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Guiding Marine Restoration and Enhancement in the Shetland Islands

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

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CONTENTS

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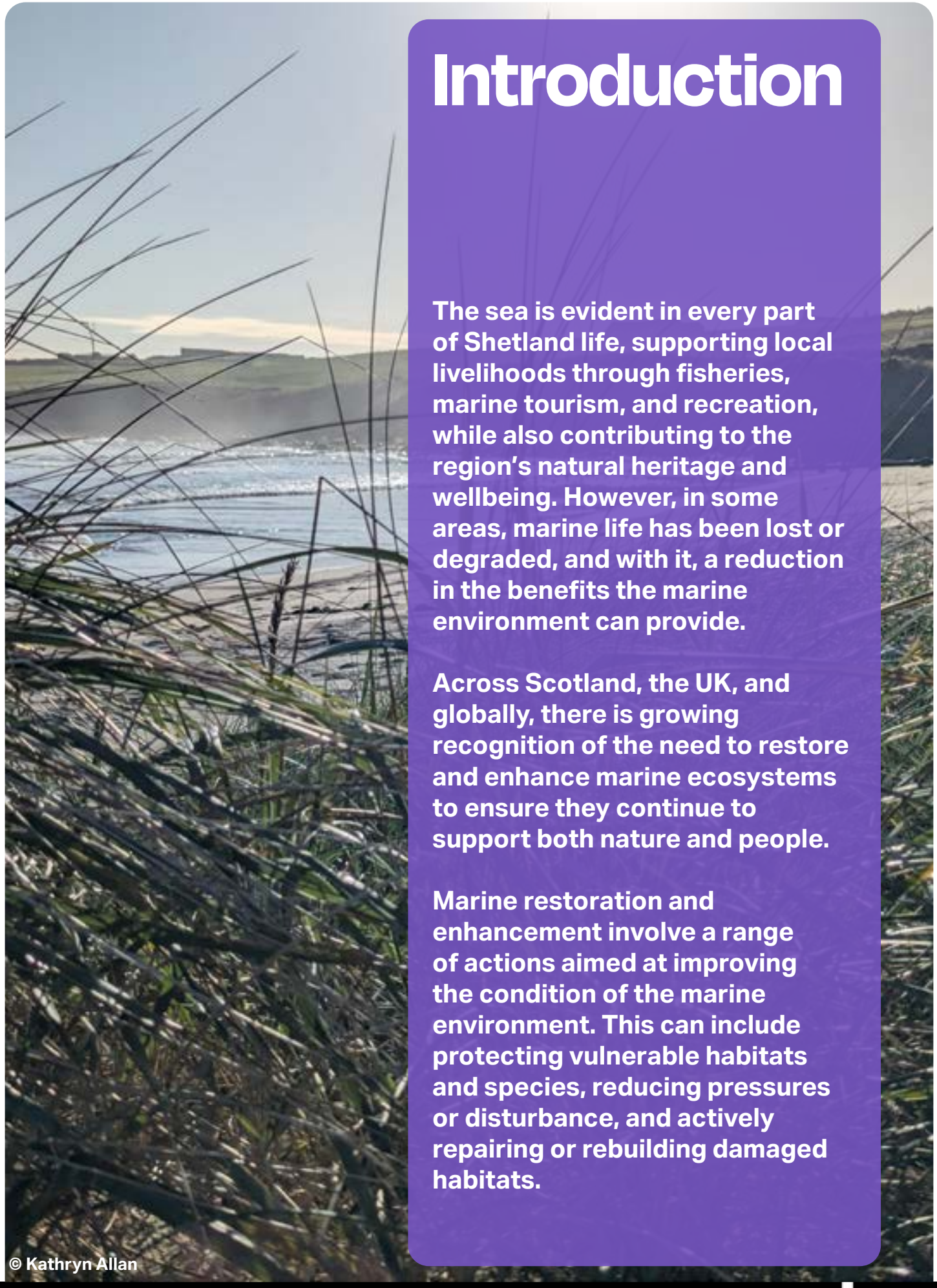

Introduction

The sea is evident in every part of Shetland life, supporting local livelihoods through fisheries, marine tourism, and recreation, while also contributing to the region's natural heritage and wellbeing. However, in some areas, marine life has been lost or degraded, and with it, a reduction in the benefits the marine environment can provide.

Across Scotland, the UK, and globally, there is growing recognition of the need to restore and enhance marine ecosystems to ensure they continue to support both nature and people.

Marine restoration and enhancement involve a range of actions aimed at improving the condition of the marine environment. This can include protecting vulnerable habitats and species, reducing pressures or disturbance, and actively repairing or rebuilding damaged habitats.

Shaped over millions of years, Shetland's unique coastal and marine environment is diverse, playing a key role in the lives of residents and visitors. It is deeply embedded in the islands' culture, economy, and way of life.

A healthy marine environment underpins Shetland's economic prosperity and social well-being. It supports industries such as fishing, aquaculture, and tourism while providing employment and recreation, sustaining local communities and its cultural value.

Shetland's waters support a rich diversity of marine life, including species of international conservation importance, from horse mussel beds to killer whales, and commercially valuable stocks such as cod, haddock, monkfish, mackerel, and herring. Within the Shetland marine region 50 priority marine features (species or habitats) are also known to occur.

Many of these are safeguarded through Shetland's extensive network of protected sites. These include 30 internationally recognised sites, 81 nationally designated sites, 49 locally recognised sites and 8 nature reserves.

This document seeks to support a range of initiatives that could be supported by various funding sources, including government, marine industry and philanthropical.

