

Manx Marine Environmental Assessment
Ecology/ Biodiversity

**Marine and coastal
conservation**



Ramsey Bay Marine Nature Reserve looking south. Photo: J Cubbon.

MMEA Chapter 3.7

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Manx Marine Environmental Assessment

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Marine and Coastal Conservation

Summary

Marine biodiversity is an important resource to the Isle of Man, providing a wide range of services and making an important contribution to the biodiversity of the wider Irish Sea.

Over 2300 marine animal species had been recorded in the Isle of Man up to 1963 (Bruce *et al.* 1963) and many more have been recorded since. At least 225 species of algae have been recorded in Manx waters. A full, up to date marine species list has not been compiled for the Isle of Man but should soon be possible.

The Department and Environment, Food and Agriculture is responsible for nature conservation designations in the Isle of Man. Manx Natural Heritage also play an important central role in island conservation. The work of these government entities is supported by a number of active conservation Non-Governmental Organisations (NGOs).

Marine Nature Reserves (MNRs) can be designated for subtidal sites and can also include intertidal areas (up to highest astronomical tide mark). Ramsey Bay Marine Nature Reserve was the Isle of Man's first MNR and was designated in 2011. Approximately 10.8% of Manx territorial waters are now designated as Marine Nature Reserve, as part of the network of marine protected areas, which also include areas used for fisheries closures, both temporary and longer term.

The EU Habitats Directive does not extend to the Isle of Man, but the Isle of Man is signed up (via the UK) to a number of Conventions identifying priority species and habitats for conservation, including:

- The OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic,
- The Bonn Convention on the Conservation of Migratory Species of Wild Animals
- Convention on the International Trade in Endangered Species of Flora and Fauna,
- The Bern Convention on the Conservation of European Wildlife and Natural Habitats,
- The Ramsar Convention on Wetlands of International Importance,
- The Rio Convention on Biological Diversity,
- The Washington Convention on the International Trade in Endangered Species of Flora and Fauna (CITES).

Marine Nature Reserves (MNRs) are the main conservation designation available for subtidal sites, and designated under the Wildlife Act 1990. For example, a range of conservation priority habitats are protected within Ramsey Bay MNR, including horse mussel reef, eelgrass meadows and maerl beds. Other priority species and habitats including kelp forest, areas of eelgrass and the Iceland clam, *Arctica islandica*, are protected within other MNRs.

However, some important areas of subtidal habitat of conservation priority are not currently protected, such as offshore mud/soft sediment habitats. It is therefore essential that appropriate reference is made to existing habitat data, or that specific habitat survey work is carried out as part of the Environmental Impact Assessment for offshore developments.

Areas of Special Scientific Interest are the most widely used terrestrial conservation designation and can include intertidal areas (down to the lowest astronomical tide mark). A significant proportion of Manx intertidal habitats are now designated as Areas of Special Scientific Interest (see map below). A range of other statutory and voluntary site designations are possible for coastal areas and these are presented in this chapter.

