The Second State of Natural Resources Report (SoNaRR2020)

SoNaRR2020 Register marine evidence

Natural Resources Wales

Final Report

About Natural Resources Wales

Natural Resources Wales's purpose is to pursue sustainable management of natural resources. This means looking after air, land, water, wildlife, plants and soil to improve Wales's well-being, and provide a better future for everyone.

Evidence at Natural Resources Wales

Natural Resources Wales is an evidence-informed organisation. We seek to ensure that our strategy, decisions, operations and advice to Welsh Government and others are underpinned by sound and quality-assured evidence. We recognise that it is critically important to have a good understanding of our changing environment.

We will realise this vision by:

- Maintaining and developing the technical specialist skills of our staff;
- Securing our data and information;
- Having a well resourced proactive programme of evidence work;
- Continuing to review and add to our evidence to ensure it is fit for the challenges facing us; and
- Communicating our evidence in an open and transparent way.

Title: **SoNaRR2020 Register marine evidence**

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The Second State of Natural Resources Report (SoNaRR2020) contents

This document is one of a group of products that make up the second State of Natural Resources Report (SoNaRR2020). The full suite of products are:

Executive Summary. Foreword, Introduction, Summary and Conclusions. Published as a series of webpages in December 2020

The Natural Resource Registers. Drivers, Pressures, Impacts and Opportunities for Action for eight Broad Ecosystems. Published as a series of PDF documents and as an interactive infographic in December 2020

Assessments against the four Aims of SMNR. Published as a series of PDF documents in December 2020:

SoNaRR2020 Aim 1. Stocks of Natural Resources are Safeguarded and Enhanced

SoNaRR2020 Aim 2. Ecosystems are Resilient to Expected and Unforeseen Change

SoNaRR2020 Aim 3. Wales has Healthy Places for People, Protected from Environmental Risks

SoNaRR2020 Aim 4. Contributing to a Regenerative Economy, Achieving Sustainable Levels of Production and Consumption

The SoNaRR2020 Assessment of Biodiversity. Published in March 2021

Assessments by Broad Ecosystem. Published as a series of PDF documents in March 2021:

Assessment of the Achievement of SMNR: Coastal Margins

Assessment of the Achievement of SMNR: Enclosed Farmland

Assessment of the Achievement of SMNR: Freshwater

Assessment of the Achievement of SMNR: Marine

Assessment of the Achievement of SMNR: Mountains, Moorlands and Heaths

Assessment of the Achievement of SMNR: Woodlands

Assessment of the Achievement of SMNR: Urban

Assessment of the Achievement of SMNR: Semi-Natural Grassland

Assessments by Cross-cutting theme. Published as a series of PDF documents in March 2021:

Assessment of the Achievement of SMNR: Air Quality

Assessment of the Achievement of SMNR: Climate Change

Assessment of the Achievement of SMNR: Energy Efficiency

Assessment of the Achievement of SMNR: Invasive Non-native Species

Assessment of the Achievement of SMNR: Land use and Soils

Assessment of the Achievement of SMNR: Waste

Assessment of the Achievement of SMNR: Water Efficiency

Updated SoNaRR evidence needs. Published in March 2021

Acronyms and Glossary of terms. Published in December 2020 and updated in March 2021

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Marine
Natural Resource Register
Evidence List

SoNaRR2020

The evidence below has been extracted from the marine chapter unless otherwise stated.

If the original piece of evidence is not cited within this document then it can be found in the marine chapter or associated chapters, which will be published in March 2021. At that point this document will be superseded.

Contents

Evidence List: Drivers, Pressures and Impacts Table

Climate Change

1. **Increased Water Temperature**

1.1. **Directly lead to a decrease in dissolved oxygen and increases in stratification**
Average projected sea temperature increases of 3°C by 2100 in the Irish and Celtic Seas will directly lead to a decrease in dissolved oxygen. Increases in stratification due to sea warming are also likely to drive declines in oxygen concentrations (Robinson et al, 2020).

1.2. **Impacting on food webs, with effects seen in seabed-dwelling species, as well as plankton, fish, birds and mammals.**
At the North Atlantic Ocean Basin scale, long-term datasets show that changes in plankton species and communities have been influenced by climate over multidecadal periods, and strongly correlate with temperature change (Robinson et al, 2020).