Shaped through engagement with the Shetland community and stakeholders, its development involved:

1. Initial phase – Gathering views on the key challenges and opportunities for marine restoration and enhancement in Shetland, resulting in initial identification of potential actions and proposed guiding principles [1].
2. Feedback phase – Refining guiding principles based on stakeholder and community feedback and assessing broader community agreement on the initial challenges, opportunities and potential actions identified [2].


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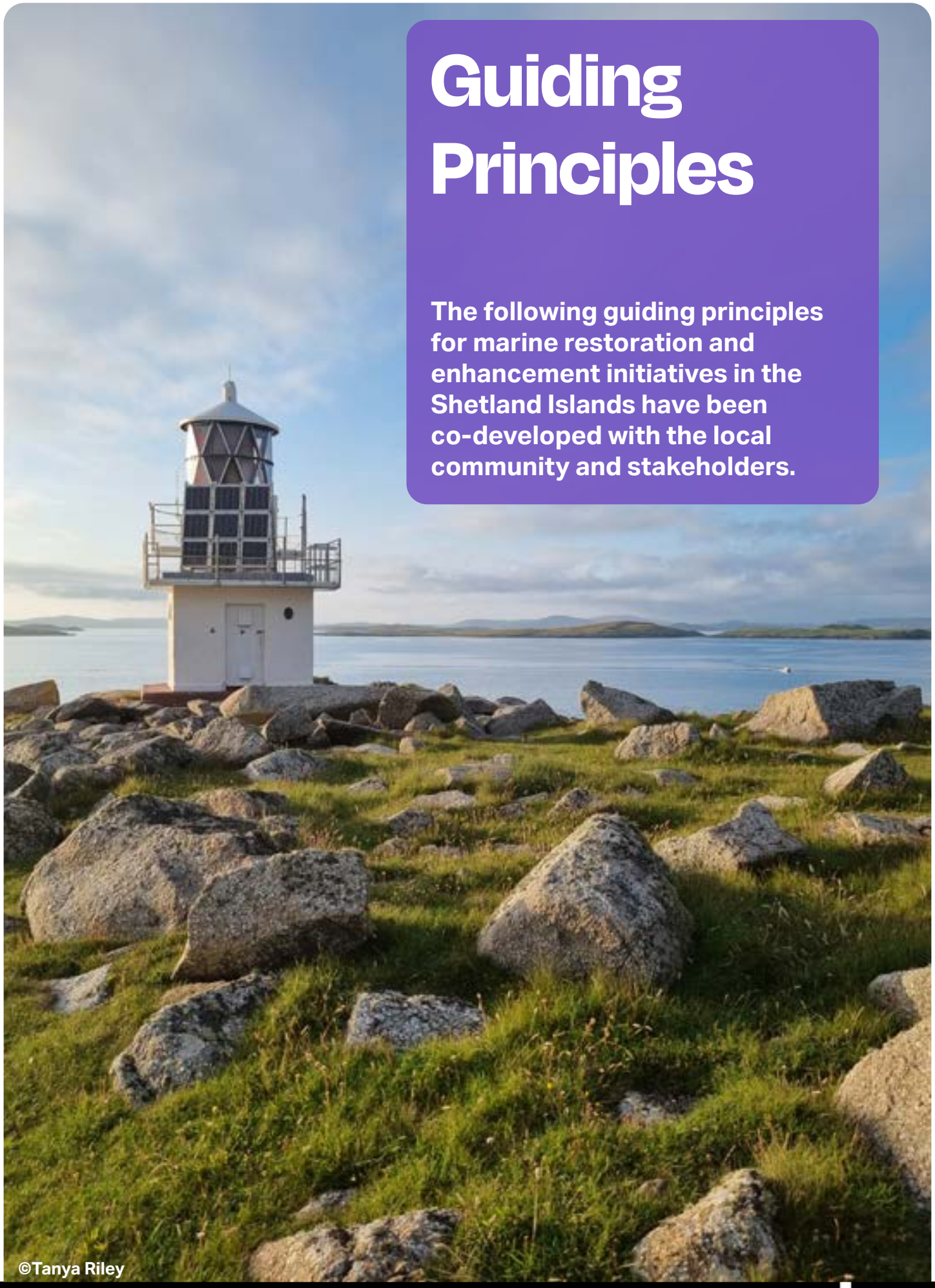
Aims

- Establish a set of **guiding principles** to support marine restoration and enhancement initiatives.
- Identify **key themes** and corresponding **potential opportunities for action** for marine restoration and enhancement.
- Showcase **case studies** of marine restoration and enhancement initiatives in Shetland's unique context.



Guiding Principles

The following guiding principles for marine restoration and enhancement initiatives in the Shetland Islands have been co-developed with the local community and stakeholders.

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Guiding Principles

Marine restoration and enhancement initiatives in the Shetland Islands should:

1. Be appropriate to Shetland's unique marine environment.
2. Recognise the value of local knowledge and robust long-term data gathering to understand natural and anthropogenic change.
3. Recognise and safeguard Shetland's rich marine cultural heritage and identity.
4. Consider the current and future needs of other marine users and activities.
5. Consider how scale and location affect the delivery of meaningful action.
6. Consider opportunities for coordinated and innovative action.
7. Engage local stakeholders at all stages through planning, delivery and monitoring.
8. Be adaptively managed to account for changing conditions.
9. Include ongoing monitoring to assess long-term effectiveness.
10. Ensure data, knowledge, and learnings are effectively shared and publicly available.
11. Where development mitigation is required, consider opportunities for investment close to the area of impact.

