












NORTH DEVON MARINE NATURAL CAPITAL PLAN

FINAL REPORT

JUNE 2020

Published by:

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Publication date: March 2020

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www.northdevonbiosphere.org.uk/mncp

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Draft	Chrissie Ingle Rose Stainthorp			31/03/2020
Final	Rose Stainthorp	Incorporation of comments from public consultation	Andrew Bell	

Acknowledgements: This work was funded by the European Maritime and Fisheries Fund and completed as part of the Marine Pioneer in North Devon. The North Devon Marine Pioneer was hosted by the North Devon Biosphere and delivered with representatives from: the University of Plymouth, Plymouth Marine Laboratory, WWF – UK, Devon and Severn IFCA, Blue Marine Foundation, Marine Management Organisation, and Natural England.

The authors would also like to thank the Biosphere's Marine Working Group and other stakeholders and interested parties that contributed to the development of this plan.

Cover photos:
Nina Constable Media, all except,
North Devon AONB (surfers, walkers, kayaks),
and,
Mike Deaton (seal, spiny lobster)

Document figures:
Illustrative Science Ltd, all except,
North Devon Biosphere (Figure 2)

List of Abbreviations

25YEP: 25 Year Environment Plan
AONB: Area of Outstanding Natural Beauty
CBD: Convention on Biological Diversity
DEFRA: Department for Environment, Food & Rural Affairs
EMS: European Marine Sites
FRMP: Fisheries, Research and Management Partnership
LNP: Local Nature Partnership
MARPOL: International Convention for the Prevention of Pollution from Ships
MCZ: Marine Conservation Zones
MERP: Marine Ecosystems Research Programme
MNCP: North Devon Marine Natural Capital Plan
MPA: Marine Protected Area
MWG: Marine Working Group
NCA: Natural Capital Approach
NDBR: North Devon UNESCO Biosphere Reserve
NDMP: North Devon Marine Pioneer
NEF: New Economics Foundation
NGO: Non-Governmental Organisations
OSPAR: Oslo and Paris Conventions 2002
SAC: Special Areas of Conservation
SDG: Sustainable Development Goals
SSSI: Sites of Special Scientific Interest
UNCLOS: United Nations Convention on the Law of the Sea
UNECE: United Nations Economic Commission for Europe
UNESCO: United Nations Educational, Scientific and Cultural Organisation
WFD: Water Framework Directive
WHO: World Health Organisation

PREFACE

PIONEERING APPROACHES TO MARINE MANAGEMENT IN NORTH DEVON

The North Devon Marine Pioneer (NDMP) was set up as one of four Pioneer projects to inform delivery of the UK Government's 25 Year Environment Plan (25YEP) with the overall vision that the environment will be left in a better state for the next generation than it was for this generation. Specifically, the NDMP aimed to contribute to implementing and updating the 25YEP by:

1. Exploring how to apply a natural capital approach (NCA) in the marine environment
2. Identifying local priorities in North Devon's coast and sea
3. Improving inter and intra government and non-government working together
4. Increasing care for, and understanding of, the marine environment
5. Gathering information about all of the marine system (social, economic, ecological)
6. Increasing the use of social and economic science and practice in delivering marine management
7. Developing a plan and mechanism for prioritising investment to restore natural capital
8. Developing and implementing innovative finance opportunities
9. Sharing lessons learned and best practice more widely

The NDMP was delivered through a local partnership of agencies and stakeholders, hosted by the North Devon UNESCO Biosphere Reserve (NDBR) and involving a steering group of government representatives led by DEFRA marine policy and evidence, Marine Management Organisation (MMO), Devon & Severn Inshore Fisheries and Conservation Authority (IFCA), South West Partnership for Environmental and Economic Prosperity (SWEEP) marine team, World Wide Fund for Nature (WWF) and Devon Local Nature Partnership (LNP).

A range of demonstration projects were agreed to explore new operating models for government and non-government organisations, highlighting benefits and beneficiaries, as well as demonstrating how natural capital approaches can be applied to the marine environment. The lessons learned from testing and applying these methods will be shared widely and hopefully can be replicated in other areas, as well as being incorporated into the next iteration of the 25YEP.

The current document represents one of the demonstration projects developed through the NDMP, with the purpose to develop and test a local spatially specific evidence base that can be used to support discussions of opportunities and risks for activities, developments and management approaches in the marine environment, summarised in the UK's first local Marine Plan based on a natural capital approach.

LESSONS LEARNED FROM THE MARINE PIONEER IN NORTH DEVON

The North Devon Marine Natural Capital Plan (MNCP) collates the findings of a number of other demonstration projects and seeks to apply or demonstrate examples for many of the lessons learned through the Marine Pioneer. Further information on key lessons and their relevance to the plan are described below.

Lesson 1: *Integrated planning and delivery needs good governance*

The Government's 'A Green Future: Our 25 Year Plan to Improve the Environment' (25YEP) underlines the value of the environment to people's existence, livelihoods and wellbeing, but also the degraded state of the environment and our need to restore it rapidly. The 25YEP says that to achieve the goals

set out in the plan we need to develop "strong governance, a robust delivery framework, and everyone to play their part" with "strong local leadership and a more integrated delivery framework" (HM Government, 2018, pg.128). However, current marine and coastal governance and management is dispersed. Planning and delivery are not integrated across policies or organisations in a systematic way and coordination and investment to implement marine policy is lacking at a local level where it is most needed to achieve national goals.

Work carried out by the Marine Pioneer demonstrates that to incorporate the range of nature's values into our decision and actions, and ensure we secure the essential benefits of nature, governance has to be more inclusive, transparent and adaptive, with integrated planning and delivery that addresses both local environmental priorities and national goals together. This would provide a platform to achieve the complex and various range of changes needed to secure the health of the sea in the future.

In Chapter II of the MNCP the governance structures for the plan area are reviewed and changes proposed that seek to connect people across different sectors and provide the structures through which decisions can be made and their impact evaluated, to ensure delivery of the plan objectives within a national context.

Lesson 2: *Applying a natural capital approach requires a holistic framework*

The natural capital approach can be adopted to support a range of coastal and marine decision-making contexts including the development of strategic plans, fisheries management, Marine Protected Area (MPA) management, sustainability appraisal and environmental impact assessment. The approach provides a system for more coherent management across assets, ecosystem services and benefits, and across land and sea where artificial separation of the two systems often prevents management from achieving all its goals. However, it is essential that the natural capital approach is given a holistic framing and is not primarily applied through monetary valuation.

Through the work of the Marine Pioneer, the real strength of the natural capital approach has been highlighted as providing a framework for the structured, consistent integration of environmental, social and economic information and in making explicit the specific linkages between environmental characteristics and human wellbeing and livelihoods. Where delivered via holistic place-based applications this could improve and restore the environment and reverse the climate and biodiversity emergencies.

The North Devon MNCP is the first to apply a natural capital approach to the marine system. The aims, objectives and policies of the plan (Chapter III) were developed through local stakeholder engagement and evidenced through the production of the North Devon Asset and Risk Register. This tool provides a systematic and hierarchical framework to record the extent, condition and spatial configuration of natural capital assets, as well as the current threats to the continued delivery of benefits from them. The asset and risk register will thus support decision making that accounts for the importance of natural capital to people's health and prosperity as well as to nature's healthy and biodiverse seas.

Lesson 3: *Innovative funding is needed to achieve environmental goals*

To date funding for environmental management has been focused on maintaining condition of priority species and habitats and reducing the pressures and impact from human activities. Funding to support improving or restoring the environment is limited despite the increasing evidence that shows how a healthy environment underpins the economy and human wellbeing. This could be improved by the creation of clear national strategy with shared goals and integration of the planning and delivery and

governance systems. Recognition of the benefits provided by the sea and the fundamental role nature plays in our lives would lead to greater support for more investment in environmental health and expanding our stocks of natural assets.

As part of the work commissioned through the Marine Pioneer, WWF explored multiple innovative funding options and their favoured solution was to develop and implement a Blue Impact Fund with the aim of investing in sustainable enterprise models that both benefit the marine and coastal environment and are capable of generating returns for investors. Alongside this, WWF propose to implement an Ocean Recovery Fund for deploying surplus returns from the Blue Impact Fund and public sector funds into activities that deliver ocean recovery, such as the delivery of the 30x30 agenda and nature-based solutions.

In Chapter IV of this plan the implementation of the proposed Blue Impact Fund through a local delivery trust in North Devon is discussed and potential investment opportunities to deliver the aims and objectives of the plan highlighted.

Lesson 4: *Collaboration and partnership working is crucial*

This lesson is not new but needs to re-emphasised. The marine environment is complex due to the four-dimensional nature of the system and the interconnected nature from micro to macro. The implications of lessons 1 and 2 are that the efficiency gains from integrated planning can be passed on to the delivery phase though collaboration. The collaboration is not limited to marine agencies but also between marine and terrestrial agencies to ensure that issues are addressed by the most appropriate actor. Through the pioneer different organisations took the lead to implement actions, according to their legitimacy, remit and resources. Most were done in collaboration rather than single agency approach. These recommendations are also reflected in the Malawi Principles of the ecosystem approach.

Lesson 5: *Ecosystem approach should underpin future fisheries management*

The UK has entered a new era of fisheries policy and management post-EU exit by leaving the EU, and has set an ambition to become a global leader through a commitment to having a world class fisheries management system that delivers for fish stocks, fishermen, the natural environment and climate. However, the complexity of the fish stocks and industry in England requires multi-disciplinary, multi-actor and cross-border collaboration which has not been happening, as well as appropriate evidence gathering, systems for knowledge exchange and processes for multi-scale but connected goal setting, decision making and management.

Despite the ecosystem approach being the preferred approach for some time it is not being applied adequately and emerging evidence indicates more regional approaches to fisheries management are required. Working relationships between managers, industry, scientists and conservationists vary from functional to poor, behavioural insights identify that greater outcomes could be achieved if we work together collaboratively rather than from opposing perspectives. New mechanisms are required to enable fishermen to participate in fisheries management through a co-management model set at regional scales.

The aims and objectives of the MNCP have sought to address some of the issues for fisheries management identified through the work of the marine pioneer, further information can be found in Chapter III of this document.

Lesson 6: *MPA management should prioritise ocean recovery*

The Marine Pioneer has found that for MPAs to be part of the solution to the climate and biodiversity emergencies their objectives, management, governance and funding needs to evolve. Admirable effort has gone into site designation which must now be complemented by effort in implementing management, governance, and funding that protects the broad range of important interactions and processes across whole sites and the wider sea, not just habitats and species. Evaluation of effectiveness and impact should become part of the management cycle so refining and adapting happens easily and regularly to achieve environmental outcomes sooner.

The North Devon MNCP area contains multiple MPA designations and the aims of the plan which encompass management objectives for these sites seek to integrate a whole site approach and net gain for biodiversity that goes beyond features of conservation interest (Chapter III). Furthermore, the proposed governance arrangements for the plan (Chapter II) will ensure continued evaluation and monitoring of the effectiveness of management activities.

Lesson 7: *Marine management plans need to deliver community empowerment*

Plans to improve nature by managing, protecting and restoring coastal and marine ecosystems must be designed, from the outset, to deliver for local communities, where governance and management of natural resources are based on local priorities and aspirations. Community empowerment requires investment of time and resources to support and enable the interactive participation of local people, but will deliver more resilient, holistic, sustainable and lasting outcomes. Empowerment can increase local stewardship, which can support social, environmental and economic targets.

In Chapter II of the North Devon MNCP the governance structures for the plan area are reviewed and changes proposed that seek to connect people across different sectors and ensure that local stakeholder engagement is instilled in planning, delivery and monitoring of the plan.

Lesson 8: *Biodiversity net gain*

Net Gain in the marine environment does not yet have a biodiversity metric equivalent to the terrestrial counterpart. Application of net gain for marine improvements has so far only been proposed for developments in the marine environment as compensation for the impact of the development. Without a metric there is no real quantification of neither the impact nor the compensation, hence the policy is at best imprecise. Loss of habitat can be more easily compensated in the intertidal and estuarine situations leading to compensatory habitat creation through realignment. It must be recognised that on land net gain projects can improve the marine environment, though the value is hard to estimate. However, that land and marine benefit of catchment action should be used to help drive policy and choice on terrestrial net gain decisions. Using biodiversity as the metric is easier than applying an enviro-metric which covers not only the biodiversity value but also the ecosystem service flows and benefits. An enviro-metric is more suited to considering natural capital approach since it deals with the flows and benefits. Creation of compensatory habitats that do not serve same functions for the same beneficiaries or wider should be avoided. Net gain can be used to create more benefits from MCZs rather than purely conservation of features. Payments to reduce fishing are complicated by implying a private fishery but these can possibly be addressed with local stewardship agreements and balancing up the fisheries benefits. Finance for MCZs can be enhanced through Net Gain but the scale is not likely to be large.

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CHAPTER I: BACKGROUND AND OVERVIEW

INTRODUCTION

1. The North Devon Marine Natural Capital Plan (MNCP) is a spatially explicit, local marine plan to support delivery of the UK Government's 25 Year Environment Plan (25 YEP)[1] across all chapters, in a place and involving local people.

2. Commissioned under the auspices of the North Devon UNESCO Biosphere Reserve and the North Devon Marine Pioneer (NDMP), the Plan pilots a natural capital approach (NCA) to management of the marine environment which seeks to better address local decision-making needs within i) the national marine planning framework, i.e. the South West Marine Plan, and, ii) the context of local strategic plans and economic development strategies.

3. Delivery of the plan will be used to draw out implications and useful lessons to feed into the delivery of the UK Marine Strategy (to meet the requirements of the Marine Strategy Framework Directive[2]) and go towards the UK government aim of achieving good environmental status for the marine environment.

4. Implementation of this plan policies, with explicit links between natural capital assets, biodiversity and ecosystem services, will ensure that the use of north Devon's marine natural capital is optimised. This will support delivery of robust protection of marine biodiversity, and enhanced resilience to natural hazards and climate change, as well as improving well-being and realising a sustainable and viable marine economy.

USING A NATURAL CAPITAL APPROACH

5. The Government's 25 Year Environment Plan (25YEP) calls for the application of a natural capital approach as a tool in decision-making to "take into account the often hidden additional benefits in every aspect of the environment for national wellbeing, health and economic prosperity, with scientific and economic evidence to the fore" (Defra, 2018 p.9, see footnote [1]).

6. There is some variation in definitions used for terms within the natural capital approach. As this document centres on UK policy we adopt the definitions used by the UK's Natural Capital Committee (2017)[3]:

    a. **Natural capital:** "the elements of nature that directly or indirectly produce value to people, including ecosystems, species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions."

    b. **Ecosystem services:** "functions and products from nature that can be turned into benefits with varying degrees of human input."

    c. **Benefits:** "changes in human welfare (or well-being) that result from the use or consumption of goods, or from the knowledge that something exists."

[1] A Green Future: Our 25 Year Plan to Improve the Environment, DEFRA 2018
[2] Marine Strategy Framework Directive
[3] How to do it: a natural capital workbook. NCC, 2017

7. Fundamentally, the natural capital approach is based on recognising the contribution of nature to human wellbeing, and therefore improving the way the natural environment is traded-off against other things that are important to society. Valuing this contribution is central to the natural capital approach, but encompasses social, socio-economic and human health indicators as well as monetary valuation.

8. The stock of natural assets (natural capital) in a place underpins the supporting and regulatory processes that ensure the healthy functioning of that system (e.g. habitat provision for spawning). Thus, from each set of natural capital stocks there may flow one or more ecosystem services (e.g. wild fish populations) which in turn can be used to produce 'goods' for people and society (e.g. food). The benefits provided to people by these goods can be valued in monetary or non-monetary terms (e.g. the number of people employed in the fishing industry in north Devon).

9. Biodiversity is a core component of natural capital and includes diversity within species populations (genetic variation), the number of different species, and the diversity of ecosystems. It is central to the ecological condition, quality and resilience of ecosystems that support services provided to people as well as providing direct benefits through species existence and enrichment of other benefits (e.g. nature-based recreation). These multiple roles make it difficult to fully capture the value of biodiversity through consideration of ecosystem services alone. Thus, a core requirement of the natural capital approach is to measure the extent, status and value of natural capital assets, as well as services and benefits. This provides a baseline from which the impact of management and development decisions can be evaluated, and any risks to biodiversity, natural capital and the services which flow from them can be identified (**Figure 1**).

