Toolbox for Modifying Marine Protected Areas (MPAs)

May 2023

GOVERNMENT OF BERMUDA
Ministry of Home Affairs

BERMUDA OCEAN
PROSPERITY PROGRAMME

1. Introduction

During the final Focus Group session on May 23, you will be asked to work with your peers to modify the proposed MPA network to address areas of concern raised during recent public consultations. Your suggested modifications will be submitted for consideration by the BOPP Steering Committee when making updates to the MPA network.

This booklet is a toolbox to help you complete that exercise. Here, you will find the baseline information needed to begin modifying the MPA network design to achieve what you feel to be the best possible outcomes for the marine environment and all its stakeholders. We will spend the May 16 Focus Group session learning more about these tools.


What the toolbox includes:

- Currently proposed nearshore MPA network
- Areas of concern
- MPA design considerations
- Spatial objectives of the MSP

- Potential solutions to consider
- Data layers used in mapping
- Science Committee recommendations
- Prioritization model output

2a. Proposed MPA Network for the Bermuda Platform (Nearshore)

This is the currently proposed MPA network for the nearshore area (shoreline to 2000 m depth), as detailed in the First Draft Marine Spatial Plan.

··········· 55 metre depth (30 fathoms)

———— 2000 metre depth (1100 fathoms)

A11

A12

A14   A10   A5

A9   A6   A7

A13

A8
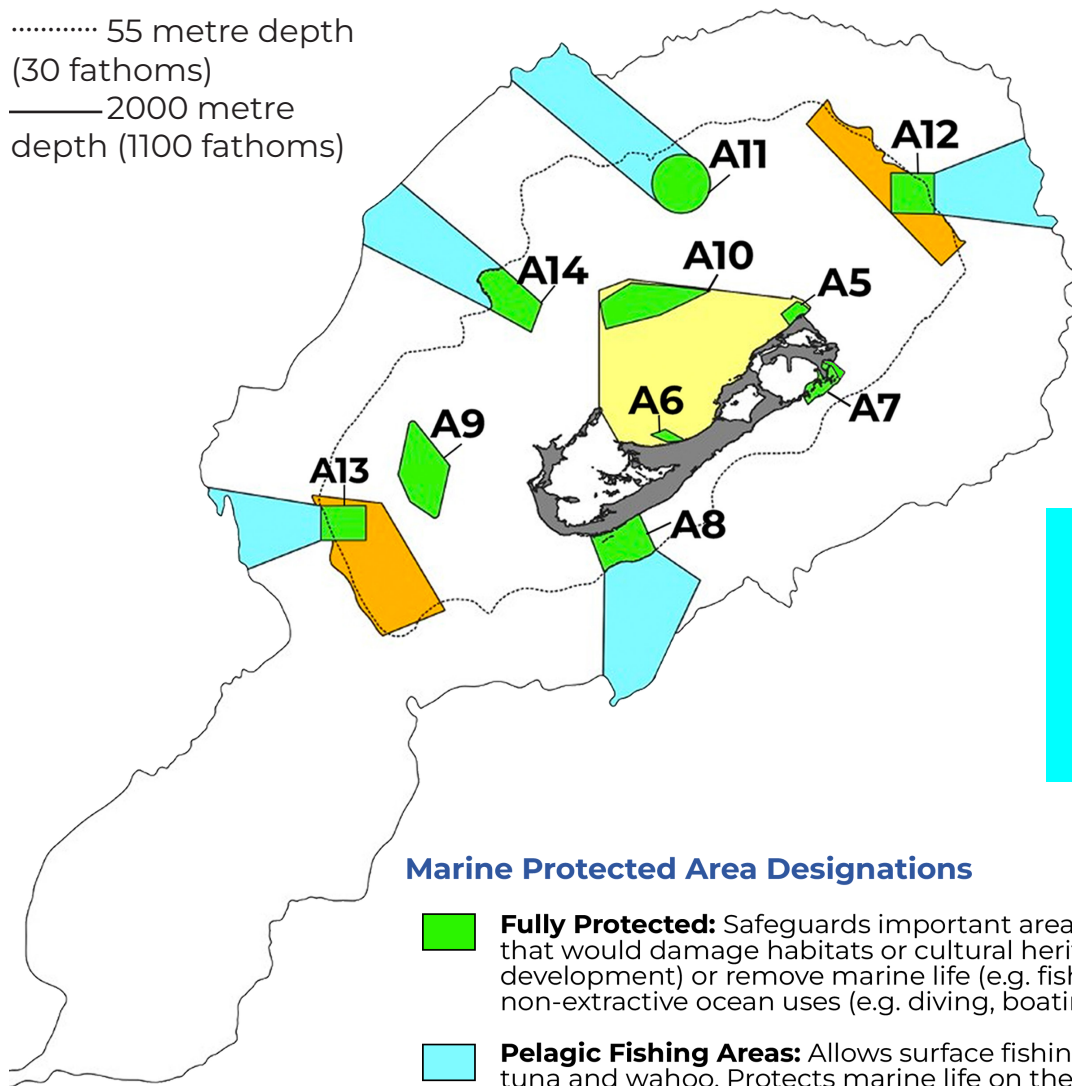
Under this proposal, 80% of Bermuda's waters will remain open to fishing.

10.1% of the Platform would be fully protected (green areas).

The highly protected areas (orange, yellow, and blue) aim to protect habitats, their physical structures, and the ecosystem services they provide, even though some fishing may be allowed.
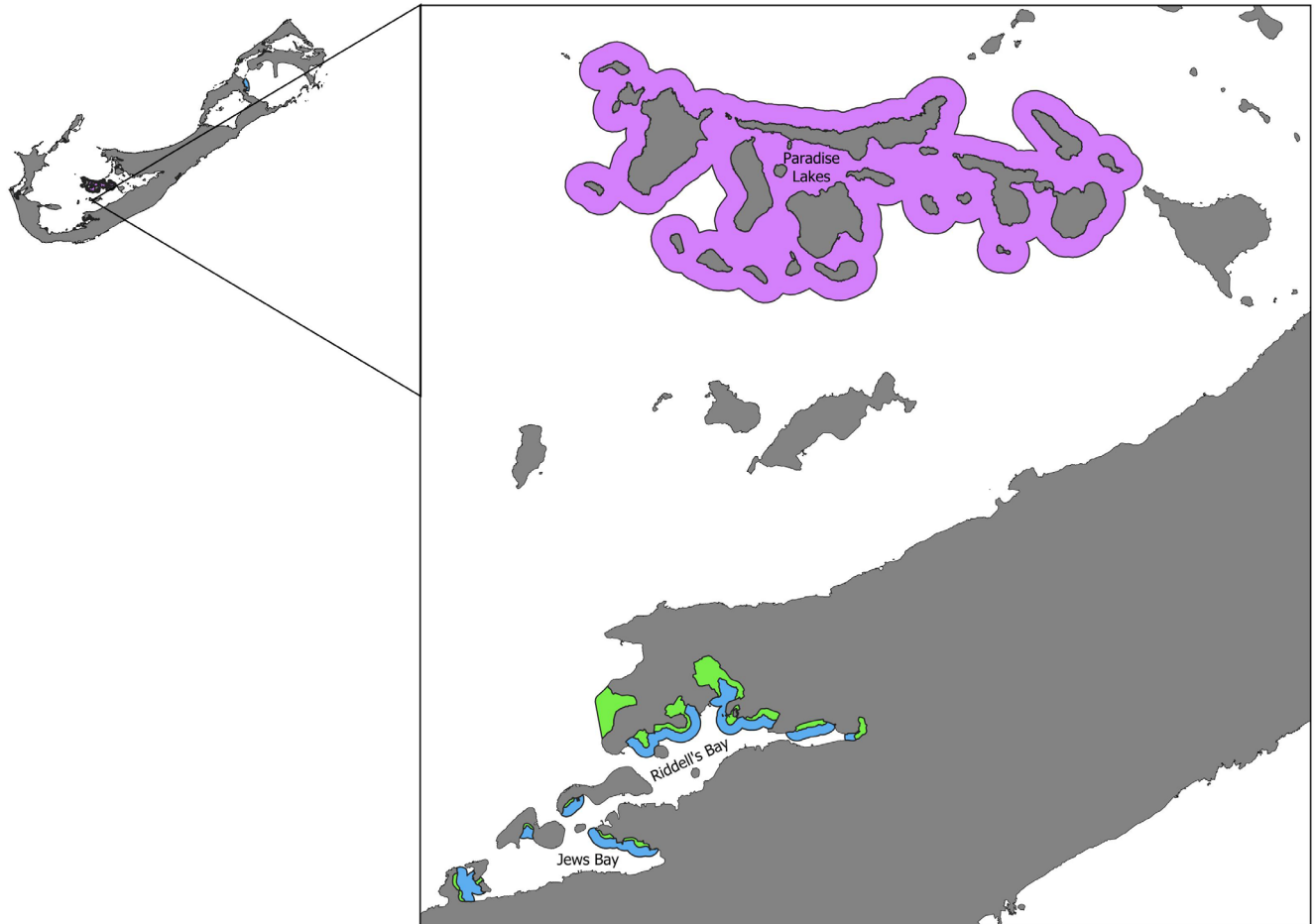
Marine Protected Area Designations