Commercial fish populations in the North Sea and Celtic-Biscay shelf are reportedly among the most negatively impacted worldwide, due to intense and prolonged overfishing and rapid warming in recent decades (>0.2°C per decade) (Robinson et al, 2020).

1.3. **Increasing threat of INNS**
In addition to the UK-wide impacts and projections, specific concerns for Wales include a risk of the invasive Pacific oyster becoming established [due to warming seas (Robinson et al, 2020).

1.4. **Impacting on food webs, with effects seen in seabed-dwelling species, as well as plankton, fish, birds and mammals.**
Average projected sea temperature increases of 3°C by 2100 in the Irish and Celtic Seas will directly lead to a decrease in dissolved oxygen. Increases in stratification due to sea warming are also likely to drive declines in oxygen concentrations (Robinson et al, 2020).

2. **Ocean Acidification**

2.1. **Impacting on food webs, with effects seen in seabed-dwelling species, as well as plankton, fish, birds and mammals.**
Impacts of ocean acidification on shellfish fisheries may be more pronounced in Wales than other regions of the UK due to the relative importance of cockle and whelk fisheries (Robinson et al, 2020).

The North Atlantic contains more anthropogenic CO2 than any other ocean basin, and ocean surface measurements between 1995 and 2013 reveal a pH decline (increasing acidity) of 0.0013 units per year there (MCCIP, 2020).

3. **Sea Level Rise**

3.1. **Increasing the threat of flooding**

Mean sea level around the UK has risen by about 12–16 cm since 1900. There is variance is sea-level change around the UK partly due to vertical land movement from isostatic rebound following the last Ice Age, with the south of the UK sinking while Scotland is rising. At many locations, extreme sea levels that exceed critical flood-thresholds are being experienced more frequently than in the past, due to mean sea-level rise (MCCIP, 2020)

Pollution

4. **Water Pollution**

4.1. **Elevated nutrient levels and chemical contaminants are detrimental to the functioning of the system as a whole, and to condition of specific habitats and species**

Elevated nutrients levels and chemical contaminants were cited as main pressure or threat (ranked medium or high) for all seven Annex I marine habitats reported on at a Wales level for Article 17 reporting (JNCC, 2019b). These MPA reporting findings echo those of the WFD Cycle 2 Interim Classification 2018, which found that 13 of 55 estuarine and coastal water bodies achieved good or high overall status, while 41 were in moderate status and one in poor status (Water Watch Wales, 2018).

36 of these 55 water bodies failed to achieve good ecological status. The most significant failures are for dissolved inorganic nitrogen, however concentrations rarely give rise to biological impacts or lead to eutrophication. Long term inputs of phosphorus from the Welsh land mass to the sea have significantly decreased over the last 30 years as a result of reductions at waste water treatment works in the catchment, however nitrogen inputs do not show a decreasing trend reflecting the difficulties in managing diffuse inputs.

Chemical status is assessed against organic and inorganic chemicals, such as metals, hydrocarbons and contaminants produced by industrial processes. 20 water bodies failed to achieve good chemical status. The status of chemicals only tells part of the story: some chemicals are subject to long-standing bans and as a result their concentrations in the environment are decreasing, and while others are still permitted their use and regulation is tightly controlled. The most common failures for chemicals in the estuarine and coastal environment are for mercury and brominated diphenylethers. All data from Water Watch Wales (2018).

4.2. **Increase and distribution of Marine litter is affecting aesthetic value of marine environment which threatens marine habitats and species**

A recent project sought to assess evidence on the impacts of plastic pollution on the features of the English and Welsh MPA network, and then prioritise those features most at risk from plastic pollution based on the available evidence (MBIEWG, 2020). The study concluded that the highest potential for impact of any habitat feature, sub-feature, species or bird feature is considered to be medium, and that marine plastic pollution is unlikely to pose a high risk to MPA features in England and Wales at concentrations of plastic that can be considered environmentally realistic. Larger marine species (such as birds and marine mammals) are more vulnerable to larger plastic debris that they may ingest or become entangled with. However, there is no evidence to suggest that this is having population level effects. Similarly, whilst studies suggest some potential

effects on habitat functioning, the decline of habitats due to plastic pollution is not evidenced (MBIEWG, 2020). It is important to note that the issue of marine plastics is a relatively new topic in scientific research, and it can be argued that the impact and effects of plastics in the environment are relatively poorly understood, and that the majority of MPA features in this study had either no evidence or limited evidence on the impact of marine plastics.