Marine restoration and enhancement initiatives should:

1 Be appropriate to Shetland's unique marine environment.

Shetland's coastal and marine ecosystems are shaped by unique natural influences, including the interaction of tidal systems from both the North Sea and the Atlantic Ocean. Seasonal variations range from calm, sunlit summer days to intense winter storms. Extreme changes in temperature further influence these variations, from the almost continuous daylight of Simmer Dim to the short, dimly lit days of midwinter [3].

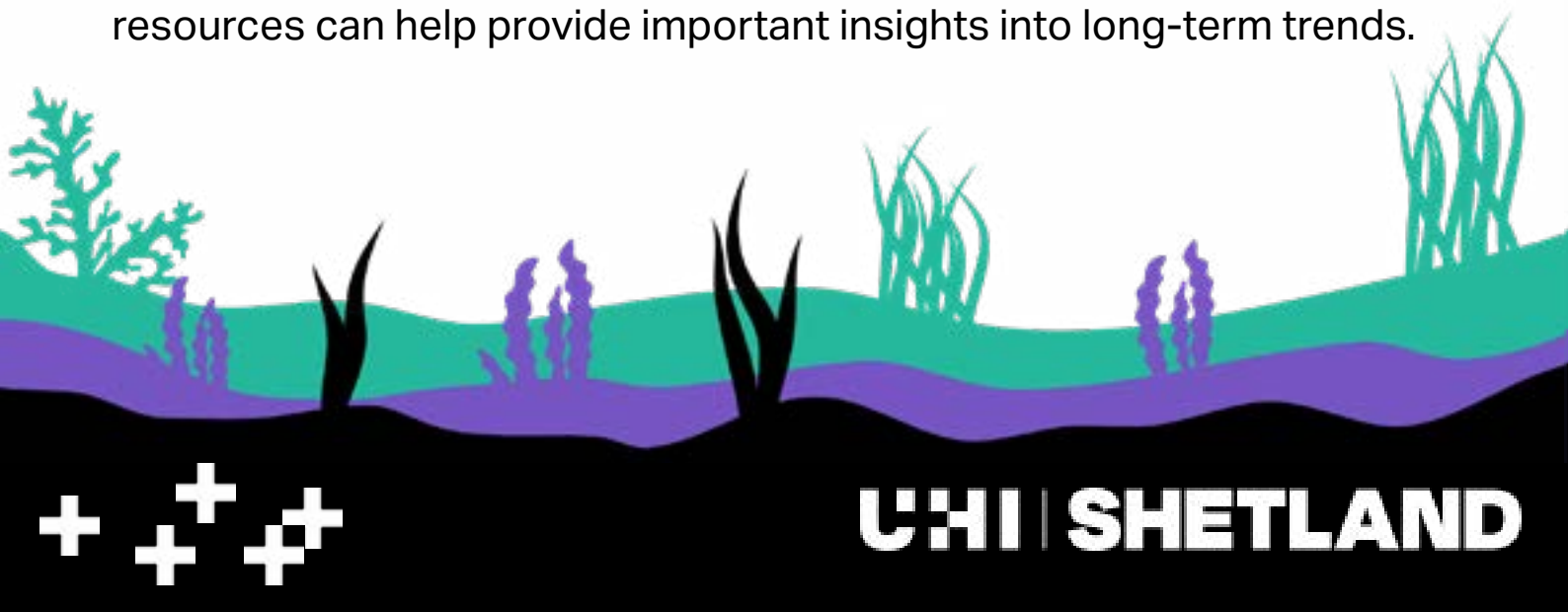
Shetland's geographical location supports a diverse array of marine and coastal species, many of which are at the southern or northern limits of their natural range. Shetland also serves as a crucial stopping point for migratory species.

Marine restoration and enhancement initiatives should:

2 Recognise the value of local knowledge and robust long-term data gathering to understand natural and anthropogenic change.

A variety of long-term locally collected marine data and monitoring records exist for Shetland. These include surveys conducted by a variety of organisations, including but not limited, to NatureScot, RSPB, SAT, SOTEAG, UHI Shetland and WDC. Surveys are conducted across a variety of differing timescales (annual to almost daily) and can range from inshore fish surveys and marine mammal observations, to records of important habitats and species.

While scientific monitoring is important, local knowledge held by marine users and communities also plays a key role in understanding changes in Shetland's marine environment over time. These combined resources can help provide important insights into long-term trends.



Marine restoration and enhancement initiatives should:

3 Recognise and safeguard Shetland's rich marine cultural heritage and identity.

Shetland's connection to the sea is deeply ingrained in its cultural heritage. Nowhere in Shetland is more than 5 km from the coast, and the islands' economy, traditions, and way of life have long been shaped by marine industries. Fishing remains a core part of island life, ranging from small-scale creel fishing to large pelagic trawlers. The aquaculture sector, which has grown rapidly since the 1970s, is now one of Shetland's key industries, producing a substantial proportion of Scotland's farmed salmon and mussels.

Through protecting biodiversity but also safeguarding cultural legacy, the marine environment can continue to support sustainable livelihoods and recreation for future generations.

Marine restoration and enhancement initiatives should:

4 Consider the current and future needs of other marine users and activities.

Shetland's waters support a wide array of economic and recreational activities, including commercial fishing, aquaculture, oil and gas, renewable energy, ferry transportation, tourism, and water sports [4]. These activities are important to Shetland's economy and culture, and should be considered within any project or proposal.