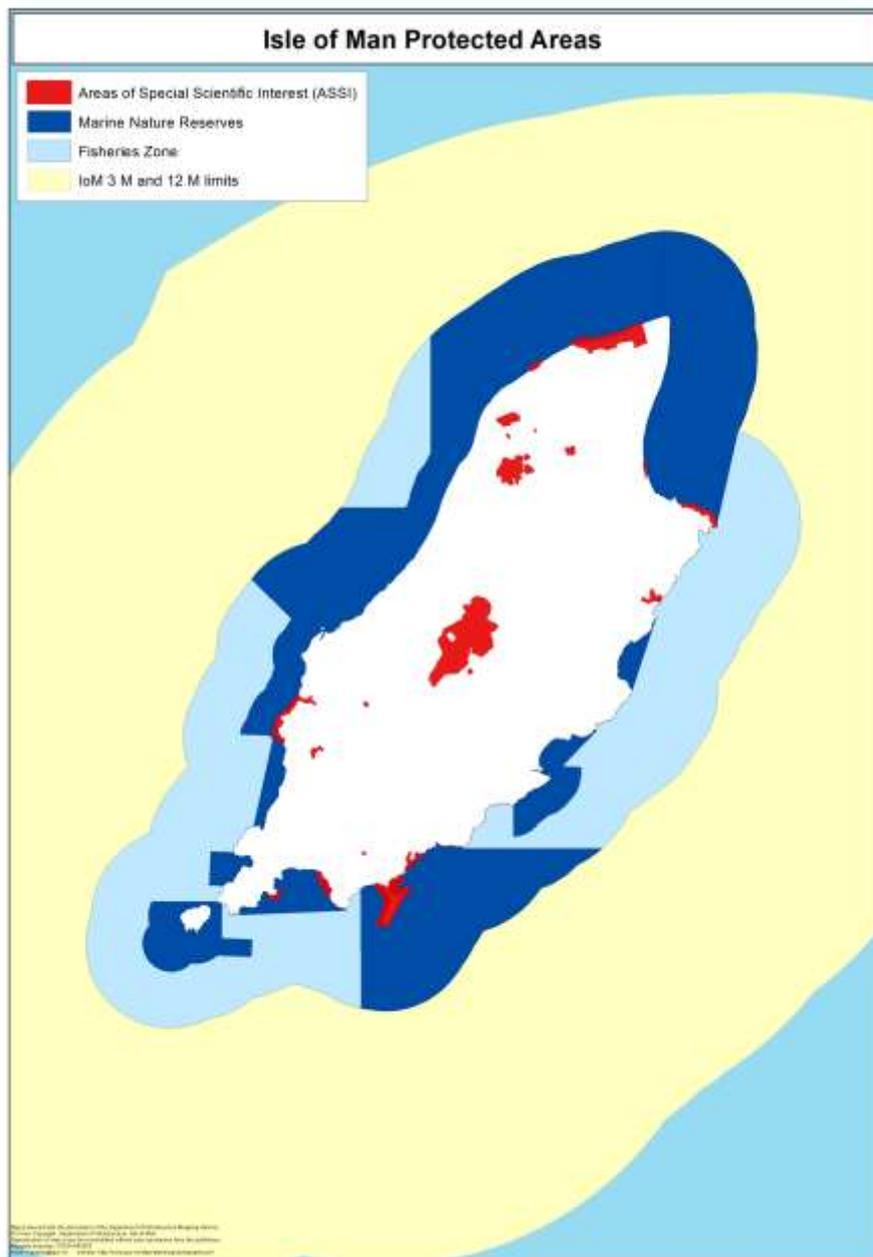


Figure 1. Map showing Isle of Man Marine Protected Areas, both terrestrial and marine.

The Isle of Man achieved UNESCO Biosphere status in 2016 and is the first entire jurisdiction to receive this status. Biosphere Reserves are areas where culture, nature and people work together to ensure biodiversity and sustainability. Within biosphere reserves, core areas are those important conservation areas that are already under statutory protection, such as marine nature reserves.

DEFA and DoI (Harbours) have roles and responsibilities in the assessment and management processes involved in marine invasive species, and have developed a Marine Biosecurity Plan for Manx waters, with an associated implementation strategy. Marine invasive species are monitored in Manx waters to a limited extent, mainly by volunteers, students and an arrangement with the Manx Wildlife Trust, although a more formal process will be introduced as a result of the Marine Biosecurity Plan.

Wireweed (*Sargassum muticum*) became established in Manx waters in 2005 and has since become widespread. The Pacific oyster (*Crassostrea gigas*) was first recorded in Manx waters in 2005 and has become established on Ramsey Piers, although a removal process has been completed, while Darwin's barnacle (*Elminius modestus*) has been recorded there since the mid-1950s. The carpet seasquirt (*Didemnum vexillum*) and the slipper limpet (*Crepidula fornicata*) have not yet been recorded in Manx waters.

Baseline

The Isle of Man has a great diversity of marine and coastal habitats and high biodiversity in terms of species and ecosystems. Some aspects of Manx marine biodiversity are extremely well studied, mainly as a result of research carried out at Port Erin Marine Laboratory for over 114 years. The intertidal species and habitats of the south of the Isle of Man were particularly well studied in the past. Other aspects remain less well understood, particularly subtidal habitats, with the exception of the southern coast and the Calf, and the inshore environment. This chapter gives a brief overview of Manx marine biodiversity (aspects of subtidal ecology, coastal habitats and protected marine species are covered in dedicated chapters) and marine and coastal conservation in the Isle of Man.