Marine litter is an issue because of effects on biodiversity, commercial and recreational activities and the visual amenity of the coastal and marine environment (SoNaRR, 2016)

Land Use Change

5. **Unmanaged Access, Sport and Recreational Activity**

5.1. **Potential impacts on marine habitats and species from recreational sea angling, recreational boating (anchoring, mooring and launching), bait digging and collection of living resources and foot access.**
NRW's Wales Non-Licensable Activities project focuses on the non-licenced activities of greatest concern at the network scale in Wales.

Bait digging on the Gann flats in Pembrokeshire Marine SAC causes indicative unfavourable condition

INNS and Pests and Diseases

6. **INNS**

6.1. **Outcompete or smother native species; significantly damage or modify marine habitats.**
Invasive Non-Native Species (INNS) are present in Welsh waters and have varying levels of impact. In some areas INNS are well-established and outcompete or smother native species, for example the slipper limpet Crepidula fornicata, or wireweed Sargassum muticum, both of which have increased in Milford Haven (JNCC, 2019c). Intertidal monitoring for the MarClim project recorded the kelp INNS Undaria pinnatifida within Skomer MCZ for the first time (Mieszkowska, 2019). Recent surveys and monitoring have revealed five new records of INNS in north Wales, including Crepidula fornicata in the Menai Strait.

From Invasive Non-Native Species Chapter - The heat map of occurrence records of INNS of interest to Wales which impact on the marine ecosystem in Wales (Fig 8b) shows a strong correlation with ports and marinas (e.g. Milford Haven, Holyhead, Swansea and Aberystwyth) which demonstrates the importance of shipping/boating as major pathways and the need to work to improve biosecurity in these types of location. The INNS of interest to Wales that impact marine ecosystems do so by affecting biodiversity, altering trophic levels, exacerbating water quality issues (e.g. red tides), smothering, predating or outcompeting native fauna and aquaculture species, affecting commercial fisheries, as well as biofouling marine structures, boats and blocking intakes/pipes.

Over-exploitation

7. Lack of fisheries evidence

7.1. Uncertainty over sustainability of fisheries and potential impacts on target and non-target species and associated habitats

For the most part, we don't have a good enough understanding of stock status and the dynamics of fishing effort, its distribution and resulting catches to be able to determine the extent to which the extraction of fisheries resources within Welsh inshore waters is being carried out sustainably. There is consensus across industry, Welsh Government and NRW on the need to progress with initiatives already underway, and augment with further planned work to better understand both the status of fish and shellfish stocks and environmental impacts of fisheries activities. NRW's Assessing Welsh Fishing Activities Project is supplying evidence-based assessments of the potential impacts of fishing gears on the features of European marine sites in Wales (NRW, 2020).

References: Drivers, Pressures and Impacts Summary Table

Article 17 mudflats and sandflats Wales report - https://jncc.gov.uk/jncc-assets/Art17/H1140-WA-Habitats-Directive-Art17-2019.pdf

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Pembrokeshire Marine SAC indicative feature condition report: https://cdn.naturalresources.wales/media/684242/indicative-condition-assessment-2018-pembrokeshire-marine-sacv2.pdf

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Evidence List: Opportunities for Action

Aim 1: Stocks of Natural Resources are safeguarded and enhanced

Understanding and improving feature condition and management
Of the 128 indicative site-level feature condition assessments for SAC and SPA features, 73 were given a high confidence, 27 medium confidence and 17 low confidence. The condition of 11 features was unknown, meaning no confidence rating. REF The term 'indicative condition assessment' describes the use of readily available evidence and expert judgement in an intensive, collective workshop process to provide an indication of feature condition at the site level. NRW has received EMFF funding to develop indicators and an improved site level feature condition assessment process. This will lead to a better understanding of feature condition and improved management of our MPA network in Wales.

Marine renewable energy
Low-carbon energy was the service found to have the greatest potential capacity to increase its contribution to well-being goals (Fletcher and Ingwall-King, 2017). This was assessed to have a substantial potential contribution to both a 'cohesive Wales' (through the economic benefits from a thriving industry contributing to more cohesive local communities) and to a 'globally responsible Wales' (through provision of energy that does not contribute to greenhouse gas emissions).