Marine restoration and enhancement initiatives should:

5 Consider how scale and location affect the delivery of meaningful action.

The scale and location of any marine restoration and enhancement activity has the potential to affect its likely success. Actions on too small a scale risk failure or may not deliver ecologically meaningful or lasting impacts. Consideration of environmental conditions are also important, with Shetland's dynamic marine environment potentially hindering success. Proximity to existing infrastructure and users is also important, and is critical to project design.

Marine restoration and enhancement initiatives should:

6 Consider opportunities for coordinated and innovative action.

The integration of marine restoration and enhancement with other projects or with broader environmental efforts to create one large-scale action, can increase its impact. Large-scale, collaborative efforts are often more effective and resource-efficient than isolated initiatives. For instance, two marine businesses or organisations could collaborate towards a single, large-scale restoration and enhancement project, pooling expertise, infrastructure, and funding to achieve a broader reach and greater ecological benefit.

Where appropriate, land-based restoration and enhancement efforts may also generate benefits for the marine environment. For example, coordinating marine initiatives with terrestrial projects, such as seabird nesting site protection or marine litter reduction strategies, can enhance the effectiveness of such efforts.

Marine restoration and enhancement initiatives should:

7 Engage local stakeholders at all stages through planning, delivery and monitoring.

Involving local communities, marine users, industry representatives, and environmental groups from the early planning stages through implementation to monitoring helps to ensure projects consider local needs and knowledge. Transparent communication and active collaboration with local stakeholders will foster good relationships and encourage long-term stewardship of the marine environment and its resources.

Marine restoration and enhancement initiatives should:

8 Be adaptively managed to account for changing conditions.

Marine ecosystems are, by nature, dynamic, but rising sea temperatures, increased storm intensity, shifting species distributions, and ocean acidification have the potential to alter local ecosystems.

Adaptive management strategies should be considered in marine restoration and enhancement initiatives to account for these dynamic conditions. By continuously monitoring environmental changes and learning from past experiences, initiatives can remain flexible and responsive to emerging challenges.

Marine restoration and enhancement initiatives should:

9 Include ongoing monitoring to assess long-term effectiveness.

Marine restoration and enhancement initiatives should consider long-term monitoring to evaluate their success and guide future actions. Ongoing data collection allows for the assessment of environmental improvements, cost-effectiveness, and potential unintended consequences. Ensuring that resources are allocated efficiently will help maintain Shetland's safe and clean marine environment for both nature and people.

Marine restoration and enhancement initiatives should:

10 Ensure data, knowledge, and learnings are effectively shared and publicly available.

Marine restoration and enhancement efforts benefit from transparency and knowledge-sharing. Data collected through monitoring should be made publicly accessible to support informed decision-making and encourage community participation. Open access to research findings fosters collaboration between scientists, policymakers, industry, and the public.

Marine restoration and enhancement initiatives should:

11 Where development mitigation is required, consider opportunities for investment close to the area of impact.

In many instances, mitigation close to the area of impact which benefit the local environment and communities, will have the greatest impact and acceptance. However, industry-driven mitigation measures should be tailored to the specific impacts being addressed and align with national guidelines to ensure their effectiveness. In some instances, this may necessitate measures which are further from the location of impact.

Key Themes

Potential opportunities for action have been characterised into five key themes highlighting areas for further exploration.

- **Access**
- **Active Restoration**
- **Communication, Education and Awareness**
- **Pressure Management**
- **Research, Innovation and Knowledge**

Rebecca Giesler © Shetland UHI

Access to Shetland's coastal and marine environments is important for both residents and visitors to appreciate and connect with nature. However, ensuring that this access is managed responsibly is key to safeguarding sensitive habitats and reducing disturbance to marine and coastal species. Responsible access should be guided by biodiversity needs, ensuring that human activity does not negatively impact the unique and fragile ecosystems of the region.

By investing in well-designed infrastructure such as boardwalks, designated viewing areas, and educational signage, access can be improved while minimising environmental harm. Successful examples of such initiatives already exist in Shetland, such as the infrastructure at Meal Beach (photo left) and Hermaness Nature Reserve (see Case Study).

Potential Opportunities for Action

- Identify potential locations where habitats and species would benefit from improved infrastructure to manage access and reduce disturbance.
- Identify opportunities to develop and enhance infrastructure such as boardwalks, viewing platforms, and designated pathways for responsible access.
- Utilise educational signage and awareness campaigns to promote responsible behaviour, inform visitors about wildlife sensitivity and seasonal breeding/nesting zones.
- Explore the potential for the development of a Shetland Coastal Path (either circular or sporadic) with guidance on best practices to enable responsible access and minimise environmental impact.

Active Restoration

Rebecca Giesler © Shetland UHI

In Shetland, opportunities for active restoration include seagrass meadows and native oyster reefs. Habitats such as these provide important ecological benefits, including carbon sequestration, improved water quality, and are important habitats for supporting other marine life. Restoring these habitats not only supports biodiversity but also enhances coastal protection and contributes to climate change mitigation.

Mia McAllister © Shetland UHI

NatureScot have also developed a Scottish seagrass restoration handbook and guidance together with the Marine Directorate of the Scottish Government and Project Seagrass. NatureScot have also developed guidance for native oyster restoration.

Potential Opportunities for Action

- Assess current extent of seagrass meadows in Shetland.
- Assess changes in Shetland's seagrass meadows over time.
- Identify potential locations for seagrass restoration.
- Engage with local communities to assist with seagrass restoration.
- Conduct community engagement to determine if and where native oyster restoration would be supported.