Statutory marine and coastal conservation in the Isle of Man is the responsibility of the Department and Environment, Food and Agriculture (DEFA) of the Isle of Man Government. The main legislation available for protected species and habitats is the Wildlife Act 1990 and the Fisheries Act 2012.

The Wildlife Act provides for the conservation of marine and coastal habitats through site protection and species protection; whilst the Fisheries Act is designed to conserve the marine and freshwater fish, and shellfish populations of the Isle of Man.

The main coastal site designation in use is the Area of Special Scientific Interest (ASSI) which can extend to the lowest astronomical tide mark. The main subtidal conservation designation in use is the Marine Nature Reserve.

Species protection is offered to a range of marine and coastal plants and animals.

The Isle of Man is also signatory to a number of international Conventions with obligations and guidance on the protection and management of other priority species and habitats.

Manx National Heritage also plays an important role in conservation, supporting biological recording and informing the public, for example through the Natural History Gallery in the Manx Museum and collections of marine specimens and historic and scientific resources. Government agencies are supported in conservation action and research by a wide range of Non-Governmental Organisations, including the Manx Wildlife Trust, Manx Birdlife, Manx Whale and Dolphin Watch, Seasearch IoM and many others.

Garrad (1990) produced a comprehensive overview of the development of Manx conservation and the organisations involved which will be useful for those interested in the history of Manx conservation prior to 1972. The Manx Museum and National Trust and the Manx Nature Conservation Trust (now the Manx Wildlife Trust) played important roles in the development of conservation in the Isle of Man.

Wildlife Committee

The Wildlife Committee of the Department of Environment, Food and Agriculture is a statutory body and has a duty under the Wildlife Act 1990 to advise the Department on the administration of the Wildlife Act and in connection with the protection of birds or other animals or plants.

Plans to designate protected areas are submitted to the Wildlife Committee, and recommended by it. The Wildlife Committee is made up of senior officers in the Department of Environment, Food and Agriculture and conservation specialists from DEFA and other organisations. Scientists and other experts may also be co-opted to consider particular issues.

Manx Nature Conservation Forum

The Manx Nature Conservation Forum was formally launched in 2009. The Forum is chaired by a DEFA Political Member and meets at least twice a year, and as required. The purpose of the Forum is outlined in the Terms of Reference, agreed in 2009:

1. A regular opportunity for dialogue between DEFA and other organisations
2. An opportunity to promote partnerships between Government and Non-Government Organisations and to extend joint working
3. A focus for the promotion and publicity of biodiversity conservation

4. Encouraging the dissemination of scientific information and conservation research, for the assessment of the conservation status of Manx species and habitats, setting targets and monitoring progress.

The meetings are typically attended by relevant DEFA Officers and the following conservation NGOs and countryside users' groups have been invited to be members of the Conservation Forum and are regularly represented at the meetings:

- Beach Buddies
- Friends of the Curraghs Wildlife Park
- IOM Beekeepers Federation
- IOM Farming and Wildlife Advisory Group
- IOM Friends of the Earth
- IOM Fungus Group
- IOM Natural History and Antiquarian Society
- IOM Woodland Trust
- Mammal Society
- Manx Basking Shark Watch
- Manx Bat Group
- Manx Biological Recording Partnership
- Manx BirdLife
- Manx Butterfly Conservation
- Manx Chough Project
- Manx Fish Producers' Organisation
- Manx Footpaths Conservation Group
- Manx Game Preservation Society
- Manx Hedgehog Conservation Society
- Culture Vannin (previously Manx Heritage Foundation)
- Manx National Farmers Union
- Manx National Heritage
- Manx Ornithological Society
- Manx Sea Matters
- Manx Society for the Prevention of Cruelty to Animals
- Manx Whale and Dolphin Watch
- Manx Wildlife Trust
- Native Oak Group
- Seasearch
- Society for the Preservation of the Manx Countryside and Environment
- Wildflowers of Mann Project a Government Partnership Project operated by Manx Wildlife Trust
- University of the Third Age

For more information about the Manx Nature Conservation Forum see:

<https://www.gov.im/about-the-government/departments/environment-food-and-agriculture/ecosystem-policy-and-energy/wildlife-biodiversity-and-protected-sites/manx-nature-conservation-forum/>

Manx Biodiversity Strategy

The Convention on Biological Diversity (CBD) was extended to the Isle of Man in August 2012. In preparation for this, in 2011, DEFA began working with partner organisations to develop a Manx Biodiversity Strategy which was completed in draft form for public consultation in 2013. The final version 'Managing our Natural Wealth: The Isle of Man's first Biodiversity Strategy 2015-2025' was approved by Tynwald in October 2015 and has now been accepted. Biological Action Plans and Habitat Action Plans, along with other targets, are now being progressed.