Fully Protected: Safeguards important areas by prohibiting activities that would damage habitats or cultural heritage (e.g. mining, development) or remove marine life (e.g. fishing). Would allow non-extractive ocean uses (e.g. diving, boating).

Pelagic Fishing Areas: Allows surface fishing for pelagic species like tuna and wahoo. Protects marine life on the seabed by prohibiting bottom fishing and activities, such as development and mining, that would damage the fragile habitats here.

Seasonal Closure Areas: Would prohibit shipping and development to protect important spawning grounds for grouper and red hind, but would allow fishing outside of the existing seasonal closure.

Lobster Reservoir: Protects valuable nursery habitat by prohibiting destructive activities and certain developments, such as renewable energy. Lobster trapping is already prohibited. Other uses would not be affected.

Multi-Use Areas: Multiple ocean activities are permitted, including fishing, within existing regulations. An Environmental Impact Assessment will now be required for all developments. The prohibition on foreign commercial fishing vessels and mining will remain.

For more information on the proposed nearshore MPA network and the representative habitats protected in each area, please visit **bermudaoceanprosperity.org/draft-blue-prosperity-plan**

2b. Proposed MPA Network: Coastal Protection Plan

This is a small sample of the proposed coastal protection plan. The full plan can be viewed in the [Draft Marine Spatial Plan](#).

Fully protected areas safeguard important habitats, such as mangroves (with a 10 m full protection buffer) or seagrass, by prohibiting activities that would damage habitats (e.g., development) or remove marine life (e.g., fishing).

No fishing zones safeguard mangroves as a nursery habitat by prohibiting fishing within 50 m from the proposed fully protected areas.

No net fishing zones safeguard important nursery areas by prohibiting net fishing within 100 m of the shoreline in Paradise Lakes.

3. Areas of Concern

During the public consultations at the end of 2022, we received a range of feedback about the Draft Marine Spatial Plan, including the Draft MPA network. These have been broken down into four topics of concern.

In the final focus group session on May 23, you will discuss how the MPA design can be modified to address these concerns.

Topic 1: The complexities of fishing have not been adequately considered

- Many of Bermuda's fishermen utilise different areas of the Platform and different gear types at different times of the year.

- The impact on the bait fishery is too high and the rest of the fishing industry is dependent upon this fishery.

- There is too large of an impact on the livelihoods of commercial fishermen.

- The impact on recreational "fishing from the rocks" is too high.

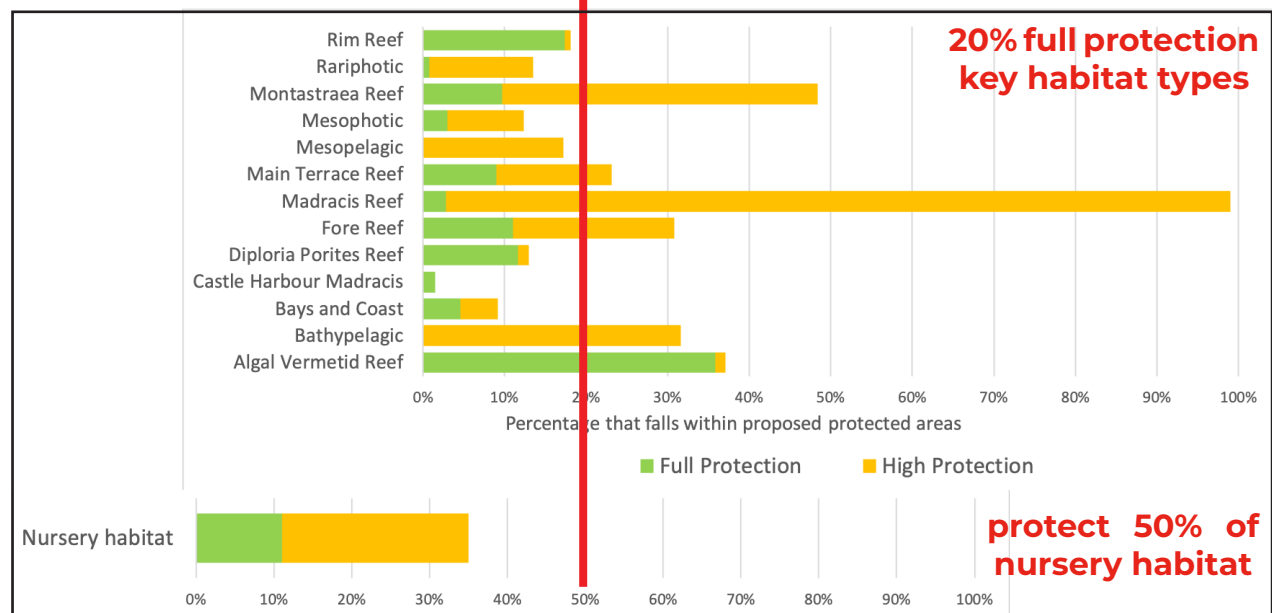# Topic 2: The proposed protection is not adequate to fully meet the ecological objectives

- The nearshore area is under the most pressure and should have more protection.

- Larger MPAs are needed to protect top predators, such as grouper.

- A more data-driven approach could be applied to designate protection and better achieve ecological objectives.