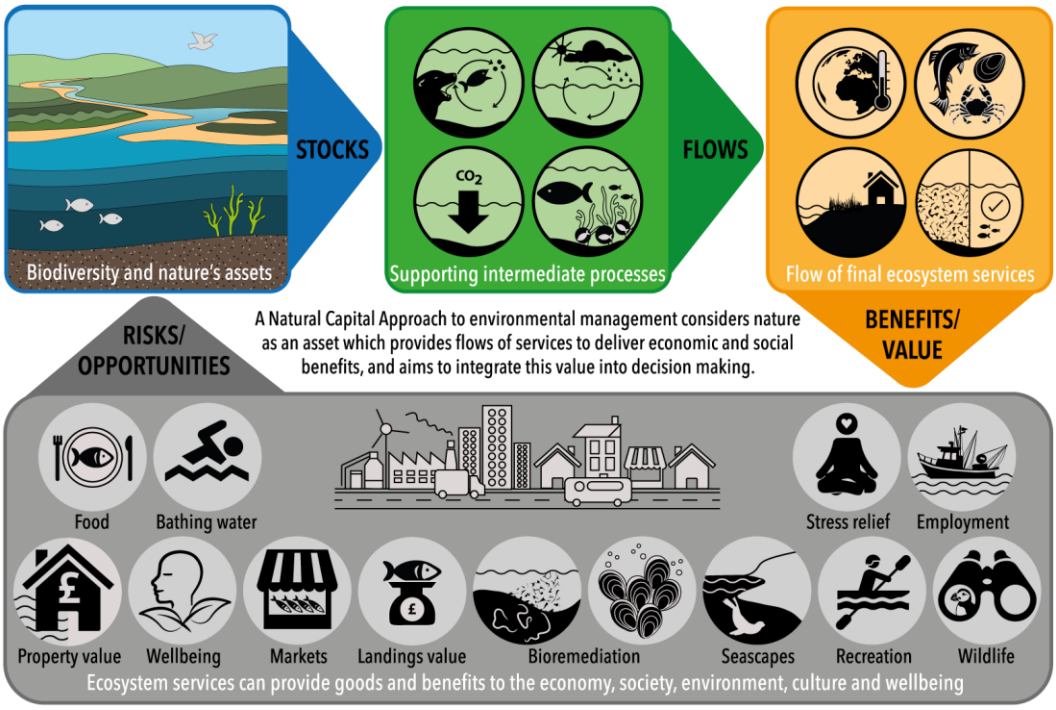


Figure 1. Overview of the natural capital approach (Credit: Illustrative Science Ltd)

10. The natural capital approach taken by the MNCP has been guided by the principles described above, and generally followed the four-stage process proposed by existing high-level guidance for developing a plan at a local or landscape scale (DEFRA, 2020, pp 49-57)[4].

    a. **Set the vision:** The long term vision for the marine aspect of the Biosphere was developed through workshops with local stakeholders as members the Marine Working Group (MWG), in conjunction with the Marine Pioneer Steering Group which includes representatives from both regional and national regulatory bodies, academic research groups, and conservation groups and Non-Governmental Organisations (NGO).

    b. **Baseline assessment:** An assessment of natural capital stocks in north Devon was conducted as part of the Marine Pioneer resulting in:

        i. *A natural capital asset register*[5] that considers the extent and condition of the natural capital assets, and the stocks and flows of ecosystem services in the plan area

        ii. *A risk register*[5] to identify threats to natural capital in the plan area

    c. **Identify and assess options**: Based on the findings of the Asset and Risk Registers recommendations were made for key natural capital assets on which future management opportunities could be focussed to achieve the greatest gains. These recommendations formed the basis of the policies, aims and objectives of the MNCP. The potential impact of these policies on the marine environment, coastal communities, and maritime economy in north Devon was then evaluated through Sustainability Assessment[6].

    d. **Implement and evaluate:** The MNCP sets a 25-year vision for the marine environment of north Devon and a periodic review of whether the plain is delivering on its objectives will be conducted every 5 years. Through the development of the Asset and Risk Registers, indicators for each of the plan objectives have been identified, and the baseline condition for many of the indicators has been established. Where data is available those indicators have been added to a Geodatabase for north Devon and online mapping tool (GeoNode)[7], which can be used to spatially monitor and review progress towards plan objectives.

11. Chapter II of the plan provides information on the governance of the plan, Chapter III includes the vision, objectives and plan policies, Chapter IV provides a summary of the findings of the Sustainability Assessment of the plan, Chapter V includes information on funding mechanisms for proposed objectives and risk assessment of returns and deliverability.

NORTH DEVON MARINE NATURAL CAPITAL PLAN AREA

12. The North Devon Marine Natural Capital Plan has used the North Devon Marine Pioneer boundary to gather evidence and data (**Figure 2**). The boundary encloses over 5500km^2 of the outer Bristol Channel and eastern Celtic Sea, extending offshore to 20nm from the north east Cornwall, north Devon and west Somerset coasts. This area was identified as the extent of fishing activity for the inshore fleet that lands to North Devon ports through work with the local fishing sector. To enable consideration of social and economic impacts the boundary also extends inland to 1km, and up to

[4] Enabling a Natural Capital Approach: Guidance, DEFRA 2020
[5] North Devon Marine Pioneer 2: A Natural Capital Asset and Risk Register. Rees, Ashley, Cameron 2019
[6] North Devon Marine Natural Capital Plan. Sustainability Assessment - Draft for Consultation. Hooper, Ashley, Mullier and Rees, 2020
[7] North Devon Geodatabase and GeoNode

the tidal limits of the Taw and Torridge rivers. The policies and objectives of the plan are currently restricted to the marine, coastal and estuarine component of the North Devon UNESCO Biosphere Reserve (NDBR) (wholly contained within the delineated boundary) in order to provide a robust and relevant governance model for the plan[8].

13. The plan area contains sites of international importance, such as the marine component of the North Devon UNESCO Biosphere Reserve (NDBR), the Lundy Island Marine Nature Reserve, North Devon Coast Areas of Outstanding Natural Beauty (AONB), European Marine Sites (EMS) (e.g. Special Areas of Conservation (SAC)), Marine Conservation Zones (MCZ) and Sites of Special Scientific Interest (SSSI).

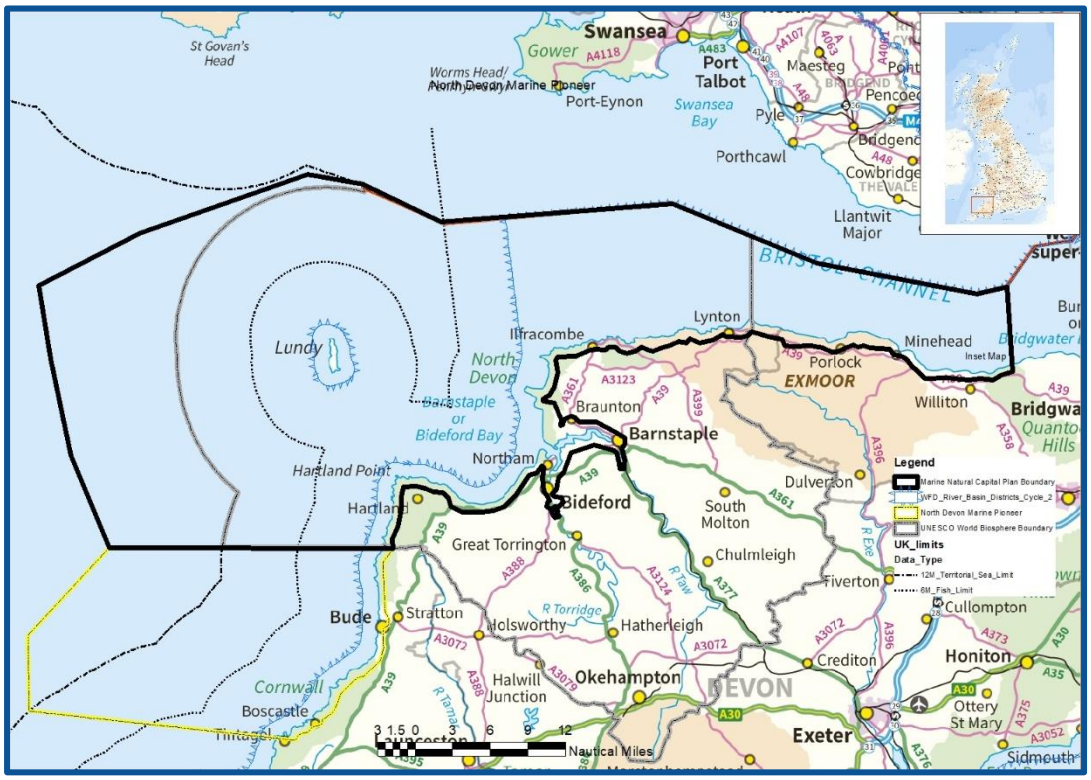


Figure 2. Map of the North Devon Local Marine Plan Area (black line), including the marine component of the North Devon UNESCO Biosphere Reserve (grey line), and the Marine Pioneer boundary (black plus yellow line) over which data and evidence have been collected.

14. Biosphere Reserves are areas of world-class natural value, designated by UNESCO. The global network of reserves aims to be test-beds for sustainable development within areas of high environmental quality. Areas of Outstanding Natural Beauty are nationally designated exceptional landscapes whose distinctive character and natural beauty are precious enough to be safeguarded in the national interest. Special Areas of Conservation protect habitats and species of European importance designated under the Habitats Directive (EEC, 1992)[9]. Marine Conservation Zones are designated under the United Kingdom Marine and Coastal Access Act 2009 (MCAA)[10] to protect nationally important habitats and species. As a network of sites, these zones contribute to fulfilling

[8] This is a Defra England initiative analysis and policy linkage with the Welsh Assembly jurisdiction has not been addressed due to time and resource constraints. However, future iterations of this plan should ensure transboundary compatibility with the Welsh waters in the spirit of integrated management.

[9] Habitats Directive 92/43/EEC 1992

[10] Marine and Coastal Access Act 2009

the United Kingdom's obligations under the Convention on Biological Diversity (CBD)[11] as well as non-binding instruments such as the recommended coherent network of marine protected areas under the OSPAR (Oslo and Paris Conventions) Recommendation 2003/3[12]. Sites of Special Scientific Interest notified under the Wildlife and Countryside Act 1981[13] (amended 1985) are present on the terrestrial and coastal border of the plan area. The UK Government has a duty to notify as an SSSI, any land, which in its opinion is of special interest by reason of any of its flora, fauna, geological or physiographical features.

15. The diverse natural environment of the plan area includes a large extent of subtidal sedimentary habitats, the presence of estuarine mussel beds, saltmarsh and mudflats, and an important sand dune system. Wetland and sea bird populations are found in the Taw Torridge and on Lundy, demersal fish species as well as crab and European lobster are important for commercial fisheries, and protected species include seals, porpoise, spiny lobster and pink sea fans. Heritage assets range from scheduled ancient monuments and protected wreck sites to memorials to sailors and fishermen. The North Devon marine area also provides important ecosystem services (and associated benefits), particularly related to tourism, recreation and leisure, seascape and cultural heritage, and commercial fisheries. Tourism is a very important source of income for the local community, and fishing contributes to both the economy and the cultural heritage of the area. Marine and coastal habitats (especially saltmarsh) also contribute to regulating and maintenance services including carbon sequestration, water quality, coastal defence, and the provision of nursery habitats for fishery species.

SPECIAL FEATURES OF THE NORTH DEVON MARINE PLAN AREA[14]

Diverse wildlife and landscapes:

- One of the best dune systems in the northern hemisphere (Braunton Burrows SAC and SSSI, core area of the Biosphere Reserve).
- Marine biodiversity to warrant the UK's first Marine Nature Reserve around Lundy, today a Marine Protected Area encompassing a Special Area of Conservation, a Site of Special Scientific Interest and a Marine Conservation Zone with a No Take Zone.
- Iconic species such as the European Otter and Atlantic Salmon, Marsh Fritillary, Common Dolphins and Porpoises, Grey Seals, Basking Sharks, Porbeagle Sharks and Pink Sea Fans.
- Characteristics landscapes such as Culm grasslands and the estuary basin, and the dramatic coastal landscapes of the North Devon Coast Areas of Outstanding Natural Beauty, coastal grazing marshes and biodiversity-rich floodplains.

Cultural richness:

- A strong maritime heritage
- Scheduled ancient monuments, protected wreck sites and memorials
- Thriving cultural communities with festivals that celebrate the area's environmental richness

Diverse economy:

- Tourism and increasing sustainable tourism based on outdoor activity such as surfing, sailing, walking and cycling

[11] Convention on Biological Diversity
[12] OSPAR Convention: Decisions, Recommendations & Agreements
[13] Wildlife and Countryside Act 1981
[14] Strategy for Sustainable Development 2014-2024, North Devon Biosphere

- Locally significant fishing industry
- Industries located here because of low pollution, such as pharmaceutical, medical filters and Electromagnetic testing

A culture of innovation and learning:

- Experimentation with habitat management and creation on Braunton Burrows and in the estuarine areas for new saltmarshes and recreating Culm Grassland
- Piloting Biodiversity Offsetting
- One of England's 12 Nature Improvement Areas
- North Wyke as part of Rothamstead Research is based in the area, Exeter and Plymouth Universities invest in the area also
- Host to Landscape and Marine Pioneer to test application of a natural capital approach and integrated planning and delivery

STRATEGIC AND LEGAL CONTEXT

16. The MNCP has been and continues to be influenced by European and national government guidance, evidence studies, appraisals, assessments, local communities and businesses. The policy context in which the plan sits at the time of production remains dynamic as the UK prepares to leave the EU. However, the overall direction of the plan will remain focused and directed towards ensuring the natural capital value of the marine environment will be enhanced, to enable sustainable future use of the seas as outlined in the 25YEP. The evolving policies in England and UK regarding EU-Exit will be used as the tools to achieve the stated aims of this plan. The following lists provide further detail.

INTERNATIONAL POLICY, INCLUDING BUT NOT EXCLUSIVELY:

17. Convention on Biological Diversity (CBD), 1992: The most recently agreed targets (Aichi 2010) relevant to the plan include, inter alia, to eliminate subsidies that lead to harmful action on biodiversity, sustainable production and consumption of natural resources, to manage and harvest fish and aquatic invertebrate stocks sustainably, to reduce pollution from excess nutrients to levels not detrimental to ecosystem functioning, control of invasive species, respect for local and traditional knowledge.

18. Bonn Convention, 1979: The UK has a signed legally binding agreement under the convention, which aims to conserve terrestrial, aquatic and avian migratory species throughout their range. Most relevant to the plan are the African Eurasian Waterbird Agreement, Conservation of Small Cetaceans and Conservation of Albatrosses and Petrels.

19. Ramsar Convention, 1971: Covers all aspects of wetland conservation and wise-use, recognising wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. Although there are no Ramsar sites in the plan area, there are obligations to promote the wise use of wetlands which includes intertidal areas.

20. MARPOL Convention, 1973: This is the main international convention covering prevention of marine pollution by ships from operational or accidental causes. This also applies to fishing vessels and covers pollution from various sources including sewage, rubbish, antifoulants, jetsam, and various gases including Nitrogen oxides and Sulphur oxides.

21. UNCLOS Convention, 1994: The convention, amongst other things, sets rules for management of seas outside and inside of exclusive economic zones. Particularly affecting this plan is the

establishment of sustainable extraction limits and in the event of trading of rights in post EU exit, the obligations of the other States in respecting the limits set.

22. OSPAR Convention, 2002: replaces both the Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft (Oslo Convention) and the Convention for the Prevention of Marine Pollution from Land-based Sources (Paris Convention, with the intention of providing a comprehensive and simplified approach to addressing all sources of pollution which might affect the maritime area, and all matters relating to the protection of the marine environment.

23. Aarhus Convention, 2001: Requires that environmental information is made accessible to the public and the public participate in decisions about the environment, including planning.

24. United Nations Framework Convention on Climate Change, 1992: the intergovernmental convention at which states agree the targets and actions to address climate change as advised by the scientific advice from the Intergovernmental Panel on Climate Change. The Paris Agreement of 2015 calling for net zero emissions was made under this convention.

