bermuda has a rich history of managing its ocean resources to preserve marine biodiversity, both for intrinsic and socioeconomic values. Over the centuries, Bermudians have come to rely on the ocean for their food, livelihoods, shipping, tourism, climate resilience, and recreation, making protecting this resource even more vital to the survival and prosperity of the island and its citizens.

In 2010, the Government of Bermuda articulated a vision for Bermuda's marine environment in the report *A Strategy for the Sustainable Use of Bermuda's Living Marine Resources*. This document included a commitment to integrated planning for Bermuda's marine waters that involved all of Government and stakeholders in its development and implementation. We knew then that a Marine Spatial Plan (MSP) would help us optimise and sustainably manage our best asset—the ocean.

In 2019, we partnered with the Waitt Institute and the Bermuda Institute of Ocean Sciences (BIOS) to achieve this commitment, forming the Bermuda Ocean Prosperity Programme (BOPP). Since that time, our commitment led to creating the Blue Prosperity Plan, which includes:

- A **Marine Spatial Plan** to preserve 90,000 square kilometres (50,000 square miles) of Bermuda's waters within fully protected, no-take fisheries replenishment zones; and
- A **Blue Economy Strategy** to sustainably develop, manage, and improve ocean industries.

It is my pleasure to present Bermuda's Marine Spatial Plan. It represents the input of voices from across the island, including:

- Citizens who took the time to share their feedback on how they use and value their ocean spaces;
- Community representatives that participated in hours of Ocean Village stakeholder conversations;
- A dedicated Steering Committee that guided the MSP's development; and,
- A committee of local scientists providing their technical advice to the process.

This MSP is truly Bermuda's plan to achieve the highest standard of marine protection while, at the same time, ensuring economic resilience. The MSP provides a new management system for Bermuda's Exclusive Economic Zone, with the Department of Environment and Natural Resources as the coordinating authority responsible for its implementation. This is not a one-time plan; it will be revised as needed to reflect changes in current scientific information, economic and social priorities, and environmental conditions. The overall goal of the MSP is to maximise the benefit to Bermudians and minimise negative environmental impacts, resulting in enhanced ecosystem health, which will support a thriving Blue Economy through sustainable growth and improved livelihoods.

This plan would not have been possible without the dedicated efforts of our partners at BOPP, including members of the Steering Committee, who worked hard to make this an open and inclusive process. I'd also like to thank individuals from the Department of Environment and Natural Resources, BOPP's Science Committee, and the Bermuda Institute of Ocean Sciences for their valuable scientific and technical contributions to the plan. Finally, I extend my gratitude to all Bermudians who committed to creating this plan, including representatives of the Ocean Village stakeholder groups and the hundreds of individuals who responded to the Ocean Use Survey—which were integral in the modelling and decision-making process. Your contributions helped to ensure this plan benefits Bermuda today and will help secure the island's prosperity well into the future.

I invite you to share in this lasting legacy of sustainability and economic growth for Bermudians for generations to come.

Walter H. Roban, JP, MP
Deputy Premier and Minister of Home Affairs

2. Introduction

In 2010, the Government of Bermuda released *A Strategy for the Sustainable Use of Bermuda's Living Marine Resources*. This Strategy articulated a long-term vision for Bermuda's marine environment and called for the creation of a **Marine Spatial Plan (MSP)** to manage Bermuda's marine waters.

Marine spatial planning is a public process that uses the best available information about the natural environment and human uses to make informed decisions about how to manage the ocean. Human activities are given spatial and temporal designations to achieve ecological, economic, and social objectives.

A Marine Spatial Plan aims to find the right balance of industry and development, while protecting the environment and marine resources for future generations.

There are numerous benefits for local ecosystems and to Bermuda residents. They include:

- Long-term sustainable management and conservation of marine resources for a healthy and productive ocean.
- Economic growth leading to improved livelihoods and job opportunities for future generations.
- Minimising conflicts of interest through extensive stakeholder input and use of the best available data.
- A transparent and adaptive process providing a greater certainty for ocean users.

This MSP aims to build upon Bermuda's robust history of marine conservation in order to improve the use of the ocean for present and future generations. It includes maps and an associated management plan. This MSP, along with the Blue Economy Strategy, together form a Blue Prosperity Plan that will enable Bermuda to move toward its ecological, social, and economic objectives.

THIS FIRST DRAFT of Bermuda's MSP provides the background and an overview of the processes that guided its development. It describes how involvement from various resident member organisations, local scientific institutions, ocean stakeholders, and the general public guided key decisions in the MSP's formation. It also describes how this First Draft MSP will be turned into a Final Draft MSP through an extensive public consultation process leading to the eventual formal adoption by the Government of Bermuda.

Provide Your Feedback

As part of the public consultations, we are seeking feedback from ocean stakeholders and the general public on marine spatial planning materials, specifically:

1. Bermuda's proposed Marine Protected Area (MPA) network:
   a. Does the proposed offshore network adequately consider the environment and stakeholder needs?
   b. Does the proposed nearshore network adequately consider the environment and stakeholder needs?
   c. What are the outcomes you would like to see from the implementation of Marine Protected Areas?
2. Potential Use Areas:
   a. The MSP provides maps that are potential areas for consideration for renewable energy projects or habitat restoration projects. These maps are not legally binding and are only meant to be one point of information in the decision process. Do you have any concerns or suggestions regarding the development of renewable energy projects and/or habitat restoration?
3. Non-Spatial Objectives:

   The MSP provides a list of non-spatial objectives. These are activities or processes that will: support MSP implementation and management and address future management needs identified in the MSP process.

   a. Are there any aspects that you would like to see addressed in the implementation of the non-spatial objectives?
   b. Do you have any suggestions for activities / actions that have not been addressed?

For full details on how you can participate in the public consultation process and provide feedback, please see Section 3.6. Next Steps.

Provide your feedback on the Bermuda Citizens Forum beginning 12th September, 2022. Learn more at bermduaoceanprosperity.org.

3. Background & Overview

In April 2019, Cabinet authorised the Ministry of Home Affairs to enter into a formal collaborative agreement with the Waitt Institute (on behalf of the Blue Prosperity Coalition) and the Bermuda Institute of Ocean Sciences (BIOS) to develop and implement a Blue Prosperity Plan for Bermuda. The collaborative agreement aligns with the goals in Bermuda's *A Strategy for the Sustainable Use of Bermuda's Living Marine Resources* and is articulated in a Memorandum of Understanding (MOU) signed in June 2019 establishing the Bermuda Ocean Prosperity Programme (BOPP). The MOU provides 30-months[1] for the development and adoption of:

- An enforceable **Marine Spatial Plan** for Bermuda's waters that designates at least 20% of Bermuda's marine waters as fully-protected fisheries replenishment zones, also known as marine protected areas (MPAs), and
- A **Blue Economy Strategy** to assist Bermuda with the diversification of its national revenue and strengthen the sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and continued ecosystem health.

Marine Protected Area (MPA): a clearly defined geographical space, recognised, dedicated, and managed through legal means to achieve the long-term conservation of nature, with associated ecosystem services and cultural values.

The MOU further commits to improving fisheries management, where appropriate, and partnering with stakeholders to support Bermuda's fisheries goals through consultations, scientific research, and economic analyses. The overall project commitment is five years, with the second 30-month phase focused on increasing capacity for implementation of both the MSP and Blue Economy Strategy, as well as continuing work on fisheries management.

3.1. LONG-TERM VISION

Bermuda's vision for its marine areas is to 'encourage a sustainable and economically viable fishing industry, promote healthy marine ecosystems, and ensure that the interests of all those who have a stake in the marine environment are represented.'[2]

Bermuda's MSP supports this vision by outlining a plan to sustainably manage resources and protect 20% of Bermuda's waters as fully protected MPAs. This will result in enhanced ecosystem health, which will support a thriving and more resilient ocean-based economy while reducing user conflicts.

3.2. WHY ARE MPAS IMPORTANT?

Fully protected MPAs confer a variety of socioeconomic and environmental benefits for the local communities in which they are established. These include both market benefits (relating to goods or services that are bought and sold, such as tourism and fisheries) and non-market benefits (such as the value people place on the habitat/organisms being protected). Nearshore MPAs can help protect critical habitat types (e.g., nursery grounds or ecologically significant areas), retain or establish connectivity between habitats, and restore or preserve target species, while large-scale offshore MPAs

1 Challenges due to the COVID-19 pandemic have resulted in an extension of the initial 30-month phase of plan development and adoption.

2 A Strategy for the Sustainable Use of Bermuda's Living Resources, pg 1

3 Davis, K. J., Vianna, G. M. S., Meeuwig, J. J., Meekan, M. G., and Pannell, D. J.. 2019. Estimating the economic benefits and costs of highly-protected marine protected areas. Ecosphere 10(10):e02879. 10.1002/ecs2.2879

can help protect whole features (e.g., seamounts, submarine canyons) and support the conservation and management of highly mobile species (e.g., tuna).[4] The success of MPAs is dependent on their placement within a larger MPA network that incorporates adequate management, monitoring and enforcement.[5] Thus, MPAs that are a component of a scientifically based, well-designed and implemented program are important to help provide for a healthy and resilient ecosystem.

The positive impacts of MPAs on fisheries have been well-documented, particularly in fully protected (no-take) MPAs, which are considered the "gold standard" for conservation. Support for fully protected MPAs can be motivated by the desire to address overfishing, conserve fish diversity and abundance, and enable recovery and restoration of fish stocks.[6] Meanwhile, fully protected MPAs yield significantly higher densities of fishes within their boundaries, support higher fish biomass, and report an increased abundance of higher trophic-level species.[7,8,9] Fully protected MPAs have also been shown to be effective tools to safeguard and recover stocks of highly-migratory pelagic fishes and spiny lobster.[10,11]

One of the most well-documented positive influences of fully protected MPAs on fisheries is "the spillover effect," in which there is a net export of larvae, as well as juvenile and adult individuals, from the MPA into adjacent fishing areas. In some locations, this effect has been seen within five years of the establishment of the MPA.[12] A meta-analysis of 44 fully protected MPAs found an average of a 23% increase in species richness (diversity) and a fourfold increase in catch per unit effort, which is an indirect measure of stock abundance.[13] This analysis showed the same MPAs demonstrate an increased resilience—or ability to recover—from natural environmental disturbances, such as hurricanes and heat waves. Similar studies have shown that, in fully protected MPAs, individual organism size increases by an average of 28%, which translates to female organisms that release higher-quality eggs, thereby increasing the survival potential of juveniles.[14]

Fisheries are not the only industry to benefit from the establishment and careful management of MPAs. The tourism industry and tourism-related local businesses (e.g., hotels, restaurants) report seeing increased revenues and job opportunities from the designation of an MPA, particularly when this is paired with a comprehensive Blue Economy strategy. While there is an economic benefit gained in the short period surrounding the establishment of the MPA (referred to as "the designation effect"), positive impacts on the tourism industry show sustainability in the longer term.[15,16]

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4 Ceccarelli, D. M., Davey, K., Jones, G. P., Harris, P. T., Matoto, S. V., Raubani, J., & Fernandes, L. (2021). How to Meet New Global Targets in the Offshore Realms: Biophysical Guidelines for Offshore Networks of No-Take Marine Protected Areas. Frontiers in Marine Science, 920.

5 Hall et al. 2021. Partially protected areas as a management tool on inshore reefs. *Rev Fish Biol Fisheries.*

6 Turnbull, J.W., Johnston, E.L. and Clark, G.F. (2021), Evaluating the social and ecological effectiveness of partially protected marine areas. Conservation Biology, 35: 921-932. https://doi.org/10.1111/cobi.13677

7 Lester, SE & Halpern, Benjamin. (2008). Biological Responses in Marine No-Take Reserves versus Partially Protected Areas. Marine Ecology-progress Series - MAR ECOL-PROGR SER. 367. 49-56. 10.3354/meps07599.

8 Eva C. McClure, Katherine T. Sievers, Rene A. Abesamis, Andrew S. Hoey, Angel C. Alcala, Garry R. Russ. Higher fish biomass inside than outside marine protected areas despite typhoon impacts in a complex reefscape. Biological Conservation. Volume 241, 2020. https://doi.org/10.1016/j.biocon.2019.108354.

9 Rojo I, Anadón JD, García-Charton JA (2021) Exceptionally high but still growing predatory reef fish biomass after 23 years of protection in a Marine Protected Area. PLOS ONE 16(2): e0246335. https://doi.org/10.1371/journal.pone.0246335

10 Kristina Boerder, Laurenne Schiller, Boris Worm. Not all who wander are lost: Improving spatial protection for large pelagic fishes. Marine Policy, Volume 105. 2019. Pages 80-90. https://doi.org/10.1016/j.marpol.2019.04.013.

11 Lenihan, H.S., Gallagher, J.P., Peters, J.R. et al. Evidence that spillover from Marine Protected Areas benefits the spiny lobster (*Panulirus interruptus*) fishery in southern California. Sci Rep 11, 2663 (2021). https://doi.org/10.1038/s41598-021-82371-5

12 Roberts, C. M., Bohnsack, J. A., Gell, F., Hawkins, J. P., & Goodridge, R. (2001). Effects of marine reserves on adjacent fisheries. science, 294(5548), 1920-1923.

13 Worm, Boris, et. al. Impacts of biodiversity loss on ocean ecosystem services. Science 314, 787 (2006). DOI: 10.1126/science.1132294

14 Cooney, M., Goldstein, M., & Shapiro, E. (2019). How Marine Protected Areas Help Fisheries and Ocean Ecosystems. *Washington: Center for American Progress.*

15 Shone, M. C., Espiner, S., & Stewart, E. J. (2016). Examining the designation effect of marine protected areas: The case of Akaroa, New Zealand. *Tourism in Marine Environments*, 12(1), 1-15.

16 Lemelin, R. H., & Dawson, J. (2014). Great expectations: Examining the designation effect of marine protected areas in coastal Arctic and sub-Arctic communities in Canada. *The Canadian Geographer/Le Géographe Canadien*, 58(2), 217-232.

Tourists have reported the existence of an MPA as having influenced their holiday destination; this is particularly true in locations with high biodiversity.[17] Tourism, and particularly dive tourism, frequently exceeds the foreign currency value of fisheries in many countries with MPAs, but visitors need assurance that activities are being conducted with verifiable sustainability (e.g., a "green certificate").[18] In a social survey of visitors conducted at both partially protected and fully protected MPAs, there were twice as many SCUBA divers and 3.5 times as many snorkelers at the fully protected MPAs, indicating a significant tourism potential in areas that are clearly designated as fully protected.[19] Other communities have chosen a bottom-up governance and actively engaged community stakeholders to develop "eco-tourism" initiatives that create jobs and raise the visibility of the MPA in the country's tourism campaigns.[20]

Beyond the market benefits, there are non-market benefits which cannot, and should not, be discounted. Some individuals are willing to preserve marine ecosystems for the inherent value of the environment, or to protect specific organisms, such as sea turtles or coral.[21] Others see the range of ecosystem services provided by certain habitat types, such as the shoreline protection conferred by reef and mangrove ecosystems, and recognise the value in creating an MPA to conserve these services.[22] On a broader scale, MPAs offer unique opportunities for education and research about the marine environment and the culture, history, and heritage of the areas they protect.

3.3. WHO IS INVOLVED IN CREATING THE MSP?

Marine spatial planning is an iterative process that calls for extensive consultation with marine stakeholders. Bermuda's MSP is no different, with multiple phases of consultation, each with various mechanisms for engagement.

At the outset, Bermuda committed to involve stakeholders through an engagement goal and a public education campaign.

> **Engagement Goal**—Constructively engage the general public and marine stakeholders in BOPP processes. The result should be a practical and effective Blue Economy Strategy and MSP that meet the objectives outlined in the MOU, consider and respond to stakeholder feedback, and create a sense of responsibility for the sustainable monitoring and management of Bermuda's marine waters for all Bermudians.
>
> **Public Education Campaign**—Interested persons are invited to participate in BOPP through workshops, lectures, targeted meetings and events, web updates using online tools, one to one meetings, stakeholder meetings, publications, media coverage, questionnaires and surveys, newsletters, and social media.

Stakeholder engagement and feedback in all aspects of MSP development and implementation is acknowledged as a critical component to its success, and BOPP is committed to:

1. Involving interested individuals early in the decision-making process and consulting stakeholders in draft creation.

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17 Haines, R., Verstraeten, Y., Papadopoulou, L., Hattam, C., Pantzar, M., Russi, D., ... & David, M. (2018). Study on the Economic Benefits of Marine Protected Areas. *Publications Office of the European Union*.

18 Kenchington, R. A., Ward, T. J., & Hegerl, E. J. (2003). *The benefits of marine protected areas*. Department of the Environment and Heritage.

19 Turnbull, J.W., Johnston, E.L. and Clark, G.F. (2021), Evaluating the social and ecological effectiveness of partially protected marine areas. Conservation Biology, 35: 921-932. https://doi.org/10.1111/cobi.13677

20 Jones, P., Murray, R., & Vestergaard, O. (2017). Marine Protected Areas: Securing Benefits for Sustainable Development-Frontiers 2017: Emerging Issues of Environmental Concern. *Frontiers 2017: Emerging Issues of Environmental Concern*, pp. 36-45.

21 O'Connor, E., Hynes, S., & Chen, W. (2020). Estimating the non-market benefit value of deep-sea ecosystem restoration: Evidence from a contingent valuation study of the Dohrn Canyon in the Bay of Naples. *Journal of Environmental Management*, 275, 111180.

22 Pakalniete, K., Ahtiainen, H., Aigars, J., Andersone, I., Armoškaite, A., Hansen, H. S., & Strāķe, S. (2021). Economic Valuation of Ecosystem Service Benefits and Welfare Impacts of Offshore Marine Protected Areas: A Study from the Baltic Sea. *Sustainability*, 13(18), 10121.

2. Engaging with stakeholders directly affected by BOPP objectives at the appropriate time with effective methods.
3. Being adaptable and flexible regarding methods necessary for stakeholder consultation.
4. Respecting the diversity of people, needs, and lifestyles.
5. Ensuring clarity regarding the purpose of any consultation and informing stakeholders how their provided information will be utilised.
6. Making documents publicly available.
7. Communicating clearly and avoiding jargon terms and phrases.

In addition, governance structures were adopted to ensure a Bermuda-led process.

Steering Committee

A Steering Committee comprising Bermudian entities is responsible for making key decisions that drive the MSP process forward. Key responsibilities include the consideration of stakeholder input, the approval of the guiding Principles, Goals, and Objectives (PGOs) and design criteria for the MSP, and the recommendation to Cabinet to approve the Draft MSP for stakeholder consultation.

The Steering Committee is composed of representatives from the following organisations:

- Bermuda Business Development Agency
- Bermuda Economic Development Corporation
- Bermuda Institute of Ocean Sciences
- Bermuda Shipping and Maritime Authority
- Bermuda Tourism Authority
- Commericial Fisheries Council
- Department of Economic Development
- Department of Energy
- Department of Environment and Natural Resources
- Department of Marine and Ports
- Department of Planning
- Department of Workforce Development
- Environmental Authority
- Estates Section, Ministry of Public Works
- Historic Wrecks Authority
- Marine Resources Board
- Regulatory Authority

Science Committee

A Science Committee comprising local and international scientific experts provides technical advice and scientific data to support the Steering Committee in their decision-making process.

The Science Committee is composed of the following representatives:

- Choy Aming, Bermuda Shark Project
- Dr. Nick Bates, Bermuda Institute of Ocean Sciences
- Dr. Annie Glasspool, Bermuda Environmental Consulting
- Dr. Gretchen Goodbody-Gringley, Bermuda Institute of Ocean Sciences & Central Caribbean Marine Institute
- Dr. Rod Johnson, Bermuda Institute of Ocean Sciences
- Dr. Kevin Mayall, Locus Consulting Group.
- Dr. Sarah Manuel, Department of Environment and Natural Resources, Bermuda Government
- Dr. Thad Murdoch, Bermuda Reef Ecosystem Assessment and Mapping

- Dr. Joanna Pitt, Department of Environment and Natural Resources, Bermuda Government
- Dr. Philippe Rouja, Department of Environment and Natural Resources, Bermuda Government
- Dr. Samia Sarkis, The Living Reefs Foundation, Bermuda
- Mandy Shailer, Department of Planning, Bermuda Government
- Dr. Geoff Smith, Department of Environment and Natural Resources, Bermuda Government
- Dr. Robbie Smith, Bermuda Aquarium, Museum and Zoo, Department of Environment and Natural Resources, Bermuda Government
- Dr. Tammy Warren, Department of Environment and Natural Resources, Bermuda Government

Ocean Village

The Ocean Village includes stakeholders in Bermuda that have a specific interest and perspective regarding Bermuda's ocean environment. The role of the participants in the Ocean Village is to act as representatives of ocean interests to ensure that the needs and perspectives of Bermuda's communities, industries, and ocean users are addressed in the MSP. The perspectives of Ocean Village participants help to guide key decisions including the PGOs and the development of ocean-use heatmaps that guide the placement of MPAs. Further consultations with the Ocean Village will be made when the First Draft MSP is available for public consultation.

Ocean Village sectors include:

- Aquaculture (Mariculture)
- Commercial Fishers
- Diving, Snorkeling, and Swimming
- Passive Recreation and Conservation
- Recreational Fishers
- Tourism, Boating, and Sports
- Utilities, Infrastructure, and Development
- Wastewater and Pollution Management

The General Public

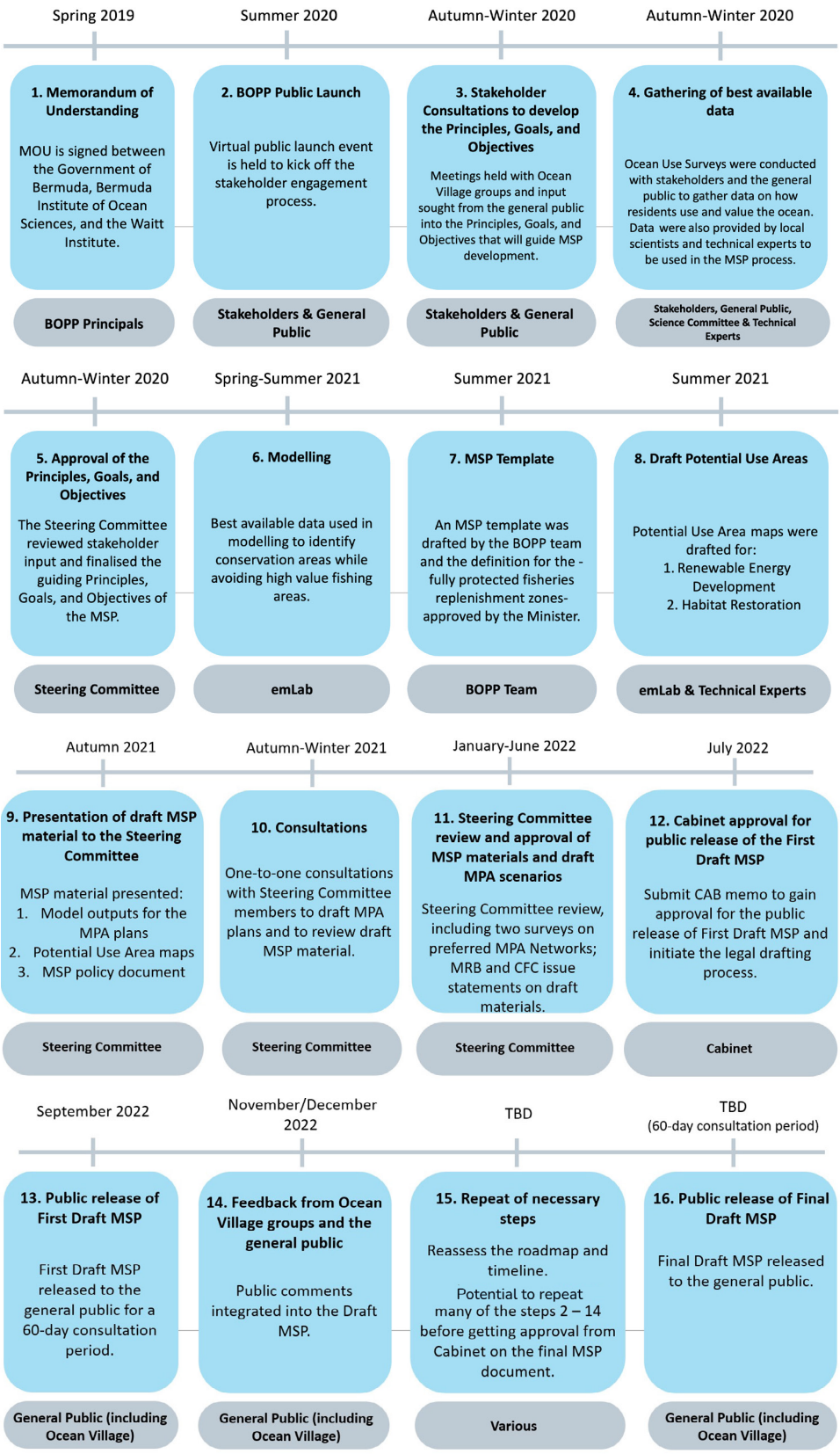
For the MSP to be truly shaped by community input, the general public has been asked to provide input at various stages of the MSP process. From September 2020 to February 2021, BOPP conducted an Ocean Use Survey and gathered information from 1,488 respondents to better understand how Bermudians use the ocean and which areas are most valuable to them. They were also invited to provide input into the PGOs through an online questionnaire or through participation in the Ocean Village. Further consultations will be conducted when the First Draft MSP is made available for public consultation.

Others

Other scientists and technical experts also shared their time, knowledge, and data with BOPP to feed into the MSP process and ensure high-quality outputs. They include:

- Nellie Brylewski, formerly Bermuda Institute of Ocean Sciences
- Dr. Letizia Campioni (and collaborators), Principal Investigator of the Bermuda Petrel Bio-Monitoring Project, Marine and Environmental Sciences Centre, Instituto Universitário, Lisbon, Portugal
- David Gumbs, Director, Islands Energy Program, Rocky Mountain Institute
- Tim Noyes, Research Specialist, Bermuda Institute of Ocean Sciences
- Dr. Christy Pattengill-Semmens, Reef Environmental Education Foundation, Florida, USA

3.4. THE MSP PROCESS



3.5. PRINCIPLES, GOALS, AND OBJECTIVES

Background and Development

The Principles, Goals, and Objectives (PGOs) outlined in the following sections were designed to define the purpose and desired results of Bermuda's MSP.

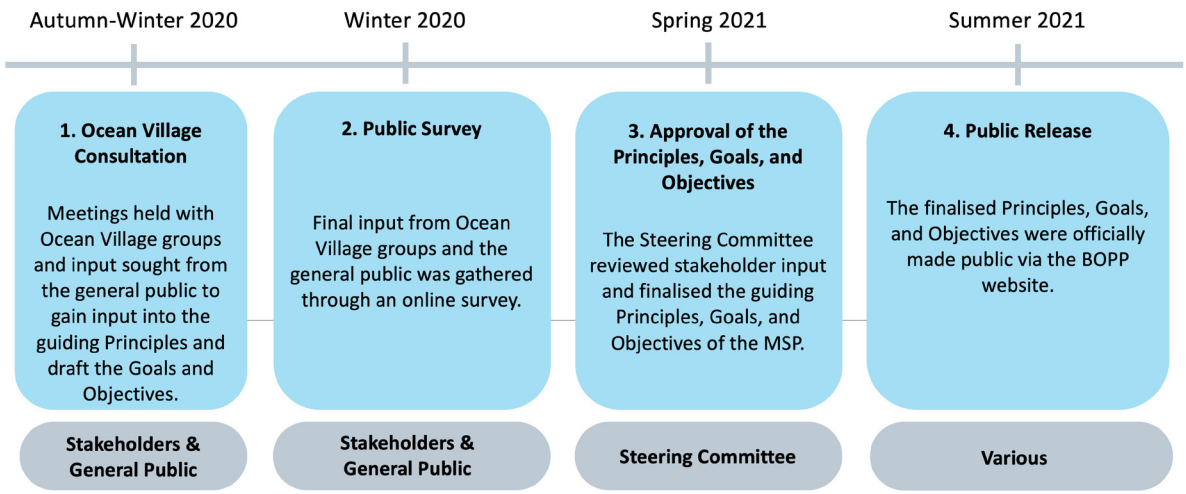
The principles set the tone of the MSP and provide high-level guidance regarding its intrinsic nature.

The goals are high-level, aspirational statements with specified, measurable objectives that collectively identify the desired outcomes of the MSP.

Extensive input was gathered through an online public survey in 2020, with most of the feedback provided through the Ocean Village.

Discussions took place over a four-month period, during which Ocean Village participants dedicated 70 cumulative hours to providing input. The Steering Committee reviewed stakeholder input on the draft PGOs over the course of four 2-hour meetings in spring 2021. In doing so, the Steering Committee discussions focused on considerations for the MSP such as practicability, anticipated benefits, applicability, and the ability to strengthen current marine priorities, including a thriving and sustainable blue economy. All received comments are saved for the record and future consideration. The resultant PGOs are listed in the following sections.

Roadmap for the PGOs Development



Principles

The MSP is guided by a set of principles that: (a) determine the nature and characteristics of the MSP process; and (b) reflect the results to be achieved. Principles do not stand by themselves, but are reflected throughout the MSP process and in the goals and objectives identified later.

BOPP MSP CORE PRINCIPLES	
COMMON RESOURCES	Bermuda's marine environment belongs to all and its integrity is held in trust for the people of Bermuda by the Government and managed collaboratively among stakeholders for the benefit of current and future generations.
CONFLICT MANAGEMENT	Integrated management of the marine environment will minimise conflict among stakeholders while recognising each other's interest and the interests of nature.

BOPP MSP CORE PRINCIPLES	
ECOSYSTEM INTEGRITY	Management of the dynamic marine environment aims to conserve biodiversity and ecosystem function. *Ecosystem Function: The services provided for humans and other organisms through the interaction of living and non-living elements in an ecosystem.*
SUSTAINABLE 'BLUE ECONOMY'	Management of the marine environment aims to support a sustainable 'blue economy' that promotes social justice, equity, inclusion, innovation, and economic opportunities for Bermuda's people.
COMMUNITY VALUES	Management of the marine environment will fully consider cultural heritage, local traditions, and community amenity value.
TRANSPARENCY AND INTEGRATION	The decision-making process will be clear, transparent, and shared publicly, including contributions from all stakeholders.
ANTICIPATORY AND ADAPTIVE	Management of the marine environment will be forward-looking and adaptive to account for new information, opportunities, and changing circumstances.
EVIDENCE-BASED	To address the potential for risk to the human and natural environment, decisions regarding proposed activities and developments in the marine environment will be based on the best available scientific and socio-economic evidence.

A goal is a statement of general direction or intent. These are high-level statements of the desired outcomes that the MSP hopes to achieve. Goals are intended to be broad and abstract, and are differentiated from objectives in that they cannot be measured. Each goal has associated objectives, with measurable outcomes, that define how it will be achieved.

An objective is a statement of desired outcomes or observable behavioural changes that represent the achievement of a goal. Objectives are concrete, detailed, focused, and well-defined outcomes of the MSP. They are achievable with a reasonable amount of effort and resources, and contribute to a desired goal. Importantly, objectives are measurable, and time bound.

Spatial objectives relate to, occupy, or otherwise have the character of physical space. They aim to define specific locations where human activities can be permitted, restricted, or enhanced.

Non-spatial objectives are activities or processes to be achieved during the development of the MSP and after the MSP is adopted in order to support its implementation and management, as well as address future management needs identified in the MSP process.

List of Organisational Acronyms

BDA	Bermuda Business Development Agency
BEDC	Bermuda Economic Development Corporation
BIOS	Bermuda Institute of Ocean Sciences
BOPP	Bermuda Ocean Prosperity Programme
BNT	Bermuda National Trust (*Observer)*
BREAM	Bermuda Reef Ecosystem Assessment and Monitoring
BSMA	Bermuda Shipping and Maritime Authority
BTA	Bermuda Tourism Authority
BZS	Bermuda Zoological Society
CFC	Commercial Fisheries Council
DOED	Department of Economic Development
DOE	Department of Energy
DENR	Department of Environment and Natural Resources

DOP	Department of Planning
DOPB	Department of Public Lands and Buildings
EA	Environmental Authority
ECO	Environmental Coalition
ES	Estates Section, Ministry of Public Works
HWA	Historic Wrecks Authority
M&P	Department of Marine and Ports Services
MRB	Marine Resources Board
OECD	Organisation for Economic Co-operation and Development
RA	Regulatory Authority
W&E	Department of Works and Engineering

THE FOLLOWING TABLE shows the approved goals and objectives for Bermuda's MSP. To guide implementation of the non-spatial objectives, the BOPP Steering Committee will identify a lead, a list of those Government ministries and/or departments that should be consulted, and a timeline for completion. The current content for the non-spatial objectives is provisional, and in some cases, is "to be determined" or incomplete. Each one will be revisited and finalised by the BOPP Steering Committee prior to MSP adoption. **Stakeholders can expect revisions to these objectives as part of the MSP management plan development and completion.**

Goals and Objectives

<table>
<tr><th>GOAL</th><th colspan="5">OBJECTIVE</th></tr>
<tr><td rowspan="4">Facilitate sustainable commercial and recreational fisheries</td><td rowspan="2">Spatial Objectives</td><td colspan="4">Ensure continued access to the most highly-valued fishing grounds on and around the nearshore area, including the Bermuda Platform and outlying banks, as identified by the Ocean Use Survey and other relevant data sources by March 2022.</td></tr>
<tr><td colspan="4">To the extent possible, allow for spatial continuity of fishing for pelagic species in depths > 55 m around the edge of the nearshore area, including the Bermuda Platform and the outlying banks, by March 2022.</td></tr>
<tr><td rowspan="2">Non-Spatial Objectives</td><td>What</td><td>Lead</td><td>Consult</td><td>Timeline</td></tr>
<tr><td>Develop a licensing structure which will allow for better monitoring of reported catches. This will lead to better reporting as it relates to quotas and better management of fish stocks to ensure sustainable commercial and recreational fisheries.</td><td>CFC</td><td>DENR, MRB</td><td>2024</td></tr>
</table>

GOAL	OBJECTIVE				
Preserve areas of historical and cultural importance	Spatial Objectives	Marine protected areas designations should prioritise those areas that have both conservation and historical significance.			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		N/A			
Identify and evaluate the environmental, economic, cultural, and social impacts of all proposed marine activities and developments, and require Environmental Impact Assessments as outlined in the MSP Legal Framework	Spatial Objectives	N/A			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Develop and adopt the legal framework for regulating and managing activities and development within the marine environment, including statutory provisions for evaluating impacts of all proposals and requiring Environmental Impact Assessments for certain proposals.	DENR, DOP	DOPB, DOE, DOED, BEDC, MRB	2022
		Develop a Strategic Environmental Assessment to establish the decision-making criteria and process for certain types of development proposals.	DENR, DOP	DOPB, DOE, ES, MRB	2024
Support environmentally sustainable marine and maritime tourism that promotes social justice, equity, inclusion, innovation, and economic opportunities for Bermuda's people	Spatial Objectives	N/A			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Design a streamlined, integrated, one-stop permitting system for maritime tourism businesses.	DOED	CFC, BDA, BEDC, MRB	2023
		Integrate sustainable, equitable blue tourism policies and actions into the implementation of the Bermuda National Tourism Plan.	BTA	BDA, MRB	2023
		Promote educational materials that enhance awareness about environmentally friendly coastal maritime tourism practises (e.g., watercraft handling around sensitive areas, best practises for SCUBA diving, etc.).	BTA	BZS, MRB	2024

GOAL	OBJECTIVE				
Support maritime infrastructure needs	Spatial Objectives	N/A			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Lead a feasibility study that evaluates the benefits and challenges (including insurance considerations and cost) for the gradual removal of abandoned and unregistered moorings, and the changeover or installation of eco-friendly swing moorings, including public use moorings in environmentally sensitive areas commonly used for recreation.	M&P	DOPB, MRB	2023
		Lead the creation of a study that assesses potential sea level rise and other climate change impacts (rising temperatures, storm frequency and precipitation), including possible adaptation plans, on the airport, bridges, causeways, commercial wharves, ferry docks, fuel docks, marinas, boatyards, BELCO power station, and beaches, updating and expanding on the Smith Warner (2004) and National Trust (2008) reports.	Cabinet, with the support of the Disaster Coordinator	DOP, Ministry of Public Works, DOPB, DENR, DOE, M&P, MRB	2024
		Conduct a survey of current marina operators, yacht clubs and the Bermuda Tourism Authority to inquire on current capacity, anticipated demand and any plans for expansion.	M&P	DOP, BDA, MRB	2023
Evaluate the feasibility of Integrated Resource Plan (IRP)-proposed marine renewable energy solutions taking into account economic, environmental, and cultural impacts	Spatial Objectives	Identify potential energy production zones that recognise the physical characteristics and criteria that should be considered when placing ocean renewable technologies for the purpose of delineating the broadest areas where these technologies could be implemented in Bermuda's EEZ with the lowest potential impact to ecosystem function.			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Contribute to a Strategic Environmental Impact Assessment as part of this MSP to establish the decision-making criteria and process for marine renewable energy development proposals by December 2022. *Note: Should reference the RA's Bulk Generation Procurement Rules found here.*	RA	DENR, DOP, DOPB, DOE	2023

GOAL	OBJECTIVE				
Facilitate the development of responsible, environmentally and economically sustainable mariculture* ***Mariculture is the cultivation of fish or other marine life for food.**	Spatial Objectives	N/A			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Lead a research project on the economic feasibility/viability of mariculture in Bermuda by 2023 and produce a guidance document regarding environmental, social and economic considerations for mariculture in Bermuda.	DENR	BIOS, MRB	By 2025
		Develop legislation and policy to create a framework to enable mariculture in Bermuda.	DENR	M&P, MRB	By 2025
Facilitate effective enforcement within the marine environment	Spatial Objectives	N/A			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Develop a marine resources enforcement strategy that clearly outlines consequences for infractions and is implemented through strengthened legislation.	DENR	Attorney General's Chambers, CFC, BSMA, MRB	2024
		Conduct a study to measure the efficacy of enforcement measures.	DENR	M&P, CFC, BSMA, MRB	2023
		Conduct a public education campaign to raise awareness about existing and new marine regulations.	DENR	CFC, BSMA, MRB	2024
Protect biological diversity, productivity, and ecological function across all habitat types	Spatial Objectives	Designate a minimum of 20% of the Bermuda EEZ as fully protected no-take Marine Protected Areas. These designations should consider and optimise existing designations. Efforts should be made to ensure the representative coverage of each key habitat type (20%) and higher coverage of habitats as specified in other objectives.			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Conduct a study to assess the need and cost/benefit for regulations on transitory commercial maritime traffic speed in Bermuda's EEZ.	M&P	DENR, BSMA, MRB	2025
		Increase ties with relevant international programs to consider Bermuda's EEZ in the context of the wider oceanic environment.	DENR	BIOS, MRB	2024

GOAL	OBJECTIVE				
Facilitate reproductive success of marine species through protection and restoration of important nursery grounds, spawning sites, and migratory routes	Spatial Objectives	Maintain seasonal no-take restrictions at all known 'fish' breeding and/or aggregation sites under the Fisheries (Protected Areas) Order 2000, and evaluate changes as new scientific information becomes available.			
		Identify and protect 50% of coastal habitats that appear to be juvenile fish nursery habitats and/or used by protected marine species.			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		N/A			
Restore degraded and vulnerable habitats	Spatial Objectives	Establish active restoration of areas that were formerly seagrass habitats (100m²) through turtle exclusion.			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Inventory and assess past, present and potential salt marsh and mangrove habitat areas and develop a strategic plan for conservation and restoration.	DENR	BZS, CFC, MRB	2024
		Initiate active restoration of threatened mangrove habitats.	DENR	BZS, CFC, MRB	2024
		Initiate active restoration of damaged and/or degraded coral habitats in protected areas.	DENR	BZS, CFC, MRB	2025
Preserve unique, rare, and/or threatened species and habitats	Spatial Objectives	When designating marine protected areas, prioritise those areas that seek to protect habitat used by unique, rare, and/or threatened species named in the Protected Species Act.			
		When designating marine protected areas, prioritise those areas that seek to protect at least 40% of seamount area in Bermuda's outer EEZ. This objective specifically excludes Argus and Challenger Banks.			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Support and promote a strategic management plan that recommends levels of protection for remaining natural/living rocky intertidal shorelines and beaches from inappropriate development.	DENR	DOP, MRB	2025
		Support recommendations as identified by DENR for protections of shark species.	DENR	BIOS, MRB	2022

GOAL	OBJECTIVE				
Improve water quality and reduce ocean pollution	Spatial Objectives	N/A			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Map point-source pollution and reduce the concentration of pollutants (sewage related, industrial waste, antifouling paints) by 30-40% at impacted nearshore areas.	DENR	W&E, MRB	2029
		Improve wastewater treatment of municipal sewage outfalls to reduce the concentration of sewage-related pollutants (suspended solids, fats, oils, and greases) in surrounding waters 30-60% below current concentrations.	DENR	W&E, MRB	2029
		Establish a strategic plan for the management of abandoned/sunken boats.	DENR	M&P, Attorney General's Chambers, MRB	2026
Promote scientific and technological research	Spatial Objectives	N/A			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Develop legislation that establishes a clear and straightforward licence process for research activities by local and visiting scientists.	DENR	BIOS, DENR, MRB	2023
		Create an intersectoral working group to identify key areas of research and develop strategies to increase activity in the marine environment.	DENR	BIOS, MRB	2023
Educate the public about the importance of the marine environment	Spatial Objectives	N/A			
	Non-Spatial Objectives	What	Lead	Consult	Timeline
		Deliver a series of public outreach MSP campaigns in collaboration with key partners.	DENR	ECO, BEDC, BIOS, MRB	2023
		Deliver a series of educational curriculum products relative to the marine environment and MSP to be distributed to local schools.	DENR	BIOS, ECO, MRB	2024
		Incorporate Bermuda's MSP in local adult education programs (18+) to give Bermudians experience relevant to local marine environment jobs.	DENR	BIOS, Department of Education, Bermuda College, MRB	2024
		Develop an intersectoral working group to promote collaboration among marine stakeholders for MSP implementation.	DENR	ECO, BEDC, MRB	2024

3.6. NEXT STEPS

Where We Are in the Process

The Principles, Goals, and Objectives were approved and finalised by the Steering Committee in 2021. These have guided the process of creating the MSP materials presented in Section 5, which were used to develop this First Draft MSP.

The Bermuda Cabinet has approved the First Draft MSP for public consultation. It is being released alongside the Draft Blue Economy Strategy, providing opportunities for stakeholder feedback on the full Draft Blue Prosperity Plan. It will then go through stakeholder consultation and Steering Committee review before returning to Cabinet for final approval. Once approved, the Final Draft MSP will return to the public.

Public Consultation

Public consultations will aim to gather feedback from the general public and Ocean Village groups during the 60-day consultation period.

The general public are invited to join an Ocean Village group or participate in one of three public consultation meetings where the MSP process and its components will be presented alongside those of the Blue Economy Strategy. A primary objective is to gather feedback on the First Draft MSP, specifically on the Proposed MPA Network and the non-legislated Potential Use Area maps for renewable energy development and habitat restoration. Meetings will be held in:

- **Session 1: Hamilton** - Thursday, 15th September, 2022, 6:00 - 7:30 p.m.
  Location: St. Paul's AME Centennial Church Hall, Hamilton
- **Session 2: St. George's** - Wednesday, 21st September, 2022, 6:00 - 7:30 p.m.
  Location: Bermuda Institute of Ocean Sciences (BIOS), St. George's
- **Session 3: Somerset** - Wednesday, 28th September, 2022, 6:00 - 7:30 p.m.
  Location: TBD, Somerset

Meetings will be televised and/or made available online for those who cannot attend in person. The government-run Bermuda Citizens Forum will also be used to collect feedback virtually beginning 12th September, 2022.

Separate meetings will be held concurrently with the Ocean Village groups to gather specialised feedback from ocean stakeholders that have a specific interest and perspective regarding Bermuda's ocean environment.

For more information visit bermudaoceanprosperity.org

4. Scope & Authority

Bermuda's Marine Spatial Plan (MSP) provides for the management of Bermuda's marine waters. This includes the territorial sea and the Exclusive Economic Zone (EEZ) extending two hundred (200) nautical miles from the coast and encompassing an estimated four hundred and sixty-five thousand (465,000) square kilometres or one hundred and eighty thousand (180,000) square miles.

The MSP will be legally binding through the enactment of a Marine Development Act ("the Act"). There is currently no legally enforceable integrated plan for guiding marine activities and decisions regarding development that are not attached to the coastline. The Act will fill this gap providing a new "umbrella" regime that complements existing legal frameworks while designating the Department of Environment and Natural Resources as the coordinating authority for marine planning and development. Other existing sectoral entities and statutes will remain operative.

The objectives of the Act will be to a) develop and implement a publicly available marine spatial planning system to manage a changing marine environment that can be accessed by all sectors and users of Bermuda's marine waters, b) promote sustainable economic opportunities which contribute to the development of Bermuda's ocean economy through coordinated and integrated planning, c) conserve the ocean for present and future generations, and d) facilitate responsible uses of the ocean.

The Act will include:

1. Principles of marine spatial planning including the protection of 20% of Bermuda's marine waters.
2. Ministerial responsibility for oversight.
3. Establishment of a national marine working group from relevant departments.
4. Powers to create, amend, and revoke protected areas or other elements of the MSP.
5. Appeal process.
6. Requirements to consult with stakeholders, boards, etc.
7. Requirements to approve a National Plan and special areas plans via the affirmative process.
8. Powers to enforce prohibited and regulated activities in protected areas.
9. Powers to make regulations.
10. Regulated procedures for considering marine-based development and providing an adaptive holistic approach to human oceanic activities and marine resource usage.

Appropriate governance structures will be identified in the Act to ensure coordinated development and implementation of the MSP, including stakeholder engagement. It will also specify that this initial MSP will cover a 10-year period and will be reviewed and revised based on new and emerging circumstances. The general public will be informed of the MSP's development and of any changes made during periods of review.

5. Management Plan

This section explains the spatial designations for Bermuda's waters, including:

- Currently legislated areas
- Proposals for a new legislated MPA network
- Non-legislated suitability maps for Potential Use Areas for priority activities

The MSP incorporates existing legally designated areas that are currently managed under Bermuda law. In order to achieve the commitment made in the MOU, additional MPAs are proposed in a new MPA network that attempts to meet the approved objectives, while also considering Science Committee and Steering Committee feedback, as well as stakeholder needs.

The proposed MPA network for the nearshore and offshore areas was selected from several potential scenarios that were put forward to the Steering Committee for consideration, including alternative suggestions by Steering Committee members on behalf of their respective organisations. The Committee discussed and ranked the scenarios during two rounds of voting. In addition, the Marine Resources Board and the Commercial Fisheries Council issued independent statements on potential scenarios. These statements highlighted issues relevant to MPA shapes, as well as management and monitoring considerations. It should be noted that the Commerical Fisheries Council declined to vote on a preferred scenario. All MPA scenarios and suggestions that were considered by the Steering Committee can be viewed in Section 8.1. and voting results are shown in Section 8.2.

Included in the MSP are descriptive maps for Potential Use Areas that identify areas of potential suitability for priority activities as listed in the PGOs. The areas are not legally binding but are intended to guide decision makers as they consider future use proposals in Bermuda's marine environment.

Potential Development Areas

- Renewable Energy Development:
    - Offshore wind (fixed)
    - Offshore wind (floating)
    - Floating solar PV
    - Wave energy

Potential Conservation Areas

- Habitat Restoration
    - Seagrass
    - Mangrove and Salt Marsh
    - Coral

The Potential Development Areas for renewable energy provide opportunities for investable projects under the Draft Blue Economy Strategy, helping to meet the Strategy's goal of producing cleaner, more cost-conscious energy. It should be noted that such activities will require a comprehensive Environmental Impact Assessment (EIA) and feasibility studies.

The Potential Conservation Areas for habitat restoration also provide opportunities for investable projects listed in the Draft Blue Economy Strategy, helping to meet the goal of expanding sustainable maritime tourism. These areas also provide opportunities for ecosystem enhancement that could be funded through developer mitigation payments as proposed in the Draft Strategy.

In addition to the maps described above, the MSP also describes the relevant authorities responsible for implementing schemes to achieve the non-spatial objectives as listed in Section 3.5. Feedback from public consultations will be incorporated into the Final Draft MSP to provide further details on implementation and management for both the spatial and non-spatial objectives.

The Government of Bermuda has created a draft Marine Enforcement Strategy that will contribute to the approved objectives by helping to enforce MSP-related regulations. They are also working with The Blue Shield, a project led by the U.K. Government to support British Overseas Territories in establishing and enhancing appropriate compliance and enforcement frameworks and improving remote monitoring for Bermuda's large marine waters. This will inform a Marine Enforcement Strategy for the MSP and the MPA Network, which will be subsequently incorporated into the Final Draft MSP.

Provide Your Feedback

As part of the public consultations, we are seeking feedback from ocean stakeholders and the general public on marine spatial planning materials, specifically:

1. Bermuda's proposed Marine Protected Area (MPA) network:

a. Does the proposed offshore network adequately consider the environment and stakeholder needs?
b. Does the proposed nearshore network adequately consider the environment and stakeholder needs?
c. What are the outcomes you would like to see from the implementation of Marine Protected Areas?

2. Potential Use Areas:

a. The MSP provides maps that are potential areas for consideration for renewable energy projects or habitat restoration projects. These maps are not legally binding and are only meant to be one point of information in the decision process. Do you have any concerns or suggestions regarding the development of renewable energy projects and/or habitat restoration?

3. Non-Spatial Objectives:

The MSP provides a list of non-spatial objectives. These are activities or processes that will: support MSP implementation and management and address future management needs identified in the MSP process.

a. Are there any aspects that you would like to see addressed in the implementation of the non-spatial objectives?
b. Do you have any suggestions for activities / actions that have not been addressed?

For full details on how you can participate in the public consultation process and provide feedback, please see Section 3.6. Next Steps.