Wave, tidal range and tidal stream technologies have the potential to deliver a further 6.4GW of installed capacity, and up to 10GW including the Severn (Marine Energy Wales, 2019). Opportunities to harness this wave and tidal potential are being explored through a number of demonstration zones and projects planned or underway around the Welsh coast (Marine Energy Wales, 2020), with leases for sites totalling 362MW agreed to date. North Wales has been identified as a priority region for Round 4 offshore wind leasing, with aspirations to add 1.5 to 3.5GW of capacity by 2030, based on potential extensions and a new leasing area (Carbon Trust, 2018).

Aim 2: Resilient Ecosystems

Complete ecologically coherent network of well-managed MPAs
The UK Marine Strategy identifies programmes of monitoring and measures to assess and deliver progress towards the Good Environmental Status of UK seas. There are many synergies between Good Environmental Status, SMNR and the requirement to maintain and enhance biodiversity, and contribute to wider ecosystem resilience.

The MPA Network Management Framework sets out the structure for improving the management and condition of the network of MPAs in Wales for the period 2018 – 2023, supported by an annual Action Plan. We need to improve our understanding of MPA condition over time, through monitoring and assessment, and this will be delivered in part through a revised integrated UK marine biodiversity monitoring programme. Within Wales, the programme will also inform wider marine evidence needs, supporting marine planning, management and regulatory functions for NRW, WG and their partners. NRW will develop a new site condition reporting process based on the findings of the EMFF project 'Improving marine site level feature condition assessment reporting in Wales' aims to

develop indicators and a process for reporting on condition of features protected in Wales' network of MPAs.

Aim 3: Healthy Places for People

Improve management of activities and pressures that impact water quality in marine and coastal ecosystems
River Basin Management Plans and Good Ecological Status. RBMPs will integrate the measures and objectives of a variety of legislation including European Marine Sites, Bathing and Shellfish Waters to protect, enhance and restore all water bodies through the application of an ecosystem-based approach. These plans will manage pressures, put in place improvements and align objectives with SMNR. There are further opportunities to address issues of water quality and impacts on marine features and associated well-being benefits, though these will require careful consideration due to the potential trade-offs.

Aim 4: A Regenerative Economy

Marine renewable energy - developing low-carbon energy potential.
Low-carbon energy was the service found to have the greatest potential capacity to increase its contribution to well-being goals (Fletcher and Ingwall-King, 2017). This was assessed to have a substantial potential contribution to both a 'cohesive Wales' (through the economic benefits from a thriving industry contributing to more cohesive local communities) and to a 'globally responsible Wales' (through provision of energy that does not contribute to greenhouse gas emissions).

Wave, tidal range and tidal stream technologies have the potential to deliver a further 6.4GW of installed capacity, and up to 10GW including the Severn (Marine Energy Wales, 2019). Opportunities to harness this wave and tidal potential are being explored through a number of demonstration zones and projects planned or underway around the Welsh coast (Marine Energy Wales, 2020), with leases for sites totalling 362MW agreed to date. North Wales has been identified as a priority region for Round 4 offshore wind leasing, with aspirations to add 1.5 to 3.5GW of capacity by 2030, based on potential extensions and a new leasing area (Carbon Trust, 2018).

Fisheries
The existing and planned initiatives aimed at improving our understanding of the condition of stocks of commercially targeted fish and shellfish will contribute valuable information on the sustainability of marine fisheries activities and their locations in Welsh waters. These include:

- Assessment and management outputs of the Assessing Welsh Fishing Activities project;
- WG/NRW Marine Evidence Strategy;
- WG Fisheries Evidence Plan;
- Welsh Government commissioned fish and shellfish stock assessments;
- Welsh Fishermen's Association Pre-Marine Stewardship Council Assessment of Welsh Fisheries project;
- Mandatory catch recording for all English and Welsh licensed fishing boats under 10 metres in length; and
- Inshore vessel monitoring system (iVMS) for licensed fishing boats under 12 metres in length
- UK Fisheries Bill and possible subsequent Wales Fisheries Bill

The opportunities presented by these initiatives, and the potential benefits for well-being, may depend on securing long-term funding.