25. UNECE-WHO/Europe Protocol on Water and Health, 1999: sets a process for consideration of health and environmental issues early in a major planning and programmes. This is broader than an "appropriate assessment" required by Special Areas of Conservation.

26. Convention on Underwater Cultural Heritage, 2001: places artefacts that have been underwater for more than 100 years as automatically protected, it sets out the good practices of conserving underwater heritage and has been adopted by the UK as standard practice, though not fully ratified in law.

27. United Nations Sustainable Development Goals (SDG), 2014: The SGDs are globally agreed as key targets for all nations to achieve by 2030. The most relevant to the plan are;
    i. SDG 6 Clean water and sanitation - improve the quality of water bodies impacted by pollution.
    ii. SDG 12 Responsible consumption and production - reduce waste arising from excessive consumption and inadequate recycling. The goal also encompasses sustainable tourism.
    iii. SDG 13 Climate action - address adaptation and mitigation for climate change.
    iv. SDG 14 Life below water - improve marine biodiversity and the condition of the seas as well as measures to allow equitable and sustainable exploitation of marine resources.
    v. SDG 15 Life on Land - improve the condition of biodiversity on land and the sustainable use of natural resources.
    vi. SDG 17 Partnerships - in particular, encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships.

NATIONAL POLICY AND PLANNING CONTEXT, INCLUDING BUT NOT EXCLUSIVELY:

28. The Marine Policy Statement sets out the aspirations of the government in what it expects from the Marine Plans around the coast. The tone of the document is very much towards sustainable "blue growth" embracing issues such as tourism, aquaculture, fisheries, telecommunications, energy ports and shipping, etc. Marine Protected Areas are front and centre in the policy statement and other developments must show how they help stop the loss of biodiversity.

29. National Policy and Planning Framework (2019 version) promotes integrated coastal zone management particularly in response to climate change and coastal change as part of a natural

process. Coastal Change Management areas can be established (as is already proposed for the Taw Torridge Estuary mouth).

30. Environment Bill and Fisheries Bill (emerging policy): The emerging Fisheries Bill has the objectives to put in place measures to ensure sustainable fisheries. Fisheries management incorporate an ecosystem-based approach. The Environment Bill Policy statement barely references the marine environment other than continued enhancement of the water environment and reducing pollution. While current legislation refers to no net loss, the Environment Bill will override this to make it mandatory for housing and development to achieve as least a 10% net gain in value for biodiversity. A statutory obligation for net gain through planning is particularly relevant to coastal, estuarine and intertidal habitats in the marine realm, which are at risk of significant degradation as a result of development. The Environment Bill will also include a new mandatory system of spatial strategies for nature – Local Nature Recovery Strategies (LNRSs). Each LNRS for an area must include (1) spatial information on the most valuable existing habitat for nature, (2) map specific proposals for creating or improving habitat for nature and wider environment goals, and, (3) agree priorities for nature recovery.

31. Climate Change and Net Zero emission targets for 2050: The Climate Change Committee and the Climate Act provide for emission reductions. These net zero actions can include the natural sequestration of carbon in ecosystems as well as capture and storage in geologically suitable sites.

REGIONAL POLICIES

32. The regional and sub-regional plans below are a mix of statutory and non-statutory plans which this plan will have a peer to peer relationship with, insofar as the iterations of this and the other plans will be used as material consideration and influence each other through the planning cycles.

33. Statutory Local Plans are not generally marine plans, but the jurisdiction overlaps with the marine area over the intertidal zone and there are implications of shore-based infrastructure influencing activity in the sea.

34. Torridge and North Devon Joint Local Plan specifically has coastal related policies that safeguard the coast and its undeveloped nature for conservation of heritage, landscape and biodiversity. Already developed marine locations are safeguarded and prioritised for activities that require a marine location specifically. The plan seeks to improve the water quality of the coast along with ensuring connectivity between coastal habitats. It allows for coastal protection in line with the recommendations of the North Devon and Somerset Shoreline Management Plan (Version 2). Tourism development is supported where it does not detract from the natural beauty of the area and connectivity of access will be maintained where possible along the coast path. Military training activity will be supported in its current locations and intensity. Renewable energy support and provision developments are allowed where they do not harm the environment and or operation of the ports. The districts are developing policies for the mouth of the estuary as a coastal change management area.

35. West Somerset Plan has similar polices and approaches as the North Devon Plan, protecting the towns of Minehead and Watchet, recognising the value of the undeveloped coast. It has a Coastal Change management area at Minehead where only temporary consents will be permitted.

36. Exmoor National Park Plan recognises 3 priority marine habitats (saltmarshes and 2 different types of Honeycomb Reef worm reefs). The policies celebrate and protect the undeveloped coast. It has a coastal change management area for the Porlock Weir area where development will be gradually reduced, and compensatory development allowed in sites away from the dynamic coastal edge.

37. North Devon AONB Management Plan is driven by primarily safeguarding the landscape and setting of the AONB which covers the coastal strip from Cornwall to Exmoor. It supports activity to improve access to heritage and biodiversity on the shoreline. The setting of the AONB is the coastal area and therefore a Seascape assessment North Devon and Exmoor was commissioned to understand the links between people on shore and the marine areas.

38. Devon County Council Minerals Local Plan does not influence marine aggregate dredging but indicates the shore facilities in the area are adequate for landing the current and anticipated demand for marine aggregates.

39. Southwest Inshore and Southwest Offshore Marine Plan (draft emerging policies): The plan has undergone wide stakeholder involvement to produce policies that have relevance to the area but are not spatially specific. The plan aims to, (1) achieve a sustainable marine economy, (2) ensure a strong, healthy and just society, and, (3) live within environmental limits. The polices that can particularly impact in the area include those for aquaculture, and renewable energy technology deployment; each subject to appropriate environmental assessment. It is worth noting that the Southwest Marine Plans do not explicitly cover fisheries management.

NON-STATUTORY PLANS

40. Biosphere Reserve Strategy including its annexed components such as Catchment Management Plan and the Landscape Natural Capital Strategy. The Marine Natural Capital Plan will be a component strategy sitting alongside the other components. This overarching strategy for the Biosphere Reserve has includes strategic aims for conserving the marine biodiversity of the area through the establishment of marine protected areas and appropriate marine and fisheries management programmes; particularly with stronger local participation in decision making. The catchment plan seeks to improve the ecological status of the water bodies in the Biosphere Reserve, including the transitional and coastal waters. It recognises the major issue of agricultural run-off causing eutrophication issues in the Taw Torridge estuary and proposes ongoing programmes to address it. The Natural Capital Strategy for the land area of the Biosphere reserve proposes a range of investment opportunities to address water quality and flooding as priorities.

41. Southwest River Basin District Management Plan is produced as part of the Water Framework Directive (WFD). The main purpose of the river basin plan is to move towards good ecological status of the rivers and water bodies in the area. This includes the waters to 1km from the coastline.

42. Heart of the Southwest Industrial Strategy and Productivity strategies: These express the opportunity for growth in the Marine sector for renewable energy and engineering. The visitor economy and the quality of life in our area relies hugely on our natural capital. The area boasts two National Parks, two World Heritage Sites and countless stunning beaches, attracting millions of visitors each year.

43. Shoreline Management Plan (Version 2): provides guidance to authorities on the management of flood and coastal defence along the shoreline from Hartland Point to Brean Down. This plan identifies where the coastline should be changed or not according to the options of (1) Hold the line, (2) Retreat the line, (3) Do nothing, or, (4) Advance the line, over three different epochs of 0-20 years, 20-50 years and 50-100 years. The derivation of these policies considers the natural features and natural capital along the coastline.

CHAPTER II: GOVERNANCE

44. The Government's 25 Year Environment Plan (25YEP) highlights that there is a unique opportunity (through EU exit) to implement institutional and cultural change, leading to effective governance underpinned by environmental principles – which is necessary to deliver the ambition of the 25YEP.

45. One of the key lessons learned through the Marine Pioneer in North Devon was that local environmental priorities and national goals could, and should, be addressed together through integrated planning and delivery to achieve good environmental outcomes.

46. Currently, UK marine and coastal governance and management is dispersed, and does not integrate planning and delivery across policies or organisation in a systematic way. For example, fishing activity is not assessed for all its impacts in one assessment but instead management of fish populations is considered separately to protection of benthic or pelagic systems. Similarly, governance and management of land-based activities which impact the marine and coastal environment, such as waste management, access and coastal defence are also disunited.

47. On a local level, the Marine Pioneer found that many stakeholders and locally engaged citizens feel disconnected and powerless because of current governance arrangements. This was due to a number of factors such as; perceived complexity of current governance arrangements, stakeholders not being engaged from the outset of a project, or, because projects claim to offer a route to change without continuing engagement or delivering on expectations at the end.

48. Until the inception of the Marine Pioneer, the governance of the marine area of the North Devon Biosphere has been piecemeal, as resources permitted, or as national issues have demanded. For example, the Biosphere's Marine Working Group has flexed according to; developing the new Marine Conservation Zones, providing expert advice to the Coastal Group that produces the Shoreline Management Plan, reacting to issues such as marine renewable energy, working with the North Devon Coast Areas of Outstanding Natural Beauty (AONB) on seascape assessments and supporting local action groups such as the Taw Torridge Estuary Forum.

49. The gaps have been in fishing, wider marine conservation, proactive planning for marine infrastructure and community engagement. Whilst actions taken have been diverse, widespread and effective, the follow up and consistent governance has not been there. As the new suite of MCZs become operational and this plan is adopted, there is a greater demand for strong governance to deliver integrated planning and delivery for the marine area.

PROPOSED GOVERNANCE OF THE MARINE NATURAL CAPITAL PLAN

50. Through the Marine Pioneer, WWF provided some in depth analysis of local and national governance and made recommendations for the ideal governance of a marine area, such as the Biosphere Reserve. WWF's project was targeted at MPAs but the principles can be extrapolated to the entire marine component of the Biosphere. A review of fisheries governance was commissioned from the New Economics Foundation (NEF) to reflect an aim in the overall Biosphere strategy and the goals set by the Marine Working Group and local fishermen of improved local decision making and governance. The principles and recommendations from these reports are summarised in the following section and **Figure 3**.

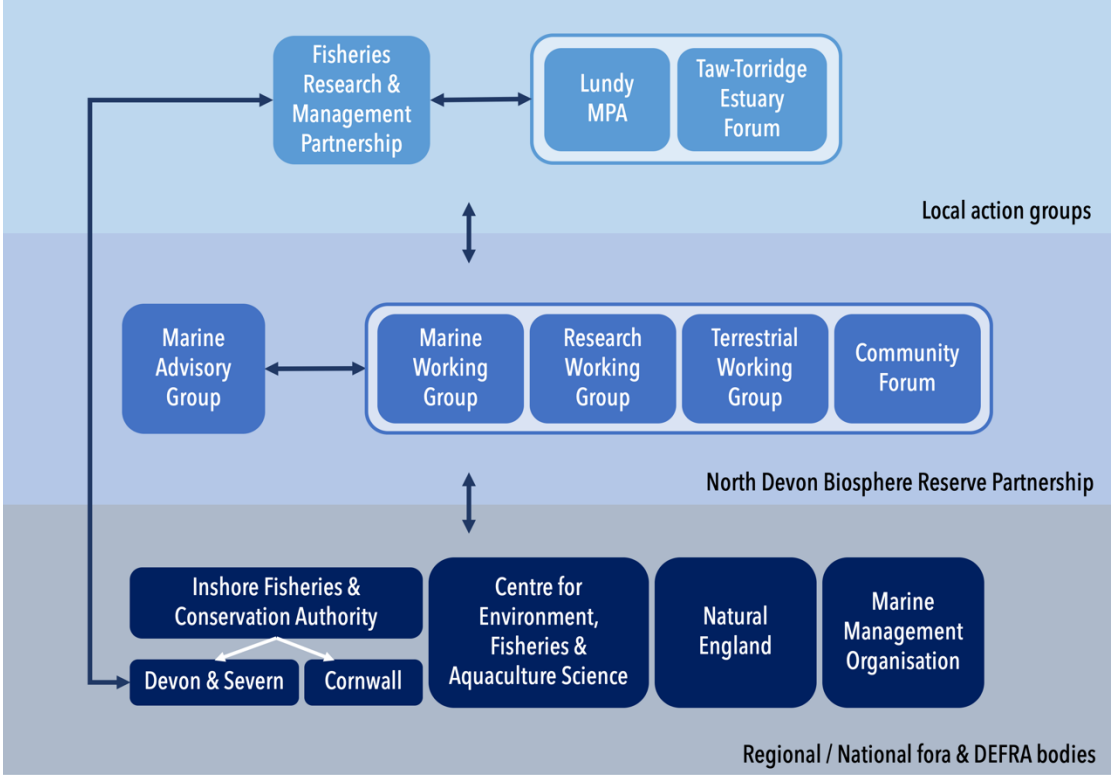


Figure 3. Summary of the proposed governance structure for the North Devon Marine Natural Capital Plan. Double-headed arrows indicate channels of communication between organisations and groups. White arrows indicate regional groups under a national body.

51. The Biosphere Reserve is overseen by the North Devon Biosphere Reserve Partnership; a collaboration of over 26 partnership organisations that meet regularly so that its members can work effectively to deliver the aims of the Biosphere Strategy[15]. The partnership works through direct action, through advocacy and providing high quality advice. It is supported by a Biosphere Reserves coordination team who help to bring projects and partners together, provide good technical advice and also directly deliver some of the projects and programmes within the Biosphere Reserve. The partnerships work is supported by a number of working groups that focus on topic areas, engaging with more stakeholders to address programmes and projects in a participatory manner.

52. The Marine Working Group of the Biosphere Partnership will be primarily responsible for the oversight and delivery of the Marine Natural Capital Plan, with expert consultation from a Marine Advisory Group, and site-specific groups. This will remain an open, 'place based' group, where possible, with local actors defined by the boundary of the Biosphere. It is a diverse group with membership regularly reviewed to ensure adequate representation of different sectors. Under the proposed governance structure the Marine Working Group will be the voice of the marine area and advocate for the Biosphere, identifying issues and successes, contributing to the delivery of the plan through their respective organisations and groups, and identifying potential projects/actions that could be delivered either by their respective groups, the Biosphere team or other organisations.

[15] North Devon Biosphere Sustainable Development Strategy 2014-2024

53. Delivery of the plan objectives will require collaboration between locally based authorities and regional and national agencies which will be facilitated by the formation of a Marine Advisory Group. This advisory group will consist of representation from regulatory bodies, academia, and NGOs, and could provide the conduit (as face to face meetings may not be necessary) for time limited regulatory bodies (MMO/IFCA), scientists and NGOs to link national policy goals with targeted local actions. This group will provide expertise to help with delivery of the plan, working closely with and seeking local input from the Marine Working Group.

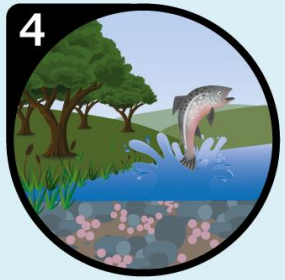
54. The Fisheries, Research and Management Partnership (FRMP) is a newly formed group stemming from the work of the Marine Pioneer. The group will consist of local fishermen, scientists and regulators working together to achieve sustainable and viable fisheries in north Devon. A primary objective of this group is to bridge the gap between current, species-focused fisheries management and a more ecosystem-based approach at an appropriate scale. This approach will integrate local and historical knowledge with scientific research outcomes, building the knowledge base for sustainable ecosystem-based management at an appropriate spatial scale, and highlighting current knowledge gaps to inform future research.

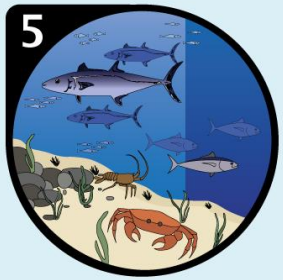
55. Local action groups such as, Lundy MPA advisory group and the Taw-Torridge Estuary Forum, already participate in Marine Working Group and/or the wider Biosphere Partnership and will be vitally important in the development of a whole systems approach to marine governance, for the Plan. They will continue to act in an advisory capacity, with representatives on the Marine Working Group, to share their knowledge for the delivery of the Marine Natural Capital Plan, and for guidance in delivering their own actions.