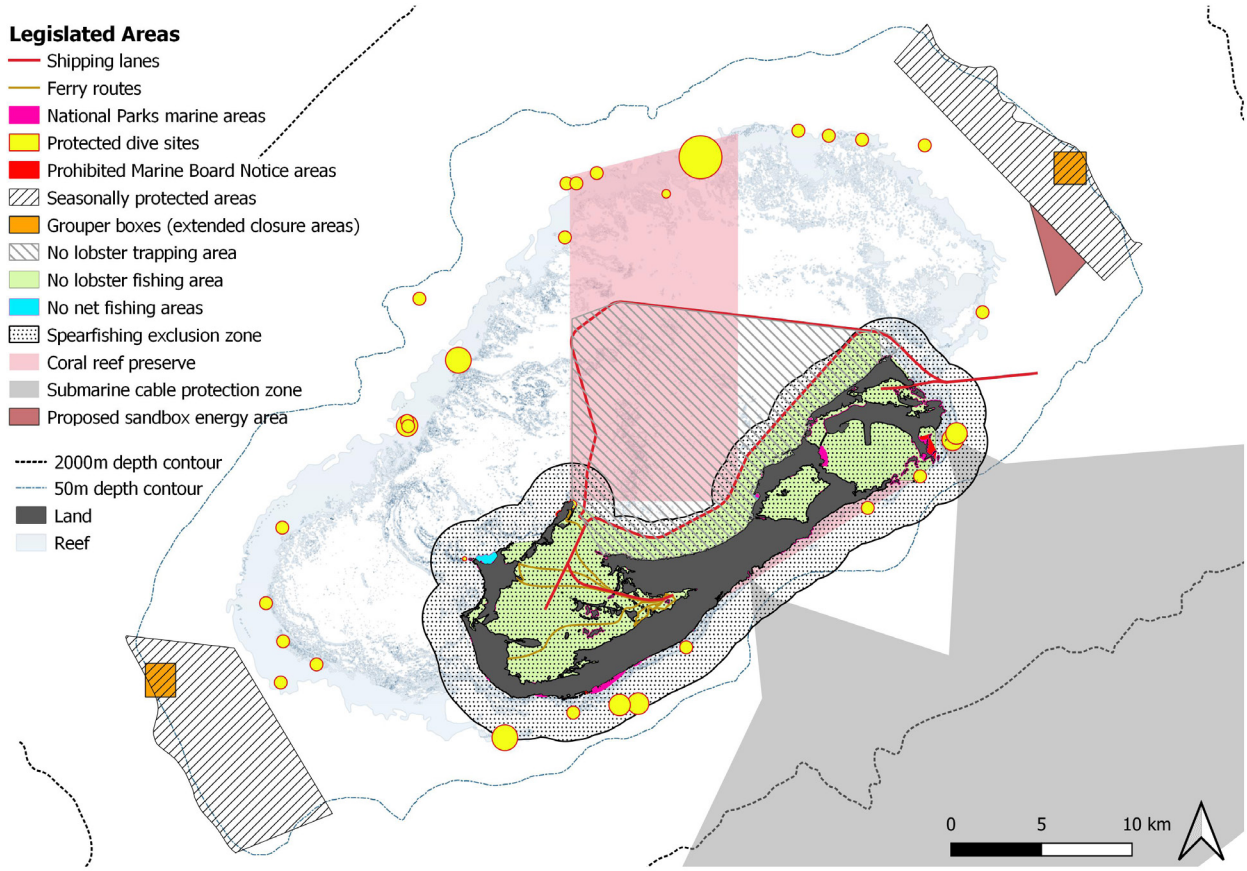
Provide your feedback on the Bermuda Citizens Forum beginning 12th September 2022. For full details on how you can participate in the public consultation process and provide feedback, please visit bermduaoceanprosperity.org.

5.1. CURRENTLY LEGISLATED AREAS

Currently legislated areas are those areas that are managed for a specific purpose under Bermuda law. These areas and legislation will remain unchanged as part of the MSP process. They include the below area types and are outlined in Map 5.1.1.

- Shipping lanes
- Ferry routes
- National Parks marine areas
- Protected dive sites
- Prohibited Marine Board Notice areas
- Seasonally protected areas
- Grouper boxes (extended closure areas)
- No lobster trapping area
- No lobster fishing area
- No net fishing areas
- Spearfishing exclusion zone
- Coral reef preserve
- Submarine cable protection zone
- Proposed sandbox energy area

5.1.1. MAP - CURRENTLY LEGISLATED AREAS



5.1.2. USE CHART - CURRENTLY LEGISLATED AREAS

Shape	Protection Level (according to MPA Guide)	Research: non-extractive	Restoration/enhancement for conservation	Non-extractive recreation	Low impact tourism	High impact tourism	Research: extractive	Lobster trapping	Lobster diving	Bottom fishing	Netting (all types)	Commercial trolling/surface fishing	Recreational trolling/surface fishing	Catch and release fly fishing	Recreational spearfishing	Navigation/transitting vessels/boating	Shipping	Restoration/enhancement for other reasons	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Dredging & dumping	Renewable energy generation	Infrastructure works & development	Cabeling	Untreated water discharge	Mining, oil and gas extraction	Habitation	EIA requirement for all development, change of use or intensity of use	Management plan required for special areas of interest, legislated or declared protected areas
Ferry routes	n/a	✓	✓	✓	✓	x	r	x	x	x	x	✓	✓	x	x	✓	✓	✓	x	x	r	r	r	r	r	x	x	-	-
Shipping lanes	n/a	✓	✓	✓	✓	x	r	x	x	x	x	✓	✓	x	x	✓	✓	✓	x	x	r	r	r	r	r	x	x	-	-
Protected dive sites	n/a	✓	✓	✓	✓	✓	r	x	x	x	x	x	x	x	x	✓	x	r	x	x	r	r	x	r	r	x	x	-	-
National Parks marine areas	n/a	✓	✓	✓	✓	✓	r	r	r	r	r	r	r	r	r	r	x	r	x	x	r	r	r	r	r	x	x	-	-
Prohibited Marine Board Notice areas	n/a	✓	✓	✓	✓	x	r	x	x	x	x	x	x	x	x	x	x	x	x	x	r	r	r	r	r	x	x	-	-
Seasonally Protected Areas	n/a	✓	✓	✓	✓	✓	r	r	r	r	r	r	r	r	r	✓	x	x	x	x	r	r	x	r	r	x	x	-	-
MPA extended closure areas (two grouper boxes)	n/a	✓	✓	✓	✓	✓	r	r	r	r	r	r	r	r	r	✓	x	x	x	x	r	r	x	r	r	x	x	-	-
No net fishing areas	n/a	✓	✓	✓	✓	✓	r	✓	✓	✓	x	✓	✓	✓	✓	✓	x	r	x	r	r	r	r	r	r	x	x	-	-
Spearfishing exclusion zone	n/a	✓	✓	✓	✓	✓	r	✓	✓	✓	✓	✓	✓	✓	x	✓	r	r	x	r	r	r	r	r	r	r	x	x	-	-
No lobster fishing areas	n/a	✓	✓	✓	✓	✓	r	x	x	✓	✓	✓	✓	✓	✓	✓	r	r	x	r	r	r	r	r	r	r	x	x	-	-
Lobster Reservoir	n/a	✓	✓	✓	✓	✓	r	x	✓	✓	✓	✓	✓	✓	r	✓	r	r	x	r	r	r	r	r	r	r	x	x	-	-
Coral Reef Preserve	n/a	✓	✓	✓	✓	✓	r	✓	✓	✓	✓	✓	✓	✓	✓	✓	r	x	x	r	r	r	r	r	r	r	x	x	-	-
Submarine cable protection zone	n/a	✓	✓	✓	✓	✓	r	r	✓	r	r	✓	✓	✓	✓	✓	r	r	r	r	r	r	r	r	r	r	x	x	-	-
Sandbox Energy Area	n/a	✓	✓	✓	✓	✓	r	r	r	r	r	r	r	r	r	r	x	x	x	x	r	r	r	r	r	r	x	x	-	-

Table 5.1.2. This table shows the currently legislated areas in Bermuda's waters and the prohibited, restricted, and permitted activities within each areas. √ = permitted; r = restricted; x = prohibited; - = not required.

5.2. PROPOSED MPA NETWORK

5.2.1. Where We Are in the Process

BOPP presented draft MSP material and facilitated discussions through group meetings and one-to-one consultations with Steering Committee members from October 2021 to June 2022. These resulted in draft MPA scenarios for consideration in Bermuda's waters and the finalisations of material presented in this Draft MSP. For further details on these consultations and the materials discussed, see the following reports.

- MPA Network Proposals: Supplemental Materials (June 2022)
- Drafting of Marine Protected Area (MPA) Scenarios in Bermuda's Waters (January 2022)

Initital Consultation and Voting Phase:

SeaSketch, a web-based, collaborative marine spatial planning tool, was used to review all available data layers (including Science Committee recommendations and Ocean Use Survey results) and to map areas where members thought MPAs should be placed. MPA shapes could be assigned permitted activities and given a level of protection (either fully protected or partially protected) based on the IUCN protected area categories. Verbal feedback was also recorded and members were asked to review their consultation notes and mapped MPA plans to ensure their feedback was accurately represented.

Mapped MPA shapes were combined and converted into heatmaps to give a visual representation of where MPA suggestions were made and where ideas overlapped. These heatmaps, along with verbal feedback, were used to create several MPA scenarios based on three approaches:

Offshore:

- Scenario A: Human-use approach (priority focus on human-use objectives)
- Scenario B: Middle ground approach (balanced focus on human-use and ecological objectives)
- Scenario C: Ecological approach (priority focus on ecological objectives)

Nearshore:

- Scenario A: Human-use approach (priority focus on human-use objectives)
- Scenario B(a): Middle ground approach (balanced focus on human-use and ecological objectives, prioritising feedback based on heatmaps showing collective MPA proposals from recent Steering Committee consultations)
- Scenario B(b): Middle ground approach (balanced focus on human-use and ecological objectives, prioritising Steering Committee feedback based on verbal communication through one-to-one consultations that could not be captured in the heatmaps)
- Scenario C: Ecological approach (priority focus on ecological objectives)

In a survey issued February 2022, the Steering Committee was asked to rank several MPA scenarios for both Bermuda's nearshore area (coastline to 2000 m depth) and offshore area (2000 m depth to the outer EEZ boundary). Its members were also given the opportunity to add suggestions or comments they felt were important.

Following this inital survey, alternative proposals brought by the Steering Committee members on behalf of their representative organisations were considered. The Commercial Fisheries Council (CFC) and the Marine Resources Board (MRB) also submitted independent statements that commented on specific MPA locations, as well as monitoring and management considerations.

Final Consultation and Voting Phase:

A series of Steering Committee meetings were held from March to June 2022 during which feedback from the initial survey, and from statements issued by the CFC and the MRB, were considered. This resulted in a second survey (issued in June 2022) for a preferred MPA Network that designates MPAs with different levels of protection (either fully, highly or lightly protected) based on recently published guidance in *The MPA Guide*. The following proposals were considered:

Offshore:

- Offshore Proposal 1: Representing the top ranked scenario as voted for by the Steering Committee in the initial voting phase.
- Offshore Proposal 2: A modified version of the top ranked scenario as voted for by the Steering Committee in the initial voting phase, incorporating a change to the map visualisation to represent management and legislation that already applies to all of Bermuda's waters.

Nearshore:

- Nearshore Proposal 1: Representing the top ranked scenario as voted for by the Steering Committee in the initial phase.
- Nearshore Proposal 2: A proposal led by DENR that builds upon the 'balanced approach' as voted for by the Steering Committee in the intitial voting phase. It puts greater emphasis on human-use considerations, particularly commerical fisheries, to achieve a better balance between human-use and ecological objectives.

The preferred network is included in this Draft MSP. It should be noted that the CFC declined to voted on a preferred scenario.

All MPA scenarios and suggestions that were considered by the Steering Committee can be viewed in Section 8.1. and results are shown in Section 8.2.

5.2.2. Steering Committee MPA Recommendations

The top ranked MPA Network proposal for Bermuda's waters can be viewed in:

- **SECTION 5.2.3.**
- **ONLINE MAP VIEWING PORTAL**

Full details of the MPA scenarios and survey results are given in Section 8.1. Supporting documents of how each proposed scenario meets the approved objectives are also available.

- MPA Network Proposals: Supplemental Materials (June 2022)
- Drafting of Marine Protected Areas (MPA) Scenarios in Bermuda's Waters (January 2022)

In July 2022, the Bermuda Cabinet approved the Draft Blue Prosperity Plan, including this First Draft MSP, for public consultation.

5.2.3. Proposed MPA Network[1]

This section proposes a new MPA network for both Bermuda's nearshore area (coastline to 2000 m depth) and offshore area (2000 m depth to the outer EEZ boundary). The network attempts to meet as many approved objectives as possible while also considering Science and Steering Committee feedback, as well as stakeholder needs. The effectiveness of this network at meeting the approved spatial objectives is outlined in Section 5.4. and potential impacts on human uses are outlined in Section 5.5.

Suggested MPAs are assigned permitted activities and given a level of protection (either fully protected, highly protected, or lightly protected) based on guidance in *The MPA Guide*. Each suggested MPA has been assigned a unique number, which are outlined in the maps below (please note that the boundaries shown are not yet definitive).

> **Marine protected area (MPA):** a clearly defined geographical space, recognised, dedicated, and managed through legal means to achieve the long-term conservation of nature, with associated ecosystem services and cultural values.
>
> **Fully Protected:** no extractive or destructive activities are allowed; all impacts are minimised.
>
> **Highly Protected:** only light extractive activities are allowed with low total impact, with all other impacts minimised.
>
> **Lightly Protected:** Some protection exists but moderate to significant extraction and other impacts are allowed.
>
> **Allowed Activity Types:** Those explicitly permitted by regulation and/or those that are not forbidden by the MPA nor by the surrounding regulations. Impact is determined via activity type, intensity, scale, duration, and frequency relative to biodiversity conservation goals.

Offshore Prosposal

A fully protected MPA over the Muir Seamount chain (shape A1) is included in the offshore area to recognise the pelagic and benthic biodiversity values of seamounts. This area is seldom used by local fishers, so immediate conflict would be minimal, and its protection helps to achieve ecological objectives set out in the PGOs. This area could provide refuge for a variety of fish species important to Bermuda if it were to expand its commercial pelagic fishing industry. Full protection is suggested to recognise the links between upper-ocean life and the seabed, therefore maintaining the integrity of this valuable habitat. High protection is suggested at the Crescent Seamount (shape A3) to achieve optimum habitat protection targets while allowing for commercial fishing activities, thereby recognising the importance of this area to the local fishing industry.

An area in the southeast of the EEZ (shape A2) has been suggested for full protection as it includes a variety of pelagic habitat zones (including escarpments, knolls and plains) thus meeting offshore habitat protection targets.

Finally, a 'lightly protected' area (shape A4) covers the entire EEZ to recognise areas covered by existing legislation and management that already exists.

1 Boundaries and use activities of proposed MPAs may change.

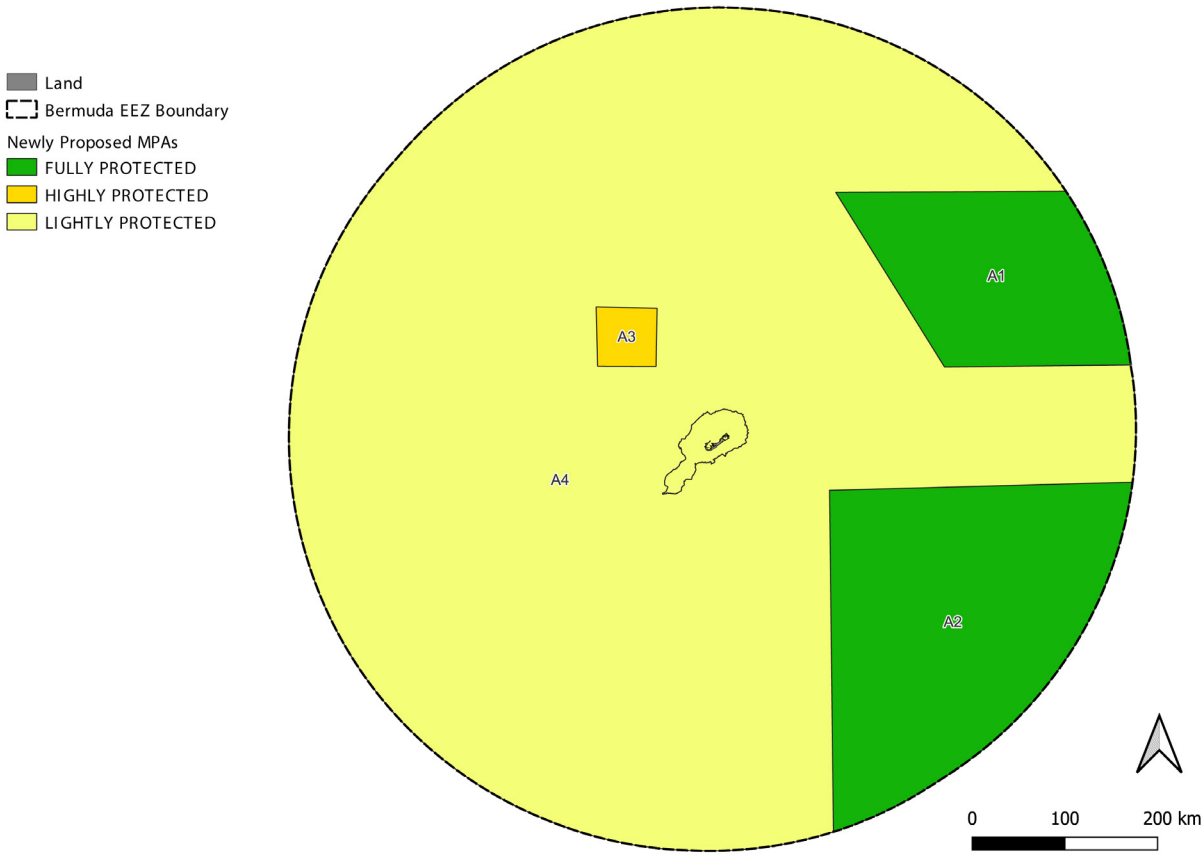


Figure 5.2.3.1. Proposed MPA network for Bermuda's offshore waters (2000 m to EEZ Boundary)

Shape	Protection Level (according to MPA Guide)	Research: non-extractive	Restoration/enhancement for conservation	Non-extractive recreation	Low impact tourism	High impact tourism	Research: extractive	Lobster trapping	Lobster diving	Bottom fishing	Netting (all types)	Commercial trolling/surface fishing	Recreational trolling/surface fishing	Catch and release fly fishing	Recreational spearfishing	Navigation/transitting vessels/boating	Shipping	Restoration/enhancement for other reasons	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Dredging & dumping	Renewable energy generation	Infrastructure works & development	Cabeling	Untreated water discharge	Mining, oil and gas extraction	Habitation	EIA requirement for all development, change of use or intensity of use	Management plan required for special areas of interest, legislated or declared protected areas
A1 - Muir Chain	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	*	x	x	x	x	x	x	r	x	x	x	+	+
A2 - Southeast EEZ	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	*	x	x	x	x	x	x	r	x	x	x	+	+
A3 - Crescent Seamount	HIGH	✓	✓	✓	✓	x	x	x	x	x	x	✓	✓	x	x	✓	*	x	x	x	x	x	x	r	x	x	x	+	+
A4 - EEZ	LIGHT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	x	x	+	-

Table 5.2.3.1. Use chart showing permitted, restricted or prohibited activities for each proposed MPA in Bermuda's offshore waters (2000 m to EEZ boundary). √ = permitted; r = restricted; x = prohibited; + = required; - = not required. *Shipping has special consideration when placing MPAs. The United Nations Convention on the Law of the Sea (UNCLOS) applies and there are different shipping rights of passage through the various ocean zones. MPAs would need to be designed to accommodate existing shipping lanes and freedom of navigation.

Nearshore Proposal

Building on the existing legislative and management framework for Bermuda's marine environment, the nearshore proposal provides spatial and management supplemental solutions to make the PGOs a reality and includes recommendations from stakeholders.

Recognising the value of Bermuda's current management and conservation measures, and wanting to leverage this existing capacity, the proposal raises the declared management level to 'lightly protected' across the whole nearshore area. This is based on comparisons between existing human uses, species and habitat protections (such as gear restrictions), as well as proposed human uses, and standards set forth in *The MPA Guide*. The new status will be further supported through improvements to marine resource management, such as increased fisheries-dependent and fisheries-independent monitoring of commercially important species. Assessments will be conducted regularly for key fishery species, including black grouper, red hind and spiny lobster, so that harvest controls can be implemented and adapted as required.

A formal Management Plan for the area will define objectives, build on current Species Action Plans, and detail actions (e.g., additional harvest control rules and/or spatial management) that should be taken in specific circumstances. This will also include a review and potential modification of the currently legislated areas in accordance with the MSP's objectives and to promote sustainable fisheries. Any proposed development or new activity in the nearshore area will require a full Environmental Impact Assessment. The MSP legislation will establish the burden of proof that must be met in order for the proposals to be approved.

Following the standards set forth in *The MPA Guide*, the plan incorporates areas of full protection and high protection against the background of lightly protected 'managed' areas.

Areas proposed for full protection incorporate representative areas from a variety of habitat types, and include essential fish and shellfish habitats such as spawning sites, juvenile recruitment areas and important seagrass areas that will provide refuge at different life stages. This is hypothesised to provide population-level benefits to commercially important species, while also supporting coral and fish diversity.

The proposal takes a 'stepping stone' approach to habitat connectivity and species dispersal, which are seen as critical functions of MPAs that assist in long-term safeguarding of marine biodiversity and ecosystem services. Key habitats are given full or high protection, and individual species are supported by the 'light' protections in the areas in between. This avoids placing large corridors off limits to a broad range of human activities.

Recognising that marking areas at sea presents logistical challenges, and that a lack of demarcation can hinder compliance with and enforcement of spatial protections, the proposal utilises practical delineations such as functional habitat units and environmental features (e.g., a cluster of patch reefs, a promontory, depth contours), as well as existing channel markers to help define protected areas.

Further, the reef areas proposed for full protection are spread throughout the Bermuda Platform to account for different prevailing environmental conditions that may affect both marine organisms and human uses, and also to provide greater equitability across resource users operating from different parts of the island.

A coastal plan proposes a series of small-scale MPAs in important bays, with relevant protective measures to support fisheries and ecosystem health. Mangrove areas are to be given full protection (with a 10 m full protection buffer) and a no-fishing buffer zone of 50 m. As a key nursery habitat, this protection will support fish recruitment. Additional areas where net fishing would be prohibited will build on the existing network that currently covers just four bays.

However, the proposal also recognises limitations in the data available for decision-making at this time, particularly in deeper areas, and lays out an adaptive approach to higher levels of protection. The areas proposed for full and high protection will be considered study sites, and a monitoring strategy will evaluate how the protective measures are performing against the PGOs over a 10-year time period. Processes built into the MSP will allow for modification of spatial management measures as appropriate, based on the evidence from the monitoring programme (see Section 6 for more details).

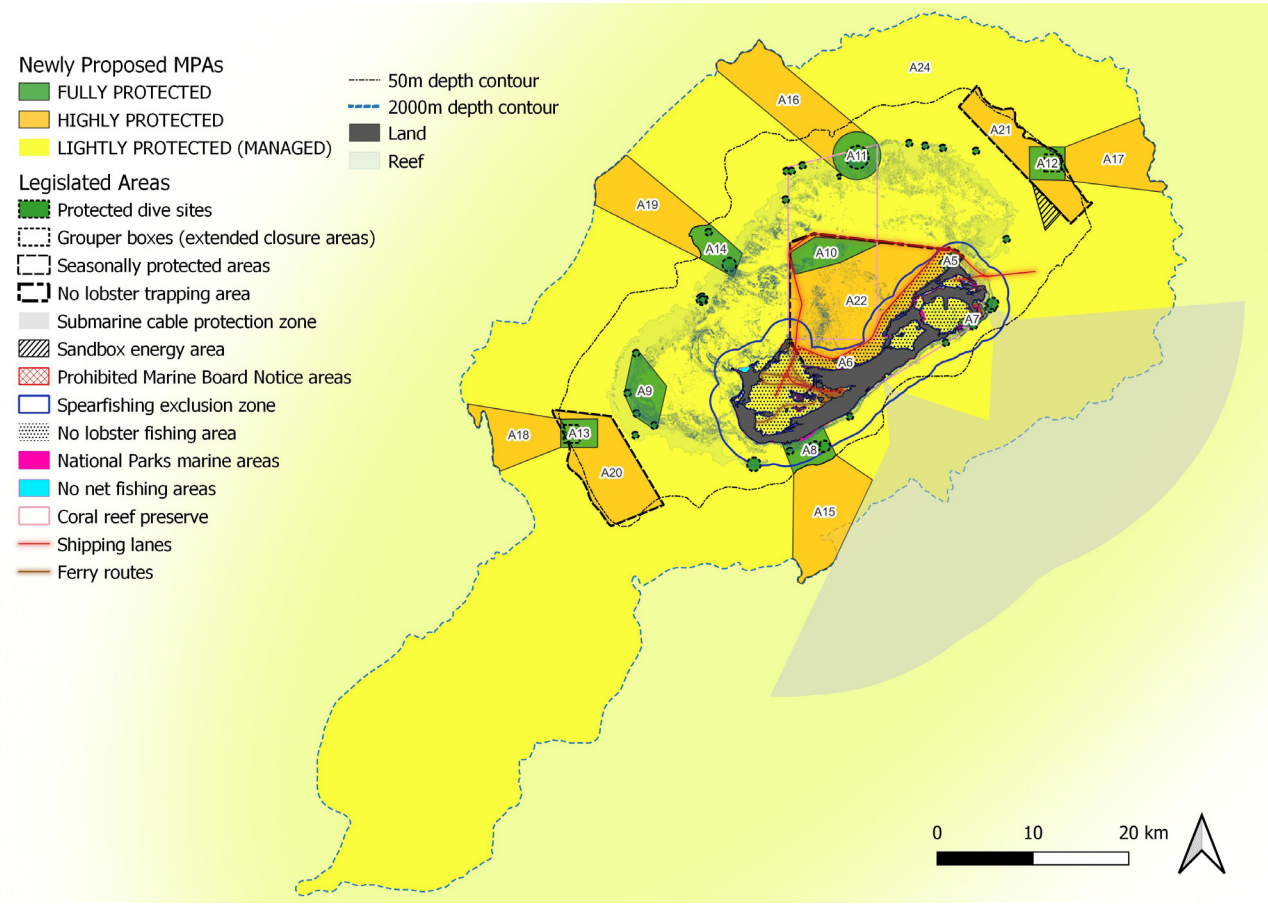


Figure 5.2.3.2. Newly proposed MPA Network for Bermuda's nearshore waters (coastline to 2000 m) alongside currently legislated areas.

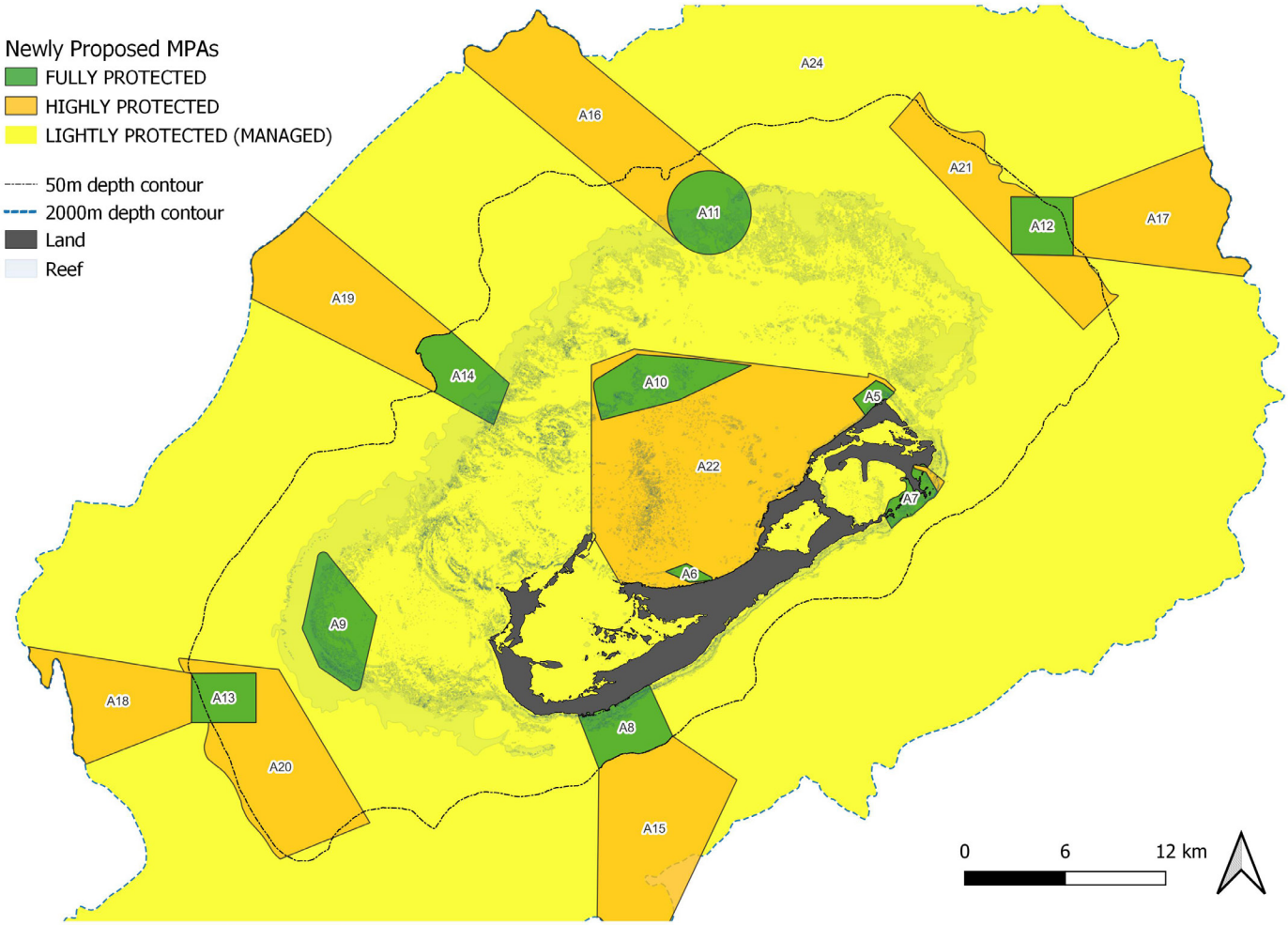


Figure 5.2.3.3. Newly proposed MPA network for Bermuda's nearshore waters (coastline to 2000 m).

See use chart on next page, Table 5.2.3.3.

Shape	Protection Level (according to MPA Guide)	Research: non-extractive	Restoration/enhancement for conservation	Non-extractive recreation	Low impact tourism	High impact tourism	Research: extractive	Lobster trapping	Lobster diving	Bottom fishing	Netting (all types)	Commercial trolling/surface fishing	Recreational trolling/surface fishing	Catch and release fly fishing	Recreational spearfishing	Navigation/transitting vessels/boating	Shipping	Restoration/enhancement for other reasons	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Dredging & dumping	Renewable energy generation	Infrastructure works & development	Cabeling	Untreated water discharge	Mining, oil and gas extraction	Habitation	EIA requirement for all development, change of use or intensity of use	Management plan required for special areas of interest, legislated or declared protected areas
A5 - Coot Pond	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A6 - Tyne's Bay Madracis Reef	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A7 - Castle Harbour Islands and Reef	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A7.1 - Cable zone adjacent to full protection areas	HIGH	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	✓	x	x	x	+	+
A8 - South Shore	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A9 - Chubb's Head	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A10 - North Lagoon	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A11 - North Rock	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A12 - Eastern Grouper Box	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A13 - Western Grouper Box	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A14 - Eastern Blue Cut	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A15 - South Shore Pelagic Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
A16 - North Rock Pelagic Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
A17 - Eastern Grouper Box Pelagic Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
A18 - Western Grouper Box Pelagic Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
A19 - Eastern Blue Cut Pelagic Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
A20 - Seasonally Protected Area West	HIGH	✓	✓	✓	✓	x	✓	r	r	r	x	r	r	r	r	✓	x	✓	x	x	x	x	x	r	x	x	x	+	+
A21 - Seasonally Protected Areas East	HIGH	✓	✓	✓	✓	x	✓	r	r	r	x	r	r	r	r	✓	x	✓	x	x	x	x	x	r	x	x	x	+	+
A22 - Spiny Lobster Reserve	HIGH	✓	✓	✓	✓	x	✓	x	r	✓	✓	✓	✓	✓	r	✓	r	✓	x	✓	x	x	r	r	x	x	x	+	+
A24 - Platform	LIGHT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	r	✓	r	✓	r	x	x	+	+
C1 - Bailey's Bay	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C2 - Coney Cove	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C3 - Whalebone Bay	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	r	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C4 - Walsingham	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	x	x	r	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C5 - North of Riddell's Bay	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C6 - Paradise Lakes	HIGH	✓	✓	✓	✓	r	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C7 - The Lagoon	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C8 - Hospital Bay	HIGH	✓	✓	✓	✓	x	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
M - Mangroves	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
MB - Mangrove Buffer Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	x	x	r	x	✓	x	✓	x	x	x	x	r	r	x	x	x	+	+

Table 5.2.3.3. Use chart showing permitted, restricted or prohibited activities for each proposed MPA in Bermuda's nearshore waters (coastline to 2000m). √ = permitted; r = restricted; x = prohibited; + = required; - = not required.

The series of maps below show the proposed MPA network for Bermuda's coastline:

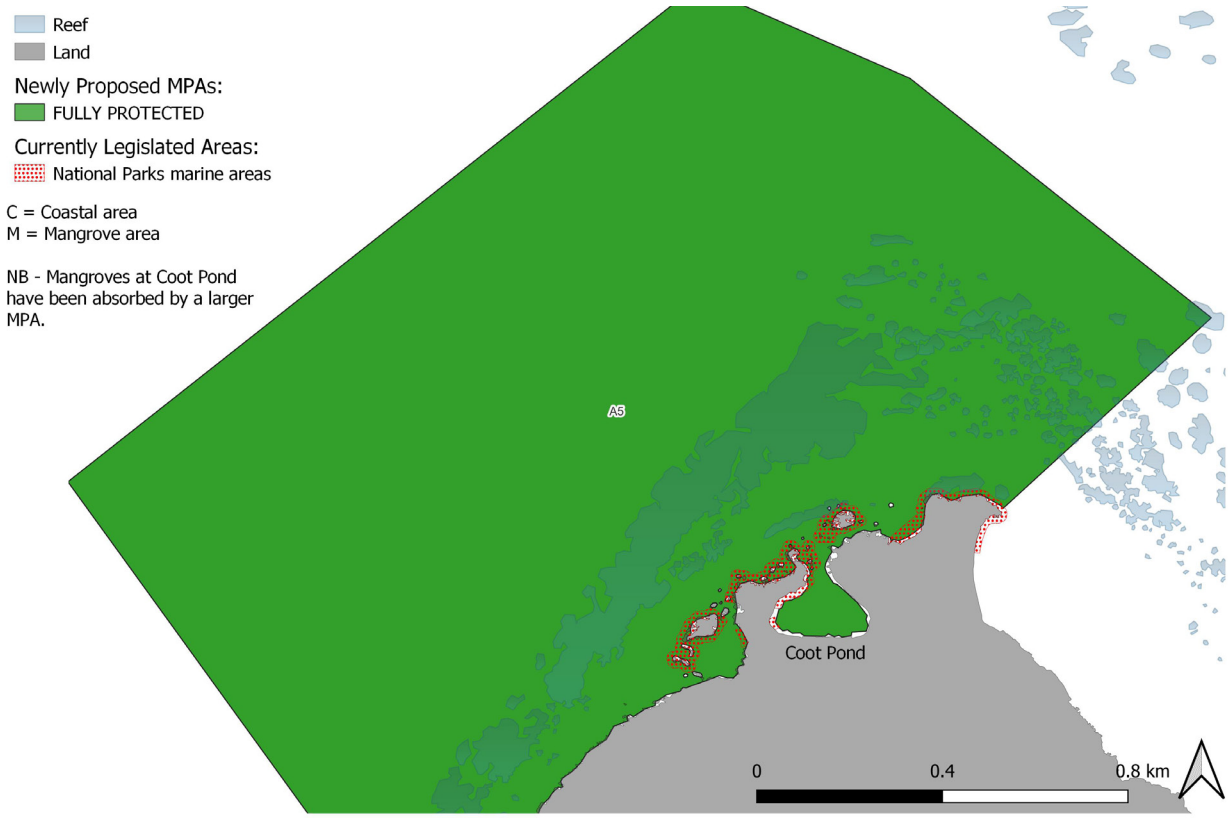


Figure 5.2.3.4.

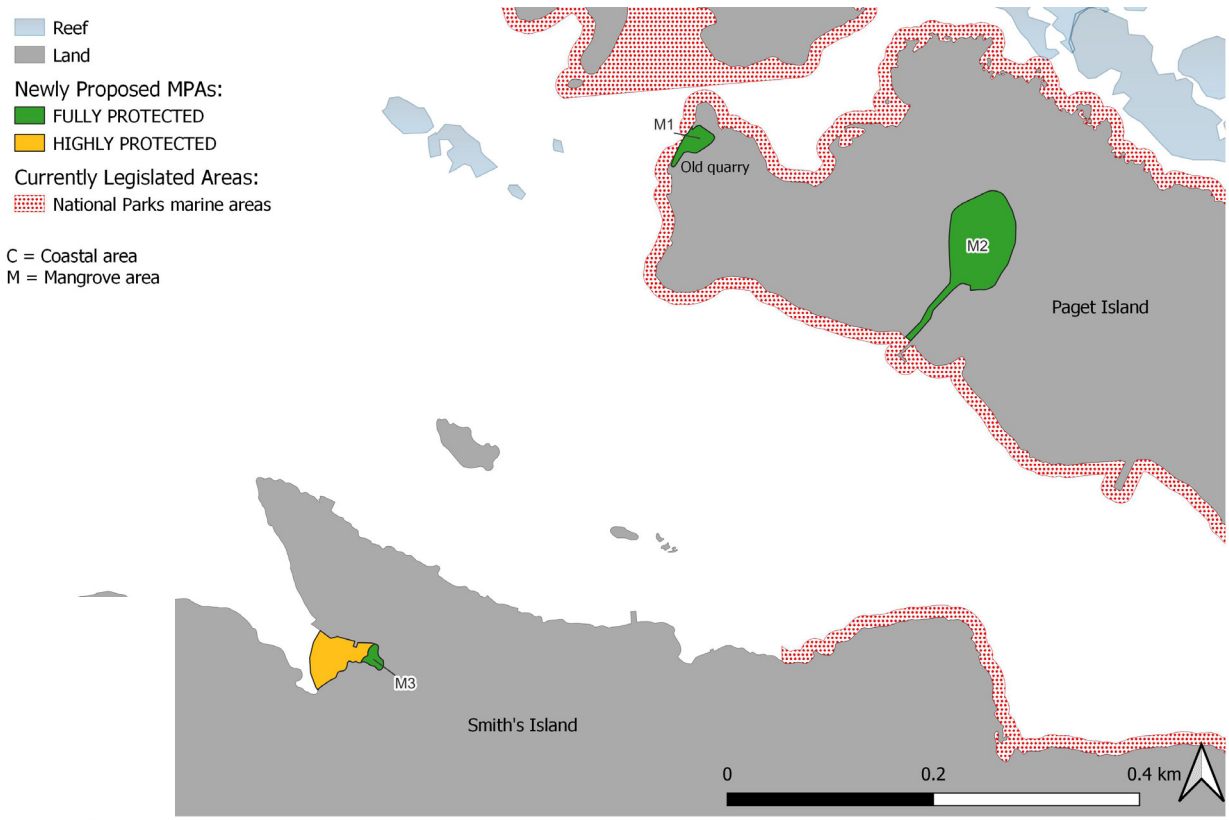
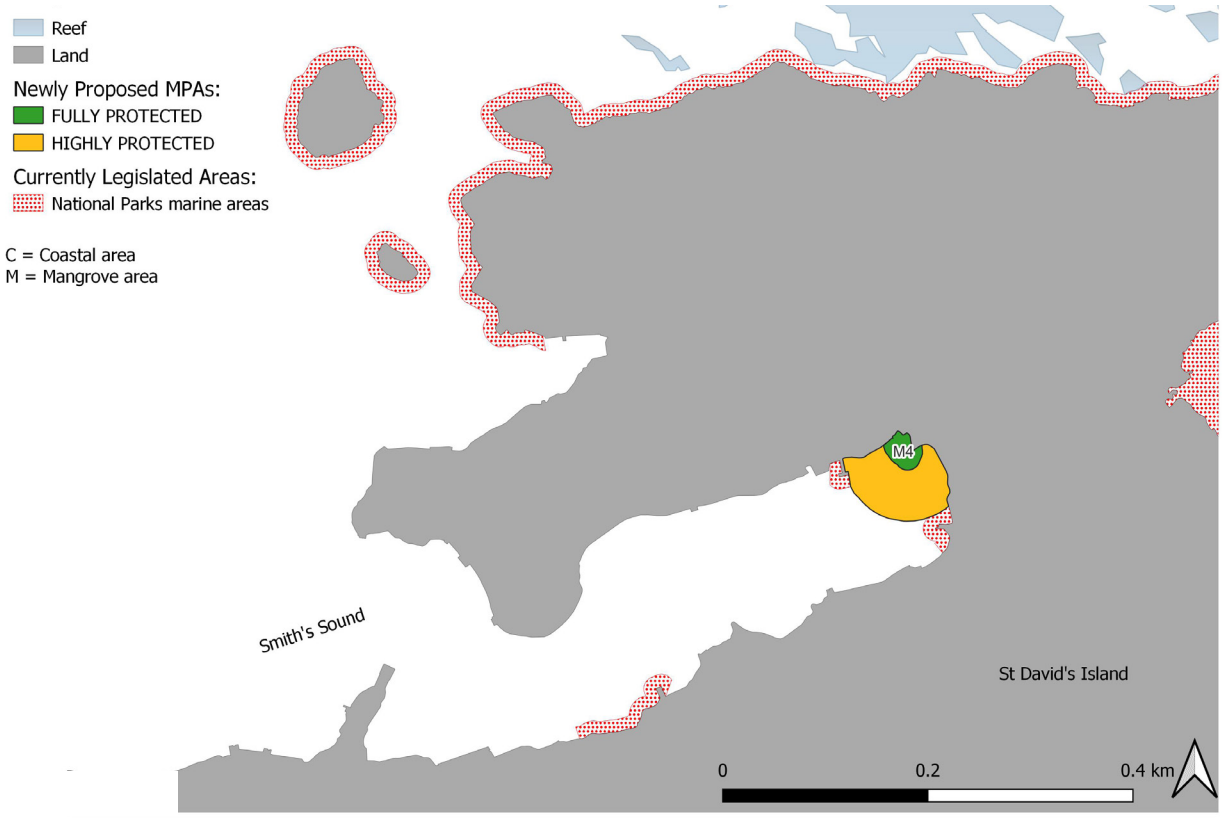


Figure 5.2.3.5.



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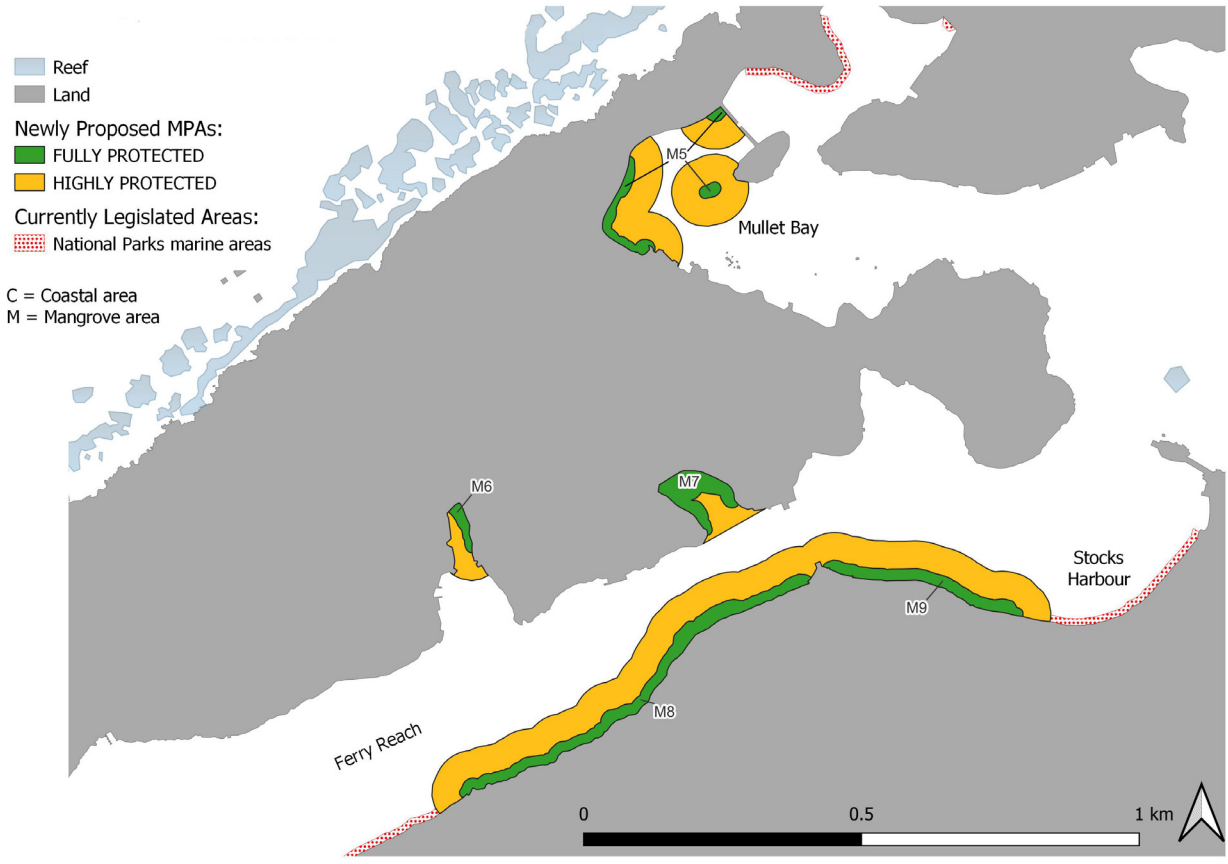
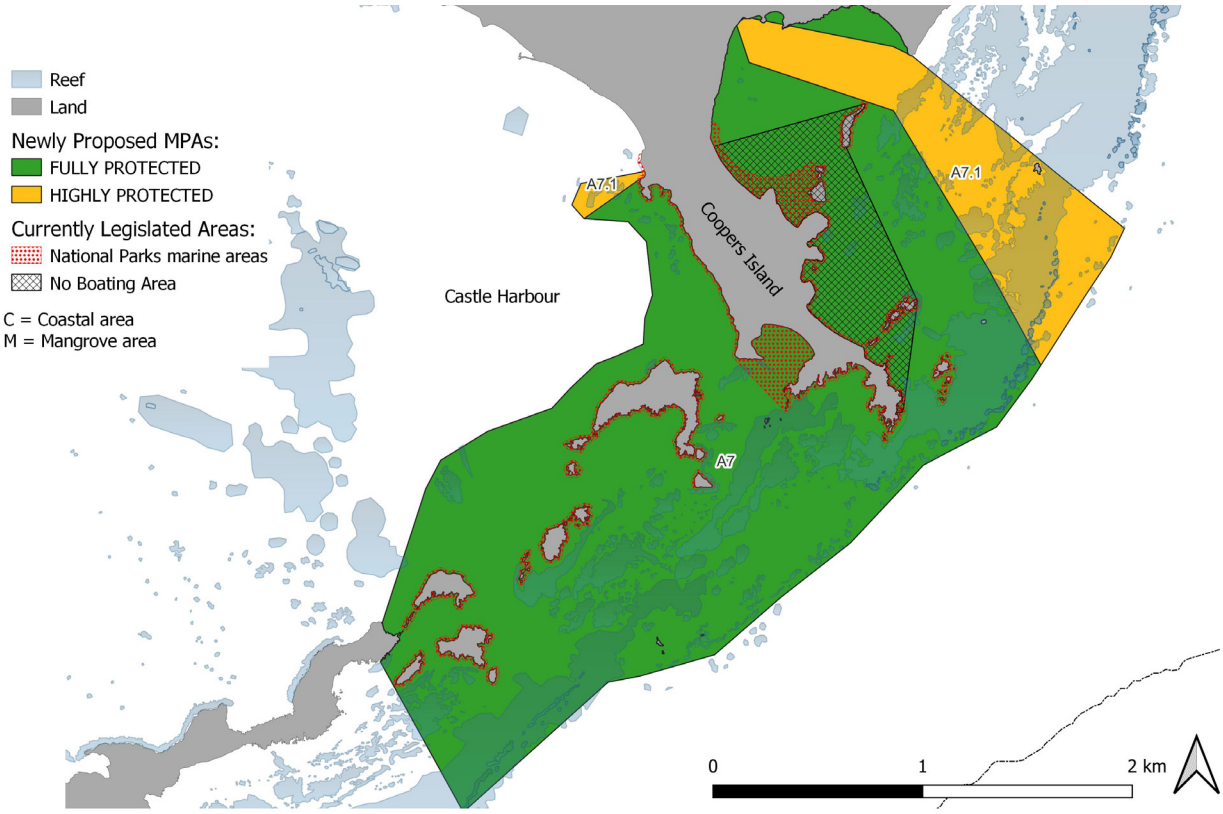


Figure 5.2.3.7.



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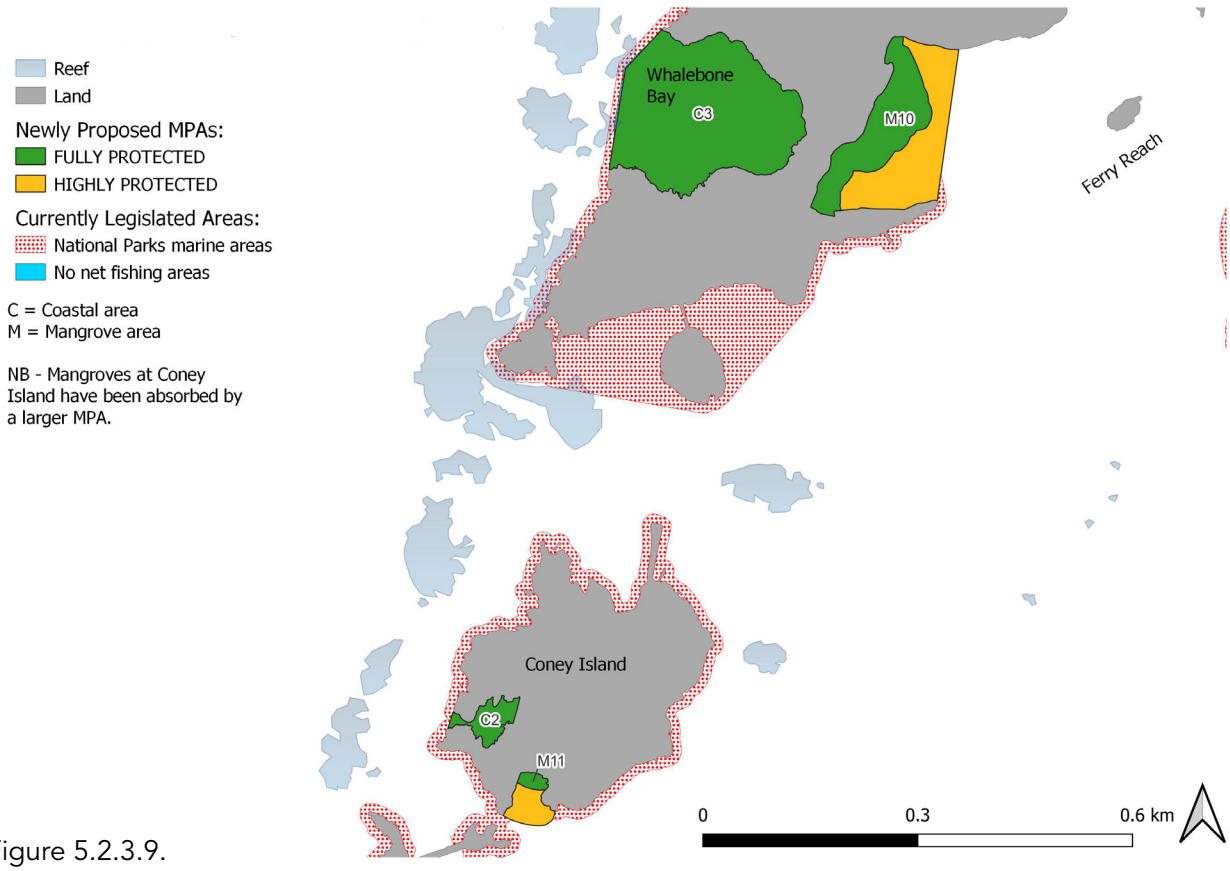


Figure 5.2.3.9.

