BERMUDA'S
BLUE PROSPERITY PLAN

DRAFT BLUE ECONOMY STRATEGY

August, 2022

GOVERNMENT OF BERMUDA
Ministry of Home Affairs

BERMUDA OCEAN
PROSPERITY PROGRAMME

DRAFT
BERMUDA BLUE ECONOMY STRATEGY (2022-2032)
AUGUST, 2022

Prepared by the Bermuda Ocean Prosperity Programme with support from UCLA and Finance Earth.

This report was prepared for official use by the Government of Bermuda.

This is a draft of the Bermuda Blue Economy Strategy that has been approved by the Bermuda Cabinet for stakeholder consultation as a part of the Blue Prosperity Plan.

Contents

Acronyms

ACRONYMS

BDA	Bermuda Business Development Agency
BEDC	Bermuda Economic Development Corporation
BIF	Blue Investment Facility
BIOS	Bermuda Institute of Ocean Sciences
BOPP	Bermuda Ocean Prosperity Programme
BTA	Bermuda Tourism Authority
DENR	Department of Environment and Natural Resources
DOE	Department of Energy
EA	Environmental Authority
ESG	Environmental, Social, and Governance
EEZ	Exclusive Economic Zone
EmLab	The Environmental Markets Lab
ERP	Economic Recovery Plan
FATF	Financial Action Task Force
FDC	Fisheries Development Centre
GDP	Gross Domestic Product
GWh	Gigawatt hour
IRP	Integrated Resource Plan
kWh	Kilowatt hour
MW	Megawatt
OECD	Organisation for Economic Co-operation and Development
OTEC	Ocean Thermal Energy Conversion
RA	Regulatory Authority
UCLA	University of California, Los Angeles
WI	Waitt Institute

CURRENCY EQUIVALENT

Dollars ($) throughout refer to Bermuda dollars (BMD), unless otherwise stated

1 BMD = 1 USD

1. Foreword

Walter H. Roban, JP, MP

Deputy Premier, Minister of Home Affairs

It is a pleasure to present the Blue Economy Strategy for Bermuda, which sets the context for our ambition to make Bermuda a global Blue Economy leader. This strategy helps build on our trajectory of sustainable economic development whilst enhancing and maximising our blue assets. It links closely with our Marine Spatial Plan and its goal to sustainably manage resources and protect 20% of Bermuda's waters as no-take fisheries replenishment zones. The Blue Economy Strategy and Marine Spatial Plan are complementary to one another and should be viewed in conjunction, as they are supporting documents that assist Bermuda in achieving its broader economic, social, and environmental goals.

Careful planning and management of our ocean environment will help our Blue Economy industries to grow and thrive. We are grateful for the wealth of input and support from Bermudian stakeholders and our partners at Bermuda Ocean Prosperity Programme (BOPP)[1]; which has led to this Blue Economy Strategy.

Bermuda may be small in land mass, but its ocean is large; Bermuda's Exclusive Economic Zone (EEZ) is over 450,000 square kilometres, giving us great potential to create world class Blue Economy industries that support economic development and grow jobs while protecting the natural environment. This Strategy identifies our core strengths in the Blue Economy as well as highlighting the importance of finance in our ambition to create a Blue Investment Facility. The Blue Investment Facility will be built upon as the foundation of our Strategy, helping to deliver on the projects outlined and support Blue economic growth as a cornerstone of our economy. We are after all, not small islands but Big Ocean Sustainable States.

Our ocean provides so much for us - economic security, food on our tables, beautiful and ecologically valuable biodiversity, and is the bedrock of our history and culture. We recognise the ability for Bermudians to live in harmony with the ocean whilst maximising its assets for the greater good of our communities. Our related industries that benefit from these ocean services, fisheries, tourism, ocean renewables, and more, can continue to thrive through this Blue Economy approach.

As an island, Bermuda is blessed – our high GDP and thriving industries cannot be separated from ocean protection and enhancement of our blue assets. We recognise that our economic development must go hand in hand with our largest natural resource. Our Blue Economy Strategy allows us to deliver on this and aims to support Bermuda in a sustainable transition; one that all Bermudians, our youth, and indeed the world needs. We hope to inspire others, show our determination, and accelerate our pathway to Blue Economy leadership. We recognise the support of our citizenry is pivotal and ask that we collectively adopt this and drive it forward. This Strategy, alongside the Marine Spatial Plan, clearly outlines how a Blue Economy approach can support Bermuda for generations to come and we are excited to share our vision with you.

Thank you. Dive in!

Walter H. Roban, JP, MP

Deputy Premier and Minister of Home Affairs

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

Provide Your Feedback

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

Are the proposed goals the right Blue Economy priorities for Bermuda?

Goal 1: Facilitate sustainable fisheries
Goal 2: Expand sustainable marine tourism
Goal 3: Produce cleaner, cheaper, energy
Goal 4: Increase blue investment in Bermuda

Do you know of a project that should be considered for the Blue Investment Facility that aligns with the blue economy guiding principles, supports the draft goals, and has the potential for a return on investment?

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.

2. Executive Summary

THIS IS A DRAFT of Bermuda's Blue Economy Strategy ("the Strategy"). The Strategy was created with involvement from various Government entities, resident member organisations, industry experts, ocean stakeholders, and the general public. It remains in draft state such that input can continue to be incorporated through an extensive public consultation process led by Government.

The Draft Blue Economy Strategy is complemented by the first draft of Bermuda's Marine Spatial Plan (MSP). The MSP was first called for in the 2010 A Strategy for the Sustainable Use of Bermuda's Living Marine Resources. While the Blue Economy Strategy outlines opportunities for economic growth, revenue diversification, and improved social equity, the MSP provides a spatial context for those activities, helping to inform Bermuda's management of its ocean space and the protection of its blue assets. Taken together, the Blue Economy Strategy and the MSP create a Blue Prosperity Plan for Bermuda, which supports the continued protection and enhancement of Bermuda's coastal and marine resources for current and future generations.

THE BLUE ECONOMY IS A $3 TRILLION OPPORTUNITY

The Organisation for Economic Co-operation and Development (OECD) estimates that the global Blue Economy accounts for $1.5 trillion annually. That number is projected to double to $3 trillion by 2030, making it potentially one of the fastest-growing sectors of this decade.

The Blue Economy is defined by the World Bank as "the sustainable use of ocean resources for economic growth, improved livelihoods, jobs and ocean ecosystem health". It covers a range of sectors including: ocean research and biotechnology, ocean-based renewable energy, waste management, coastal and marine tourism, coastal climate protection and infrastructure, fisheries and aquaculture, sustainable maritime transport, and other ocean- and maritime-related services, including sustainable blue finance.

Increasingly, nations are seeking to maximise the returns on their blue economies, starting with focused strategic planning. Through this document, Bermuda shares its 10-year vision and strategy for global leadership in the Blue Economy space.

BERMUDA HAS A STRONG FOUNDATION FOR LEADERSHIP IN THE BLUE ECONOMY

The country has a wealth of "blue assets" - ocean-related resources that contribute to the environmental, social, and economic development of the country to which they belong. Its unique oceanic geographic location, large Exclusive Economic Zone (EEZ), and rich biodiversity are just three notable examples of these assets. Paired with deep history in blue economy industries such as commercial fishing and considerable prowess in the financial services sector, Bermuda is well-positioned to have a thriving Blue Economy. Bermuda can become the global hub for environmental, social, and governance (ESG) and climate finance due to its existing sectors and physical and intellectual infrastructure.

Bridging the gap from what exists today to a thriving, world-class Blue Economy requires a vision. The 2032 Blue Economy vision sees Bermuda as a global Blue Economy leader with prosperous ocean industries. This Bermuda is the Atlantic hub for blue wealth and sustainable equity. Built on a robust Marine Spatial Plan (MSP) for maintaining and building natural capital, Bermuda's future Blue Economy

supports a cadre of blue entrepreneurs and enterprises, and provides greater job opportunities for a wider cross-section of the Bermudian population. It also attracts and develops innovative finance and builds capacity to contribute to the growth and export potential of Blue Economy sectors while maintaining ecosystem integrity through sustainable management of common resources.

When achieved, Bermuda will be synonymous with Blue Economy. This reputation, in turn, will help attract more finance, innovation, enterprise development, jobs, and economic growth in Bermuda's Blue Economy space. It is an iterative, positive-feedback process. The Goals, Objectives, and Pipeline Projects within the Draft Blue Economy Strategy are designed to set the process in motion.

THE DRAFTING PROCESS BALANCED TRADITION AND AMBITION

The Draft Blue Economy Strategy was created by the Bermuda Ocean Prosperity Programme (BOPP) over the course of two years. A careful process was adopted to guarantee that existing laws, plans, and other strategic documents served as the foundation, while not constricting aspirational visioning. BOPP wanted to ensure that ambitious, new avenues for economic diversification were uncovered.

To begin the process, a set of Guiding Principles was adopted by the BOPP Steering Committee:

- Provide social and economic benefits for current and future generations of Bermudians, by contributing to food security, poverty eradication, livelihoods, income, employment, health, safety, equity, and political stability.
- Restore, protect, and maintain the diversity, productivity, resilience, core functions, and intrinsic value of marine ecosystems.
- Utilise evidence-based decision-making when evaluating new activities, policies, or tradeoffs and, in circumstances where evidence is lacking, the burden of proof falls on those advocating for an action.
- Adopt a multidisciplinary approach to management and prioritise activities which benefit Bermuda and Bermudians as a whole, instead of a single sector.
- Employ participatory, inclusive, and transparent governance.

These principles outline a balanced approach to the Strategy's development—allowing for thoughtful consideration of all participants in the Blue Economy.

Following the adoption of the Guiding Principles, BOPP commissioned expert analysis on four of Bermuda's core Blue Economy industries: commercial fishing, blue tourism, ocean renewable energy, and aquaculture. The commissioned analyses consisted of market evaluation and extensive consultation with stakeholders to effectively evaluate the historical and current performance of these sectors in Bermuda, while identifying informed suggestions for continued sustainable growth over the next 10 years. Experts were encouraged to think creatively about what might be possible in the future to match the aspirational nature of the Blue Economy Vision.

While subject matter experts provided core analyses and recommendations, they were always based upon local knowledge and viewpoints. At multiple points throughout the Draft Strategy's creation, stakeholders have been invited to provide their input and critiques. The resulting Strategy is one that represents the views of many voices.

BOPP served as moderator to review the expert reports and validate which elements were suitable for inclusion in the Draft Blue Economy Strategy. Throughout the process, there was coordination with the development of the MSP, such that the contents of both documents are complementary.

FOUR GOALS WILL ALLOW BERMUDA TO ACHIEVE ITS BLUE ECONOMY VISION

BOPP has organised the output of all the expert analyses and stakeholder input into four goals, which are designed to work together—delivering on one will benefit the others. There is no hierarchy among the goals; each carries the same weight and urgency.

I. Facilitate sustainable fisheries.

Fishers are the core of Bermuda's society. Their sustainable use of ocean resources can be supported through improvements to monitoring and surveillance, equitable licensing for all users, adoption of new technologies to reduce costs, and income diversification initiatives. Together, these approaches will help to ensure lasting food security, attract new employment opportunities, and promote long-term ecosystem productivity for future generations. A number of potential projects have been identified for possible funding to help meet this goal, including support for the Fisheries Development Centre, investment into monitoring and surveillance, and increased capacity for pelagic fishing.

II. Expand sustainable marine tourism.

Prior to the COVID-19 pandemic, tourism was one of the leading industries in Bermuda. As the industry rebounds, it can emphasise opportunities that build upon its previous strengths while enhancing environmental and social sustainability. Local programs and operators that offer ecotourism activities can be strengthened and benefits of the tourism industry can be more widely and equitably distributed. As part of meeting this strategic goal, efforts are ongoing to identify suitable projects in this sector. So far, options for supporting the Bermuda Underwater Exploration Institute (BUEI) and the Coral Garden Initiative have been flagged as potential areas for investment. Other initiatives will also be explored.

III. Produce cleaner, cheaper, energy.

Reducing dependency on imported fossil fuels will benefit the environment and the pocketbooks of Bermudians. Bermuda should continue to install renewable energy projects on land and begin a marine renewables program. When coupled with supporting storage networks, these installations will produce energy with fewer emissions while still providing the island with energy security. The 2019 Integrated Resource Plan provides a robust preliminary framework for action, and the Energy Regulatory Sandbox a platform for innovation and experimentation. Options for solar photovoltaics and wind energy are explored as part of this Blue Economy Strategy.

IV. Increase blue investment in Bermuda.

Building on its rich maritime heritage, its commitment to conserve natural capital, and a vision for blue wealth and sustainable equity, Bermuda supports blue businesses, projects, and entrepreneurs, and providing greater job opportunities for a wider cross section of the Bermudian population. Bermuda will attract finance and build capacity to contribute to the growth and export potential of these sectors in line with environmental and community values. The MSP and and its associated marine protected area (MPA) network are central to the achievement of this goal and the overall blue economy plan. Additionally, the establishment of a Blue Investment Facility is also critical.

In the main body of the Draft Strategy, the *goals* are refined into *objectives* that specify policy-level targets for focus over the next ten years. *Projects* that help meet the *goals* and *objectives* are further described in the document, with greater detail on *projects* that are investable in the near term.

SUCCESSFUL EXECUTION REQUIRES FUNDING

BOPP recognised that achievement of the Blue Economy vision and its supporting goals would not be possible without an innovative funding mechanism. Accordingly, BOPP commissioned the development of a proposed Blue Investment Facility ("the Facility"). This Facility will support long-term sustainable growth of the Blue Economy industries and implementation of the MSP. To capitalise the Facility, a range of sources for investment will be sought out, with a view to deploy capital into the target Blue Economy sectors (tourism, fisheries, and renewable energy), as well as support MSP implementation.

The Facility will deliver on Blue Economy goals through a phased approach over time as project pipelines become established, and match the appropriate type of capital to individual projects across two 'sister' funding mechanisms:

- **An Investment Programme**, providing repayable and blended capital into investment-ready aggregation vehicles and an associated Green Fund; and
- **An Incubator Programme**, providing investment-readiness grant support and technical assistance for pipeline development.

Both programmes will have aligned governance to coordinate the investment and funding strategy across a priority portfolio in support of the goals of the Blue Economy Strategy. The governance structure will include a mix of public, private, and third sector stakeholders with skills and expertise in developing, financing, and advising on projects in the target sub-sectors and supporting the sustainable development of the Blue Economy. Additional details of the proposed Facility design are found in the Strategy Implementation section of this document.

As part of the Facility design, an indicative pipeline of potential projects was analysed to identify investable projects that are currently ready in Bermuda. A core requirement of these projects was their ability to deliver a return on investment. A sample of these prospective investable projects are included in the Strategy as examples of potential first steps to deliver upon the objectives. They do not create an exhaustive list, and the success of the Blue Economy Strategy should not be evaluated solely upon their execution.

The Facility advocates for support not only of ocean-based activities but also terrestrial-based ones, such as community solar photovoltaic (PV) assets. This is due to the carbon offsetting benefits for the ocean to reduce ocean warming and acidification as a result of fossil fuel consumption. The exact allocation of resources between these two arenas will be determined in the future by the Facility's governance body.

NEXT STEPS

The Draft Blue Economy Strategy is a work in progress. It requires ongoing participation and input from all stakeholders to make it succeed. Standing up the Blue Investment Facility, selection of projects and project implementation are all yet to come. The Strategy is intended to serve as a guide. There are a range of costs and timelines associated with this Strategy that are dependent on the pipeline projects selected for development. Articulation of further details by participating authorities and partners can be expected in the future.