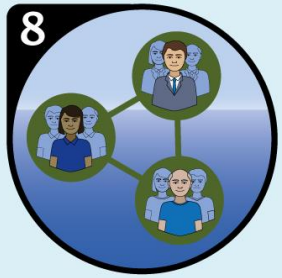
56. The proposed framework aims to empower and strengthen local delivery capability to increase connection between decision-makers, the flow of knowledge about nature and places, and direct resources towards connecting local and national systems together. This connectivity means that there is also the opportunity to test new policy ideas at a regional and local level, and feedback to the national level, thus ensuring the system can continue to learn and adapt as new challenges or information presents itself.

Our 25 Year Vision for the North Devon Biosphere

The North Devon Biosphere has thriving wildlife and clean waters, with protected areas supporting diverse and resilient marine systems. Nature supports prosperous and sustainable fisheries, mariculture and other maritime industries. People in north Devon feel an increased connection to their environment and are empowered to participate in governance to achieve locally-led priorities. Flourishing seas and improved environmental awareness has led to growth in sustainable and conscientious tourism, bringing greater prosperity and sense of pride to the area. Decision-makers consider ecosystems as a whole, recognising not only the linkages between land and sea, but also between all elements within each of these realms, and how multiple activities can interact with each other to impact our natural systems. Society feels the benefits of a healthy and recovering natural environment through increased human health and wellbeing.







1. Thriving wild fisheries
2. Sustainable aquaculture
3. Environmentally-aware tourism
4. Clean water and sediments
5. Protected biodiversity
6. Climate change resilience
7. Knowledge sharing
8. Strong governance

CHAPTER III: VISION, AIMS AND OBJECTIVES

DEFINING THE VISION

57. The 25-year vision for the North Devon Biosphere was developed through a scenario-testing workshop with the Marine Working Group in 2017, in conjunction with input from the Marine Pioneer Steering Group, to ensure that local expertise was explicitly considered from the outset when setting long terms goals for the MNCP. This was done as part of a programme of work run by the Marine Ecosystems Research Programme (MERP).

58. Using scenarios generated by the National Ecosystem Assessment in 2011 as a starting point, local stakeholders were asked to consider how marine-specific drivers (e.g. demand for sea food, the strength of fisheries and marine protection legislation, land management actions, expansion of marine renewable energy, and others) could affect the provision of goods and benefits (e.g. fish imports/exports, fishing effort, species harvested, aquaculture development, pollutant inputs, cultural identity, leisure activities, and others) from marine natural capital in the future.

59. The three scenarios considered were:

    a. Green and Pleasant Land: a scenario in which the conservation of biodiversity and landscape are dominant driving forces, with continued expansion of global free-market but also further increases in global environmental standards.

    b. National Security: a scenario driven primarily by increasing global energy prices that force most countries to seek greater self-sufficiency and efficiency in many of their core industries. Increased focus on home-grown production and sustainable use of resources due to short supply of global resources. Economic growth is low.

    c. Local Stewardship: a scenario is driven by similar external pressures to National Security, but society has made a more conscious effort to reduce the intensity of economic activity and the high levels of consumption that were a characteristic of the early years of the century. Political power is devolved, and decisions are made at a local level, where appropriate and site based. Economic growth is slow, but the economy is stable.

60. Through this workshop and further work by MERP, the following principles were identified as most important by local stakeholders in setting long term goals for the marine environment:

    a. The top three guiding principles were identified as ‘respecting the earth, harmony with other species’, ‘curious, interested in everything, exploring’ and ‘protecting the environment, preserving nature’ which were about living in balance and harmony with nature, managing human impacts on the marine environment and the diversity of experiences the coast and sea provides.

    b. People’s cultural values are linked to sense of place, which is generally where they live or work, their cultural identity including being part of a coastal community, places and practices where activities are changed to suit the environment (say from fishing to wildlife watching), aesthetic pleasure including biodiversity of wildlife, all of which contribute directly to a ‘fulfilled human life’ and are associated with charismatic marine life and biodiversity.

    c. Furthermore, when talking about managing the interests of marine species and habitats in decision making, the participants in the study proposed ideas of strategic, adaptive management and monitoring approaches based on scientific evidence with strong local

community involvement and a need to integrate local, national and international marine management strategies

61. Overall these principles fit best with the 'local stewardship' future scenario and so this scenario was used as the basis for developing the final 25-year vision for the marine area of the North Devon Biosphere.

ENVIRONMENTAL PRIORITIES FOR NORTH DEVON

62. As part of Marine Pioneer in North Devon the UK's first Marine Natural Capital Asset and Risk Register was developed and was used to map the links between natural capital assets, ecosystem services and related benefits.

63. The asset and risk register identified significant contribution of multiple ecosystem services from the habitat features within the MNCP area. In particular, there is high provision of goods / benefits from: 1) Provisioning services (food), 2) Regulating services (i) healthy climate, (ii) prevention of coastal erosion, (iii) sea defence, and 3) Cultural services (i) tourism / nature watching, (ii) aesthetic benefits (**Figure 5**).

64. Asset-benefit relationships represent the relationship between the condition of the natural asset and the benefit provided to people. Three types of natural capital assets were taken forward for the North Devon risk register. These comprise: Habitat assets – all habitats that provide a moderate or significant contribution to an ecosystem service benefit; Species assets – commercial species (fish and shellfish) with and without quota; migratory species (salmon and seatrout); and the water column – water bodies, bathing waters, shellfish waters.

65. To determine the nature and the severity of the risk to the asset-benefit relationship the performance of the asset-benefit relationship was assessed against UK policy targets. A metric for Community Based Knowledge of Risk was developed though participation in a workshop of the members of the Marine Working Group.

66. From this work, the greatest risk to the asset-benefit relationships in the MNCP area are summarised below:

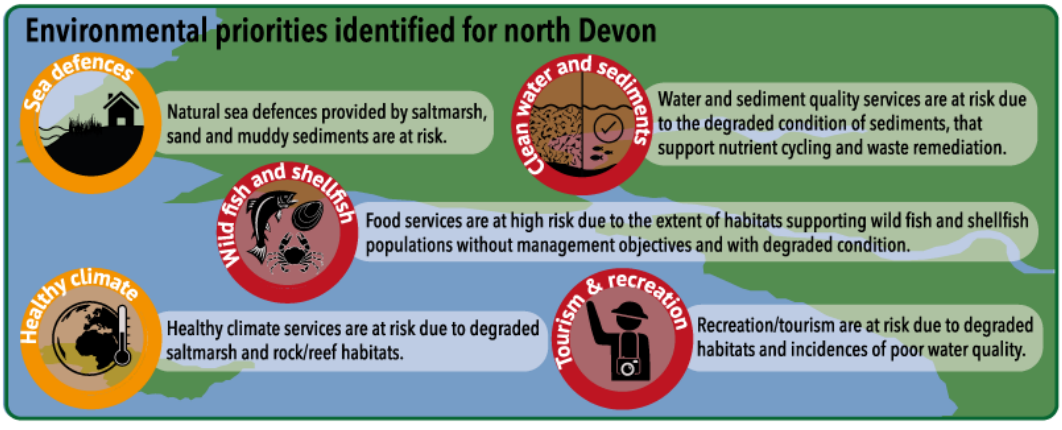


Figure 4. Environmental priorities for north Devon as identified in the North Devon Asset and Risk Register (Credit: Illustrative Science Ltd).

67. The environmental priorities and recommendations for sustainable management of North Devon's natural capital assets presented in the asset and risk register have been used to develop the aims and objectives for this plan.

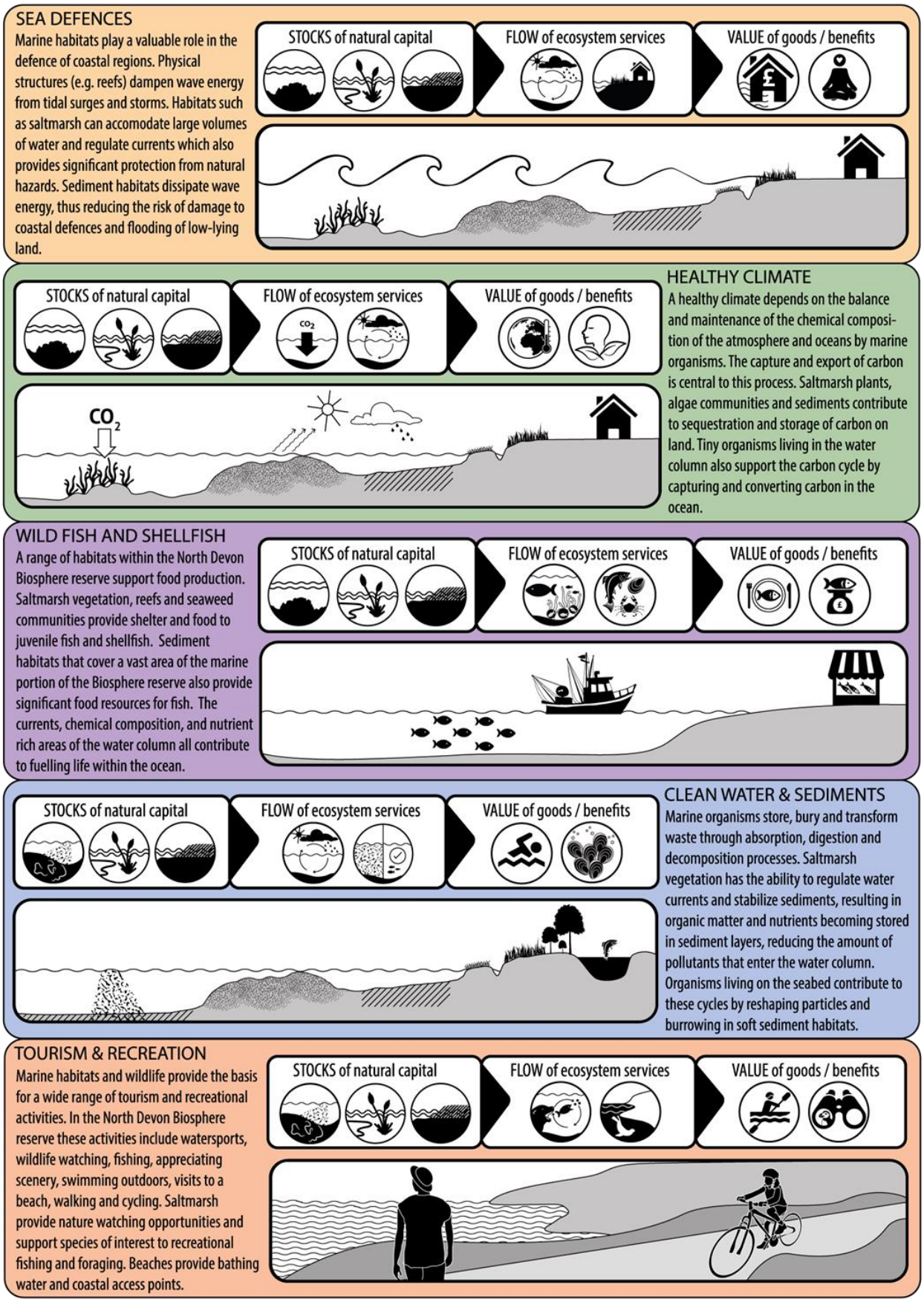


Figure 5. Summary of the contribution of ecosystem services from habitat features (natural capital) in north Devon. (Credit: Illustrative Science Ltd)

AIMS AND OBJECTIVES

68. The order of the aims and objectives does not reflect their priority and are based on the presumption that economic, social and environmental goals should be considered alongside one another to optimise the use and enhancement of natural capital for the benefit of the marine environment and society.

69. Effective management leading to net gain for biodiversity, protection of natural capital stocks and ecosystem services will require cross-sectoral and multi-agency cooperation. Where objectives of this plan crossover workstreams delivered by other regulatory bodies this is highlighted.

AM01. ACHIEVE SUSTAINABLE AND VIABLE WILD-CAPTURE FISHERIES

70. Fisheries are a key economic industry in north Devon linked to and dependent upon the natural capital assets. However, the North Devon Asset and Risk Register indicates that, overall, there has been a decline in species stocks at a local level and in the wider areas the fish stocks move within.

71. There are a range of habitats and species within the North Devon Biosphere reserve that support the ecosystem service (ES) Wild Fish and Shellfish and deliver the benefit of food provision from natural capital at both a local and regional scale.

72. Habitats that provide structure, complexity, and niches, provide shelter and food resources for fish and shellfish. For example:

    a. The three-dimensional structure of saltmarsh vegetation during high tide, provides significant shelter benefits to juvenile fish species, as well as food resources.

    b. Reefs (including biogenic reefs) and kelp communities provide shelter and prey resources for juvenile stages of commercially targeted fishes, crustaceans and bivalve mollusc.

    c. Sediment habitats that cover a vast tract of the North Devon Biosphere are a significant provider of food resources for fish.

73. There are also a number of commercially important fish and shellfish species in the North Devon Biosphere including: cod, plaice, sole, Thornback ray, small-eyed ray, blonde ray, herring, crab, lobster and whelk.

74. Key risks to wild fish and shellfish fisheries in north Devon are:

    a. Historical exposure to abrasion (linked to demersal fishing activity) has negatively impacted the condition of habitats which provide shelter and food resources for fish stocks supporting commercial fisheries.

    b. A large extent of these habitats are outside MPAs and therefore without management objectives or regular monitoring.

    c. Declines in vessel numbers and landings may reflect declines in species abundance but may also be influenced by social and economic factors that influence fishing activity or implementation of management measurements.

FISH_1.1 Develop and test innovative approaches to fisheries management, based on opportunities identified at the whole ecosystem level.

75. There are currently two demonstration projects associated with this objective:

76. Fisheries, Research and Management Partnership which will integrate local and historical knowledge with scientific research outcomes for ecosystem-based fisheries management, in collaboration between local fishermen, managers (including Devon & Severn IFCA and the Biosphere Partnership) and scientists.

77. Target: Facilitate collaboration with local fishermen within the partnership towards delivery of ecosystem-based reviews of the ecology, fisheries and management for key species in north Devon.

78. The Herring Project is a collaboration between Swansea University, Devon & Severn IFCA, the Blue Marine Foundation and fishermen. The purpose of this project is to improve the knowledge of herring stock structure in the Bristol Channel in order to inform management of commercial fisheries and management of marine developments in the Severn Estuary which have the potential to impact local herring populations.

79. Target: Support local delivery of the recommendations from the Herring Project to achieve sustainable commercial fish stocks (wild capture).

FISH_1.2 Support activities that maintain or increase the cultural or economic value of ongoing inshore fisheries (wild capture), where these do not exceed sustainable exploitation limits (Maximum Sustainable Yield), including value-added benefits e.g. fish smokeries

80. Target: Fishery economy is sustained or increased, and diversity of local businesses associated with fishing industry is maintained or expanded.

FISH_1.3 Catalyse cross-sectoral cooperation to deliver management of hand working activities (hand gathering, crab tiling, bait collection) that augments recovery of shoreline and intertidal habitats

81. Devon & Severn IFCA are developing a new Hand Working Permit Byelaw[16] to manage the use of crab tiles, bait digging and other hand gathering types of fishing activity. These activities are carried out both recreationally and commercially in the Taw-Torridge Estuary, within Marine Protected Areas (MPAs). Environmental impacts identified relating to these activities include impacts on sediment and macrofauna communities within it, impacts on shellfish stocks, removal of a food source for fish, risks to seagrass beds, bird disturbance and insufficient food supply for shorebirds.

82. Devon and Severn IFCA are the lead organisation in applying suitable management measures for crab tiling and bait digging. Hand gathering activities are also subject to regulation by Devon and Severn IFCA, alongside Natural England which manages the collection of mussels in the Taw-Torridge subject to specific conditions.

83. The Marine Working Group (North Devon Biosphere) will seek to support future management efforts of these activities and delivery of the Hand Working Permit Byelaw by:

    a. Catalysing cross organisational working through establishment of Marine Advisory Group (see Chapter II: Governance, AM08 and associated objectives)

[16] Devon and Severn IFCA Bulletin, 2019

b. Supporting communication and awareness of voluntary codes (existing and potential additional codes) in north Devon
c. Promoting knowledge exchange from spatial monitoring and impact assessment of hand working activity, benefitting site level management approaches to underpin flows of multiple ES benefits including ES Wild Fish and Shellfish.