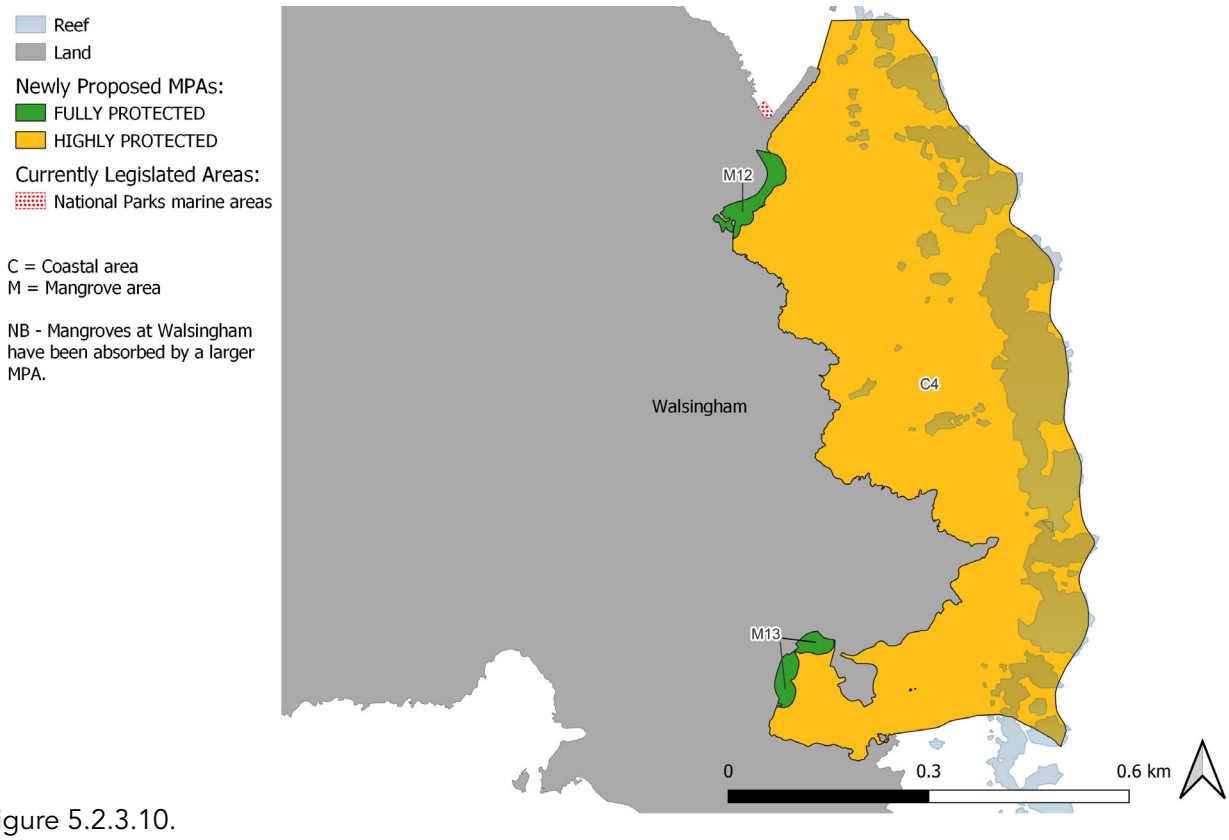


Figure 5.2.3.10.

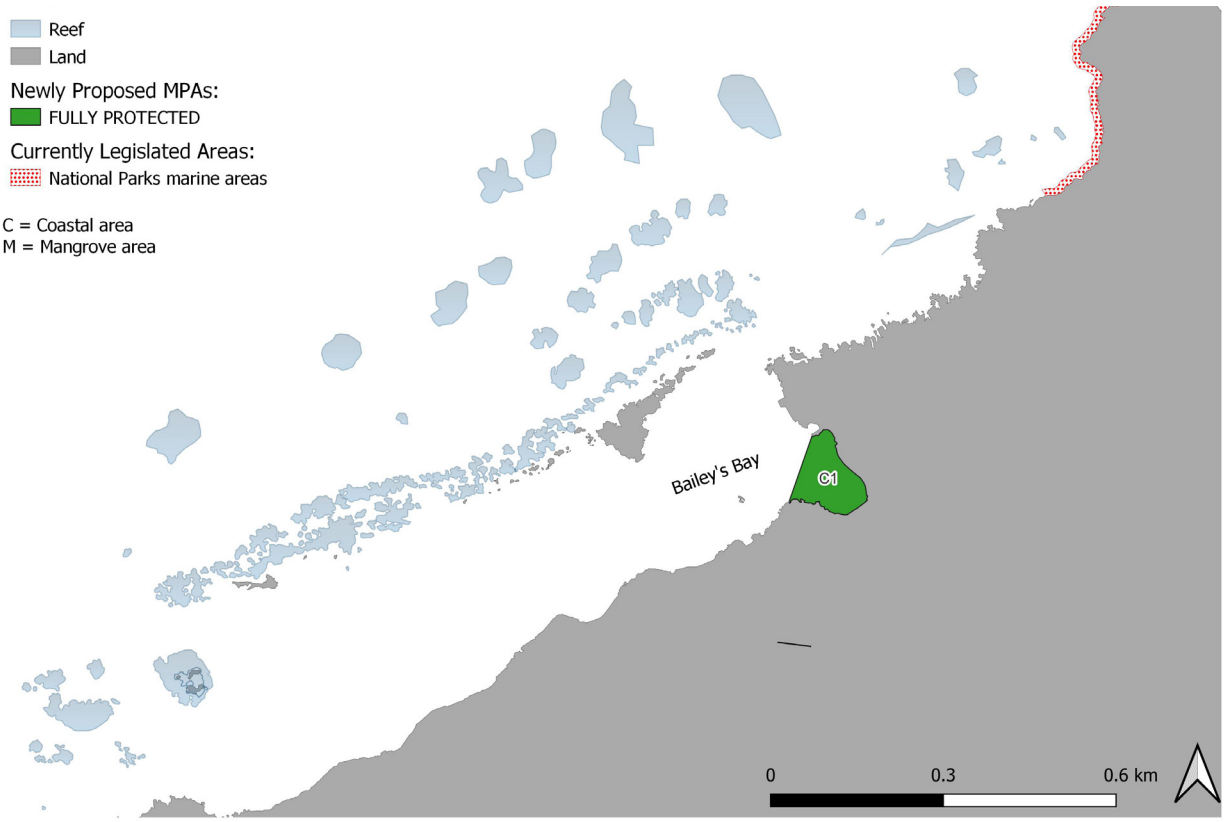
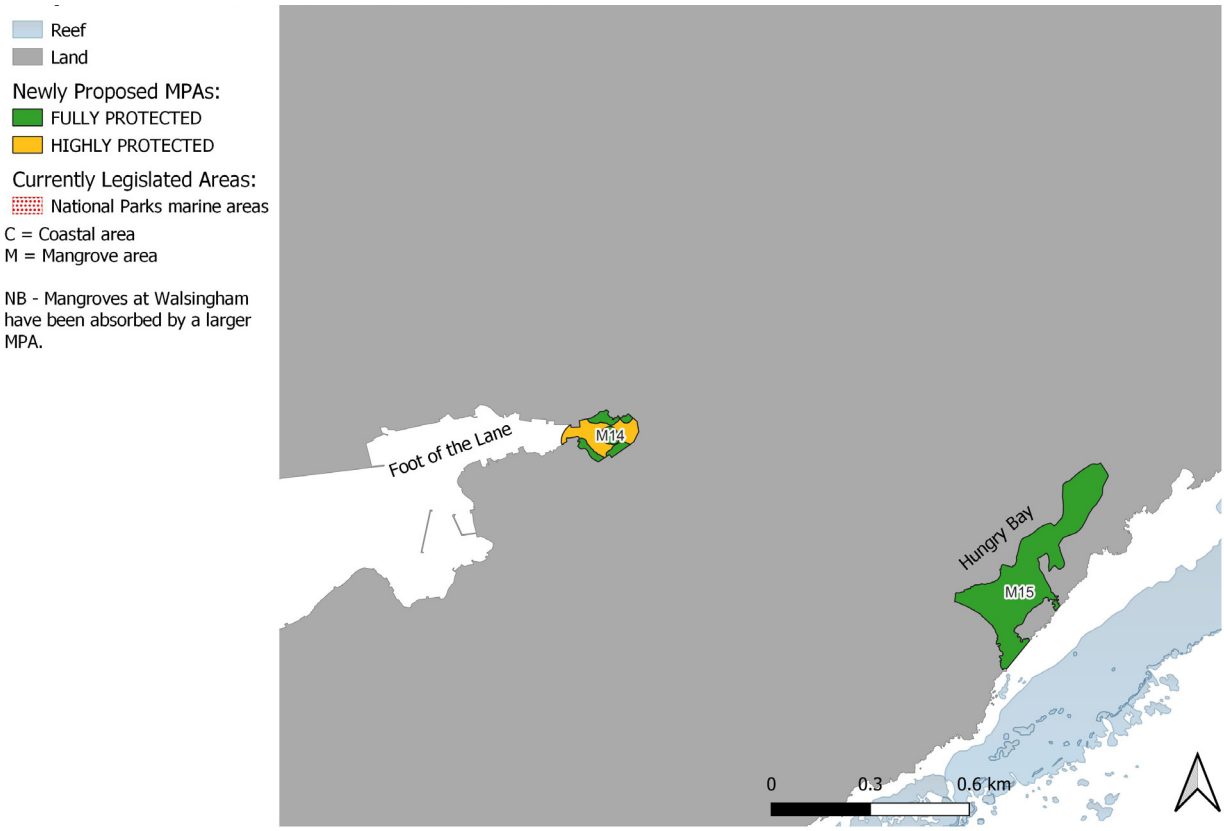


Figure 5.2.3.11.



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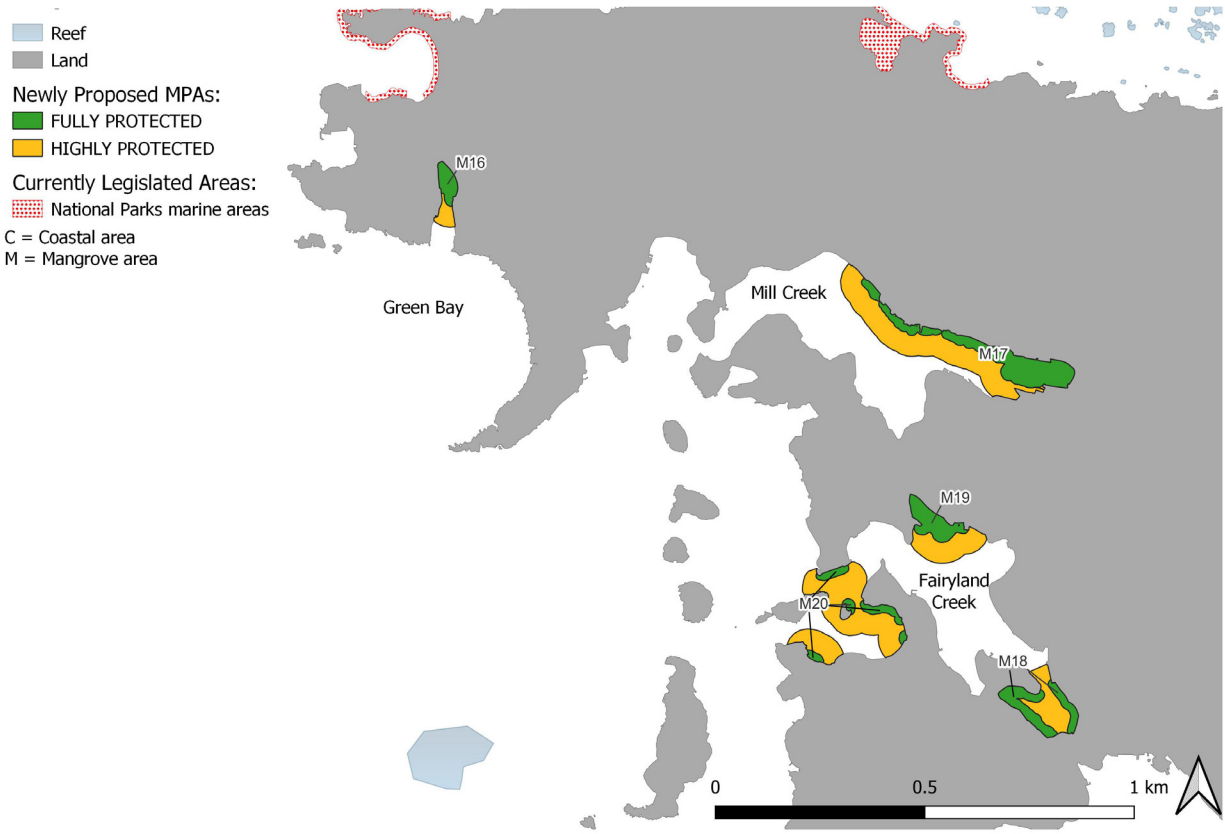

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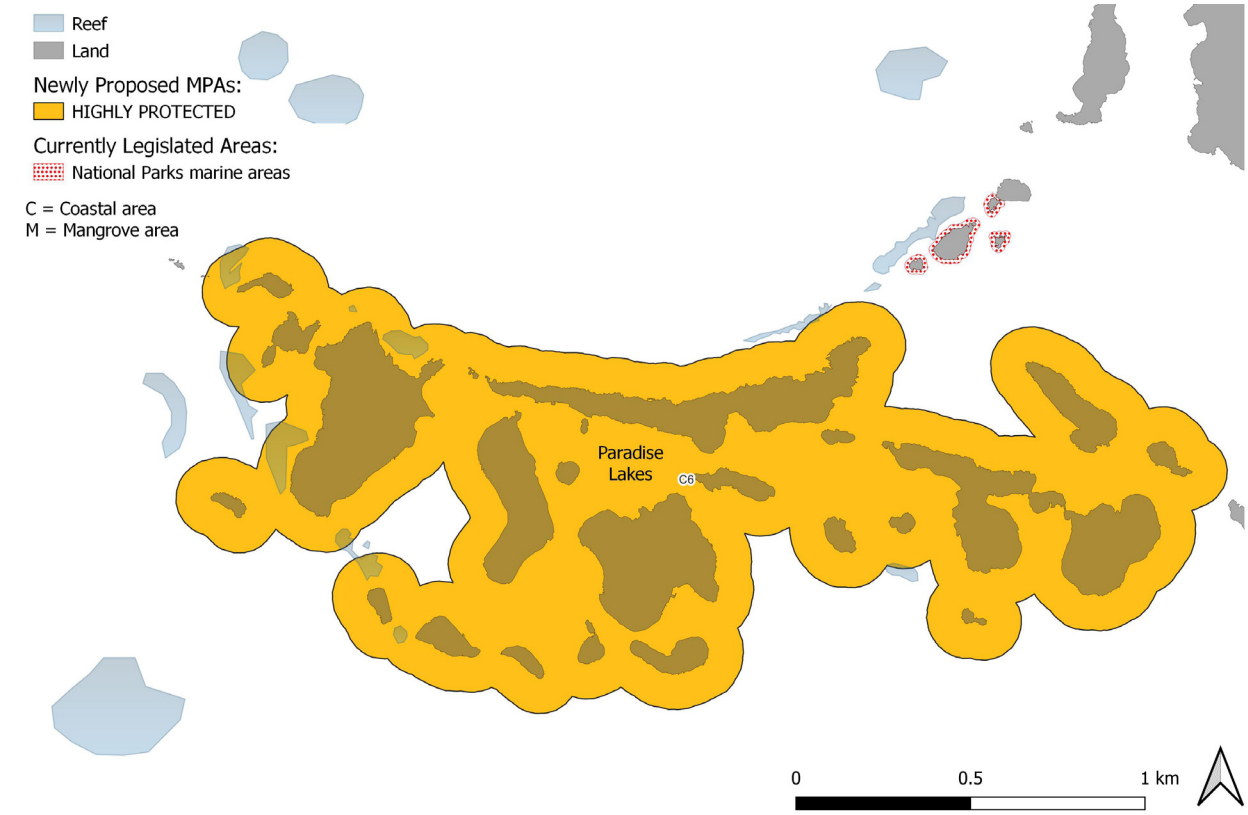

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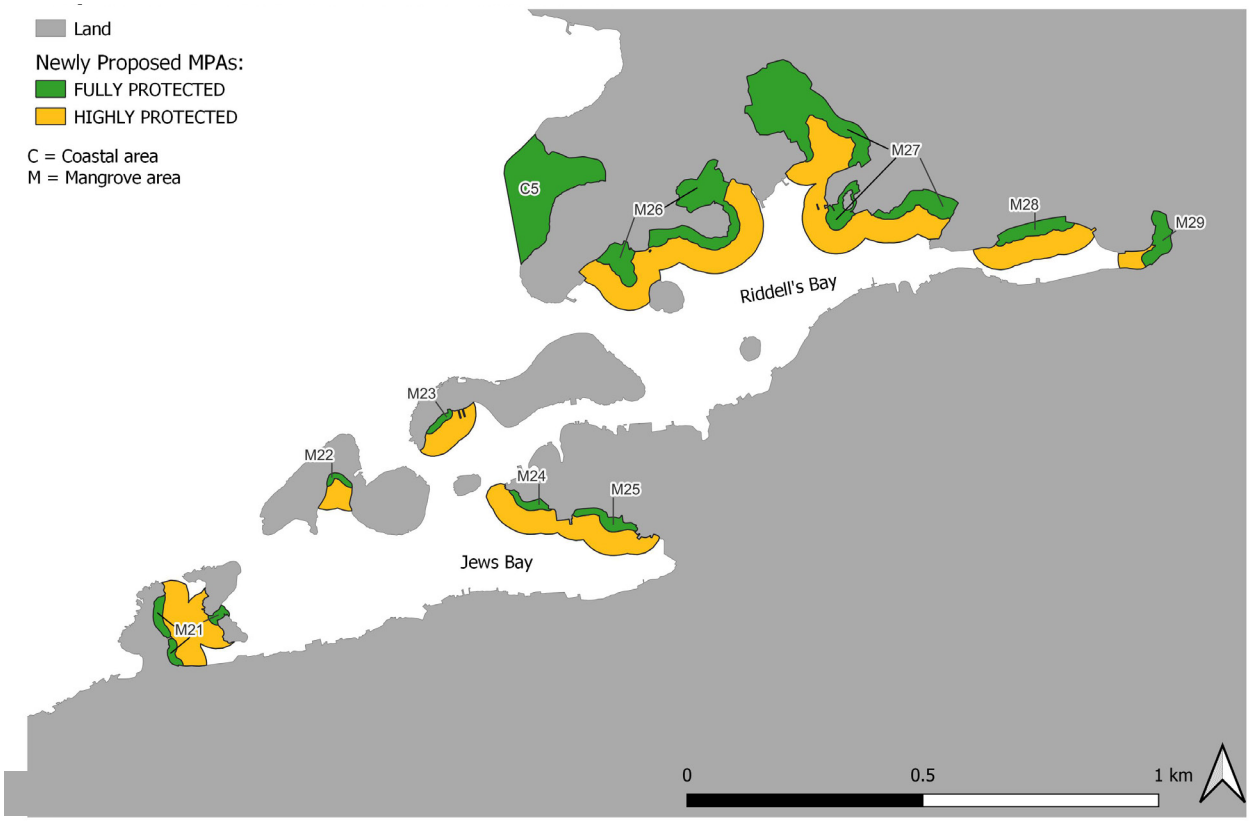

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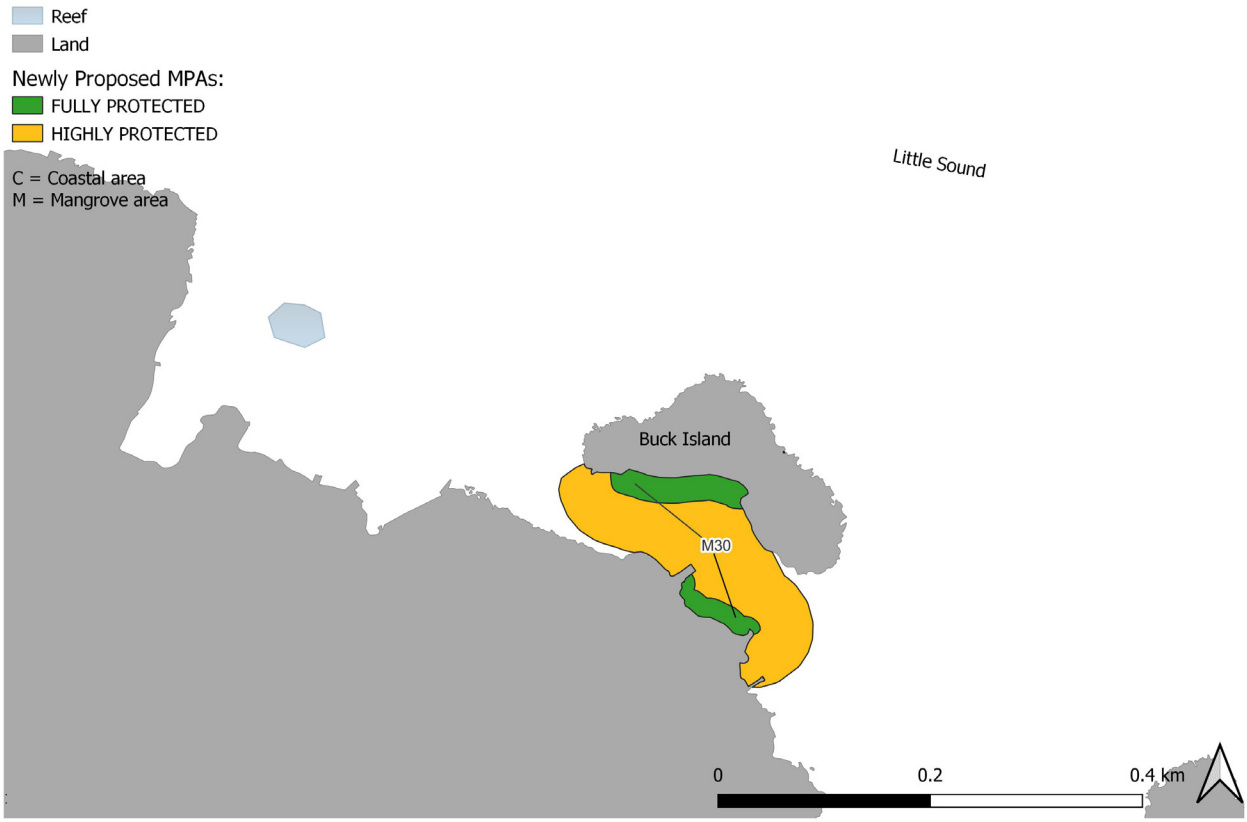

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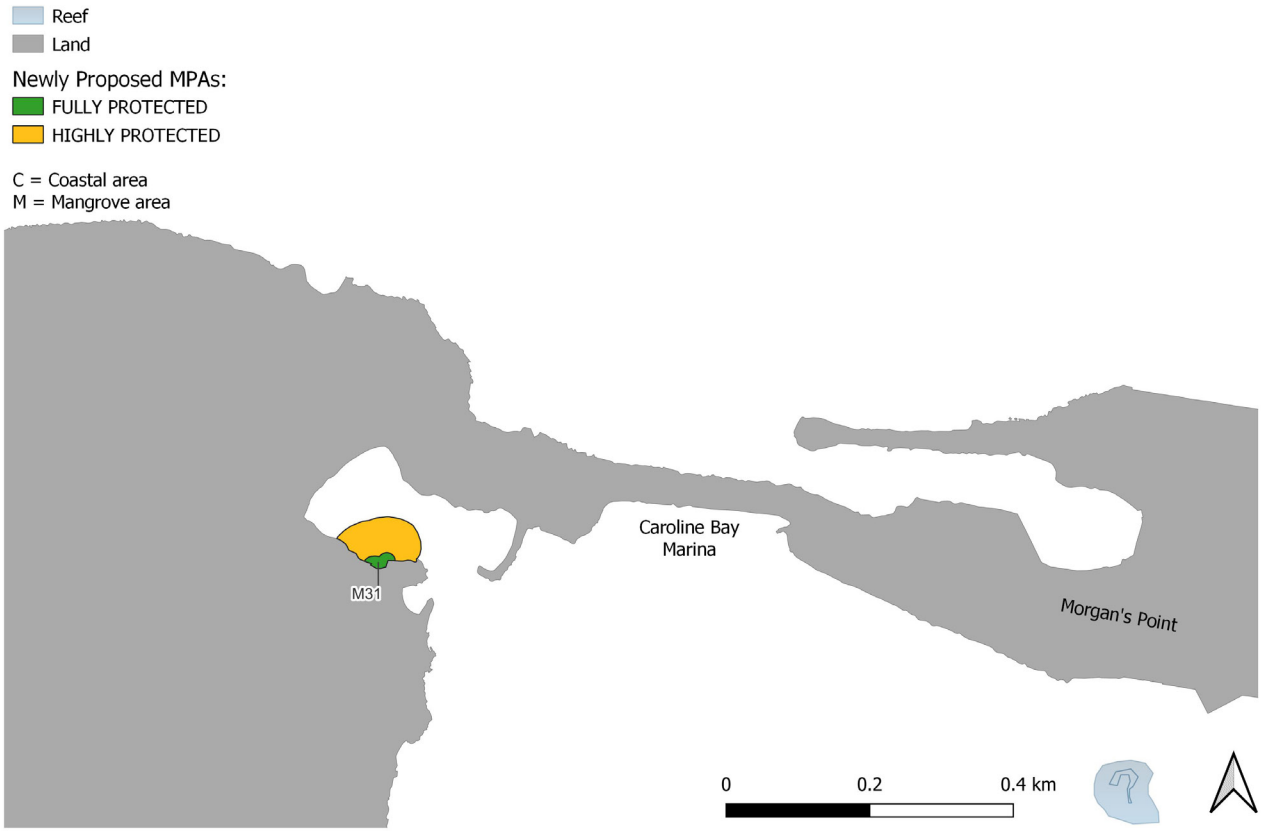


Figure 5.2.3.17.

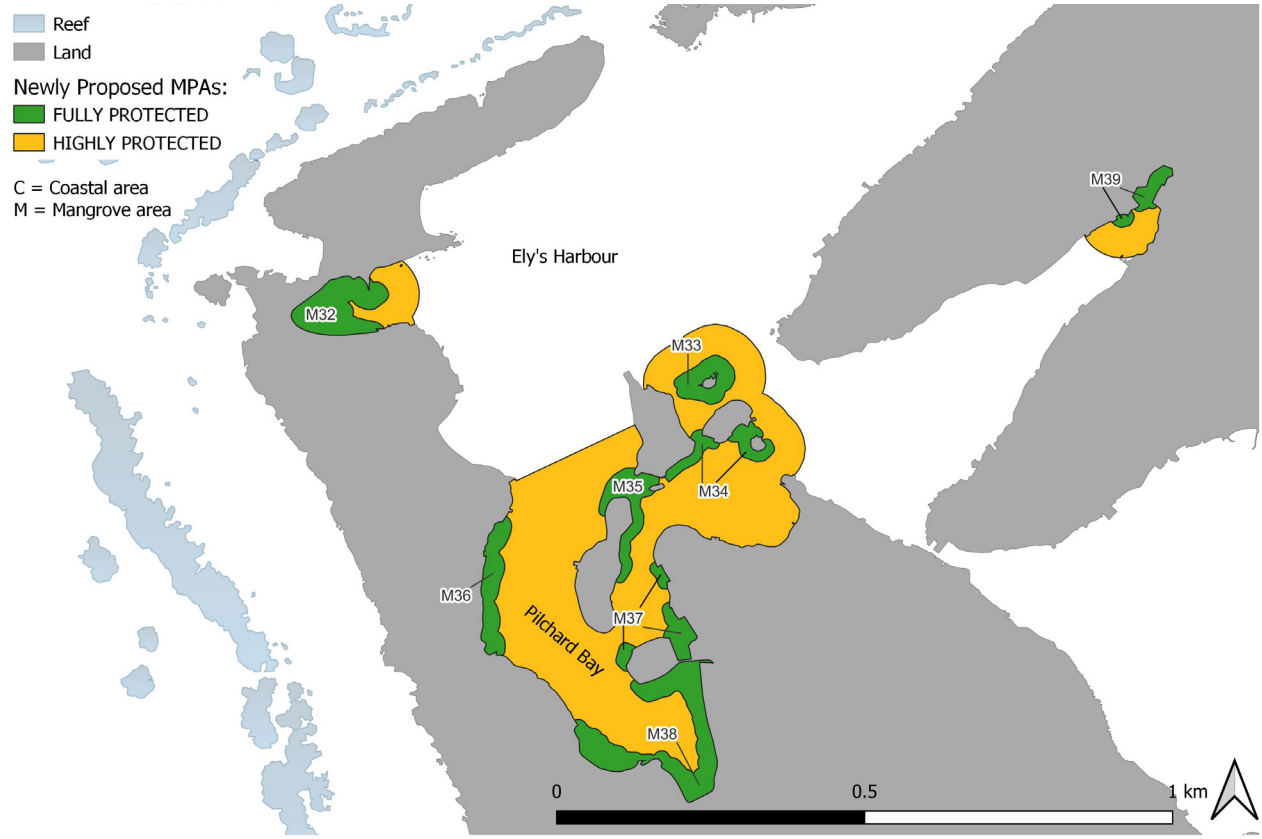


Figure 5.2.3.18.

Figure 5.2.3.19.

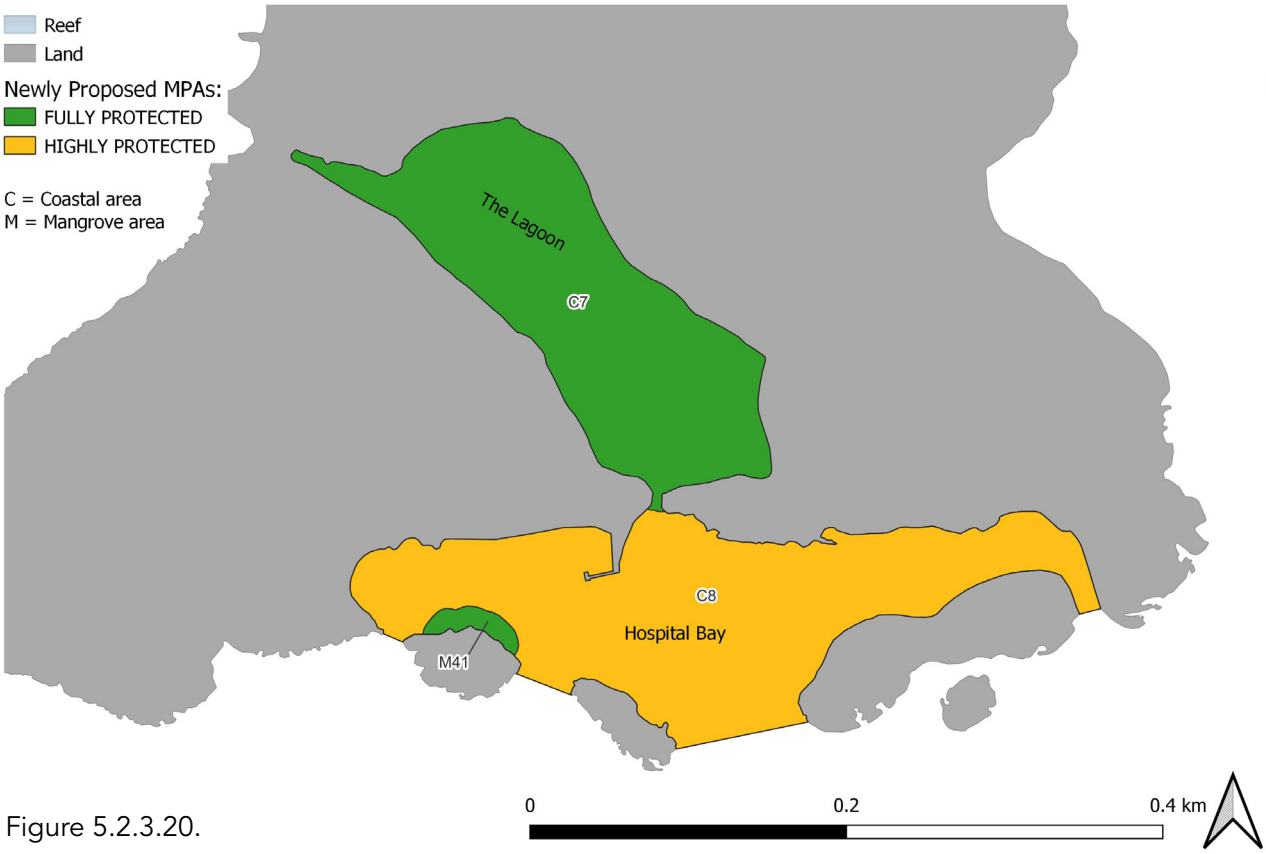


Figure 5.2.3.20.

5.3. POTENTIAL USE AREAS

Potential Use Area maps can serve as valuable resources for planners, managers, and developers. They are not legally binding and represent recommendations based on the best available science, as well as feedback from the BOPP Steering Committee and stakeholders. These maps were created by one of BOPP's contracted partners—Environmental Marketing Solutions Lab (emLab) based at the University of California at Santa Barbara—under the guidance of local scientists and technical experts.

5.3.1. Potential Development Areas—Renewable Energy

The Potential Development Area maps can provide initial guidance in the planning process for progressing renewable energy development while considering environmental constraints and areas of potential stakeholder conflict. They provide preliminary information for the potential siting of renewable energy platforms, although comprehensive feasibility studies and a full EIA will be necessary for the final siting location to be determined and development approval to be granted.

Local technical experts and scientists were consulted by BOPP to provide guidance on creating these maps for renewable energy development. Their guidance was used to apply a combination of exclusionary criteria to identify areas suitable for renewable energy platform siting. These criteria included economic (e.g., fishing value, the cost of cabling, the location of shipping and ferry lanes and submarine cables); ecological/environmental (e.g., protected areas, sensitive habitats, and fish spawning sites likely to be impacted); cultural/historic (e.g., the location of historic wrecks); and practical considerations (e.g., depth limitations and wave energy requirements). These criteria were combined to produce a final site suitability index, which helped to assess the suitability of remaining areas that were not excluded by prior criteria.

The resulting set of maps (outlined in Figure 5.3.1. below) identify areas for each renewable energy technology that could be suitable for further investigation as platform installation sites. Only areas on the Bermuda Platform, excluding the Challenger and Argus seamounts, are considered. The seamounts are assumed to be too far from land to transmit the generated energy where needed, causing them to be economically not feasible. For each of the renewable energy types–offshore wind (fixed); offshore wind (floating); floating solar (PV); and wave energy—the suitable areas for platform installation are denoted on their respective maps according to the same colour scale: from most suitable (red) to least suitable (yellow). A 50 m depth contour is shown by a red dashed line and a 300 m depth contour is shown by a solid red line.

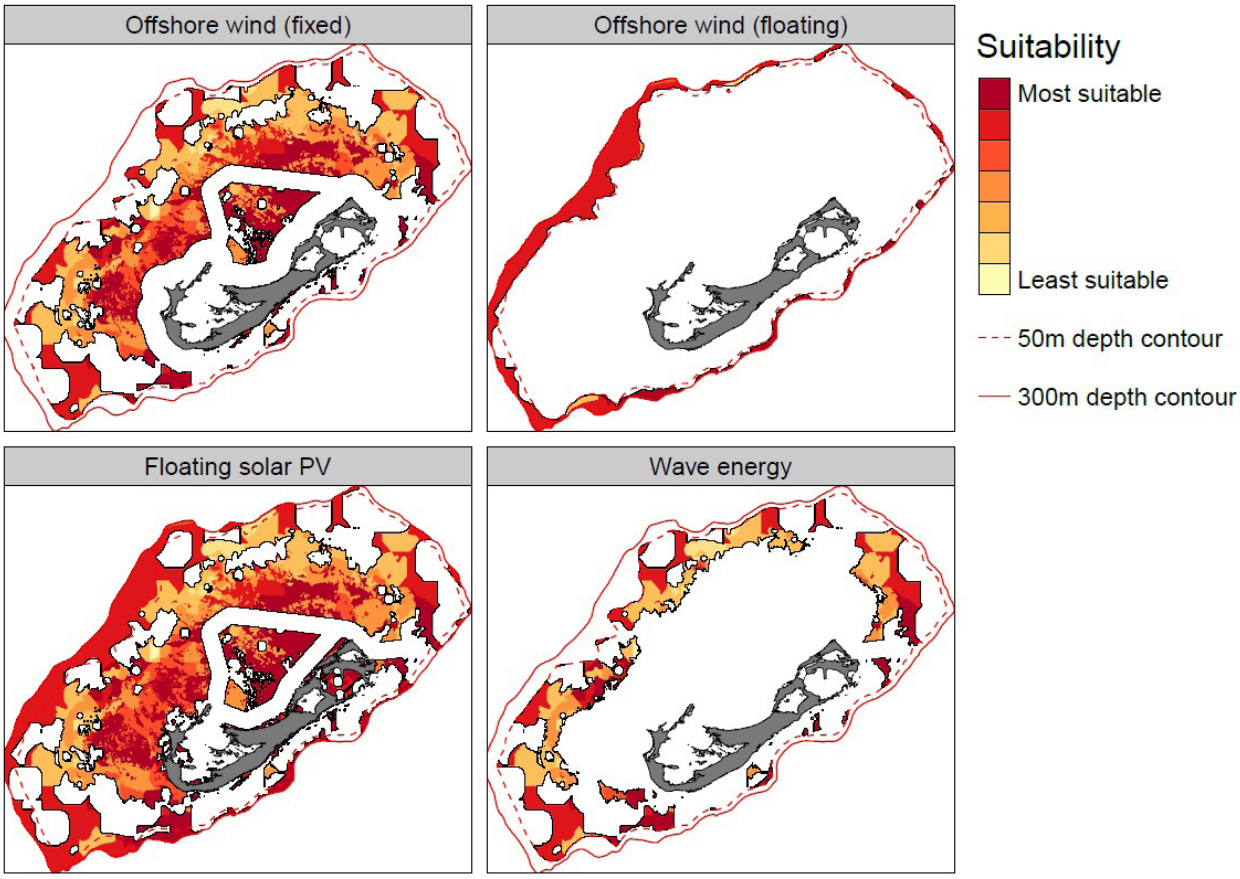


Figure 5.3.1. Areas suitable for further investigation as energy platform installation sites, with the site suitability index shown. See Section 8.3. for a breakdown of the methodology used to create these maps.

How to Use These Maps

These maps **SHOULD NOT** be used independently for site selection for renewable energy development.The following considerations are suggested prior to granting development approval:

1. Additional feasibility studies should be conducted, including a cost-benefit analysis to determine the financial feasibility of installing the equipment, and a technical feasibility study to investigate specific logistics related to project implementation and potential energy generation (e.g., coral reef structures impeding construction).
2. A comprehensive EIA that assesses the viability of several potential locations should be conducted.
3. A license or lease should be obtained from the Minister of Public Works for any works impacting the seabed.
4. Consider the impacts on ocean stakeholders and impacts (positive and negative) on ocean user groups (e.g., wind energy platforms may act as Fish Aggregating Devices (FADs), which would yield a benefit to fishers; however, silting from the installation of these platforms could damage dive sites, which would yield a loss to recreational divers and the tourism industry).
5. Consider enacting additional legislation on an as-needed basis to support potential use areas that will require some level of protection/exclusion and are not currently in legislated zones.

5.3.2. Potential Conservation Areas—Habitat Restoration

The Potential Conservation Area maps show areas with special environmental significance in relation to habitat restoration. They provide initial guidance into where restoration projects might be viable and can inform on potentially suitable areas to offset development-related habitat damage by restoring habitats elsewhere. Current and potential habitat quality should be an EIA consideration for any development. All the suggested locations on the Potential Conservation Area maps have potential for restoration and "as such" developments should take measures to avoid them.

Local technical experts and scientists were consulted by BOPP to provide guidance on creating these habitat restoration maps. Their guidance was used to apply a combination of indices and criteria to identify areas suitable for habitat restoration in coral, mangrove/salt marsh, and seagrass habitats. These criteria included environmental and ecological indices, such as proximity to nature reserves, recreation/amenity sites, and water resources protection areas (for mangroves/salt marsh habitats); proximity to existing mangrove stands (for mangroves/salt marsh habitats); presence of seagrass (for seagrass); and vulnerability of existing patch reefs to coastal erosion due to storm events (for coral). Other criteria included the presence of ongoing restoration efforts, as well as (in the case of mangroves and salt marshes) supplemental data from a 2020 survey by Dr. S. R. Smith (BZS), and additional site suggestions based upon expert knowledge.

The resulting set of maps identifies areas for each habitat type that could be suitable for further investigation for restoration activities. The areas identified in these maps are not legally binding and represent recommendations based on the best available science, as well as feedback from the BOPP Steering Committee and stakeholders.

For the seagrass map outlined in Figure 5.3.2.1., and mangrove/salt marsh maps outlined in figures 5.3.2.2., 5.3.2.3. and 5.3.2.4., the suitable areas for habitat restoration are denoted according to the same colour scale: from suitable (yellow) to most suitable (red). For the coral reef maps outlined in 5.3.2.5. and 5.3.2.6., there is no suitability scale. Instead, priority sites identified by experts are denoted using squares.

Seagrass

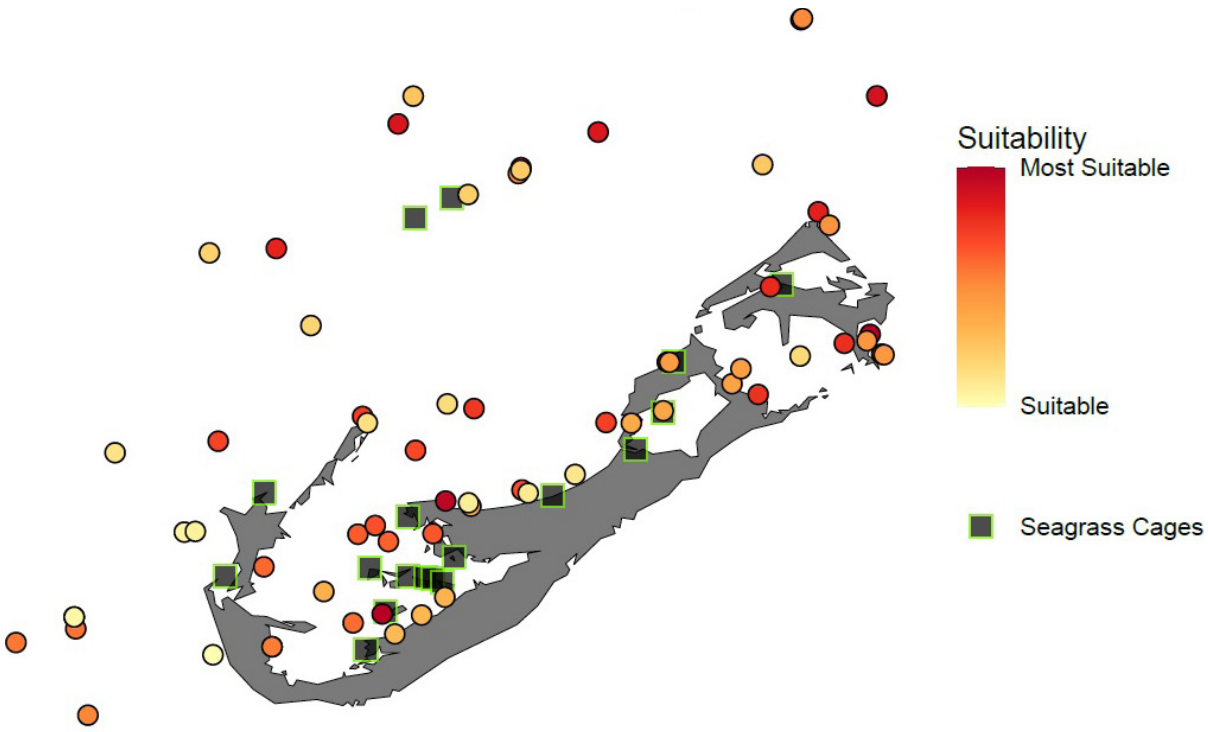


Figure 5.3.2.1. Seagrass sites to be given special environmental consideration for restoration. All available seagrass data provided by local experts from 2004 to 2020 were used to identify areas suitable for restoration. These are locations that were surveyed more than once, had seagrass in at least one survey, and had no seagrass in the most recent survey. Other restoration sites may exist that are not identified in this map; however, all those identified in this map are potentially suitable for restoration with the level of suitability denoted by the colour. Black squares (not to scale) represent the location of installed turtle exclusion cages, which are used to reduce the impacts of turtle grazing on seagrass meadows as a form of seagrass restoration. These locations should be considered top priority for seagrass restoration as they are currently active project sites that could easily be expanded.

See Section 8.4.1. for a breakdown of the methodology used to create these maps.

Mangrove and Salt Marsh

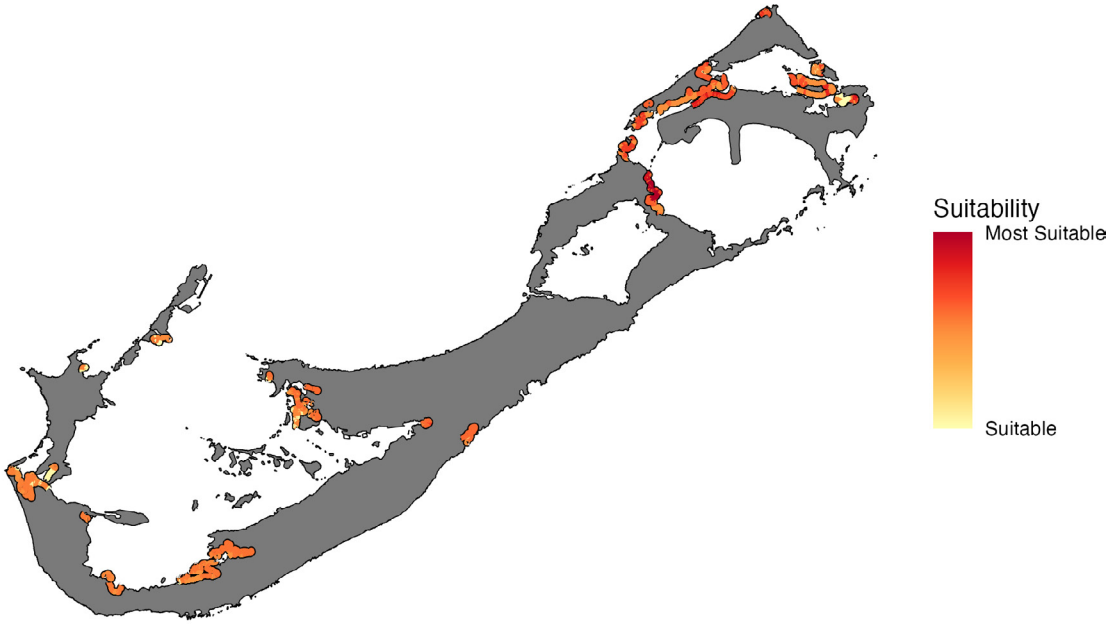


Figure 5.3.2.2. The final suitability map that prioritises areas suitable for mangrove and salt marsh restoration from suitable (yellow) to most suitable (red). This map combines a variety of ecological data sets, as well as data across five suitability ranking categories that account for environmental and socioeconomic indices such as: potentially suitable substrates and habitats; potential conflicts with stakeholders; prioritisation of restoration within nature reserves, amenity parks, or marine National Parks; and proximity to existing mangrove stands (within 50 m). Other restoration sites may exist that are not identified in this map; however, all those identified in this map are potentially suitable for restoration and the level of suitability denoted by the colour. See Section 8.4.2. for a breakdown of the methodology used to create these maps.

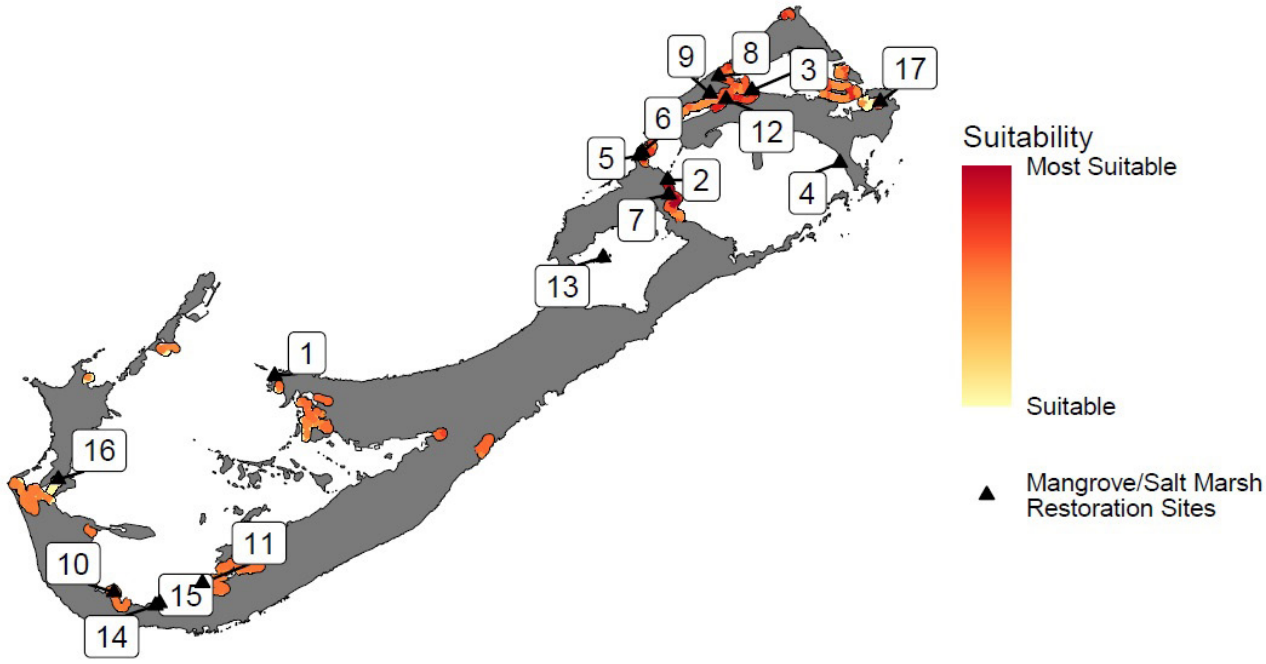


Figure 5.3.2.3. This map shows an additional data set used in the development of the final suitability map that prioritises areas suitable for mangrove and salt marsh restoration. The black triangles indicate sites suggested for restoration based on expert knowledge. The 17 sites include a mixture of mangrove, salt marsh, and both salt marsh and mangrove habitats. This data set is layered on top of the suitability ranking categories that prioritises areas from suitable (yellow) to most suitable (red). See Table 5.3.2.3. for site names. See Section 8.4.2. for a breakdown of the methodology used to create these maps.

ID	Site Name	Restoration Habitat Type
1	Stovell Bay	Salt marsh and mangrove
2	Blue Hole	Salt marsh and mangrove
3	Stocks Harbour	Salt marsh and mangrove
4	Officers Beach / Goat Island	Salt marsh
5	Coney Island Road	Salt marsh
6	Coney Island	Salt marsh and mangrove
7	Walsingham Pond	Salt marsh
8	Outer Mullet Bay West	Mangrove
9	Richardson's Bay	Mangrove
10	Buck Island	Mangrove
11	Spectacle Island	Mangrove
12	Ferry Reach South	Mangrove
13	Trunk Island	Mangrove
14	Near 117 Middle Road	Mangrove
15	Near 131 Middle Road	Mangrove
16	Scaur Bay	Mangrove
17	St David's Cricket Club	Mangrove

Table 5.3.2.3. Mangrove and salt marsh sites based on expert knowledge identified in Figure 5.3.2.3.