3. Background

THE BERMUDA OCEAN PROSPERITY PROGRAMME

Bermuda's Blue Economy Strategy proposes a framework to support the economic ambitions of Bermuda's Blue Prosperity Plan and was developed under the leadership of the Bermuda Ocean Prosperity Programme (BOPP). BOPP was established in 2019 as a partnership between the Government of Bermuda, the Bermuda Institute of Ocean Sciences (BIOS), and the Waitt Institute. Its objective is to foster sustainable, profitable, and enjoyable use of ocean resources for present and future generations.

BOPP STEERING COMMITTEE

Much of the work of BOPP is advised by a Steering Committee whose members represent contributing elements of Bermuda's Blue Economy. The BOPP Steering Committee comprises:

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

The Steering Committee selected Blue Economy Guiding Principles outlined below and has been instrumental in narrowing the focus of the Strategy to make it more tangible, practical, and equitable.

BERMUDA'S BLUE PROSPERITY PLAN

The Blue Prosperity Plan seeks to:

- Legally adopt an enforceable, comprehensive, and integrated plan to sustainably manage marine resources and designate 20% of Bermuda's marine waters as fully protected marine protected areas (MPAs), and
- Adopt an economic strategy to diversify Bermuda's national revenue and strengthen the sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and continued ecosystem health.

The result is a legally binding Marine Spatial Plan (MSP) and government-adopted Blue Economy Strategy that collectively act as the Blue Prosperity Plan.

BLUE ECONOMY GUIDING PRINCIPLES

In December 2019, the BOPP Steering Committee adopted a set of guiding principles to direct the development of Bermuda's Blue Economy Strategy and resulting investments. These principles ensure that Bermuda's best interests are reflected in decision-making and that there is balance between the economy, environment, and priorities of diverse ocean stakeholders.

The Guiding Principles:

- Provide social and economic benefits for current and future generations of Bermudians, by contributing to food security, poverty eradication, livelihoods, income, employment, health, safety, equity, and political stability.
- Restore, protect, and maintain the diversity, productivity, resilience, core functions, and intrinsic value of marine ecosystems.
- Utilise evidence-based decision-making when evaluating new activities, policies, or tradeoffs and, in circumstances where evidence is lacking, the burden of proof falls on those advocating for an action.
- Adopt a multidisciplinary approach to management and prioritise activities which benefit Bermuda and Bermudians as a whole, instead of a single sector.
- Employ participatory, inclusive, and transparent governance.

BERMUDA'S BLUE ECONOMY STRATEGY FRAMEWORK METHODOLOGY

As a first step in the formulation of the Blue Economy Strategy, the Steering Committee voted to prioritise fisheries, ocean renewable energy, and blue tourism with an initial market evaluation. These industries either lie at the heart of Bermuda's cultural identity and/or represent emerging sectors that could shape its economic future. Under BOPP, an aquaculture analysis, commissioned by KPMG, was also undertaken to complement and support fisheries research.

Analyses were done in partnership with RedSky Strategy; the Rocky Mountain Institute; 1Skip; Dr. Samia Sarkis; and the University of California, Los Angeles' Institute of the Environment and Sustainability. The resulting industry reports[2] evaluated the historical and current performance of these sectors in Bermuda, while providing informed suggestions for continued sustainable growth over the next 10 years. In the context of ocean renewable energy, industry experts also evaluated the feasibility of existing ocean renewable energy technology within Bermuda's marine environment.

The industry reports were reviewed by key experts in Bermuda from the related sectors to refine the conclusions and recommendations. Officials within the Bermuda government offered feedback and the reports were evaluated within the context of existing national planning documents and priorities (such as the Integrated Resource Plan, National Tourism Plan, and Economic Recovery Plan). The duration of this analytical process was extended and eventually paused due to COVID-19 safety restrictions. The BOPP Steering Committee decided to not publish final versions of the reports as they did not represent the desired breadth of stakeholders engagement. Elements of the analyses are found in this Blue Economy Strategy and the full industry reports are available upon request.

It is acknowledged that these three initial industries do not represent the full breadth of Bermuda's Blue Economy but, rather, those with the greatest initial potential as identified by the BOPP Steering Committee. It is intended that this Strategy will also inform the development of other industries and aspects of Bermuda's Blue Economy.

As a next step, BOPP announced a partnership with Finance Earth to assist in the development of a Blue Investment Facility in Bermuda. Finance Earth is a specialist investment manager providing corporate finance and fund management services with the aim to protect and restore nature. Finance Earth provided strategic thinking for the development of a Blue Investment Facility in Bermuda to

2 Executive summaries of the reports are found in Appendix D. For additional information, please visit the Blue Economy page of the BOPP website: https://www.bermudaoceanprosperity.org/blue-economy. For a copy of the industry report drafts, please contact BOPP at info@bermudaoceanprosperity.org

capitalise and support projects identified in the Blue Economy Strategy. The objective of the Blue Investment Facility is to provide the governance and resources for the diversification of national revenue and strengthen the sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and continued ecosystem health.

To design and structure a suitable facility, Finance Earth engaged with over 20 target stakeholders to identify potential Blue Economy investment opportunities and build an understanding of the Bermudian operating and investment environment. This process sought to identify projects and enterprises that deliver environmental benefits alongside financial returns for raising private investment. In total, Finance Earth identified 18 current and planned sustainable Blue Economy activities in the Bermudian seascape that could potentially raise investment.

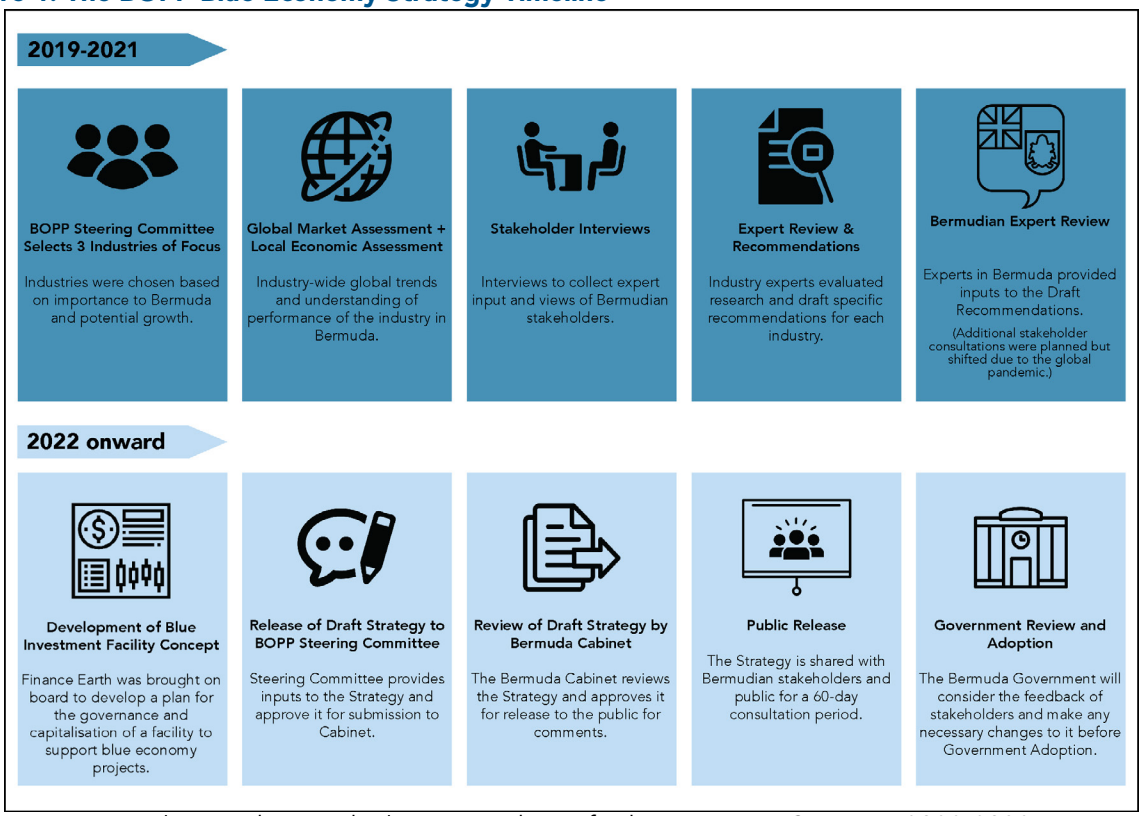
Projects identified as demonstrating the potential to raise investment were analysed and assessed against key criteria, such as their level of business maturity, to establish which were most ready and appropriate for investment.

Using information provided by Bermuda's stakeholders, Finance Earth mapped projects against the "j-curve," an illustration that approximates how business models develop from early-stage embryonic concepts through to fully operational businesses over time, to understand how close each project was to investment-readiness. Investment-readiness occurs as the project's cash flows become well-evidenced and predictable, providing potential investors with the required confidence that their investment will be repaid and returns generated.

The Draft Blue Economy Strategy has gone through a thorough stakeholder consultation process including BOPP Steering Committee members and will next go to the Government of Bermuda. It will then be shared with the public and feedback will be incorporated as part of the finalisation of the Strategy, after which it can be reviewed and formally adopted by the Government of Bermuda. Figure 1 presents a visual demonstration of the steps described above.

The contents of this document synthesise these inputs into a coordinated, actionable strategy for public review.

Figure 1: The BOPP Blue Economy Strategy Timeline

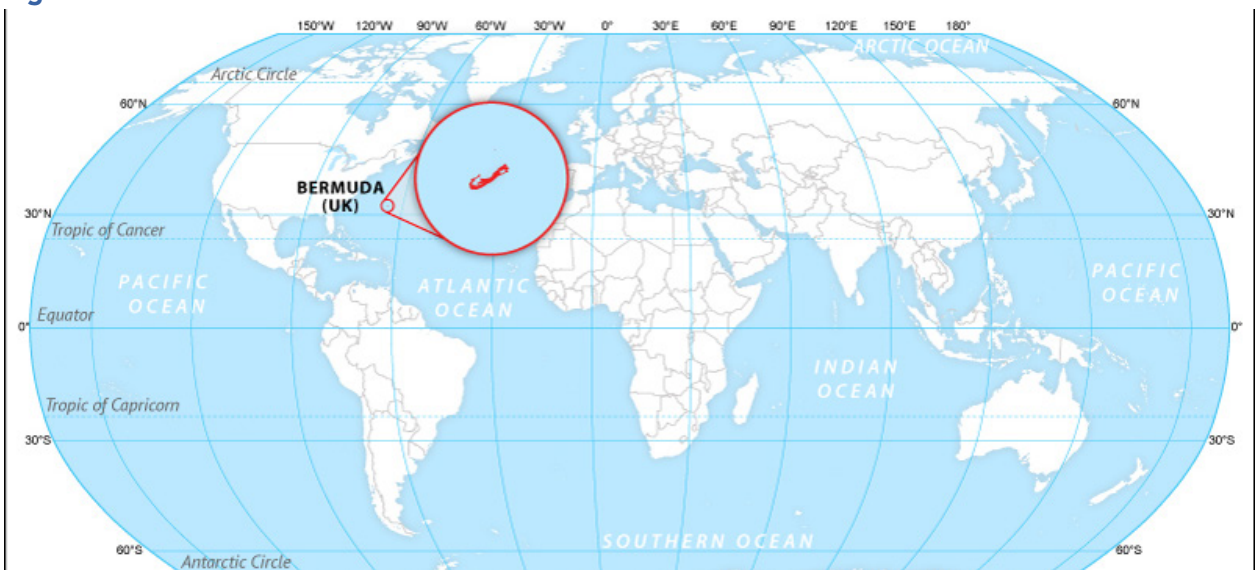


4. Country Context

GEOGRAPHIC CONTEXT

Bermuda's unique mid-Atlantic location, 965 kilometres (600 miles) east of the U.S. Eastern Seaboard, provides it with a number of opportunities for maritime trade, transport, and services. These advantages have been a historic basis for its important role in the marine insurance and reinsurance markets and its emergence as a global financial hub.

Figure 2: Bermuda in the Atlantic



ENVIRONMENTAL CONTEXT

Bermuda's EEZ comprises a total of 464,389 kilometres squared (288,558 miles squared). The islands are home to the northernmost coral reefs in the Atlantic, which support diverse fisheries and tourism businesses such as commercial fishing, snorkelling, and SCUBA diving. Undersea meadows of seagrasses and coastal mangrove stands perform critical ecosystem services, acting as nurseries to young fish and helping to lessen the effects of storm surge.

Bermuda's marine environment is vulnerable due to use and climate change. A summary of these vulnerabilities can be found in the report, The State of Bermuda's Waters[3]. An integral part of the Government of Bermuda's approach to reinvigorating the Blue Economy is protecting its unique marine environment, which comprises the vast majority of Bermuda's fixed natural capital. The aforementioned report provides additional context on the management of Bermuda's marine environment. In addition, the Marine Spatial Plan that accompanies this Blue Economy Strategy outlines next steps for the integrated management of Bermuda's marine environment. Including specific principles, goals, and objectives to be achieved with spatial solutions, such as marine protected areas and potential use areas, as well as non-spatial objectives that address issues such as enforcement, management, and monitoring.

3 For a more complete snapshot of Bermuda's marine waters, please see The State of Bermuda's Waters on BOPP's website; https://www.bermudaoceanprosperity.org/reports

ECONOMIC CONTEXT

Bermuda is a small, open, and import-dependent country. The economy of this British Overseas Territory is dominated by offshore insurance, reinsurance, and tourism. Bermuda serves as a reinsurance hub and luxury tourism destination, with most of its clients and tourists originating from the United States (which is also its main trading partner).

In 2019, Bermuda recorded a per capita income of $117,098[4] , placing it among the top five countries in the world. Yet evidence suggests that income inequality in Bermuda is high and trending upward.[5] Data collected for 1993 and 2016 suggest that, in the preceding two decades, Bermuda's household income gains in the top half of the income distribution spectrum exceeded those of the bottom half by a large margin.[6]

In 2020, Bermuda's output contracted by 6.97% due to broad COVID-19-related reductions in economic activity. Economic recovery in 2022 and beyond is expected, supported by moderate increases in visitor arrivals from the United States in 2021, where vaccinations against the coronavirus are increasing. Bermuda's own vaccination drive, gradual recovery in the tourism sector, and government construction projects are likely to increase domestic employment and raise consumption in the near- to medium-term.

Bermuda relies heavily on its marine resources to generate income and sustain livelihoods. Tourism is, by far, the largest Blue Economy industry, followed by commercial fishing. However, substantial Blue Economy potential remains.

Other important Blue Economy industries include blue finance, including ocean and climate risk finance; ocean renewable energy; and ocean-based research, including future potential prospects for aquaculture.

Commercial Fishing. Although Bermuda's fishing industry is considered small, accounting for less than 0.3% of GDP in 2018, it is one of the oldest industries on the island and has significant historical and cultural relevance. The industry comprises roughly 315 registered fishers, 85 of whom operate full-time. Their catch is an important part of food production in Bermuda, providing 33% of marine fish consumed locally.[7] At present, there is not an export market, but there is interest in expanding and diversifying the industry such that export would be commercially viable. One initiative working towards this outcome is the Fisheries Development Centre, which is supported by the Government and proposed as a pipeline project in this Strategy.

Management of fisheries has existed in some form since the early 1600s in order to balance the socioeconomic benefits of the industries with their impacts on the marine environment. Fishers believe the biggest threat to their economic livelihood is illegal fishing and a lack of marine enforcement of existing regulations. Improving monitoring and surveillance capability and capacity is one mechanism to curtail this threat and ensure sustainable use. An example of an existing initiative to improve enforcement is the establishment in 2021 of a partnership between the Government and the U.K.'s Blue Shield Programme to tackle illegal fishing and unlawful marine activities. Another is exploring how to account for the impact of recreational fishers through licensing or other means.

4 World Bank national accounts data.

5 Fowler, N. (2018). Bermuda: Inequality and Poverty in UK Overseas Territory. Tax Justice Network: www.taxjustice.net.

6 In 1993, average household income in Bermuda was $65,676, 26% higher than the median household income of $52,295. However, by 2016, Bermuda's household income rose to $131,074 but exceeded median household income by 40%.