Habitat zones
- Bays and coast
- Madracis reef
- Montastraea reef
- Diploria porites reef
- Castle Harbour madracis
- Algal vermatid reef
- Rim reef
- Main terrace reef
- Fore reef
- Mesophotic
- Rariphotic
- Mesopelagic
- Bathypelagic

0   10   20 km
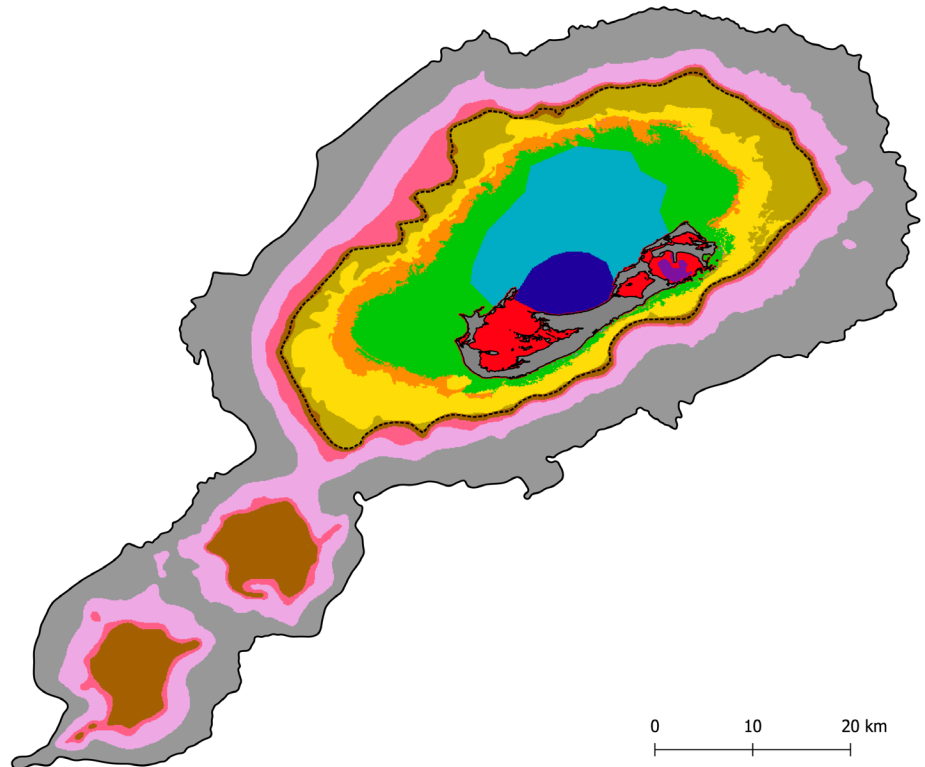
Percentage of habitats that fall within the proposed protected areas

Target

20% full protection key habitat types

Rim Reef
Rariphotic
Montastraea Reef
Mesophotic
Mesopelagic
Main Terrace Reef
Madracis Reef
Fore Reef
Diploria Porites Reef
Castle Harbour Madracis
Bays and Coast
Bathypelagic
Algal Vermetid Reef

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%

Percentage that falls within proposed protected areas

■ Full Protection   ■ High Protection

Nursery habitat

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%

protect 50% of nursery habitat

Topic 3: Proposed protection will impact the ability to maintain critical infrastructure

- Cable maintenance needs better consideration where cables pass through the proposed MPAs.

- Dredging should be permitted where MPAs overlap with shipping lanes.

- MPA designation should not prevent maintenance of current infrastructure (e.g., moorings, docks, slips, marinas, etc.).

- Current proposals around Paradise Lakes and Smith's Island could prevent future maintenance of critical infrastructure.

- Pollution sources should be better considered in MPA designation.

Topic 4: MPA placement should enhance tourism and not impact potential development opportunities

- Development and infrastructure works should not be prohibited at the shoreline, especially in popular tourism areas.

- The amount and level of proposed protection should be increased in order for blue tourism to benefit.

- MPAs should be placed and marketed to improve the tourism sector.

4. MPA Design Considerations

MPAs allow for ocean ecosystems and populations of marine organisms to replenish and grow. The movement of fish and invertebrates, such as lobster, beyond the borders of a protected area is known as **spillover**. When planning MPAs and MPA networks, there are some basic design considerations that can increase the likelihood of spillover.

Size of the MPA

Less spillover

vs.
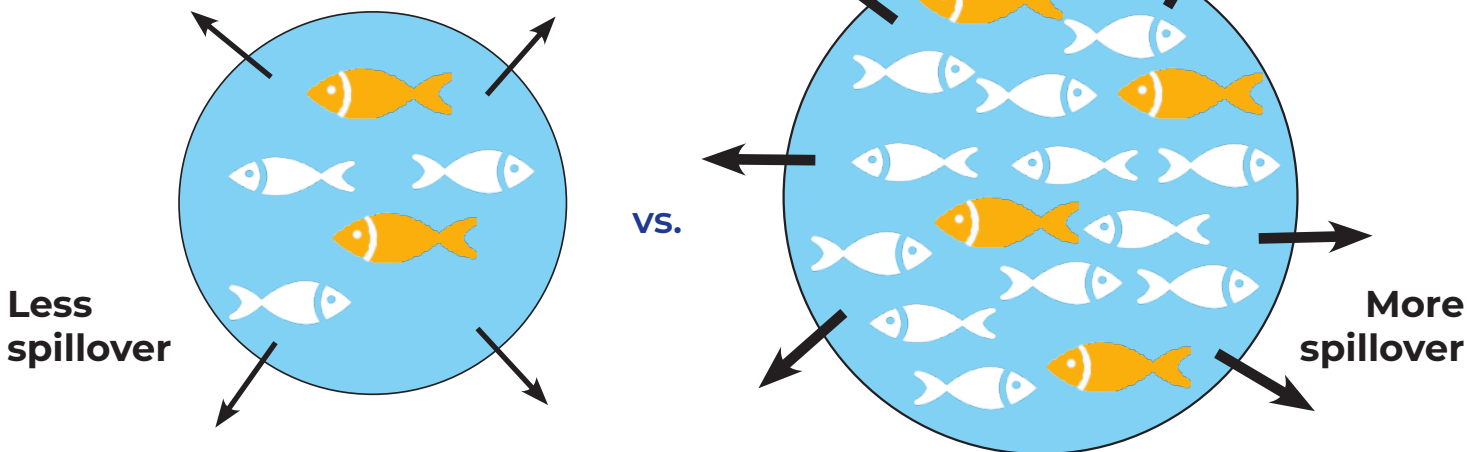
More spillover

Shape of the MPA (aka, the "edge effect")

Simple
Area=10km^2
Edge=11km

Less spillover relative to population size
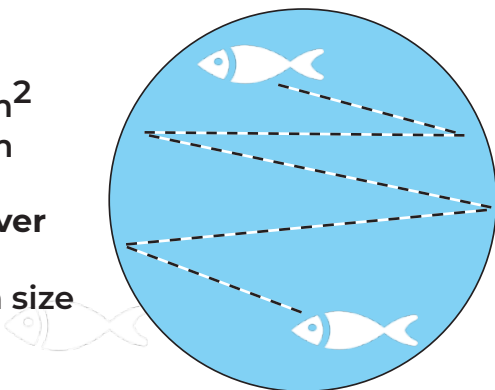
Complex
Area=10km^2
Edge=27km