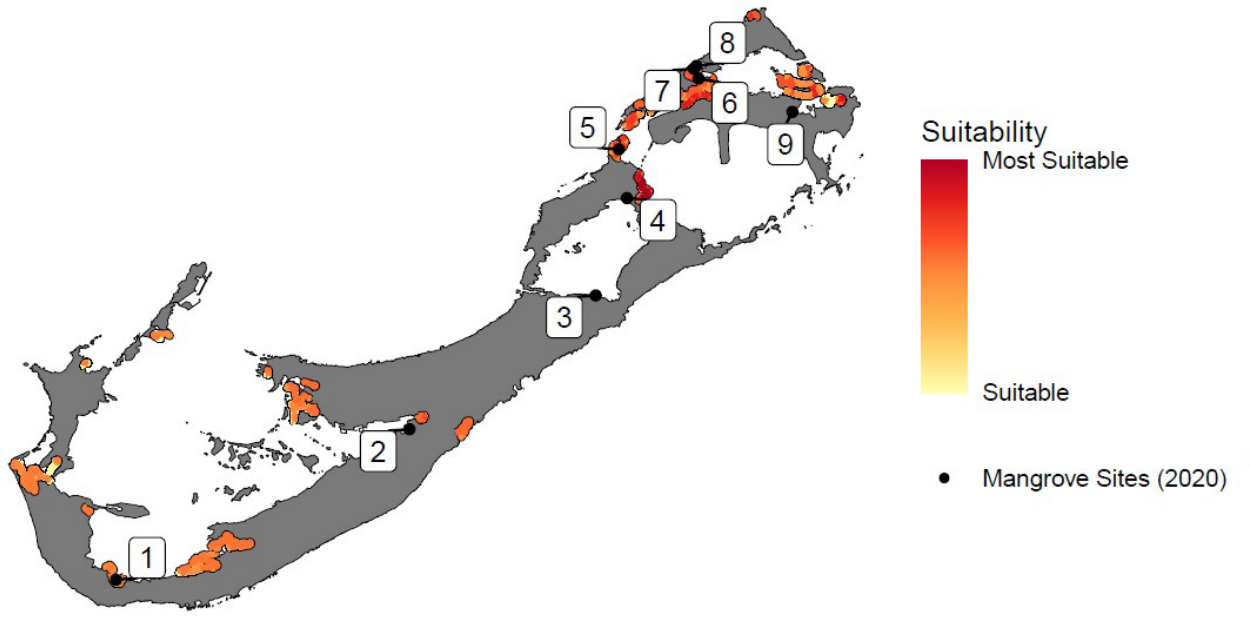


Figure 5.3.2.4. This map shows an additional data set used in the development of the final suitability map that prioritises areas suitable for mangrove and salt marsh restoration. The black dots denote mangrove locations surveyed by Dr. S.R. Smith in 2020 that had scattered trees, making them particularly suitable for restoration through infill planting. This data set is layered on top of the suitability ranking categories that prioritises areas from suitable (yellow) to most suitable (red). See Table 5.3.2.4. for site names. See Section 8.4.2. for a breakdown of the methodology used to create these maps.

ID	Site Name
1	Frank's Bay
2	Red Hole
3	Patton's Point
4	Dingle Bay
5	Coney Island South
6	Outer Mullet Bay Southeast
7	Outer Mullet Bay North
8	Rocky Hill Park
9	Dolly's Bay West

Table 5.3.2.4. Mangrove restoration sites based on surveys by Dr. S.R. Smith identified in Figure 5.3.2.4.

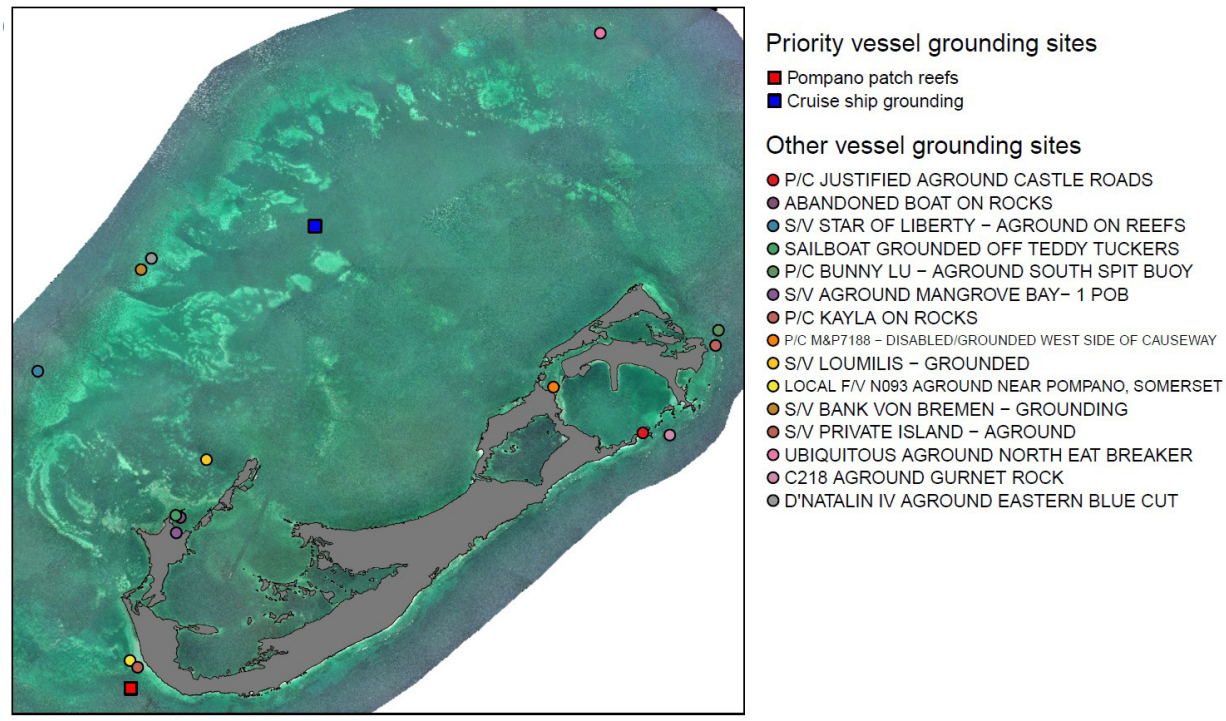


Figure 5.3.2.5. Given feedback from coral reef experts, this map shows the priorities for coral restoration areas (blue square and red square), with secondary priorities shown in circles. These areas are vessel grounding sites, some dating back as far as 2012. Visual surveys show that some corals are still loose and restoration could begin with re-cementing activities. NB - the coordinates used to plot these points are estimates based on descriptions of grounding locations and need groundtruthing. See Section 8.4.3. for a breakdown of the methodology used to create these maps.

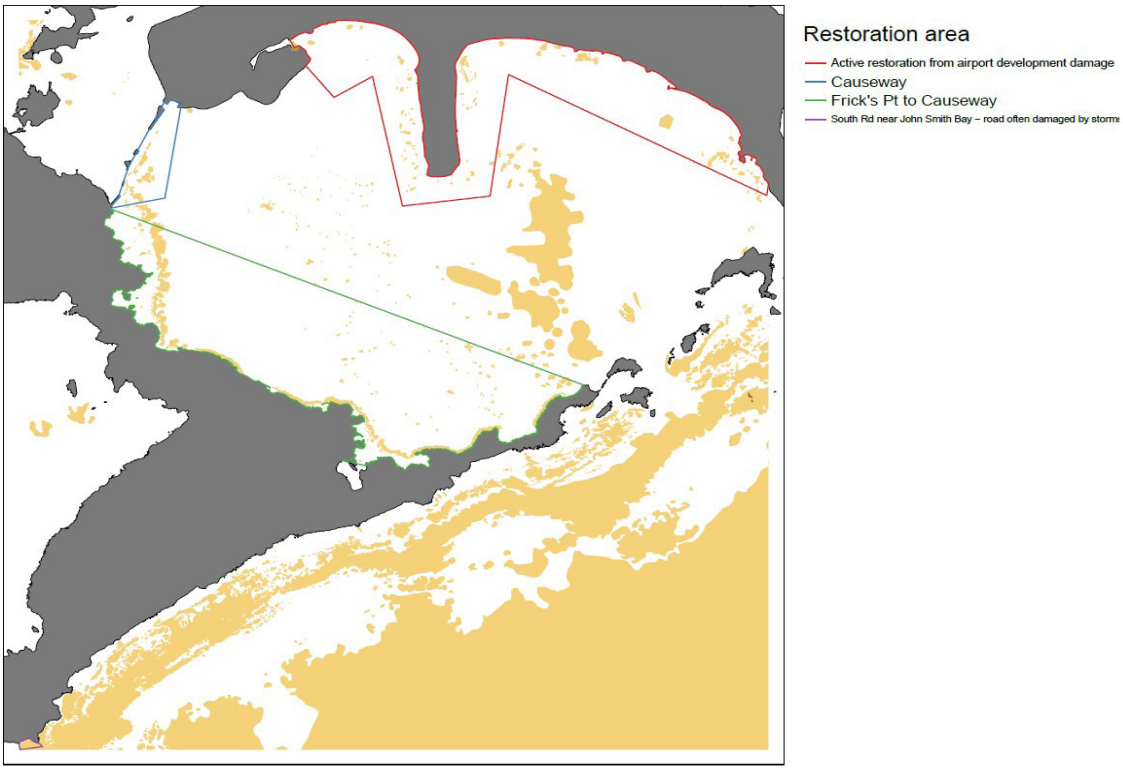


Figure 5.3.2.6. This map shows additional coral restoration areas suggested by Dr. Samia Sarkis in Castle Harbour and along South Road near John Smith's Bay. Justifications include the continuation of a long-term ocean-based coral nursery (green line) whose methodology has been proposed to restore corals damaged from the construction of the airport in the 1950s (red line); the construction of a natural barrier protecting the Causeway Bridge (blue lines); and restoration of corals offshore of South Road where the infrastructure is frequently damaged by storms, as an effort to reduce wind and wave-related damage (purple lines). Reefs as mapped by Dr. Thad Murdoch in yellow. See Section 8.4.3. for a breakdown of the methodology used to create these maps.

How to Use These Maps

These maps **SHOULD NOT** be used independently for site selection for habitat restoration. The following considerations are suggested prior to the commencement of restoration projects.

1. Obtain additional information from DENR and utilise the local expertise they offer to aid in site selection.
2. Refer to relevant DENR habitat management plans.
3. Consider land access and obtaining relevant permission from landowners.
4. Consider and avoid stakeholder conflict (e.g., restoring mangroves in a mooring area could conflict with boat owners).
5. Initial restoration and ongoing management will differ from site to site (e.g., mangrove restoration could include invasive species removal, planting, coastal engineering to provide protection, etc.). A management plan should be written to ensure the success of restoration projects.
6. Projects will require protected species licences from DENR.
7. Ecological assessments are suggested and some projects may need an EIA.
8. All the suggested locations have potential for habitat restoration and, as such, developments should take measures to avoid them.

5.4. SPATIAL OBJECTIVES

This section describes how the proposed MPA network achieves the spatial objectives of the MSP. For each objective, qualitative and quantitative summaries are provided. The intent is to provide an understanding of the potential results of implementing the proposed MPA network. The explanatory text under each objective may change pending a review from the Minister of Home Affairs.

5.4.1. OBJECTIVE

Ensure continued access to the most highly-valued fishing grounds on and around the nearshore areas, including the Bermuda Platform and outlying banks, as identified by the Ocean Use Survey, and other relevant data sources by March 2022.

The current spatial restrictions on fishing allow for continued access to the most highly-valued areas. These restrictions can be viewed in the Currently Legislated Areas map.

Efforts have been made when designing the proposed MPA network to ensure continued access to the most highly valued fishing grounds. As indicated by the resulting heatmaps created through the Ocean Use Survey, the proposed MPA network avoids 80.5% of the commercial fishing value, and 75.2% of the recreational fishing value. Moreover, full no-take areas avoid 88.1% of commercial fishing value and 94.7% of recreational fishing value, while, at the same time, focusing protection on areas that are likely to lead to fish stock replenishment, thereby benefitting the local fishing industry. In other locations where similar MPA networks have been adopted and are well-enforced, size of catches outside MPA boundaries have increased when spillover occurs.[2]

5.4.2. OBJECTIVE

To the extent possible, allow for spatial continuity of fishing for pelagic species in depths >55 m around the edge of the nearshore area, including the Bermuda Platform and the outlying banks, by March 2022.

There are currently no spatial restrictions in place that fully prohibit all types of fishing in the pelagic fishing zone (depths of 55 m or greater in the nearshore area). There are several designations that prohibit certain types of fishing activity or have temporal restrictions in these pelagic areas and can be viewed in the Currently Legislated Areas map. These current designations do not affect pelagic fishing, but include:

- The seasonally protected areas and extended closure areas for the Black Grouper spawning aggregations as stated in the Fisheries (Protected Areas) Order 2000.
- The spearfishing exclusion zone as stated in the Fisheries Regulations 2010 - Regulation 22 (5)(c).
- The submarine cable protection zone as stated in the Submarine Communications Cables Act 2020.

Some MPAs proposed in Section 5.2. overlap with this zone. However, only 2.8 sq kilometres (equivalent to just 0.2% of the pelagic fishing zone) would prohibit fishing. These restrictions are to protect breeding aggregation sites of commercially important species. Other proposed MPAs that overlap with this zone focus on protecting benthic habitats and would therefore allow pelagic fishing to continue by permitting sustainable trolling and surface fishing.

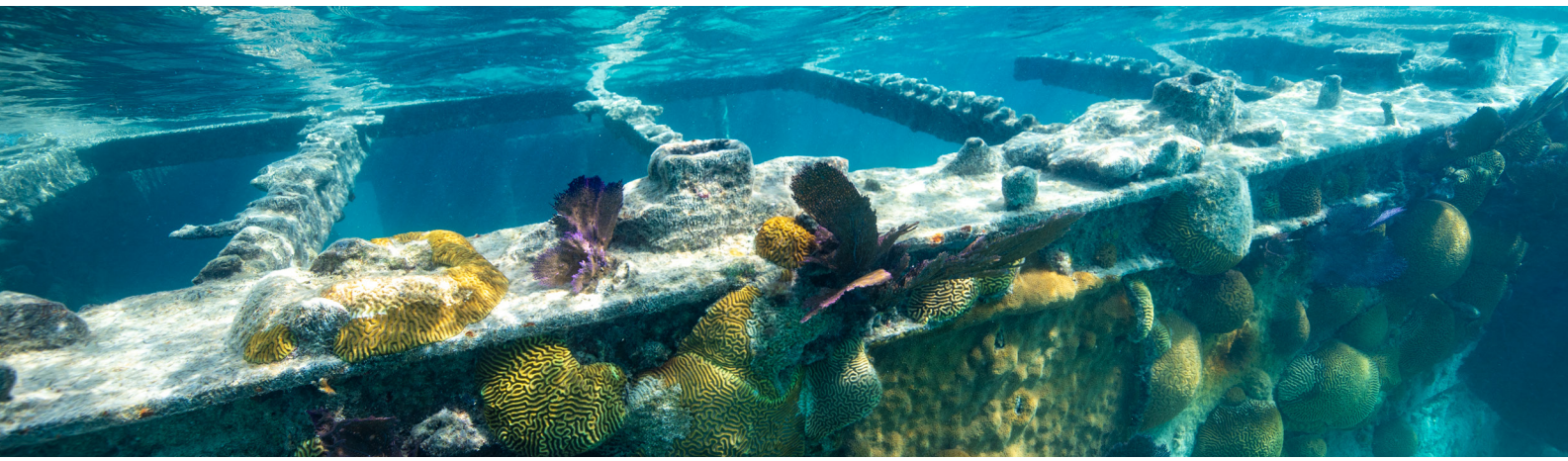
2 Goñi, Raquel, Fabio Badalamenti, and Mark H. Tupper. "Fisheries-Effects of marine protected areas on local fisheries: Evidence from empirical studies." Marine protected areas: A multidisciplinary approach 72 (2011): 73.

5.4.3. OBJECTIVE

Marine protected areas designations should prioritise those areas that have both conservation and historical significance.

The Fisheries Act 1972 provided for the creation of the Fisheries (Protected Areas) Order 2000, which prohibits the taking of fish or the use of any anchor other than a Danforth (sand) anchor at several historic wrecks and other dive locations around the island. These areas are known as Protected Dive Sites and can be viewed in the Currently Legislated Areas map. Moreover, shipwrecks that are over 50 years old are governed under the Historic Wrecks Act 2001. This legislation governs the protection and scientific management of Bermuda's underwater cultural heritage assets.

The proposed MPA network considers this objective and makes efforts to incorporate areas of historical significance, including protected dive sites and open wrecks. It also includes 66.9% of shipwreck value based on the heatmap showing historic shipwreck abundance per square kilometre. As well as preserving areas of cultural importance, underwater cultural and historical resources can serve as islands of biological diversity, acting as artificial reefs and offering hard substrate for a variety of macro-organisms and marine benthic microbiomes to colonise.[3]



5.4.4. OBJECTIVE

Identify potential energy production zones that recognise the physical characteristics and criteria that should be considered when placing ocean renewable technologies for the purpose of delineating the broadest areas where these technologies could be implemented in Bermuda's EEZ with the lowest potential impact to ecosystem function.

Bermuda's Economic Recovery Plan encourages new renewable energy technology developers to test their products in Bermuda by creating an energy regulatory sandbox. This can be seen in the currently legislated areas map. Subsequently, the Electricity Act 2016 was amended under the Electricity Amendment Act 2022 to promote and encourage innovation in the electricity sector.

The Potential Use Areas for renewable energy outline potentially suitable areas for energy development in the nearshore area. These maps were created using siting criteria that excludes the most valuable coral and seagrass habitats, while prioritising remaining areas using an index of suitability based on coral cover, coral diversity, and seagrass value. These maps should not be used independently for site selection and a comprehensive EIA should be conducted to reduce potential impacts to ecosystem function. They do, however, provide preliminary information for potential sites for renewable energy, thus enabling the target of reducing annual carbon emissions as set out in Bermuda's Integrated Resource Plan 2019.

3 Hamdan, Leila J., et al. "Deep-sea shipwrecks represent island-like ecosystems for marine microbiomes." The ISME journal 15.10 (2021): 2883-2891.

5.4.5. OBJECTIVE

Designate a minimum of 20% of Bermuda's marine waters as fully protected no-take Marine Protected Areas. These designations should consider and optimise existing designations. Efforts should be made to ensure the representative coverage of key habitat types (20%) and higher coverage of habitats as specified in other objectives.

The MSP will be legally binding through the enactment of a Marine Development Act, which will grant powers to create protected areas in accordance with the Act's objectives.

The proposed MPA network in Section 5.2. achieves the target of designating a minimum of 20% of Bermuda's marine waters as fully protected no-take MPAs. Full protection is shown to confer the greatest ecological benefits, including higher fish biomass and the ability to restore ecosystem function and resilience following disturbances.[4]

	Offshore	Nearshore	Total
Fully Protected	20.0%	3.8%	20.0%
Highly Protected	0.7%	21.6%	0.9%
Lightly Protected	100.0%	100.0%	100.0%

Table 5.4.5.1. This table summarises the amount of fully, highly or lightly protected MPAs in the proposed MPA network.

The proposal complements and builds upon the existing legislative framework. Increasing levels of protection in areas that are already protected can confer additional ecological and economic benefits.[5] Many of Bermuda's protected dive sites, National Parks and no-net fishing bays are incorporated into the proposed wider network, while other regions such as the seasonal closure areas, grouper boxes and the no lobster trapping area have been designated with additional protections that better achieve the associated objectives. Furthermore, important areas for mangroves, seagrass and coral are incorporated into the proposed MPA network, which builds upon the current protected species legislation to provide robust habitat protection to safeguard these important locations in their entirety.

The proposal incorporates representative areas from a variety of habitat types in both the offshore and nearshore areas in order to ensure long-term resilience, promote ecosystem connectivity and protect biodiversity.[6] It takes a 'stepping stone' approach to connectivity and dispersal with key habitats given either full or high protection, and individual species protected by the 'light' protection management measures in between. This approach to MPA network design has been shown to confer fisheries benefits in other locations.[7]

4 Lester, Sarah E., et al. "Biological effects within no-take marine reserves: a global synthesis." Marine Ecology Progress Series 384 (2009): 33-46.
5 Bohnsack, James A., et al. "Baseline data for evaluating reef fish populations in the Florida Keys, 1979-1998." (1999)
6 McLeod, Elizabeth, et al. "Designing marine protected area networks to address the impacts of climate change." Frontiers in Ecology and the Environment 7.7 (2009): 362-370
7 Goñi, Raquel, Fabio Badalamenti, and Mark H. Tupper. "Fisheries-Effects of marine protected areas on local fisheries: Evidence from empirical studies." Marine protected areas: A multidisciplinary approach 72 (2011): 73.

	Habitat Type	Protection Level		
		Full	High	Total
Nearshore	Algal Vermetid Reef	35.9%	0.6%	36.5%
	Bathypelagic	0.0%	31.6%	31.6%
	Bays and Coast	4.6%	4.5%	9.1%
	Castle Harbour Madracis	1.5%	0.0%	1.5%
	Diploria Porites Reef	11.7%	1.1%	12.8%
	Fore Reef	11.0%	19.6%	30.6%
	Madracis Reef	2.8%	96.1%	98.9%
	Main Terrace Reef	9.0%	13.8%	22.8%
	Mesopelagic	< 0.1	17.2%	17.2%
	Mesophotic	3.0%	9.4%	12.4%
	Montastraea Reef	9.7%	38.5%	48.2%
	Rariphotic	0.8%	12.5%	13.3%
	Rim Reef	17.4%	0.6%	18.0%
Offshore	Abyssopelagic	19.7%	0.7%	20.4%
	Bathypelagic	37.1%	9.7%	46.8%
	Cold water coral	55.6%	0.0%	55.6%
	Escarpments	28.2%	4.8%	33.0%
	Knolls	26.6%	1.5%	28.1%
	Pelagic zone 1	19.7%	0.8%	20.5%
	Pelagic zone 2	22.8%	0.0%	22.8%
	Pelagic zone 3	18.6%	1.4%	20.0%
	Plains	16.7%	0.3%	17.0%
	Seamounts	69.4%	8.0%	77.4%

Table 5.4.5.2. This table summarises the percentage of each key habitat type that overlaps with the proposed MPA network.

5.4.6. OBJECTIVE

Maintain seasonal no-take restrictions at all known 'fish' breeding and/or aggregation sites under the Fisheries (Protection Areas) Order 2000, and evaluate changes as new scientific information becomes available.

The current no-take seasonal restrictions can be viewed in the Currently Legislated Areas map. The Fisheries (Protected Areas) Order 2000 which governs these restrictions will remain unchanged. The proposed network in Section 5.2. suggests MPAs overlapping these areas that incorporate additional protection to fully prohibit development, dredging or dumping of any kind.

Additional fully protected MPAs that incorporate the current extended closure areas that protect spawning aggregation sites for key fisheries species are also proposed. Similar MPAs have been shown to help sustain and restore stocks of commercially-important fish species in other locations.[8]

8 Waterhouse, L, Heppell, SA, Pattengill-Semmens, CV, McCoy, C, Bush, Ph, Johnson, BC, and Semmens, BX (2020) Recovery of critically endangered Nassau grouper (Epinephelus striatus) in the Cayman Islands following targeted conservation actions. Proceedings of the National Academy of Sciences, 117(3): 1587-1597. DOI: 10.1073/pnas.1917132117

5.4.7. OBJECTIVE

Identify and protect 50% of coastal habitats that appear to be juvenile fish nursery habitats and/or used by protected marine species.

The Protected Species Order 2012 (which falls under the Protected Species Act 2003) lists the species that are protected anywhere within Bermuda's marine waters and includes coral, seagrass, and mangrove species that often form the basis of juvenile fish nursery habitats. The proposed MPA network in Section 5.2. offers additional protection to nursery habitats, thus protecting entire communities associated with key nursery areas, which can be highly productive for sub-adult fishes.[9] This includes full protection of 100% of established mangrove sites, with a 10 m full-protection buffer and an additional no-fishing buffer of 50 m. Nursery patch coral and significant seagrass locations are also incorporated into many of the larger fully and highly protected areas, covering 37.2% of nursery patch reefs and 27.4% of seagrass value. Of particular importance is the proposed full protection near Coot Pond (shape A5), which encompasses all three nursery habitat types, providing protective ecological connectivity that can have significant beneficial effects on fish assemblages and diversity.[10]

5.4.8. OBJECTIVE

Establish active restoration of areas that were formerly seagrass habitats (100 m²) through turtle exclusion.

There has been a marked decline in the extent of Bermuda's seagrass meadows over the last 25 years. Until recently, this was thought to be the result of increased herbivory from a growing population of green sea turtles. However, a 2022 study co-authored by the scientific directors of The Bermuda Turtle Project used turtle population, individual biomass, and site fidelity data (among other metrics) to demonstrate that a more complex set of environmental stressors may also be contributing factors.[11] Some scientists and managers are suggesting human intervention to further mitigate the decline of this vital marine ecosystem.[12]

The Bermuda Government funded the first installation of turtle exclusion cages for the purpose of seagrass restoration in 2020. The original goal of covering 225 m² with cages was increased to a total of 2640 m² thanks to the generosity of private donors. As of January 2022, 1980 m² of this target has been achieved as part of DENR's Seagrass Restoration Project. Early results are positive, with regeneration occurring faster for some seagrass species than others. Although the cages occupy only a small area of the Platform, they also provide valuable nursery habitat for local fish.

DENR is currently in the process of drafting a habitat management plan for seagrass that includes information on restoration implementation and management.

The Potential Use Areas for habitat restoration outline the most suitable potential areas for seagrass restoration. The associated map includes active restoration projects where turtle exclusion cages are currently installed and could be expanded. It also applies a suitability index to locations where seagrass was recently present but is currently absent, where the most suitable locations for restoration are those where seagrass was recorded as present most recently. Other restoration sites may exist that are not identified in the map, but all those identified are potentially suitable for restoration.

9 Nagelkerken, Ivan, Monique GG Grol, and Peter J. Mumby. "Effects of marine reserves versus nursery habitat availability on structure of reef fish communities." PloS one 7.6 (2012): e36906

10 Kopp, D., Bouchon-Navaro, Y., Louis, M., Mouillot, D. & Bouchon, C. (2010) Juvenile Fish Assemblages in Caribbean Seagrass Beds: Does Nearby Habitat Matter?. Journal of Coastal Research, 26(6), 1133-1141

11 Meylan, P. A., et al. "A half-century of demographic changes in a green turtle (Chelonia mydas) foraging aggregation during an era of seagrass decline." Marine Biology 169.6 (2022): 1-20.

12 Fourqurean, James W., et al. "Decadal monitoring in Bermuda shows a widespread loss of seagrasses attributable to overgrazing by the green sea turtle Chelonia mydas." Estuaries and Coasts 42.6 (2019): 1524-1540.

5.4.9. OBJECTIVE—*When designating marine protected areas, prioritise those areas that seek to protect habitat used by unique, rare, and/or threatened species named in the Protected Species Act.*

The Protected Species Order 2012 (which falls under the Protected Species Act 2003), lists the species that are protected anywhere within Bermuda's marine waters. The proposed MPA network described in Section 5.2. offers additional protection where suggested MPAs overlap with areas of high-quality habitat. Understanding the high-quality habitats used by unique, rare and/or threatened species are important considerations for effective protection.[13] In Bermuda, these areas have been determined using nine measures of reef health as indicated in Table 5.4.9.

Indicator	
Coral Cover	26.2%
Coral Diversity (richness)	26.4%
Coral Recruit Density	23.2%
Fish Density	37.9%
Fish Diversity (BREAM)	27.4%
Fish Diversity (BIOS)	20.6%
Fish Recruit Density	56.4%
Rugosity (complexity)	20.8%
Seagrass	28.4%

Table 5.4.9. This table summarises the proportion of high-quality habitat within the fully protected and highly protected MPAs in the proposed network.

5.4.10. OBJECTIVE—*When designating marine protected areas, prioritise those areas that seek to protect at least 40% of seamount area in Bermuda's outer EEZ. This objective specifically excludes Challenger and Argus Banks.*

Seamounts are a distinctive feature of the global ocean, with many supporting dense assemblages of commercially important fishes and unique benthic organisms, such as deep-water corals, as well as rich natural mineral deposits. Seamounts are therefore vulnerable to extractive activities and should be afforded additional protection to safeguard these habitats for the future.[14] The MSP will be legally binding through the enactment of a Marine Development Act, which will grant powers to create protected areas in accordance with the Act's objectives. The proposed MPA network in Section 5.2. achieves the target of protecting at least 40% of seamount area in Bermuda's offshore area.

See Table 5.4.5.2.

13 Roberts, Kelsey E., et al. "Evaluating the use of marine protected areas by endangered species: A habitat selection approach." Ecological Solutions and Evidence 2.1 (2021): e12035.
14 Probert, P. Keith, et al. "Management and conservation of seamounts." Seamounts: ecology, fisheries, and conservation. Blackwell fisheries and aquatic resources series 12 (2007): 442-475.

5.5. USER IMPACT ASSESSMENT

This section details what the impacts of the proposed MPA network will be on human-use activities when combined with current legislation. It details the percent cover of the nearshore area (0-2000 m) and of the demersal fishing area (0-55 m) where specific activities would be:

- Fully prohibited
- Restricted (limited in some form)
- A combination of both prohibited and restricted

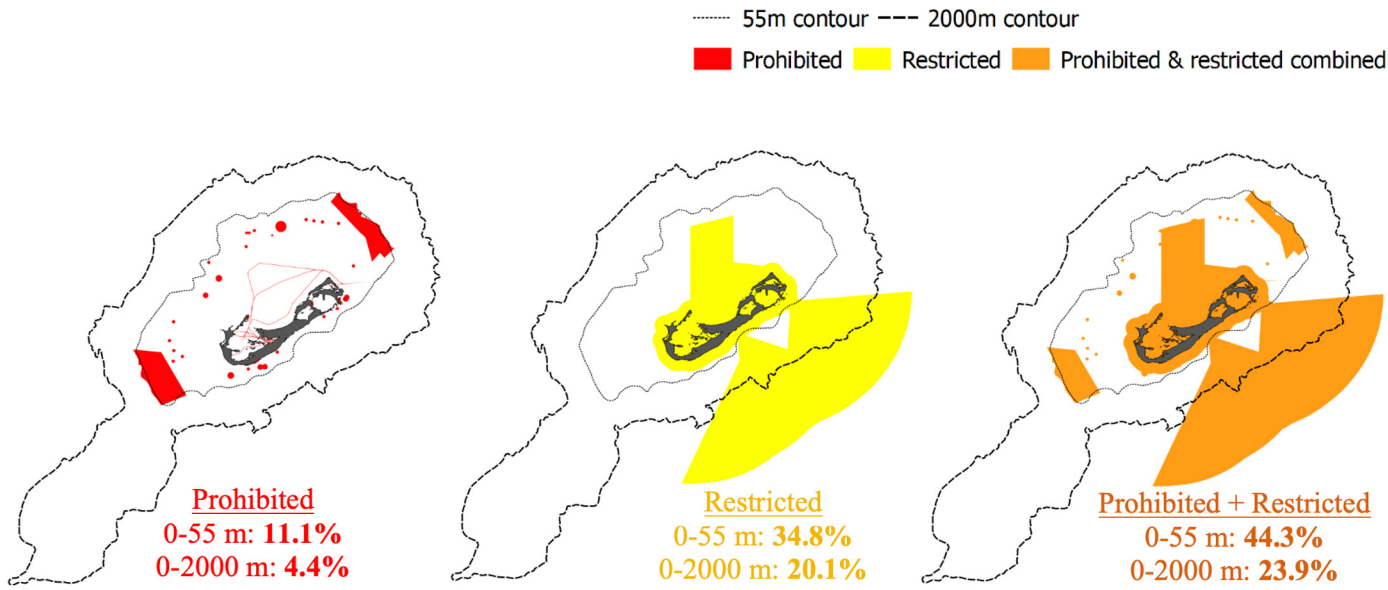
This has been done for:

- Currently legislated areas only (those listed in Section 5.1.)
- The proposed MPA network in Section 5.2. combined with currently legislated areas

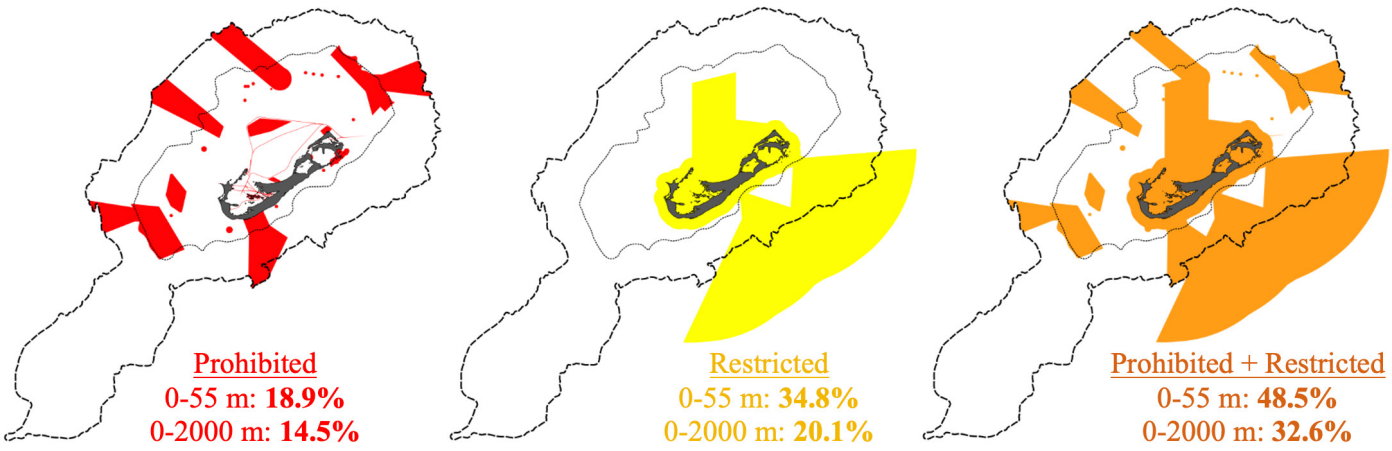
Assessments have been made using the Use Charts in Sections 5.1. and 5.2. to determine where activities are prohibited or restricted. NB – Use Charts and MPA boundaries are in DRAFT format and are likely to change. Public consultation and further discussions with the relevant authorities are needed before these are finalised.

5.5.1. AQUACULTURE

Under existing legislation:

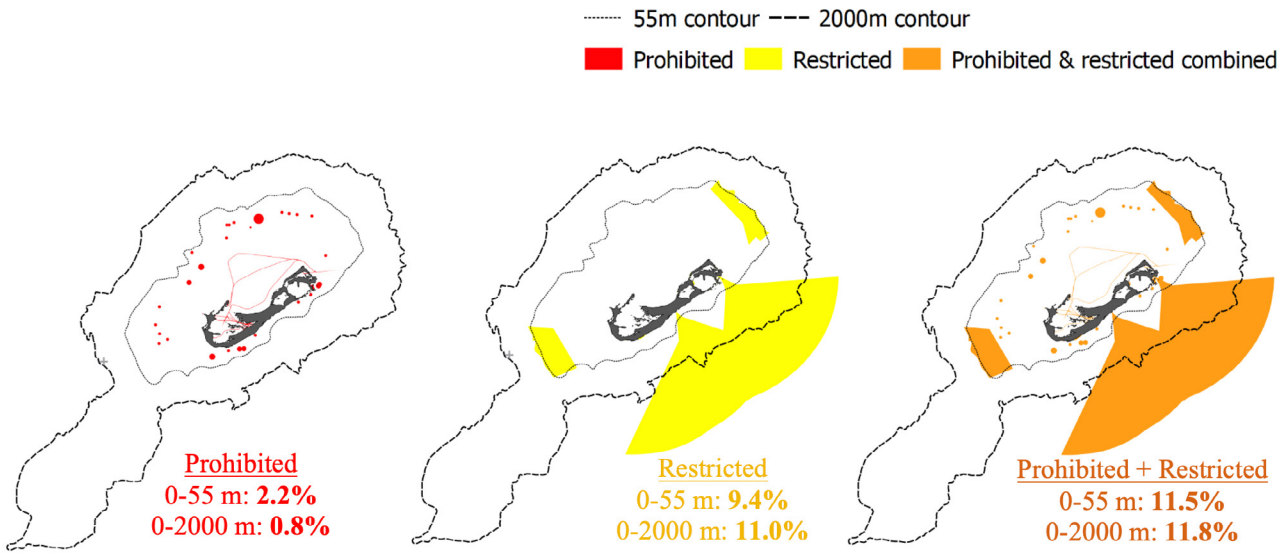


New MPA proposal + existing legislation:

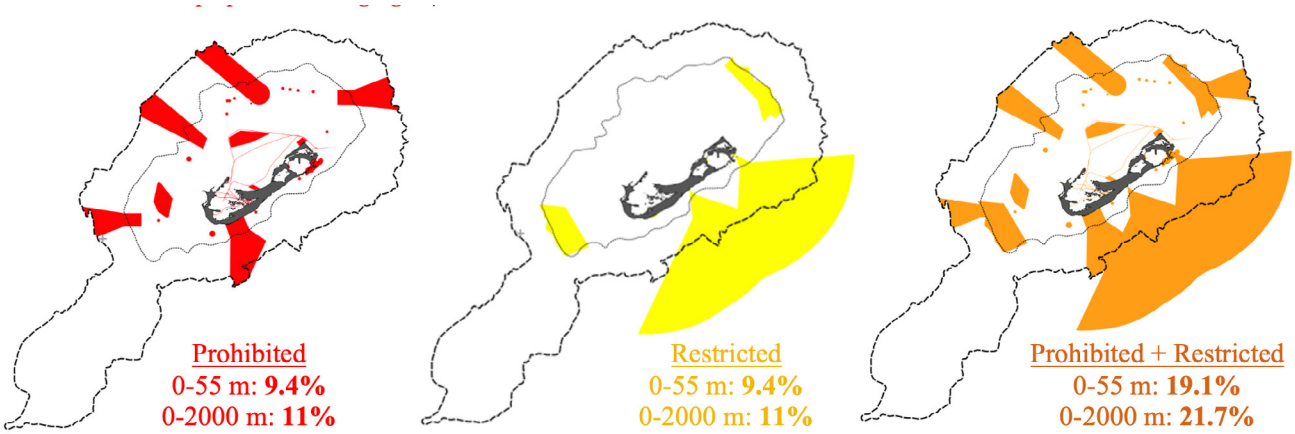


5.5.2. BOTTOM FISHING

Under existing legislation:

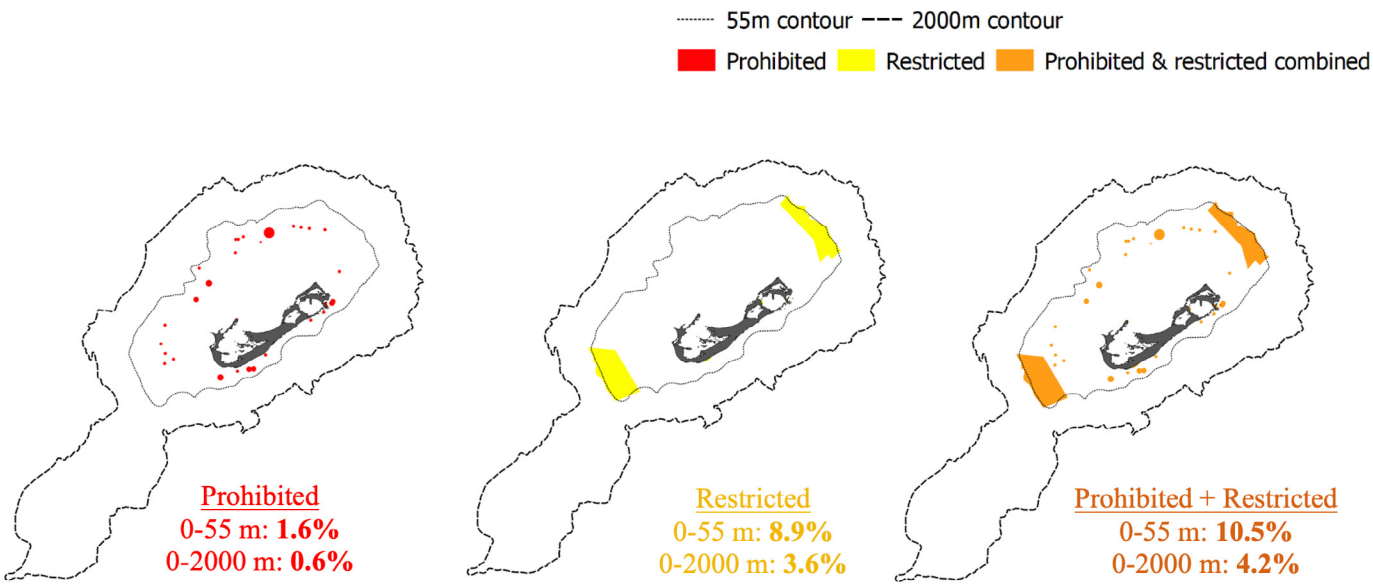


New MPA proposal + existing legislation:

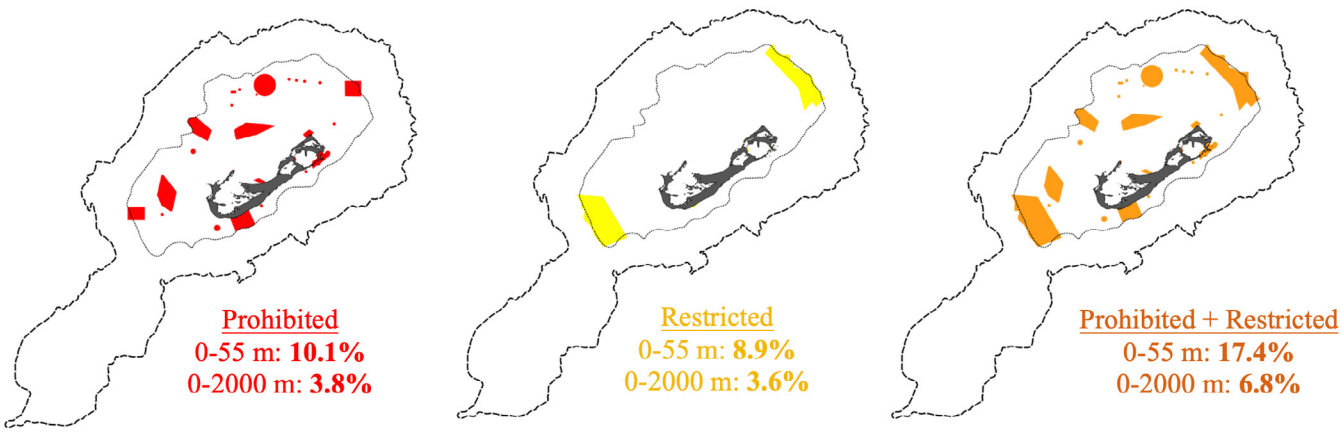


5.5.3. COMMERCIAL TROLLING / SURFACE FISHING[1]

Under existing legislation:



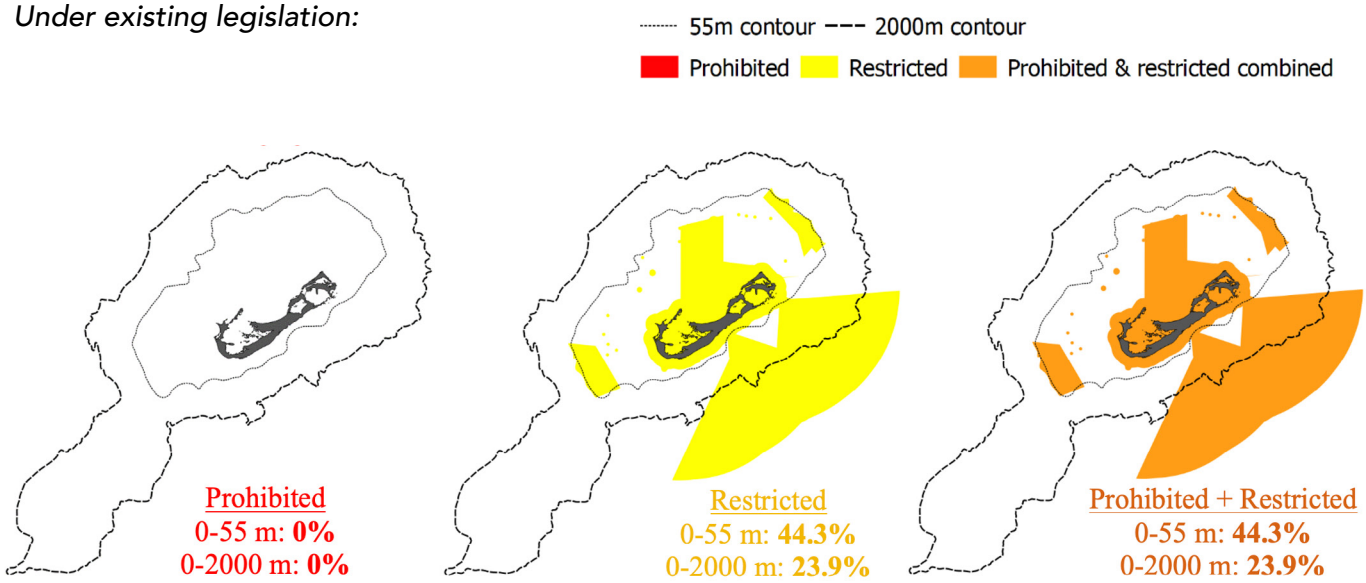
New MPA proposal + existing legislation:[1]



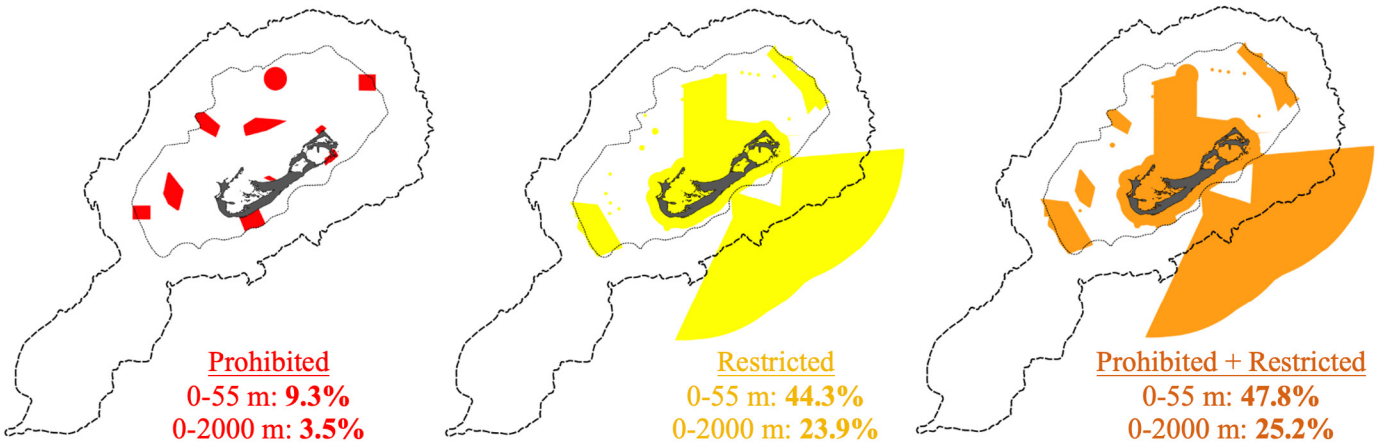
1 Same as Recreational Trolling / Surface Fishing

5.5.4. EXTRACTIVE RESEARCH

Under existing legislation:

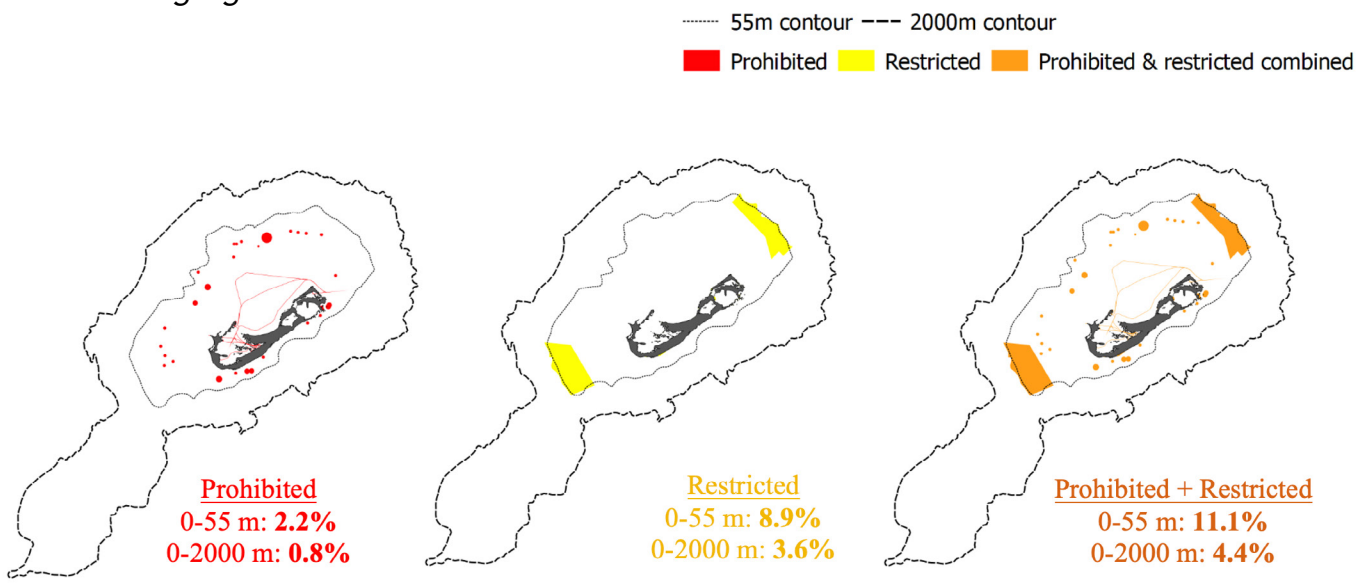


New MPA proposal + existing legislation:

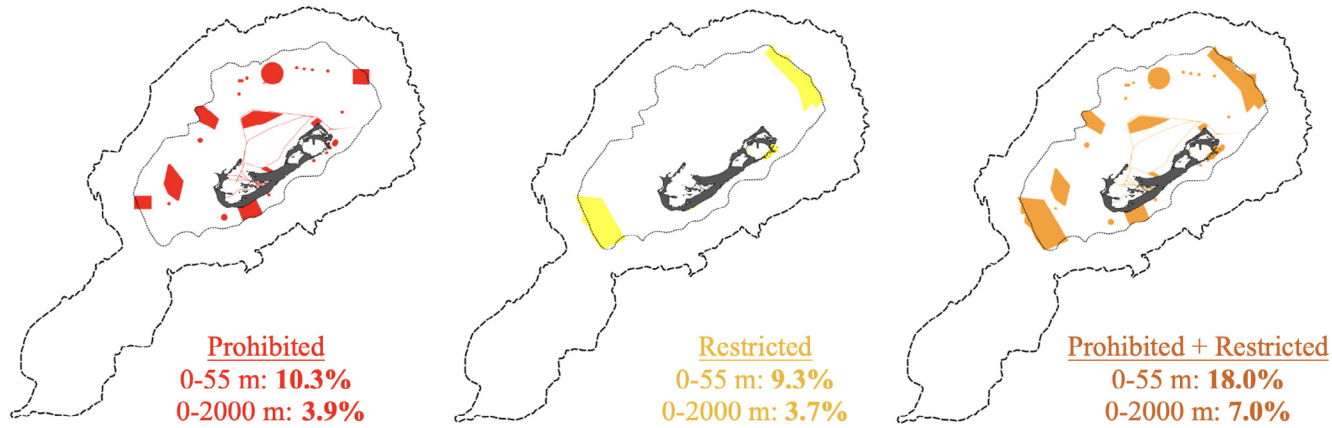


5.5.5. FLY FISHING - CATCH AND RELEASE

Under existing legislation:

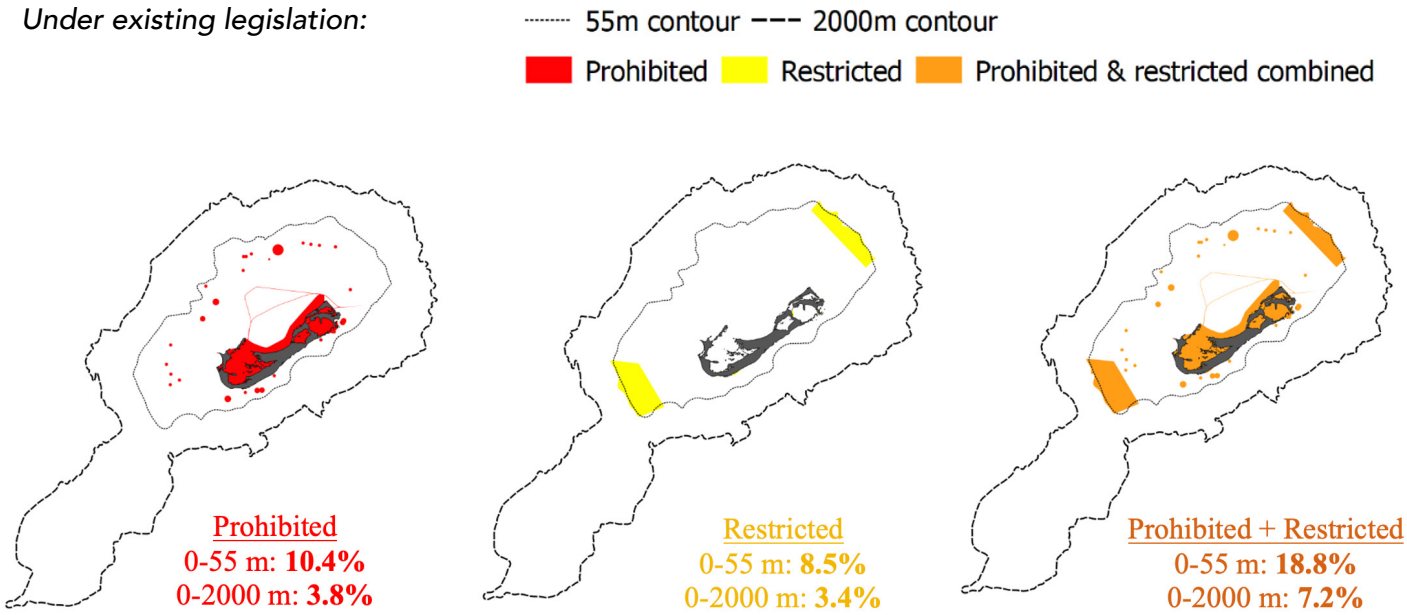


New MPA proposal + existing legislation:

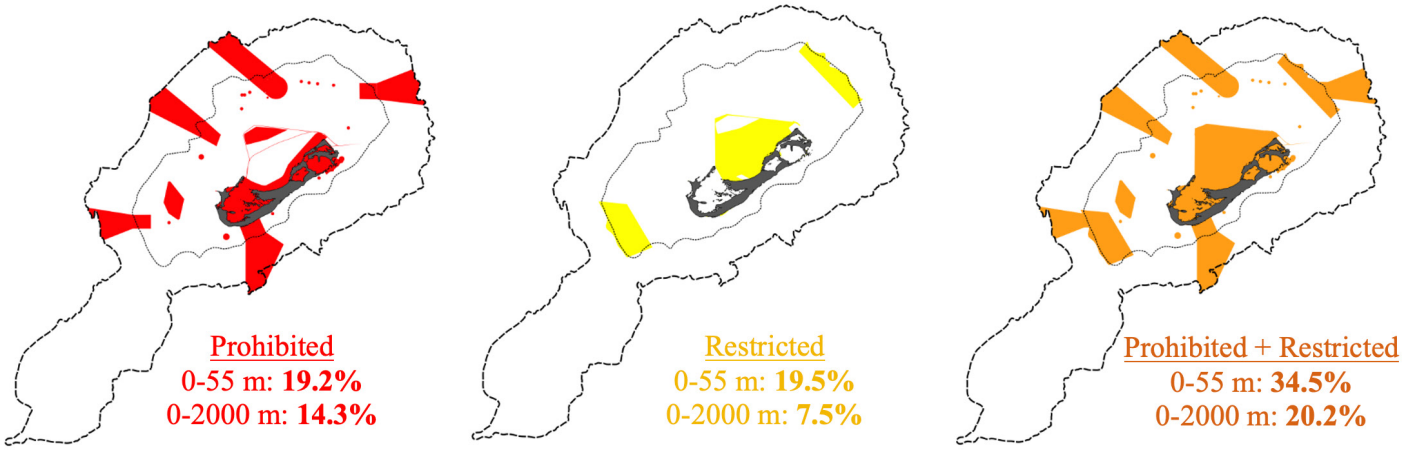


5.5.6. LOBSTER DIVING

Under existing legislation:

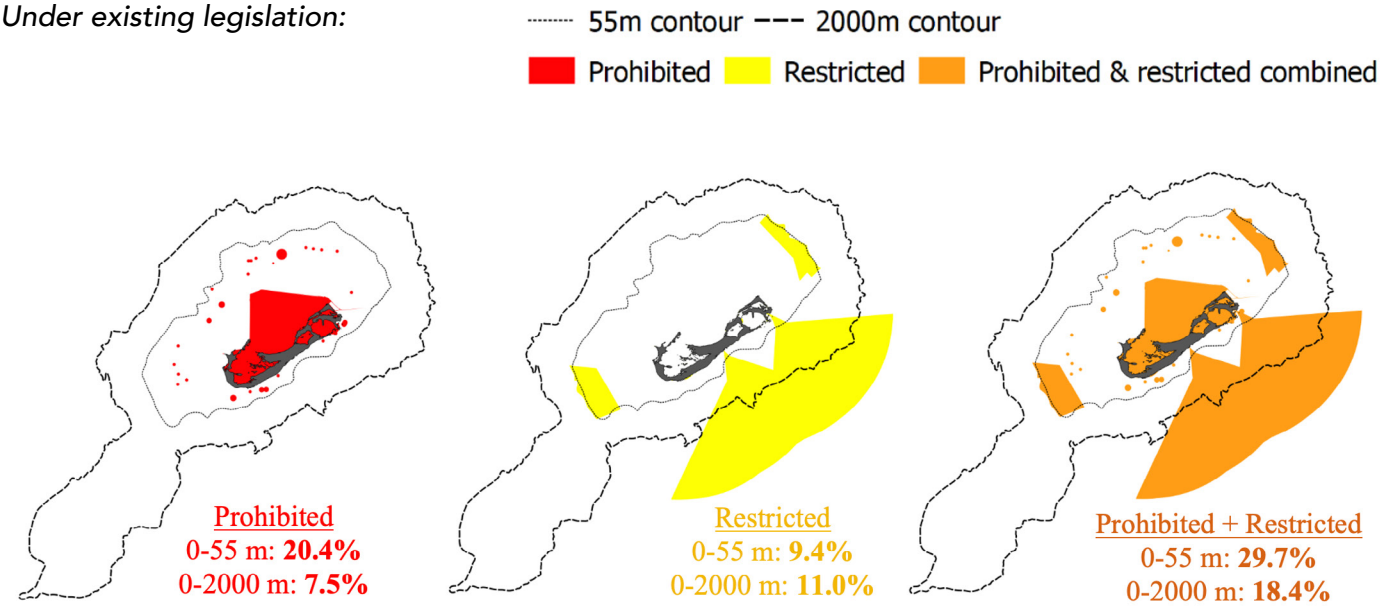


New MPA proposal + existing legislation:

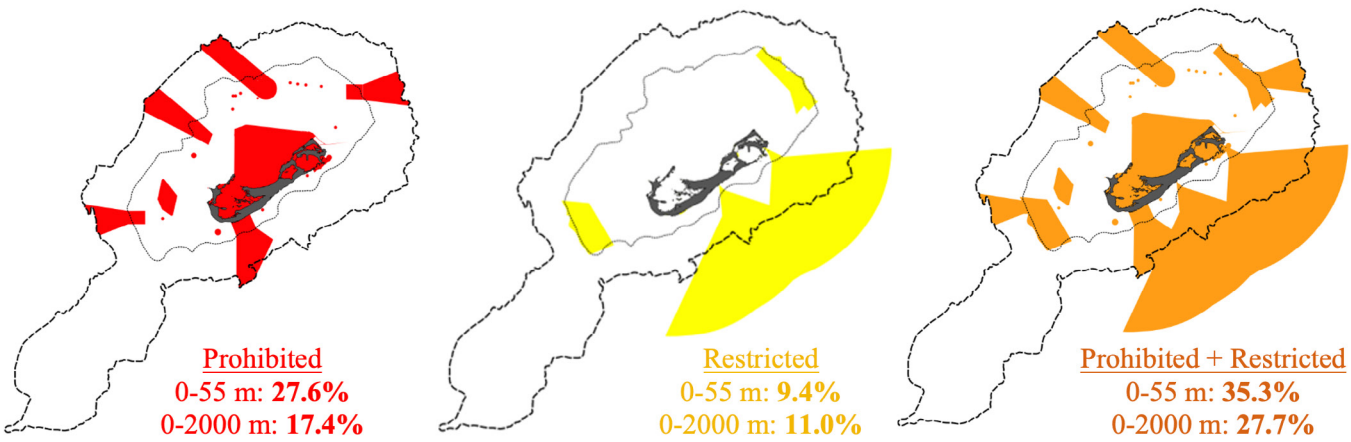


5.5.7. LOBSTER TRAPPING

Under existing legislation:

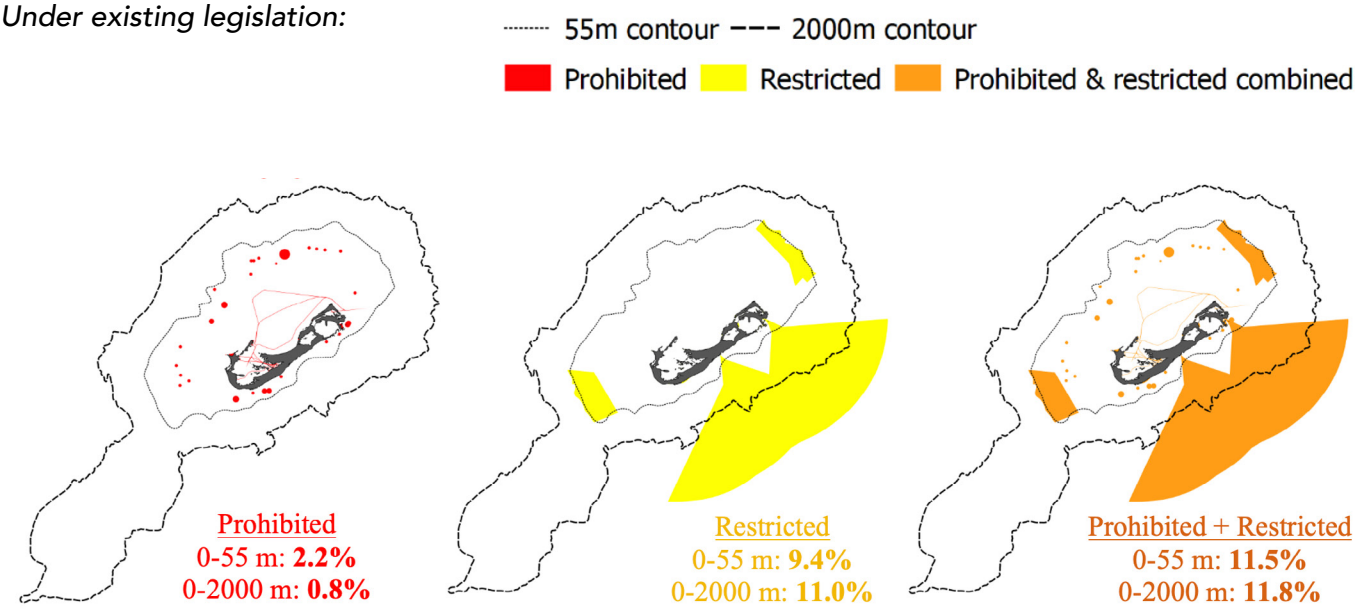


New MPA proposal + existing legislation:

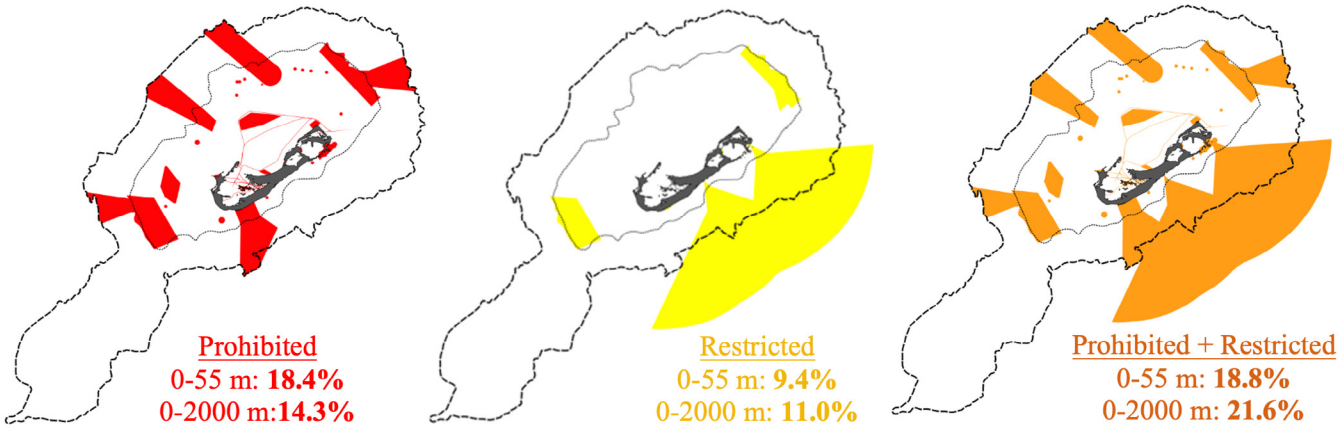


5.5.8. NETTING

Under existing legislation:



New MPA proposal + existing legislation:

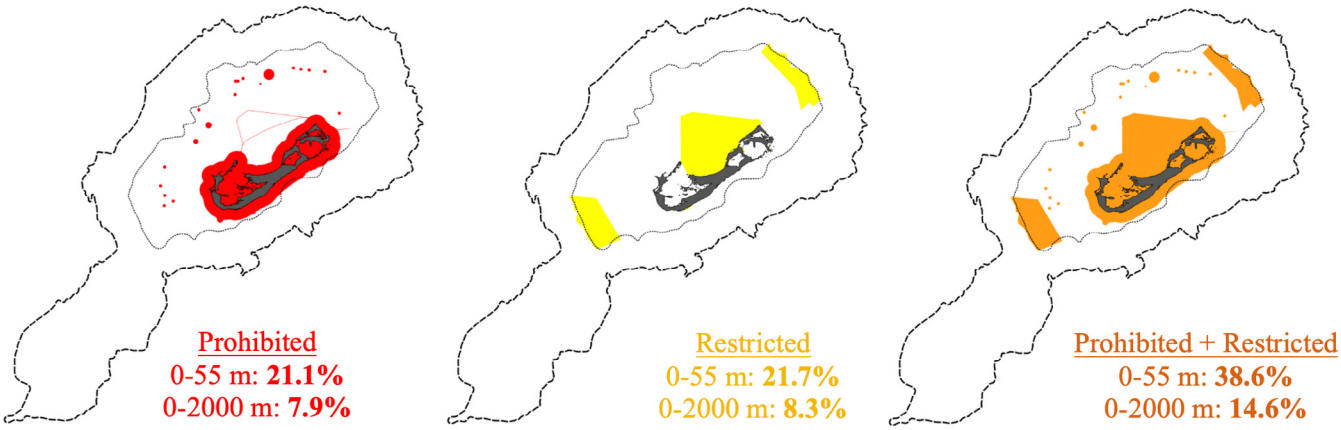


5.5.9. RECREATIONAL SPEARFISHING

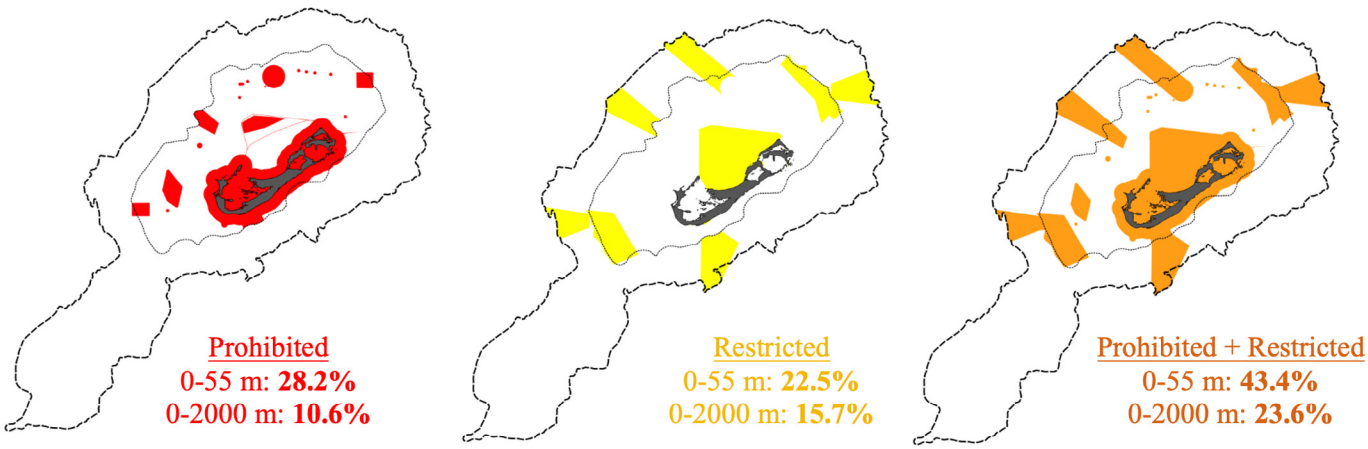
Under existing legislation:

55m contour 2000m contour

Prohibited Restricted Prohibited & restricted combined

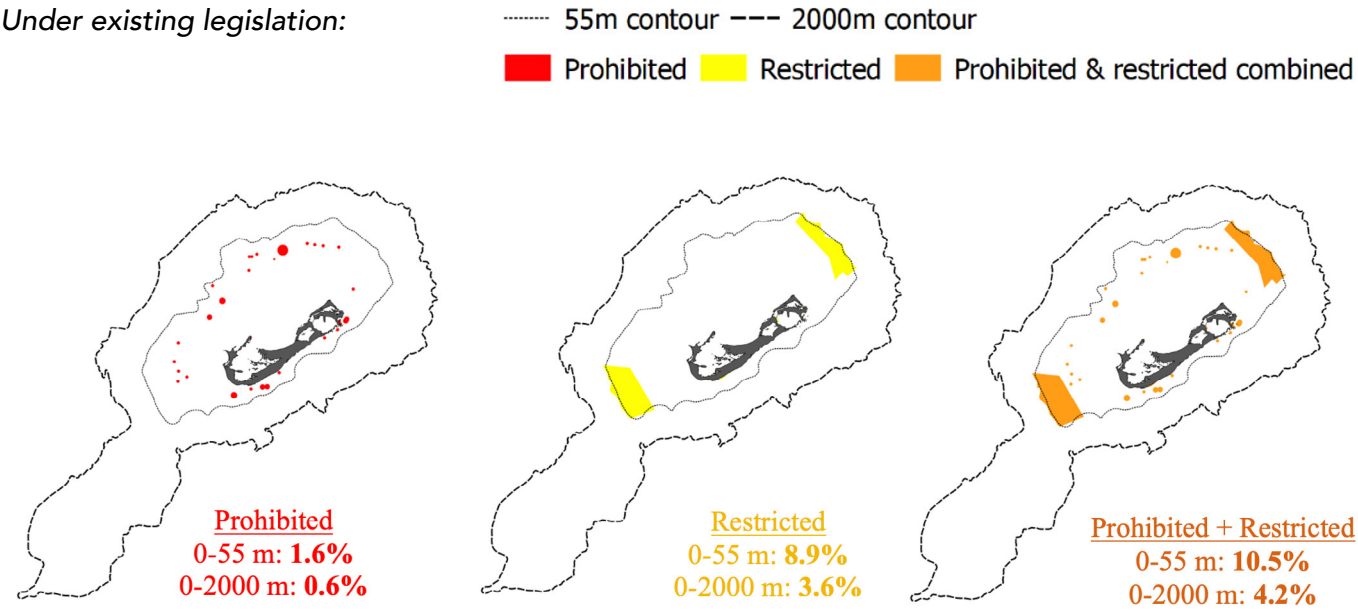


New MPA proposal + existing legislation:

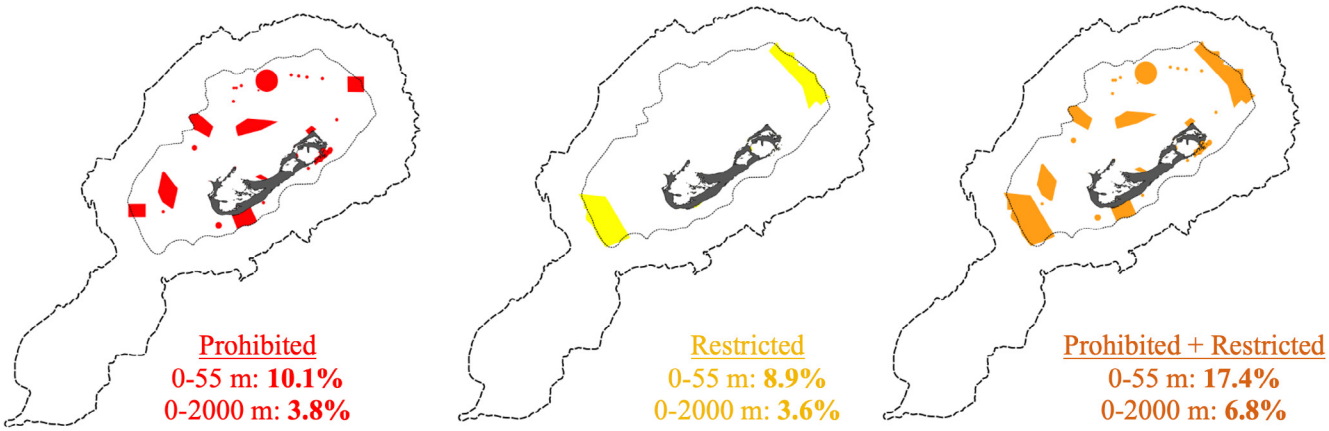


5.5.10. RECREATIONAL TROLLING / SURFACE FISHING[1]

Under existing legislation:



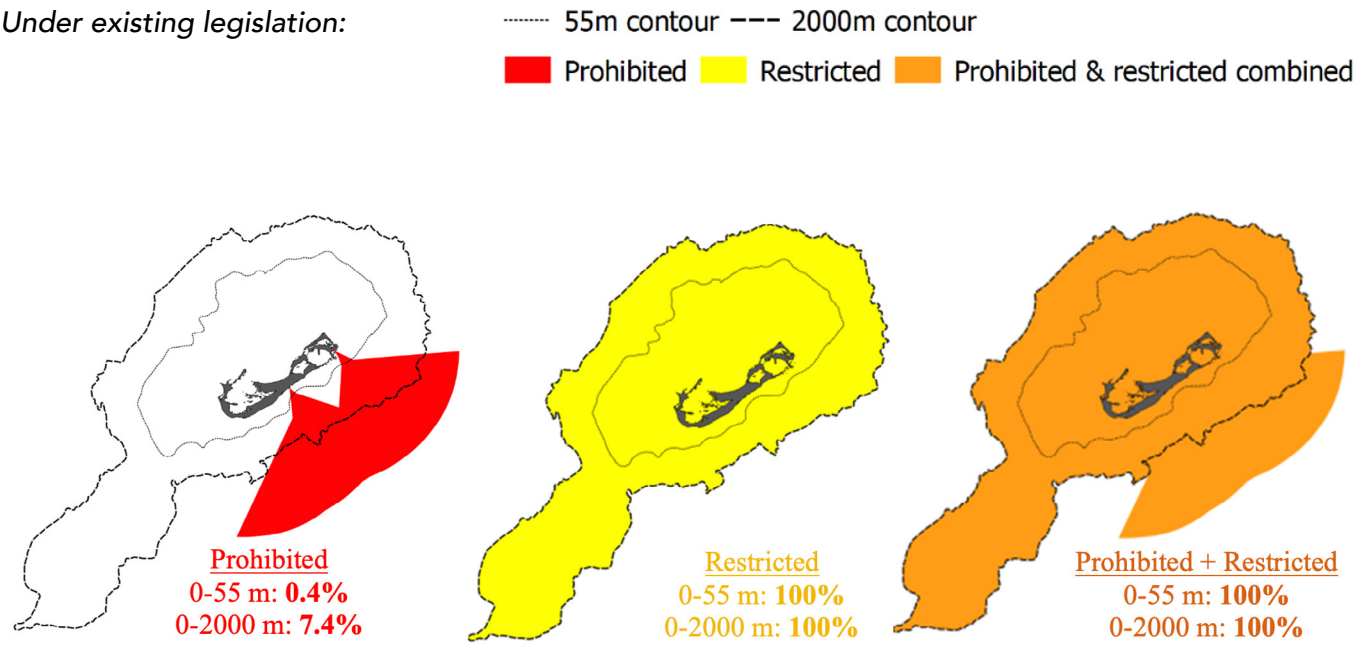
New MPA proposal + existing legislation:[1]



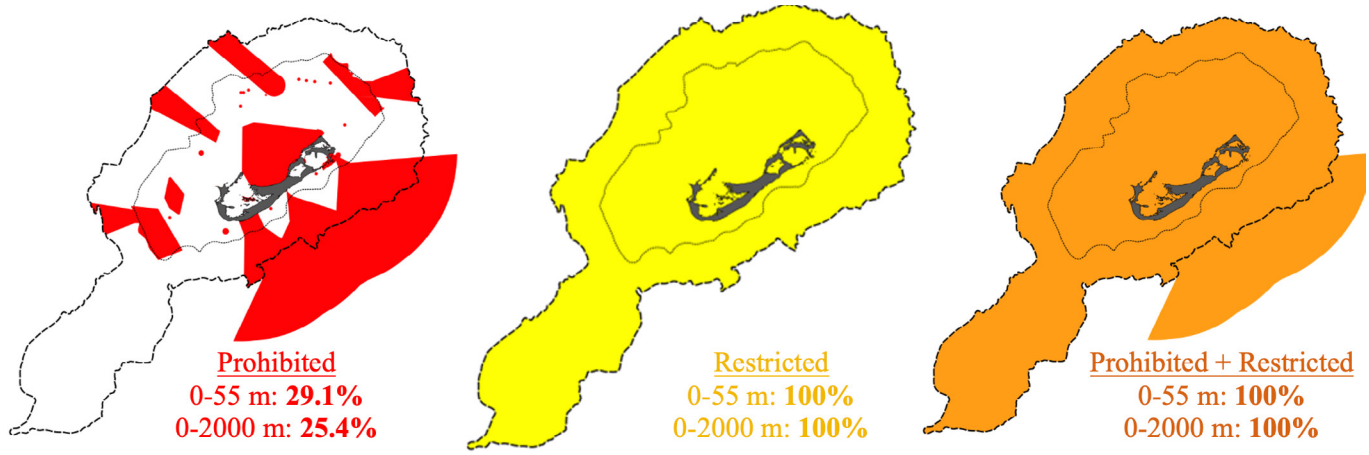
1 Same as Commercial Trolling / Surface Fishing

5.5.11. RENEWABLE ENERGY DEVELOPMENT

Under existing legislation:

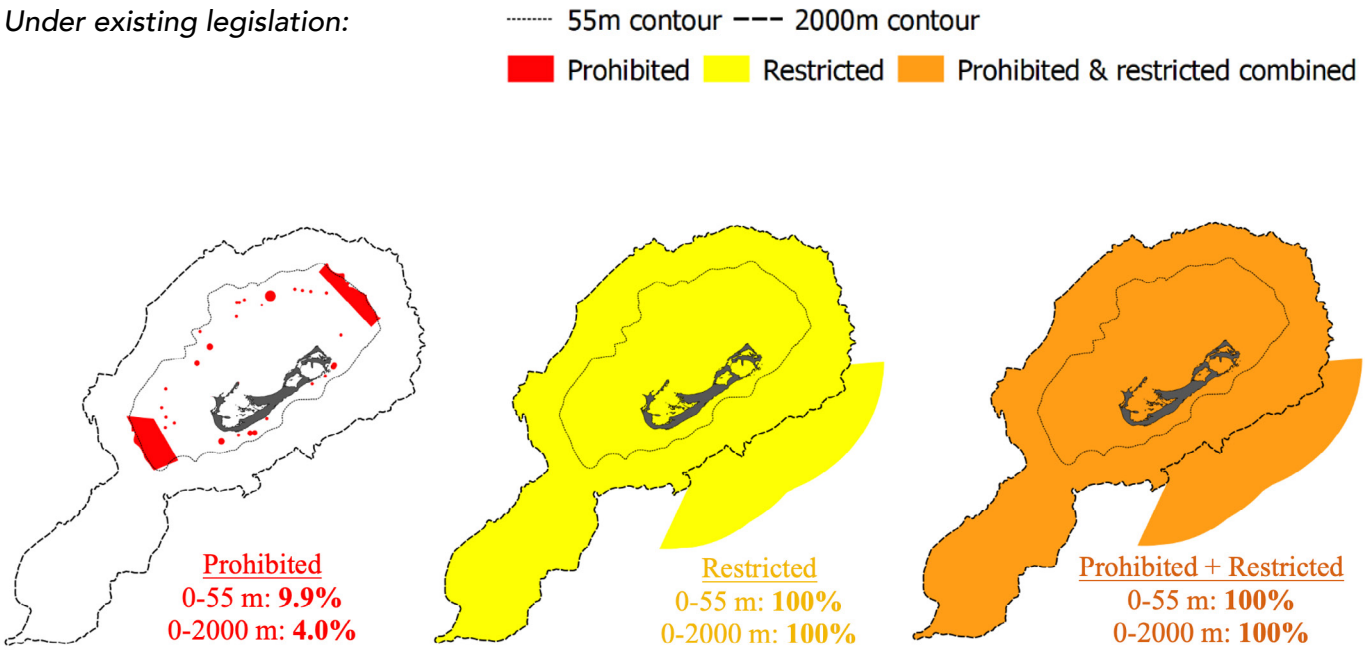


New MPA proposal + existing legislation:

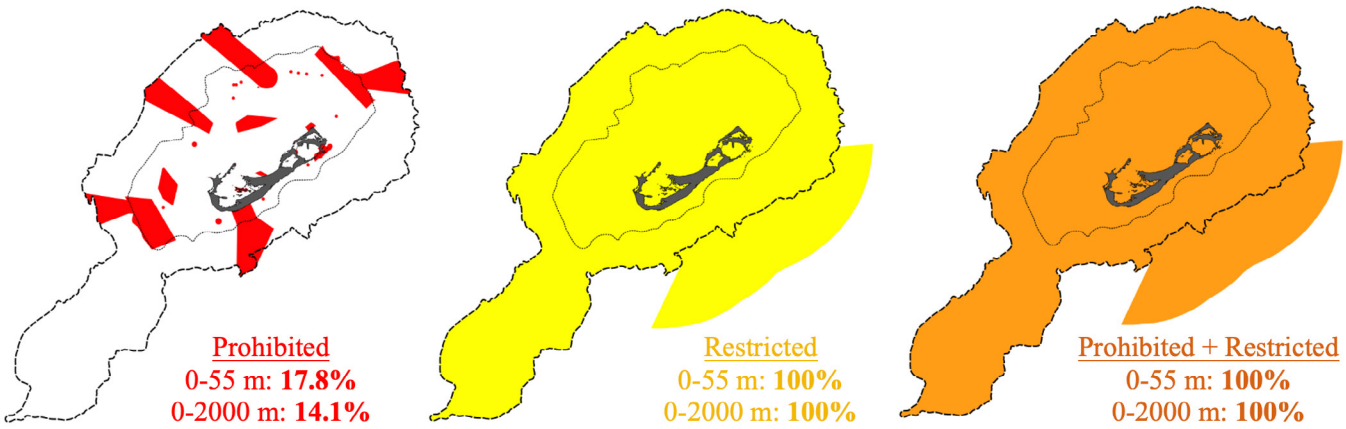


5.5.12. INFRASTRUCTURE WORK AND DEVELOPMENT

Under existing legislation:



New MPA proposal + existing legislation:



6. Implementation, Monitoring, and Review

6.1. IMPLEMENTATION

The MSP will be implemented as prescribed in the forthcoming Marine Development Act ("the Act") described in Section 4. The Act will appoint the Department of Environment and Natural Resources as the coordinating authority responsible for administering the MSP as a whole.

6.2. MONITORING AND REVIEW

The process of monitoring and periodic reporting on the management of the MSP will comply with requirements of the Act. The Act will also detail the review period of the MSP and associated instructions.

The MSP is designed to be forward-looking and adaptive to account for new information, opportunities, and changing circumstances. Progress toward achieving the objectives set out in the MSP will be measured using ecosystem health metrics and blue economic indicators. If evidence supports the need for change, then modifications to the MSP will be made in accordance with the requirements of the Act.

6.2.1. MARINE RESOURCES MONITORING:

Principle Priority:

Annual monitoring of fish diversity, abundance and biomass for 10 years in fully protected areas, highly protected areas and comparable unprotected 'control' areas during the same season:

1. Baited Remote Underwater Video (BRUV) cameras will be used to record fish diversity, abundance and biomass at reef MPAs and control sites. Machine learning will be used for automated analysis.
2. School size estimates for baitfish will be recorded at coastal MPAs and control sites, and eDNA analysis will be conducted on water samples to determine species composition of the school.

Supporting Priorities:

1. Regular/annual fishery-independent surveys for lobsters and other invertebrates.
2. Towed video transect surveys and diver-based video transect surveys, as dictated by depth, to evaluate coral community structure and health at reef MPAs and control sites.
3. Diver-based surveys and surveys of seagrass and associated benthic habitats from shore across the lagoon to the rim reef, following established protocols.
4. BRUV method calibrated against previous surveys conducted (e.g., stationary video [unbaited], Bohnsack and Bannerot cylinder method, AGRRA method, roving diver method).
5. BRUV fish surveys conducted during a minimum of two seasons per year, with the same seasons repeated annually.
6. Monitor the above metrics in areas directly adjacent to fully protected areas to examine the effects of spillover.

6.2.2. FISHERIES MONITORING:

Principle Priority: Regular data-limited stock assessments for priority species, including black grouper, red hind and lobster.

Supporting Priority: Fisheries catch data in areas adjacent and non-adjacent to fully protected areas assessed using logbook data from fisheries and/or targeted experimental fishing.

6.2.3. TOURISM MONITORING:

Principle Priority: A baseline evaluation and follow-up survey of the economic impacts of MPA establishment on the local tourism industry, with visitor surveys that include questions about tourists' willingness to pay (WTP) for nature-based experiences (e.g., snorkel/dive trips) to areas within full protection areas; their prior knowledge of Bermuda's MPAs before visiting the island and whether that impacted their choice of activity or destination; and potentially their WTP a green fee arrival/departure tax (similar to Palau) to support ongoing conservation efforts.

Supporting Priority: Recording the number of trips to locations in fully protected MPA sites vs other sites, then calculating the revenues associated with those for comparison purposes.

6.2.4. OTHER CONSIDERATIONS:

Blue Shield may be able to support with enforcement and compliance efforts for the MSP network in the offshore and nearshore areas. The Waitt Institute has the resources to support a full Ecosystem Monitoring and Evaluation Plan to satisfy most elements of this monitoring proposal, which are available immediately. The Waitt Institute can also provide assistance in creating MPA management plans, with DENR and other relevant departments taking ultimate responsibility for implementation in the long-term.

7. Glossary

Bermuda's marine waters: The region that extends from Bermuda's coast outward to 200 nautical miles (nm), including the territorial sea and exclusive economic zone (EEZ). Bermuda has jurisdiction over the natural resources, marine environment, and energy production rights in this region.

Bermuda Ocean Prosperity Programme (BOPP): A partnership between the Government of Bermuda, the Waitt Institute, and the Bermuda Institute of Ocean Sciences (BIOS). The goal of BOPP is to foster the sustainable, profitable, and enjoyable use of ocean resources for present and future generations.

Blue economy: The sustainable use of ocean resources for economic growth, improved livelihoods, and increased jobs while preserving the health of ocean ecosystems.

Blue Economy Strategy: A 10-year roadmap, presented by BOPP and developed with the involvement of various Government entities, resident member organisations, local scientific institutions, ocean stakeholders, and the general public. The Blue Economy Strategy outlines opportunities for economic growth, revenue diversification, and improved social equity within Bermuda's blue economy.

Blue Prosperity Plan: The combined Marine Spatial Plan (MSP) and Blue Economy Strategy which, together, support the continued protection and enhancement of Bermuda's coastal and marine resources for current and future generations.

Environmental Impact Assessment (EIA): The aim of an Environmental Impact Assessment is to protect the environment by ensuring that a local planning authority, when deciding whether to grant planning permission for a project which is likely to have significant impacts on the environment, does so in the full knowledge of the likely significant effects, and takes this into account in the decision-making process. The aim of the Environmental Impact Assessment is also to ensure that the public is given early and effective opportunities to participate in the decision-making procedures.

Exclusive economic zone (EEZ): The region that extends from 12 nautical miles (nm) outward to 200 nm in Bermuda's waters.

FAD (or fish aggregating device): Man-made objects designed and strategically placed to attract pelagic fish.

Fully protected marine protected areas: No extractive or destructive activities are allowed; all impacts are minimised (aka no-take fisheries replenishment zone)

Goal: A statement of the general direction or intent. High-level statements of the desired outcomes you hope to achieve. Goals are intended to be broad and abstract. They are differentiated from objectives in that they cannot be measured. Each goal has associated objectives that define how it will be achieved with a measurable outcome.

Highly protected: Only light extractive activities are allowed with low total impact, with all other impacts minimised.

Lightly protected: Some protection exists but moderate to significant extraction and other impacts are allowed.

Marine Protected Area (MPA): A clearly defined geographical space, recognised, dedicated, and managed through legal means to achieve the long-term conservation of nature, with associated ecosystem services and cultural values.

Marine Spatial Planning: Is a public process that uses the best available information about the natural environment and human uses to make informed decisions about how to manage the ocean. Human activities are given spatial and temporal allocations to achieve ecological,

economic and social objectives. It aims to find the right balance of industry and development, while protecting the environment and marine resources for future generations.

Nearshore area: The marine area between Bermuda's coastline and the 2000 m depth contour covering both the Platform and outlying banks.

Non-spatial objectives: Specific, defined, and measurable outcomes that are activities or processes to be achieved during the development of the MSP and after the MSP is adopted in order to a) support MSP implementation and management, or b) to address future management needs identified in the MSP process.

No-take fisheries replenishment zone: See fully-protected marine protected areas (aka no-take zone).

Objective: A statement of the desired outcomes or observable behavioural changes that represent the achievement of a goal. Objectives are concrete, detailed, focused, and well-defined outcomes of the MSP.

Offshore area: The marine area between the nearshore boundary and the boundary of the EEZ.

Principles, Goals, and Objectives (PGOs): The approved Principles, Goals, and Objectives that guide the MSP process.

Platform, the (or Bermuda's Platform): The marine area between Bermuda's coastline and the 100 fathom (approximately 183 m) contour line. Bermuda's Platform is part of the nearshore area.

Principle: A basic or essential quality or element determining the intrinsic nature or characteristic behaviour of the MSP.

Spatial objectives: Specific, defined, and measurable outcomes that relate to, occupy, or otherwise have the character of physical space. They aim to outline the dimensions of specific locations where human activities can be permitted, restricted, or enhanced.

Spillover effect: The outward net movement (or emigration) of larvae, subadults, and/or adults from MPAs to the remaining fishing grounds.

Territorial waters (or territorial sea): Defined as the waters within 12 nm of the baselines. The baseline is measured generally as the low water line.

7.1. ORGANISATIONAL ACRONYMS

BDA	Bermuda Business Development Agency
BEDC	Bermuda Economic Development Corporation
BIOS	Bermuda Institute of Ocean Sciences
BOPP	Bermuda Ocean Prosperity Programme
BNT	Bermuda National Trust (*Observer*)
BREAM	Bermuda Reef Ecosystem Assessment and Monitoring
BSMA	Bermuda Shipping and Maritime Authority
BTA	Bermuda Tourism Authority
BZS	Bermuda Zoological Society
CFC	Commercial Fisheries Council
DOED	Department of Economic Development
DOE	Department of Energy
DENR	Department of Environment and Natural Resources
DOP	Department of Planning
DOPB	Department of Public Lands and Buildings
EA	Environmental Authority
ECO	Environmental Coalition
ES	Estates Section, Ministry of Public Works
HWA	Historic Wrecks Authority
M&P	Department of Marine and Ports Services
MRB	Marine Resources Board
OECD	Organisation for Economic Co-operation and Development
RA	Regulatory Authority
W&E	Department of Works and Engineering

8. Appendices

8.1. MPA SCENARIOS

8.1.1. FINAL PROPOSED SCENARIOS

In a survey issued in June 2022, the Steering Committee was asked to vote for their preferred MPA network proposal for both Bermuda's nearshore area (coastline to 2000 m depth) and offshore area (2000 m depth to the outer EEZ boundary). The proposals put forward MPAs with different levels of protection (either fully, highly or lightly protected) based on recently-published guidance in *The MPA Guide*. The following options were considered:

Offshore:

Offshore Proposal 1: Representing the top ranked scenario as voted for by the Steering Committee in the initial voting phase.

Offshore Proposal 2: A modified version of the top ranked scenario as voted for by the Steering Committee in the initial voting phase, incorporating a change to the map visualisation to represent management and legislation that already applies to all of Bermuda's waters.

Nearshore:

Nearshore Proposal 1: Representing the top ranked scenario as voted for by the Steering Committee in the initial voting phase.

Nearshore Proposal 2: A proposal led by DENR that builds upon the 'balanced approach' as voted for by the Steering Committee in the initial voting phase. It puts greater emphasis on human use considerations, particularly commercial fisheries, to achieve a better balance between human-use and ecological objectives.

For a full description and comparison of the MPA proposals considered in the final phase of Steering Committee consultations before Cabinet submission, please see this report.

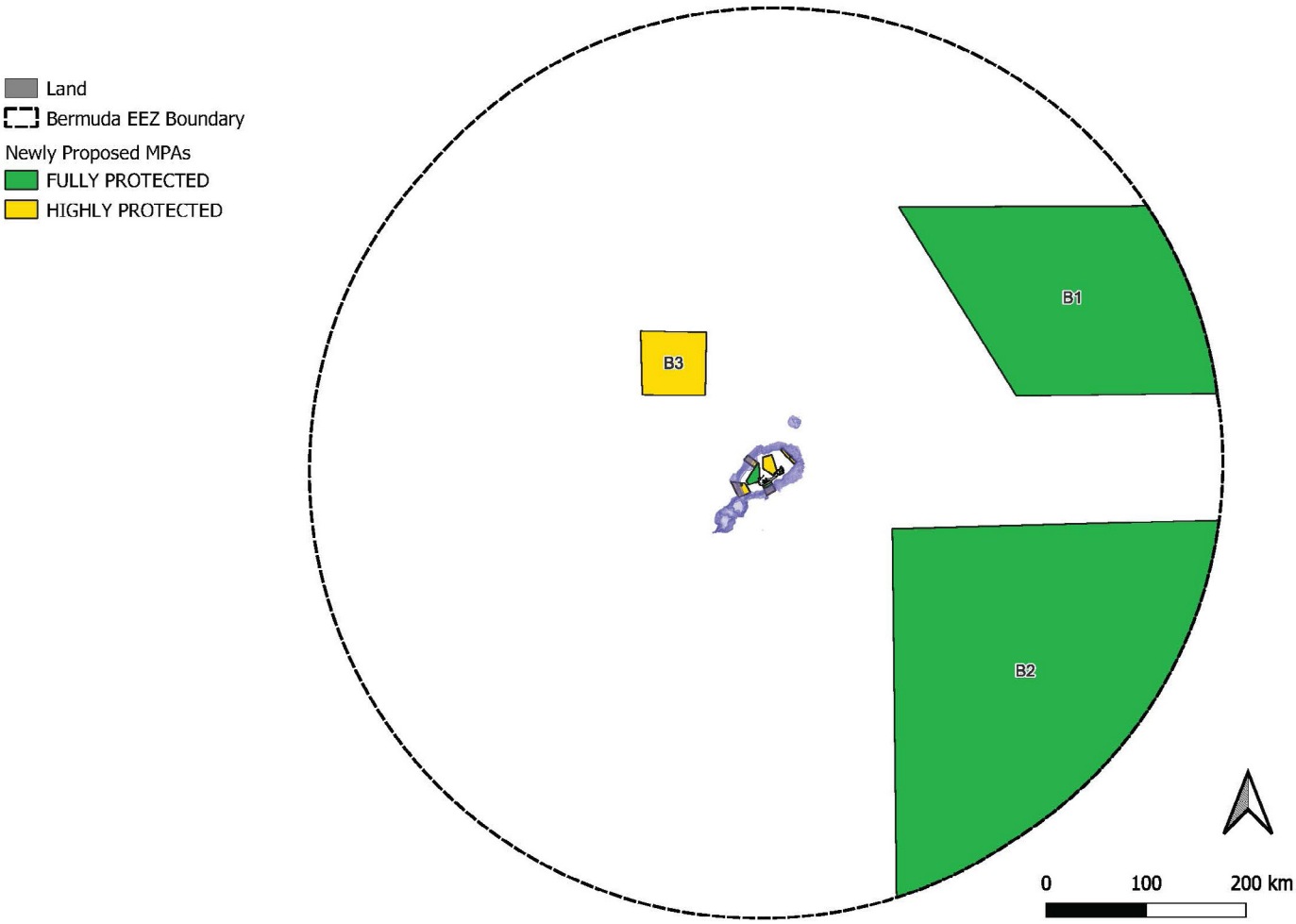


Figure 8.1.1.1. MPAs proposed in Offshore Proposal 1.

Shape	Protection Level (according to MPA Guide)	Research: non-extractive	Restoration/enhancement for conservation	Non-extractive recreation	Low impact tourism	High impact tourism	Research: extractive	Lobster trapping	Lobster diving	Bottom fishing	Netting (all types)	Commercial trolling/surface fishing	Recreational trolling/surface fishing	Catch and release fly fishing	Recreational spearfishing	Navigation/transitting vessels/boating	Shipping	Restoration/enhancement for other reasons	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Dredging & dumping	Renewable energy generation	Infrastructure works & development	Cabeling	Untreated water discharge	Mining, oil and gas extraction	Habitation	EIA requirement for all development, change of use or intensity of use	Management plan required for special areas of interest, legislated or declared protected areas
B1 - Muir Chain	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	*	x	x	x	x	x	x	x	r	x	x	x	+	+
B2 - Southeast EEZ	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	*	x	x	x	x	x	x	x	r	x	x	x	+	+
B3 - Crescent Seamount	HIGH	✓	✓	✓	✓	x	x	x	x	x	x	✓	✓	x	x	✓	*	x	x	x	x	x	x	x	r	x	x	x	+	+

Table 8.1.1.1. Use chart showing permitted, restricted or prohibited activities for each proposed MPA in Bermuda's offshore waters (2000m to EEZ boundary) for Offshore Proposal 1. √ = permitted; r = restricted; x = prohibited; + = required; - = not required. *Shipping has special consideration when placing MPAs. The United Nations Convention on the Law of the Sea (UNCLOS) applies and there are different shipping rights of passage through the various ocean zones. MPAs would need to be designed to accommodate existing shipping lanes and freedom of navigation.

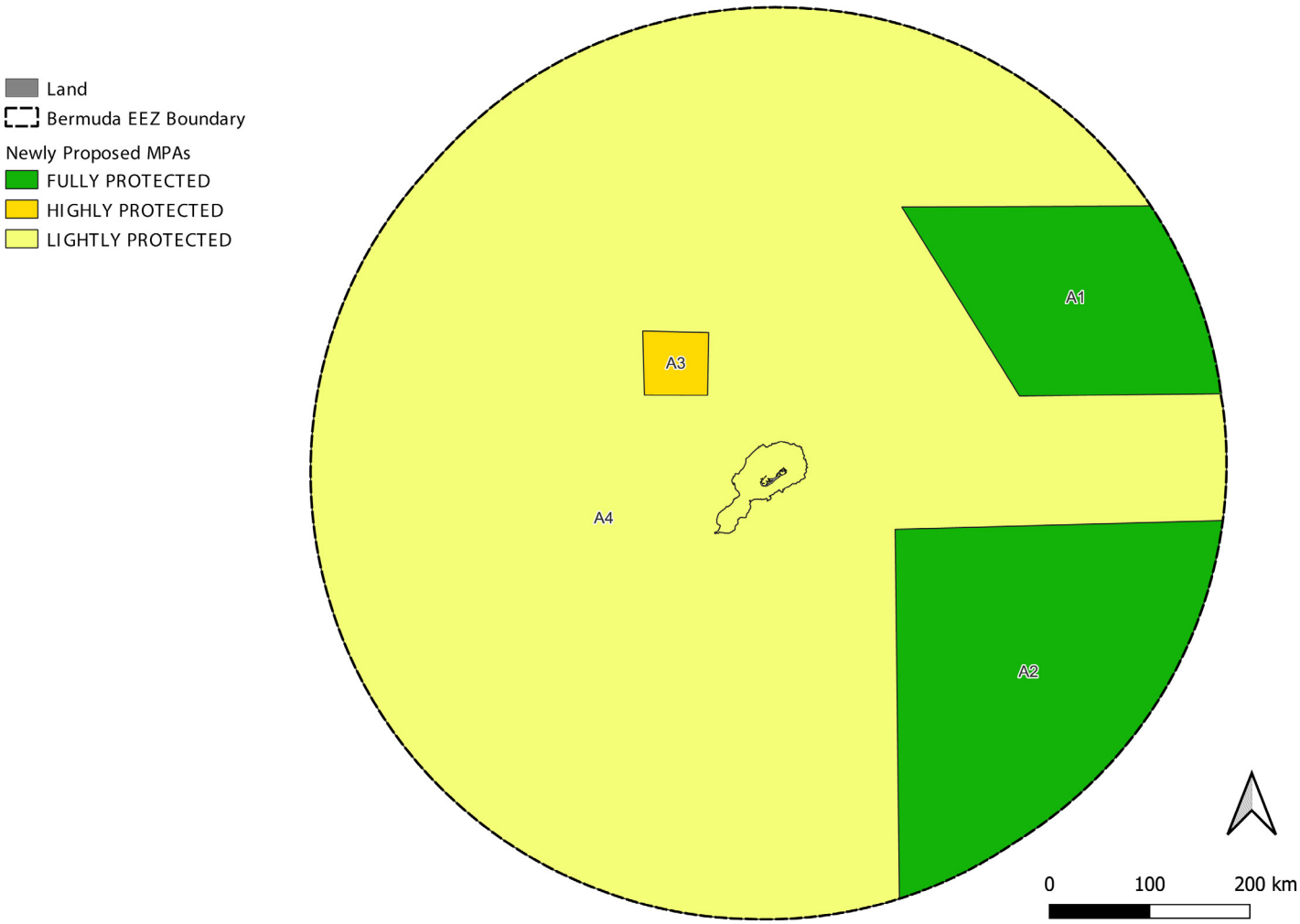


Figure 8.1.1.2. MPAs proposed in Offshore Proposal 2.

