

NRW's Marine and Coastal High Priority Evidence Needs

As part of NRW's Marine and Coastal Evidence Programme we produce a list of high priority evidence needs, which is updated on an annual basis. Many of these are being progressed internally and completed evidence reports will be published on our website. This document describes the high priority evidence needs and the progress we have currently made with them. If you think you may be able to help us deliver any of these evidence needs, please get in touch.

We also have a longer list of other marine and coastal evidence needs and have identified projects from both lists that might be particularly suitable for delivery by partners, especially through academic research projects.

High Priority List

What are the reasons for the decline of specific species and benthic habitats across the Marine Protected Area network in Wales?

Monitoring has shown a decline in the health of various habitats and species in Welsh Marine Protected Areas (MPAs). Work is needed to identify the causes of these declines. This should include the following: maerl and herring around Milford Haven in the Pembrokeshire Marine Special Area of Conservation (SAC), sponges and infauna in the Menai Strait and Conwy Bay SAC, *Modiolus modiolus* (horse mussel) beds in the Pen Llyn a'r Sarnau SAC, pink sea fan *Eunicella verrucosa*, red sea fingers *Alcyonium glomeratum* and potato crisp bryozoan *Pentapora foliacea* in the Skomer Marine Conservation Zone and birds in the Burry Inlet Special Protection Area. This will allow effective management measures to be identified that will improve our understanding of the ways to improve the condition of MPA features, improving the resilience of marine ecosystems across Wales.

Next steps and progress: Continue Nature Networks MPA investigations projects, also any PhDs/MScs that help us to understand the ecology and sensitivities of the species and habitats in decline.

What is the condition of our protected marine features and status of coastal and transitional waters?

Understanding the condition of Welsh waters is a fundamental requirement that ultimately leads to us being able to advise on the management measures required to recover and/or

increase biodiversity and resilience. NRW has a marine monitoring programme which covers features of Marine Protected Areas and the coastal and estuarine water bodies under the Water Environment Regulations. Ideally this would be expanded to cover more habitats, species and the wider ecosystem; with increased monitoring in terms of both frequencies and locations.

Next steps and progress: Continue with current NRW marine monitoring programme and expand if possible. Potential to establish collaborative monitoring where relevant.

What are the productivity and survival rates of seabirds at Welsh colonies?

Set up ringing and resighting for seabird species as well as camera traps for productivity and diet at seabird colonies. This could include the following species: Atlantic puffin, black-legged kittiwake, common guillemot, lesser black-backed gull, razorbill, shag cormorant, tern species, gulls.

Next steps and progress: Collaboration with Academia and NGOs.

What areas of Welsh waters are used by different fish species and how?

An assessment of abundance, distribution and structure of marine fish species in Welsh waters through the year, with a review of available data and recommendations for gap filling. This would lead to an update to Ellis et al. (2012) for Wales but would also cover other species, life stages and habitat use in addition to spawning and nursery grounds.

Next steps and progress: Needs to be scoped out, but a contract to update and expand upon the Ellis et al. (2012) work is likely.

What are the critical inshore and coastal migration routes and marine habitats used by diadromous fish in Wales?

Based on recommendations in NRW Evidence reports; 'Feasibility Study of Methods to Collect Data on the Spatial and Temporal Distribution of Diadromous Fish in Welsh Waters' and 'Acoustic tracking in Wales – designing a programme to evaluate Marine Renewable Energy impacts on Diadromous fish'. The project would hydroacoustically tag and track diadromous fish from a selection of Welsh rivers, to collect data on their distribution, particularly in marine energy resource areas. The evidence would be used to inform modelling tools to establish risk to salmon, sea trout, eel and shad populations from potential tidal range and tidal stream developments in Wales. Current work in south Wales could be expanded to include more species and similar systems could be set up in north Wales.

Next steps and progress: Strategic evidence which needs large scale funding. However, some progress is being made notably for shad in the Bristol Channel through working with research partners.

What are the impacts of cable installation methodologies to reef habitats?

An increase in offshore renewables is leading to an increase in cables and sometimes a difficulty in finding cable routes that avoid reef habitats. Current cable installation methodologies include trenching, horizontal directional drilling and pinning. A literature review would be carried out of the impacts of these installation methodologies on Habitats Regulations Annex I Reef types that occur in Welsh waters. Of particular interest is the impacts of pinning cables to reef as we have very limited information at present. This could start by investigating whether any monitoring has taken place on Annex I Reefs post-cable installation for the different methodologies. If there have been no studies, then monitoring could take place after discussions with developers to identify suitable sites.