Evidence List: Assessment of SMNR

The Marine Area Statement is a key vehicle for addressing the issues and opportunities that either fall outside of existing regulatory and management processes, or are related to opportunities for better integration and collaboration between policy areas. The actions we have identified with our partners are centred around three themes, all of which relate directly to ecosystem resilience and SMNR:

- Building resilience of marine ecosystems
- Nature-based solutions and adaptation at the coast
- Making the most of marine planning

Aim 1: Stocks of Natural Resources are safeguarded and enhanced

Aim 1: Progress towards meeting the aim

1.1 State and condition of marine natural resources:

MPA feature condition: Indicative marine site-level feature condition assessments published in 2018 show that 46% of features were in favourable condition, 45% in unfavourable condition and 9% were unknown. The confidence levels are a vital component of the assessments. Previous assessments were carried out between 2005 and 2007 under a very different process, and the network of MPAs has increased considerably since then. As such, it is difficult to provide an overall trend for feature condition. REF

Marine fish and shellfish: Many stocks of commercially targeted fish and shellfish species are assessed and managed over large geographic scales (e.g. International Council for the Exploration of the Sea (ICES) sub-region) and it is not always feasible or appropriate to attempt to assess extent/condition/trends at a Welsh level. Additionally, whilst the distributions of many such stocks are known to overlap with the Welsh inshore, they are not typically landed by the Welsh fleet in significant numbers due to a lack of quota. Many notable species in a Welsh fisheries context are non-quota – whelk, scallop, lobster, crab, spider crab and prawn and are managed through a combination of European, UK and Welsh legislation. Where Welsh level assessments could be considered appropriate, data deficiencies often present challenges. These data limitations also restrict attempts to assess the extent to which the sustainable management of natural resources, such as fish and shellfish, is being achieved.

Marine birds – seabirds: There is a mixed picture for seabirds. Auks, gannet, Manx shearwater and terns have all shown healthy population increases over the period. However, most gulls, cormorant, shag and black guillemot have declined (JNCC, 2019a).

Marine birds – waterbirds: There is a mixed picture for waders, with declines observed for grey plover, bar-tailed godwit, curlew, oystercatcher and dunlin, in line with UK-wide population reductions. Increases in the Welsh populations of knot and redshank were observed despite a UK-wide decline, while a large increase in the black-tailed godwit population was in line with the UK trend (Frost et al, 2020). Wintering wildfowl species such as wigeon, pintail, teal and great-crested grebe increased on the whole, with the only population reduction in Wales observed for shelduck (Frost et al, 2020).

Marine mammals: The grey seal population in Welsh waters has shown an upward trend in pup production over the long-term, with an increase in population abundance ((Bull et al 2017a,b; Clarke et al, 2020 in prep; Morgan et al 2018; Mitchell et al, 2018a; Mitchell et al, 2018b; SCOS 2018). The picture for harbour porpoise is less clear because of the lack of population assessments specifically for the Welsh inshore. For the wider Celtic and Irish Seas Management Unit of which Welsh waters are a part, there is evidence of a significant decline (SCANS II, 2008; Hammond et al, 2017, Rogan et al, 2017). The bottlenose dolphin population in Welsh waters is stable over the longer term (2001 - 2016), although there is some evidence of population shifts within the last decade in the Cardigan Bay SAC (Lohrengel et al 2018).

Intertidal and subtidal habitats: There is a mixed picture for intertidal and subtidal habitats based on
i. indicative feature condition assessments;
ii. Article 17 reporting; and
iii. WFD status.
Whilst some habitats have been stable over reporting periods, significant proportions of Annex I features remain in unfavourable condition, and the indicative feature condition assessments suggest that there are common issues impacting upon intertidal and subtidal habitats across the MPA network. The WFD assessments of intertidal and subtidal elements shows that the majority of water bodies are meeting the required good status for saltmarsh, seagrass, opportunistic macroalgae, benthic invertebrates, estuarine fish and phytoplankton.

Hydrological processes and impacts of climate change: Mean sea level around the UK has risen by about 12–16 cm since 1900. There is variance is sea-level change around the UK partly due to vertical land movement from isostatic rebound following the last Ice Age, with the south of the UK sinking while Scotland is rising. At many locations, extreme sea levels that exceed critical flood-thresholds are being experienced more frequently than in the past, due to mean sea-level rise (MCCIP, 2020)

Models and observations show an increase in annual and winter mean significant wave heights in the Northeast Atlantic since the 1950s. Over the past 50 years, a poleward shift in mid-latitude depressions is evident during the winter. The strongest mid-latitude depressions may be increasing in intensity but becoming less frequent (MCCIP, 2020).