More spillover relative to population size

MPA Boundary Location

valuable habitat

Boundary encompasses habitat

Less spillover relative to population size

valuable habitat

Boundary crosses through habitat

More spillover relative to population size
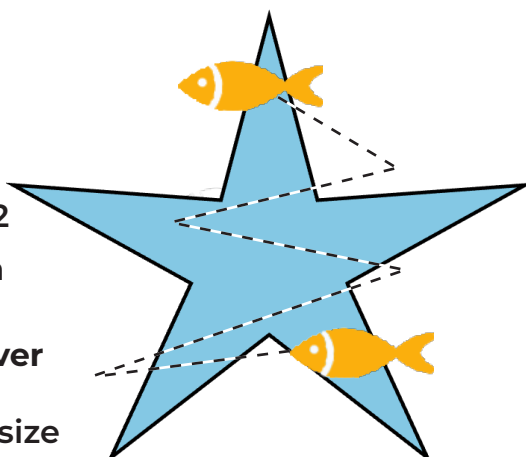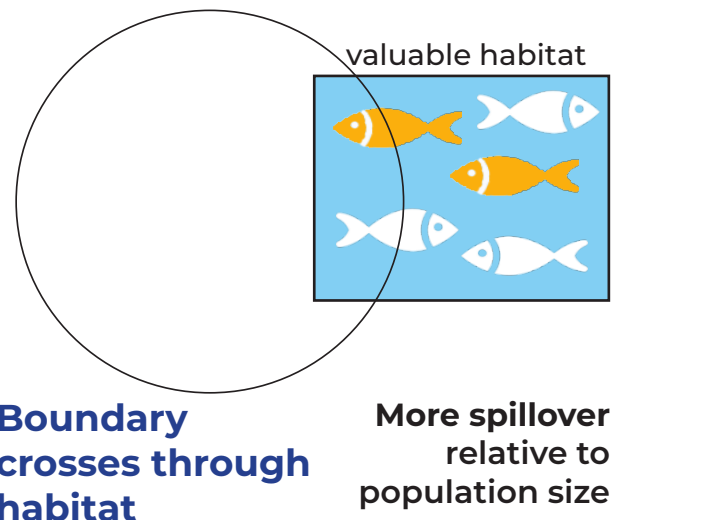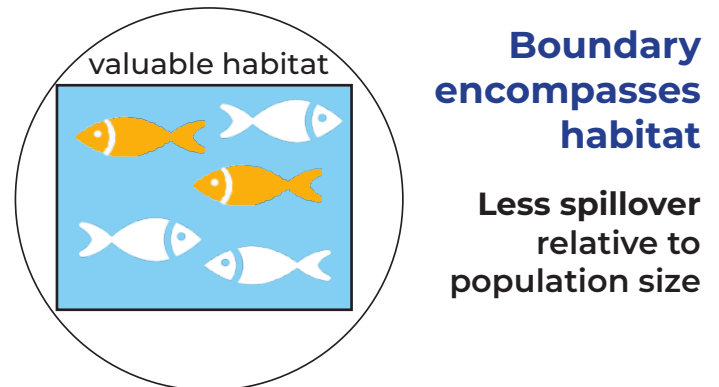
5. Spatial Objectives

The best available science was used to determine which conditions make MPAs most effective. Local scientists and stakeholders helped to turn this information into formalised spatial objectives. The spatial objectives can be thought of as an "instruction manual" for how to design Bermuda's MPA network. Below is a summary of these objectives to help you create your maps. To read the original spatial objectives, download the [Draft Marine Spatial Plan](#) and reference pages 49 to 54.

- Designate a minimum of 20% of Bermuda's EEZ as fully protected no-take Marine Protected Areas.

- New MPAs should consider and optimise existing legislated areas.

- Efforts should be made to ensure representative full protection coverage (20%) of each key habitat type and higher as specified in other objectives.

- MPA designations should prioritise those areas that have both conservation and historical significance.

- Protect 50% of juvenile fish nursery habitats and/or areas used by protected marine species.

- When designating MPAs, maintain restrictions at known 'fish' breeding or aggregation sites.

- When designating MPAs, prioritise those areas that seek to protect valuable habitat used by unique, rare, and/or threatened species.

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

- 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.

6. Potential Solutions

The BOPP Steering Committee and Science Committee have discussed potential solutions to address some of these concerns. You can choose whether to adopt these solutions when you suggest modifications to the Draft MPA network.
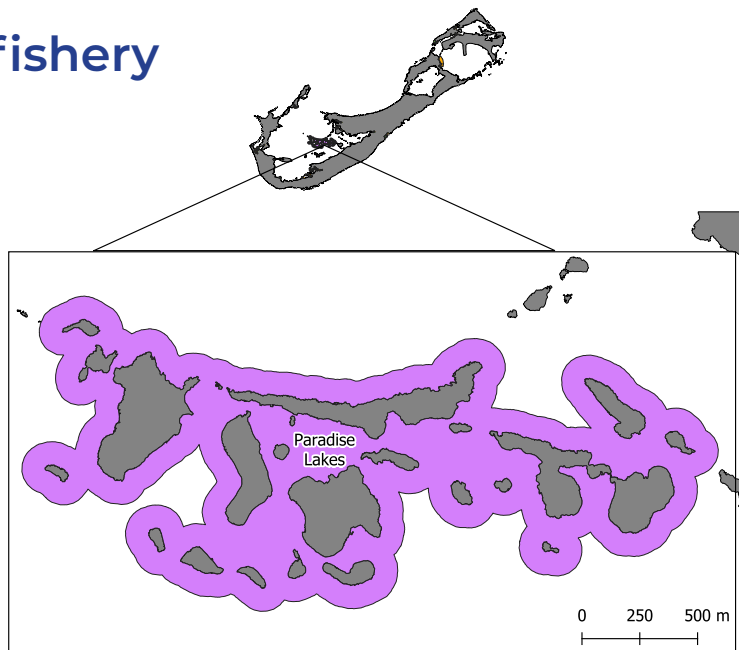
Reduce impacts to the bait fishery

Paradise Lakes

- Important to bait fishermen during the winter
- Currently proposed to prohibit net fishing year round

Suggested Proposals

- **Remove year round prohibition against netting**
- **Seasonally close to netting in the summer** (May-October, inclusive)
- Proposal is acceptable to DENR

Mangrove Areas

- Stakeholders have said that the proposed 50 m no fishing buffer zone placed to protect mangrove habitat will have too large of an impact on the bait fishery