Next steps and progress: Likely to be a contract to carry out a literature review, possibly as part of a collaborative project.

What are the best Collision Risk Models and parameters to assess impacts on marine mammals?

Existing collision risk models and encounter rate models and their input parameters used in our advice should be reviewed to ensure the best available evidence/techniques are being used, and are applicable to Wales. Other collision risk models have been/are being developed, especially to accommodate different/unusual tidal turbine designs, and a review (with recommendations) of available models/techniques would be valuable.

Next steps and progress: Possible collaboration. Potential contract (review), and workshop. Also possible PhD.

What is the efficacy and potential longer-term impacts of acoustic deterrent devices for marine mammals, birds, and fish?

There remains a gap in knowledge of how some marine mammal, fish and bird species respond to acoustic deterrent devices (ADDs). They are routinely advised as potential mitigation techniques for tidal energy and other industries/activities but while there is some information for seals around aquaculture sites, and for fish at power stations, our understanding of how effective these are for some species remains limited or unknown. The need is for experimental research observing reactions to ADDs at sea. There is also a need to explore how ADDs optimised for one receptor (species) could affect other receptors, particularly given differences in hearing range, auditory sensitivity, and behaviour in reaction to underwater noise. Finally, research is needed to evaluate longer term ADD deployments, and whether these could have lasting displacement or disturbance effects on different receptors.

Next steps and progress: May be taken forward as part of a collaborative project.

How do sub-sea cabling practices affect sand wave and sand bank morphodynamics, and the wider sedimentary system?

Cable laying activities can include sand wave clearance, cable burial via trenching and cable protection measures. The morphological impacts on sand waves and sand bank systems caused by these activities are poorly understood. Equally, the implications of any change on the wider sediment budget, especially links to the coast, requires investigation. Key questions include: does cable protection block bedload transport pathways? Do sand waves recover after clearance and what are the timescales? Does sand wave clearance affect the form and function of the sandbank system? Will the impact of cabling practices alter the natural coastal protection that sand banks provide? It is particularly important to understand this for areas of Wales where cable routing and landfall is expected; for example, the north Wales coast and the Pembrokeshire coast.

Next steps and progress: Build on a knowledge exchange project underway. Potential collaboration.

What is the bathymetry and morphodynamics of Turbot Bank and surrounding areas?

This project would focus on the Turbot Bank and other large areas of mobile sediment around the approaches to Milford Haven. There is future anthropogenic activity anticipated in this area, primarily relating to cable routes, but minimal bathymetric data in the area and no knowledge on the mobility and stability of the seabed over the wider area. This increases risk in the consenting process and makes management of the Annex 1 Sandbank habitat of Turbot Bank difficult. The project would collect at least one set of multibeam bathymetry to compare to the CCW 2012 survey. Ideally, additional targeted repeat bathymetry surveys would be used to better understand mobility. This understanding would then be used to develop preferred management options with regards cable routing and laying, as well as other activities. The data will also be useful for future marine condition assessments, Turbot Bank could not be assessed for topography in the current round.

Next steps and progress: Investigating third-party data.

Where are the most suitable locations for marine and coastal restoration (saltmarsh, native oysters and seagrass) in Wales?

Build on 2021 work that mapped opportunities for restoration of native oysters, seagrass, *Sabellaria*, *Modiolus modiolus*, saltmarsh and mudflats (NRW Evidence Report No 554). This next phase should refine previous mapping to identify the most suitable locations for restoration of saltmarsh, native oysters and seagrass and take account of the opportunities to deliver wider benefits (e.g. flood defence, improved water quality, blue carbon etc.). This work could include engagement with local communities and should consider biodiversity implications on existing features in those locations.

Next steps and progress: Deliver through collaboration, contract being developed, some work done in house.

How can we best restore Welsh islands to benefit seabirds?

Rat free islands are a great resource for seabirds due to the lack of predation by these invasive mammals. However, often after eradication populations of ground or burrow nesting birds do not increase due to lack of management, e.g. grazing. To increase resilience to climate change impacts, ensuring connectivity and adequate locations for these birds to breed is important. Different management techniques could be considered as an experiment to see what works best on different islands.

Next steps and progress: Seek external funding (component of a candidate project for future Nature Networks funding)

What are the flood-risk benefits provided by coastal habitats?