7 BOPP Pilot Study (2020).

Currently, there is no commercial-scale aquaculture in Bermuda; however, some stakeholders are interested in exploring its potential. BOPP commissioned KPMG Bermuda to carry out an Aquaculture Suitability Analysis.[8] The findings were not optimistic regarding commercial viability over a 10-year period. Challenges cited included limited demand for farmed product, high production costs, and large upfront capital outlays. However, given the many benefits that could accrue to the environment and food security from aquaculture, this is likely to remain an area of interest and further analysis in future.

Finance. Due to climate change, global economic losses are projected to reach $69 trillion by 2100, according to a Moody's Report published in 2019[9]. Climate and ocean risk finance is, therefore, a rapidly-growing field in response to the projected climate impacts on coastal areas. Bermuda is a major offshore financial hub and is referred to as the "world's risk capital" by the Bermuda Association of Insurers and Reinsurers (BAIR).[10] Today, Bermuda is the largest supplier of catastrophe reinsurance to U.S. insurers, and Bermuda's insurance and reinsurance companies employ 106,000 persons in over 150 countries worldwide.[11] Climate and ocean risk finance was identified as an area of interest by the Bermuda Business Development Agency for further development.

Renewable Energy. Bermuda is highly reliant on imported fossil fuels. The Bermuda Electric Light Company (BELCO)'s maximum generation capacity is 165 megawatts (MW), produced by diesel engines and gas turbines. Given Bermuda's high energy costs (which are among the highest in the world), a desire for energy independence, and concerns about climate change, it is the policy of the Government of Bermuda to diversify its energy mix towards renewables and the development of local sources of fuel.[12] Initial steps in this direction include the Electricity Act of 2016, the 2019 Integrated Resource Plan, and the recently-established Energy Regulatory Sandbox. There are also some instances of the use of solar on rooftops in Bermuda, but this is not widespread as yet and sites for future deployment are currently being identified. The Rocky Mountain Institute is working with the Department of Energy to diversify Bermuda's energy sector, aiming to deliver a cost reduction for citizens, benefit the environment, and reduce reliance on imported fossil fuels.

Tourism. In 2019, prior to the onset of the COVID-19 pandemic, tourism in Bermuda accounted for 5.1% of Bermuda's GDP and directly employed 3,241 people (or 9.4% of all filled jobs). In 2019, visitor arrivals to Bermuda totaled 726,578; of this, 535,161 (73.65%) travelled by cruise and 191,417 (26.35%) travelled by air. By the end of 2020, tourism accounted for 1.8% of GDP and directly employed 1,295 people, reflecting massive contraction due to COVID-19-related travel restrictions.[13] The tourism sector policies are guided by the 2019-2025 Bermuda National Tourism Plan. The plan outlines seven pillars for success, including a "greener" pillar that targets Bermuda becoming one of the 'greenest' tourist destinations by 2025. It further outlines goals to (1) promote green hospitality and ecotourism, (2) expand the yachting sector, and (3) better balance cruise traffic by a) reducing the heavy dependence on a few large vessels and b) expanding tourism into non-summer months.

Research. The presence of the Bermuda Institute of Ocean Sciences (BIOS) increases the potential for the country to develop nascent Blue Economy industries such as marine biotechnology, ocean exploration technologies, and/or pharmaceuticals. Ocean science research has the potential to fuel innovation and establish new pathways for the viability of such pursuits. Research at BIOS spans the fields of oceanography, marine biology, genetics, molecular biology, microbial ecology, chemistry, air/environmental quality, optics, biogeochemistry, and climate change, among others.

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8 Please note that the KPMG aquaculture analysis does not include consideration for land-based systems in the initial analysis. This would need to be explored further to understand the viability of this as an option for development.

9 Steven Mufson, Washington Times, 8 Jul 2019. Accessed 24 January 2022.

10 Aggregate global capital the members of BAIR totaled USD$124 billion (CY 2020). Bermuda re-insurers make up about 36% of the global reinsurance market based on property/casualty net premiums earned, according to the most recent report of credit rating agency AM Best (2018 AM Best).

11 Association of Bermuda Insurers and Reinsurers. https://www.abir.bm/

12 estimated at 42 cents (USD currency) per kWh compared to the average 12 cents in the US.

13 Government of Bermuda, Department of Statistics.

As an independent U.S. non-profit scientific research and educational organisation, and a Bermuda registered charity, BIOS has several programs for students and educators at the primary and secondary levels in addition to university-level students. BIOS presents an opportunity for Bermuda to expand its marine research and education into a blue industry. It can also improve upon and strengthen intellectual property in this area and patents for ocean technologies. At the end of 2020, BIOS registered net assets of nearly $39 million. In that same fiscal year, revenues increased from $15 million to $24 million, with 38% in grants and contracts.[14] Recently, BIOS merged with the Julie Ann Wrigley Global Futures Lab at Arizona State University (ASU), described as a medical centre for planet Earth. Together, BIOS and ASU will share expertise in ocean sciences to study the highly interlinked, complex problems related to the future of the planet and put students on the cutting edge of ocean science.

KEY DEVELOPMENT PRIORITIES

Bermuda's recent development priorities have been shaped by the effects of the COVID-19 pandemic. The economic fallout in 2020 was severe, resulting in a 6.9% contraction of aggregate output. To address this economic malaise, the Government of Bermuda introduced a five-year medium-term framework: the Economic Recovery Plan (ERP) (2020-2025). The ERP aims to restore fiscal responsibility, enhance growth and employment prospects, and, importantly, improve social welfare through an increase in income equity. The ERP can be summarised by the following seven thematic goals:[15]

1. Diversifying Bermuda's economy through growth of new industries with co-investment from the private sector, including allowing Bermudians themselves to invest (e.g., medical tourism, vertical farming, Small and Medium Enterprises (SME)s marketplace, residential schemes, casino industry, subsea communications, and the Space Strategy).
2. Making financial markets work better for businesses and consumers (e.g., lowering interest rates, COVID-19 SME support, and the National Digital Bank).
3. Building critical new infrastructure or enhancing existing infrastructure (e.g., Shoreside Facility, water and waste management facility, and electric vehicle recharging).
4. Expanding the resident population (e.g., through short-term measures such as the introduction of the Economic Investment Certificate, as well as medium-term initiatives such as regularising the position of long-term residents and making it easier for Bermudians born overseas to return home).
5. Introducing labour market reforms and social development measures to deliver skills, employment, and economic security in the future economy (e.g., execution of a jobs strategy and youth employment strategy, establishing national unemployment insurance, and implementation of minimum and living wage legislation).
6. Reforming the delivery of healthcare (e.g., through introduction of an affordable universal healthcare system and by reducing the cost of medicines).
7. Developing supportive legal and regulatory frameworks (e.g., energy regulatory sandbox, digital/FinTech, and the marine development zone).

The Bermuda Blue Economy Strategy is aligned with the ERP's focus on developing economic opportunities through green growth and environmental sustainability, including an economic development plan in Bermuda's marine waters. This Strategy can help to realise the goals of the ERP.

14 BIOS 2020 Annual Report: www.bios.edu/about/annual-reports/.

5. Strategy Framework

VISION

In 2032 Bermuda is the Atlantic hub for Blue Wealth and Sustainable Equity. Built on a robust marine spatial plan for maintaining and building natural capital, Bermuda's Blue Economy supports a cadre of blue entrepreneurs and enterprises, and provides greater job opportunities for a wider cross-section of the Bermudian population. It also attracts and develops innovative finance that includes returns on investment to build capacity and growth while maintaining ecosystem integrity through sustainable management of common resources.

THEORY OF CHANGE

To achieve the vision, a theory of change is needed which postulates the steps required to move from Bermuda's current situation to the desirable outcomes proposed by the vision.[16]

> According to the Centre for Theory of Change, "a Theory of Change is essentially a comprehensive description and illustration of how and why a desired change is expected to happen in a particular context. It is focused in particular on mapping out or "filling in" what has been described as the "missing middle" between what a program or change initiative does (its activities or interventions) and how these lead to desired goals being achieved."

For the purposes of this Blue Economy Strategy, the desired outcome is for Bermuda to attain a global leadership position in the Blue Economy as shown at the centre of the diagram below. This is important in a globally competitive environment where a "winner-takes-all" dynamic often leads to distinct clusters of industries exemplified by centres such as Silicon Valley in California for information technology. The emergence of a locality as a global leader in a particular sector tends to attract more skilled personnel, more finance, more innovators, more corporates and so forth, which, in turn, create more jobs, generate more exports and allow that locality to collect more revenue through competitive taxation arrangements. These public revenues can then be re-invested into social, environmental and other benefits. Therefore a bold vision as a global leader is required at the outset.[17]

The Theory of Change to move from Bermuda's current position to a position of global leadership is not a linear roadmap, but rather a cyclical and iterative process that begins with a thorough understanding of its "blue assets" shown at the top of the diagram below.[18]

Blue assets. Natural, institutional and human assets that can be deployed to improve the value of Bermuda's Blue Economy. There are a number of these in Bermuda's favour. For example: (a) Its rich maritime heritage; (b) its unique mid-Atlantic location which is also within the Sargasso Sea; (c) its large Exclusive Economic Zone; (d) its biodiversity; (e) its pink sand beaches; (f) its ocean research and teaching institutions and the institutional knowledge contained therein; (g) its success as a global centre for climate and ocean risk finance which also bodes well for the availability of finance for both green- and Blue-Economy investments; and (h) its ocean-enhancing and ocean-industry-enhancing

16 https://www.theoryofchange.org/what-is-theory-of-change/

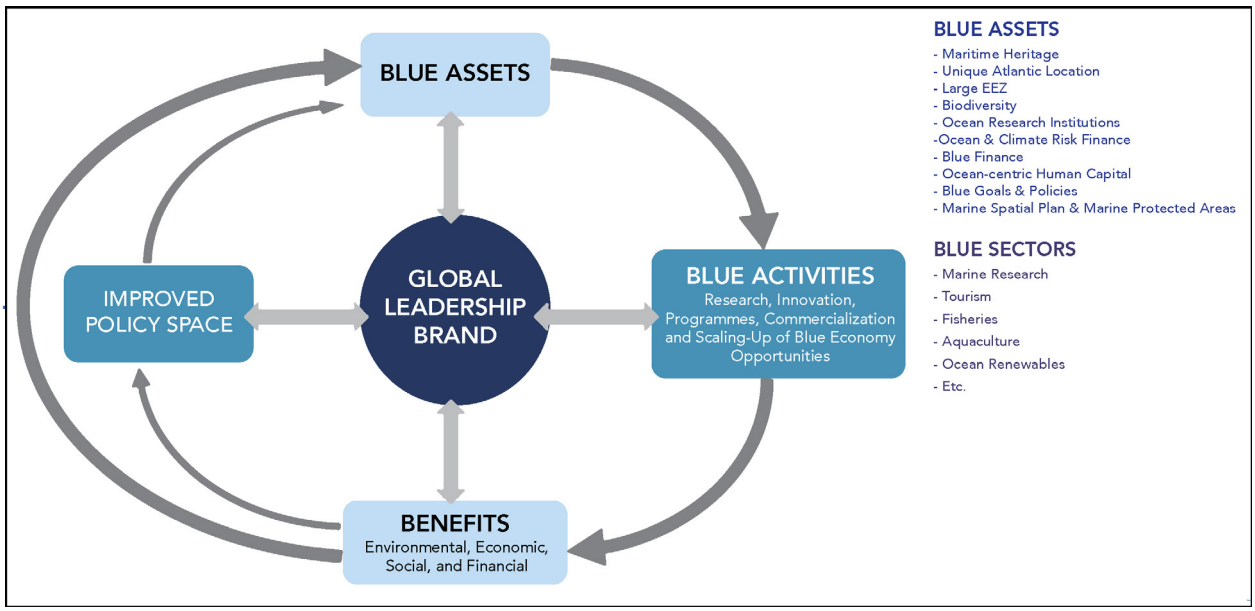
17 This idea of global leadership attracting talent and finance is also exemplified by Bermuda's insurance and reinsurance industry. According to the Association of Bermuda's Insurers and Reinsurers, Bermuda is the "World's Risk Capital" and its members operate in 150 countries and employ 106,000 persons around the world. https://www.abir.bm/about/

18 An example of a good strategy built upon a virtuous and cyclical theory of change is the Amazon "Flywheel". There are numerous articles on this including this one by the Business Chronicler. https://businesschronicler.com/business-strategy/amazon-flywheel-explained/

policies implemented in the past and to be implemented in future. To this end, careful planning of Bermuda's coastal and ocean space through a comprehensive and inclusive marine spatial planning process is fundamental. The MSP together with policies that preserve and enhance Bermuda's natural capital through MPAs and other related objectives ensure the long term viability of blue assets that rely on a healthy marine ecosystem. Bermuda's natural capital and policies that support it are therefore the foundations of Bermuda's ocean prosperity.

Blue Activities. As shown on the right-hand side of the diagram, with the right policies in place and with the right financing, these blue assets can be converted into Blue Economy-related activities including research, innovation, commercialisation, and scaling up of blue entities and programmes. These activities could be undertaken in key sectors such as fisheries and aquaculture, sustainable tourism, ocean renewables and other Blue Economy sectors.

Figure 3. The Theory of Change Diagram



Benefits. When the blue activities are undertaken with the BOPP Principles in mind, a number of benefits accrue, including environmental, social, economic and financial benefits, as shown at the bottom of the diagram above. For example, investments in the projects and programs identified later in this document are designed to preserve and enhance ocean biodiversity, create jobs, reduce inequity, stimulate economic growth and provide financial returns. These benefits then feed back into the enhancement of Bermuda's stock of blue assets. As an example, the financial returns derived from Bermuda's Blue Economy investments will attract more investors and investment into Bermuda's Blue Economy sectors.

Policy Space. Moreover, as the benefits of the policies become self-evident, this will create an improved and more conducive environment to make further beneficial policy improvements; as shown on the left-hand side of the diagram. These policies themselves will help in the growth of Bermuda's blue assets.

Global Leadership. As mentioned at the outset, the process described and shown in the diagram above is a cyclical and iterative process. Bermuda will attract more talent, skills, partnerships and investments by establishing Bermuda as a location where these blue assets and blue activities are converted into the benefits described above. And this successive process, over time, will establish Bermuda as a global centre for specific sectors in the Blue Economy. Finally, the branding of global leadership will, in itself, help Bermuda to continuously attract more and more resources with benefits accruing to the Bermudian people, Bermuda's environment and the entities that operate within Bermuda.

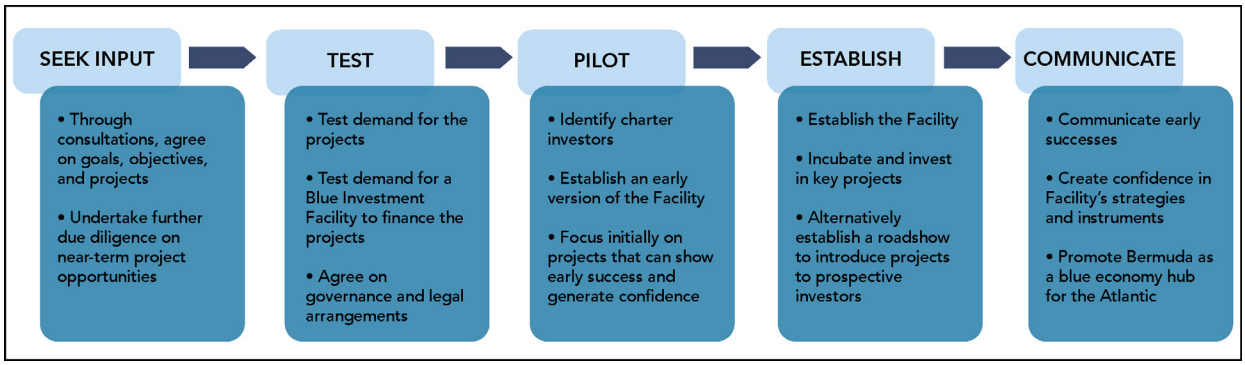
MAKING IT HAPPEN

Converting Bermuda's blue assets into viable blue activities has required scoping and identification of blue projects and investment opportunities. The blue projects identified are detailed in a later section with their corresponding goals. These projects will catalyse and accelerate Bermuda's shift towards becoming a Blue Economy leader and will help in achieving its development priorities. Finance targeted at the Blue Economy sector is critical for moving expediently from the identification of projects to the implementation, commercialisation and scaling-up of these Blue Economy opportunities. In this regard, a dedicated Blue Investment Facility is a critical infrastructure that will enhance Bermuda's blue assets and will ensure the success of Bermuda's Blue Economy Strategy. This Facility is described in greater detail in the next sections of this document.