FISH.1.4 Seek resources and cross-agency collaboration for programmes to collect local level data for lobster stocks in north Devon.

84. Landings of lobster *Homarus gammarus* are a high value fishery. Landings have shown a declining trend between 2010 and 2017. South West UK lobster stocks are assessed as being exploited above minimum reference limits and approaching, but not yet at maximum sustainable yield (MSY). However, there is no data on the local levels of lobster abundance for the NDMP. Historical re-stocking with hatchery reared juveniles has occurred in the region. Assessing the benefit of such initiatives would inform future sustainable management options.

85. Target: Coordinate a stock assessment and gather abundance data for lobster fishery in north Devon.

FISH_1.5 Support development and adoption of criteria for maritime industries to reduce impacts on fishery and ecosystem sustainability.

86. Target: Negative impacts from maritime industries on fishery and ecosystems reduced.

AM02. CREATE NEW JOBS IN SUSTAINABLE MARICULTURE

86. Currently, blue mussels and Pacific oysters are the only mariculture species being actively farmed and harvested within the MNCP plan area. Intertidal harvesting of by hand and seed collection is permitted in the Taw-Torridge on public mussel beds. Pacific oysters are farmed on the north coast of the MNCP area and within the Taw-Torridge estuary on trestles.

87. As part of the development of a new Mariculture Strategy[17], which includes the MNCP area, Devon & Severn IFCA have gathered information on the ecological and physical impacts of different forms of mariculture on their surrounding environment:

    a. Gamete dispersal from farmed species can help restock public beds by increasing the abundance of viable larvae within the water column.[18]

    b. There is some research and anecdotal evidence that other commercially or recreationally important species aggregate around mussel ropes and oyster trestles.

    c. Mariculture can sequester and fix large amounts of dissolved carbon from the water column, contributing to the flow of benefits from ecosystem services relating to a healthy climate.

    d. Mariculture could increase the resilience of the fishing sector in north Devon through provision of new employment or supplementary income for fishers; cultural links to the sea through more artisanal fisheries; and support jobs indirectly in supply chains.

88. Key drivers jeopardising the natural capital contributing to ES Wild Fish and Shellfish from mariculture in the MNCP area include:

    a. Water quality – poor water quality leading to microbial contamination of shellfish is influenced by several factors, which primarily stem from agricultural run-off, discharge from effluent pipes, overflow drains, and from storm discharges from sewage works.

    b. Harmful algal blooms – aggregations of toxin-producing microalgae occur naturally in the marine environment, which can lead to high concentrations of toxins in the flesh of shellfish. Poor water quality (high anthropogenic nutrient loads) and high temperatures can increase their frequency and magnitude.

    c. Sedimentation – high sediment loads over extended durations can smother and kill shellfish species which live on the seabed in the wild. For estuarine oyster farmers this can be avoided by growing the shellfish on trestles above the seafloor. By contrast, cultivated subtidal mussels are more at risk to sedimentation.

[17] Mariculture Strategy 2020, D&S IFCA.

[18] It should be noted that there are some ecological concerns surrounding the potential for non-native farmed species to spread to the wild (oysters) or hybridise within other commercially unsuitable species (mussels) requiring careful management and monitoring.

MARI_2.1 Support the sustainable development of mariculture industry in north Devon through dissemination of information and local delivery of recommendations from the Mariculture Strategy[17].

89. Devon and Severn IFCA are the lead organisation in applying suitable management measures for inshore and estuarine mariculture operations, alongside Natural England which manages the collection of mussels from public beds in the Taw-Torridge estuary. In addition, the local authority, on behalf of the Food Standards Agency (FSA) and in conjunction with Cefas, carries out classification and monitoring sampling for microbiological and biotoxin testing. Overall, successful future development of sustainable mariculture will require close collaboration between stakeholders across the supply chain, as well as scientists and regulators.

90. The Marine Working Group and Marine Advisory Group could provide an ideal conduit between current / prospective mariculturists, other users of sea that may operate near to mariculture sites, scientists, local managers and regulators. Providing an open channel of communication where information flows both ways would facilitate management that considers pressures across the 'whole site' (ecosystem) for benefits to multiple services including ES Wild Fish and Shellfish. For example, liaison between marine regulators and agencies involved with projects that seek improvements to upstream management of agriculture and wastewater discharges.

MARI_2.2 Support activities which maintain or increase the cultural or economic value of ongoing mariculture operations, within sustainable exploitation limits (Maximum Sustainable Yield), allowing for the requirements of other legitimate users and conservation objectives of the Taw-Torridge SSSI.

91. Target: Mariculture economy is sustained or increased, and diversity of artisanal fishing industry is maintained or expanded.

MARI_2.3 Seek resources and cross-agency collaboration for a feasibility study to assess potential for macroalgae mariculture in north Devon.

92. Macroalgal farming has similar potential to sequester carbon, and could provide additional benefits in terms of reducing fossil fuel consumption if converted to biofuels[17]. The sequestration potential for both shellfish and algae are therefore highly relevant towards contributing towards the current global and national drive towards a more carbon neutral global society.

93. Target: Coordinate a feasibility study for macroalgae mariculture in north Devon.

AM03. PROMOTE SUSTAINABLE TOURISM AND RECREATION

94. High interest in activities that utilise beaches, and activities that access Taw Torridge estuary, coastal harbours and water bodies illustrates the importance of these activities, the waterbodies and natural assets that support them to residents of north Devon. There is also considerable spend associated with these activities which supports businesses and communities within the MNCP area.

95. Overall, the North Devon Asset and Risk Register identifies the main risks to Tourism and Recreation ES are due to degraded habitats and incidences of poor water quality:

    a. Saltmarsh (in relation to nature watching, aesthetic interest and supporting species of interest to recreation fishing and foraging) – 30% of saltmarsh habitat within Taw-Torridge SSSI has the conservation objective 'recover' attributed to grazing pressure.
    b. Subtidal reef habitats (in relation to recreation activities such as angling, snorkelling / diving, as well as providing habitats for species of interest to wildlife watching) – within MPAs 82% of these habitats require a conservation objective 'recover' and outside MPAs 48% was assessed to likely be in moderate or lower condition, due to historical interaction with activities causing abrasion.
    c. Water column (in relation to nature watching, water-based sports and recreation, bathing and supporting wildlife contributing to multiple ES) – the ecological status of 3 of the 7 water bodies within the MNCP area failed to meet 'good' or 'high' target levels in the most recent assessment, attributed to high nitrate levels from freshwater sources. 3 out of 21 designated bathing waters received 'poor' classification, as well as short-term pollution incidents being recorded at 3 separate designated bathing water beaches in 2017/18.
    d. Salmon (in relation to recreational fishing activities) – all salmon rivers supporting salmon stocks in MNCP area are considered 'probably at risk' which could be due to man-made barriers to movement and incidences of poor water quality.
    e. Species of interest to wildlife watching from land, sea or recreational snorkelling and diving – stable or increasing populations of harbour porpoise, sea birds and seals within Lundy SAC and SSSI and the wider MNCP contribute significantly to nature watching ES benefits. However, the recruitment and reproductive capability of spiny lobster within Lundy and Bideford to Foreland Point MCZs is judged to be reduced and in need of recovery.
    f. Bird disturbance (in relation to wintering waterbird species of interest to wildlife watching) – walkers accompanied by dogs off the lead were identified as the dominant cause of disturbance to wintering waterbirds at the estuary in a 2019 survey[19]. Increasing levels of access to the estuary for recreational activity were found to negatively impact the numbers of waterbirds present.

[19] Identification of Wintering Wildfowl High Tide Roosts & Recreational Disturbance Impacts on the Taw Torridge Estuary, Berridge, R. 2019

TOUR_3.1 Scope options for no-anchor zones (voluntary or legislated) for highly sensitive areas and work with stakeholders to raise awareness, understanding and self-policing.

96. Reduction of pressures negatively impacting subtidal habitats further offshore (e.g. abrasion related to demersal fishing, anchoring and mooring in coastal MCZs), will benefit fish and shellfish populations that utilize multiple habitats as nursery areas or across different life stages.
97. Target: No-anchor zones created where evidence suggests this can be supported and mooring code of conduct for the estuary is established.

TOUR_3.2 Seek resources and cross-agency collaboration for programmes to replace damaging moorings with more environmentally sensitive alternatives where recreational boating activity interacts with sensitive habitats.

98. Advanced Mooring Systems (AMS)[20], or eco moorings, are mooring systems designed to have less impact on the seabed than conventional swing moorings. They aim to minimise interaction with the seabed to prevent abrasion and therefore the potential to damage sensitive habitats.

99. There is strong evidence from trials that eco-moorings can be successfully installed and the technology sustained in UK conditions[21].

100. At Lundy Island, the first eco-mooring installation in the UK, there are three Seaflex eco-moorings in current use. They have been operating without problems since installation in 2007 in a site shared with six traditional moorings. They were also deemed to be effective in reducing drag on the seabed.

101. Target: Liaise with stakeholders, regulators and scientists to identify sites and seek funding for new eco-mooring installations in MNCP area by 2025, where evidence suggest this can be supported.

TOUR_3.3 Review and deliver code of conduct of conduct for recreational activities within the Taw-Torridge estuary including zoning areas for motorised watercraft e.g. water-skiing, jet-skiing etc.

102. Target: Code of conduct for motorised watercraft and water-based recreational activities established by 2025.

TOUR_3.4 Review and reinstate licencing scheme for motorised watercraft.

103. Target: Licencing scheme for motorised watercraft in the Taw Torridge estuary established by 2025.

TOUR_3.5 Implement the recommendations from the bird disturbance report[19] to reduce and where possible eliminate overwintering bird disturbance by recreational use.

104. The report suggests that going forward, partnership working between estuary stakeholders will be essential to deliver effective management and mitigation that can increase biodiversity and achieve other conservation objectives on the Taw-Torridge estuary.

105. The North Devon Biosphere represents a suitable umbrella organisation that could co-ordinate and manage such a partnership in north Devon.

106. Recommendations from the report suggest management and mitigation measures including:

[20] Advanced Mooring Systems, RYA
[21] Final report: Potential for eco-moorings as management option for MPAs. Cefas, 2017

a. Signage and interpretation as a cost-effective tool to influence behaviour of estuary users;
b. Publications and media representation to target specific estuary user groups;
c. Protected areas and access arrangements alongside on-site signage and interpretation;
d. Further work to establish monitoring and evaluation programmes for assessment of impact from any management measures put in place or changes to disturbance pressures in the future i.e. rising sea levels

TOUR_3.6 Review and reinstate biosphere accreditation scheme for recreational boats as part of BCHT project.

107.Target: Biosphere accreditation scheme for recreational boats established by 2025.

AM04. IMPROVE WATER QUALITY AND CLEAN SEDIMENTS

108. A significant amount of human waste is released into the oceans comprising of both organic (oil and sewerage) as well as inorganic (chemical) pollution. Marine habitats and species play a vital role in ecosystem processes that deliver the benefits of clean water and sediments.

109. Overall, the North Devon Asset and Risk Register identifies the main risks to Clean Water and Sediments ES are due to degraded habitats and likely impaired functioning of biological communities as a result:

   e. Saltmarsh, nearshore sediment and subtidal sediment habitats contribute to Clean Water and Sediment ES – 30% of saltmarsh habitat within the Taw Torridge SSSI is in unfavourable condition; 43% of shoreline sediment habitat is within an MPA and has a conservation objective of 'recover; and, a very large proportion of subtidal sediment habitats are also either in conservation objectives of 'recover' (in coastal MCZs), or received a modelled likely relative condition of moderate or below.

   f. The provision of ES benefits from Clean Water and Sediments relies on favourable structure and functioning of biological communities to aid in the degradation of waste – marine organisms store, bury and transform waste though absorption, digestion and decomposition. Saltmarsh vegetation helps to regulate water currents and stabilise sediments, resulting in waste being trapped in sediment layers and reducing the amounts of pollutants that enter the water column. Organisms living in sediment on the seabed contribute to mixing and reworking of sediment structure which provides a mechanism for nutrient cycling.

   g. In a degraded condition, these habitats reduce the resilience of north Devon as a whole, to absorb and recover from human impacts such as nutrient run-off from agriculture or sewage. As water quality is vital to enabling participation in marine based recreational activities (see AM03. Promote sustainable tourism and recreation), reduction in clean water and sediment ES benefits are also likely to impact associated economic benefits to local communities. Wildlife watching and recreational fishing will also be impacted if water quality cannot support species of interest.

110. The habitats which contribute to significant benefits from Clean Water and Sediment ES also support multiple benefits from Wild Food and Shellfish, Sea Defence, Healthy Climate, and Tourism and Recreation ES. Habitat specific management objectives are given under AM03. Promote sustainable tourism and recreation and AM06. Enhance resilience to natural hazards and future climate change for saltmarsh and sediment habitats.

111. Management objectives under AM04. Improve water quality and clean sediments therefore focus on impacts to the water bodies in MNCP area from human activities (diffuse pollution and acute pollution incidents from land-based activity, and marine litter). Partnership working between estuary stakeholders and regulatory agencies on both land and sea will be essential to deliver

effective management and improvements to upstream management of agriculture and wastewater discharge. The North Devon Biosphere represents a suitable umbrella organisation that could co-ordinate such a partnership in north Devon.

CLEAN_4.1 Support delivery of the recommendations from the River Basin- and Catchment-Management Plans to maintain and where possible improve the overall Ecological Status of water bodies.

112.Target: Achieve 'good' or 'high' target levels for all 7 water bodies within the MNCP area by 2025.

CLEAN_4.2 Improve shellfish waters up to at least class B by 2030 through enhanced upstream management to reduce run-off.

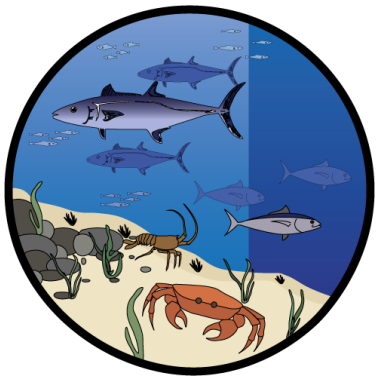
CLEAN_4.3 Improve bathing water quality to guideline standards by 2025 through concerted beach and catchment management including beach specific measures.

CLEAN_4.4 Support the implementation of Plastic Free Consortium strategy particularly through Fishing for litter and other marine sectors.

CLEAN_4.5 Support research and development to monitor microplastics in the marine environment through continued collaboration with local research agencies.

CLEAN_4.6 Support programmes seeking to reduce/prevent waste entering the marine environment from land-based sources.

Target: Seek investment in water and sewerage infrastructure to reduce annual incidence of acute pollution events.



AM05. DELIVER ROBUST PROTECTION OF MARINE BIODIVERSITY

113. Biodiversity is a core component of natural capital and includes diversity within species populations (genetic variation), the number of different species, and the diversity of ecosystems. It is central to the ecological condition, quality and resilience of ecosystems that support multiple ES to society (e.g. healthy climate, clean water and sediments, etc.) as well as providing direct benefits through species existence (e.g. food provision) and enrichment of other benefits (e.g. nature-based recreation).

114. The North Devon Asset and Risk Register makes the following recommendations for protection and enhancement of biodiversity in north Devon:

115. **Habitat recovery**: "MPAs and the associated management measures cover a relatively small proportion of the MNCP area. The ES benefits of Food, Sea Defence, Healthy Climate and Tourism and Recreation are largely supported by MPA management measures for estuarine and coastal intertidal habitats, particularly saltmarsh as well as shallow subtidal reefs and sediments. Given the importance of these habitats to multiple ES, it is necessary to set management priorities that will rapidly enable 'recovery' of habitats where this conservation objective exists."

116. BIODIV_5.1 Support research and monitoring to identify degraded habitats with potential for recovery under Highly Protected Marine Area management measures, and deliver measures for recovery.

117. **Biodiversity net gain**: "A 'net gain' for natural capital may be achieved via MPA management though a more ambitious approach to marine biodiversity conservation that considers the wider ecological structures and processes that have the potential for 'recovery' and 'renewal' beyond the delineated boundaries of features of conservation interest within an MPA (the whole site approach). ES benefits may be linked to management that seeks a reduction in pressures across the 'whole site' along with the identification of thresholds for sustainable use."