Suggested Proposals

- **Remove 50 m no fishing buffer.**
- The BOPP Science Committee supported this change in light of local research showing that juvenile fish often stay within a few metres of mangroves

without 50 m no fishing buffer
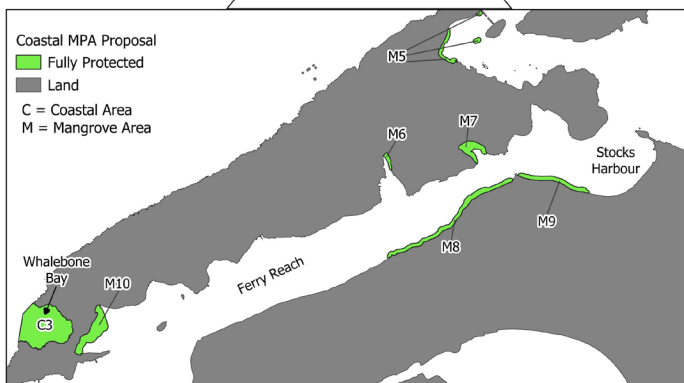
with 50 m no fishing buffer
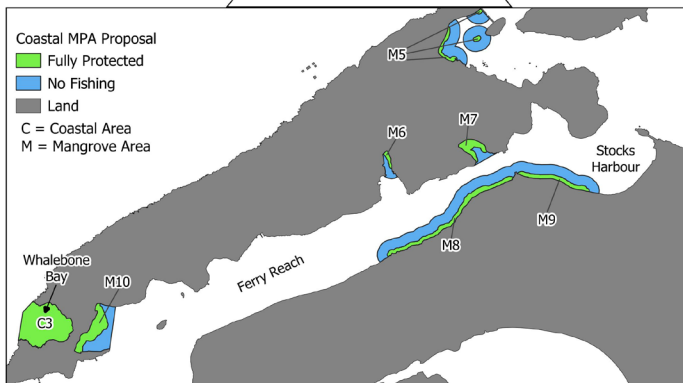
Better consider complexities within the fishing industry

- We heard feedback that we needed to better account for the various types of gear used, the different species being fished for, and changes in fishing that take place throughout the year

Solution to Consider

- **An updated Ocean Use Survey (OUS) with additional information from the commercial fishing industry**

- The original OUS has been updated with feedback from 75 commercial fishermen (38% of the industry), which included 36 full-time fishermen (60% of the industry) and 39 part-time (29% of the industry).

Commercial fishing - All fishing
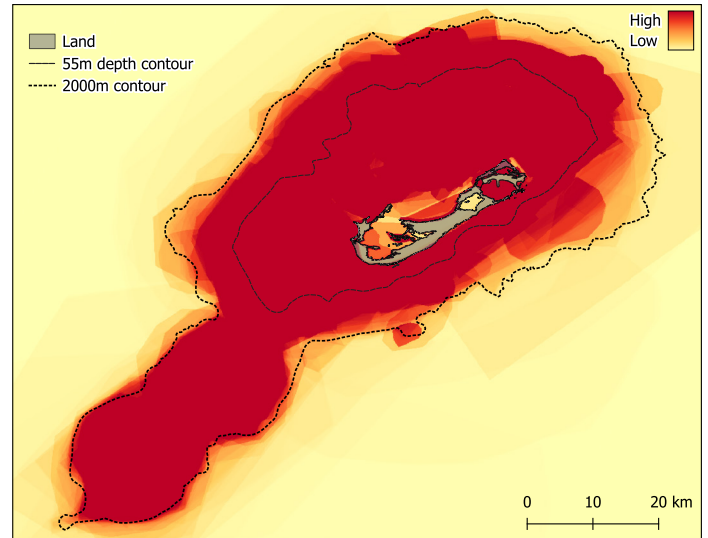
When taken together, the new data are similar to the original survey and show that all the Platform is utilised in some way.

With the new surveys, we are better able to break down the combined data to better assess the different types of fishing that occur in Bermuda, as shown in the maps below. We've also been able to create other heat maps based on species fished and fishermen based in the east, west, and central regions. **These new, more specific data layers help us to better meet the objective of ensuring continued access to the most highly valued fishing grounds**.
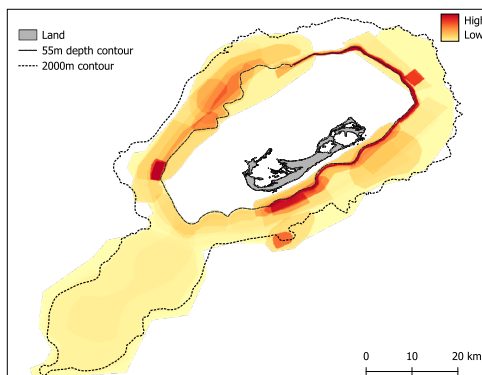
Commercial fishing - Pelagic Trolling
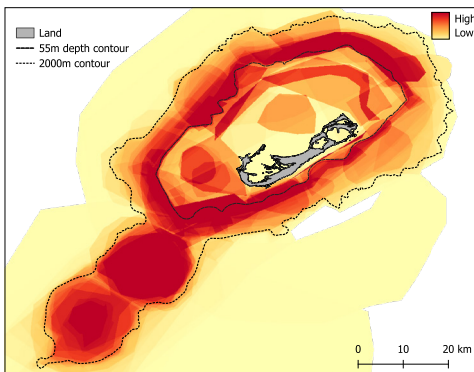
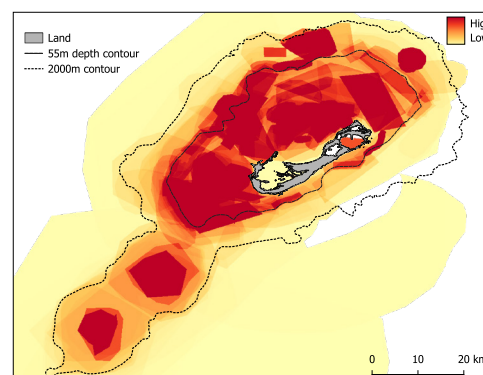Commercial fishing - Rockfish Trolling
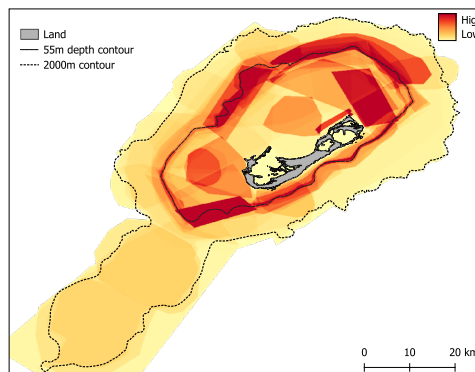
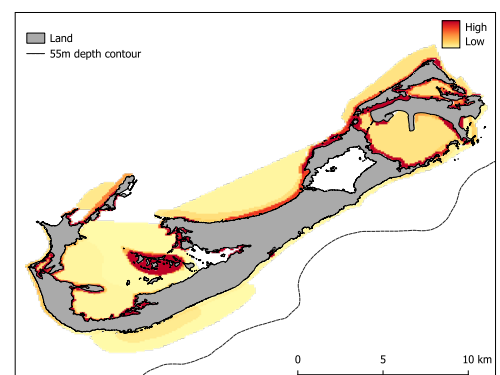

Commercial fishing - Spiny Lobster Trapping
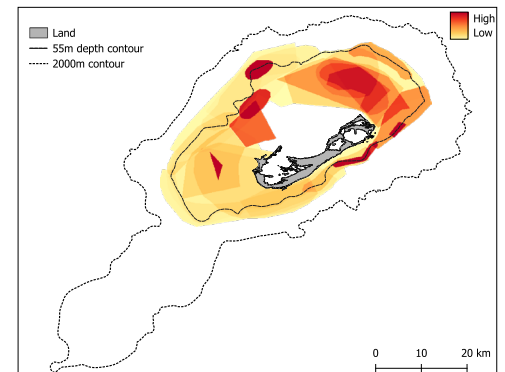
Commercial fishing - Vertical Lining