<https://www.gov.im/media/1346374/biodiversity-strategy-2015-final-version.pdf>

International Agreements and Conventions

The Isle of Man is signatory to a number of international conservation conventions. Since 1950, such conventions have not been automatically applied to the Isle of Man, as a UK Crown Dependency, but have required the Isle of Man to decide whether they wish the convention to be extended to the jurisdiction.

The following Multinational Environmental Agreements (MEAs) on nature conservation have been extended to the Isle of Man by the UK:

- Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention) and the following agreements under the CMS:
 - Agreement on the Conservation of African-Eurasian Migratory Waterbirds
 - Agreement on the Conservation of Populations of European Bats
 - Agreement on the Conservation of Albatrosses and Petrels
 - Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas ASCOBANS
 - Memorandum of Understanding on Migratory Shark Species (Bonn) (applies to basking shark, porbeagle and spurdog). For more information about this:
 - http://www.cms.int/species/sharks/sharks_bkrd.htm
 - Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (agreed and awaiting ratification).
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)
- Convention on Wetlands of International Importance (Ramsar Convention)

- Convention on the International Trade in Endangered Species of Flora and Fauna (CITES)
- Convention for the Protection of the Marine Environment of the North East Atlantic (OSPAR)
- Convention on Biological Diversity (CBD or Rio convention, extended to the Isle of Man in August 2012)

The Isle of Man is not a member of the European Union and is not subject to the EU Habitats or Birds Directives. However, other conventions which do apply to the Isle of Man such as OSPAR, the CMS and the CBD require good marine habitat protection. Brexit negotiations between the UK and the EU have the potential to affect the international legislative environment in the Isle of Man in the future.

Marine Biodiversity

Despite many decades of marine research in Manx waters, we cannot currently give a total number of marine species recorded in the Isle of Man. At the time of the publication of the Fauna of the Isle of Man (Bruce *et al.* 1963) over 2300 marine animals had been recorded. In addition to this, 224 species of seaweed had been recorded at the time of the publication of the most recent Seaweed Atlas for the British Isles (Hardy and Guiry 2003), 128 red seaweeds, 69 brown seaweeds and 26 green seaweeds. In 2005 an additional species of brown seaweed, the invasive wireweed (*Sargassum muticum*) was first recorded and has since become established, bringing the total number of species formally recorded to 70 brown seaweeds and 225 species in total (see Appendix 1 for seaweed species recorded in Manx waters). Some sites have been particularly well studied. For example, in dive surveys up to 1993 a total of 449 species of marine animals and plants had been recorded around the Calf of Man (Morrow *et al.* 1993) and more species will have been recorded from the site since then. Between 1946 and 1950 Jones (1951) carried out 134 grab samples and 111 hauls within 15 miles of Port St Mary and identified more than 527 species, 75 of which were new species records. Just 10 grab samples in Ramsey Marine Nature Reserve in 2011 resulted in 260 different species being identified (Kennington 2011). Whist Holt *et al.* (1998) identified around 270 species from the Horse mussel reef within Ramsey Bay MNR. In 2013 diver-collected samples from Little Ness horse mussel reef were found to contain 296 different species, identified by experts, and making it one of the most biodiverse reef in European waters.

There has been recent progress in marine biological surveys, with benthic surveys carried out by Bangor University, new work by DEFA, including Masters student thesis projects from several UK Universities and dive surveys by Seasearch Isle of Man. In June 2015, the Porcupine Marine Natural History Society visited as part of a Seasearch dive week, 4 new species of nudibranchs were identified bringing the total recorded number of species to 76, plus an additional 15 unidentified species of *Doto* and *Dendronotus* (Bullimore 2015).