118. BIODIV_5.2 Catalyse cross-sectoral cooperation to integrate natural capital approach for management of MPAs in north Devon to deliver biodiversity net gain across the whole site

119. **Ecological connectivity**: "Identifying habitat extents outside MPAs, that enhance ecological connectivity, would benefit site level management approaches to underpin flows of ES benefits."

BIODIV_5.3 Seek resources and cross-sector collaboration for research projects aiming to understand habitat use, and influence of habitat condition, inside and outside coastal MPAs in north Devon, to support delivery of Local Nature Recovery Strategies.

120. **Improve spatial knowledge**: "Beyond MPAs, deeper subtidal habitats provided a moderate to significant contribution to the ES benefits 'food' and clean water and sediments'. These habitat assets make up a significant proportion of NDMP. Very large extents of these deeper offshore habitats are in an impacted condition, assessed to have a conservation objective of 'recover', or to

be in an impacted ‘likely relative condition’ (outside of MPAs) due to previous interactions with abrasive pressure from demersal fishing activities. Management must consider increasing both the extent and condition of this habitat under management measures. To support the implementation of management measures that can reduce pressure across subtidal sediments. It is necessary to trial management measures that improve spatial knowledge of fishing and levels of impact across sediment habitats.”

BIODIV_5.4 Seek resources and cross-sector collaboration for programmes that improve spatial knowledge of fishing and levels of impact across sediment habitats, to support delivery of Local Nature Recovery Strategies.

AM06. ENHANCE RESILIENCE TO NATURAL HAZARDS AND FUTURE CLIMATE CHANGE

121. A healthy climate is dependent on the balance and maintenance of the chemical composition of the atmosphere and the oceans by marine living organisms. The capture and export of carbon is central to this process. Marine habitats also play a valuable role in the defence of coastal regions to natural hazards (e.g. flooding, storms).

122. Saltmarsh vegetation and seaweed communities capture carbon and sediments contribute towards storage / sequestration. Physical structures such as reefs dampen wave energy from tidal surges, storms (e.g. reefs) and saltmarsh / sediment habitats also dissipate wave energy, thus reducing the risk of damaging coastal defences and flooding low-lying land. Natural intertidal habitats such as saltmarsh will also migrate with rising sea levels, predicted under future climate scenarios, so long as man-made structures do not create a barrier to migration.

123. Overall, the North Devon Asset and Risk Register identifies the main risks to Healthy Climate and Sea Defence ES are due to degraded saltmarsh, reef, and sediment habitats in north Devon:

124. **Saltmarsh** – 30% of saltmarsh habitat within the Taw Torridge SSSI is in unfavourable condition due to grazing pressure impacting plant communities. The plant communities capture carbon that is then stored in saltmarsh soils, as well as baffling water currents, and a healthy plant community will thereby provide a greater contribution to Healthy Climate and Sea Defence ES benefits. In addition, saltmarsh habitat with structure and function in favourable condition will adapt (migrate) to sea level rise and continue to provide sea defence benefits under future scenarios.

125. The restoration of saltmarsh in north Devon, with consideration of the ecological function and connectivity of saltmarshes in the wider Bristol Channel region, would benefit multiple ES benefits in addition to Sea Defence and Healthy Climate including: Food (**AM01. Achieve sustainable and viable wild-capture fisheries, AM02. Create new jobs in sustainable mariculture**), Tourism and Recreation (**AM03. Promote sustainable tourism and recreation**), and Clean Water and Sediments (**AM04. Improve water quality and clean sediments**).

HAZ_6.1 Increase extent of saltmarsh habitat in north Devon and compensate for any freshwater and/or terrestrial priority habitat losses to ensure overall biodiversity net gain.

126. Target: Increase saltmarsh extent in the Taw-Torridge estuary by 50-80Ha by 2030.

HAZ_6.2 Support activities which improve degraded saltmarsh habitat in Taw Torridge estuary, allowing for requirements of other legitimate users and conservation objectives of the Taw-Torridge SSSI

127. Target: Improve degraded saltmarsh habitat to achieve national policy targets for Good Ecological Status by 2030.

128. **Sediment** – 43% of nearshore sediment habitat is within an MPA and has a conservation objective of 'recover; and, a very large proportion of subtidal sediment habitats are also in unfavourable condition. Nearshore sediment habitats dampen high wave energy and are able to migrate with rising sea levels, providing flood defence benefits in to the future. Offshore sediment contributes to the burial of organic carbon that is eroded from land and transported through the rivers and estuary system.

HAZ_6.3 Support activities which improve degraded sediment habitats, allowing for requirements of other legitimate users, and compensate for any freshwater and/or terrestrial priority habitat losses to ensure overall biodiversity net gain.

129. Target: Improve degraded nearshore sediment habitats to achieve national policy targets for Good Ecological Status by 2030.

130. **Blue carbon** – Algae communities are often free floating or attached to rocks and therefore do not have extensive root systems which can trap detritus and sediment in the same way as coastal wetlands. Further research is required to examine actual carbon sequestration levels. This is particularly important in north Devon, as it would influence potential decisions regarding payment for ecosystem services as mitigation for developments (if payment for ecosystem services was applied as a financing/management option).

HAZ_6.4 Seek resources and cross-agency collaboration for a feasibility study for blue carbon (phytoplankton, macroalgae and seagrass) in north Devon.

131. Target: Deliver feasibility study for blue carbon in north Devon by 2025.

HAZ_6.5 Establish minimum criteria to enable project consideration for offshore wind and tidal renewable energy projects through engagement with stakeholders and regulators.

AM07. DEVELOP A CENTRALISED DATABASE AND KNOWLEDGE SHARING

132. A core aim of the Biosphere Strategy 2014-2024[22] is to "create and share knowledge within the Biosphere Reserve that improves our wellbeing and benefits others". Additionally, a key lesson from the work of the Marine Pioneer in north Devon and through the development of the MNCP highlights the importance of: partnership working, multi-agency and cross-sectoral collaboration, and engagement with local stakeholders for sustainable development that will ensure an overall net gain for biodiversity.

133. The North Devon Asset and Risk Register was developed alongside a North Devon Geodatabase, which stores geographical information about the area, including spatial data (maps) and related non-spatial information for the extent and condition of natural capital stocks and indicators for flows of ES benefits. Where possible this was turned into an online mapping tool (GeoNode[23]) for stakeholders and managers to use for monitoring and evaluation of progress towards achieving the management objectives of the MNCP.

134. The following objectives relate to the knowledge gaps and proposed areas of research that would inform more effective management of natural capital stocks in north Devon to support flows of multiple ES benefits to the MNCP area, and to be added to the GeoNode where possible:

KNOW_7.1 Establish voluntary agreements with fishermen and shellfish harvesters to supply appropriate spatial-scale data on catch and effort, and wider ecosystem assessment of impacts fisheries north Devon.

KNOW_7.2 Collaborate with regulatory bodies to improve access to data on spatial intensity of fishing activity.

KNOW_7.3 Repeat North Devon water sports survey regularly as part of recreational activities monitoring scheme.

KNOW_7.4 Reinstate incident database on Biosphere Reserve website.

KNOW_7.5 Design and deliver regular water bird disturbance survey.

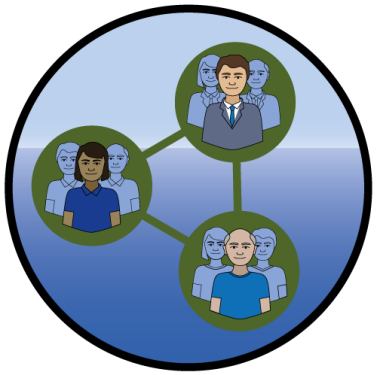
KNOW_7.6 Collation of data on marine litter from citizen science and voluntary marine waste collection organisations.

KNOW_7.7 Collation of data on features of conservation interest in MPAs.

KNOW_7.8 Implement annual monitoring of mean chlorophyll-a concentrations as a proxy for planktonic productivity to improve future assessment of the contribution of water bodies to Healthy Climate ES benefits (carbon sequestration).

KNOW_7.9 Support research and development to improve habitat-based models for north Devon habitats, to increase the accuracy of future assessment of risks e.g. coastal storm impacts

[22] North Devon Strategy for Sustainable Development 2014-2024
[23] North Devon Marine Natural Capital Plan GeoNode



AM08. ESTABLISH NEW GOVERNANCE AND FUNDING STRUCTURES

135. The introduction of a marine coordinator role within the Biosphere Partnership is a key objective of the MNCP, who would administer these groups, provide additional representation and links between smaller groups and partnerships, encourage participation by different people, and identify topics of relevance which would be useful to members.

GOV_8.1 Establish Biosphere Foundation as local delivery body for Blue Impact Fund / natural capital trust.

GOV_8.2 Formalise the role of the North Devon Biosphere Reserve's Marine Working Group and sub-groups.

GOV_8.3 Seek funding to progress and formalise the Fisheries Research and Management Partnership.

GOV_8.4 Strengthen the relationship between the Biosphere Partnership, Marine Working Group and IFCA committee.

GOV_8.5 Develop clear management objectives and decision-making partnerships for MPAs (where this doesn't exist.

GOV_8.6 Set-up appropriate monitoring and evaluation of governance groups.

GOV_8.7 Seek funding to hire a North Devon Marine Coordinator by 2025.

GOV_8.8 Seek funding to hire an Estuary Officer for the Taw-Torridge estuary by 2030.

POLICIES

136. Policies contained in the MNCP support delivery of the plan objectives to achieve the vision and address risks to asset-benefit relationships identified in the North Devon Asset and Risk Register.
137. Policies cover a wide range of topics including activities and uses, economic, social and environmental considerations, and cross-cutting issues such as integration of decision-making on land and at sea. **Table 1** shows the relationship between the marine plan policies and the plan objectives. Policy aims are also provided in **Table 1** to explain how the policies guide decisions and support the application of plan objectives.
138. The marine plan must be read as a whole, taking all plan policies together rather than each policy in isolation. It is unlikely that a particular decision will involve a single policy or all policies. Instead, several plan policies are likely to be pertinent to a decision. Decision-makers, working with proponents and others as necessary, are to determine which plan policies apply to a particular decision.

Table 1. Policies of the North Devon Marine Natural Capital Plan.

Policy	Description	Objectives
PL01. Novel and ongoing monitoring of the marine environment should incorporate local knowledge to identify where there may be potential for research and data gathering, and promote partnership working between regulators, academics and local stakeholders.	A key function of the Biosphere Reserve is to research, monitor and disseminate the learning from our approaches to sustainable development. In addition, there is a rich heritage of marine and maritime sectors in north Devon with a variety of stakeholder groups. PL01 recognises the value of collaboration with local users of the marine environment to gather novel anecdotal evidence, and to deliver bespoke, locally led approaches to sustainable governance. Furthermore, PL01 highlights that the natural capital assets in MNCP area deliver benefits from multiple ES and will require multi-agency, cross-jurisdiction working to ensure effective, site level management approaches to underpin flows of ES benefits.	1.1, 1.2. 1.7, 3.1, 4.5, 4.6, 5.1-5.4, 6.5, 7.1, 7.2, 7.6, 7.9, 8.2, 8.3, 8.4
PL02. Development or activities that will maintain and / or increase the cultural and economic value of inshore fisheries, including diversification, should demonstrate consideration of and compatibility with thresholds for sustainable use and be designed to maintain and, where possible, enhance ecosystems services and functions.	North Devon inshore fisheries hold important cultural, societal and economic value. PL02 seeks to support growth in this sector within sustainable exploitation limits and to promote innovative approaches to fisheries management that integrates with a 'whole-site' approach to marine biodiversity conservation. Protection and enhancement of ecological connectivity will benefit fish and shellfish populations that utilise multiple habitats as nursery areas or across different life stages.	1.1-1.8, 2.1, 5.3, 7.1, 8.3
PL03. Development or activities within existing or potential strategic areas of sustainable mariculture production must demonstrate consideration of and compatibility with sustainable mariculture production.	The policy recognises that mariculture has the potential to grow in North Devon and provides multiple benefits such as contributing to food supply, bioremediation for improved water quality, and opportunities for blue carbon capture. PL03 seeks to protect existing mariculture operations as well as new opportunities identified in strategic areas through explicit spatial planning; and promotes co-existence and co-operation over exclusion for other activities.	2.1, 2.2, 2.3, 6.4

Policy	Description	Objectives
PL04. Support and facilitate activities which reduce waste at source to improve water body condition and / or reduce marine litter.	The policy makes sure proposals avoid, minimise or mitigate waste entering the marine environment and encourages support for improvements in waste management and removal of marine litter.	4.1-4.6
PL05. Support proposals which seek to improve water quality through waste remediation utilising natural capital assets (e.g. saltmarsh restoration, mussel beds).	Much of the economic and cultural prosperity of the North Devon Marine Natural Capital Plan area is reliant on water quality. Activities can place stress on water bodies such that, in parts of the plan area water quality requires improvement. PL05 supports activities whose primary objective is to enhance and restore water quality and places an emphasis on proposals which trial natural capital approaches to waste remediation.	4.1-4.6, 6.1, 6.4
PL06. Support land-based infrastructure development, diversification or regeneration which facilitates water quality and marine pollution goals through integration with the North Devon Landscape Strategy.	The natural capital assets and the flow of ecosystem service benefits in the plan area are impacted by diffuse pollution from agriculture and acute pollution incidents from the failure of water and sewerage infrastructure. PL06 supports projects on land that will facilitate delivery of the water quality objectives for this plan.	4.1-4.6
PL07. Support proposals that identify habitat extents outside MPAs that enhance ecological connectivity and seek to increase extent and / or condition of these assets where it has been identified as 'at risk'.	Identifying habitat extents outside MPAs that enhance ecological connectivity would benefit site level management approaches to underpin flows of ecosystem benefits. PL07 supports ongoing research and monitoring of natural capital assets in North Devon to improve understanding of the flow of ecosystem services for enhancement of marine natural capital.	1.2, 5.1-5.5, 6.1-6.6

Policy	Description	Objectives
PL08. Set management priorities that will rapidly enable 'recovery' of estuarine and coastal intertidal habitats within MPAs, where this conservation objective exists.	In the North Devon Marine Natural Capital Plan area these habitats, particularly saltmarsh as well as shallow subtidal reefs and sediments, support multiple ecosystem benefits including food provision, sea defence, healthy climate, and, tourism and recreation. PL08 recognises the importance of these habitats and focuses management measures towards delivering multiple ecosystem service benefits.	5.1-5.5, 6.1-6.6
PL09. Support MPA management priorities that consider the wider ecological structures and processes that have the potential for 'recovery' and 'renewal' beyond the delineated boundaries of features of conservation interest within an MPA.	Environmental net gain for natural capital may be achieved via MPA management though a more ambitious approach to marine biodiversity conservation. PL09 supports proposals that seek a reduction in pressure across the whole site instead of considering only the designated features, along with the identification of thresholds for sustainable use.	5.1-5.5, 6.1-6.6
PL10. Support the implementation of management measures that reduce pressure across subtidal sediments.	Deeper subtidal habitats provide multiple ecosystem service benefits including food provision and water quality. These habitat assets make up a significant proportion of the plan area but very large extents of these deeper offshore habitats are in an impacted condition, both within and outside MPAs, due to previous interactions with abrasive pressure from demersal fishing activities. PL10 recognises that management must consider improving the condition of this habitat.	5.1-5.5, 6.5, 7.1, 7.2
PL11. Facilitate the identification of potential areas, and support proposals that enable provision of marine renewable energy technologies, where there is a net gain for marine biodiversity and natural capital, and where conflict of use is mitigated.	Renewable energy technologies contribute to the diversification and decarbonisation of the electricity grid. PL12 supports the identification of future leasing rounds and provides a level of certainty for other activities as to where future development may occur.	6.5

MONITORING AND EVALUATION

139. Monitoring is essential to establish what the trends have been up to the present and to estimate what may happen in the future. It provides vital feedback for decision-makers and policy development, chiefly to answer whether:

    a. The policies are achieving their objectives and delivering enhancement of natural capital

    b. There have been unintended consequences from implementation of the plan

    c. The assumptions on which the policies are based are still relevant

    d. The targets for specific objectives are being achieved

140. The North Devon Marine Natural Capital Plan will be reviewed at intervals of no more than five years from the date of plan adoption. The findings of the review will be published in a Natural Capital Monitoring Report prepared for the North Devon Biosphere.