6. Strategy Implementation

In October 2021, the Bermuda Ocean Prosperity Programme commissioned Finance Earth, a specialist impact investment advisor and fund manager, to design a Blue Investment Facility in Bermuda to support the implementation of Bermuda's Blue Economy Strategy. The Facility aims to attract investment from a range of sources and deploy finance into targeted Blue Economy sectors, including tourism, fisheries and aquaculture, and renewable energy, to support marine conservation and long-term sustainable growth of Bermuda's Blue Economy. Through supporting sustainable use of the ocean's natural capital, the Facility seeks to deliver sustainable and inclusive economic growth, improved livelihoods, employment opportunities, and continued ecosystem health and resilience.

Finance Earth's scope included defining the requirement of the Facility, identifying initial pipeline projects, and testing market and investor interest. Based on this, Finance Earth has recommended options to meet the financing needs of blue enterprises in Bermuda and financing requirements that may arise from the Marine Spatial Planning process. Initial recommendations are included in this section and are summarised within the process figure below



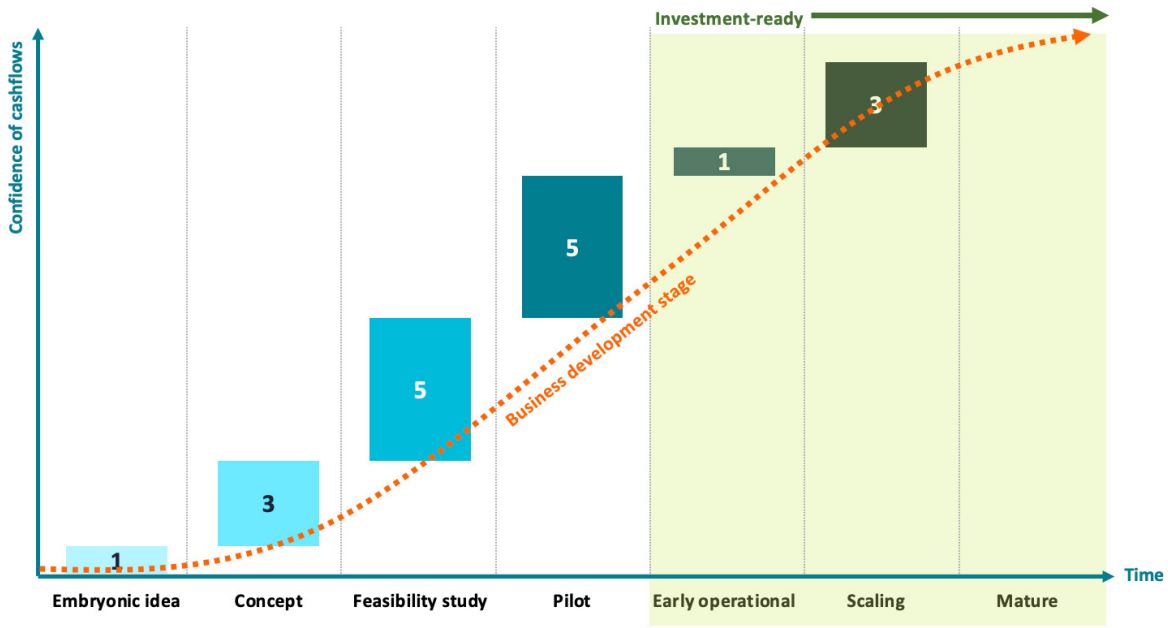
BLUE INVESTMENT FACILITY OVERVIEW

PIPELINE PROJECT IDENTIFICATION

To design and structure a suitable Facility, Finance Earth engaged with over 20 target stakeholders across tourism, renewable energy, fisheries, and government sectors to identify potential Blue Economy investment opportunities and build an understanding of the Bermudian operating and investment environment. This process sought to identify projects and enterprises that deliver strong environmental benefits alongside financial returns for raising private investment.

Bermuda's Blue Economy presents a range of investment opportunities with social and environmental impact potential. In total, Finance Earth identified 18 current and planned sustainable Blue Economy activities in the Bermudian seascape that could potentially raise investment, while also helping to finance its marine protected areas. These projects were identified through consultations with Bermudian stakeholders and the international community. Investment-readiness occurs as the projects' cash flows become well-evidenced and predictable, providing potential investors with the required confidence that their investments will be repaid and returns generated. The breakdown of Bermuda's projects by business model maturity stage is shown in the following diagram.

Figure 5: "J-Curve" Stage of Project



The stage of the projects range from 'embryonic,' or an early stage idea which requires further research and development prior to reaching an investment ready phase to a fully mature, operational project, with a range of stages identified in between. They have been categorised on this basis.

The analysis demonstrated that the majority of the projects reviewed are not yet able to support repayable investment and would benefit from 'investment-readiness' support. Only four projects, predominantly within the renewables sector, demonstrated the ability to deliver environmental benefits and generate financial returns at a suitable scale to attract private finance.

FACILITY STRUCTURE

Based on this research, Finance Earth has begun development of a Blue Investment Facility, which will deliver support through a phased approach over time as project pipelines become established. The Facility would also match the appropriate type of capital with individual projects across two key 'sister' funding mechanisms: the Investment Programme and an Incubator Progamme.

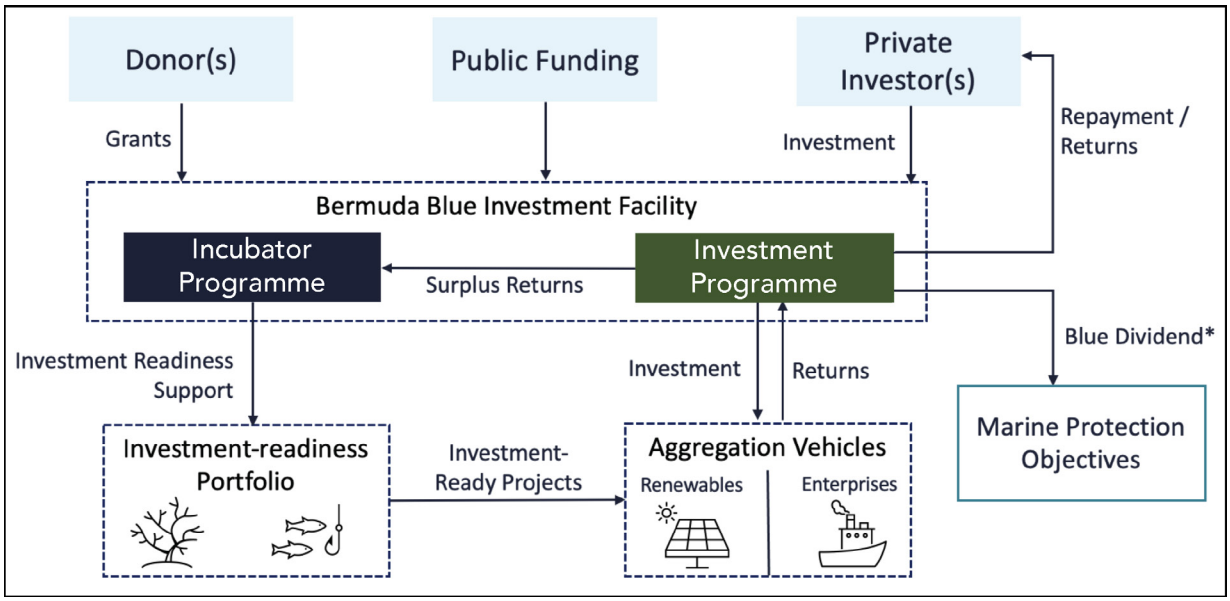
- **An Investment Programme**—providing repayable and blended capital into investment-ready aggregation vehicles and viable projects at a more mature stage of development. Investment in a range of businesses provides an opportunity to support the growth of the sustainable Blue Economy in Bermuda. Given Bermuda's operating environment, the Facility is viable to implement in the near-term with a market-ready sector (renewables). An associated Green Fund would also be aligned with the Investment Programme and provide support to community solar energy projects on an equitable basis. This programme would have an corporate environmental, social, and governance (ESG) component for organisations interested in financing marine protection or carbon offsetting initiatives.
- **An Incubator Programme**—providing investment-readiness grant support and technical assistance for pipeline development to identify and accelerate small-scale Blue Economy projects and test pilots. The Incubator Programme is an important part of the Facility and will benefit from upfront funding from government or philanthropic sources to accelerate enterprise development and provide a more robust pipeline for the Facility. Support should be provided on a competitive basis according to a set of predetermined criteria that takes into account factors such as job creation, environmental impact, and revenue potential. This funding can support entrepreneurs and enterprises to a point where cash flows for

new business proposals become well-evidenced, providing the required confidence to attract private investors.

Both funding mechanisms would have aligned governance and complementary key performance indicators to coordinate the investment and funding strategy across a priority portfolio, all in support of the goals of the Blue Economy Strategy.

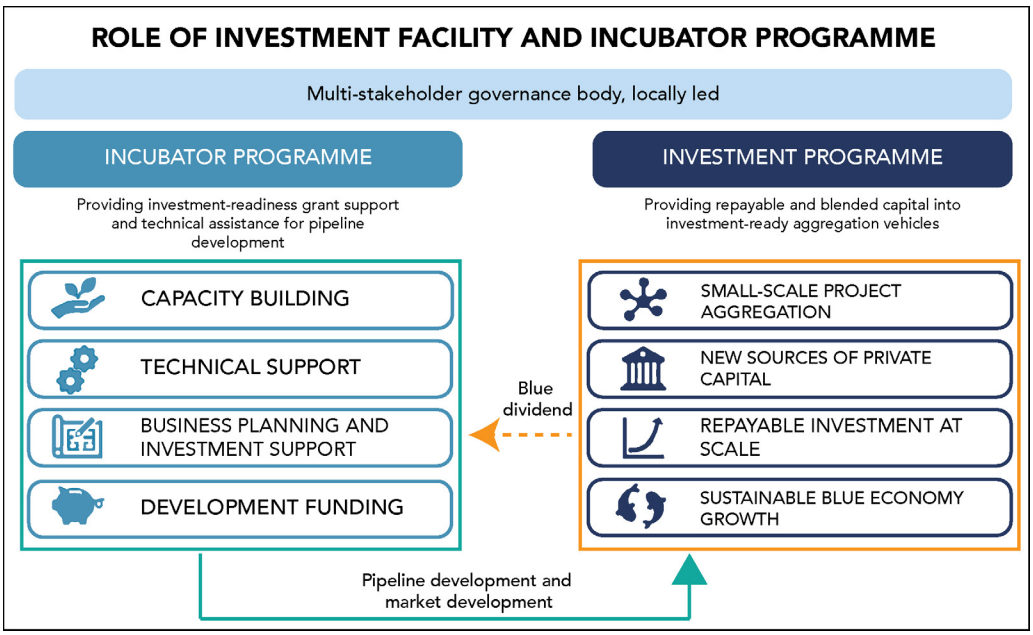
Given the small size of Bermuda, and the overlap between the blue and green economies, it is recommended that the Facility adopts an investment mandate across both the blue and green economies to increase the range of potential investable projects that have positive environmental and social impacts. The indicative Facility structure is outlined below:

Figure 6: Proposed Blue Investment Facility Structure



*Over time, 'blue dividend,' funds generated from a share of financial surpluses from the aggregated project portfolios, could be ringfenced to catalyse the Incubator Programme, as well as provide funding support for wider marine protection and fisheries objectives in line with the Marine Spatial Planning objectives.

Figure 7: Proposed Blue Investment Facility Services



The level of surplus that could be generated through the blue dividend is dependent on the return of the pipeline investments. Based on case-studies of similar impact funds, a blue dividend of up to 10% of the fund size can be achieved; however, a large proportion of this is not realised until the end of the fund's lifetime. Other sources of funds, such as government commitments, donor resources, and 'blue' levies (i.e., user fees), are needed to complement the blue dividend to deliver the necessary broader range of marine outcomes, including ongoing funding for the management of MPAs.

The creation of dedicated aggregation mechanisms and a shared governance structure across the two facilities would provide a range of benefits including:

- **Economies of scale** in delivering the investment capital and enterprise support required by the opportunities identified across Bermuda as well as the ESG opportunities for investors including carbon credits;
- **Aggregation of multiple small-scale** projects to create investment portfolios of sufficient scale to improve attractiveness to investors and minimise the relative transaction costs;
- **A long-term source of financial support** to enable projects to progress through their lifecycle, from originating early-stage concepts through to investment-readiness, and ultimately investment into mature operational business models;
- **A shared governance program and strategic approach** to investment and funding, increasing access to pipeline and best practices around developing well-structured investment opportunities to significantly increase the attractiveness to investors compared to disparate, uncoordinated approaches;
- **A centralised intelligence point** to provide information and learnings back to government to support the refinement of policies to strengthen the sustainable Blue Economy over time; and
- **Generation of a blue dividend** from a share of financial surpluses from the aggregated project portfolios, ringfenced to catalyse the Incubator Program and/or support wider marine protection objectives, including supporting fisher communities and MPAs once established. In addition to this, this would help investors support carbon offsetting through credits linked to the MPAs.

CAPITALISATION

The targeted capitalisation of the Investment Facility has been based on the investment requirements for the near-market pipeline opportunities, which include distributed and utility scale solar PV projects and the highlighted tourism and fisheries enterprises detailed above. Confidence factors have also been applied to targeted pipelines based on an indicative assessment of the accuracy of data provided on capital requirements and the likelihood of commercial viability.

The analysis indicates that the targeted capitalisation for the Facility could be $60 million optimistically (based on the total size of investment required from the commercially viable pipeline); however, when adjusting this for confidence factors, an indicative capital requirement of $40 million to deliver the target investment opportunities appears a more prudent estimate. These figures are variable depending on the pipeline projects selected for implementation and investor traction.

The majority of the capital requirement is targeted towards land-based renewable energy systems, where there is a higher level of confidence in the immediate commercial model and pipeline deliverability. Importantly, this capitalisation level exceeds a threshold of $10 million based on identified projects. This indicates the Facility makes sense to implement from a cost-benefit perspective, meaning that there can be a return on investment in the types of projects identified in Bermuda. The targeted capitalisation is expected to be refined through further financial assessment of the market-ready pipeline opportunities and engagement with prospective investors.

The targeted capitalisation for the Incubator Program has been assessed based on the indicative costs of feasibility testing and delivering pilot projects for identified opportunities. A targeted funding need of $2.5 million in grant funding from either government and/or philanthropic donors could kickstart the Incubator Program to develop a more extensive pipeline of opportunities for investment, building the case to private investors to capitalise the Investment Facility.

FACILITY IMPLEMENTATION PROCESS

A series of targeted aggregation vehicles is likely to provide the optimum balance between flexibility and targeted focus required by investors and enable sectors that are ready for investment to be prioritised. This suggests the process to implementation should include a pilot phase targeting a specific market-ready sector, providing a case for scale-up once the model is demonstrated.