Commercial fishing - Bottom Fishing

Commercial fishing - Bait Fishing

Address conflicts with a variety of shoreline uses
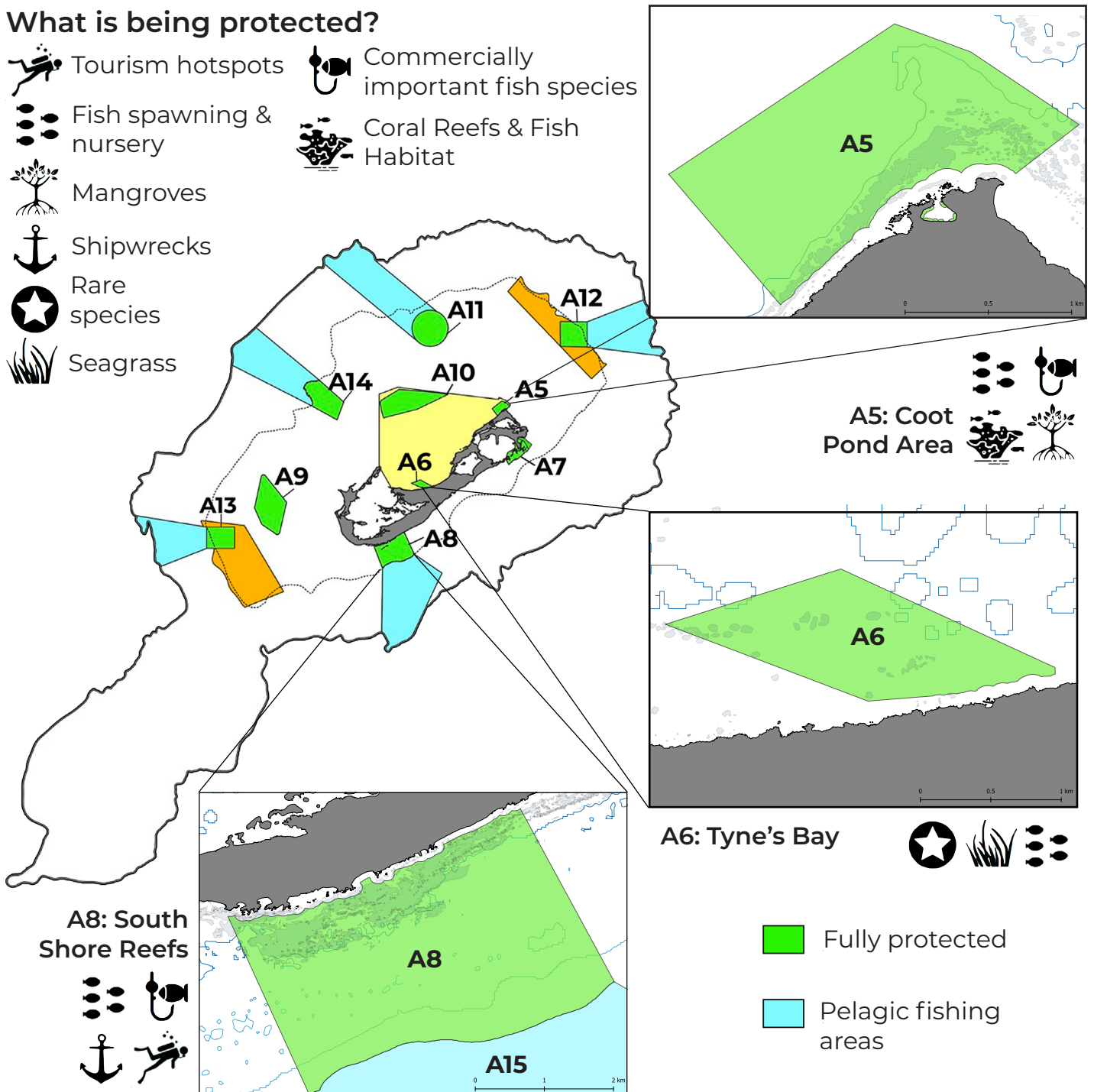
Shoreline Uses to Address

- Recreational "fishing from the rocks"
- Maintenance of existing shoreline infrastructure
- Future shoreline development opportunities

Solution to Consider

- **Remove full protection to 100 m away from the shoreline in high conflict areas**

What is being protected?