141. Indicators for each of the objectives have been identified, and the baseline condition for many of the indicators has been established, through the development of the Natural Capital Asset and Risk Register. Where data is available those indicators have been added to the GeoNode as a spatial layer and both these tools will be used to monitor and review progress towards plan objectives. A summary table of the indicators for each objective can be found here: https://www.northdevonbiosphere.org.uk/uploads/1/5/4/4/15448192/north_devon_marine_natural_capital_plan_appendix3_indicator_table.xlsx

142. The governance of the Marine Natural Capital Plan will also provide essential feedback, in particular identifying critical issues, to allow for adaptive management outside of these timescales.

CHAPTER IV: SUSTAINABILITY ASSESSMENT SUMMARY[24]

143. The purpose of this assessment is to consider how the Marine Natural Capital Plan could impact upon the marine environment, coastal communities, and maritime economy in North Devon. The Marine Natural Capital Plan is the first iteration of what is expected to be an evolving process and serves to build the necessary framework for long term sustainable management. Thus, few detailed benchmarks are included in the sustainability assessment, which instead evaluates the expected direction of travel of the Marine Natural Capital Plan. The sustainability appraisal uses a natural capital framework in order to continue to test the approach being developed under the South West Partnership for Environmental and Economic Prosperity (SWEEP) programme and the Marine Pioneer.

144. Several plans and policies interact with the Marine Natural Capital Plan, most of which have similar high-level objectives to: support sustainable development of the maritime economy; protect the marine environment; connect people to nature; and develop strong and just societies. These include the South West Marine Plan, the North Devon and Torridge Local Plan, fisheries byelaws from the Inshore Fisheries and Conservation Authorities, national conservation legislation relating to the protection of landscapes, habitats and species, and the 25 Year Environment Plan.

145. Thirty sustainability objectives are defined, which overlap significantly with the objectives of the Marine Natural Capital Plan itself as a result of the overarching aims of the Marine Natural Capital Plan being intrinsically linked to sustainable development. The sustainability objectives encompass natural, human, social, manufactured and financial capital, and include those for species populations, habitats, heritage; engagement of fishers, recreational users and the wider public; strengthening networks; minimising the impact of new infrastructure; and securing inward investment. Indicators for each objective are given within the sustainability assessment framework. Few policy targets exist at present (and mostly concern water quality and protected areas), but more targets are expected to be defined as the Marine Natural Capital Plan evolves.

146. The baseline assessment includes (i) an asset register, (ii) an ecosystem services inventory, and (iii) a risk register. It highlights the large extent of subtidal sedimentary habitats, the presence of estuarine mussel beds, saltmarsh and mudflats, and the important sand dunes. Wetland and sea bird populations are found in the Taw Torridge and on Lundy, demersal fish species as well as crab and European lobster are important for commercial fisheries, and protected species include seals, porpoise, spiny lobster and pink sea fans. Heritage assets range from scheduled ancient monuments and protected wreck sites to memorials to sailors and fishermen. The North Devon marine area also provides important ecosystem services (and associated benefits), particularly related to tourism, recreation and leisure, seascape and cultural heritage, and commercial fisheries. Marine and coastal habitats (especially saltmarsh) also contribute to regulating and maintenance services including carbon sequestration, water quality, coastal defence, and the provision of nursery habitats for fishery species. The continued supply of ecosystem services and benefits from the assets of the North Devon marine area is in some cases at risk however, due to

[24] North Devon Marine Natural Capital Plan. Sustainability Assessment - Draft for Consultation. Hooper, Ashley, Mullier and Rees 2020.

the level of pressure on certain habitats. The ability of subtidal habitats to support food production, and saltmarsh condition are of most concern.

147. The sustainability assessment compares implementing the plan versus not doing so. In the short term (1-5 years), the principal positive impacts relate to human, social and financial capital, due to the expected strengthening of networks, improved governance, data-sharing, raising awareness, and new finance initiatives. Impacts on natural capital assets, ecosystem services and benefits are largely neutral. In the longer term, positive impacts are expected for subtidal habitats where management measures reduce seabed abrasion and for local stocks that have limited exposure to external pressures. Water quality is expected to improve as the Marine Natural Capital Plan supports actions to reduce diffuse pollution, and improved water quality is likely to increase the economic viability of mussel harvesting. There is potential for positive impact on cultivated seafood and macro-algae as well as tidal energy if the Marine Natural Capital Plan intention to support maritime industries is realised through the establishment of new businesses. A reduction in litter is likely to improve aesthetic quality, with improvements potentially occurring quickly with increasing support for ongoing initiatives. The quality of nursery habitats may increase if management reduces subtidal abrasion impacts, and through increasing saltmarsh area. More saltmarsh will also increase climate regulation, although benefits may be relatively limited, depending on the extent to which current land use promotes carbon uptake. Impacts on recreation are expected to be neutral, although there may be a decline in benefits from bait digging. It is not possible to make useful judgments about the likely effects on erosion control and flood protection. The limited benefits of the Marine Natural Capital Plan reflect the limitations of local management: ensuring positive outcomes for natural capital is also dependent on national and international governance.

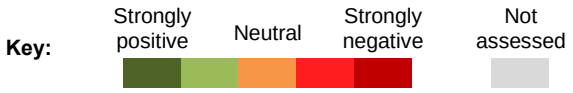
COMPARING PLAN ALTERNATIVES

148. In its current phase, the Marine Natural Capital Plan does not propose different options for achieving specific plan objectives, as in most cases the objectives relate to very specific high-level tasks (such as the development of codes of conduct or management plans). In the absence of alternative options, this sustainability assessment considers the binary choice of implementing the plan versus not doing so. The expected impacts of implementing the Marine Natural Capital Plan in terms of the degree to which it will have positive, negative or neutral effects, are made using expert judgment and are summarised in **Table 2**, which considers both the short (1-5 years) and longer term (more than five years). The assessment of longer-term implications is particularly speculative as it relies, for example, on the management plans that are being developed in the first phase of the Marine Natural Capital Plan resulting in the expected actions that will protect stocks and habitats and support local fisheries. Similarly, the projections assume that governance structures are accepted and maintained and that new financing mechanisms are sufficiently successful to become self-sustaining. More accurate assessment of the outcomes of these strategies and actions will be possible in future phases of the Marine Natural Capital Plan.

149. In the short term, the principal positive impacts of implementing the Marine Natural Capital Plan relate to human, social and financial capital, due to the expected strengthening of community networks, improved governance structures, data-sharing, raising awareness and the inward investment from new sustainable finance initiatives. There is the potential for increased positive impact on financial capital in the longer term, as successful funds attract snowballing investment. As the Marine Pioneer, SWEEP and similar recent activities in North Devon have demonstrated, the Marine Natural Capital Plan area has provided significant opportunities for research, which are expected to continue in the future now that key partnerships have been established. The Marine

Natural Capital Plan is also expected to have a positive impact on education through proposed citizen science and wider engagement initiatives, and on non-use values (existence and bequest) as awareness and understanding of the marine environment increases.

Table 2. The expected direction of impacts of the marine natural capital plan on assets, ecosystem services and benefits, and human, social, and financial capital, when compared to not implementing the plan.



	Short term (1-5yrs)	Longer term (>5yrs)
Natural capital assets		
Geology		
Supralittoral rock		
Supralittoral sediment		
Littoral rock		
Littoral sediment		
Saltmarsh		
Mussel beds		
Sublittoral rock		
Sublittoral sediment		
Commercial finfish		
Crab and lobster		
Wetland birds		
Seabirds		
Marine mammals		
Heritage assets		
Designated and non-designated sites		
Ecosystem services and benefits		
Cultivated seafood		
Foraged plants		
Game and wild fish		
Non-food products from plants, animals & algae:		
Bait		
products from cultivated macroalgae		
Genetic resources (*mussel spat*)		
Energy from non-living sources (*tidal energy*)		
Commercial and other transport		
Water quality		
Maintenance of nursery populations and habitats		
Erosion control		
Flood protection		
Climate regulation		
Recreation, tourism and other experiential opportunities		
Scientific and educational opportunities		
Aesthetic		
Heritage, spiritual and representational significance		
Existence, bequest and option values		
Social and human capital		
Community networks		
Knowledge, skills and capabilities		
Financial capital		
Inward investment		

150. Impacts on natural capital assets, ecosystem services and benefits are largely neutral in the short term. In this inception phase, the Marine Natural Capital Plan is seeking to put in place the necessary structures to support environmental growth and to aid the development of management plans for specific natural capital assets and ecosystem services, such as those related to fisheries. Thus, direct impacts on the environment in the initial years will be limited. Improvements in the quality of subtidal habitats are expected where eco-moorings are installed and recreational anchoring reduced (and so scour and abrasion impacts decrease) although the spatial scale of these will be small. Management of bait digging is likely to reduce disturbance of intertidal mud. Further increases in the extent or quality of species and habitats may also be secured as sustainable finance

allows investment in local conservation initiatives, although these cannot be predicted at this stage.

151. Even in the longer term when more detailed management plans have been put in place, impacts may not be universally positive. The fisheries management plans are expected to focus on improving the status of species and habitats of particular local importance, and to have impacts in the longer term when the resulting management measures have had time to take effect. Positive impacts are expected for subtidal sedimentary habitats in inshore areas where fisheries management measures reduce seabed abrasion and for local stocks which have limited exposure to external pressures. However, these external pressures (such as fishing activity beyond the 6nm limit) as well as climate change will influence the condition, and indeed the continuing presence, of many of the fisheries species important in North Devon. Similarly, the impacts on services and benefits from wild capture fisheries are expected to be broadly neutral even in the longer term, although improved shellfish water quality is likely to increase the economic viability of mussel harvesting resulting in a positive outcome. It is expected that fisheries management plans will seek to maintain the livelihoods of inshore fishermen. Ensuring the continuation of an active inshore fishing fleet in North Devon also secures the connection to the maritime history of the area, preventing a decline in the value of cultural heritage. There is greater potential for measurable positive impact on the supply of cultivated seafood and macro-algae as well as tidal energy if the Marine Natural Capital Plan intention to support mariculture and other maritime industries is realised through the establishment of new businesses. Similarly, opportunities to re- establish a limited export of mussel spat may be explored, which could also bring economic benefit.

152. Water quality is expected to improve in the long term as the Marine Natural Capital Plan supports actions within the North Devon Catchment Management Plan to reduce diffuse pollution, although this is reliant on suitable investment being secured. An increase in the aesthetic quality of the area is also expected. The main land/seascape features (such as cliffs) will not be affected, but a reduction in litter is likely to improve aesthetic quality of specific sites, with improvements potentially occurring quickly as a result of increasing support for ongoing initiatives. The expansion of saltmarsh may also improve visual amenity, although aesthetic judgements are subjective and benefits will depend on relative perception of the current landscape. Increasing the extent and quality of saltmarsh will also provide nursery habitat, with benefits increasing with further expansion in the longer term. Fisheries management plans may have positive impacts on wider nursery habitats in the longer term through the potential protection of important subtidal areas. New areas of saltmarsh will also increase climate regulation, although benefits may be relatively limited, depending on the extent to which current land use promotes carbon uptake. The rate of carbon sequestration in saltmarsh decreases as the habitat matures, tempering the scale of the longer term benefits of continuing to create new areas of saltmarsh in the future. Saltmarsh areas also support significant recreational benefits. Recreation more generally may see a possible slight negative impact for those whose activities are restricted by codes of conduct, although this is likely to be balanced by the increased positive experience of others who benefit from improved environmental quality and noise reduction. There may be a decline in benefits from bait digging, as future management of effort may restrict opportunities for individuals and prohibit expansion.

153. The implications of the Marine Natural Capital Plan for erosion control and flood protection have not been assessed. Changes in these services would be related primarily to the expansion of saltmarsh and its role in moderating tidal inundation and attenuating wave action. However, these issues are very complex and require consideration of factors such as whether the saltmarsh replaces hard defences, the extent to which landward expansion is possible, and wider

topographical and hydrographic parameters within the estuary. Without sophisticated modelling, it is not possible to make useful judgments about the likelihood of positive or negative effects.

154. The limited positive benefits of the Marine Natural Capital Plan are also a reflection of the limitations of local management effectiveness where access rights or species' ranges exceed the governance jurisdiction (as is the case for example with wetland and sea birds and most commercial fisheries species). Ensuring positive outcomes for natural capital in these cases is therefore also dependent on national and international governance. The legislative landscape is particularly uncertain at present (especially for fisheries) with the UK's exit from the European Union and the forthcoming Agriculture, Fisheries and Environment Bills. Local management nonetheless remains extremely important, as any reduction in stress will benefit the resilience of species and habitats, and exemplary management practices may be adopted more widely, increasing the scale of benefits to natural capital.

CHAPTER V: SUSTAINABLE FINANCE

155. Through the work of the Marine Pioneer in North Devon it was identified that various marine natural capital assets are at risk and therefore the services they provide are at risk. These services are wild food production, healthy climate, sea defences, tourism and recreation, and flows of clean water. These principles apply inside and outside of marine protected areas.

156. The UK SEAS team at WWF contracted Eftec to identify what the predicted costs per annum would be to effectively manage North Devon's Marine Protected Areas (MPAs) and what was currently spent, this identified a gap for MPA governance alone of £1.1 million. In addition to this, work with Environmental Finance and Vivid Economics has identified potential funding models that would close this gap and through this work two sustainable models, Blue Impact Fund and a North Devon Natural Capital Trust are in development.

157. The projects that have been identified through the work of the Marine Pioneer and deliverable through this plan are:

    a. Fisheries enhancement
    b. Enhancing clean water
    c. Reducing impact on wildlife
    d. Enhancing carbon storage and natural flood management

158. All this needs to be supported by targeted marine coordination, communication and engagement which is factored into the costs of delivering this plan.

NATURAL CAPITAL INVESTMENT GAP

159. The WWF UK SEAS project as part the North Devon Marine Pioneer, looked at how to increase the effectiveness and sustainable management of UK's Marine Protected Areas (MPA). One pillar of that work was to look at sustainable finance mechanisms, to deliver well managed MPAs in North Devon.

160. Using the compass survey framework WWF looked at what the predicted costs per annum would be to effectively manage an MPA. The compass is divided into three phases; the creation phase, the pioneer phase, and the self-sufficient phase. Each phase contains a number of elements looking at different aspects of a well-managed MPA. They then undertook an assessment of the current average cost of a North Devon MPA, from an assessment of current spend. This identified that there was a current funding gap across North Devon of £1.1m per annum with stakeholder engagement and governance as the most resource heavy ~ 50% of costs, particularly in the preliminary stage (set up), followed by operations and planning (19 to 22%) and monitoring and review (15 to 22%) in the later stages. The lowest cost was related to defining the area to be designated (8%).

161. This study was based on good management of MPAs, this funding gap is a good indicator of the scale of funds needed for improvements to the marine natural environment as MPAs although requiring more focussed management cover only around 50% of North Devon's marine area, this study also doesn't factor in the savings that could be made through managing MPAs in clusters.

162. Once this funding gap was identified, WWF with Environmental Finance undertook an assessment of different funding models – identifying funding structures that may be able to provide a return

on investment that would complement, not replace, current public funding. Providing a vehicle for blending public and private financing and a sustainable source of revenue to enhance the marine environment, with a focus on MPAs.

163. Two models were identified that were suitable vehicles for sustainable finance that are not mutually exclusive:

    e. Blue Impact Fund and associated Ocean Recovery Fund to operate at a national scale and allow North Devon to benefit from

    f. A North Devon Natural Capital Trust to develop and manage local investments and programmes including drawing down from the Blue Impact Fund

BLUE IMPACT FUND

164. This structure involves investors contributing to the Blue Impact Fund that will in turn invest in sustainable businesses and projects that will produce a financial return. This financial return will then be fed back to investors, but any surpluses are added to the sister fund, the Ocean Recovery Fund. This fund will provide investment to projects and businesses that will also enhance our marine environment, where there may not be a fiscal return but there may be positive environmental benefits or reduced management costs. The Ocean Recovery Fund will also be used to develop capacity for innovation and businesses, that may be suitable for future funding from the Blue Impact Fund. Both of these funds will have to be supported by the correct governance structure, an investment committee for the Blue Impact Fund, and an ocean trust for the Ocean Recovery Fund. This fund is expected to be launched towards the end of 2020.