UK seas show an overall warming trend. Over the past 30 years, warming has been most pronounced to the north of Scotland and in the North Sea, with sea-surface temperature increasing by up to 0.24°C per decade. Warming of UK shelf seas is

projected to continue over the coming century. Most models suggest an increase of between 0.25°C and 0.4°C per decade (MCCIP, 2020).

The salinity of UK shelf seas, and the adjacent Atlantic Ocean, has been highly variable on annual and decadal timescales with no clear long-term trends.

In the past five years, salinity of eastern North Atlantic waters west of the UK has dramatically decreased, probably in response to atmospheric changes in the western North Atlantic earlier this decade (MCCIP, 2020).

The North Atlantic contains more anthropogenic CO2 than any other ocean basin, and ocean surface measurements between 1995 and 2013 reveal a pH decline (increasing acidity) of 0.0013 units per year there (MCCIP, 2020).

1.2 Evidence provided in Assessment of SMNR

1.3 Evidence provided in Assessment of SMNR

Aim 1: Obstacles remaining to meeting the aim

1.4 See evidence provided in 1.1 marine fish and shellfish

Aim 2: Resilient Ecosystems

Aim 2: Progress towards meeting the aim

2.1 At a Welsh seas scale, the condition of the MPA network (figure X) can be considered as a best available proxy for marine ecosystem resilience, and an important starting point for the assessment of SMNR. In 2018, NRW published **indicative condition assessments** for all marine Special Area of Conservation (SAC) and Special Protection Area (SPA) features (NRW, 2018a). 46% of marine features were assessed to be in favourable condition, 45% were assessed to be in unfavourable condition and 9% were unknown, with underpinning confidence assessment given in table 1. A 2016 assessment found that Welsh MPAs make a substantial contribution to the UK ecologically coherent network, with only a small number of shortfalls in the protection of habitats and species of conservation interest (Carr et al, 2016).

2.2 An NRW-funded project (Armstrong et al, 2020) estimated the blue carbon sink potential of marine habitats in Wales and their contribution to offsetting carbon released by human activities, reporting the following key findings:

- a substantial amount of carbon is already stored in Welsh marine sediments; at least 113 Million tonnes (Mt) in the top 10 cm of sediment. This represents almost 170 % of the carbon held in Welsh forests.
- In any given year, the water column holds at least another 48.7 Mt of carbon in Welsh seas, mostly in the form of dissolved inorganic carbon.
- It has been estimated that Welsh marine habitats sequester at least 26,100 tonnes of carbon (or 0.03 Mt C) every year, with saltmarshes and intertidal flats accounting for a large percentage of this value.

2.3 Evidence provided in Assessment of SMNR

2.4 Evidence provided in Assessment of SMNR

Aim 2: Obstacles remaining to meeting the aim

2.5 See evidence provided in 1.1

Aim 3: Healthy Places for People

Aim 3: Progress towards meeting the aim

3.1 A review of the well-being plans of Wales' 19 public service boards (PSBs) found that the majority recognised the importance of the marine environment for physical and mental wellbeing and outdoor activity, but there was significant potential for greater recognition of the contribution that the coast and marine environment can make to generating jobs through recreation and tourism (NRW, 2020). The cultural services and benefits to well-being contribute to the overall picture in the UK, where the marine sector is estimated to contribute 8.1% of GVA (Stebbings et al, 2020).

Recreational activities are of huge importance in Wales, including wildlife watching; sailing and leisure boating and associated marinas, clubs and infrastructure; surfing; angling; swimming; kayaking and many more (Welsh Government, 2015).