Tourism hotspots

Fish spawning & nursery

Mangroves

Shipwrecks

Rare species

Seagrass

Commercially important fish species

Coral Reefs & Fish Habitat

A5

A5: Coot Pond Area

A11

A12

A14

A10

A5

A6

A7

A9

A13

A8

A6

A6: Tyne's Bay

A8

A15

A8: South Shore Reefs

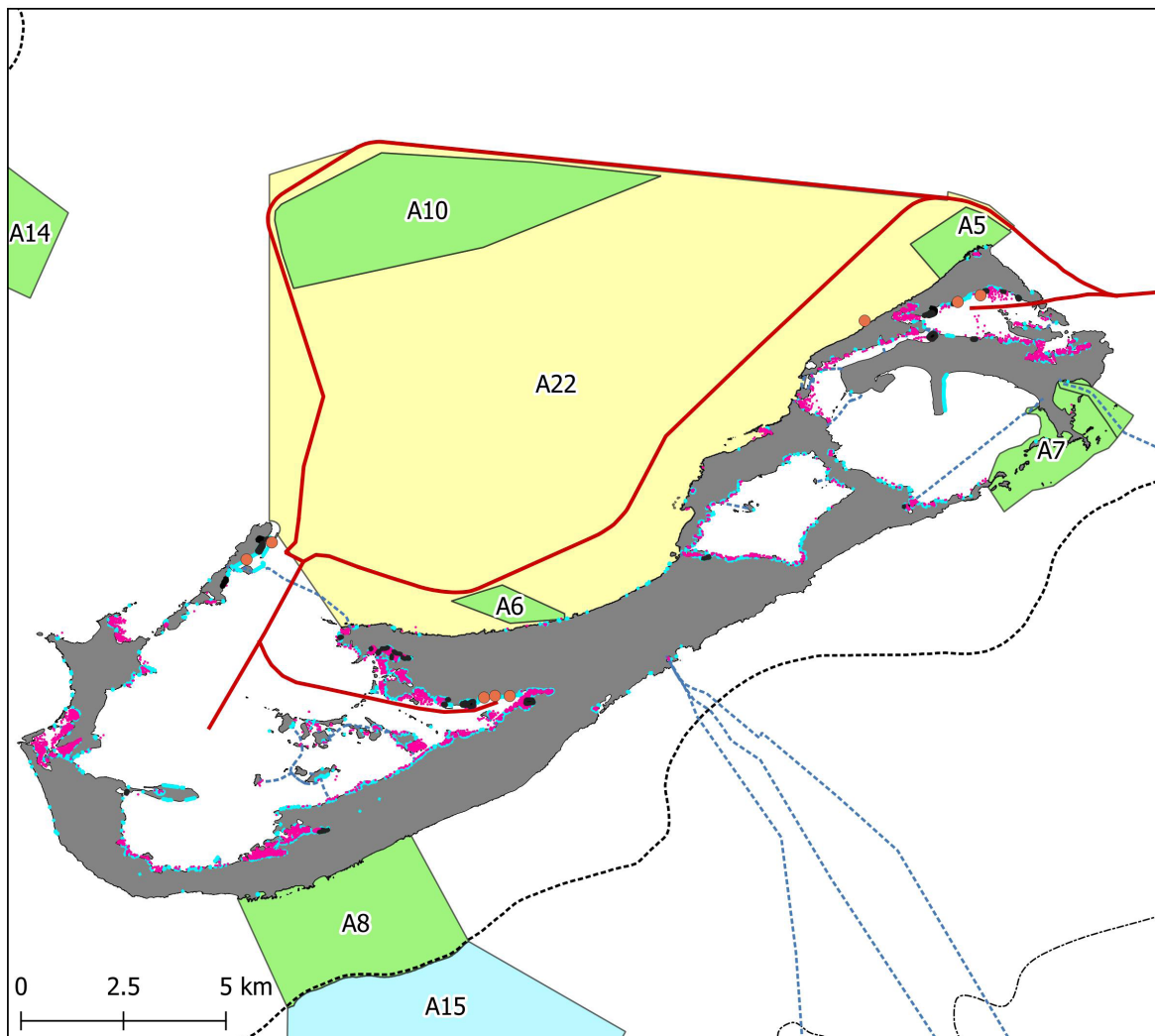Fully protected

Pelagic fishing areas

Address impacts on utilities and infrastructure

Solution to Consider

Modify the MPA Network to ensure continued ability to perform maintenance on:

- Shipping lanes
- Cables
- Moorings
- Shoreline infrastrure (e.g., docks, slips)

Utilities

- 🟠 Port facilities
- ⬛ Marinas and boat yards
- 🔴 Moorings
- 🟦 Docks
- ─── Shipping lanes
- ----- Sea floor cables

- ⬛ Land
- ----- 55m contour
- -·-·- 2000m depth contour

Nearshore MPA Proposal
- 🟩 Fully protected
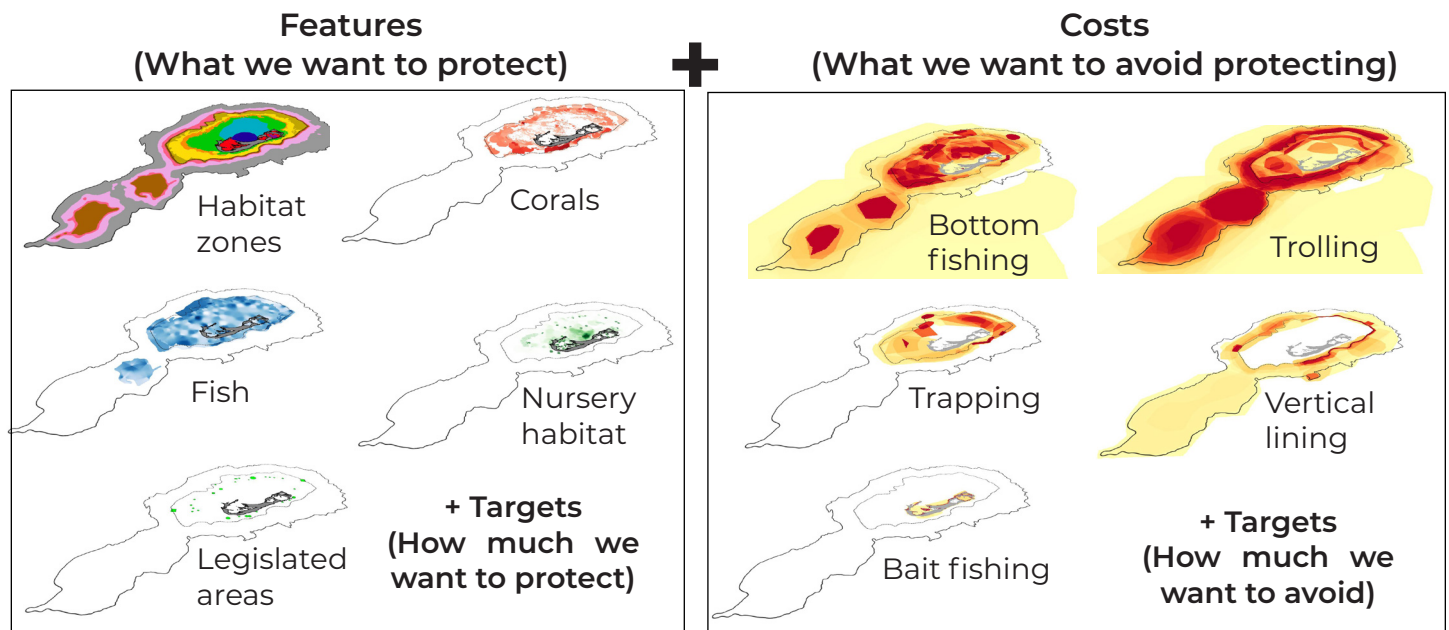- 🟨 Lobster reservoir
- 🟦 Pelagic zone

Designate protection to better achieve ecological objectives
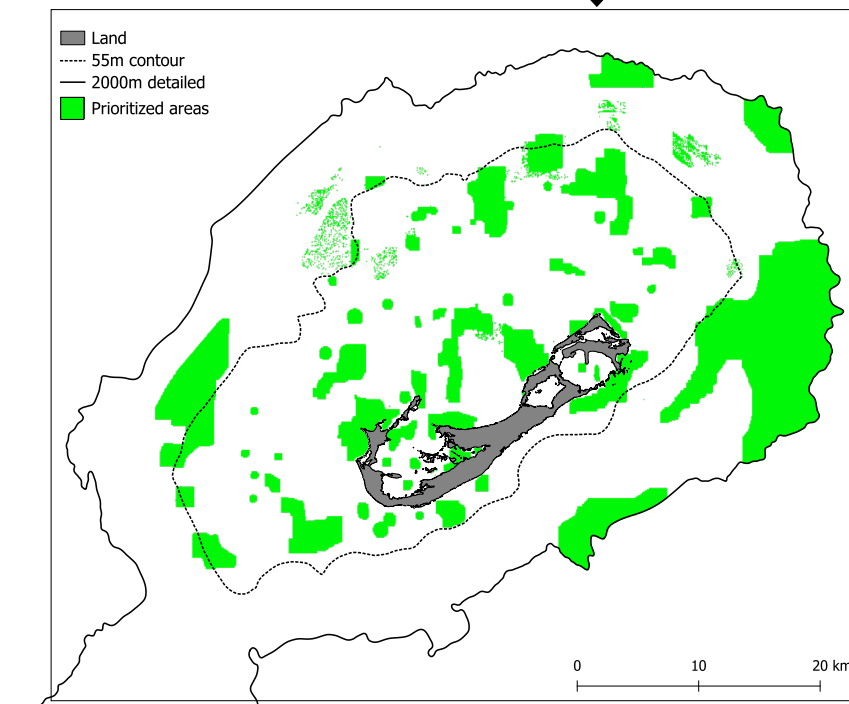
Solutions to Consider

Use a data-driven, prioritization model to design protected areas in a way that best meets conservation objectives while minimising user conflicts (socioeconomic costs).

Consider incorporating the mapped Science Committee recommendations, which are areas recommended for protection based on the expert opinions of our top scientists. Please see Section 8, page 16 for more details.