THE BIOSPHERE FOUNDATION'S NATURAL CAPITAL TRUST

165. It was identified that there was a need for a financial vehicle which contributed to local natural capital enhancements across land and sea, supporting delivery of the North Devon Marine Natural Capital Plan and Landscape Pioneer's Natural Capital Strategy, as well as supporting local delivery of the Blue Impact Fund.

166. The role of the Foundation is to attract and distribute funds to the local project deliverers. This takes a blended approach to finance, providing a trading platform for carbon offsetting, (where individuals and businesses invest in environmental projects to balance out their carbon footprint) and biodiversity net gain (where post development, nature is in a better condition), as well as identifying public assets (natural or otherwise) that can be transferred to the Natural Capital Trust for sustainable management that would produce returns on investment. It can be summarised as

    g. Trading Platform; to allow investors to buy verified ecosystem service benefits.

    h. Brokering: to put local stakeholders in touch with investors directly

    i. Direct asset management; acquiring and improving assets then re-investing the profit into other asset improvements.

167. This blended approach allows for the highly profitable projects to support the less profitable but equally important projects. The organisational structure to do this may require other entities to be established such as trading arms and registering finance facilities to operate within the legal framework. The Biosphere Foundation is developing this capacity and structure.

INVESTMENT CASES

168. To identify which investment cases, have the most potential and least risk to the delivery of enhancements to nature, a qualitative assessment was completed. Unlike the usual approach to project assessment, where priority would be given to the type of impact that each action would have, this assessment provides some guidance on investment opportunity and deliverability to feed into the action plan. Using the criteria in **Table 3,** which considers: amount of investment needed; return on investment both fiscal and also other non-fiscal returns, such as enhancement to nature or reduction in the costs of management; and whether it is realistically deliverable in the short or long term or reliant on other pieces of work to be completed. As this assessment is qualitative, there was also a need to identify potential barriers to delivery that may not be clear from the scoring. A summary of proposed projects to deliver MNCP management objectives is given in **Table 4**.

Table 3. Criteria used to calculate risk score for proposed management projects.

Score	Investment	Delivery	Return
1	Up to £50k	0-5 years	High fiscal return, > 10% biodiversity net gain
2	>£50k – £100k	+5 years	Medium fiscal return, natural capital stocks improved
3	>£100k – £500k	Dependency (0-5 yrs)	Low fiscal return, natural capital stocks maintained
4	>£500k	Dependency (+5 yrs)	No fiscal return, natural capital stocks maintained
5	Uncertain	Uncertain	Uncertain

Table 4. Summary of proposed projects to deliver MNCP management objectives.

Project description	Investment	Delivery	Return	Risk score
Fisheries Research and Management Plans (FRMP): Conduct research on fish stock structure, distribution and critical habitats, initially for skates and rays, squid, herring, bass, whelk and then any other species identified.	£30k pa over 7 years	3 years	➢ Increased understanding of research and management needs for fish stocks in the Bristol Channel. ➢ Benefits of change in management to natural capital assets and flows of benefits from ecosystem services. ➢ 4% increase in yield at North Devon ports will cover the costs.	9
Comments: This is medium risk but very important for the future delivery of excellent natural capital and ecosystems enhancements, although there are no direct financial returns. Delivery over 3 years to allow for inter-annual variability.				
Herring Project: Support delivery of the Herring Project including scanning of seabed habitats and measures to manage sustainable herring fishery.	£30k pa over 5 years	4 years	➢ Exponential returns expected after 4 years (to allow for time taken for herring to reach maturity). ➢ Increased revenues for local fleet as a result of improved yield and/or catch per unit effort (CPUE). Shared benefit to reinvest. ➢ Increased brand/accreditation uplift.	8
Comments: This is a medium cost project that has huge potential for identifying critical habitats for the delivery of wild food. Delivery after 4 years allows for time taken for herring to reach maturity. There will be some incremental benefits in the interim.				
Voluntary agreements with fishermen: Set up effort and/or spatial and temporal management measures with fishermen resulting in reduction of fishing effort and/or seasonal fishery closure for lobster and crab (potentially including payments for ecosystem services).	£50k pa over 5 years	12 months to establish then 5 years	➢ Increased revenues for local fleet as a result of improved yield and/or catch per unit effort. ➢ Period of return will depend on maturation age of the species. ➢ Interim returns are based on a payment for ecosystem service - requires donor for payment not to fish.	9
Comments: The main barrier to delivery is associated with the alignment of harvesting rules across the 6nm boundary and neighbouring waters.				

Table 4. Summary of proposed projects to deliver MNCP management objectives.

Project description	Investment	Delivery	Return	Risk score
Sustainable fishing gear: Investment in developing and testing improved gear that reduces by-catch or damage to non-target species.	£30k pa over 5 years	Uncertain - active research programme.	➢ Non-fiscal return - reduced impact on natural capital assets, therefore increasing flow of other ecosystem service benefits.	12
Comments: This is medium risk but would be more suited to be revisited after the 5 year review of the plan and once fisheries enhancement projects are in plan. Research and development can begin soon, and some work can be done through the Herring Project, however, gear deployment will require an alternative finance model.				
Local markets and value-added benefits: Marketing of sustainably caught fish, both locally and beyond. Support efforts to improve local, value-added supply chain (Biosphere Brand, fish smokery, etc).	£50k pa over 5 years	Uncertain – see comments	➢ Increased return based on brand credibility and willingness to pay higher price. ➢ Seeks improved repayments to support fishers and processors.	8
Comments: The work will tie-in with land-based projects in the Biosphere Reserve linking to the Brand of the UNESCO Biosphere. Requires appropriate sustainability criteria, transparency in catch data, but returns can be quick.				
Water quality improvements: Investigate the potential for aquaculture to be used for bioremediation, including identification of suitable locations for future sustainable aquaculture operations.	£20k	1 year	➢ Non-fiscal return - one off study that may produce future options for natural capital enhancements related to water quality and potential investible aquaculture projects.	7
Comments: Priority should be given to feasibility studies that have potential to deliver future actions that would produce return on investment, i.e. that have business interest.				

Table 4. Summary of proposed projects to deliver MNCP management objectives.

Project description	Investment	Delivery	Return	Risk score
Sustainable mussel beds: Increase sustainable mussel harvesting through improvements to extent and condition of beds.	£100k pa over 5 years	Uncertain – see comments.	➢ Increased revenue from mussel sales. ➢ However public status of fishery does not make the investment secure without regulation	14
Comments: Requires further investigation – currently high risk but if feasibility study for aquaculture includes potential sites for mussel beds, risk would be reduced. Time for delivery depends on legal processes and securing a management structure.				
Reduce upstream impacts on water quality: Improve land management practices to reduce run off and pollution as well as reducing land-based flooding events.	£6m pa over 10 years	Uncertain – see comments.	➢ Reduced farming costs ➢ Reduced defensive costs for water borne disease ➢ Improved bating water and shellfish water quality ➢ Improved reputation as a tourism destination	3
Comments: This project is being delivered through the Landscape Pioneer strategy and associated land-based plans so does not need funding through this plan but monitoring of associated coastal and marine benefits needs to be factored in and costs associated with this could be met through plan. Requires integrated delivery between land and sea, and regulation enforcement.				
Reduce marine plastic pollution: Support projects that seek to reduce single-use plastic at source, recycle plastics in circulation, and actively remove plastic from the environment.	£10k pa over 5 years	Immediate	➢ Cleaner seas and beaches ➢ Increased community engagement ➢ Reduced pollution in landed species ➢ Hard to define the actual finance return	6
Comments: This work is being delivered by the plastic free consortium, and Plastic Free North Devon but marine focussed initiatives should be identified through work with Marine Coordinator and fishing industry and supported through this plan. Potential for co-financing with Biosphere Reserve Business Partners scheme.				

Table 4. Summary of proposed projects to deliver MNCP management objectives.

Project description	Investment	Delivery	Return	Risk score
Reduce disturbance to wildlife: Introduce codes of conduct for different groups of marine, coast and estuary users. Increase visibility of educational information to reduce pressure on wildlife.	£10k pa over 3 years	Immediate	➢ Reduced pressure on migratory and overwintering birds ➢ Improved tourist quality experience ➢ Increased community engagement	8
Comments: This project is reliant on the introduction of a Marine Coordinator but is realistic in the short term as work has already begun.				
Reduce disturbance/scour of subtidal habitats: Introduce eco-moorings in sensitive sites.	£30k pa over 2 years	2 years – see comments	➢ Increased flow of benefits from ecosystem services supported by subtidal habitats ➢ Unlikely to be self-funding but potential for revenue from rental of moorings in desirable areas	11
Comments: This project is of higher risk due to reliance on other work but once these are achieved it will be easy to deliver: (1) Marine Coordinator needs to be in place to engage with stakeholders to identify key sites and potential for investment, (2) can be delivered immediately in some key places but responsibility for maintenance needs to be agreed, and, (3) adoption of policy is required to drive the implementation.				
Accreditation scheme: Repeat wildlife accreditation scheme that has already been piloted and develop UNESCO Biosphere Reserve branding opportunities.	£10k pa over 2 years	2 years – see comments	➢ Seek to partly self-fund from membership of operators ➢ Improved tourist quality experience ➢ Improved reputation as a tourist destination ➢ Improved protection of biodiversity through responsible tourism and community engagement	8
Comments: This project is reliant on the introduction of a Marine Coordinator but is realistic in the short term as some charter boat operators are already engaged. Some funding in place from the Biosphere Interreg project.				

Table 4. Summary of proposed projects to deliver MNCP management objectives.

Project description	Investment	Delivery	Return	Risk score
Protect and restore wetland habitats: Increase saltmarsh extent in the estuary by 40ha through maintenance, restoration and creation.	£2m over 10 years	10 years	➢ Natural hazard regulation and increased defence against coastal flooding ➢ Increased carbon sequestration, payments for carbon ➢ Improved water quality and / or Environment Agency investment in heavily modified waterbodies ➢ Biodiversity net gain ➢ Increased tourist experience and improved reputation as a tourist destination, increased revenue from tourist visits	10
Comments: The natural capital benefits of this project are excellent but defining returns on investment is reliant on the introduction of a blue carbon code. It is also reliant on landowners relinquishing land (and potentially on introduction of payment of ecosystems services).				
Macroalgae mariculture (feasibility): Investigate the potential for macroalgae as a sink for carbon sequestration, including identification of suitable locations for future sustainable macroalgae mariculture operations.	£20k	Can be readily commissioned.	➢ Non-fiscal return - one off study that may produce future options for natural capital enhancements related to carbon sequestration and potential investible macroalgae mariculture operations.	5
Comments: Low risk one off study, that will identify actions that could increase carbon storage (and provide diversification opportunities), priority should be given to feasibility studies that have potential to deliver future actions that would produce return on investment, i.e. that have business interest.				
Macroalgae mariculture (establishment): Support set-up and development of macroalgae farm	£50k	Uncertain – see comments.	➢ Experience from current south Devon operations will reduce the uncertainties and improve the return. ➢ Potential revenue from carbon and remediation benefits. ➢ High returns on carbon pending the end-use.	9
Comments: Low cost business with low return and reliance on feasibility study for delivery, should be revisited once the feasibility study has been completed (1-3 years). Projected investment will cover establishment of infrastructure and the first 2 years of operation.				

SUMMARY OF PROJECTS FOR THE MARINE NATURAL CAPITAL PLAN

169. The preferred best option for the Marine Natural Capital Plan in the short term to medium term are based around those projects that are medium risk with most potential for delivery and as medium risk with most potential for natural capital / ecosystem service enhancements.

170. Projects with medium risk and most potential for delivery are supporting marine and fisheries specific projects for reducing plastic, and codes of conduct and accreditation schemes for wildlife watching and recreation to improve engagement and reduce our impact on wildlife. These will both have the added benefit of being newsworthy enhancing communication about the plan. These will support natural capital services of recreation and tourism (and associated water quality)

171. Fisheries research and fisheries enhancement projects securing natural capital benefits of wild food and through reduced impact on the seabed, water quality. Some work can be undertaken to develop the projects and pilot ideas, but long term management will require long term funding and commitment from the fishing industry.

172. Saltmarsh restoration securing natural capital benefits relating to climate change through flood attenuation and, when new, carbon storage. Although there is some further work that needs to be completed to identify potential sites, there has been some modelling to identify the potential hectares of saltmarsh that could be restored. The additional work (which may fall under the coordinators role) will be to work with landholders to develop sites.

173. Long term projects are linked to the progression of previous pieces of work, so will need to be brought forward as and when particular pieces of work are completed or producing outputs (such as research or feasibility studies). The long term projects are related to development of aquaculture and mariculture.

174. The 2 feasibility studies (for bioremediation using aquaculture, and seaweed mariculture) have been identified as medium risk. These need to be actioned when there has been a clear business/organisation identified to progress ideas beyond the feasibility study, if there is potential to develop the ideas. These could be funded through a commercial enterprise or be something that the Biosphere Foundation itself could invest in to set up a business that could provide income.

175. The Herring project which has been a joint Swansea University, Blue Marine Foundation and Devon and Severn IFCA project has already completed a year of research the next stages are to find resources to scan the seabed and ground truth the findings. This is to help identify critical fish habitats, that will complement the genetic analysis that was undertaken. Although focussed on herring this should demonstrate the importance of different habitats that fish need to live.

176. Reduction of marine plastic – this has been identified through the Plastic Free Northern Devon Consortium's strategy. The day to day delivery of the strategy is currently undertaken by the Plastic Free North Devon team but there are some clear activities that the governance of the plan can help with, such as reducing fishing litter. This has been a challenge in the past in North Devon where there is no interest from larger projects such as fishing for litter, due to small size of the North Devon fleet, and the ports and harbours themselves. Individual efforts to collect litter have been undertaken at Clovelly, Appledore fish dock and Ilfracombe Harbour, led by the port and harbour authorities, but it is the monitoring of what is collected that is lacking and the opportunity to reduce waste through recycling, nurdle research and collection, etc.

177. Codes of conduct to reduce pressure on wildlife as well as an accreditation scheme for charter boats . This is about reducing the impact have on the wildlife itself as an indirect improvement to

natural capital. Further, it provides an avenue for community engagement with our marine and coastal environment. By involving people and co-creating codes of conduct to manage we interact with wildlife, as well as setting up networks between different providers, we increase social capital (our networks, relationships, etc,)

178. Saltmarsh restoration, with associated enhancement of freshwater habitats upstream, provides significant benefits to natural capital in relation to climate change (carbon storage and natural flood management) but there is no standard for blue carbon credits, which limits the ability to define returns in investment for investors. The introduction of a blue carbon code would reduce risk.

179. Fisheries enhancement projects including research identified through Fisheries Research and Management Plans and with the local fishing industry to develop management measures to restore fish stocks. There is the potential for potting restrictions and spatial and temporal closures to fishing – this could include (dependant on policy changes) payments for ecosystems services, as well as alignment across the 6nm barrier for harvesting control and enforcement.

180. Investment in selective fishing gear and fishing infrastructure as well as marketing and branding - for adding value to fisheries - has the potential to produce a high return in investment. This cannot be identified until some of the work (herring project and other fisheries enhancement projects) has been completed or at least progressed to a point where there are clear results. There is the potential in the medium term to complete a project around the herring fishery, but this is a small fishery with limited return in investment, this has more natural capital benefits through reducing pressure on fish stocks and habitats and increasing income to herring fishermen without an associated increase in fishing effort,

181. Development of mussel harvesting, aquaculture and mariculture. Increase in mussel beds/aquaculture in estuary potentially related to the use of them for bioremediation (filtering the water) but also for spat and/or harvesting to eat. This is reliant on the completion of the feasibility study but needs to also identify who might progress the activity once the feasibility study has been completed. The development of mariculture in North Devon can also be investigated but the challenging conditions in the Bristol Channel mean that this work may have to be focused in the estuary.

ANNEX: SUPPORTING DOCUMENTS

1. NCA non-technical summary (DEFRA)
2. UKSEAS + WWF governance toolkit
3. WWF Compass Report
4. Marine Working Group workshop report 2017
5. Asset & risk register
6. Table of indicators
7. Sustainability assessment
8. GeoNode and guidance
9. Action plan
10. WWF sustainable financing mechanisms for MPAs
11. Habitat regs assessment
12. Strategic environmental assessment