Communication, Education and Awareness

© Chris G Smith

Effective communication, education, and awareness are key to fostering a deeper understanding of Shetland's marine environment and the importance of its protection and sustainable management. By increasing public engagement and providing accessible, innovative educational resources, communities can play an active role in marine restoration, enhancement and protection, and sustainable marine management.

A key priority is enhancing marine education in schools, ensuring that young people continue to develop a strong connection to Shetland's marine ecosystems. Additionally, exploring innovative approaches, such as virtual reality experiences, interactive workshops, and digital tools, help bring marine conservation and management to life for a wider audience.

To ensure the success of these initiatives, community engagement will be crucial in identifying the most effective methods of support and education.

© Tanya Riley

Potential Opportunities for Action

- Engage with local communities and stakeholders to understand their needs and preferences for marine education and awareness initiatives.
- Enhance marine education in schools, supported by hands-on learning experiences.
- Collaborate with educators, industry, environmental groups, and technology providers to explore innovative educational approaches, such as virtual reality, to produce educational content tailored to Shetland's marine biodiversity.
- Improve communication around biosecurity to address potential risks to the wider environment.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Pressure Management

Noss Predator Management

The Isle of Noss has faced challenges from invasive species, particularly feral cats and rabbits, which have threatened its seabird colonies. Feral cats preyed on seabirds, leading to population declines. In response, a removal initiative began in 1987, and the last recorded sighting of a feral cat was in 1989. This successful eradication led to an observed recovery in seabird populations.

More recently, rabbits have caused habitat degradation on the island through overgrazing and soil erosion, negatively impacting ground-nesting birds and native vegetation. Unlike the successful cat eradication, rabbit control efforts have proven costly and limited in eliminating the population. Instead, mitigation efforts have been implemented, including laying chicken wire to create sand traps in 2015, 2021, and 2022 to combat erosion.

The waters around Shetland support a diverse range of marine and coastal species and habitats, providing important ecosystem services, economic benefits, and recreational opportunities. Effective pressure management is key to balancing human activities with the health of the marine environment. Pressures such as marine debris, water pollution, and invasive non-native species can negatively impact biodiversity and ecosystem resilience.

These stressors can reduce biodiversity, weaken ecosystem resilience, and threaten the long-term sustainability of marine industries. If left unaddressed, they may also disrupt food chains, alter habitat structures, and diminish the capacity of marine ecosystems to recover from environmental changes.


© Tanya Riley

To report any finfish aquaculture debris found on beaches please contact: reportdebris@salmonscotland.co.uk

Fishing For Litter - KIMO

The Fishing for Litter scheme encourages fishermen to land any litter brought up in their fishing nets and gear. Lerwick Harbour was involved in the original launch of the initiative by KIMO in 2005, the scheme has since expanded with 15 harbours now participating across Scotland, including Scalloway and Cullivoe.

Potential Opportunities for Action

- Continue to remove marine debris at sea and at the coast.
- Map the current extent of underwater marine debris.
- Remove historical marine debris on land.
- Assess chemical waste disposal needs for motorhomes/tourism, particularly on islands such as Yell and Unst.
- Assess the needs of improved cruise ship facilities.
- Continue to research and improve gear designs, such as escape gaps to reduce bycatch and seabird interaction.
- Identify areas where anti-predator fences (e.g. for polecats) could help protect breeding bird colonies.
- Implement detection and eradication initiatives of invasive land predators to protect seabird colonies and native flora.

Da Voar Redd Up

Beginning in 1987, 'Da Voar Redd Up' ('the spring clean' in Shetland dialect) is an annual community litter pick organised by the Shetland Amenity Trust held over a weekend in April/May. It is one of the most successful community clean ups in the UK covering beaches, coastlines and roadside verges in Shetland with around 20% of Shetland's population taking part [3]. From 1988 to 2024 this has equated to 114 465 volunteers and 2 010 tonnes of rubbish. Covid-19 caused a two-year gap in the event between 2020 and 2021.

Research, Innovation and Knowledge

Tanya Riley © Shetland UHI

Shetland Surveys

A variety of marine surveys are conducted in Shetland to monitor and assess its diverse ecosystems. These surveys have been conducted across varying timeframes, from annual or biennial studies, to more frequent monitoring that may occur almost daily.

These efforts involve contributions from UHI Shetland, the Shetland Oil Terminal Environmental Advisory Group, Shetand Amenity Trust, Shorewatch (Whale and Dolphin Conservation), RSPB, NatureScot and citizen science initiatives. The surveys focus on a range of species and habitats including; cetaceans, seabirds, seals, fisheries, invasive non-native species monitoring, and rocky shore ecosystems.

These efforts have, and continue to support, the sustainable management of Shetland's seas.

Baseline data, continuous monitoring, and innovative solutions are key to ensuring Shetland's marine restoration and enhancement initiatives are effective, enabling informed decision-making and management strategies.

Long-term data collection across multiple years and seasons is key for understanding natural variability, tracking trends, and assessing the health of marine species and habitats in Shetland's ecosystems.

This foundation of robust data can enable the identification of key areas where intervention may be needed, ensuring that restoration and enhancement initiatives are targeted and effective.

Tanya Riley © Shetland UHI

Invasive Non-Native Species (INNS) Monitoring

UHI Shetland has pioneered and led the establishment of one of the only long-term marine non-native species monitoring programmes in the UK. Following an initial risk assessment of vectors and INNS distribution, a comprehensive Biosecurity Plan for the Shetland Islands was developed and an annual monitoring programme initiated at eight high-risk sites, including two in Lerwick. These surveys have identified thirteen marine non-native species in Shetland, with Lerwick and Scalloway hosting the highest number of species. This research has demonstrated that once a species is introduced to Shetland, there is the potential for rapid spread to other sites.