This work would comprise spatial (GIS) mapping to identify the locations along the coast where habitats are providing flood risk benefits. It will also identify opportunities for the use of nature-based solutions, management and restoration activities that could help to support natural flood management activities at those localities identified in the spatial mapping and provide an analysis of the feasibility and effectiveness of their implementation at localities where possible.

Next steps and progress: Evidence review completed in house and mapping and valuation contract underway.

How connected are coastal habitats along the coast and where are there gaps in connectivity?

Connectivity maps exist for sand dunes, but require a degree of refining. Connectivity maps do not exist for the other coastal margin habitats and when produced will form a valuable tool for highlighting areas where the coastal strip is narrow and/or vulnerable and where transitions between different coastal habitats occur.

Next steps and progress: Likely to be contracted out.

Where is habitat rollback occurring and what gains in habitat are there in response to coastal change?

The rollback of coastal habitats in response to climate change, sea level rise and cliff erosion is expected where conditions allow. Evidence is required to record and provide a register of where this is currently occurring, documenting habitat gains in terms of extent and condition. Evidence is also required concerning the actual change relating to climate and storm events. The requirement would be to create up to date maps (and a

methodology to keep them updated) showing locations where change is occurring due to storms / sea level rise on unconstrained coasts.

Next steps and progress: Likely to be contracted out (development of a methodology).

Where are there constraints to habitat rollback, including development and intensive agriculture?

The rollback of coastal habitats in response to climate change and sea level rise is expected where conditions allow, however, where there are hard coastal defences, other structures and land management issues, this will not be possible. Spatial evidence in relation to the physical constraints to rollback are required to provide a better understanding of where the coast is likely to be most vulnerable and to take action.

Next steps and progress: Seek external funding (component of a candidate project for future Nature Networks funding)

What upper limit of livestock stocking levels on saltmarsh is required to safeguard water quality?

Grazing of livestock on saltmarsh can lead to water quality problems when the saltmarsh is inundated by the tide and faecal matter is washed into the sea. However, actual grazing levels where numbers of livestock will cause issues are not known and there is a need to establish appropriate upper grazing levels to prevent unacceptable levels of bacterial and nutrient loading in coastal water. To enable grazing levels to be set more evidence will be required.

Next steps and progress: Seek external funding (component of a candidate project for future Nature Networks funding)

What is the sensitivity and longevity of fragile sponge species?

There is a lack of information on the sensitivity and longevity of sponges, in particular the species that make up the Section 7 fragile sponge and anthozoan communities. This includes mostly branching sponges such as *Axinella* spp. *Homaxinella* sp., *Raspailia* spp. and *Stelligera* spp. Potentially also other sponges that form large colonies such as *Pachymatisma johnstonii* and *Cliona celata*. The evidence need could be widened out to include other species that are common to the fragile sponge and anthozoan community habitat such as *Pentapora*, certain hydroids and anthozoans. Information in MarESA (Marine Evidence based Sensitivity Assessment) points to a lack of supporting information on longevity and sensitivity of sponges species, this work would help to plug that gap. A better understanding of the sensitivity and longevity of these sponge species would enable more informed decisions on the management of these species.

Next steps and progress: Combination of in house and potential collaboration

What is the source apportionment of nutrients to Welsh estuarine and coastal waters?

We need to investigate the sources and apportionment of nutrients coming into our estuaries and causing water quality failures there. Modelling is needed to identify those sources. Many of our transitional and coastal waters fail for Dissolved Inorganic Nitrogen (DIN). Any modelling would need to be able to represent diffuse and point sources, including continuous and intermittent discharges, entering these systems both direct and from the catchment. An additional part of the project would be to add aerial deposition of Nitrogen to the project to look at apportionment in the estuarine and coastal environment.

Next steps and progress: Seek external funding or collaborative working .

Can we develop a better understanding of eutrophication, specifically the relationship between nutrient inputs, algae growth and undesirable disturbance?

Our understanding of the impacts of nutrients on algae growth and undesirable disturbance is changing. Work by the Environment Agency and CEFAS is indicating nutrient ratios are important in determining community structure of phytoplankton which could have impacts on food webs. This project would look at the impact changing nutrient concentrations has on algae growth and community structure, with an aim of looking at impacts to food webs in Welsh waters.

Next steps and progress: Likely to be contracted out after scoping.

This document was last updated in December 2024.

Next update due January 2026.

For more information please contact Dr Kirsten

Ramsay: marinecoastalevidence@naturalresourceswales.gov.uk