Taking into account the maturity and depth of the project pipelines identified, it is recommended that the Facility is designed and launched through a three phased approach over an initial three-year period:

Phase 1a: Pilot renewables aggregation facility—(Years 1-2) Deliver a pilot phase targeting a market-ready sector. This would include a mechanism for community solar, especially for low income households and associated community benefits. The Facility should be structured to raise investment, which may include technical assistance support and/or first-loss capital, in order to implement a portfolio of land-based solar PV projects. A bond issuance may also be appropriate. This will enable the Facility concept to be tested, learnings gathered, and iteration of the model design.

Phase 1b: Design an Incubator Programme—(Years 1-3) Surplus returns generated from the aggregation facilities can be used to catalyse an Incubator Programme to support pipeline development and investment-readiness support. An upfront public or philanthropic funding commitment could rapidly accelerate the implementation of an Incubator Programme in advance of or alongside the development of the Investment Facility. The design phase would target the delivery of pilot projects with the most potential to reach investment readiness to gather learnings, iterate program operational design, and resourcing.

Phase 1c: Build the business case and implement additional income streams supporting long-term marine protection—(Years 1-3) A detailed business case should be developed for additional income streams requiring political and stakeholder support, including blue levies (user fees) and developer mitigation payments. This will be reliant on a detailed cost-benefit analysis for MPA management to determine the amount of funding required and the benefits delivered to both society and the Blue Economy. This process would require substantial community and business engagement, including within the tourism sector, to gain buy-in for potential new initiatives.

Phase 2: Pilot enterprise aggregation facility— (Years 2-3) Based on the different scale and capital structure requirements of enterprise opportunities in comparison to renewables, the design of a separate aggregation facility could be explored subject to investor appetite. This facility could focus on developing and scaling identified investment-ready enterprise opportunities across the fisheries, tourism, and aquaculture sectors.

Phase 3: Facility scale up—(Years 3+) Capture learnings from the previous phases that demonstrate a proof-of-concept for a scaled-up, sustainably operating Facility across wider sub-sectors. Refine the operational design, resourcing, and governance alongside identification of suitable pipeline projects supporting the fundraising and launch of a scaled-up Facility.

STRATEGIC GOALS & OBJECTIVES THE FACILITY WILL HELP DELIVER

The overall intent of the Facility is to help implement the Vision of the Blue Economy Strategy. BOPP has organised all its expert and stakeholder inputs into four overarching goals to achieve the Vision. These goals can be found below, along with supporting objectives. There is no hierarchy among the goals; each carries the same weight and urgency.

Associated with each goal is a list of pipeline, investable projects. These are some initial steps that can be taken to put the Strategy into action on the ground. Please keep in mind this is not an exhaustive list of all of the projects that the Blue Investment Facility can fund. No funding decisions or allocations have been made yet and any other project is still eligible for consideration by Government and the Facility once established.

The contents of this section are also shown in tabular form in Appendix A. This table maps the goals to BOPP Blue Economy Principles as well as the priorities within the Economic Recovery Plan.

GOAL 1:

Facilitate sustainable fisheries

OBJECTIVES

1. Develop and implement a licensing structure that will allow for better monitoring of catch, improved management, and enduring sustainability for both commercial and recreational fisheries.
2. Enhance monitoring and enforcement using innovative technologies and partnerships, such as with the Blue Shield Programme.
3. Increase sustainable harvest of pelagic species with emerging technology and new best practices.
4. Support development and operation of the Fisheries Development Centre; modalities to be decided.
5. Lower cost and improve sustainability of fishing practice by piloting sustainable energy solutions on nearshore fishing vessels.
6. Diversify and increase high-paying employment opportunities in the commercial fishing sector.

PROSPECTIVE INVESTABLE PROJECTS (Most are near-term options for investment and development.)

- Fisheries Development Centre. Support existing activities of the Bermuda Economic Development Corporation, Fishermen's Association of Bermuda, and Department of Environment and Natural Resources as they create the Fisheries Development Centre.[19] This project is at the early operational stage. Budgets and timelines are to be further investigated.
- Monitoring & Surveillance. By augmenting existing monitoring and surveillance with state-of-the-art technologies, Bermuda can better protect all parts of its marine waters and, thus, the livelihoods of its domestic fishing fleet. A foundation for this work is being built through a partnership between the Government of Bermuda and the Blue Shield Programme to facilitate the achievement of improved management of Bermuda's marine waters. This initiative is still at the conceptual stage. Budgets and timelines are to be further investigated.
- Pelagic Fishing Vessels. Given that Bermuda is currently underutilising its International Commission for the Conservation of Atlantic Tuna (ICCAT) quotas for pelagic species, and plans for the Fisheries Development Centre are advancing, there exists an opportunity to acquire vessels with greater pelagic fishing capability. Increases in pelagic harvest could

19 Discussions are ongoing regarding specific elements of the FDC.

provide a diversified income opportunity for fishers, as well as ease pressure on demersal stocks. Further information is required to establish the commercial opportunity and delivery model. This prospective project is still at the pilot stage. Budgets and timelines are to be further investigated.

- **Bermuda Maritime Academy.** The effort to increase the harvest of pelagic fish species, the growing superyacht trade, fishing tournaments, and the return of America's Cup signal a thriving maritime industry. However, Bermuda has no central training facility for maritime users. Currently, the internationally recognised safety certificate course—Standards of Training, Certification, and Watchkeeping (STCW)—is not available in Bermuda. Bermudians have had to travel abroad for certifications and recertifications, putting maritime careers out of reach for most of the local population. The Bermuda Maritime Academy is seeking to develop a training enterprise providing career pathways and training courses at a fee to increase and diversify Bermudians' skill base within the maritime industry. Additionally, it could offer courses and certifications to recreational users to ensure proper boating practices, including adherence to the MSP. This prospective project is still at the feasibility stage and would require less than $500,000 to develop over an indicative 1 to 2-year time frame.
- **Eco-mooring.** The development or retrofit of eco-mooring systems for commercial and recreational vessels across the island would reduce seabed damage. Further information gathering and feasibility testing is required to establish the commercial viability, as well as the associated social and environmental benefits of the intervention. This prospective project is still at the conceptual stage. Budgets and timelines are to be further investigated.
- **Solar Electric Retrofit of Small-Scale Commercial Fishing Boats.** The nearshore commercial fishing fleet represents around 195 gasoline or diesel-powered vessels. The fishers experience high fuel costs and the fleet exerts pressure on the local marine environment and climate. There is an opportunity to test the feasibility of replacing existing fuel-operated vessel motors in the nearshore with zero-emission, solar electric motors. The aim is to support fishers in proving the commercial viability of the model, which could then attract private investment and be replicated at scale. The associated benefits include reduced fuel and noise pollution, reduced carbon emissions, and reduced operating costs for fishers through fuel savings. A pilot study is first needed to validate the cost-benefit ratio both for fishers and the environment. This prospective project is still at the feasibility stage and would require less than $500,000 to develop over a 5-year indicative time frame.

GOAL 2:
Expand sustainable marine tourism

OBJECTIVES

1. Support and increase the number of sustainable tourism operators, infrastructure, and events.
2. Increase awareness locally and internationally of Bermuda's leadership in eco-friendly tourism offerings.
3. Integrate sustainable and equitable blue tourism policies and actions into the implementation of the Bermuda National Tourism Plan.
4. Enhance advancement opportunities for workers in the tourism sector, including training.

PROSPECTIVE PROJECTS (All three are near-term projects.)

- **Bermuda Underwater Exploration Institute (BUEI).** BUEI is a museum offering educational experiences relating to the ocean with a wide range of focuses, from biology to the technology of underwater exploration to deep-sea ecology. The Institute seeks to foster

a greater appreciation and understanding of the ocean and its inhabitants, as well as how humans interact with it. The Ocean Discovery Centre hosts the main exhibits and requires infrastructure upgrades and the development of a floating dock to increase the quality of programmatic offerings and attract more fee-paying visitors on a year-round basis. This is a scaling-up opportunity which will require $10 million for development over the next 2 to 3 years.

- **The Coral Garden Initiative.** The Coral Garden Initiative aims to develop a coral gardening restoration system and increase awareness of the value of coral reefs among Bermuda's residents, visitors, and youth. The initiative will work to sustainably grow young corals to support Bermuda's reef restoration, providing tours and workshops to fee-paying tourists and local students. The initiative is seeking to develop a permanent coral farm site with an adequate resource base to support their ambitions at scale. This is an early operational opportunity. It would require under $500,000 and would take 1 to 2 years to develop. This project should align with sites identified by the habitat restoration maps within the MSP.
- **Seagrass Restoration.** Bermuda's seagrass habitats are in critical condition. They are key nursery habitats whose restoration and enhancement could be hugely beneficial to the fishing industry, tourism, and for educational purposes. Seagrass acts as a carbon sink and in, other geographies, is valued for climate change mitigation; if successfully restored, they may serve as a future resource for the Blue Investment Facility. There are active restoration projects currently underway that would benefit from additional resources. Budgets and timelines are to be further investigated. This project should also align with sites identified by the habitat restoration maps within the MSP.
- **Other Opportunities.** Additional efforts will be made to identify specific investment opportunities in important sub-sectors such as sport fishing, yachting, and marine public education in coordination with the Bermuda National Museum and other programs such as WaterStart.

GOAL 3:
Produce cleaner, cheaper, energy

OBJECTIVES

1. Increase the amount of energy produced by renewable sources.
2. Integrate the Green Fund and provide support for community solar on an equitable basis for households of different income levels.
2. Adopt policies and practices to foster electrification of the transportation sector and reduce reliance on fossil fuels.
3. Evaluate the environmental and economic impact of new energy development proposals in the marine environment in coordination with the MSP, including impacts to other industries such as fishing and tourism.

PROSPECTIVE PROJECTS (The first two are near term options for investment and development.)

- **Distributed Solar PV.** There is an opportunity to install solar photovoltaic (PV) assets across a range of government buildings. A process to procure leases for 40 sites of solar PV is underway, with the opportunity to sell electricity to the building occupiers and export under the local feed-in tariff. This is a scaling-up opportunity that could require 2-3 years for development and an investment of $12 million. This should also include opportunities for community solar and co-operative projects. In addition to this, solar as a part of commerical building's energy efficiency savings should be considered to help businesses align with Bermuda's Climate Risk Finance leadership and offset their emissions.

- **Offshore Wind Development.** The 2019 Integrated Resource Plan outlined a vision for how Bermuda might pursue this technology. The most promising opportunity identified was the installation of a 60+ megawatt (MW) offshore wind farm. A first step to making this a reality is a detailed feasibility study to evaluate technical, environmental, economic, and political components of such an installation, as well as stakeholder engagement. The central function of a feasibility study is to identify risks and rewards of a proposed project before substantial capital investment is committed to its development. This is still at the feasibility stage and would require $1 to $2 million and could take around 5 years to bring to fruition.[20]
- **Utility Solar.** The Regulatory Authority of Bermuda is exploring opportunities to deliver up to 60 MW of utility-scale solar assets across a range of government and privately-owned sites. Further information is required to establish the pipeline of feasible sites, clarity over development and maintenance costs, and the delivery model. This is a scaling opportunity. Budgets and timelines are to be further investigated.
- **Wave Energy.** Wave power technology is still in the early stages of development, with many different design concepts being tested. There is currently a pilot project underway in Bermuda which, depending on the outcomes and performance, could lead to the implementation of future larger-scale projects. Budgets and timelines are to be further investigated.
- **Electric Taxis.** A potential pilot opportunity exists to test the commercial viability of replacing gasoline-powered taxis with electric vehicles, delivering fuel cost savings and environmental benefits. This is a pilot opportunity and budgets and timelines are to be further investigated.
- **Electric Ferry Services.** Another potential pilot opportunity exists to test the commercial viability of replacing gasoline-powered ferries with electric vessels, delivering fuel cost savings and environmental benefits. Budgets and timelines are to be further investigated.
- **Floating Solar.** Although earlier in its development than opportunities such as offshore wind, the technology to support offshore solar installations is rapidly evolving. There could be an opportunity to pilot projects in Bermuda to test their technological and economic viability over the next half decade.This is still at the feasibility stage with budgets and timelines to be further investigated.
- **Energy Storage.** The increased generation of renewable energy presents an opportunity to develop the supporting infrastructure including energy storage systems. Exploring such opportunities is key to achieving scale and ensuring an uninterrupted supply of energy across the island. Further information on future storage needs and viable technologies is required to progress this opportunity.

20 $1-2m feasibility costs to identify full requirements and delivery options. Comprehensive stakeholder consultation will be a part of the process to the establishment of offshore wind.

GOAL 4:
Increase blue investment in Bermuda

OBJECTIVES

1. Develop an MSP with identified marine protection areas.
2. Establish a first-of-its-kind Blue Investment Facility to support the implementation of the MSP and growth in key Blue Economy sectors.
3. Support blue entrepreneurs and enterprises to thrive and create jobs in the Blue Economy.
4. Become a global thought leader in ocean science and research.
5. Become a hub for ocean and climate risk finance.

PROSPECTIVE PROJECTS (The first two are near-term options for development.)

- **Develop an MSP with Identified Marine Protected Areas.** The Government of Bermuda has committed to developing and legally adopting a comprehensive and enforceable MSP to sustainably manage resources and protect 20% of Bermuda's marine waters in fully-protected marine protected areas. Through the public and stakeholder-led process, the plan will support the protection of important fish species and habitats with the goal of securing ecosystem resilience, increasing fish biomass, and enhancing sustainable economic opportunities. For example, commercially important fisheries will see benefits through the protection of important fish spawning and breeding grounds. The MSP also provides initial guidance regarding the locations of marine renewable energy installations by identifying areas that could be suitable for further evaluation.
- **Blue Investment Facility.** The Facility aims to attract investment from a range of sources and deploy financing into targeted Blue Economy sectors—such as tourism, fisheries and aquaculture, and renewable energy—to support marine conservation and the long-term sustainable growth of Bermuda's Blue Economy. $25.5 million of investable pipeline projects to date have been identified; 4% of which would be for fisheries-related projects, 54% for renewable energy projects, and the remaining 42% for tourism-related projects. There is also a proposed blue dividend as part of the fund that will comprise 10% of profits generated from the Investment Programme. The BIF is in the concept stage and is detailed in Appendix B. The Facility will require $220,000 for further development and could take 1 to 2 years to develop the concept and governance further before implementation of the Facility. The Incubator Programme has been estimated at $2.5 million for financing, grants, feasibility and testing initial pilot projects with additional start-up costs for a physical incubator estimated at $700,000 depending on the services offered and team size.
- **Blue Insurance Products.** An insurance option is being explored to limit the financial impact of hurricanes on the island's coral reefs and/or coastal infrastructure protected by the coral reefs. The model is fairly new but has been successfully piloted in other countries through the Caribbean Oceans and Aquaculture Sustainability Facility (COAST) in partnership with the World Bank and other partners. Further work is required to understand the commercial model and pilot the product for reefs in Bermuda. There is also an opportunity to develop a parametric insurance product for the fisheries sector similar to what has been launched in other locations, designed to enhance the resilience of fishers against the impacts of climate-related disaster, under the Caribbean Catastrophic Risk Insurance Facility (CCRIF). These ideas are still conceptual in the context of Bermuda and require further analysis before development can be proposed.

NEXT STEPS & CONCLUSION

The Draft Blue Economy Strategy is undergoing a stage of review with the general public. BOPP is seeking input on the Strategy's goals and projects. Comments will be integrated into the Strategy and the BOPP Steering Committee and Bermuda Cabinet will review the changes prior to Government adoption of the Blue Economy Strategy. Comments can be provided through a BOPP stakeholder engagement group, also known as the Ocean Village, public consultation forums, and on the Government Citizen Forum. Please visit the BOPP website for more details.