UHI Shetland also work with the Marine Directorate to carry out surveillance surveys for high-risk INNS such as the carpet seasquirt (*Didemnum vexillume)*. High-risk species not currently in Shetland include the slipper limpet (*Crepidula fornicata*) which has recently arrived in the Moray Firth.

Effectively managing invasive species in Shetland requires a holistic approach that integrates research, education, communication, and pressure management. Long-term monitoring and biosecurity measures are key, but public awareness and stakeholder collaboration also play an important role in early detection and response.


Rebecca Giesler © Shetland UHI

Potential Opportunities for Action

- Collect high-resolution, long-term data on marine biodiversity, habitat conditions, and ecosystem changes, expanding current monitoring efforts where possible.
- Conduct research into seabed recovery rates.
- Identify and assess sites for carbon sequestration and quantify their potential capacity where possible.
- Support annual monitoring surveys.
- Investigate the impacts of climate change on Shetland's marine environment.
- Develop and promote technological and sustainable innovations in marine restoration and enhancement.

CASE STUDY

Searching for Shetland's Lost Seagrass

Project Lead: UHI Shetland

Funding: Scottish Marine Environmental Enhancement Fund (SMEEF) and Nature Restoration Fund

Aim:

- Investigate the baseline distribution of seagrass in Shetland
- Understand the potential for seagrass restoration in Shetland

Background

Seagrass is the only aquatic flowering plant species, found in shallow soft and sandy sediments in coastal areas worldwide. In Shetland, seagrass (known as *marlie* or *marlok* in Shetland dialect), used to be found in sheltered, shallow voes across the west Mainland where it was protected from the full force of the Atlantic waves. These seagrass beds are an important and diverse habitat, which help stabilise sediment, sequester carbon and provide habitat for juvenile fish. Unfortunately, most of the beds which were present in the early 1900s are now thought to have been lost from Shetland. The last surveys were conducted in the early 1990s so accurate data on the distribution of seagrass is needed to protect this important habitat and assess options for future enhancement and restoration.

Approach

Researchers at UHI Shetland collated information on historic records of seagrass around Shetland from research reports and published texts. The areas identified were then surveyed using UAVs (drones) to take aerial photographs and look for the presence of subtidal *Zostera marina* beds. Members of the community aided in confirming the size and location of suspected seagrass beds by snorkelling, paddleboarding and swimming.

Outcome

The project identified that seagrass beds have been lost from many of the areas with historic records. Remaining beds are now only found in two areas, Whiteness Voe (14 beds) and Weisdale Voe (1 bed). The total area covered by *Zostera marina* beds is 1.62 hectares, a small fraction of the historic coverage in Shetland.

The findings have led to a new UHI Shetland project 'Restoring Shetland's Marlie Meadows', funded by SMEEF as part of the Seagrass Meadows Scotland programme, which aims to plant 1.2 ha of seagrass. The project will trial transplantation of seagrass shoots and work with volunteers and local organisations to increase the abundance of seagrass habitats, monitor the condition of existing beds, and raise awareness of this vital ecosystem.

CASE STUDY

Clearance at the Loch of Strom

Project Lead: Seafood Shetland

Funding: Supported by Seafood Shetland and Salmon Scotland

Aim:

- Remove long-redundant aquaculture equipment from the Loch of Strom

West Side Clearance

In 2016, Seafood Shetland and Shetland Aquaculture recognised the need to clear redundant aquaculture equipment from the west side of the Loch of Strom, located in the Weisdale area of Shetland.

The plan followed a structured approach:

1. Identify the equipment and its location,
2. Engage suitable manpower and machinery,
3. Organise collection, uplift, and appropriate disposal.

Hunter and Morrisons Limited, a local contractor, was appointed to carry out the clearance. Their work successfully restored the area to a clean and orderly condition.

© Malakoff

© Hunter and Morrisons Limited

© Malakoff

East Side Clearance

Additional equipment still remained on the loch's east side, posing a greater logistical challenge due to limited access, requiring equipment to be floated down the loch to an accessible removal point on the west side. Progress on this phase was delayed by the Covid-19 pandemic, but with support from Salmon Scotland, a contract was awarded to Malakoff in mid-2023 to complete the removal and disposal. Work was completed in October 2023.

CASE STUDY

Hermaness Boardwalk

Project Lead: NatureScot
Project Partners: Visit Scotland & Shetland Islands Council
Funding: Natural and Cultural Heritage Fund, Rural Tourism Infrastructure Fund, and NatureScot
Aims:

- Protect sensitive peatland habitat from further erosion
- Protect nesting seabirds by re-routing visitors away from sensitive areas
- Enhance the visitor experience through new infrastructure, and increase awareness and understanding of the natural and cultural heritage

Background

Hermaness National Nature Reserve is located at the northern tip of Unst. The reserve is known for its spectacular cliff scenery, internationally important seabird populations, and rich cultural heritage.


© NatureScot

Increasing visitor numbers were causing erosion to the fragile peatland habitat and potential disturbance to nesting birds, which led to NatureScot (site manager) closing the path to the historic Muckle Flugga lighthouse signalling station.