Shape	Protection Level (according to MPA Guide)	Research: non-extractive	Restoration/enhancement for conservation	Non-extractive recreation	Low impact tourism	High impact tourism	Research: extractive	Lobster trapping	Lobster diving	Bottom fishing	Netting (all types)	Commercial trolling/surface fishing	Recreational trolling/surface fishing	Catch and release fly fishing	Recreational spearfishing	Navigation/transitting vessels/boating	Shipping	Restoration/enhancement for other reasons	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Dredging & dumping	Renewable energy generation	Infrastructure works & development	Cabeling	Untreated water discharge	Mining, oil and gas extraction	Habitation	EIA requirement for all development, change of use or intensity of use	Management plan required for special areas of interest, legislated or declared protected areas
A1 - Muir Chain	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	*	x	x	x	x	x	x	r	x	x	x	+	+
A2 - Southeast EEZ	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	*	x	x	x	x	x	x	r	x	x	x	+	+
A3 - Crescent Seamount	HIGH	✓	✓	✓	✓	x	x	x	x	x	x	✓	✓	x	x	✓	*	x	x	x	x	x	x	r	x	x	x	+	+
A4 - EEZ	LIGHT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	x	x	+	-

Table 8.1.1.2. Use chart showing permitted, restricted or prohibited activities for each proposed MPA in Bermuda's offshore waters (2000m to EEZ boundary) for Offshore Proposal 2. √ = permitted; r = restricted; x = prohibited; + = required; - = not required. *Shipping has special consideration when placing MPAs. The United Nations Convention on the Law of the Sea (UNCLOS) applies and there are different shipping rights of passage through the various ocean zones. MPAs would need to be designed to accommodate existing shipping lanes and freedom of navigation.

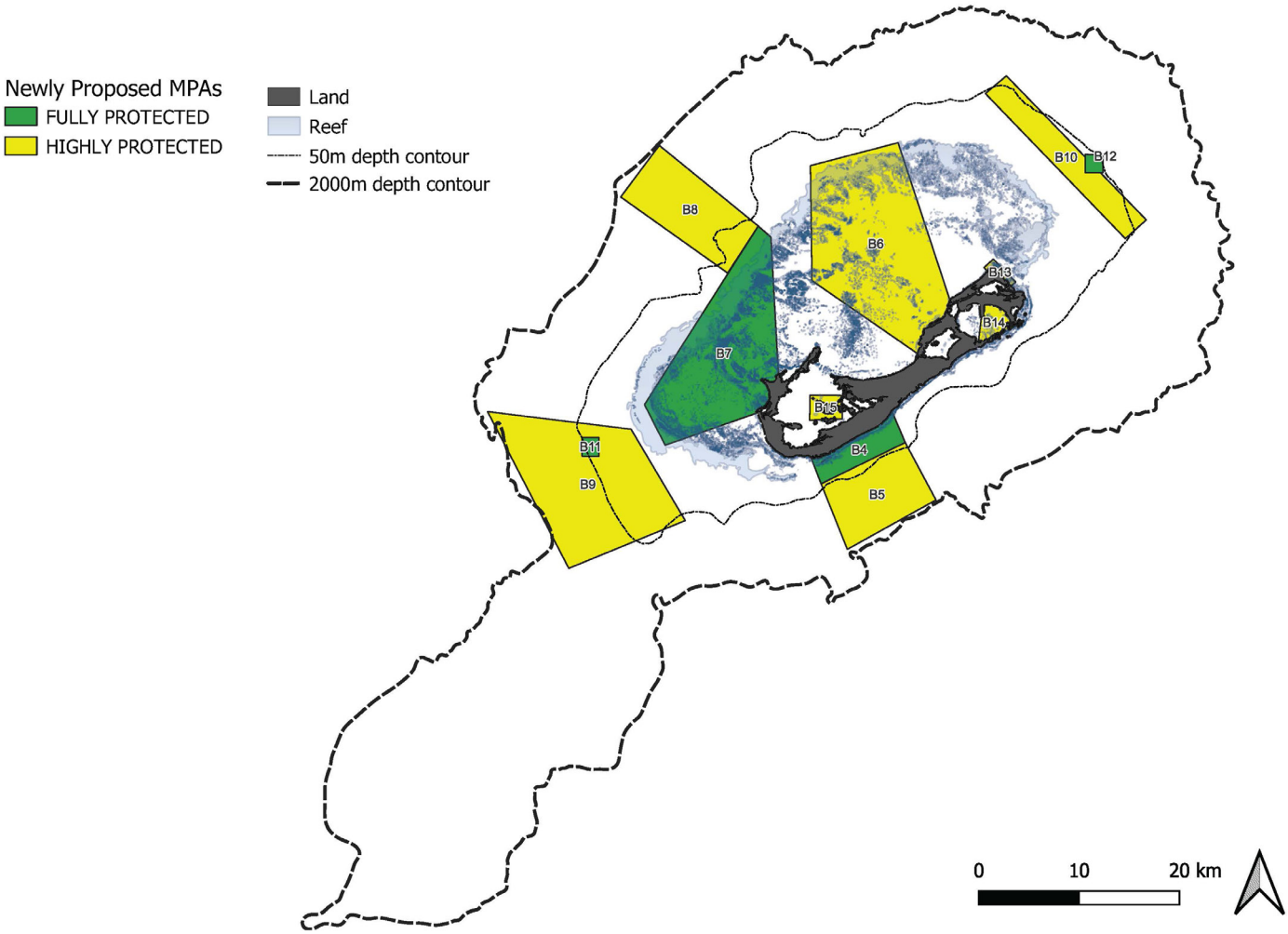


Figure 8.1.1.3. MPAs proposed in Nearshore Proposal 1.

Shape	Protection Level (according to MPA Guide)	Research: non-extractive	Restoration/enhancement for conservation	Non-extractive recreation	Low impact tourism	High impact tourism	Research: extractive	Lobster trapping	Lobster diving	Bottom fishing	Netting (all types)	Commercial trolling/surface fishing	Recreational trolling/surface fishing	Catch and release fly fishing	Recreational spearfishing	Navigation/transitting vessels/boating	Shipping	Restoration/enhancement for other reasons	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Dredging & dumping	Renewable energy generation	Infrastructure works & development	Cabeling	Untreated water discharge	Mining, oil and gas extraction	Habitation	EIA requirement for all development, change of use or intensity of use	Management plan required for special areas of interest, legislated or declared protected areas
B4 - South Shore	FULL	✓	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
B5 - South Shore Pelagic Zone	HIGH	✓	✓	✓	✓	✓	x	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
B6 - Central Lagoon	HIGH	✓	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	✓	✓	x	x	x	r	✓	r	r	x	x	x	+	+
B7 - Eastern Blue Cut	FULL	✓	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
B8 - Eastern Blue Cut Pelagic Zone	HIGH	✓	✓	✓	✓	✓	x	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
B9 - Western Area	HIGH	✓	✓	✓	✓	✓	x	x	x	x	x	r	r	r	r	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
B10 - Eastern Area	HIGH	✓	✓	✓	✓	✓	x	x	x	x	x	r	r	r	r	✓	x	✓	x	x	x	x	x	r	x	x	x	+	+
B11 - Grouper Box West	FULL	✓	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
B12 - Grouper Box East	FULL	✓	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
B13 - Eastern Shoreline	HIGH	✓	✓	✓	✓	✓	x	x	rc	rc	rc	x	✓	rc	✓	✓	✓	x	x	x	r	x	r	r	x	x	x	+	+
B14 - Castle Harbour	HIGH	✓	✓	✓	✓	✓	x	x	rc	rc	rc	x	✓	rc	✓	✓	x	x	x	x	r	x	r	r	x	x	x	+	+
B15 - Paradise Lakes	HIGH	✓	✓	✓	✓	✓	x	x	rc	rc	rc	x	✓	rc	✓	✓	✓	x	x	x	r	x	r	r	x	x	x	+	+

Table 8.1.1.3. Use chart showing permitted, restricted or prohibited activities for each proposed MPA in Bermuda's nearshore waters (coastline to 2000m) for Nearshore Proposal 1. √ = permitted; r = restricted; x = prohibited; + = required; - = not required; rc = recreational only.

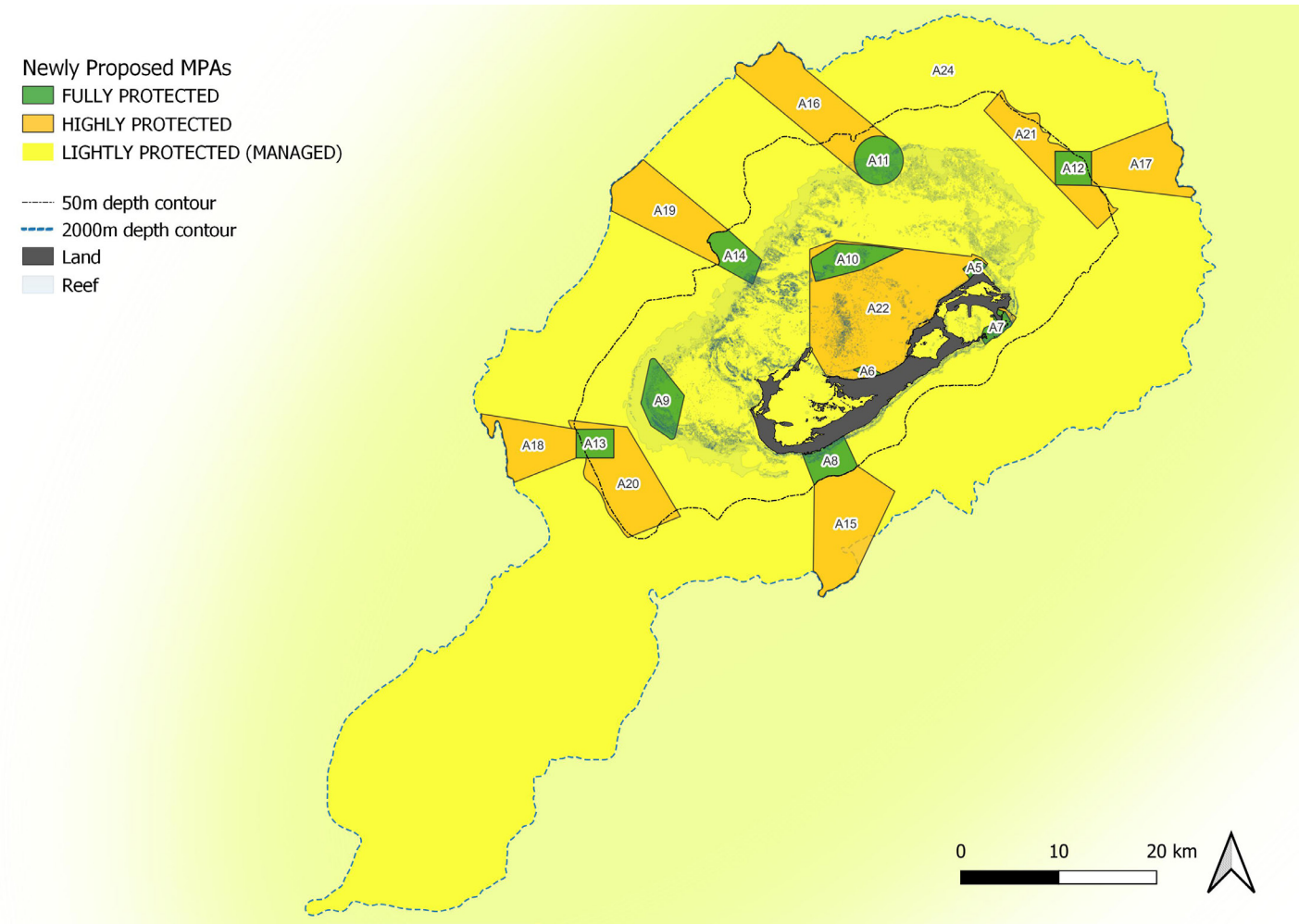


Figure 8.1.1.4. MPAs proposed in Nearshore Proposal 2.
Also included in this proposal is a coastal protection plan as indicated by the maps in Section 5.2.

See Use Chart Table 8.1.1.4. on next page.

Shape	Protection Level (according to MPA Guide)	Research: non-extractive	Restoration/enhancement for conservation	Non-extractive recreation	Low impact tourism	High impact tourism	Research: extractive	Lobster trapping	Lobster diving	Bottom fishing	Netting (all types)	Commercial trolling/surface fishing	Recreational trolling/surface fishing	Catch and release fly fishing	Recreational spearfishing	Navigation/transitting vessels/boating	Shipping	Restoration/enhancement for other reasons	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Dredging & dumping	Renewable energy generation	Infrastructure works & development	Cabeling	Untreated water discharge	Mining, oil and gas extraction	Habitation	EIA requirement for all development, change of use or intensity of use	Management plan required for special areas of interest, legislated or declared protected areas
A5 - Coot Pond	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A6 - Tyne's Bay Madracis Reef	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A7 - Castle Harbour Islands and Reef	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A7.1 - Cable zone adjacent to full protection areas	HIGH	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	✓	x	x	x	+	+
A8 - South Shore	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A9 - Chubb's Head	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A10 - North Lagoon	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A11 - North Rock	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A12 - Eastern Grouper Box	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A13 - Western Grouper Box	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A14 - Eastern Blue Cut	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
A15 - South Shore Pelagic Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
A16 - North Rock Pelagic Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
A17 - Eastern Grouper Box Pelagic Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
A18 - Western Grouper Box Pelagic Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
A19 - Eastern Blue Cut Pelagic Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	✓	✓	✓	r	✓	✓	✓	x	x	x	x	x	r	x	x	x	+	+
A20 - Seasonally Protected Area West	HIGH	✓	✓	✓	✓	x	✓	r	r	r	x	r	r	r	r	✓	x	✓	x	x	x	x	x	r	x	x	x	+	+
A21 - Seasonally Protected Areas East	HIGH	✓	✓	✓	✓	x	✓	r	r	r	x	r	r	r	r	✓	x	✓	x	x	x	x	x	r	x	x	x	+	+
A22 - Spiny Lobster Reserve	HIGH	✓	✓	✓	✓	x	✓	x	r	✓	✓	✓	✓	✓	r	✓	r	✓	x	✓	x	x	r	r	x	x	x	+	+
A24 - Platform	LIGHT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	r	✓	r	✓	r	x	x	+	+
C1 - Bailey's Bay	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C2 - Coney Cove	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C3 - Whalebone Bay	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	r	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C4 - Walsingham	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	x	x	r	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C5 - North of Riddell's Bay	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C6 - Paradise Lakes	HIGH	✓	✓	✓	✓	r	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C7 - The Lagoon	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
C8 - Hospital Bay	HIGH	✓	✓	✓	✓	x	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
M - Mangroves	FULL	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	r	x	x	x	+	+
MB - Mangrove Buffer Zone	HIGH	✓	✓	✓	✓	x	✓	x	x	x	x	x	x	r	x	✓	x	✓	x	x	x	x	r	r	x	x	x	+	+

Table 8.1.1.4. Use chart showing permitted, restricted or prohibited activities for each proposed MPA in Bermuda's nearshore waters (coastline to 2000m) for Nearshore Proposal 2. √ = permitted; r = restricted; x = prohibited; + = required; - = not required.

8.1.2. INITIAL PROPOSED SCENARIOS

In a survey issued in February 2022, the Steering Committee was asked to rank several MPA scenarios for both Bermuda's nearshore area (coastline to 2000 m depth) and offshore area (2000 m depth to the outer EEZ boundary). Its members were also given the opportunity to add suggestions or comments they felt were important.

Each MPA scenario attempts to meet as many approved objectives as possible while also considering extensive Science and Steering Committee feedback, as well as stakeholder needs. Each scenario takes a different approach and prioritises certain objectives over others. Full details of each scenario and how they meet the approved spatial objectives can be viewed in this report.

Offshore:

- **Scenario A**: Human-use approach (priority focus on human-use objectives)
- **Scenario B**: Middle ground approach (balanced focus on human-use and ecological objectives)
- **Scenario C**: Ecological approach (priority focus on ecological objectives)

Nearshore:

- **Scenario A**: Human-use approach (priority focus on human-use objectives)
- **Scenario B(a)**: Middle ground approach (balanced focus on human-use and ecological objectives, prioritising feedback based on heatmaps showing collective MPA proposals from recent Steering Committee consultations)
- **Scenario B(b)**: Middle ground approach (balanced focus on human-use and ecological objectives, prioritising Steering Committee feedback based on verbal feedback through one-to-one consultations that could not be captured in the heatmaps)
- **Scenario C**: Ecological approach (priority focus on ecological objectives)

Suggested MPAs in each scenario are assigned permitted activities and given a level of protection (either fully protected or partially protected) based on the IUCN protected area categories. Each suggested MPA has been assigned a unique number, which are outlined in maps in this section.

- **Marine protected area (MPA):** a clearly defined geographical space, recognised, dedicated, and managed through legal means to achieve the long-term conservation of nature, with associated ecosystem services and cultural values.
- **Full Protection:** no extractive or destructive activities are allowed; all abatable impacts are minimised.
- **Partial Protection:** only light extractive activities with low total impact are allowed, with all other abatable impacts minimised. Permissible low impact activities are identified for that specific partially protected area based on the area's objective and would be governed by a formal management system. Examples of low impact activities that could be identified within the management plan include: sustainable fishing, aquaculture, shipping, renewable energy development, works (for harbours, dredging, cable maintenance, etc.).

8.1.2.1. MPA SCENARIO A

Click the appropriate links to see the nearshore map and the offshore map.

In both the offshore and nearshore areas, Scenario A prioritises objectives relating to human-use of the ocean. It takes into account feedback from Steering Committee members whose primary focus is ensuring continued ocean access for livelihood-related activities. A trade-off to this approach is that fewer ecological objectives are achieved.

In this scenario, key offshore areas remain completely open to fishing and a ring has been placed around the EEZ boundary (MPA shape A10) to protect Bermuda's waters from foreign vessels as suggested during Steering Committee consultations. Note that Bermuda's waters are already

protected from fishing by foreign vessels under the Fisheries Act 1972. Moreover, shipping has special consideration when placing MPAs. The United Nations Convention on the Law of the Sea (UNCLOS) applies and there are different shipping rights of passage through the various ocean zones. MPAs would need to be designed to accommodate existing shipping lanes and freedom of navigation. Also, complex shapes such as rings have proportionately more edge and greater spillover of species outside the MPA, and they increase the number of opportunities to fish along the border ("fishing the line"), compared to simpler shapes such as squares and circles of the same area.[1] Simpler shapes therefore offer better refuge for fish species and can be easier to monitor and enforce. A thicker ring inset farther into the EEZ would reduce these "edge effects" and produce relatively less spillover compared to the EEZ-boundary ring. It would also ensure spillover benefits flow into Bermuda's EEZ rather than directly out of it.[2]

The Muir Seamount chain is also included in the offshore MPA area in recognition of the pelagic and benthic biodiversity values of seamounts[3,4]. This area is seldom used by local fishers, so immediate user conflict would be minimal, and its protection helps to achieve ecological objectives detailed in Section 3.5. This area could provide a refuge for a variety of fish species, which would become more important if Bermuda were to expand its commercial pelagic fishing industry. Full protection is suggested to recognise the links between upper-ocean life and the seabed[5], therefore maintaining the integrity of this valuable habitat.

Many of the suggested MPAs in the nearshore area allow for activities such as sustainable local and recreational fishing, renewable energy development, works (for harbours, ports, dredging, etc.), and shipping. The seasonally protected areas are recognised as important fishing grounds during the open season and remain open to fishing in Scenario A, apart from where full protection has been suggested to protect grouper spawning aggregation sites.

A suggested ring-shaped MPA around Bermuda's Platform (MPA shape A9) between 100 and 350 fathoms deep permits sustainable local fishing under a governed management system. This area is currently used by local fishers on a rotational basis for deepwater snapper fishing. At present, this system of fishing is informal; however, designating this area as an MPA would allow for better regulation and monitoring. Moreover, Bermuda's local fishers could take a lead role in designing the associated management plan. It could also be possible to expand this area to include the management of additional fish species while achieving more ecological objectives as suggested in Scenario B(b). Protection of nursery habitats is considered important to safeguard the fishing industry and, as such, protection of key nearshore areas (shapes A4, A5, A6, A7) is suggested, allowing for recreational fishing to continue, as well as limited commercial baitfish and lobster fishing where it does not compromise the underlying objective. Areas along the South Shore to depths of approximately 25 fathoms, and areas of the Coral Reef Preserve south of the northern shipping lane, were identified during the Steering Committee consultations as areas that were not heavily used by the fishing community. Heavy restrictions have therefore been suggested in these areas to help achieve listed objectives while reducing conflict with stakeholders.

1 Roberts, C. M., J. A. Bohnsack, F. Gell, J. P. Hawkins and R. Goodridge (2001). Effects of Marine Reserves on Adjacent Fisheries. Science 294.
2 A conceptual model of this idea has been drafted for French Polynesia: Millage, K., Burgess, M. G. Strauss, K., Lenihan, H. S. & Costello, C. (2017) Ocean Halos - Phase 1: A conceptual model of marine zoning in French Polynesia
3 Morato, T., Hoyle, S. D., Allain, V. and Nicol, S. J. (2010) Seamounts are hotspots of pelagic biodiversity in the open ocean. Proceedings of the National Academy of Sciences. 107, 21, 9707-9711. https://doi.org/10.1073/pnas.0910290107
4 Clark MR, Schlacher TA, Rowden AA, Stocks KI, Consalvey M (2012) Science Priorities for Seamounts: Research Links to Conservation and Management. PLoS ONE 7(1): e29232. https://doi.org/10.1371/journal.pone.0029232
5 O'Leary, B. C. and Roberts, C. M. (2018) Ecological connectivity across ocean depths: Implications for protected area design. Global Ecology and Conservation. Volume 15, 2351-9894. https://doi.org/10.1016/j.gecco.2018.e00431

8.1.2.2. MPA SCENARIO B

Click the appropriate links to see the nearshore maps and the offshore map.

Scenario B takes a middle ground approach whereby human-use objectives and ecological objectives are considered equally.

In the offshore area, the suggested MPAs reach the optimum ecological targets for habitat protection while permitting sustainable local fishing in the suggested Crescent Seamount MPA (MPA shape B13).

There are two suggested nearshore scenarios: (Scenario B(a) and Scenario B(b)).

Scenario B(a) best reflects heatmaps showing collective MPA proposals made during recent Steering Committee consultations. The patchwork of MPAs incorporates key nursery areas, fish dispersal corridors, highly valuable coral areas, sites with high historic wreck value, and currently legislated areas. A network consisting of many small MPAs may be more difficult to implement, manage and enforce, but could have greater benefits to fisheries due to the increased spillover of species from MPAs into fishing areas across the Platform.[6]

Scenario B(b) best accounts for the verbal feedback received from the Steering Committee during recent consultations that could not be captured in the heatmaps. This feedback includes strong objections to protecting specific areas, or unique suggestions that warrant further consideration (such as shape B6b, which expands on the idea of a partially protected ring around Bermuda's Platform that allows for sustainable local fishing on a rotational management system as described above). Shape B5b is also suggested as an MPA with strong protection as feedback suggests that conflict between stakeholders and ocean-related industries in this area would be minimal, and it still includes important coral habitat and historic wrecks. This scenario also focuses protection on key nursery habitats and fish dispersal corridors.

When ranking Scenario B for the nearshore area, Steering Committee members were asked to choose between option B(a) or option (B)b.

8.1.2.3. MPA SCENARIO C

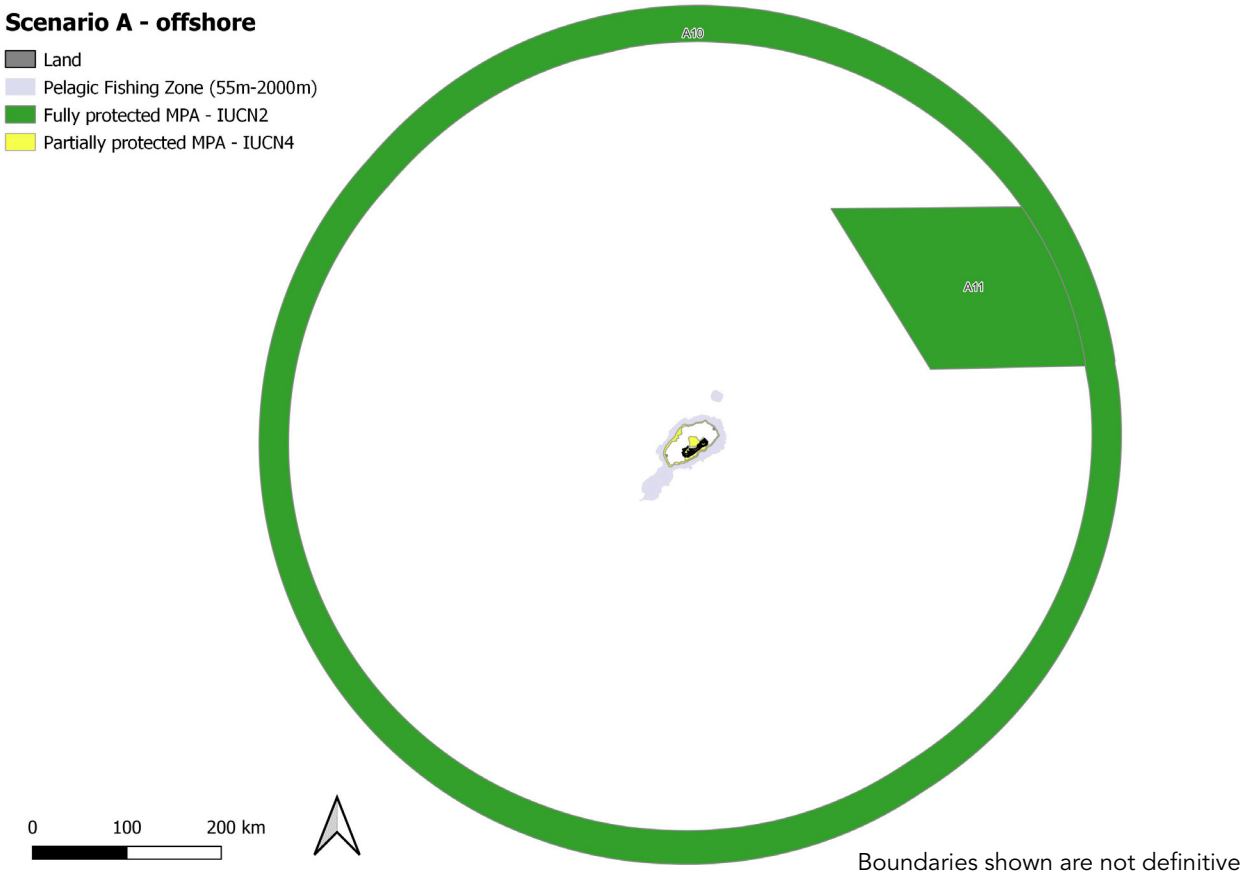
Click the appropriate links to see the nearshore map and the offshore map.

In both the offshore and nearshore areas, Scenario C prioritises objectives relating to ecological function. It takes into account feedback from Steering Committee members who have a primarily environmental focus. A trade-off to this approach is that a greater risk of conflict exists with ocean users due to the overlap of MPAs with highly valued human-use areas.

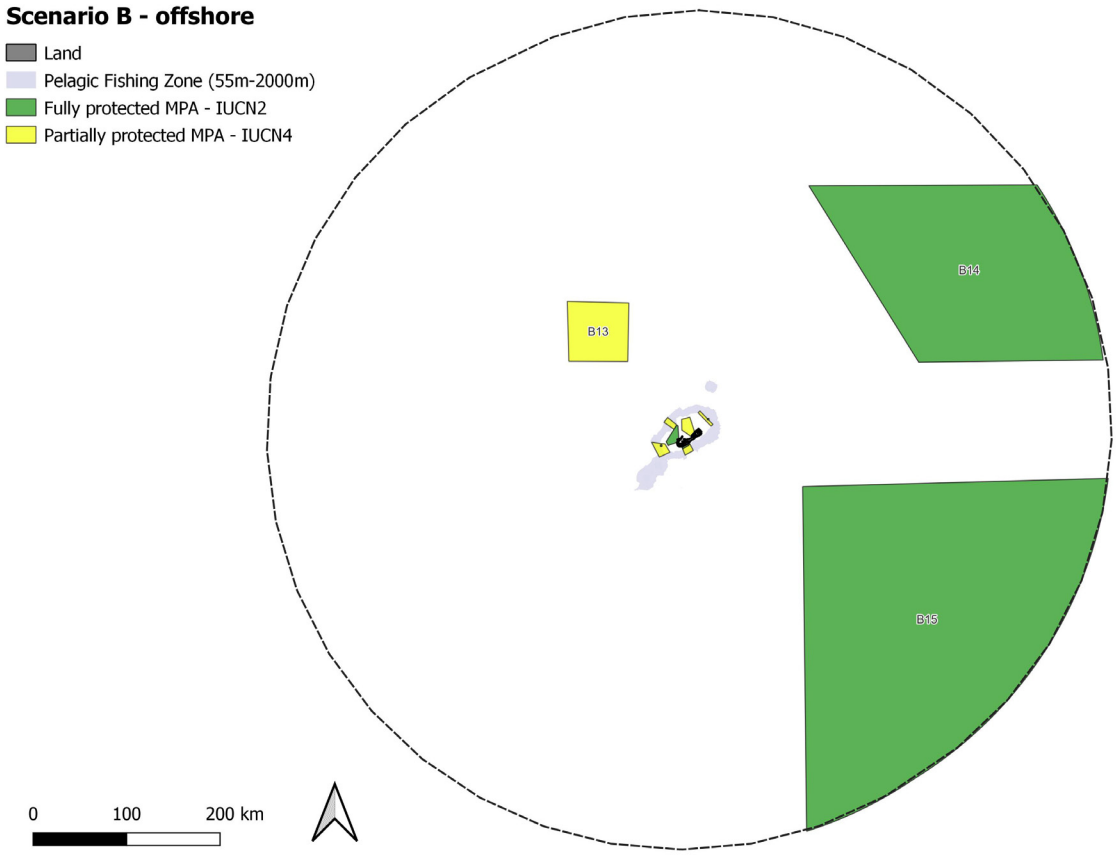
All offshore suggested MPAs in Scenario C are designated with full protection, including the Crescent and Muir Seamounts, in recognition of their ecological importance.

Nearshore suggested MPAs in Scenario C limit all extractive activities, except for shipping and works, to maintain current infrastructure needs.

6 IUCN World Commission on Protected Areas (IUCN-WCPA) (2008). Establishing Marine Protected Area Networks—Making It Happen. Washington, D.C.: IUCN-WCPA, National Oceanic and Atmospheric Administration and The Nature Conservancy, P59.

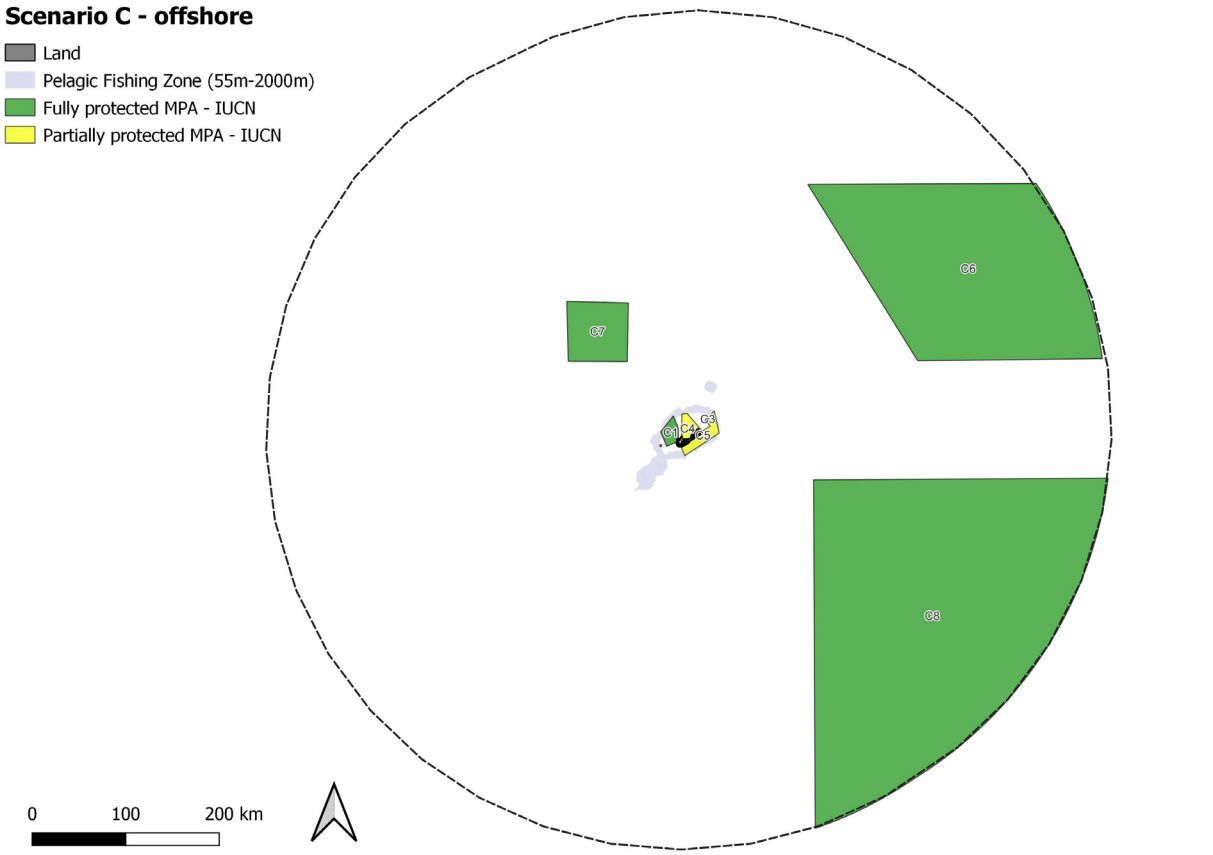


			Activities (✔ = permitted; ✕ = prohibited)																	
MPA NAME	PROTECTION STATUS	IUCN DESIGNATION	Research: non-extractive	Traditional use: non-extractive	Restoration/ enhancement for conservation	Traditional fishing/collection	Non-extractive recreation	Large scale high intensity tourism	Shipping	Research: extractive	Renewable energy generation	Restoration/ enhancement for for other reasons	Fishing/collection: recreational (sustainable)	Fishing/collection: local fishing (sustainable)	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Works (harbors, ports, dredging)	Untreated water discharge	Mining, oil and gas extraction	Habitation
A10. Offshore Ring	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
A11. Muir Chain	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕



Boundaries shown are not definitive

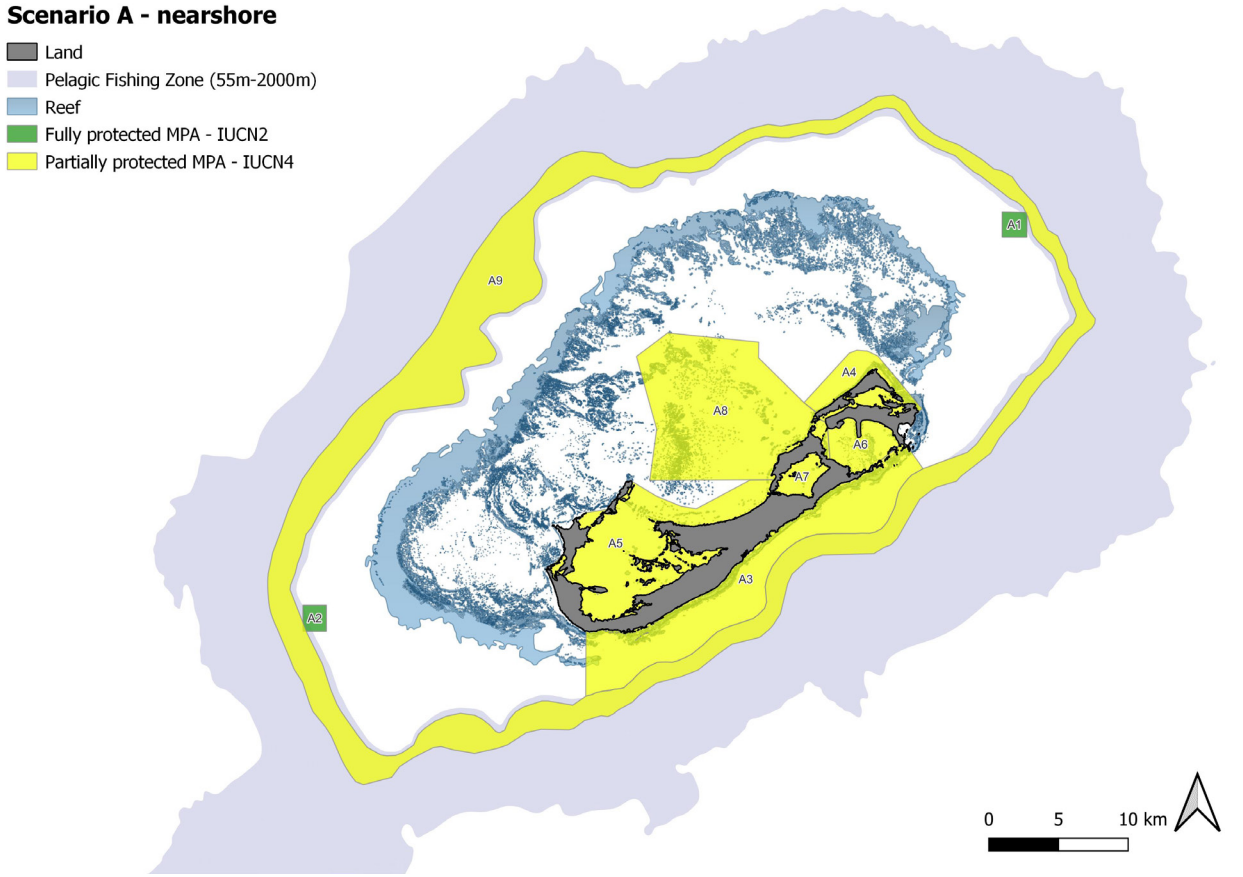
MPA NAME	PROTECTION STATUS	IUCN DESIGNATION	Activities (✔ = permitted; ✕ = prohibited)																	
			Research: non-extractive	Traditional use: non-extractive	Restoration/ enhancement for conservation	Traditional fishing/collection	Non-extractive recreation	Large scale high intensity tourism	Shipping	Research: extractive	Renewable energy generation	Restoration/ enhancement for for other reasons	Fishing/collection: recreational (sustainable)	Fishing/collection: local fishing (sustainable)	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Works (harbors, ports, dredging)	Untreated water discharge	Mining, oil and gas extraction	Habitation
B13. Crescent Seamount	Partial	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✔	✕	✕	✕	✕	✕	✕
B14. Muir Chain	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B15. Southeast EEZ	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕



Boundaries shown are not definitive

MPA NAME	PROTECTION STATUS	IUCN DESIGNATION	Activities (✔ = permitted; ✕ = prohibited)																	
			Research: non-extractive	Traditional use: non-extractive	Restoration/ enhancement for conservation	Traditional fishing/collection	Non-extractive recreation	Large scale high intensity tourism	Shipping	Research: extractive	Renewable energy generation	Restoration/ enhancement for for other reasons	Fishing/collection: recreational (sustainable)	Fishing/collection: local fishing (sustainable)	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Works (harbors, ports, dredging)	Untreated water discharge	Mining, oil and gas extraction	Habitation
C7. Crescent Seamount	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
C6. Muir Chain	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
C8. Southeast EEZ	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕

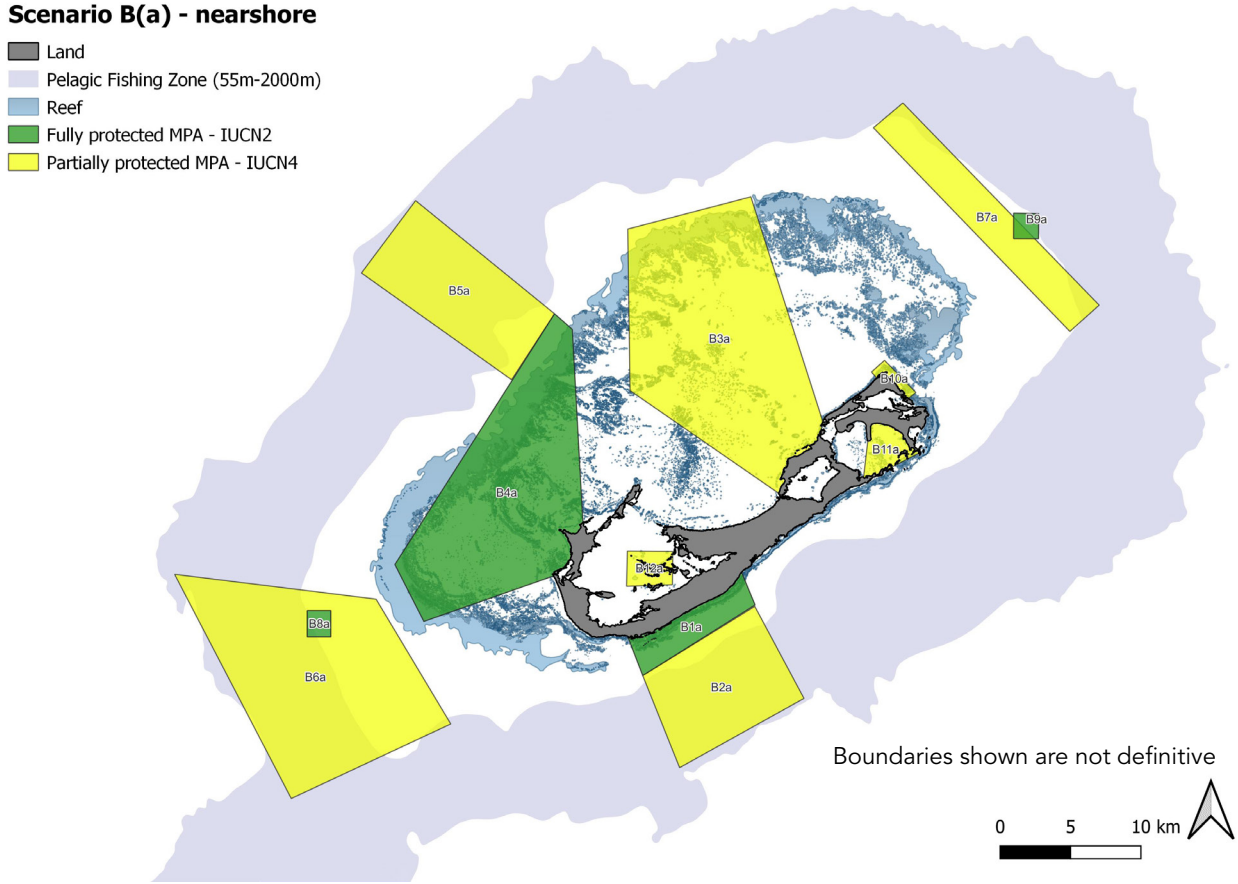
Scenario A - nearshore



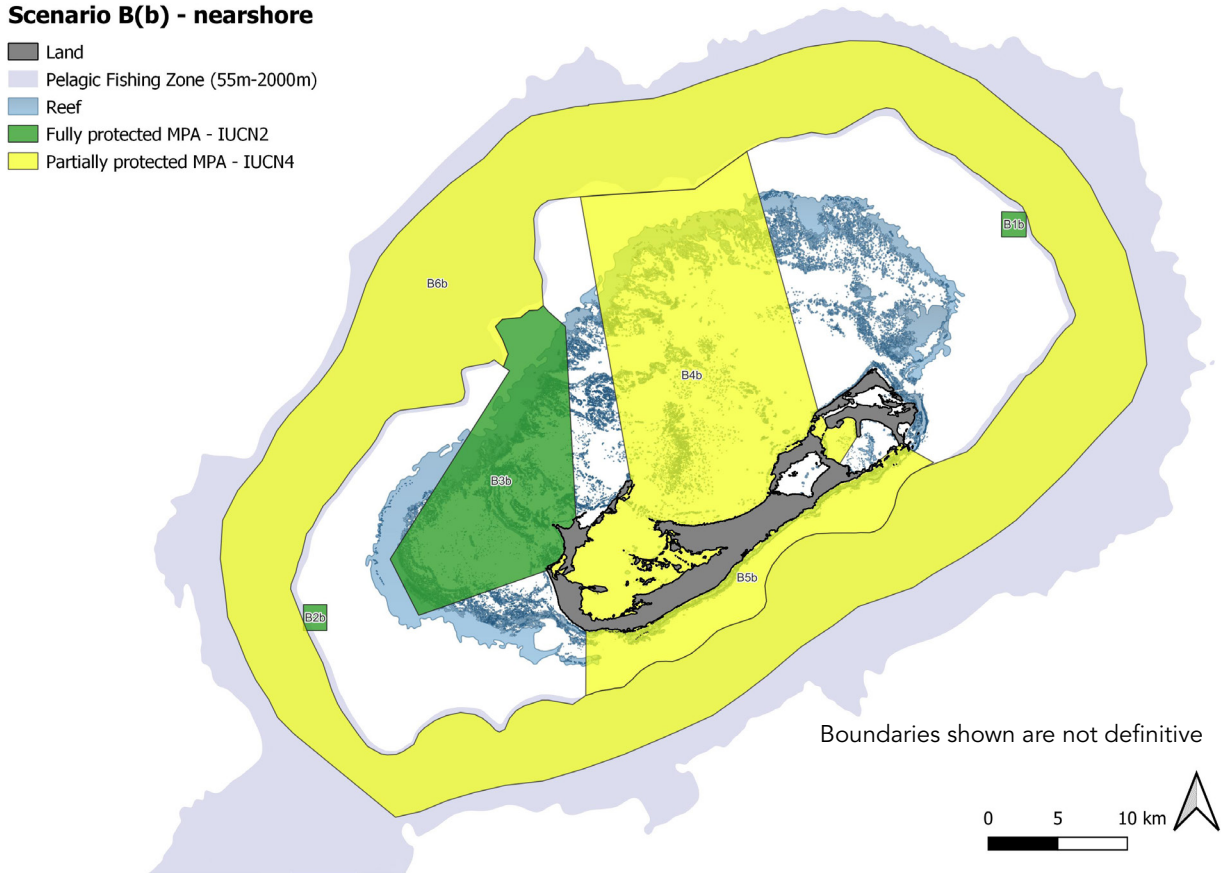
Boundaries shown are not definitive

MPA NAME	PROTECTION STATUS	IUCN DESIGNATION	Activities (✔ = permitted; ✕ = prohibited)																	
			Research: non-extractive	Traditional use: non-extractive	Restoration/ enhancement for conservation	Traditional fishing/collection	Non-extractive recreation	Large scale high intensity tourism	Shipping	Research: extractive	Renewable energy generation	Restoration/ enhancement for other reasons	Fishing/collection: recreational (sustainable)	Fishing/collection: local fishing (sustainable)	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Works (harbors, ports, dredging)	Untreated water discharge	Mining, oil and gas extraction	Habitation
A1. Grouper Box East	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
A2. Grouper Box West	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
A3. South Shore	Partial	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✔	✕	✕	✕
A4. Nearshore Area East	Partial	4	✔	✔	✔	✔	✔	✔	✔	✕	✕	✕	✔	✔	✕	✕	✔	✕	✕	✕
A5. Nearshore Area West	Partial	4	✔	✔	✔	✔	✔	✔	✔	✕	✕	✕	✔	✔	✕	✕	✔	✕	✕	✕
A6. Castle Harbour	Partial	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✔	✔	✕	✔	✔	✕	✕	✕
A7. Harrington Sound	Partial	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✔	✔	✕	✔	✔	✕	✕	✕
A8. Central Lagoon	Partial	4	✔	✔	✔	✔	✔	✔	✔	✕	✔	✕	✕	✕	✕	✕	✔	✕	✕	✕
A9. Nearshore Ring	Partial	4	✔	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✔	✕	✕	✔	✕	✕	✕

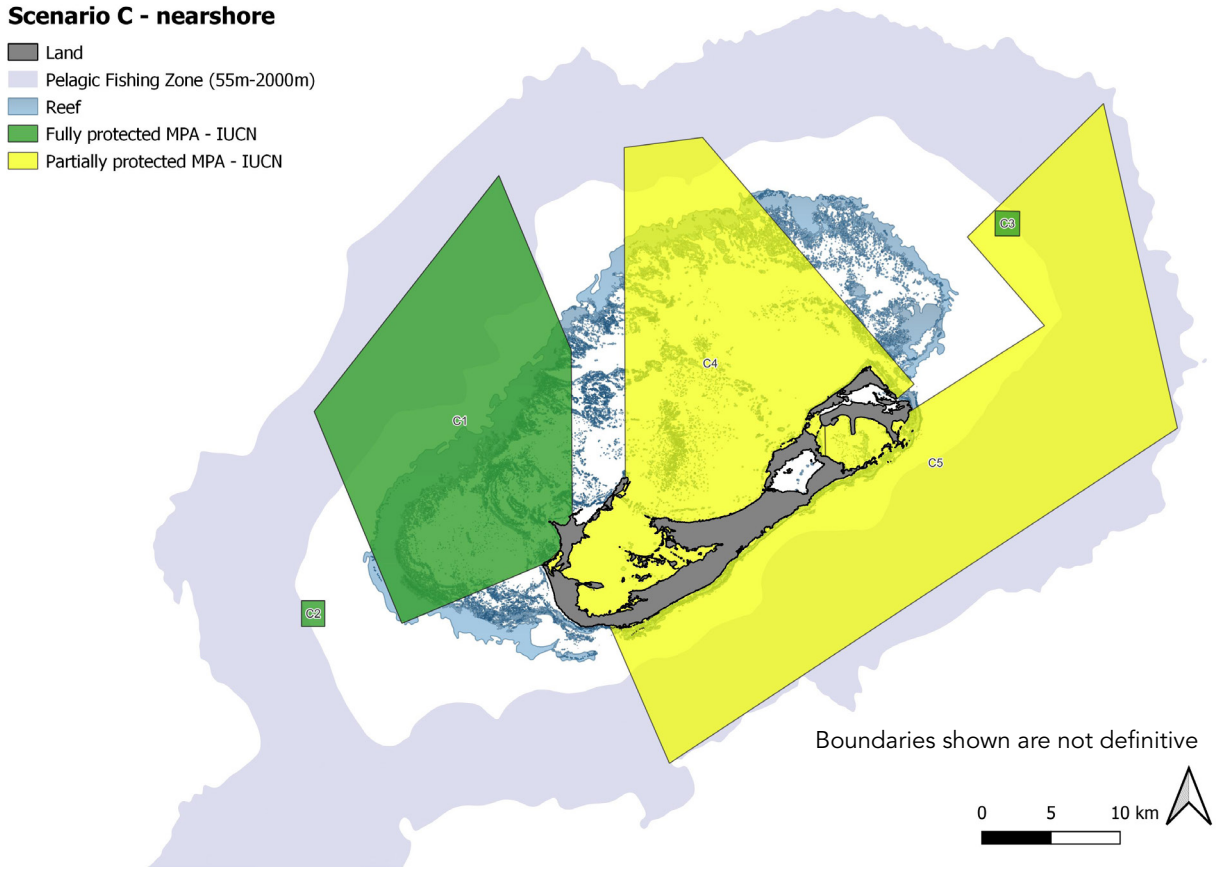
Scenario B(a) - nearshore



MPA NAME	PROTECTION STATUS	IUCN DESIGNATION	Activities (✔ = permitted; ✕ = prohibited)																	
			Research: non-extractive	Traditional use: non-extractive	Restoration/ enhancement for conservation	Traditional fishing/collection	Non-extractive recreation	Large scale high intensity tourism	Shipping	Research: extractive	Renewable energy generation	Restoration/ enhancement for for other reasons	Fishing/collection: recreational (sustainable)	Fishing/collection: local fishing (sustainable)	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Works (harbors, ports, dredging)	Untreated water discharge	Mining, oil and gas extraction	Habitation
B1a. South Shore	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B2a. South Shore Pelagic Zone	Partial	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✔	✕	✕	✕	✕	✕	✕
B3a. Central Lagoon	Partial	4	✔	✔	✔	✔	✔	✔	✔	✕	✔	✕	✕	✕	✕	✕	✔	✕	✕	✕
B4a. Eastern Blue Cut	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B5a. Eastern Blue Cut Pelagic Zone	Partial	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✔	✕	✕	✕	✕	✕	✕
B6a. Western Area	Partial	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✔	✔	✕	✕	✕	✕	✕	✕
B7a. Eastern Area	Partial	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✔	✔	✕	✕	✕	✕	✕	✕
B8a. Grouper Box West	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B9a Grouper Box East	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B10a Eastern Shoreline	Partial	4	✔	✔	✔	✔	✔	✔	✔	✕	✕	✕	✔	✕	✕	✕	✔	✕	✕	✕
B11a. Castle Harbour	Partial	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✔	✕	✕	✕	✔	✕	✕	✕
B12a. Paradise Lakes	Partial	4	✔	✔	✔	✔	✔	✔	✔	✕	✕	✕	✔	✕	✕	✕	✔	✕	✕	✕



MPA NAME	PROTECTION STATUS	IUCN DESIGNATION	Activities (✔ = permitted; ✕ = prohibited)																	
			Research: non-extractive	Traditional use: non-extractive	Restoration/ enhancement for conservation	Traditional fishing/collection	Non-extractive recreation	Large scale high intensity tourism	Shipping	Research: extractive	Renewable energy generation	Restoration/ enhancement for other reasons	Fishing/collection: recreational (sustainable)	Fishing/collection: local fishing (sustainable)	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Works (harbors, ports, dredging)	Untreated water discharge	Mining, oil and gas extraction	Habitation
B1b. Grouper Box East	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B2b. Grouper Box West	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B3b. Eastern Blue Cut	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B4b. Central Lagoon	Partial	4	✔	✔	✔	✔	✔	✔	✔	✕	✔	✕	✔	✕	✕	✕	✔	✕	✕	✕
B5b. South Shore	Partial	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✔	✕	✕	✕
B6b. Nearshore Ring	Partial	4	✔	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✔	✕	✕	✔	✕	✕	✕



MPA NAME	PROTECTION STATUS	IUCN DESIGNATION	Activities (✔ = permitted; ✕ = prohibited)																	
			Research: non-extractive	Traditional use: non-extractive	Restoration/ enhancement for conservation	Traditional fishing/collection	Non-extractive recreation	Large scale high intensity tourism	Shipping	Research: extractive	Renewable energy generation	Restoration/ enhancement for other reasons	Fishing/collection: recreational (sustainable)	Fishing/collection: local fishing (sustainable)	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Works (harbors, ports, dredging)	Untreated water discharge	Mining, oil and gas extraction	Habitation
C1. Eastern Blue Cut	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
C2. Grouper Box West	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
C3. Grouper Box East	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
C4. Central Lagoon	Partial	4	✔	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✔	✕	✕	✕
C5. Southeast Area	Partial	4	✔	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✔	✕	✕	✕

8.2. RANKING RESULTS

8.2.1. FINAL RESULTS

Who completed the survey

17 Steering Committee members responded to the survey request in June 2022; 16 voted, representing the following 16 organizations:

- Bermuda Business Development Agency
- Bermuda Economic Development Corporation
- Bermuda Institute of Ocean Sciences
- Bermuda Shipping and Maritime Authority
- Bermuda Tourism Authority
- Commercial Fisheries Council
- Department of Economic Development
- Department of Energy
- Department of Environment and Natural Resources
- Department of Marine and Ports
- Department of Planning
- Department of Workforce Development
- Environmental Authority
- Estates Section, Ministry of Public Works
- Historic Wrecks Authority
- Marine Resources Board
- Regulatory Authority

The Commercial Fisheries Council declined to vote.