Finalisation of the investment case for the Blue Investment Facility and potential projects was completed in May 2022 by Finance Earth. Soft testing and initial discussions on Facility set-up and governance mechanisms have begun. It will also be important to consider options for mechanisms to manage the process of delivery going forward, as part of the standing up of the Blue Investment Facility. Final options should be agreed upon by the individuals within the final proposed Governance structure. The Blue Investment Facility's governance and its uses are intended to be supported by legistlation.

Underpinned by Bermuda's natural assets, this Draft Strategy and its goals and objectives serve as a guide for developing Bermuda's Blue Economy and an initial blueprint for realising the 10-year vision of becoming a leader in this space. The next steps require the review, consideration, amendments, and, ultimately, approval of key stakeholders regarding the concepts contained herein. A coalition of willing partners—both domestic and international—from the private sector, public sector, civil society, and academia will be needed to execute the strategy and bring this vision to life. The creation of a Blue Investment Facility is but one of many steps required to provide momentum and to enable multiple projects and larger-scale transformation across a range of Blue Economy sectors.

Alongside this, many other supporting projects, policies, and actions within this document require champions and sustained leadership at all levels. As such, this document presents a call to action and is a living document that will require periodic updating. For example, as the Strategy unfolds, it will become clearer whether the existing policy and legislative frameworks are sufficient, or whether amendments may be recommended for the Government's consideration. In the meantime, stakeholders are encouraged to become actively involved in the practical application of the principles and the Strategy presented herein. This will help accelerate Bermuda's sustainable future and to cement its position as a global leader and the Atlantic hub for the Blue Economy.

7. Appendices

A STRATEGY SUMMARY TABLE

B BERMUDA BLUE INVESTMENT FACILITY DRAFT REPORT

C GLOSSARY

D INDUSTRY REPORTS

E AQUACULTURE SUMMARY FINDINGS

APPENDIX A: STRATEGY SUMMARY TABLE

GOAL	OBJECTIVE	BOPP PRINCIPLES IN ACTION	FIT WITH BERMUDA'S ECONOMIC RECOVERY PLAN (ERP)	INVESTABLE PROJECTS
Facilitate and enhance sustainable commercial and recreational fisheries	1. Develop and implement a licensing structure that will allow for better monitoring of catch, improved management, and enduring sustainability for both commercial and recreational fisheries. 2. Enhance commercial monitoring, control, and surveillance using innovative technologies and partnerships, such as with the Blue Shield Programme. 3. Increase sustainable harvest of pelagic species with emerging technology and new best practices. 4. Support development and operation of the Fisheries Development Centre; modalities to be decided. 5. Lower cost and improve sustainability of fishing practice by piloting sustainable energy solutions on nearshore fishing vessels. 6. Diversify and increase high-paying employment opportunities in the commercial fishing sector.	• Provide social and economic benefits for current and future generations of Bermudians by contributing to food security, poverty eradication, livelihoods, income, employment, health, safety, equity and political stability. • Restore, protect and maintain the diversity, productivity, resilience, core functions and intrinsic value of marine ecosystems. • Utilise evidence-based decision-making when evaluating new activities, policies or tradeoffs and, in circumstances where evidence is lacking, the burden of proof falls on those advocating for an action. • Employ participatory, inclusive and transparent governance.	• Introducing labour market reforms and social development measures to deliver skills, employment and economic security in the future economy • Building critical new infrastructure or enhancing existing infrastructure • Developing supportive legal and regulatory frameworks	1. Fisheries Development Centre 2. Monitoring & Surveillance 3. Pelagic fishing vessels 4. Bermuda Maritime Academy 5. Eco-mooring 6. Solar electric retrofit of small-scale commercial fishing boats

GOAL	OBJECTIVE	BOPP PRINCIPLES IN ACTION	FIT WITH BERMUDA'S ECONOMIC RECOVERY PLAN (ERP)	INVESTABLE PROJECTS
Make Bermuda the Atlantic hub for blue wealth and sustainable equity	1. Develop a Marine Spatial Plan with identified marine protected areas 2. Establish a first-of-its kind Blue Investment Facility to support the implementation of the MSP and growth in key Blue Economy sectors. 3. Support blue entrepreneurs and enterprises to thrive and create jobs in the Blue Economy. 4. Become a global thought leader in marine science and research. 5. Become a hub for climate and ocean risk finance.	• Provide social and economic benefits for current and future generations of Bermudians by contributing to food security, poverty eradication, livelihoods, income, employment, health, safety, equity and political stability. • Restore, protect and maintain the diversity, productivity, resilience, core functions and intrinsic value of marine ecosystems. • Utilise evidence-based decision-making when evaluating new activities, policies or tradeoffs and, in circumstances where evidence is lacking, the burden of proof falls on those advocating for an action. • Adopt a multidisciplinary approach to management and prioritise activities which benefit Bermuda and Bermudians as a whole, instead of a single sector. • Employ participatory, inclusive and transparent governance.	• Diversifying Bermuda's economy through growth of new industries with co-investment from the private sector (including allowing Bermudians themselves to invest) • Developing supportive legal and regulatory frameworks • Making financial markets work better for businesses and consumers • Expanding the resident population • Introducing labour market reforms and social development measures to deliver skills, employment and economic security in the future economy	1. Marine Spatial Plan with identified marine protected areas 2. Blue Investment Facility 3. Blue insurance products
Produce cleaner, more cost-conscious energy	1. Increase the amount of energy produced by renewable sources. 2. Integrate the Green Fund and provide support for community solar on an equitable basis for households of different income levels. 3. Adopt policies and practices to foster electrification of the transportation sector and reduce reliance on fossil fuels. 4. Evaluate the environmental and economic impact of new energy development proposals in coordination with the MSP, including impacts to other industries such as fisheries and tourism.	• Provide social and economic benefits for current and future generations of Bermudians by contributing to food security, poverty eradication, livelihoods, income, employment, health, safety, equity and political stability. • Utilise evidence-based decision-making when evaluating new activities, policies or tradeoffs and, in circumstances where evidence is lacking, the burden of proof falls on those advocating for an action.	• Developing supportive legal and regulatory frameworks • Introducing labour market reforms and social development measures to deliver skills, employment and economic security in the future economy • Building critical new infrastructure or enhancing existing infrastructure	1. Distributed Solar PV 2. Offshore wind development 3. Utility solar 4. Wave energy 5. Electric taxis 6. Electric ferry services 7. Floating solar 8. Energy storage

GOAL	OBJECTIVE	BOPP PRINCIPLES IN ACTION	FIT WITH BERMUDA'S ECONOMIC RECOVERY PLAN (ERP)	INVESTABLE PROJECTS
Expand sustainable marine and maritime tourism	1. Support and increase the number of sustainable tourism operators, infrastructure, and events. 2. Increase awareness of Bermuda's leadership in eco-friendly tourism offerings. 3. Integrate sustainable, equitable blue tourism policies and actions into the implementation of the Bermuda National Tourism Plan. 4. Enhance advancement opportunities for workers in the tourism sector, including trainings.	• Provide social and economic benefits for current and future generations of Bermudians by contributing to food security, poverty eradication, livelihoods, income, employment, health, safety, equity and political stability. • Restore, protect and maintain the diversity, productivity, resilience, core functions and intrinsic value of marine ecosystems. • Utilize evidence-based decision-making when evaluating new activities, policies or tradeoffs and, in circumstances where evidence is lacking, the burden of proof falls on those advocating for an action.	• Introducing labour market reforms and social development measures to deliver skills, employment and economic security in the future economy • Developing supportive legal and regulatory frameworks	1. Bermuda Underwater Exploration Institute (BUEI) 2. The Coral Garden Initiative 3. Seagrass restoration 4. Other

APPENDIX B: BERMUDA BLUE INVESTMENT FACILITY DRAFT REPORT

INTRODUCTION AND OBJECTIVES

Growth of the global Blue Economy is expected to double over the next decade from 2010 levels, adding $3 trillion to the global economy. Whilst this growth offers significant economic opportunities, it also risks placing huge pressure on ocean ecosystems. Unsustainable economic activity is driving widespread loss of the ocean's natural capital, eroding the resource base on which such growth depends.

While the economic value of the Blue Economy is attracting increasing numbers of investors, insurers, banks, and policymakers as a new investment opportunity, it can potentially create negative impacts if not managed appropriately. However, if managed sustainably, investments in the Blue Economy can drive long-term economic growth, improve livelihoods, and preserve the health of ocean ecosystems. A range of financial instruments have emerged over recent years that can mobilise new capital for Blue Economy investments and help close high financing gaps. However, the market for investments that can deliver positive socioeconomic and environmental outcomes for marine and coastal resource management, as well as financial returns for investors, is still relatively nascent.

PIPELINE DEVELOPMENT BARRIERS

Despite the ambition to drive sustainability and grow Bermuda's Blue Economy, the island's particular operating environment presents challenges to developing commercially viable, sustainable Blue Economy business models, highlighted by the limited investment-ready pipeline identified. These challenges identified through the stakeholder engagement and pipeline identification process include:

- The high cost of operations on island, such as wages, the cost of energy, and importation of goods;
- The seasonality of certain industries, such as tourism;
- The remote location limiting export opportunities;
- The relatively small population putting a constraint on local demand; and
- A lack of enterprise development grant funding to build and scale commercial business models.

Government support in the form of tailored grant funding to businesses and projects in their earlier, more high-risk stages of maturity—potentially awarded on a rolling competitive basis based on specific sustainability and commercial criteria—would accelerate the development of the sustainable Blue Economy and provide a more robust pipeline for the Facility. Such funding could support entrepreneurs and enterprises to a point where cash flows for new business proposals become well-evidenced, providing the required confidence to attract private investors.

OTHER BLUE ECONOMY INCOME OPPORTUNITIES

The potential for additional funding sources was assessed as part of determining a suitable financing structure and governance structure for the Facility. Recurring income streams would enable additional finance to be raised to cover the capital expenditure to implement marine protected areas and deliver maintenance and monitoring activities over the long term.

FUNDING SOURCE	OPPORTUNITY	READINESS ASSESSMENT
Enterprise	Bermuda has ambitious targets to grow its sustainable Blue Economy and has identified three target industries with potential for growth: fisheries and aquaculture, ocean renewable energy, and tourism. Investment in enterprises operating for the benefit of marine and coastal environments would support sustainable growth of the Blue Economy and generate surpluses to support wider marine protection.	**Short-term** Enterprise investment provides a scalable model that has a demonstrable track record of success in enhancing local sustainable economies. Bermuda has a successful track record of tapping international capital markets, with potential to attract investors with an interest in delivering environmental and social benefits alongside a financial return.
User fees	Tourism plays a major role in Bermuda's economy, with over 800,000 annual visitors spending nearly $550 million before the pandemic.[1] There may be an opportunity to raise additional 'blue' levies on certain businesses or targeted tourist sectors to use or access specific marine areas/resources. These resources can be used to fund marine and other environmentally sustainable projects, and may be especially well-placed to fund the ongoing management of marine protected areas, since they provide stable ongoing revenues.	**Medium-term** Bermuda already has some of the highest cruise head taxes in the world, and an existing tax or user fee placed on all tourist visitors. Engagement with the tourist sector indicates that an additional fee is likely to encounter resistance at this stage, particularly following the impact of COVID-19 on the economy and visitor numbers. As the tourist economy recovers, user fee increases or a more graduated tax to incentivise longer stays could be raised with a portion of the fee raised ringfenced to provide long-term funding for marine protection. Examples in other countries, such as Palau and Belize, that have adopted 'green fees' to support conservation has not demonstrated an adverse impact on attractiveness as a tourism destination.
Developer mitigation payments	Mitigation payments obtained from hotel developers and marine infrastructure planning obligations could be ringfenced to improve marine biodiversity.	**Medium-term** No mechanism exists to allocate marine development mitigation funding received to marine ecosystem enhancement. Mitigation payments are currently allocated into a central government-managed fund. Policy change is required to extend Bermudian legislation for planning obligations to the marine environment and ringfence funding generated for marine ecosystem recovery. These mitigation payments should provide finance in line with sites indicated by the habitat restoration maps within the MSP to offset any negative externalities from future developments.

1 Bermuda Tourism Authority, Annual Data 2018, updated 2020.

FUNDING SOURCE	OPPORTUNITY	READINESS ASSESSMENT
Blue bond	A blue bond is a debt instrument issued by governments, municipalities, development banks, corporate entities, or others to raise capital from investors to finance marine and ocean-based projects that have positive environmental, economic, and climate benefits. Bermuda has a favourable sovereign credit rating and a successful track record in tapping international capital markets. As such, it could potentially issue a blue bond as a tool to fund marine-related projects that deliver an economic return if a suitable investment pipeline for a blue bond issuance can be identified.	**Medium-term** While Bermuda has a favourable sovereign credit rating, its current debt stands at about $3 billion. With a government mandated debt ceiling of $3.5 billion, there may be limited scope to issue substantially more debt.[4] Bermuda's COVID-19 recovery plan for the next few years appears largely contingent on a return of the tourism industry over the next three years. In addition, a suitable investment pipeline of projects for blue bond issuance is not yet available; however a bond issuance is an opportunity for the land-based renewables pipeline. The relative higher cost and short maturity of this form of financing make idle funds costly if the lack of pipeline means that funds cannot be drawn down quickly. In the medium term, part of a blue bond issuance could potentially help capitalise the Facility with a portion also being ringfenced for a 'Blue Grants' programme to fund small-scale sustainable fisheries projects, with financing awarded on a competitive basis. However, care would need to be taken to ensure that potential beneficiaries have the knowledge and capacities to apply for these funds. As such, a blue bond issuance should be seen as a medium to long-term process.
Blue carbon	A network of seagrass and mangrove habitats exists in Bermuda with the potential to deliver carbon benefits. Proceeds from the sale of blue carbon credits through avoided carbon loss or carbon sequestration from marine habitats generate revenues for marine ecosystem protection.	**Long-term** The size of the area of mangrove and seagrass habitat in Bermuda is not at a sufficient scale to deliver substantial funding to cover the cost of blue carbon verification and ecosystem restoration.

OVERALL ASSESSMENT

- Blue Economy enterprise investment can, in turn, be made more impactful and sustainable if revenue streams such as 'blue' levies/user fees to access specific marine sites and/or developer mitigation payments can, in parallel, support the ongoing costs associated with the management and enhancement of MPAs. Surplus returns from the Investment Facility are unlikely to be sufficient to fund both the Incubator Program and the ongoing management of MPAs. Further work is needed to assess the ongoing funding requirements of Bermuda's MPAs, and to engage the tourism sector in this discussion to build the business case. Extending Bermudian legislation for planning obligations to hotel developers and the marine environment and ringfencing funding generated for marine ecosystem recovery would also increase income sources available.
- Blue or green bond issuance could be explored in time as the pipeline of investment opportunities develops and matures with government and philanthropic support. To support fishers, a small portion of funds raised through the bond issuance could be ringfenced to support investment readiness amongst small-scale fishers' projects.

IMMEDIATE NEXT STEPS

The next stage in the design of the Facility consists of the following key steps:

- More in-depth pipeline analysis, focused on the identified market-ready opportunities to review capital requirements, development needs, and financial return potential;
- Carrying out a review of existing relevant funding sources and identify any market gaps for financing the identified pipeline;
- Building upon the outcomes of marine spatial planning to understand the financial needs to both implement and maintain MPAs in the long-term and assess the level of support that the Facility could be able to provide as a complement to other primary funding sources;
- Assessing the potential Facility structure(s) and engaging legal partners to assess considerations for template Articles of Association; and
- Identifying funders for engagement and testing the concept and investment structure of the Facility with potential investors and philanthropic donors.

APPENDIX C: 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.

Blue Assets: Ocean-related resources that contribute to the environmental, social and economic development of the country to which they belong.

Blue Bonds: a new form of financing that operates as an innovative instrument to support ocean conservation.