How the Prioritization Model Works

Features
(What we want to protect)

+

Costs
(What we want to avoid protecting)

Habitat zones

Corals

Fish

Nursery habitat

Legislated areas

+ Targets
(How much we want to protect)

Bottom fishing

Trolling

Trapping

Vertical lining

Bait fishing

+ Targets
(How much we want to avoid)

Run the model

Land
.... 55m contour
——— 2000m detailed
■ Prioritized areas

0   10   20 km

Result

A new map of priority areas for protection that better considers both ecological and socio-economic factors using a data-driven approach.

7. Data Layers

This section details some of the most important data layers you will have at your disposal to help with the mapping exercise in session #5.

Top priority data layers

- **Proposed MPA network**
- **Science Committee recommendations**
- **Prioritization model output**
- **Habitats**
  - Habitat zones
  - Nursery habitat
    - Seagrass
    - Mangroves
    - Patch Reef
- **Historic wreck value**
- **Imporant Reef Areas**
  - Coral health heatmaps
    - Cover, diversity, rugosity, recruitment
  - Fish health heatmaps
    - Diversity, density, recruitment
  - Fish health heatmaps (commercial species only)
    - Diversity, density, recruitment
- **Fishing Ocean Use Survey Heatmaps**
  - Commercial
    - Pelagic trolling, rockfish trolling, vertical lining, bottom fishing (snappers), bottom fishing (turbot), bottom fishing (other species), spiny lobster trapping, guinea chick trapping, bait fishing, shark fishing, eastern-based fishers, central-based fishers, western-based fishers
  - Recreational
    - Bait fishing, bottom fishing, trolling, lobster diving, spearfishing
- **Utilities, Infrastructure, and Waste Management**
  - Point source pollution, cables, shipping lanes, moorings, marinas, docks, boat-yards, ports, shoreside roads and buildings, other important tourism areas (e.g., Tourism Zones from the Bermuda Terrestrial Plan)
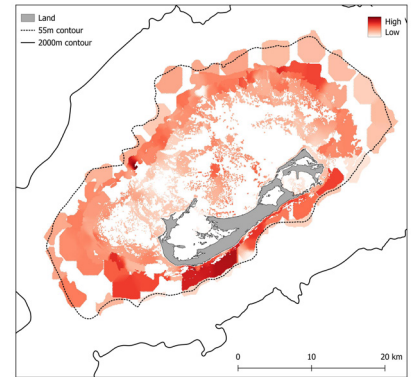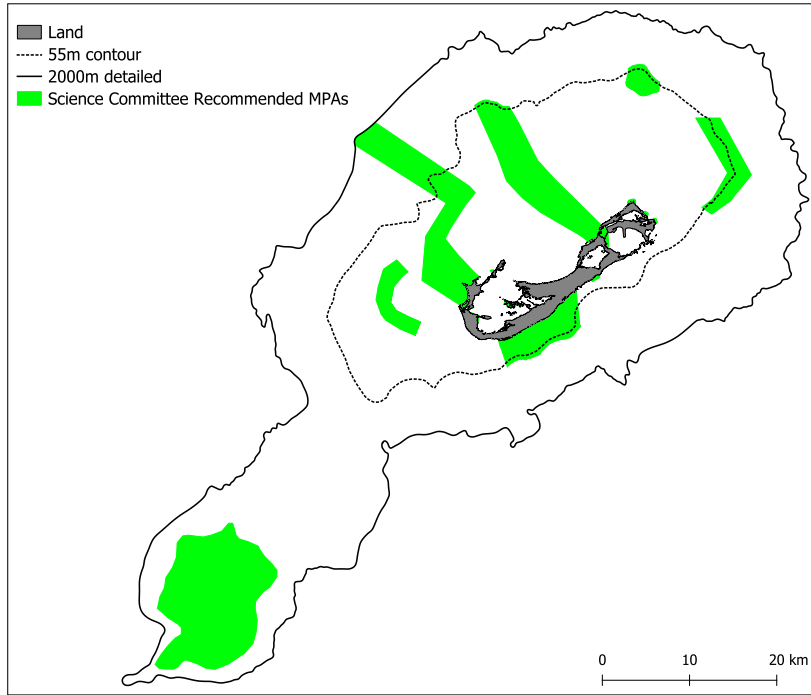

Coral cover
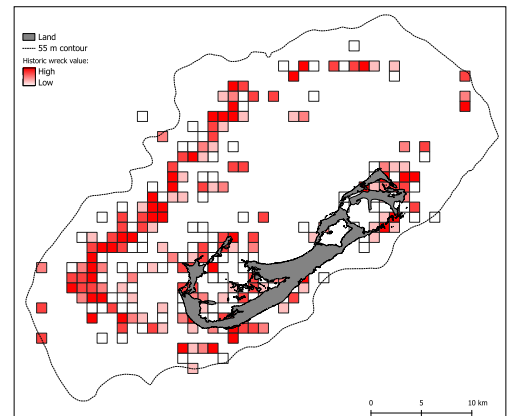
Historic wreck value

8. Model Output & Recommendations

Science Committee Recommendation

A Committee of 15 resident scientists made recommendations on the best areas to protect based on their expert scientific opinions.
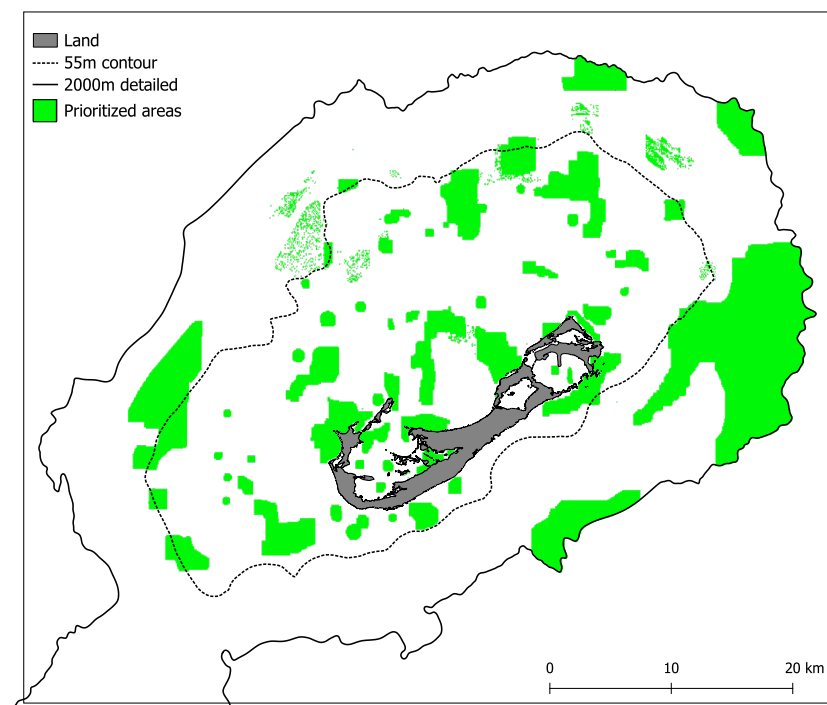

For full details scan here:

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Prioritization Model Output

A computer model analysed data provided by local scientists, alongside the most valued fishing areas as described by the fishing community, to prioritize areas for protection while minimising user conflict.

For more information on the prioritization model, please see section 6, page 14