Approach

After a meeting with stakeholders, including NatureScot, Burrafirth Common Grazings Committee, Shetland Islands Council Access Officer, and Shetland Amenity Trust Peatland Action Officer it was identified that the installation of an upgraded boardwalk would be the ideal solution. The project utilised a recycled plastic boardwalk, offering a low maintenance, non-slip, long-lasting and recyclable solution suited to the boggy environment.


© NatureScot

The project also included additional improvements; an information shelter for visitors, toilets and improved parking at the reserve entrance, enhanced trail signage to provide clear guidance for visitors.

Outcome

The project was completed successfully with nearly 2km of new boardwalk installed. The path to Muckle Flugga lighthouse was reopened, allowing visitors to enjoy a circular route around the reserve while protecting the peatland and bird nest sites. The new interpretation and signage have also enhanced the visitor experience and provided opportunities to demonstrate the threats to marine ecosystems, such as climate change.


© NatureScot

Since its opening in May 2022, the new facilities have attracted record numbers of visitors and ensuring the long-term preservation of the reserve's sensitive habitats and wildlife.

CASE STUDY

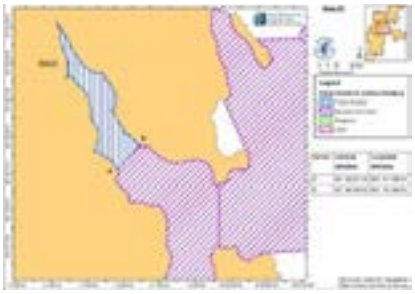
SSMO closed areas

Project Partners: Shetland Shellfish Management Organisation (SSMO) and UHI Shetland (formally NAFC Marine Centre UHI)

Aim:

- Protect sensitive inshore seabed habitats from damage by mechanical dredging by scallop fishing boats


© David Loftus/MSC




© David Loftus/MSC

The SSMO closed areas are widely distributed around Shetland, stretching from Unst in the north to Mousa in the south. The SSMO worked closely with local inshore fishermen and UHI marine scientists at UHI Shetland to identify and protect areas of seabed which supported sensitive species and habitats. The key protected species are horse mussel beds, seagrass meadows and maerl beds, all of which are sensitive to disturbance and increasingly recognised as important sources of carbon capture. These habitats also act as nursery grounds for fish and shellfish and help stabilise soft seabed sediments.

Approach

This is an example of fishermen, scientists and managers in Shetland working together proactively for the benefit of a healthy and diverse marine environment. The areas were initially closed voluntarily to scallop dredging in 2011 prior to being surveyed by UHI marine scientists. This involved multi-beam acoustic surveys and use of drop-down camera equipment to verify the spatial extent and abundance of the habitats. Once the data were assessed, the SSMO was able to refine the areas, then use its shellfish management powers delegated from the Scottish government to implement a formal ban on dredge fishing. Further surveys have taken place since 2011 when new reports of maerl and horse mussels have emerged, and these have been surveyed by UHI Shetland, and subsequently protected by the SSMO.

Outcome

As of 2025 a total of 26 closed areas were identified covering 29.9km^2 of inshore seabed. These closed areas sit among other statutory marine planning protections within the Shetland Islands Regional Marine Plan, helping safeguard against harmful man-made developments or activities. They are an extra layer of habitat protection for Shetland not widely replicated elsewhere in Scotland.

SPECIES ACTION PLAN

NORTHERN FULMAR

Local Name: Maalie

Appearance: Distinctive seabirds with stiff-winged flight, white underparts, and grey upperparts.

Feeding Behaviour: Surface feeders, skimming the water for small crustaceans, plankton, and fish. Frequently follow fishing vessels to scavenge offal and discards.

Breeding Habits: Almost exclusively coastal nesters, typically found on cliffs but can nest along dry-stone walls and in croft ruins. Mate for life, single egg/chick.

Breeding range in Shetland: Fair Isle to Unst, Foula to Out Skerries.

Population Trends:

- First recorded breeding in Shetland in 1879 in Foula, expanding to five more sites by 1890s.
- Seabird 2000 census (1998-2002) Population 190,243 Apparently Occupied Sites.
- Seabird Counts census (2015–2021) Shetland population 151,790.
- UK population: 319,508 pairs.
- Scotland holds 96.9% of the UK's Fulmar population.

Conservation Status: Amber - Scotland showed a 37% decline in the most recent census.

© Chris G Smith

Threats At Sea

Climate Change: Fulmars are vulnerable to shifts in prey distribution due to rising sea temperatures and oceanographic changes which can impact food availability, potentially influencing breeding success and survival rates.

Marine Plastics: Fulmars can ingest marine plastics, which can accumulate in their stomachs and lead to sublethal effects, including reduced nutrient absorption.

Offshore Wind Developments: The potential impacts of offshore wind farms on Fulmars remain uncertain. Potential risks include collision, displacement, and barrier effects, as well as indirect impacts on prey availability.

Bycatch: Fulmars are highly vulnerable to bycatch in fishing gear, particularly in offshore longline fisheries targeting European Hake to the north and northwest of Scotland. As many as 9,100 Fulmars are estimated to die annually as bycatch on UK-flagged vessels alone. UK breeding Fulmars are also affected by fisheries outside UK waters, such as those in the Faroe Islands, where an estimated 9,500 Fulmars are killed annually in longline fisheries. Tracking studies have shown an overlap between Scottish breeding Fulmars and Faroese fishing

zones. It is therefore also important to consider those threats outside our EEZ as well (although this is harder to quantify).


© Ian Napier

Threats On Land

Mammalian Predators: While Shetland has no native land mammals, several have been introduced, and predatory mammals such as polecat ferrets, stoat and feral cats may be impacting Fulmar breeding success, though this remains poorly documented.