Blue Economy: the sustainable use of ocean resources for economic growth, improved livelihoods, jobs and ocean ecosystem health.

Blue Finance: Finance or monies directly allocated to ocean resources, conservation or development of ocean industries and projects in the Blue Economy sectors.

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

ESG: Environmental Social and Governance. A collection of corporate performance evaluation criteria that assess the robustness of a company's governance mechanisms and its ability to effectively manage its environmental and social impacts.

Fully-protected marine protected areas: marine protected areas in which no extractive or destructive activities are allowed and all abatable 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.

Blue Investment Facility: A mechanism for identifying, nurturing and funding potentially viable projects in the Blue Economy sectors; fisheries, tourism, renewables or other identified areas such as conservation in line with the designed governance principles of the fund.

Incubator Programme: A structured accelerator approach to supporting the growth of micro, small and medium enterprises and mini-projects that need further business development and support before accessing finance via the Investment Facility.

J-Curve: An illustration which approximates how business models develop from early-stage embryonic concepts through to fully operational businesses over time, to understand how close each project was to investment-readiness. The stages include; embryonic, concept, feasibility, pilot, early operational, scaling and mature.

Marine protected area (MPA): a clearly defined geographical space, recognised, dedicated, and managed, through legal or other effective 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.

Natural Capital: Stocks of natural assets including water, air, soil and other living things that generate ecosystem services to sustain human life and contribute to society's development.

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

Objective: A statement of the desired outcomes or observable behavioural changes that represent the achievement of a goal.

Ocean and climate risk finance: a subsector of the finance and insurance industry that supports blue carbon markets and other climate related investments including mitigation and adaptation financing and risk management.

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

Partially-protected marine protected areas: marine protected areas in which only light extractive activities with low total impact are allowed, with all other abatable impacts minimised. Permissible low impact activities are identified within the management plan for that specific partially protected area based on the area's objective. 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.).

Pelagic fish: fish that exist in the pelagic zone, oceanic fish found closer to the surface or mid-depths.

Sustainable: able to balance social, economic and environmental needs and manage the balance between these three pillars to continue over time.

Sustainable Development: Development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs.

Third Sector: Organisations that neither fall into the private or public sector and usually in reference to NGOs, community groups, charities, and social enterprises.

Triple Bottom Line: Delivering environmental, social and economic benefits.

APPENDIX D: INDUSTRY REPORTS

The BOPP Steering Committee commissioned three industry reports to evaluate historic and current performance of the three core blue economy sectors in Bermuda: fisheries, ocean renewable energy, and blue tourism. The reports were crafted by 1Skip, RMI, and RedSky Strategy (respectively) with extensive stakeholder consultation. The end goal was to identify potential recommendations for interventions to improve the sustainable performance of each industry. The recommendations within the report are from the perspective of the expert authors, not BOPP. These recommendations were taken into consideration for the development of the Draft Blue Economy Strategy, but it is important to note that not all recommendations from the reports have been adopted by the Draft Strategy.

Within this Appendix are the Executive Summaries of each of the expert industry reports. They are titled "Phase 1 Report" as they were an initial input or phase in the crafting of the Draft Blue Economy Strategy. For more information, please contact BOPP.

FOR THE DEVELOPMENT OF BERMUDA'S BLUE ECONOMY DRAFT STRATEGY – PHASE 1 REPORT:

FISHERIES

Global Market Assessment + Local Economic Assessment + Industry Expert Analysis

EXECUTIVE SUMMARY

Bermuda's Blue Economy Draft Strategy will outline recommended activities and areas for investment for the sustainable use of Bermuda's ocean resources in order to support economic growth, improve livelihoods, and increase jobs while maintaining the health of ocean ecosystems. The Draft Strategy will begin with a focus on Bermuda's fishing industry, ocean renewable energy, and blue tourism.

This Phase 1 report on Bermuda's Fisheries includes a global market assessment, local economic assessment, and industry expert analysis. Its recommendations will be discussed and refined with stakeholder feedback, and will then undergo an economic analysis that will be incorporated into the Blue Economy Draft Strategy. The Blue Economy Draft Strategy will be a single document combining the recommendations and economic analyses for fisheries, ocean renewable energy, and blue tourism over a 10-year time horizon (2022 – 2032). The final recommendations in the Blue Economy Draft Strategy will not be legally binding, but are intended inform policy and investment decisions going forward.

The research begun in 2020 and was conducted within the confines of the global COVID-19 pandemic; the recommendations across industries may change due to the shape of recovery progress in Bermuda and it is the intention of this research and these reports to add to the conversation in order to create opportunity and flexibility within those recovery efforts.

Summary

Commercial fishing vessels have been licensed in Bermuda since 1972, with an average of 180 licensed vessels and approximately 300 licensed commercial fishers active in recent years. In the past, fishing effort was directed mainly at reef species but, following stock declines in the 1970s-80s and the banning of fish traps in 1990, pelagic species now make up about half of commercial landings. Most fishers deploy simple handheld lines or use trolling gear that tows lures or bait behind a moving boat. There has been limited use of longlining gear to date, but there is interest to expand.

This phase 1 report examines the commercial fishing industry to identify recommended interventions for its sustainable growth and continued management. The report reviews local market activities in the context of global market trends, and shares recommendations on ways to increase local value through combinations of increased opportunities for effort, efficiencies (regulatory and economic), and value

(through market incentives and activity changes). The focus is to improve outcomes for the people, the environment, and the businesses of Bermuda.

Bermuda's fisheries management has robust scientific data that is largely serving Bermuda well, but there are gaps. Demersal stocks are viewed as depleted but there is not adequate data to conduct full stock assessments. There are progressive harvest control rules that include closed areas, closed seasons, minimum size limits, and trip landing limits, but it is unknown how effective those controls have been. Additionally, little is known about resident recreational harvest.

While improvements to regulatory frameworks can improve efficiencies, lessen confusion, and sometimes create revenue streams, most fisheries, like markets, respond well to incentives. Economic incentives can be introduced to influence individual behavior and the actors decide themselves how best to meet those incentives. The recommendations in this report therefore focus mainly on creating incentives through increased market access. Many of the recommendations are conditional— i.e. they will have their intended outcome only under certain conditions or if paired with certain activities. Additionally, the recommendations, as a packaged whole, are intended to be self-funded.

The recommended interventions are:

1. Increase harvest of pelagic species
2. Explore a shoreside facility with the initial focus on raw, ready-to-eat tuna loin for export
3. Enhance commercial monitoring, control and surveillance, including;
    a. License recreational fishers for hook and line fishing, and use funds collected from tourist angler licenses for enabling conditions
    b. Use recreational licensing to enhance recreational monitoring, control, and surveillance

Figure CF2 at the end of the summary breaks each of these high-level interventions into a series of steps. The constituent parts and costs are discussed at length in the main report.

Increase Harvest of Pelagic Species: Bermuda is currently underutilizing its International Commission for the Conservation of Atlantic Tuna (ICCAT) quotas for pelagics. Increases in harvest should come from the pelagic fishery, thereby easing pressure on demersal stocks. Increasing tuna harvest will require Bermuda's continued and active engagement in ICCAT. Brexit may cause changes in Bermuda's participation, as well as potential changes of country level quotas. Many of the economically important stocks in ICCAT are overfished; in order to remain engaged and for Bermuda's quota to be fairly assigned, it is important for Bermuda to participate in the process for the reassigning of quota amounts. The market access program detailed in this report requires adherence to ICCAT quotas and other rules to obtain premium market access.

Explore a Shoreside Facility: This report recommends the creation of a high-value export fishery for raw, ready-to-eat tuna loins. Loining, instead of exporting headed and gutted product, is selected because it eliminates grading risk, brings higher prices, reduces shipping costs, and adds jobs to the Bermudian economy by using local labor to process the fish before export. A raw product is selected because of its high value and low plant development/operating costs relative to more energy dependent value-adding process, such as a frozen product. Generally, islands that have to import fuel have energy costs that are too high to make processing frozen or cooked products profitable. The only way to make freezing plants successful with high energy cost is if the input costs (fish costs) are very low, which is not the case in Bermuda, which furthers the recommendation of raw product. Therefore, this report recommends one of the components of a Shoreside facility to include loining facilities. If a low-cost loining plant is successful, expansion to other products could be explored. Other recommendations for the shoreside facility and some tradeoffs are discussed further in the report.

As proposed, an opportunity to increase revenue would be gaining premium market access for Bermuda tuna loins by entering the commercial fishery into a Comprehensive Fishery Improvement Plan (C-FIP). A C-FIP is a pledge by Bermuda to enhance their monitoring, control, and surveillance to improve overall management. This opens the door to countries and seafood retailers that only source product that is certified under a sustainability scheme (such as the Marine Stewardship Council standard) or in a C-FIP. The improved market access brings better prices and stronger demand. The C-FIP would require a number of investments, detailed in the main report. Investments would also include a state of the art, raw, ready-to-eat Hazard Analysis Critical Control Point (HACCP) that would allow export to even the most stringent countries.

Successful fisheries intervention is defined by generating more revenue for the fishers and keeping the shoreside facility profitable, while enhancing overall monitoring, control, surveillance and sustainability, all without any funding that is external to the recommendations.

Another uncertainty is the grade of tuna in the North Atlantic; Bermuda is currently not grading fish and therefore what level grade of fish are available is unknown. The current analysis assumes that 40% of current landings in Bermuda meets grades 1 or 2. If grade rises faster than projected, fishers will increase their revenues faster.

It should be noted that a shoreside facility will never be able to pay fishers what they are currently receiving for direct sales. However, the hope is that with the combination of increased Monitoring, Control, and Surveillance (which benefits both fishers and managers), easy access to export markets, increased revenue from increased catch, and simple improvements such as access to storage and ice, then the initial change in sales will have a limited impact on fisher livelihood. This is detailed below.

Cashflow Analysis

Using the best data available, a cash flow analysis of these interventions was conducted. This cash flow analysis is only speculative at this point, as the data is based on estimates, particularly current price data and shoreside facility operating cost data, so it cannot be taken directly to a business plan or pro forma for investment. It does, however, provide a good basis for discussing the trade-offs that will have to be made for these interventions to be successful.

The analysis projects that tuna landings would have to increase to 78 tonnes from the current 26 tonnes in order for fishers to generate current revenue levels. Currently, fishers sell direct to the end of the market for over $7/pound for yellowfin tuna. Current export prices are lower than that for loins. As a result, the switch to ex vessel prices to provide fish to a facility that will export those loins will see prices paid to fishermen drop to around $3/pound on average across all grades. Therefore, volumes would have to increase to pay the margins of the shoreside facility, pay for shipping, and pay for processing. In the model, the break-even point for fishers is forecasted to happen in the fourth year of the seven-year initial loan payback period. It could be sped up by landing more tuna sooner in the timeline or by increasing product grades faster.

Total initial investment for these recommendations is estimated to be under $600,000 and recurring investments on an annual basis are around that same figure. The goal is to devise a way to make these improvements self-funding. To pay for the start-up investments, the analysis models a seven-year loan at 9% interest.

VALUE ADDS	• Construction of Shoreside Facility	• Reporting Apps • Training & Transition • Electronic Monitoring for Commercial Fishers • Marketing plan for enhanced Tuna products • Fisheries Improvement Project Audit • Marine Stewardship Council pre-assessment • Food Safety Training & Audits • Reefer truck	• Recreational Catch and Effort validation • Commercial Validation • Annual FIP Audit
COST	$1.5 Million	$589k Start-up cost ($550k without electronic monitoring)	$650k **yearly** cost ($620k without Electronic Monitoring)
FUNDING	Pledge from Government	Start-up Loan	Tourist angler recreational licensing fees -or- 5x tuna landings -or- tax

Figure CF1: Cashflow Analysis Breakdown. A more detailed breakdown of start-up and reoccurring costs are in Appendix CF5.

Enhancing Monitoring, Control, and Surveillance: Electronic monitoring (EM) has come a long way and is increasingly affordable and user friendly. This report details several avenues of electronic monitoring that would suit the needs of Bermuda's small commercial and recreational fleet. In addition to EM, the report also makes several suggestions on landings control points, such as the shoreside facility and/or a refrigerated truck that could allow fishers to land their catch further away from the shoreside facility. These are just a few of the potential options to improve MCS in Bermuda. Additional

approaches, with a reduced emphasis on new technologies, are also worth further investigation. Most importantly, all potential options should be discussed in detail with stakeholders to assess feasibility of implementation. Increases in MCS will not only enhance data understanding and allow for the quality control necessary to enter in higher markets, but it will also increase the understanding of local markets. A traceable supply chain can cut down on illegal sales of local fish and can improve fisher business records, improving access to capital and insurance products

License Recreational Fishers: The report details several possible structures to this license, such as implementing licenses only for non-resident fishers, charter fees, or creating a small local license that has exemptions for youth, elderly, or other groups. The cash flow analysis above relies on fees collected from a tourist angling license to generate the investment necessary to implement the recommended MCS interventions across both sectors and to service the debt from the initial $600,000 start-up loan. If a tourist angling license is not used as a revenue source, a tax could be implemented, or the commercial fishery will have to land 130 tonnes of higher-grade tuna (five times the current landings) to cover the annual management and Monitoring, Control, and Surveillance costs suggested here.

Enhance Recreational MCS: Licensing local recreational fishers even for no fee will have the added value of increasing data collection and monitoring to better understand demersal fish stock health. With the use of a mobile app, recreational fishers can share data on their catches with relative ease, which both increases data and also better incorporates recreational fishers into the fisheries management conversation. App possibilities are detailed in the report below. The recommendation also comes with the necessity that these funds be earmarked for fisheries conservation to ensure these fees directly support other efforts outlined here.

In summary, this report lays out a sustainable path forward to increase pelagic harvests and enhance livelihoods. By keeping incentives in mind as the process moves forward, there appears to be a solution that is self-sustaining. Through enhanced market access created through improved MCS and sanitation, Bermuda can realize great benefits from this segment of the blue economy.

Recommendation Roadmap	
Step	**#1 – Increase Harvest of Pelagics**
1	Through incentives and creating a larger market, ease the pressure on demersal stocks
2	Pilot anchored fishing aggregation devices (FADs) to test if they can support a more consistent catch of pelagic, specifically sushi quality tunas (larger than 60 pounds dressed; grade 2+), to enhance both Commercial and Charter operators while allowing the expansion of market opportunities in Bermuda and through export.
3	Pilot small scale longlining using small day boats and small longline reels to enhance job creation and education of existing and future fishers.
4	Assess market opportunities based on quality and market prices
5	Improve fish handling to global best standard. Carry adequate ice, bleed, head, gut and pith fish immediately upon landing and place in clean ice.