Results

Offshore Proposal 2 was the Steering Committee's top ranked scenario for the offshore area, making this the option that will be included in the First Draft MSP as the proposed MPA network for Bermuda's offshore waters.

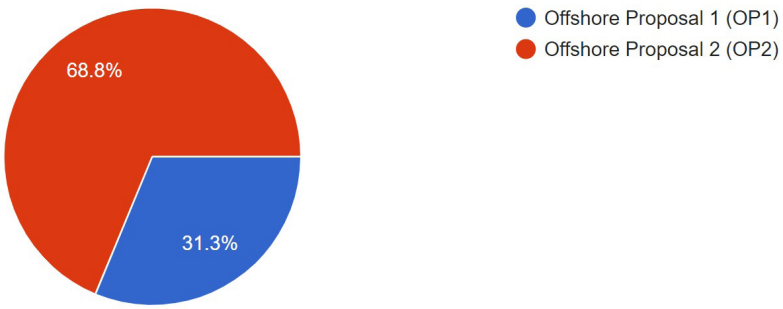


Figure 8.2.1. This pie chart shows the percentage of member votes received for each MPA scenario proposed for the offshore area.

Offshore Proposal 1	Offshore Proposal 2
5	11

Table 8.2.1. This table shows how many members voted for each MPA scenario proposed for the offshore area.

Nearshore Proposal 2 was the Steering Committee's top ranked scenario for the nearshore area, making this the option that will be included in the First Draft MSP as the proposed MPA network for Bermuda's nearshore waters.

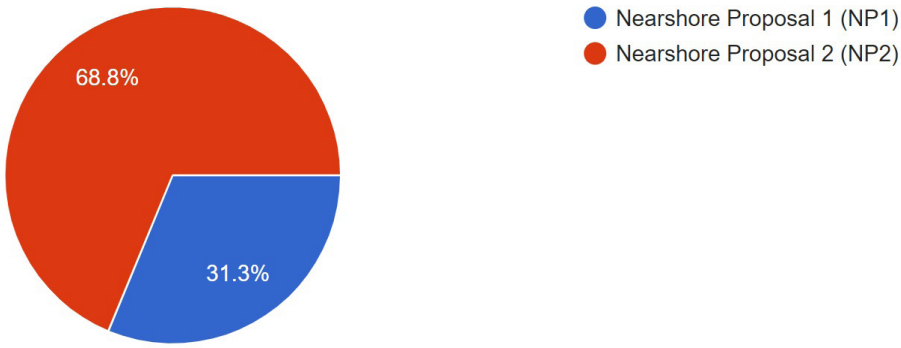


Figure 8.2.2. This pie chart shows the percentage of member votes received for each MPA scenario proposed for the nearshore area.

Nearshore Proposal 1	Nearshore Proposal 2
5	11

Table 8.2.2. This table shows how many members voted for each MPA scenario proposed for the nearshore area.

8.2.2. INITIAL RESULTS

RANKING OF THE INITIAL SCENARIOS AND ADDITIONAL MPA SUGGESTIONS BY THE STEERING COMMITTEE

Who completed the survey

16 Steering Committee members responded to the initial survey in February 2022, representing the 13 organisations listed below:

- Bermuda Economic Development Corporation
- Bermuda Institute of Ocean Sciences
- Bermuda Tourism Authority
- Department of Economic Development
- Department of Energy
- Department of Environment and Natural Resources
- Department of Marine and Ports
- Department of Planning
- Department of Workforce Development
- Environmental Authority
- Historic Wrecks Authority
- Marine Resources Board
- Regulatory Authority

The three organisations that did not respond to the survey are listed below, with their respective reasons:

- Bermuda Business Development Agency
- Commercial Fisheries Council
- Estates Section, Ministry of Public Works

As the Commercial Fisheries Council (CFC) and the Marine Resources Board (MRB) represent stakeholders who could be significantly affected by the MPA proposals, they have been given the option of issuing independent statements of recommendation in this regard.

The Steering Committee recommendations on Bermuda's proposed MPA network are detailed below. Seven Steering Committee organisations requested more time to review and discuss the MSP prior to the First Draft Blue Prosperity Plan going to the public for consultation. This request was granted and subsequent consultations were held, which are detailed in this report.

Ranking Results

Offshore:

Scenario B was the Steering Committee's first choice preference for the offshore area, indicating that a balanced approach is preferred. More members voted for Scenario C as their second choice preference over any other scenario, showing a general preference towards the ecological approach if their first choice option is not implemented.

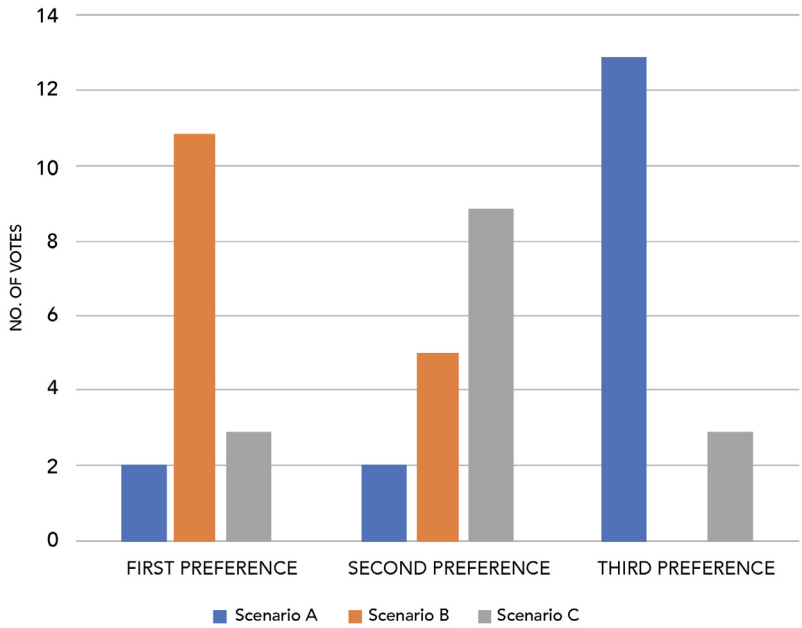


Figure 8.2.2.1. This graph shows how many members voted for each MPA scenario as their first, second, or third choice preference for the offshore area.

	FIRST PREFERENCE	SECOND PREFERENCE	THIRD PREFERENCE
Scenario A	2	2	13
Scenario B	11	5	0
Scenario C	3	9	3

Table 8.2.2.1. This table shows how many members voted for each MPA scenario as their first, second, or third choice preference for the offshore area.

Nearshore:

Scenario B was the Steering Committee's first choice preference for the nearshore area, indicating a balanced approach is preferred. Scenario A received more votes for the first choice preference compared to Scenario C, but Scenario C received more votes as a second choice preference compared to Scenario A.

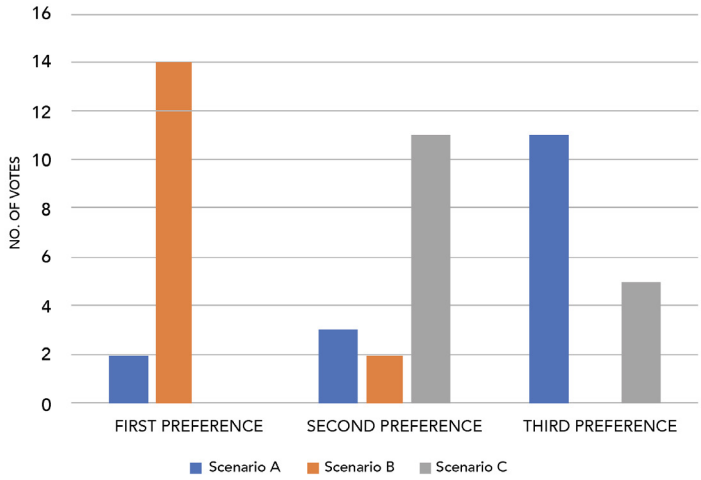


Figure 8.2.2.2. This graph shows how many members voted for each MPA scenario as their first, second or third choice preference for the nearshore area.

	FIRST PREFERENCE	SECOND PREFERENCE	THIRD PREFERENCE
Scenario A	2	3	11
Scenario B	14	2	0
Scenario C	0	11	5

Table 8.2.2.2. This table shows how many members voted for each MPA scenario as their first, second or third choice preference for the nearshore area.

Of those who voted for Scenario B, option B(a) was preferred. This shows a general preference towards adopting the MPAs that best reflect the collective feedback shown in the heatmaps produced from recent Steering Committee consultations.

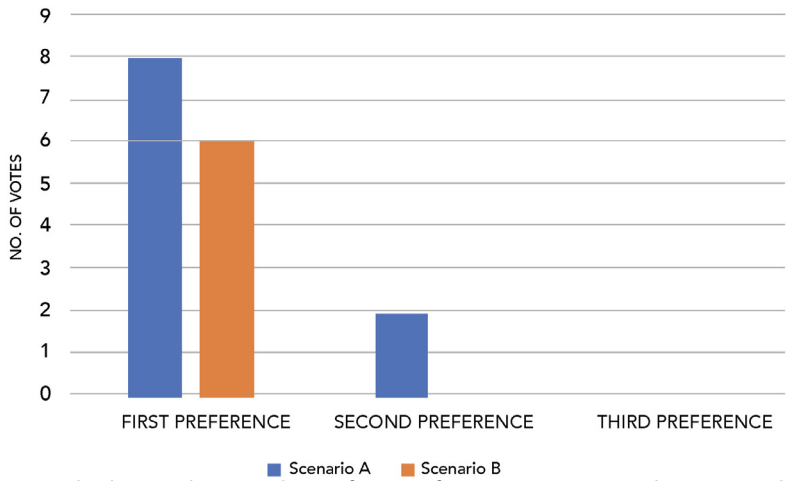


Figure 8.2.2.3. This graph shows the number of votes for option B(a) and option B(b) for the nearshore area.

	FIRST PREFERENCE	SECOND PREFERENCE	THIRD PREFERENCE
Scenario B(a)	8	2	0
Scenario B(b)	6	0	0

Table 8.2.2.3. This table shows the number of votes for option B(a) and option B(b) for the nearshore area.

Additional MPA suggestions

Suggestion by the BEDC for the offshore area:

The BEDC suggests reducing the area of the fully protected MPAs proposed in Scenario B for the offshore area by approximately 50% and applying it instead to a ring around the boundary of the EEZ. This attempts to find a compromise between Scenario A and Scenario B that better considers stakeholders in the fishing industry, particularly with regard to current and future pelagic fishing interests. By reducing the B14 Muir Chain MPA by approximately 12% and the B15 Southeast EEZ by approximately 35%, a ring can be placed around the EEZ boundary approximately 15 km wide, while also achieving the same number of habitat targets as Scenario B. The trade-off to this suggestion is that a ring-shaped MPA may not provide as many ecological benefits as the larger 'block' MPAs originally proposed.[7] A thicker ring set farther into the EEZ would reduce edge (i.e., total length of the MPA border) and produce relatively less spillover compared to a ring set on the boundary of the EEZ. It would also ensure spillover benefits flow into Bermuda's EEZ rather than directly out of it.[8] Moreover, a small section of the Muir Seamount habitat is open to extractive activities. Although this may provide benefits to the fishing industry by increasing spillover of fish species, the integrity of this seamount habitat would be better preserved if the MPA boundary was at its edge rather than passing through its interior.[9]

Boundaries shown are not definitive

MPA NAME	PROTECTION STATUS	IUCN DESIGNATION	Activities (✔ = permitted; ✕ = prohibited)																	
			Research: non-extractive	Traditional use: non-extractive	Restoration/ enhancement for conservation	Traditional fishing/collection	Non-extractive recreation	Large scale high intensity tourism	Shipping	Research: extractive	Renewable energy generation	Restoration/ enhancement for for other reasons	Fishing/collection: recreational (sustainable)	Fishing/collection: local fishing (sustainable)	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Works (harbors, ports, dredging)	Untreated water discharge	Mining, oil and gas extraction	Habitation
B13. Crescent Seamount	Partial	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✔	✕	✕	✕	✕	✕	✕
B14(new). Muir Chain	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B15(new). Southeast EEZ	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B16(new). Offshore Ring	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕

7 Claudet, J., C. W. Osenberg, L. Benedetti-Cecchi, P. Domenici, J. García-Charton, Á. Pérez-Ruzafa, F. Badalamenti, et al. 2008. Marine reserves: size and age do matter. Ecology Letters 11: 481–89

8 A conceptual model of this idea has been drafted for French Polynesia: Millage, K., Burgess, M. G. Strauss, K., Lenihan, H. S. & Costello, C. (2017) Ocean Halos - Phase 1: A conceptual model of marine zoning in French Polynesia

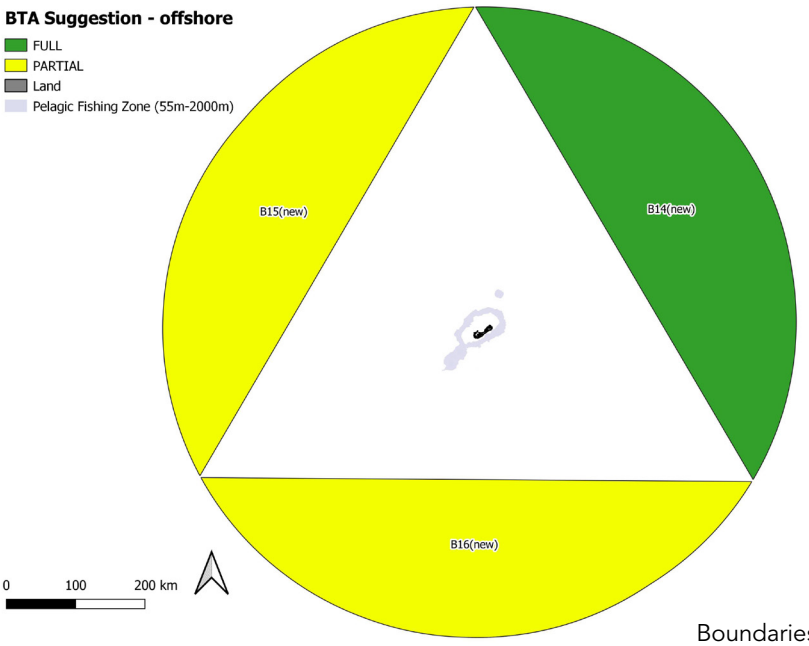
9 Willis, T., R. Millar and R. Babcock (2003). Protection of exploited fishes in temperate regions: high density and biomass of snapper Pagrus auratus (Sparidae) in northern New Zealand marine reserves. Journal of Applied Ecology 40: 13.

Suggestion by the BTA for the offshore area:

The BTA proposes a large MPA at the edge of the EEZ, shaped as a cut-out of a large triangle, with the triangle's three points touching the EEZ's perimeter. This can be seen as three separate MPA segments, one along each of the triangle's three sides. The rationale for the BTA's suggestion is based on their economic research on the benefits of MPAs to maritime tourism.

The total area covered by the suggested MPAs is approximately 60% of Bermuda's waters; however, only one shape is designated as fully protected, which amounts to 20% of Bermuda's EEZ. The remaining areas would be designated as benthic protection zones, allowing for sustainable pelagic fishing guided under a formal management system. As full protection is condensed into a single area, several habitat types in the offshore are unrepresented in the fully protected areas. However, partially protected MPAs help to reach other habitat protection targets. This network also avoids the main areas used by the local long-lining vessels.

A review of the academic literature on the economic impact of MPAs indicates that MPAs can generate a significant increase in maritime tourism visitors and expenditure, rising over a period of several years.[10] The primary driver of that increase appears to be the 'Designation Effect', which is the act itself of creating and promoting an MPA and the subsequent increase in visitor activities such as ecotourism and diving. The Designation Effect is independent from the level of protection provided by the MPA and from any ecological changes the MPA facilitates. The BTA therefore suggests that Bermuda should maximise the Designation Effect and promotional/PR opportunities arising from Bermuda's planned new MPA network by not only considering ecological benefits, but also designing it to be unique and memorable to Bermuda. The BTA suggests naming it 'The Bermuda Triangle MPA' which would simultaneously be recognisable around the world and large enough to be visible on maps.



Boundaries shown are not definitive

MPA NAME	PROTECTION STATUS	IUCN DESIGNATION	Activities (✔ = permitted; ✕ = prohibited)																	
			Research: non-extractive	Traditional use: non-extractive	Restoration/ enhancement for conservation	Traditional fishing/collection	Non-extractive recreation	Large scale high intensity tourism	Shipping	Research: extractive	Renewable energy generation	Restoration/ enhancement for for other reasons	Fishing/collection: recreational (sustainable)	Fishing/collection: local fishing (sustainable)	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Works (harbors, ports, dredging)	Untreated water discharge	Mining, oil and gas extraction	Habitation
B14(new). Triangle 1	Full	4	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B15(new). Triangle 2	Partial	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✔	✕	✕	✕	✕	✕	✕
B16(new). Triangle 3	Partial	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✔	✕	✕	✕	✕	✕	✕

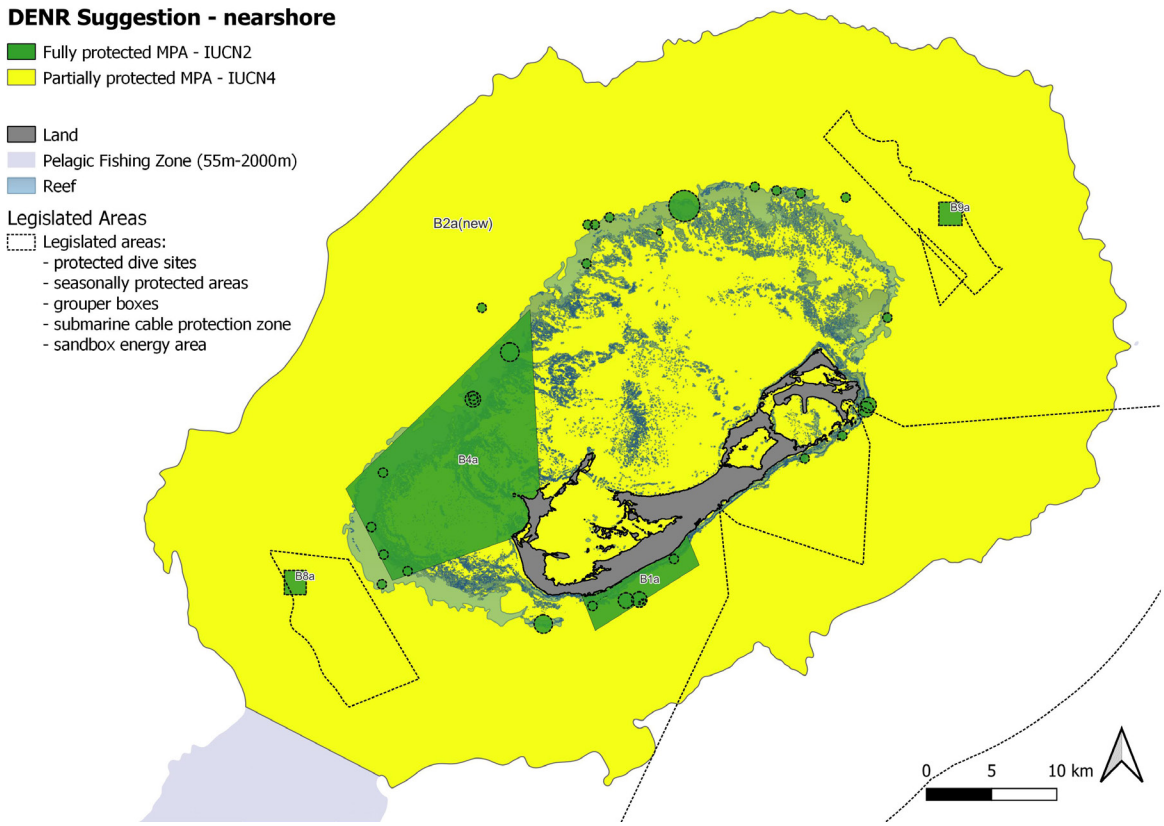
10 Haines, R., Verstraeten, Y., Papadopoulou, L., Hattam, C., Pantzar, M., Russi, D., ... & David, M. (2018). Study on the Economic Benefits of Marine Protected Areas. Publications Office of the European Union.

Suggestion by the DENR for the nearshore area:

DENR expresses concerns that the proposed MPAs in the nearshore area do not adequately utilise currently legislated areas and are too fragmented/numerous to be effectively implemented and enforced. As such, they suggest better utilisation of legally designated areas by incorporating the grouper boxes and the fully protected dive sites as fully protected MPAs in the proposed network, alongside the fully protected areas suggested in the top ranked scenario, Scenario B(a).

To enable better implementation and management, DENR also suggests a blanket, partially protected MPA (with all IUCN Category 4 permitted activities included) encompassing the remaining Platform area. For a partially protected MPA such as this to be effective at achieving the underlying objectives, adequate implementation and management would be imperative.[11] This blanket protection would allow for the design of a single unified management system that could adopt the same principles that guided the creation of the top ranked scenario. For example, areas identified as important nursery habitats or fish-dispersal corridors could still be protected through varying levels of activity restrictions. Sustainable fishing could be guided through a designated management plan which the fishers could take a role in developing and would build upon current legislation. Other activities prioritised in the MSP and Blue Economy Strategy (e.g., renewable energy development or aquaculture) could be considered anywhere within this MPA, with the underlying conservation objectives prioritised through an EIA procedure or other means deemed necessary by the relevant authorities. Note, however, that networks containing many small MPAs may be more beneficial to fisheries than fewer large MPAs.[12] They may also help to reduce socio-economic impacts without compromising conservation or fisheries benefits.[13]

DENR also suggests a slight alteration to the proposed fully protected MPA B4(a) to better incorporate the Chubbs Head protected dive site and Science Committee feedback.



11 Hall et al. 2021. Partially protected areas as a management tool on inshore reefs. Rev Fish Biol Fisheries.

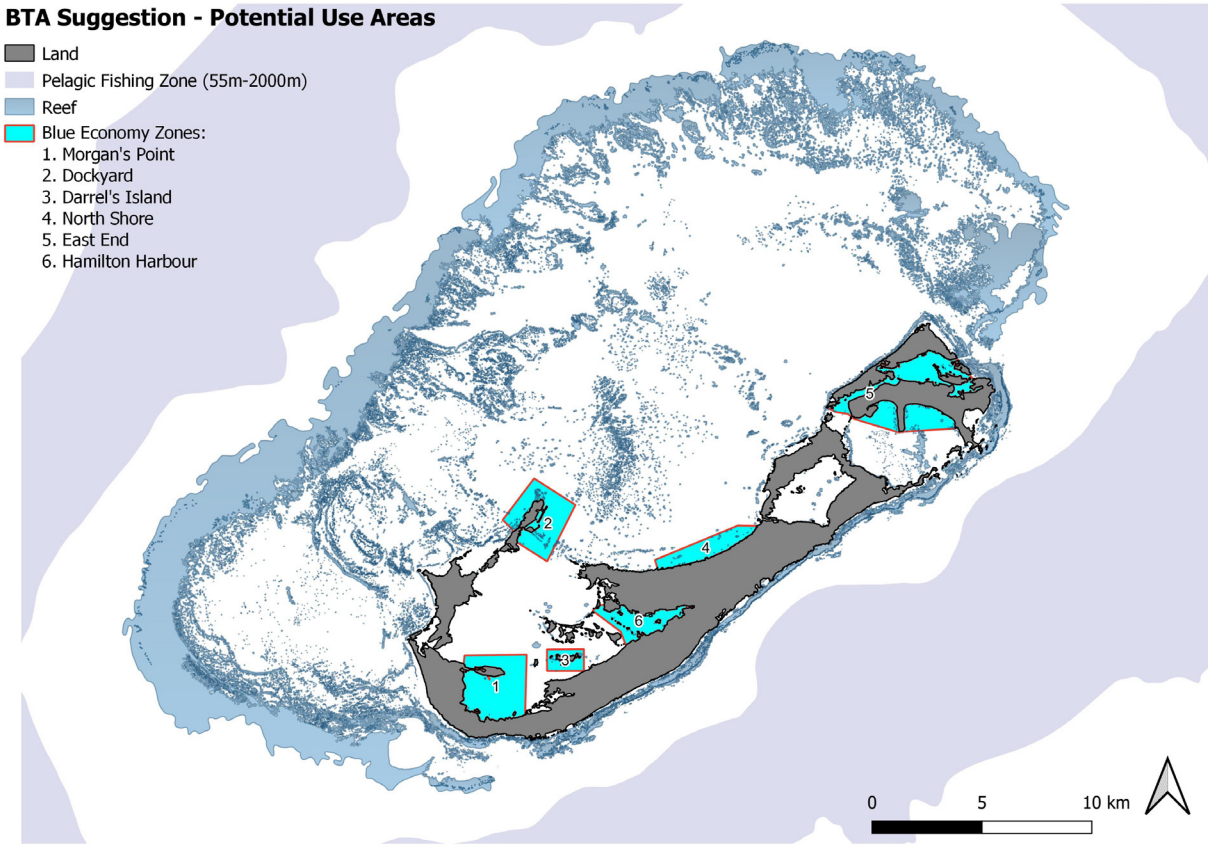
12 Roberts, C. M. and J. P. Hawkins W. E. S. Campaign (2000). Fully-protected marine reserves: a guide. Washington, DC, USA and Environment Department, University of New York

13 PISCO (2007). The Science of Marine Reserves [2nd Edition, United States Version], Partnership for Interdisciplinary Studies of Coastal Oceans.22. www.piscoweb.org.

MPA NAME	PROTECTION STATUS	IUCN DESIGNATION	Activities (✔ = permitted; ✕ = prohibited)																	
			Research: non-extractive	Traditional use: non-extractive	Restoration/ enhancement for conservation	Traditional fishing/collection	Non-extractive recreation	Large scale high intensity tourism	Shipping	Research: extractive	Renewable energy generation	Restoration/ enhancement for for other reasons	Fishing/collection: recreational (sustainable)	Fishing/collection: local fishing (sustainable)	Industrial fishing, industrial scale aquaculture	Aquaculture - small scale	Works (harbors, ports, dredging)	Untreated water discharge	Mining, oil and gas extraction	Habitation
B1a. South Shore	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B2a(new). Platform	Partial	4	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✕	✕	✕
B4a. Eastern Blue Cut	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B8a. Grouper Box West	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
B9a. Grouper Box East	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✔	✕	✕	✕
Circles(new). Protected dive sites	Full	2	✔	✔	✔	✔	✔	✔	✕	✕	✕	✕	✕	✕	✕	✕	✔	✕	✕	✕

The BTA for the nearshore area:

The BTA proposes the addition of Blue Economy Zones in the nearshore area. As these cannot be part of the legislated MPA network, they would be included as a Potential Use Area to identify key areas where sustainable blue economy activities including, but not limited to, tourism, are encouraged and supported. Economic incentives and streamlined red tape would help accelerate local businesses in the Blue Economy Zones, similar to Economic Empowerment Zones. The precise definition used to identify a Blue Economy Zone is not yet determined but the map below identifies some preliminary areas based on local tourism expertise from the BTA. The Zones would ideally be located where maritime activity is already clustered, e.g., Dockyard, Southside, and Hamilton and St. George's Harbours. The BTA proposes that the Zones be named for legendary Bermudians in our maritime economic history, for example, Llewellyn Hollis, Pilot James Darrell (in St. George's), and Mary Prince (in 'Hamble Town', as she called the Hamilton port). The BTA suggests that concrete measures to support and ease burdens on local businesses should be considered fundamental, not secondary, to the conservation goals of the MSP. Further work is needed before such proposals can be included in the MSP.



8.3. METHODOLOGY FOR POTENTIAL DEVELOPMENT AREA MAPS - RENEWABLE ENERGY

The following maps provide context for the potential use areas for renewable energy.

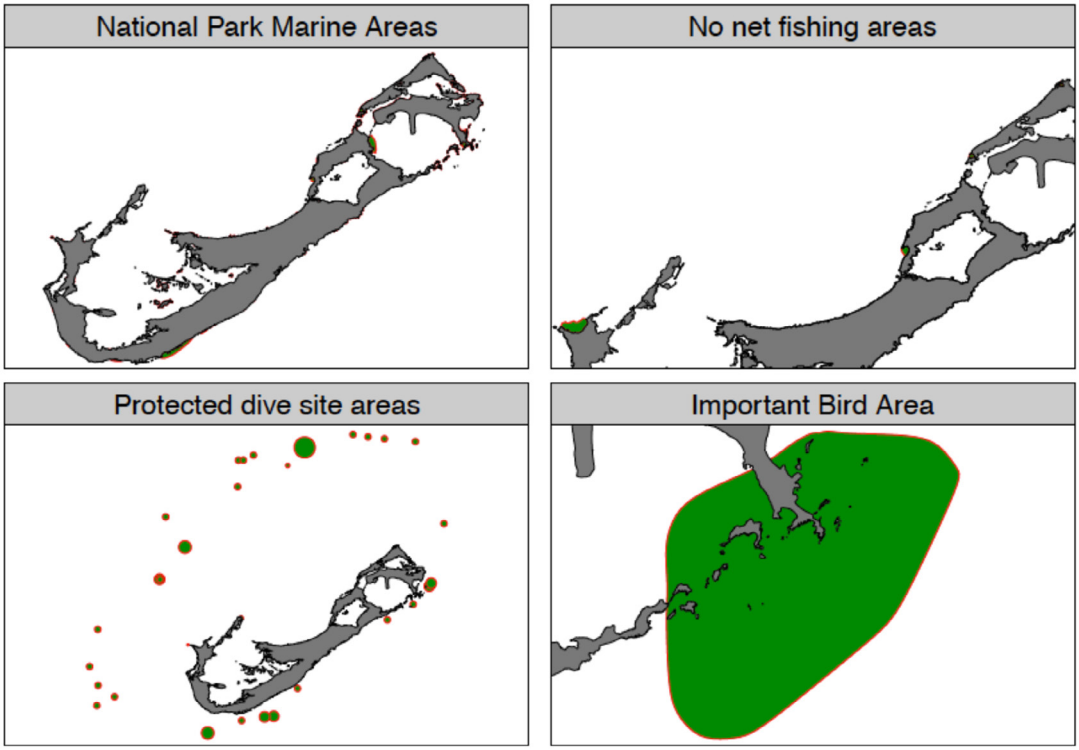


Figure 8.3.1. Exclusionary criteria were used to identify areas potentially suitable for renewable energy platform siting. These four maps identify areas, shown in green with red outlines, that are considered protected areas for marine habitats and species and, as such, would not be suitable for energy platform siting.

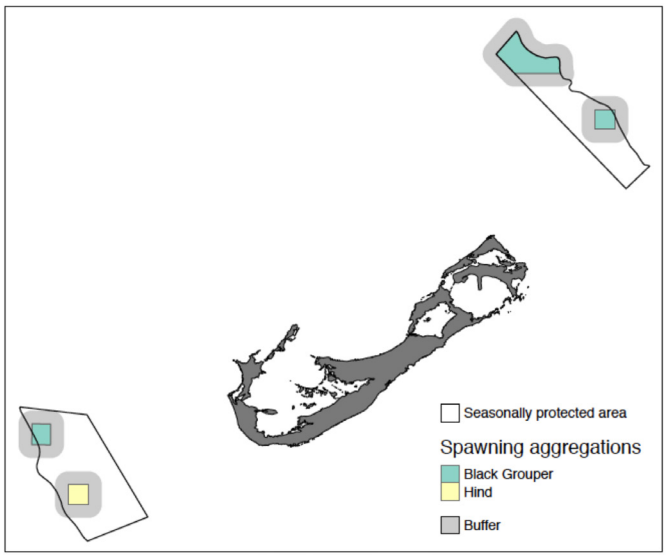


Figure 8.3.2. Exclusionary criteria were used to identify areas potentially suitable for renewable energy platform siting. This map identifies spawning aggregation areas that could have significant impact on the placement of those sites. Spawning aggregation areas for two species—the black grouper (green) and the red hind (yellow)—as well as a 1 km buffer (grey), and the Seasonally Protected Areas are all excluded as suitable siting areas.

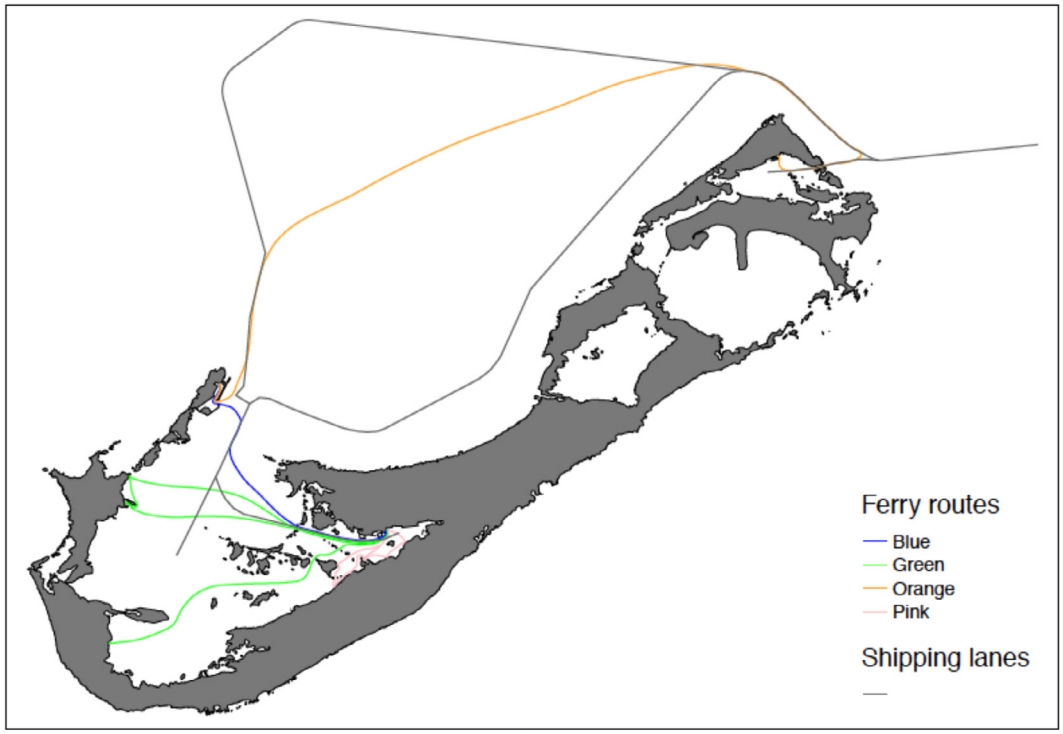


Figure 8.3.3. Exclusionary criteria were used to identify areas potentially suitable for renewable energy platform siting. This map identifies Bermuda's ferry routes (blue, green, orange, and pink) and shipping lanes (grey). The orange ferry route is not used and, as such, was not used in this analysis.

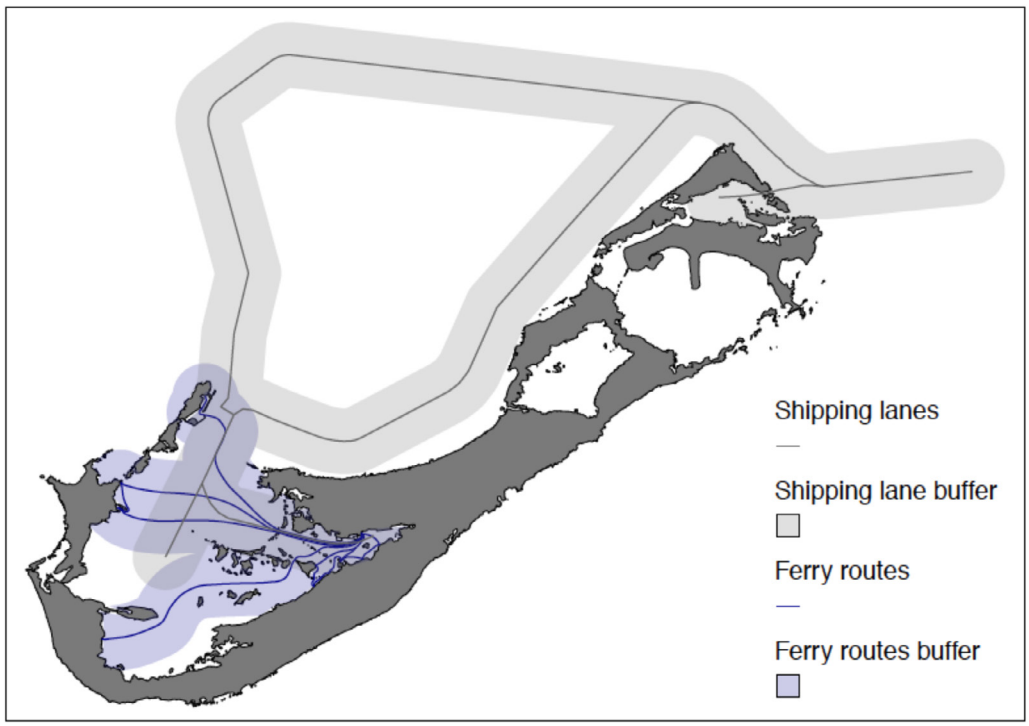


Figure 8.3.4. Exclusionary criteria were used to identify areas potentially suitable for renewable energy platform siting. Above and below water energy platforms are likely to be incompatible with shipping lanes and ferry routes, shown in Figure 8.3.3. Both shipping lanes and ferry routes were buffered to a distance of 0.5 nm, i.e., areas within 0.5 nm (926 m) of the shipping lanes are considered unsuitable for energy platform installation.

Figure 8.3.5. Exclusionary criteria were used to identify areas potentially suitable for renewable energy platform siting. Submarine cable routes are assumed to be unsuitable for energy platforms due to the need to access them, and the potential for damage during platform installation. This map shows cable route locations, as well as a 50 m buffer zone, i.e., areas to 50 m distance around the cables are excluded as suitable areas for energy platform siting.

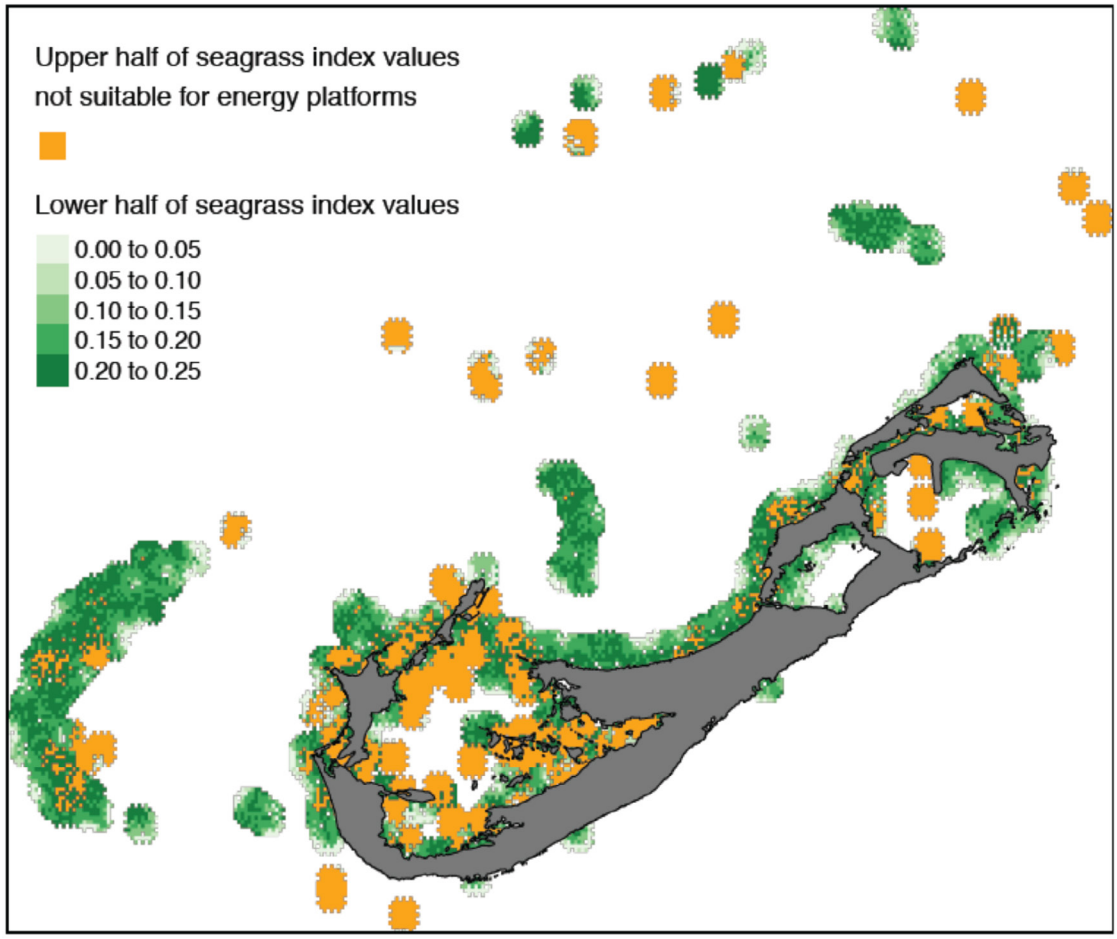


Figure 8.3.6. Exclusionary criteria were used to identify areas potentially suitable for renewable energy platform siting. Given the considerable loss of seagrass habitat in Bermuda, the conservation and restoration of remaining areas is of high importance and at odds with the siting of energy platforms. Using a seagrass index, the upper half of index values (orange) are considered not suitable for energy platforms. The lower half of index values were used as part of a site suitability index with low seagrass index values being most potentially suitable for energy platform siting, and high values least suitable.

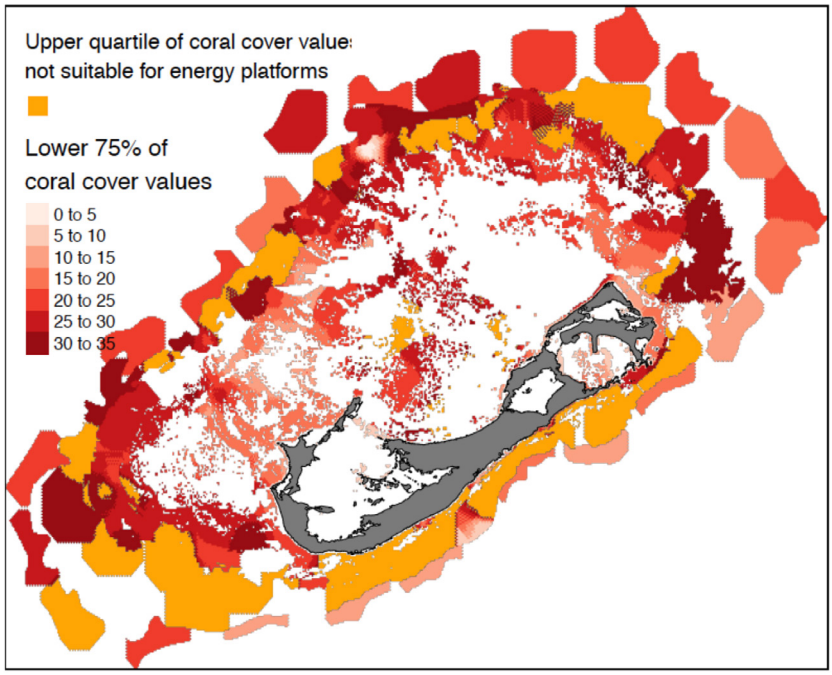


Figure 8.3.7. Exclusionary criteria were used to identify areas for renewable energy platform siting. The placement of energy platforms will destroy benthic coral habitat; however, coral cover is not contiguous, meaning there may be space between reef patches that is suitable for placement. This map shows the upper quartile (25%, in orange) of coral cover values as unsuitable for energy platforms, with the lower 75% used in an index of site suitability. Coral cover values are percent coral cover. Higher values are least suitable in the index of site suitability.

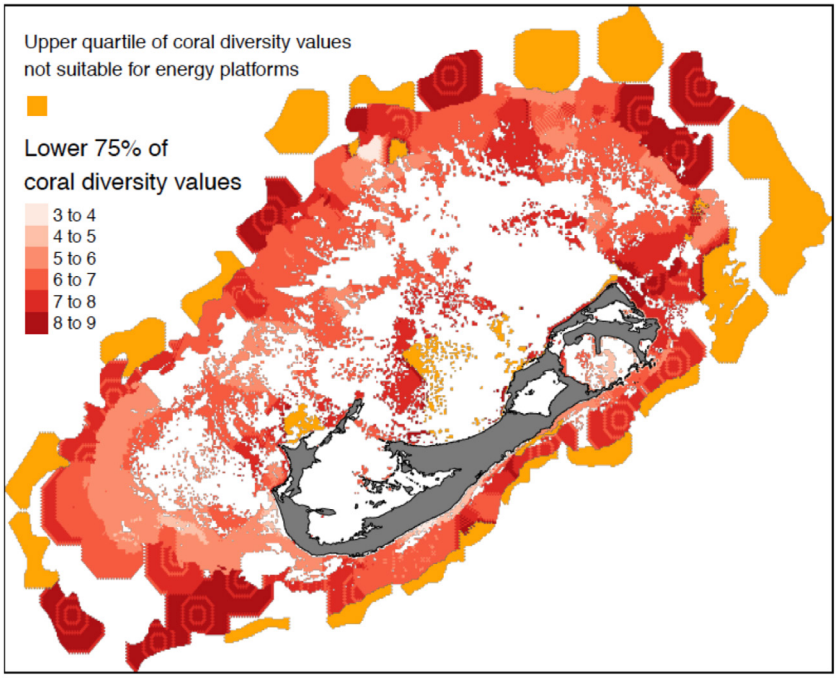


Figure 8.3.8. Exclusionary criteria were used to identify potential areas for renewable energy platform siting. Areas of high coral diversity (number of coral species, or species richness) should be avoided in the placement of energy platforms. This map shows the upper quartile (25%, in orange) of coral diversity values as unsuitable for energy platform siting, with the lower 75% used in an index of site suitability. Coral diversity values are species richness (number of coral species). Higher values are least suitable in the index of site suitability.

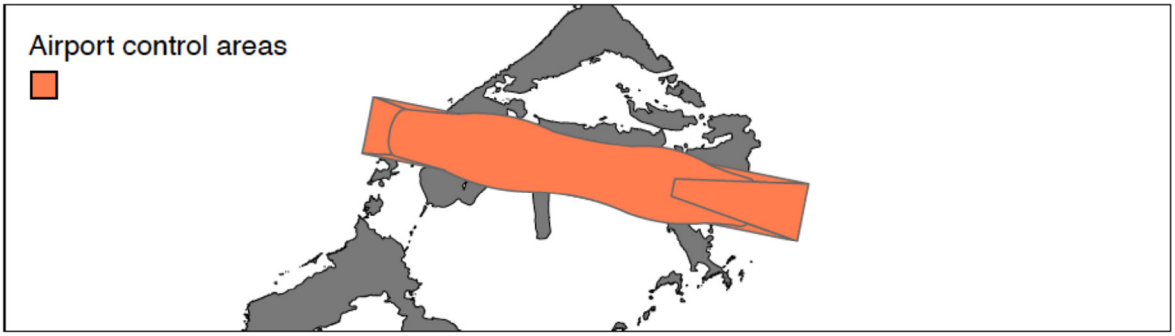


Figure 8.3.9. Exclusionary criteria were used to identify potential areas for renewable energy siting. This map shows the airport control areas (in orange), which are assumed to be unsuitable for wind energy platform siting.