White-Tailed Eagles: In other parts of Scotland, White-tailed Eagles are known to prey on Fulmars.

Threats at Sea and On Land

Highly Pathogenic Avian Influenza: Few cases recorded to date, but Fulmar have extensive foraging ranges and are largely pelagic outside the breeding season influencing the number of carcasses found.

Key Actions	
+ Promote responsible wildlife tourism and recreation guidelines to minimise human disturbance at breeding sites.	
+ Reducing marine plastic by dealing with them at source, as well as those already in the environment.	
+ Continue to conduct long-term monitoring of Fulmar population trends and breeding success in Shetland.	
+ Expand research into the impacts of marine plastics on Fulmar health at a molecular level.	
+ Study the extent and effects of mammalian predation on Shetland's breeding Fulmar colonies	
+ Assess the potential effects of offshore wind developments, including collision risks, displacement, and barrier effects on Fulmar movements.	
+ Effective monitoring of Fulmar bycatch impacts and mitigation strategies through rollout of remote electronic monitoring with cameras (REM) onboard all vessels operating in UK waters.	
+ Develop, implement and monitor mitigation measures to minimise and where possible eliminate Fulmar bycatch.	
+ Good biosecurity practices are important for this species, and eradications could be considered. Fixed links between islands may lead to more INNS on islands where they are currently absent.	

Key Contacts

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Shetland Fisherman's Association (SFA):
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info@shetlandfishermen.com

Shetland Islands Council (SIC):
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Shetland Oil Terminal Environmental Advisory Group (SOTEAG):
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Definitions

Definitions are taken from the following sources:

- CBD - Convention on Biological Diversity Glossaries
- IPBES - Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services Glossary
- NatureScot - Marine Habitat Enhancement, Recovery, Restoration and Creation in Scotland: Terminology and Examples

Active Restoration: Includes a range of human interventions aimed at influencing and accelerating natural successional processes to recover biodiversity ecosystem service provision. (IPBES)

Baseline: A minimum or starting point with which to compare other information (e.g. for comparisons between past and present or before and after an intervention). (IPBES)

Biodiversity: Short for biological diversity, the diversity of life in all its forms – the diversity of species of genetic variation within one species, and of ecosystems. (CBD)
Plants, animals and micro-organisms in a given area or volume. (IPBES)

Co-design: A participatory approach to design, in which community members are treated as equal collaborators in the design process.

Conservation: The management of human use of nature so that it may yield the greatest sustainable benefit to current generations while maintain its potential to meet the needs and aspirations of future generations. (CBD)

Ecosystem: Communities of organisms interacting with each other and with their non-living environment e.g. wetlands, lakes, rivers. (CBD – modified)

Habitat: A place or type of site where an organism or population naturally occurs. (CBD)

Habitat Enhancement: Actions that aim to improve the quality, size or geographic distribution of a habitat. (NatureScot)

Habitat Restoration: Projects entailing a high level of intervention, such as those rebuilding a habitat or reintroducing an ecosystem engineering species to assist with enhancing a habitat into a location from which it has been extirpated and where re-establishment could not occur without assistance. (NatureScot)

Local: Within a short distance of an identified locality (IPBES)

Marine and coastal species: any plant or animal (or other organism) that spends any portion of its life cycle in the sea or ocean. This includes organisms that live permanently in the ocean, as well as those that may migrate or use the sea for certain stages of their life, like breeding or feeding.

Marine Debris/Industrial Waste: Any solid material that is disposed of (accidentally or intentionally) into the marine environment. (Scottish Government - modified)

Passive Restoration: Includes reliance primarily on natural process of ecological succession to restore degraded ecosystems but may include measures to protect a site from processes that currently prevent natural recovery (e.g. protection of degraded forests from overgrazing by livestock or unintentional human-induced fire). (IPBES)

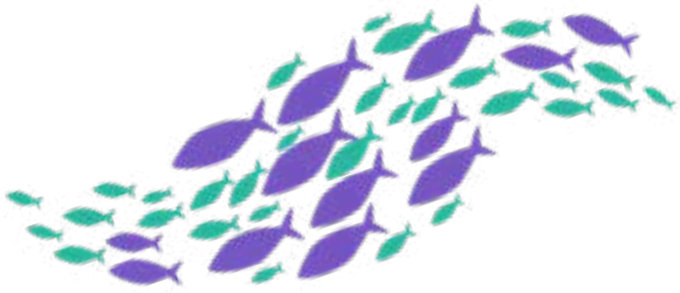
Resilience: The capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks. (IPBES)

Restoration: The process of assisting the recovery of an ecosystem towards or to good condition, as a means of conserving and/ or enhancing biodiversity and ecosystem resilience; for habitat types listed in Annexes I and II, restoration means the process of assisting their recovery to the highest level of condition attainable. (EU – proposed)

Restoration Measure: Any measure assisting ecosystem recovery actively or passively towards or to good condition an enhancing biodiversity, including measures taken for the improvement of the condition of an ecosystem or for the re-establishment of natural and semi-natural ecosystems, as well as measures to improve the connectivity of natural and semi-natural ecosystems, and to enhance species populations. (EU – proposed)

Rewilding: The restoring processes and functions in very large, landscape/ ecosystem scale projects. Scientifically and scale wise, marine habitat enhancement is at too small a scale currently for this term to be applied. (NatureScot)

Species: A group of organisms capable of interbreeding freely with each other but not with members of other species. (CBD)



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