6	Provide virtual auction through onboard data loggers that link to shoreside facility virtual auction (or could be independent if shoreside facility does not gain traction)
#2 – Explore A Shoreside Facility for Exporting Fresh Tuna Loins	
1	Provide incentives to land at a shoreside facility. Provide trip credit for fuel, ice and chandlery. Run facility as a cooperative to provide annual or quarterly dividends to fishers. Provide cooperative processing facilities and/or market stalls for fishers that still want to sell direct. Provide rooms with audited Hazard Analysis Critical Control Point (HACCP) for export processing
2	Create a catch validation system. Allow warden/enumerator/port sampler validation of catches. Provide full electronic traceability of product and order routing/virtual auction.
3	Initial focus of the shoreside facility on the export of high value raw pelagics with low cost, lean processing. If successful, explore other more energy intensive value add and freezing. As stocks are assessed healthy, include processing of demersals for local consumption and value add.
#3 – Monitoring, Control, and Surveillance (MCS) Reform	
1	One potential avenue is to develop a catch reporting software application that links to the current commercial database and includes modules for private recreational, for-hire commercial/recreational and commercial recording. Include catch by species and effort. Include all data elements currently in reporting forms for commercial. For for-hire commercial/recreational, add the number of patrons/anglers on each trip for catch per unit effort (CPUE) purposes. Add sales prices to commercial forms. Add number of patrons to for-hire forms. Add charter fee for charter form (lower priority). Other options to improve the catch reporting system, without advanced technology requirements, are also worth further investigation.
2	License all recreational anglers for hook and line fishing. Charge tourists the most for a 1-3 day license; fee should be in the $20-$30 range. Think about licensing private resident boaters for a small, or no, fee annually. Issue licenses to shore anglers for free or a small fee. Require that everyone have a license in possession. This creates a sample frame for reporting control and validation. License will be stored in catch reporting software application. Require residents to report all catches and effort via the app or a web portal if they don't have a smart phone. Require reporting to be same day. Catch reporting software application would develop statistically valid estimates of CPUE.
3	Change legislation or create public private partnership (PPP) so that license fees can be held back from the general fund to be invested in management.
4	Use recreational license database as a sample frame for validation phone calls and estimation of effort per person per unit of time (month, quarter, semi-annually, would not go with a longer interval due to reporting bias). Use CPUE x total effort from validations to generate total catch estimates. Validate and gather total effort through field intercepts or within the catch reporting software. The option of conditioning license renewal to reporting.
5	Wardens can check licenses and catches periodically, or under a rigid sampling routine, to enforce licenses and validate catch data. Will likely need to hire more wardens and/or port samplers.

6	Require shorter intervals for commercial catch reporting. Shorten to same day if possible. One way to enforce is by requiring hail-in/hail-out tied to the logbook record. If a vessel fished that day, they are subject to being validated. Could use electronic monitoring (EM) to determine passively if they left the port and therefore belong to the pool of trips than can be validated. If they are using the app for inventory, sales and marketing, they will be incentivized to do this voluntarily if that is built into the app. Options which do not require app use are also worth investigation.
6a	Alternatively, consider requiring all landings, or at least all pelagic landings initially, to be validated by landing at a check station. Check station could include shoreside facility, other small stations around the island or a roving warden(s). It is highly recommended that if shoreside facility is developed in concert with the recommendations, that all pelagics from the longline (LL) and FAD fisheries be required to land at the facility or the transport truck that will be required to service the other end of the island.
6b	Consider piloting EM for catch validation. If this is deemed too expensive, ban filleting at sea or require identifiers be left on fillet for dockside validation of species. Banning filleting at sea might drive more fishers to a shoreside facility also.
7	Require sales price data to be recorded in the logbook
8	Random port sampler/warden validation of all the commercial measures.
9	Most importantly, socialize options with stakeholders, and solicit alternatives. Together develop the set of interventions that will work best for their operations at the lowest cost. There are many options within these recommendations – hail-in/hail-out, official landing site/check-in station, EM to trigger a reporting event, port sampling, etc. Not all have to be done, but some combination will be needed. Technology aversions or challenges with scaling implementation fleet-wide should be considered when selecting which options make the most sense for Bermudian fishers.
10	Conduct outreach regarding changes; licensing and app usage.

Figure CF2: Bermuda Recommendation Implementation Plan

FOR THE DEVELOPMENT OF BERMUDA'S BLUE ECONOMY DRAFT STRATEGY – PHASE 1 REPORT:

OCEAN RENEWABLE ENERGY

Global Market Assessment + Local Economic Assessment + Industry Expert Analysis

EXECUTIVE SUMMARY

As Bermuda explores opportunities to address the island's energy needs, it is imperative to explore ocean renewable energy in addition to options on land. This chapter reviews ocean renewable energy first through a broad global assessment of available technologies, and then in the specific context of Bermuda, in order to consider which options best meet the island's priorities while being both technically and commercially viable today.

This assessment and analysis have resulted in the following recommended near-term actions for Bermuda:

1. **Implement a Feasibility Study for Offshore Wind:** In line with its 2019 Integrated Resource Plan, Bermuda should proceed with the initial implementation steps for a 60+ megawatt offshore wind farm, which includes conducting a detailed feasibility study containing technical, environmental, economic, and political components.
2. **Floating Solar PV Over the Next Decade:** Bermuda should next consider floating solar photovoltaics (PV) as the highest potential resource option after offshore wind, and with potential to be implemented together in the same location. Cost and technology developments should be monitored prior to adoption.
3. **Maintain Stakeholder Engagement in Monitoring Developing Technologies:** Bermuda can further capitalize on local marine energy resources by considering wave power, tidal power, and ocean thermal energy conversion (OTEC) power as components of the long-term energy mix. Maintain active stakeholder engagement as designated agencies monitor technological milestones and collect environmental data in the short-term to confirm potential viability would be the first step as these technologies are improving rapidly.

Offshore wind is likely the most near-term viable option for ocean renewable energy in Bermuda, given its well-established record globally and the opportunity to tailor a specific solution to meet Bermuda's local conditions. For example, a floating option is likely better suited to Bermuda than an option that is fixed to the sea floor. The resilience of the equipment itself is also an important consideration so that it contributes to a more resilient overall electricity system in Bermuda, able to withstand and recover quickly from external shocks.

Floating solar PV is also likely to be a good near-term option, as more projects are being deployed globally in the marine environment (compared to the majority of floating solar projects today that are located in freshwater locations). As costs continue to come down and the ability of marine-based

floating solar is further demonstrated to be able to withstand regular saltwater conditions as well as storm situations, this technology could provide a significant electricity resource in Bermuda.

Finally, other options such as wave power, tidal power, and ocean thermal energy conversion (OTEC) have been tested so far in demonstration projects, but have very limited or no commercial deployment. It is worth keeping a pulse on these technologies as they may continue to mature and see their costs become more certain and competitive; the recommendation is for Bermuda to establish a diverse committee to monitor these and any other potential options for ocean renewable energy that may become good options for Bermuda in the future.

FOR THE DEVELOPMENT OF BERMUDA'S BLUE ECONOMY DRAFT STRATEGY – PHASE 1 REPORT:

BLUE TOURISM

Global Market Assessment + Local Economic Assessment + Industry Expert Analysis

EXECUTIVE SUMMARY

Although Tourism is not Bermuda's largest sector, it plays a major role in the economy, particularly as it accounts for a significant portion (between 10%-20%) of employment. Like many destinations, Bermuda's tourism industry has been severely impacted by COVID-19 due to travel restrictions around the world. This Phase 1 report for the blue tourism chapter of Bermuda's Blue Economy Draft Strategy will lay out issues facing tourism in Bermuda and provide recommendations to grow tourism in an economically and environmentally sustainable way over a 10-year horizon.

This Phase 1 report provides a global market assessment of the tourism industry. This provides the context in which Bermuda – and the tourism industry around the world – finds itself. The outlook for tourism as a whole in 2020 is particularly grim, with a projected 70% decline in international arrivals. While projections for 2021 look more positive, it is clear that the industry as a whole will take years to recover. Given Bermuda's reliance on cruise tourism, it is important to note that the cruise sector was among the worst hit and will likely remain depressed for the next few years.

Tourism has a major impact on the environment through increased greenhouse gas emissions and damage to the ocean and nearshore environment. Prior to COVID-19 there was a growing interest in ecotourism (tourism practices that claim to limit negative impacts and/or support positive impacts on the environment), but it remains to be seen what effect the pandemic will have on this trend. Understanding and tracking this dynamic is important, as governments around the world, including Bermuda, will need to balance policies that are intended to protect the environment with those that encourage economic development as these are often seen as opposed to each other.

Prior to COVID-19, Bermuda's tourism sector was growing steadily and accounted for approximately. 5.3% of the GDP. However, Bermuda faces some unique challenges: highly seasonal tourism arrivals (causing capacity constraints in the summer and overcapacity in non-summer months); reliance on a few source markets (mostly the U.S. and Canada); a shortage of Bermudians willing to work in tourism; an inefficient transport infrastructure; and the dominance of cruise passengers versus air passengers (cruise passengers' spend per day is around 10-15% of the spend of air passengers). Some of these issues may not be relevant for the next two to three years, but they are inherently structural issues that will reappear when the tourism sector reaches its 'normal' capacity post-COVID-19. Despite these issues and the effect of COVID-19, some 'bright spots' appeared in the tourism sector in 2020, including: the passing of new legislation to encourage more Superyachts to visit Bermuda; the continuation of fishing tournaments and other sporting events; and the opening of the new airport.

In order to enhance the Blue Economy as it relates to tourism, this report combines a global market analysis and a local economic assessment to put Bermuda tourism realities and opportunities within the global context. This, along with stakeholder interviews, has resulted in the development of three major recommendations, highlighted below for further discussion and analysis:

1. **Promote 'Blue and Green' tourism** with the creation of a certification program. The intent of this recommendation is to encourage activities that have positive effects for both the blue economy and environment. This recommendation examines which activities should be considered and how this investment could occur.
2. **Update cruise head tax** to reflect capacity constraints and destination control. This recommendation considers changing cruise taxes to balance traffic in terms of when calls occur, what types of ships call on Bermuda, and where they berth
3. **Heighten visitor awareness of the environmental impact of tourism activities**. This involves building on successful education and awareness programs implemented elsewhere with positive effects.

APPENDIX E: AQUACULTURE (KPMG SUMMARY FINDINGS)

AQUACULTURE FEASIBILITY ASSESSMENT UPDATE

INTRODUCTION

The Waitt Institute engaged KPMG Advisory Limited (KPMG) to assess the financial feasibility (the "Feasibility Assessment") of an aquaculture operation to produce selected sustainable mariculture species. The financial assessment considered five species:

- snapper (finfish),
- almaco jack (finfish),
- calico scallops (bivalve),
- lion's paw scallops (bivalve) and
- pearl oysters (bivalve)

The five selected species were identified in the Bermuda Aquaculture Suitability Analysis (the "Suitability Analysis") report, authored by Dr. Samia Sarkis, as the **most suitable native species** taking into account the species' biological and culture requirements and performance (hatchery and farm), source of stock, market demand, availability of suitable areas, potential production yield, and potential impact to the environment.

KPMG's work is ongoing, but the below represents an update and summary of their preliminary findings.

BACKGROUND AND OBJECTIVES

As noted in the Suitability Analysis, "there is no precedent for commercial aquaculture in Bermuda however previous experimental and pilot scale operations provided insight into the potential and challenges of mollusc and finfish culture". Hence, the objective of the engagement is to explore the financial feasibility of aquaculture production of the five selected species on a commercial scale in Bermuda.

INFORMATION COLLECTED ON DEMAND AND PRICES

- *Bermuda's fish consumption* per capita is approximately 2,925 metric tonnes per year, or ~42kg per capita. This is nearly double the consumption per capita in Canada, USA, and UK. Higher fish consumption in Bermuda is largely attributed to Bermuda's tourism sector
- *Population growth and consumer preferences* have increased the demand for fish globally, which has largely been met by the expansion of aquaculture (rather than traditional fisheries.
- *Local fresh fish commands a premium price* at grocery stores and restaurants. Restaurants are a significant buyer of fresh local and imported 'fresh' fish. Restaurateurs' views suggest that the demand for local fresh fish, broadly, is greater than supply.

FINANCIAL MODEL AND ANALYSIS

Demand

Based on the information collected, the following demand assumptions were developed:

- Production levels were set at approximately the level of current demand for the four species intended for consumption (finfish and scallops), and an estimate of three thousand oysters for the production of pearls
- The potential for export sales were not considered owing to:
    - high production costs relative to competitor jurisdictions,
    - additional costs necessary to export products,
    - lack of export facilities, and

- limited suitable space available on land and in surrounding waters to develop such export facilities.

Culture techniques

The level of production, operating costs, and capital expenditure is largely informed by the culture techniques used and was refined with the input from Dr. Sarkis and the Department of Natural Resources and Environment.

Based on the information collected the following assumptions were used to develop the capital and operating expenditure of aquaculture production of the five species singly or in combination.

- Bivalve species cultured on 100m longlines in the ocean. A land-based hatchery would be required to facilitate the production of these species before being transferred onto longlines in the ocean.
- Finfish species could be cultured using land based recirculating aquaculture systems (RAS). This could be a partially closed system or a fully integrated closed system.
- Producing only native species limited culture and production options.

PRELIMINARY FINDINGS

KPMG's approach to data collection included desk-based research and consultation with Dr. Sarkis to develop high level estimates of the fixed and variable costs associated with producing the selected species. The model projects revenue and expenditures over a 10-year period and is intended to be used as a tool to produce initial estimates of cash flow.

Using the assumptions developed, multiple production scenarios with a mix of species indicated a net negative cash flow after considering capital expenditure. The primary financial drivers were:

- High levels of capital outlay and production costs in Bermuda
- Small market size (~65,000 people plus tourists) limited the economies of scale that could be achieved.

Notwithstanding that the results of the financial assessment were net negative, the development of the model, scenarios, extensive discussions with Dr. Sarkis and others, have resulted in insights which may be helpful in developing future aquaculture business models for Bermuda. These insights are summarized below:

Species selection

- The Suitability Analysis was limited to native species which were optimal from biological and environmental considerations. If the production system is a closed land-based system, there may be potential for culturing non-native species, which may generate better cash flow by expanding product diversity and opportunity for export.
- A different product mix could reduce production costs.

Price

- Net profit per kg of production is sensitive to both the market price and level of demand assumed.

Market demand

- It is difficult to predict whether customers will be attracted to the social mission of a local cultured/farmed product but global trends indicate the market is growing.
- There was insufficient information to assess growth potential of a locally cultured/farmed fish product which could be of superior quality or distinguished in the market as unique to Bermuda.
- Another challenge in relation to demand is the bifurcation between cultured products that could potentially be sold at retail prices versus wholesale prices. While some are of the view that a locally sourced/farmed product could attract a premium, it is unlikely that all sales would

be in line with current retail prices in supermarkets and restaurants. Therefore, the model assumes that the average price per kg would be below current retail prices.

- In terms of pearl oyster farming, there would be some interest based on discussions held with various local jewelers. However, there is uncertainty as to whether a Bermuda cultured pearl could be marketed and sold successfully in the local market alone, and what the level of demand would be and at what price.

Growth potential

- Revenue growth (i.e. selling more product) is limited by the level of demand in the local market and the availability of suitable space for aquaculture in Bermuda, particularly with the bivalves cultured in the ocean, but also the space available for land based finfish culture.

High production costs

- Bermuda is a high cost jurisdiction and therefore the associated operating costs are significant.
- Operating costs for finfish are higher given the costs associated with importing fingerlings, feed, and electricity usage of RAS. However, finfish yield the lowest cost per kg of production on a standalone basis, given the higher level of demand assumed in the model.

Social investment

- The possibility of a portion of the costs being offset by social investment, grants, charitable donations, Government incentives or contributions, has not been explored or factored into the analysis.
- Other potential benefits generated from a commercial aquaculture operation (e.g., employment creation, improving the balance of accounts, preserving fishing culture, strengthening tourism and food security) could contribute to the value of aquaculture to Bermuda's economy, which are outside the scope of this report. Potential negative factors, such as the impact on fisherman (e.g. competition, livelihood) are also outside the scope of this report. Applying a methodology which quantifies negative and positive economic, social and environmental impacts in a common financial metric may produce a different result.

Capital investment

- KPMG factored in a 30% additional cost assumption on all capital expenditure items for shipping to Bermuda and freight and installation. However, KPMG have assumed import duty would be nil.
- There is a significant upfront capital cost associated with finfish aquaculture irrespective of the culture technique used (offshore cages versus on-land recirculating systems). During KPMG's research, it has been difficult to obtain data in relation to the costs of a recirculating aquaculture system.

Synergies and economies of scale

- Synergies for fixed costs were assumed. For example, savings in relation to the number of staff that could operate the facility and rent for a land-based facility. However, aquaculture for finfish and bivalves are very different operations, thereby limiting the potential overlap in operational costs.