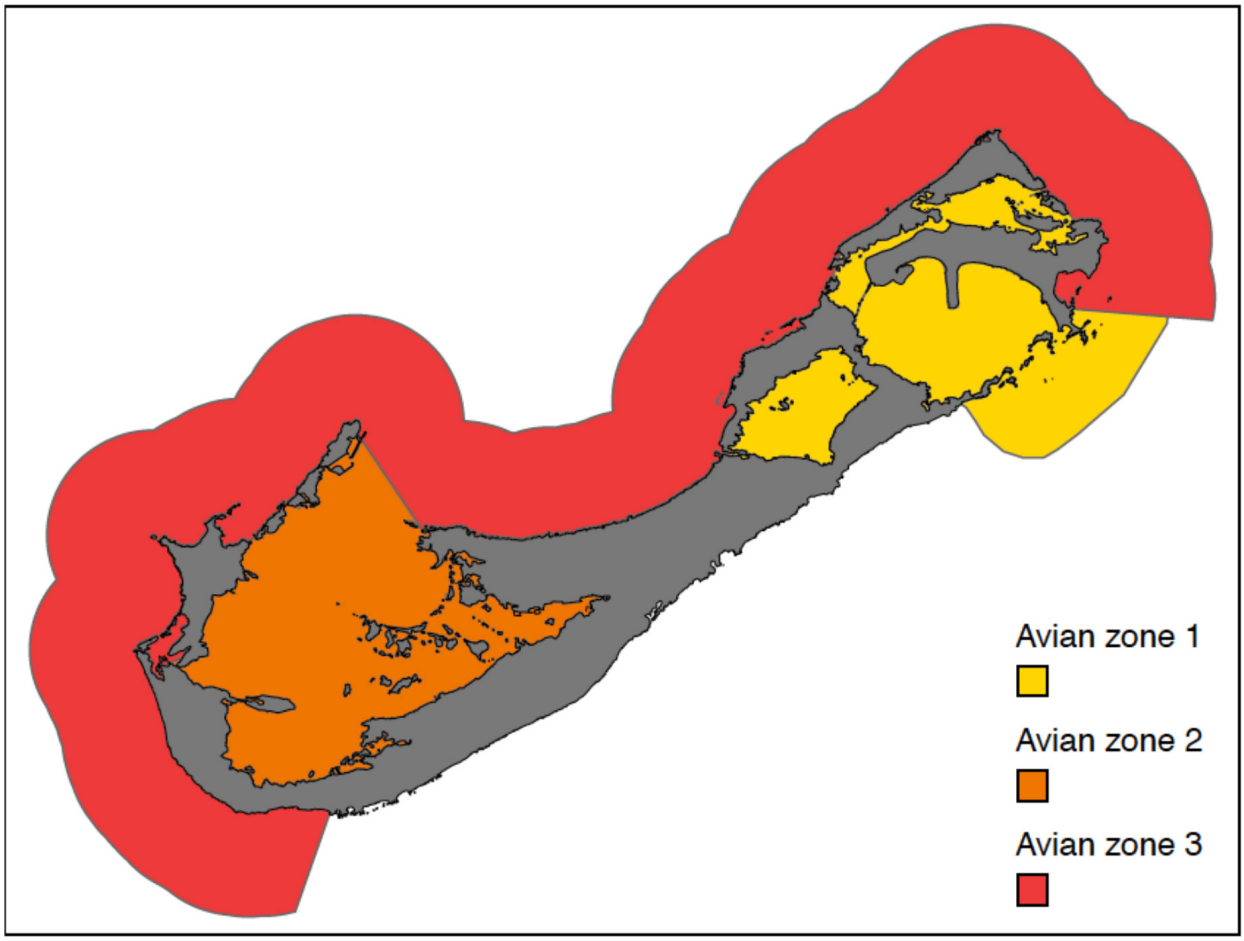


Figure 8.3.10. Exclusionary criteria were used to identify areas for renewable energy siting. This map shows 3 zones identified by DENR in a previous wind energy study[1], as important for avian courtship activity, food foraging, and/or nesting access. The DENR considers zones 1 and 2 to be incompatible with wind turbines and zone 3 to be partially compatible. Following the approach taken by the previous study, all 3 zones were considered unsuitable as areas for wind energy siting.

1 Amrhein, Alisan, et al. Offshore Wind Energy in the Context of Multiple Ocean Uses on the Bermuda Platform. 2014. Univ. Santa Barbara. Master's thesis. https://bren.ucsb.edu/projects/offshore-wind-energy-context-multiple-ocean-uses-bermuda-platform

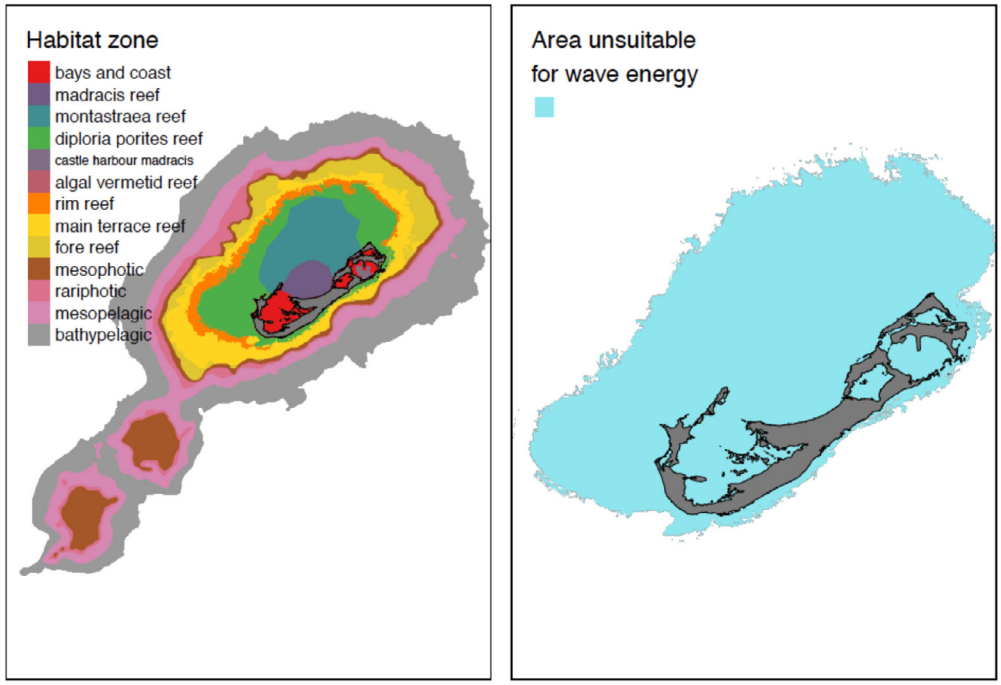


Figure 8.3.11. Exclusionary criteria were used to identify potential areas for renewable energy siting. Wave energy installations require a suitable amount of water movement to function. These maps show habitat areas that are highly sheltered and assumed to be unsuitable for placement sites. The map on the left breaks areas down by habitat zone type (e.g., *Diploria Porites* reef, Castle Harbour *Madracis*), while the map on the right shows all areas unsuitable for wave energy installations.

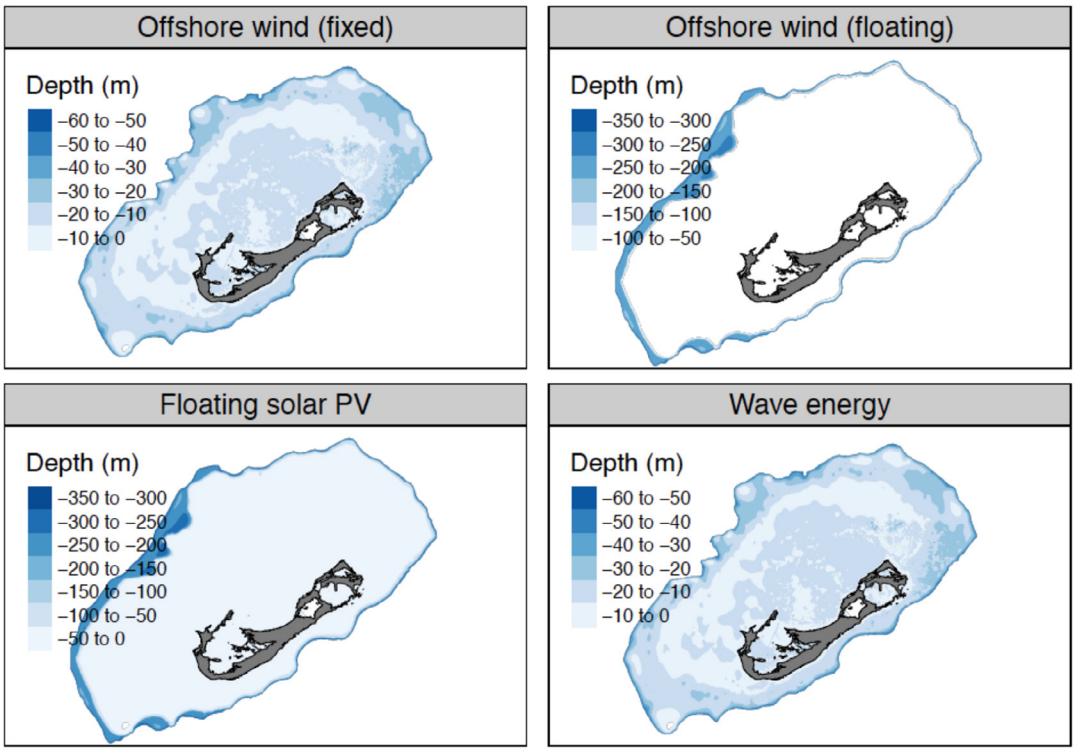


Figure 8.3.12. These four maps indicate the various depth limitations, shown in contours, for each renewable energy technology, as taken from a literature review by RMI. Note that nearshore and offshore floating solar PV have the same depth limits.

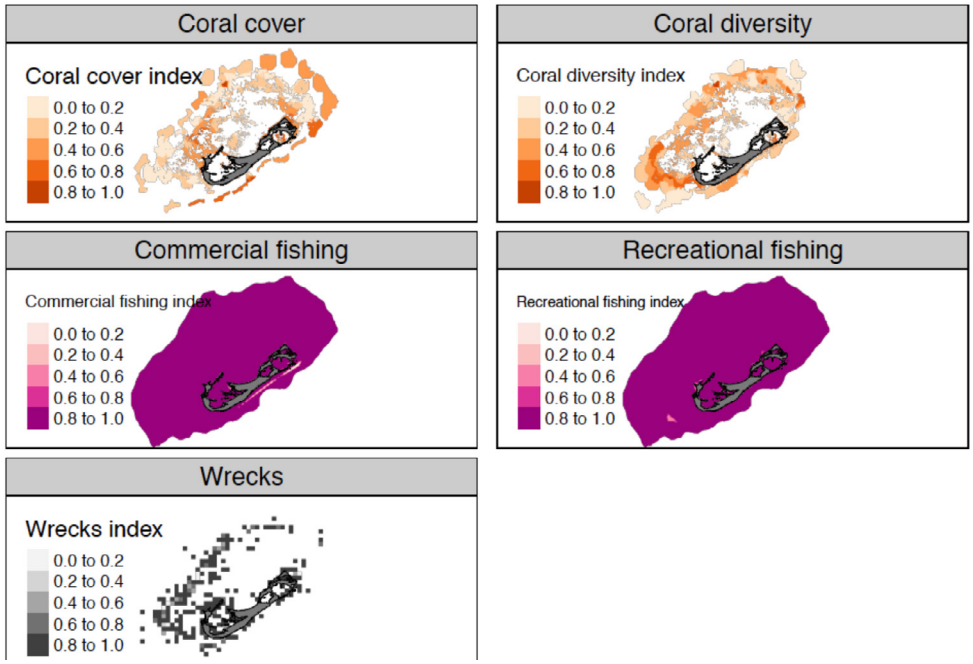


Figure 8.3.13. These five maps use data to create an index of potential site suitability for areas that were not previously excluded as potential sites. They illustrate the following criteria: Coral cover (lower 75% of values, scaled 0 to 1); Coral diversity/species richness (lower 75% of values, scaled 0 to 1); Commercial fishing (all values, scaled 0 to 1); Recreational fishing (all values, scaled 0 to 1); Wrecks heatmap (heatmap of wrecks, indicating number of wrecks in an area). Higher values represent areas potentially more suitable for energy platform siting, and lower values the areas that are least suitable.

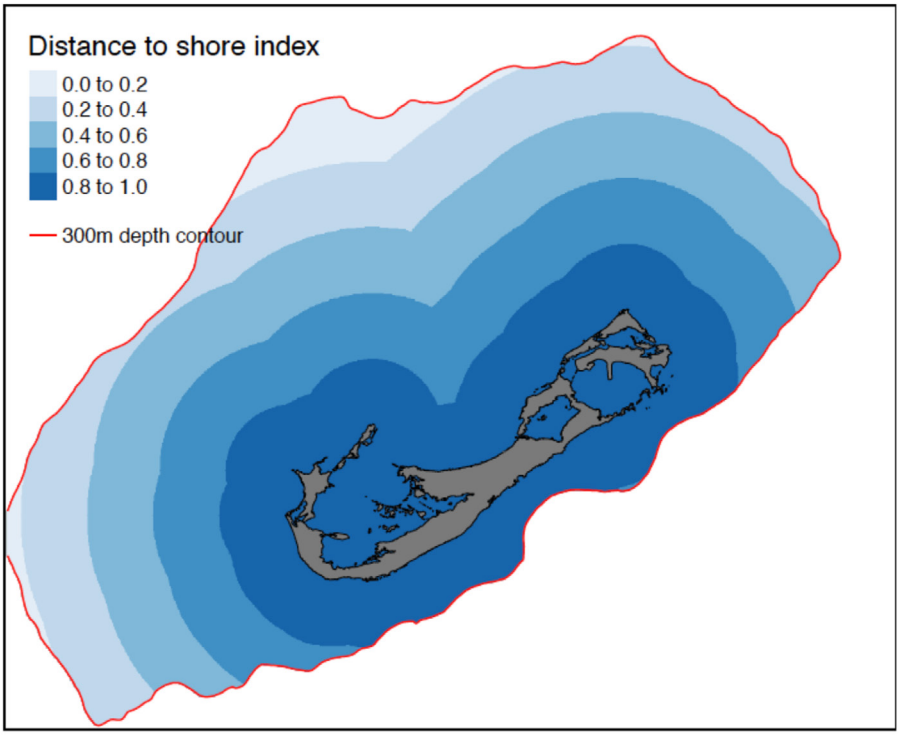


Figure 8.3.14. As the distance from shore increases, so does the cost of installing a renewable energy platform based on the additional expense of cabling. This map shows a distance from shore index, in contours out to the 300 m depth contour, with higher values (shows in darker blue) indicating greater suitability for energy platform siting.

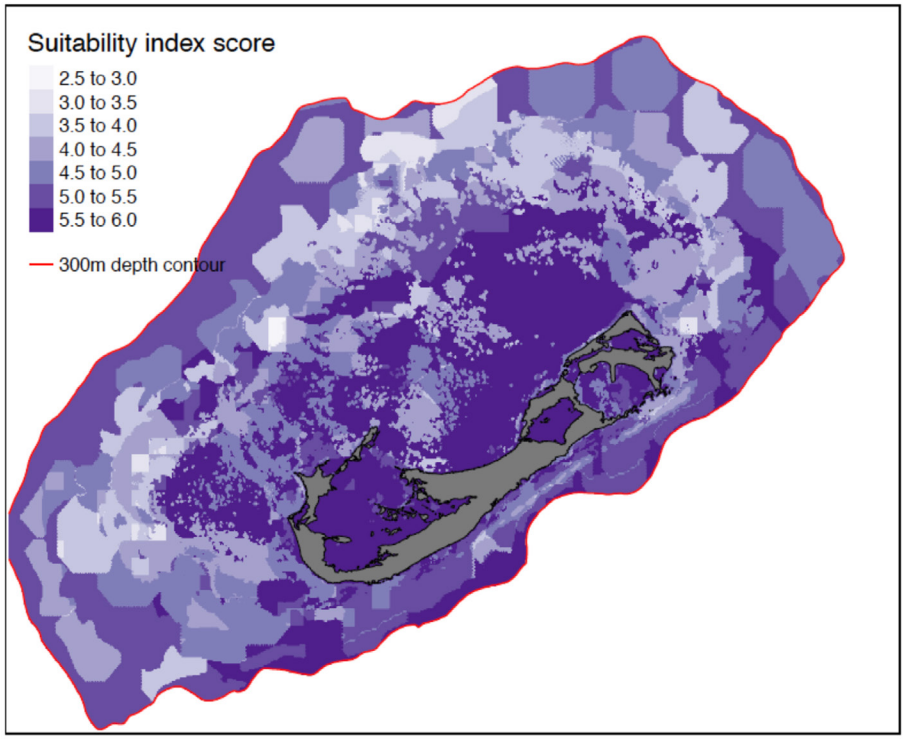


Figure 8.3.15. An additional site suitability index was applied to rank the remaining areas that had not been excluded via previous criteria. This final index is a sum of the indices in the previous data maps, with any areas not showing any data being assigned a value of 1 (most suitable). This map shows the results of the application of the site suitability index, with darker colours used to indicate areas of higher potential suitability for the placement of renewable energy platforms.

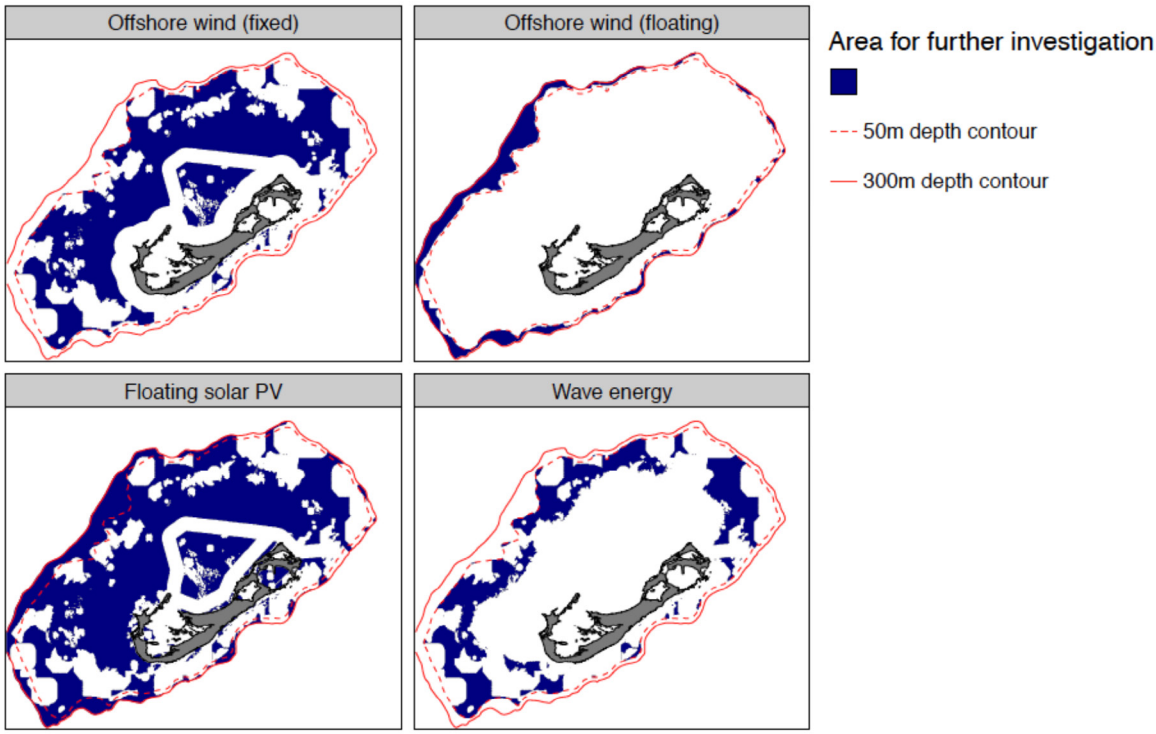


Figure 8.3.16. Based on the exclusivity criteria presented in the maps above, a series of four maps was created to demonstrate the areas potentially suitable for further investigation into the installation of energy platform installation based on the type of renewable energy technology (offshore wind-fixed, offshore wind-floating, floating solar PV, and wave energy).

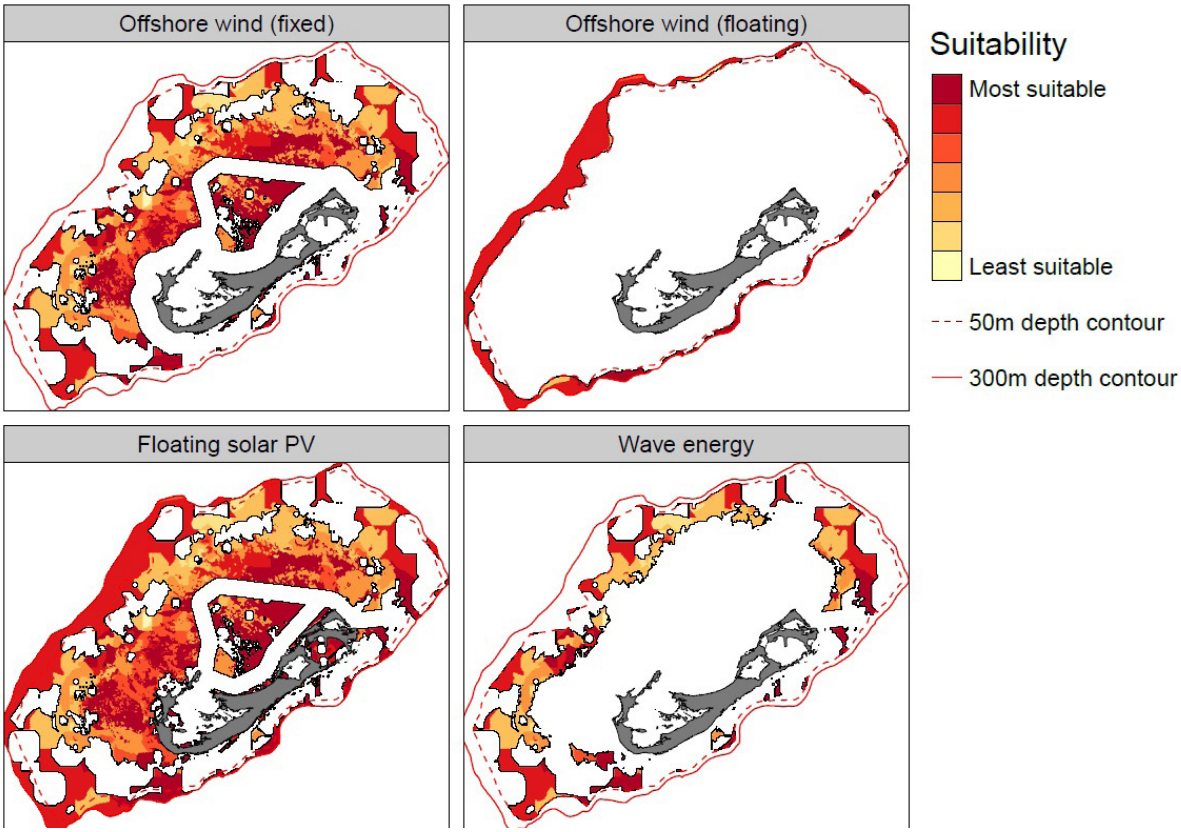


Figure 8.3.17. This final set of maps represents areas suggested as potentially suitable for further investigation as energy platform investigation sites, based on both the exclusionary criteria and the site suitability index.

8.4. METHODOLOGY FOR POTENTIAL CONSERVATION AREA MAPS - HABITAT RESTORATION

The following reports provide context for the potential use areas for habitat restoration.

8.4.1. SEAGRASS

[Download Here]

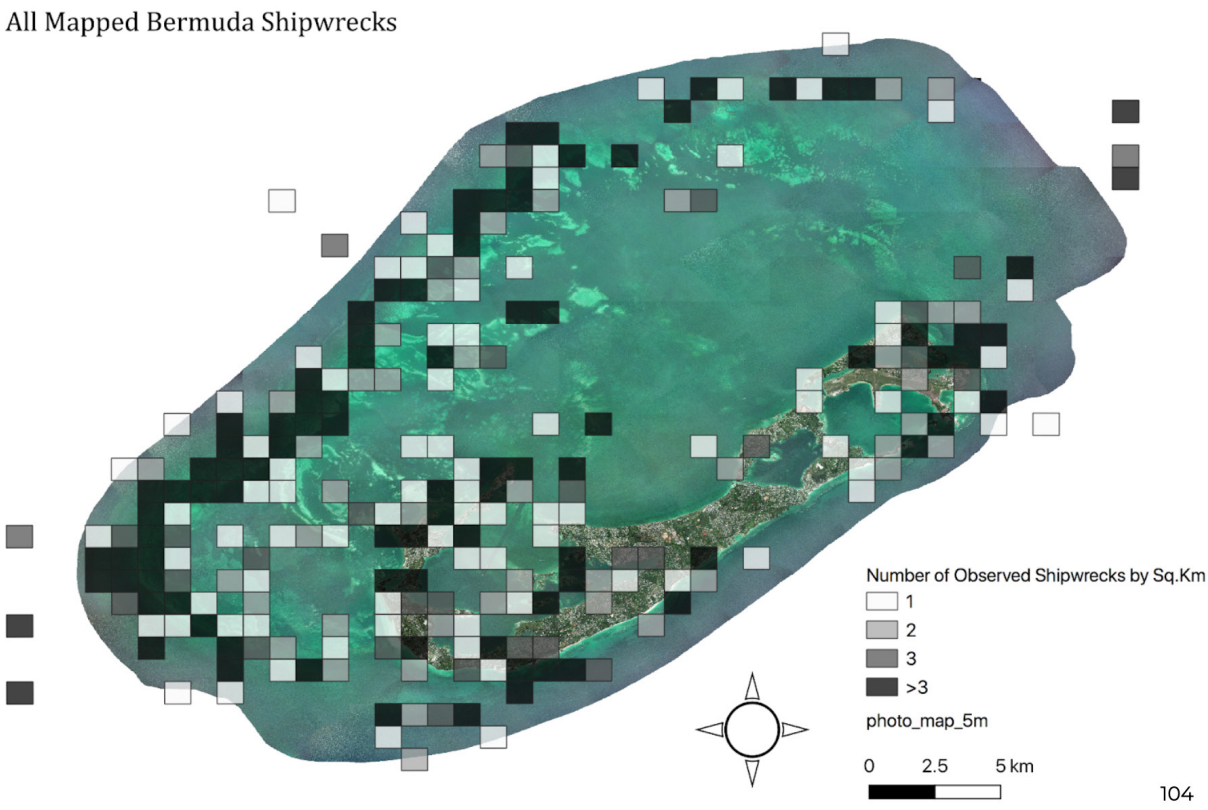
8.4.2. SALTMARSH AND MANGROVE

[Download Here]

8.4.3. CORAL

[Download Here]

8.5. HISTORIC WRECKS HEATMAP



8.6. DATA LAYERS USED IN THE MSP DECISION-MAKING PROCESS

The data layers below were provided to BOPP in a spatial format and have been made available through the SeaSketch platform for marine spatial planning purposes.

Bathymetry

- NOAA Contours (50 metre intervals)
- Bathymetric Contours (5 metre intervals)
- Selected Bathymetric Contours (labelled, in metres)
- Selected Bathymetric Contours (unlabelled)

Boundaries

- Maritime zones
    - Nearshore boundary (0-2000 m depth)
    - Pelagic fishing zone (55-2000 m depth)
    - Lobster Zones Inshore
    - Lobster Fishing Zones
    - Exclusive Economic Zone (Global)
    - Exclusive Economic Zone (Bermuda)
    - Territorial Seas (Bermuda)
    - Land
- Protected Areas
    - Marine Mammal Sanctuary
    - Castle Harbour Islands Nature Reserve
    - Spiny Lobster Reservoir
- Regulatory Zones
    - Marine Enforcement Zones
    - Restricted Maritime Zones
    - Boating Restrictions (Areas)
    - Boating Restrictions (Points)
    - Speed Limits for Boats
- Legislated Areas
    - Shipping Lanes
    - Submarine Cable Protection Zone
    - Public Ferry Routes
    - Open Wrecks
    - MPA Extended Closure Areas
    - Coral Reef Preserve (Areas)
    - Prohibited marine board notice areas
    - Protected Dive Site (Areas)
    - Seasonally Protected Areas (Feb 2012)
    - National Parks Marine Areas 2017
    - No Net Fishing Area
    - Spearfishing Exclusion Zone
    - No Lobster Fishing Area
- Terrestrial Planning Layers

    - Conservation Areas
    - Bermuda Plan 2018

Ecology

- Ecological Geographic Regions
- Terrestrial Habitats (1997)
- Coastline Physical Habitats
- Coastline Environmental Sensitivity Index
- Intertidal Environmental Sensitivity Index
- Benthic Habitat Assessment (2006-2008)
    - Benthic Community Survey Points
    - Benthic Communities Percent Cover
    - Seagrass Survey Sites - Presence/Absence
    - Seagrass Survey Sites - Presence Only
- Benthic Community Mapping Program (2012)
    - Macroalgae Cover
    - Coral Cover
    - Turf Algae Cover
- Coral Reefs (1997)
    - Lagoonal Reef
    - Coral Reef Types
    - Coral Reef Cover
    - Mangroves (2012)
    - Seagrass (1997)
- Baitfish Survey Points
    - No fish detected
    - Round sardinella (*Sardinella aurita*)
    - Atlantic thread herring (*Opisthonema oglinum*)
    - Dwarf herring (*Jenkinsia lamprotaenia*)
    - Reef silverside (*Hypoatherina harringtonensis*)
    - Redear herring (*Harengula humeralis*)
    - Bermuda anchovy (*Anchoa choerostoma*)
    - Fry (Bermuda anchovy, reef silverside, and dwarf herring)

Fisheries

- Teddy Tucker Fishing Map
- Longline Segments
- Recreational Fishing Data Grid
- Recreational Lobster Diving (2002-2013)
    - Lobster (2007-2013)
    - Lobster (2002-2007)
- Recreational Spearfishing (2011-2013)
    - Almaco Jack
    - Black Grouper
    - Gray Snapper
    - Hogfish

- Lionfish
- Total

Geomorphology

- Habitat Zones
- Outer Reef Breaker Line
- Seafloor Features
    - Abyss - Area below the foot of the continental slope and above 6000 m
    - Abyssal Zones - Plains (<300 m relief), hills (300–1000 m relief), mountains (>1000 m relief)
    - Slope - Shelf edge to the upper limit of the continental rise
    - Escarpments - Elongated, linear, steep slope separating gentle slopes in non-shelf areas
    - Shelf - Shoreline to a depth at which there is a marked increase of slope
    - Knoll Base Areas
    - Knolls - Large, isolated, characteristically conical elevations (<1000 m relief)
    - Seamounts - Large, isolated, characteristically conical elevations (>1000 m relief)
    - Predicted Seamounts

Human Use

- Long Line Activity - Nov 2019 - Nov 2020
- Long Line Activity - Nov 2020 - Nov 2021
- Shipping Traffic
- Public Ferry Stops
- Powerboat Race Routes
- Port Facilities
- Marinas
- Mooring Buoys
- Tourism Operations
- Public Road Soakaways (2012)
- Public Road Drains (2012)
- Sewage and Water Outfalls
- Sea Floor Cables
- Ocean Use Heatmaps
    - Finalised heatmaps
        - Recreational Fishing - All Responses, Weighted
        - Commercial Fishing - All Responses, Weighted
        - Aquaculture - All Responses, Weighted
        - Boating - All Responses, Weighted
        - Tourism - All Responses, Weighted
        - Swimming, Snorkeling and Diving - All Responses, Weighted
        - Passive Recreation and Conservation - All Responses, Weighted
        - Utilities - All Responses, Weighted
        - Shipping - All Responses, Weighted
        - Fishing Gear Heatmaps
            - Commercial
                - Commercial Bait Fishing
                - Commercial Bottom Fishing
                - Commercial Hand Lining

        - Commercial Long Lining
        - Commercial Net Fishing (bait species)
        - Commercial Net Fishing (schooling pelagics)
        - Commercial Traps
        - Commercial Trolling
    - Recreational
        - Recreational Bait Fishing
        - Recreational Bottom Fishing
        - Recreational Lobster Diving
        - Recreational Spearfishing
        - Recreational Trolling

Oceanography

- Sea Surface Contours
- Surface Temperature
- Chlorophyll-a
- Salinity

Other

- Navigational Aids
- Survey Grids
    - Survey Grid (EEZ)
    - Survey Grid (Territorial Seas)
    - Survey Grid (Territorial Seas Plus)

Protected Seas

- Global database of marine protected areas
    - MPA Protection Level 1 - Least restrictive: no known fishing restrictions
    - MPA Protection Level 2 - Less restrictive: Few species- or gear-specific restrictions apply
    - MPA Protection Level 3 - Moderately restrictive: Several species- or gear-specific restrictions apply; or either commercial fishing or recreational fishing is entirely prohibited.
    - MPA Protection Level 4 - Heavily restrictive: Fishing is mostly prohibited, with few exceptions.
    - Protected Seas Protection Level 5 - Most restrictive: Fishing is prohibited

Site Suitability – Potential Use Areas

- Potential Development Areas
    - Potential Site Suitability - Floating Solar
    - Potential Site Suitability - Wind Energy (fixed)
    - Potential Site Suitability - Wind Energy (float)
    - Potential Site Suitability - Wave Energy
- Potential Conservation Areas
    - Mangrove Restoration Suitability
    - Seagrass Restoration Suitability
    - Seagrass Restoration Sites 500 m buffer
    - Mangrove Restoration Sites 500 m buffer

Wave Energy Proposal Jan 2021

- BDA Wave Energy Points
- BDA Wave Energy Array Points

- BDA Wave Energy Array Cables
- BDA Wave Energy Areas

Modelling Solutions

- Science Committee Feedback - Final
    - Data Used in the Nearshore Modelling Process
        - Cost - Recreational Fishing Effort
        - Cost - Commercial Fishing Effort
        - Fish diversity (BRUVs data)
        - Fish diversity (BREAM data)
        - Fish density
        - Fish recruit density
        - Habitat Zones
        - Seagrass Index Value
        - Coral cover
        - Coral diversity (richness)
        - Coral recruit density
        - Rugosity
    - Data used in Offshore Modelling Process
        - Abyssopelagic
        - Seamounts
        - Offshore cost
        - Bathypelagic
        - Cold water coral
        - Escarpments
        - Knolls
        - Terraces
        - Pelagic zone 1
        - Pelagic zone 2
        - Pelagic zone 3
        - Plains
    - Solutions
        - Offshore solution - no terraces
        - Nearshore Scenario 1 v2
        - Nearshore Scenario 2 v2
        - Nearshore Scenario 3 v2
        - Nearshore Scenario 4 v2

8.7. MEMORANDUM OF UNDERSTANDING

GOVERNMENT OF BERMUDA

Memorandum of Understanding

Developing and implementing a Blue Prosperity Plan for Bermuda's Marine Economic Exclusive Zone

WAITT FOUNDATION OCEANS 5 WAITT INSTITUTE BIOS Bermuda Institute of Ocean Sciences

GOVERNMENT OF BERMUDA

THIS MEMORANDUM OF UNDERSTANDING is made on the ____ day of _____, 20___.

BY AND BETWEEN:

(1)

Ministry: **Home Affairs**

Department:

Address: **Government Administration Building, First Floor**

30 Parliament Street, Hamilton, HM12, Bermuda

(hereinafter called the "**Government**") of the one part; and

(2) The person or entity as identified and set out in Schedule 1 (hereinafter referred to as "**you**") of the other part.

The Government and you are referred to individually as a "**party**" or collectively as the "**parties**".

The parties to this MOU have collaborated and agreed to jointly enter into and agree to the terms and conditions of this MOU, which is non-binding, unless otherwise stated.

NOW THEREFORE, the following is hereby agreed by and between the parties:

That in this MOU, capitalized terms have the respective meanings referred to in this MOU, words by their context importing the plural shall include the singular and vice versa, references to either gender includes any other gender or a neutral entity where appropriate, and a reference to any statute or regulation or law means as amended from time to time and include any successor legislation, regulations or laws and unless the context otherwise requires, the expressions set forth below have the following meanings in any schedules or annexes hereto.

1. DEFINITIONS

"Confidential Information" means the terms and existence of this MOU as well as any information or data disclosed which (i) if in tangible form, is marked clearly as proprietary or confidential, (ii) if oral, is identified as proprietary, confidential, or private on disclosure or (iii) any other information which is not in the public domain, which upon receipt by the Recipient should reasonably be understood to be confidential, provided, however, that such information or data is provided under or in contemplation of this MOU and the fact that any discussions between the parties have been held or are being held;

"Disclosing Party" means the party disclosing any particular item of Confidential Information;

"Effective Date" means the date first written above in this MOU;

"MOU" means this memorandum of understanding and includes any schedules, appendices or annexes attached in accordance with the obligations or deliverables under this agreement;

"Recipient" means, in relation to any particular item of Confidential Information, the party which receives or otherwise obtains such information;

"Purpose" means the purpose as identified in Schedule 1;

"Schedule 1" means the schedule which forms a part of this MOU and contains your contact details, statement of the Purpose, objectives, Term and any special terms and other information related to this MOU; and

"Term" means the commencement date and completion date of this MOU as identified in Schedule 1.

1. NATURE OF THIS MOU

1.1 This MOU confirms the intentions and commitment of the parties to achieve meaningful cooperation in the areas outlined herein and to support and advance the objective and Purpose.

1.2 This MOU establishes an understanding and cooperative working relationship in key areas whereby you will assist the Government in promoting the Purpose in ways that are consistent with respective mandates, policies and resources of the Government, which shall be provided to you from time to time.

2. TERM OF MOU

This MOU shall take effect from the Effective Date for the period as set out in Schedule 1 (subject to early termination under clause 5). This MOU may continue thereafter until terminated by either party on 30 days prior written notice, however, in the event of such continuation, the parties shall remain under the obligations of this MOU until termination.

3. SCOPE OF MOU

3.1. This MOU is concerned solely with the Purpose and does not apply to any other activities in which the parties may be involved in.

3.2. Each party shall be liable for any costs, expenses and disbursements incurred by it in relation to any actions or omissions pursuant to this MOU.

3.3. This MOU is an expression of present intent between the parties and shall except for clauses 6 and 9.2, be non-binding.

3.4. The parties agree to act in good faith at all times when working together on the Purpose.

4. OBJECTIVE AND PURPOSE

The objectives and Purpose of this MOU are as set out in Schedule 1.

5. TERMINATION

5.1 Either party may terminate this MOU upon prior written notice:

(a) if the other party is in material breach of any of the terms of this MOU and has failed to remedy such breach (if it is capable of remedy) within 30 (thirty) days of receipt of notice of the breach or such reasonable shorter period specified in the notice; or

(b) by giving the other party the notice period, without cause, as set out in Schedule 1.

5.2 This MOU may be terminated without notice by a party if the other party engages in an act of dishonesty or misconduct which brings either party into disrepute, or if, there are reasonable grounds for believing that there has been a breach of the obligations of confidentiality.

5.3 Termination of this MOU for whatever reason or its expiry shall be without prejudice to the accrued rights and obligations of the parties.

5.4 Clauses 6 and 9.2 shall survive the termination or expiry of this MOU.

6. Duty to Keep Information Confidential

6.1 The Recipient shall keep any confidential information received from or belonging to the Disclosing Party ("**Confidential Information**") confidential and shall not disclose such Confidential Information to anyone (except on a need to know basis for internal use only where necessary to perform its obligations under this Agreement to its employees or contractors bound by express written non-disclosure obligations) or use such Confidential Information other than to perform its obligations under this MOU without the prior written consent of the Disclosing Party.

6.2 Either party may however (i) share information with its advisers (including potential partners, lenders, attorneys and consultants) or employees on a need-to-know basis, provided however that such party shall ensure that its advisers and employees shall keep the confidentiality of such information and such party shall also be liable for breach of confidentiality caused by their advisers or employees and (ii) disclose such information, including this MOU, to its direct or indirect shareholder(s) and its present or future creditors.

6.3 This section shall not apply to any Confidential Information to the extent that:

(a) disclosure is required to or by any court, tribunal or governmental authority with competent jurisdiction, provided that the Recipient shall give the Disclosing Party prompt written notice of such required disclosure in order to afford the Disclosing Party an opportunity to seek a protective order or other legal remedy to prevent the disclosure, and shall reasonably cooperate with the Disclosing Party's efforts to secure such a protective order or other legal remedy to prevent the disclosure;

(b) it is or becomes generally and freely publicly available through no fault of the Recipient or its servants or agents; or

(c) it can be shown to have been independently originated by the Recipient without reference to the Confidential Information, or communicated to it in circumstances otherwise than where its disclosure to the Recipient imparted a duty of confidence.

6.4 In consideration of the Disclosing Party's disclosure to the Recipient of the Confidential Information, the Recipient agrees that, from the date of this MOU, the Recipient shall:

(a) use the Confidential Information solely for the Purpose;

(b) keep the Confidential Information strictly confidential and shall not, without the Disclosing Party's prior written consent, disclose or distribute the Confidential Information to any person other than for the purposes of the Purpose;

(c) disclose any Confidential Information only to such employees, agents, professional advisors and approved sub-contractors to whom disclosure is strictly necessary for the Purpose;

(d) ensure that its employees, agents, professional advisers and sub-contractors comply with the provisions of this clause and are bound by terms and conditions of use and non-disclosure at least equivalent to those contained in this MOU;

(e) keep the Confidential Information stored securely and marked as the Confidential Information of the Disclosing Party and use its commercially reasonable efforts to prevent unauthorised persons having access to the Confidential Information;

(f) comply at all times with all policies and procedures of the Disclosing Party relating to confidential information from time to time notified to the Recipient (including, for the avoidance of doubt those in relation to IT and data security); and

(g) hold the Confidential Information to the Disclosing Party's order and, on expiry or termination of this MOU for whatever reason or (if earlier) forthwith upon the request of the Disclosing Party, return to the Disclosing Party thereof or, if requested by the Disclosing Party, destroy all copies, summaries and notes of the contents or parts of the Confidential Information and any documents or materials compiled as a result of the disclosure of the Confidential Information, save that copies of Confidential Information may be retained which have been created pursuant to the Recipient's automatic archiving and back-up procedures or as otherwise may be required by a party's document retention policies or by applicable law, provided that such Confidential Information shall remain subject to the continuing obligation of confidentiality under this section.

6.5 The Recipient understands and acknowledges that (other than may be separately agreed between the parties in writing) neither the Disclosing Party nor its officers, directors, employees or agents make any representations or warranties, express or implied, as to the accuracy or completeness of the Confidential Information, nor shall they have any liability to the Recipient or any other person resulting from the Recipient's use of the Confidential Information.

7. **FORCE MAJEURE**

7.1 Neither party shall be liable to the other party for any delay or non-performance of its obligations under this MOU to the extent that its performance is interrupted or prevented by anything beyond the reasonable control of either party.

7.2 Such delay or failure shall not constitute a breach of this MOU and the time for performance shall be extended by a period equivalent to that during which performance is so prevented subject to clause 7.3.

7.3 Should such delay or failure persist for 60 days, or such shorter period as is reasonable in the circumstances, the party not affected, may, at its option and if it is reasonable for it to do so, terminate this MOU immediately.

8. **NOTICES**

8.1 Any notices or consents required to be given under this MOU shall be in writing, signed by an authorised signatory and delivered personally by commercial courier, first class post or electronic mail to the address of the parties as set out in Schedule 1:

8.2 Any notice served by the following means shall be deemed served as indicated:

(a) personal delivery: at the time of delivery;

(b) commercial courier: on the date of signature of the courier's delivery receipt;

(c) first class post: at the start of the second business day after posting; and

(d) if e-mailed, at the time that the e-mail was sent.

8.3 If deemed receipt is not within business hours (meaning 9:00 am to 5:00 pm Monday to Friday on a day that is not a public holiday in the place of receipt), the notice, approval or consent is deemed to have been received when business next starts in the place of receipt.

8.4 Either party may change the details of its address, or electronic mail address by notice to the other party by any of the means set out above.

9. **Miscellaneous Provisions**

9.1 Entire Agreement

(a) This MOU is effective on the Effective Date. Where this MOU refers to past or current obligations, this MOU applies retrospectively from that date. Each of the parties represents that this MOU is executed by its duly authorized signatories and that it has all required authorizations and capacity to perform its obligations.

(b) This MOU together with any documents referred to in it supersedes, extinguishes and replaces all previous agreements, promises, assurances, warranties, representations and understandings, whether written or oral including whether in invoices, emails or otherwise between the parties with respect to the Purpose and is the complete agreement between the parties. There shall be no covenants, conditions, warranties, representations, terms or provisions, express or implied, relating thereto except as herein set forth. A person who is not a party to this MOU shall have no right to enforce it.

9.2 Public Announcement

No public announcement will be made regarding the arrangements contemplated by this MOU, unless the parties will have first agreed in writing on the form, content and timing of such announcement or notice.

9.3 Implementing this MOU

Each party will review its internal procedures and, where appropriate, will revise them to accommodate the provisions of this MOU. Each party will also designate in writing one person who will be responsible for coordinating and implementing the provisions of this MOU.

9.4 Amendments

This MOU may be amended in writing signed by the parties.

9.5 Assignment

A party may not assign this MOU or any of its rights, interests nor obligations hereunder without the prior written consent of the other party and any assignment without such consent shall be void.

9.6 Severability

If any part of this MOU shall be invalid or unenforceable under applicable law, said part shall be ineffective to the extent of such invalidity only, without in any way affecting the remaining parts of this MOU and the parties hereby agree to negotiate in good faith with respect to any such invalid or unenforceable part to render such part valid and enforceable to the extent legally possible.

9.7 Settlement of Disputes

If a dispute arises under this Agreement, the parties agree to first try to resolve the dispute with the help of a mutually agreed upon conciliator in Hamilton, Bermuda. The parties shall share any costs and fees, other than attorney fees associated with the conciliation, equally. If the dispute is not resolved through conciliation, the parties agree to submit the dispute to binding arbitration in Hamilton, Bermuda before a single arbitrator under the provisions of Bermuda Arbitration Act 1986. The parties shall share any costs and fees, other than attorney fees associated with the arbitration, equally. Judgment upon the award rendered by the arbitrator may be entered in any court with jurisdiction to do so.

9.8 Waiver

A failure or delay of either party to enforce any provision of this MOU will not be construed as a waiver of such provision or any other rights under this MOU, unless in writing and signed by the party granting such waiver.

9.9 Counterparts

This MOU may be executed in one or more counterparts, each of which shall be an original, but all of which together shall constitute one and the same MOU.

9.10 Governing Law

This MOU and any dispute or claim arising out or in connection with it or its subject matter shall be governed by and construed in accordance with the laws of Bermuda and the parties hereby submit to the exclusive jurisdiction of the Bermudan courts.

IN WITNESS WHEREOF, the parties, or their authorized representatives, have read and agree to the terms and conditions of this MOU on the Effective Date.

SIGNED by a duly authorised officer/ representative for and on behalf of the **Government**	Signature:
	Print Name: WALTER H. ROBAN
	Title: DEPUTY PREMIER & MINISTER.
SIGNED by **you** or your duly authorised officer/representative for and on your behalf	Signature:
	Print Name: Ted W. Watt
	Title: Chairman

WILLIAM B. CURRY
PRES. + CEO, BIOS

SCHEDULE 1

DECLARATION OF COMMITMENT TO BLUE PROSPERITY

The Parties hereby agree to the following:

Whereas:

(1) Bermuda's "*A Strategy for the Sustainable Use of Bermuda's Living Marine Resources,*" document outlines Bermuda's need for better management of its marine resources,

(2) Bermuda has a robust history of marine conservation, including early bans on pot fishing, sea turtle protections, a whale sanctuary, membership in the Sargasso Sea Commission, and various other measures;

(3) There is need for a vibrant Blue Economy to achieve the sustainable use of ocean resources for economic growth, improved livelihoods and jobs and ocean ecosystem health;

(4) The Parties share the goals of building a sustainable Blue Economy through Marine Spatial planning resulting in:

a. a healthy, productive, and sustainable ocean;

b. economic growth through marine spatial planning for long-term sustainable management and conservation of ocean resources;

c. a full-scale economic development plan with scientifically sound conservation goals; sustainable fisheries policies and programs that create positive incentives to encourage responsible fishing;

d. in particular, assessing and operationalizing Bermuda's *Department of Environment and Natural Resources'* 2018 *"Fishery Data Improvement and Assessment Action Plan"*

e. durable government and financial human capacity to carry out the above; and

f. durable civil society financial and human capacity to rebuild fisheries where needed and grow a sustainable *Blue Economy* through myriad industries;

(5) Best available science calls for protection of at least 30% of the marine environment;

(6) The Convention on Biological Diversity Aichi Target 11 and SDG 14 calls for protection of at least 10% of the marine environment; Aichi Target 6 calls for the sustainable management and harvest all fish, invertebrates and aquatic plants; and

(7) The International Union for Conservation of Nature (IUCN) adopted Resolution 050 at the 2016 World Conservation Congress for countries to designate and implement at least 30% of each marine habitat in a network of highly protected MPAs.

The Purpose of this agreement is therefore to develop and implement a Blue Prosperity Plan within 30 months of signing the agreed upon Program of Work and Year 1 work plan, including accomplishing the following objectives:

a. Passing any necessary new laws in order to develop and adopt an enforceable, comprehensive, EEZ-wide Marine Spatial Plan designed to sustain the marine environment while growing the blue economy.

b. Designating at least 20% of Bermuda's waters as fully protected fisheries replenishment zones within the comprehensive Marine Spatial Plan. *The Parties will work closely together to assemble the necessary science to support this strong protection of at least 20%, particular with regard to* Bermuda's *own ecological and socioeconomic realities.*

c. From the outset of this partnership, immediately begin developing and, ultimately implementing public and private sustainable finance for ocean management by passing necessary laws, forming relevant national and international partnerships, and the like.

The Parties agree to the following Term:

(1) Commencement Date: within 3 months of Effective Date of the MOU, after the completion of a 30-month Program of Work that is agreed up in writing and signed by all Parties; and
(2) Completion Date: 30 months after the commencement date.

In undertaking this ambitious endeavor, the Parties will:

(1) Develop an annual workplan to be reviewed and revised as necessary every six months by the Parties;

(2) Conduct science, analysis, policy development, and engagement as expressed in the Addendum to follow; and

(3) Pass laws as identified herein within 30 months of signing this Declaration.

Upon the passage of such laws, the Blue Prosperity Coalition will commit to an additional 30 months of support for implementation.

The Parties agree that this endeavor may include one or more of the following Areas of Collaboration, as indicated in the Program of Work:

- Marine Spatial Planning & Protected Area Plans
- Sustainable Blue Economy Long-Term Planning
- Sustainable Financing for MSP
- Scientific Surveys and Assessments
- Legal Analysis, Development and Advocacy
- Community Consultation, Education and Outreach
- Communications and Political Strategy
- Whole of Government Capacity Building
- Enforcement Planning & Assistance
- Civil Society & Government Capacity Building
- Disaster Preparedness within MSP
- Monitoring & Evaluation
- Offshore Renewable Energy Assessment
- Customized Implementation Strategy & Transition/Exit Plan
- Joint Development of Other Customized Solutions

Contact Details

Full Name: Dr. Kathryn Mengerink
Address: 7817 Ivanhoe Avenue, Suite 300
Mailing Address: Same
Tel No.: 1-619-635-4945
Email address: mengerink@waittinstitute.org

MOU Details

Commencement Date:
Completion Date:
Termination Notice Period:

Address for Notices

Full Name: Dr. Kathryn Mengerink
Address: Same as above
Mailing Address:
Tel No.:
Email address:

Signed:

Deputy Premier and Minister, Home Affairs
Government of Bermuda

Date: 12 April 2019.

Founder & Chairman,
Waitt Foundation
on behalf of the
Blue Prosperity Coalition
Date: April 10, 2019

President & CEO,
Bermuda Institute of Ocean Sciences
Date: April 15, 2019