Welsh beaches have 43 Blue Flags, 19 Green Coast Awards and 83 Seaside Awards. Bathing water quality in Wales has improved significantly over the past two decades and in 2019, 100% of designated bathing waters met the minimum standard, with 79% achieving the highest standard of 'excellent' (Natural Resources Wales, 2019; Welsh Government, 2019)

Bacterial load: After a long period of improvement, 100% of bathing waters meet the minimum standard and 83% were assessed as excellent (NRW, 2020). Some issues remain with the standard of shellfish waters protected areas, but improvements have been made. Nutrients: Of the 55 estuarine and coastal water bodies around Wales, 24 fail the standard for dissolved inorganic nitrogen, however these failures rarely lead to excessive growth of algae or impacts on the ecosystem (Water Watch Wales, 2018). Since 1990, phosphorus loads have decreased but there is no significant trend in discharges of nitrogen from catchments to the sea. Contaminants: Some chemicals, now banned from production, continue to cause failures of standards and have the potential to bioaccumulate through food chains. There are other chemicals such as TBT whereby control measures have been effective and impacts on the ecosystem reduced. Emerging contaminants such as pharmaceuticals remain a concern.

Aim 3: Obstacles remaining to meet the aim

3.2 Evidence provided in Assessment of SMNR

3.3 There is evidence relating to the occurrence of marine litter on Welsh beaches, but we know less about the impacts in Wales. Welsh inshore waters are only partially

covered by the established monitoring programmes for seabed litter and there is a poor understanding of the distribution of microplastics. A number of policies and initiatives that are planned or in place seek to reduce the inputs of litter into the marine environment. These include:

a. Proposals to restrict single-use, hard to recycle and commonly littered plastics in Wales

b. Proposals for a Deposit Return Scheme

c. Proposals for Extended Producer Responsibility

d. The Wales Clean Sea Partnership

e. The Circular Economy Strategy

f. The National Litter Prevention Strategy
A joint Natural England and Natural Resources Wales project funded through the Defra Impacts Evidence Group has investigated the impacts of marine plastics on MPA habitats and features (MBIEWG, 2020). This work could be further developed to identify new opportunities for SMNR in relation to biodiversity and impacts from marine litter. NRW is working to identify the links between waste, freshwater and marine functions in order to ensure better coordination and develop activities that can address the sources, pathways and impacts of marine litter

Aim 4: A Regenerative Economy

Aim 4: Progress towards meeting the aim

4.1 Welsh seas provide a range of social, environmental and economic benefits derived from provisioning services, as detailed in table 7. Key benefits include low-carbon marine renewable energy from abundant wave, tidal (stream and range) and wind resources; food such as fish and shellfish, both from wild capture and aquaculture; and aggregates (sands and gravels) extracted from the sea bed. Other benefits include water abstraction; genetic resources for aquaculture; various applications of micro- and macroalgae, including as inputs for pharmaceuticals and biofuels, as fertilisers, food additives and direct consumption as food. Some of these benefits are reliant on biological resources and as such the optimisation of their delivery is dependent on the resilience of the marine ecosystem. Other key services, such as renewable energy and aggregates, do not depend on the resilience of the ecosystem, so the focus of optimisation here lies in reducing the environmental impact of their production.

These provisioning services contribute to the overall picture in the UK, where the marine sector is estimated to contribute 8.1% of GVA (Stebbings et al, 2020).

Renewable Energy

The existing operational offshore wind farms in Welsh waters have a generating capacity of 726MW (Carbon Trust, 2018).

Wave, tidal range and tidal stream technologies have the potential to deliver a further 6.4GW of installed capacity, and up to 10GW including the Severn (Marine Energy Wales, 2019).

Fisheries

In 2018, £3.24m (662 tonnes) of fish and £8.57m (4,539 tonnes) of shellfish (excluding cockles) were landed in Welsh ports by vessels registered in Wales (Seafish, 2020). £0.76m (860 tonnes) of cockles were landed in the NRW managed fisheries in the Dee Estuary and Burry Inlet (Seafish, 2020). There are 440 registered fishing vessels in Wales in 2018, of which 410 are less than 10m in length and 30 are greater than 10m in length. There are an estimated 1,193 fishermen in the Welsh fleet (MMO, 2019).

In 2017, aquaculture operations produced £1.05m of finfish (234 tonnes) and £1.87m of shellfish (1,545 tonnes) (Seafish, 2020). In 2015, aquaculture supported approximately 23 full time equivalent staff across Wales and provided over £3.5 million GVA

Marine aggregates

47% of sand and gravel sold in Wales is from the marine environment, with 80% of south Wales fine aggregate demand being met from marine sources (Welsh Government, 2020).

4.2 Evidence provided in Assessment of SMNR

Aim 4: Obstacles remaining to meet the aim

4.3 Evidence provided in Assessment of SMNR

References: Opportunities for Action and Assessment of SMNR

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