Progress in biological recording, led by the Marine Biological Recording Partnership, is helping to facilitate better marine recording and dissemination of marine survey data. It is hoped that this will eventually provide a complete species list for Manx waters, including rare, threatened and declining species. The latest development within the partnership is the creation of an Isle of Man Atlas, as part of the national NBN Gateway. This will provide better access and data recording in the future. This resource continues to be augmented.

The Subtidal Ecology Chapter (MMEA Chapter 3.3) gives a detailed account of our current knowledge of Manx marine habitats and some information on historical recording. Information about cetacean and bird diversity is also presented in the relevant chapters.



Hotspots of biodiversity – a horse mussel reef (Little Ness) in Manx waters encrusted with other species including a spider crab, numerous sponges, starfish, hydroids and bryozoans. Photo: Caroline and Phil Roriston.

Rare, threatened and declining species

More work is required to develop understanding of rare, threatened and declining species in Manx waters. In some cases, information now exists which requires further analysis. For other species groups, more baseline survey work is required.

Sanderson (1996) lists 16 seabed species in Manx waters which are classified as Nationally Rare* and Scarce in the UK and gives the reference for the species:

- The sponges *Stellata grubii*, *Stryphus ponderusus**, *Tethyspira spinosa*, *Stylostichon dives*, *Plocamilla coriacea* (see Ackers et al 1992).

- The soft coral *Parerythropodium coralloides* and the anemones *Isozanthus sulcatus*, *Halcampoides elongatus*, *Mesacmaea mitchellii* and *Edwardsia timida* (Manuel 1988).
- The sea snail *Jordaniella truncatula** (Graham 1988), now known as *Chrysallida truncatula*.
- The sea slugs *Trapania pallida* and *Aeolidiella sanguinea** (Picton & Morrow 1994).
- The bryozoan *Hincksina flustroides** (Hayward and Ryland 1990).
- The sea squirt *Molgula oculata* (Hayward and Ryland 1990).
- The seaweeds *Callophyllis cristata* (Irvine 1983) and *Cruoria cruoriaeformis* (Maggs and Guiry 1989).

All of the species above were identified around the south west of the Isle of Man.

The rare anemone *Edwardsia timida* was recorded from a number of new sites during the 2008 benthic survey in Manx waters (see Hinz *et al.* 2010 and MMEA Chapter 3.3 'Subtidal Ecology').

Many other species lists and resources exist linked to rare species in Manx waters. For example, a field report by Killeen (1995) in the Porcupine Society Newsletter lists 101 mollusc species identified from one day of sampling around the south west of the Isle of Man, including the sea snail *Jordaniella truncatula*.

The OSPAR lists of Threatened or Declining Habitats and Species is a useful starting point to assess the status of threatened and declining species in Manx waters. Table 1 below gives an initial assessment of the status of some of the OSPAR Threatened and Declining Habitats in Manx waters. Table 2 gives an initial assessment of the status of some of the OSPAR Threatened or Declining Species in Manx waters.

More research and analysis of existing data would enable us to provide full assessments of each of the habitats. For information, the Isle of Man is in OSPAR Region III, the Celtic Seas (an area bounded by, on the east, longitude 5°W and the west coast of Great Britain and on the west by the 200 metre isobath (depth contour) to the west of 6°W along the west coasts of Scotland and Ireland).



A daisy anemone (*Cereus pedunculatus*) in maerl beds in Ramsey Bay Marine Nature Reserve. Maerl is an OSPAR listed 'Threatened or Declining Habitat'. Photo: J. Self, Seasearch Isle of Man.

Table 1: Manx occurrences of OSPAR Threatened or Declining Habitats (adapted and updated from a table in Tomlinson (2008)).

DESCRIPTION OF HABITATS	OSPAR Regions where habitat occurs	OSPAR Regions where habitats are under threat and/or in decline	Isle of Man details
Deep-sea sponge aggregations	I, III, IV, V	All where they occur	Not known to occur in Manx waters
Intertidal Mudflats	I, II, III, IV	All where they occur	Very little in IOM – mainly in and around harbours. For example in Ramsey Harbour. Also found at Derbyhaven and Cornaa. Significant area lost from Peel Harbour due to marina development.
Maerl beds (calcareous algal communities)	All	III	Occur in a few locations around the Island: North Ramsey Bay (Veale et al 1998), off Langness and Douglas (divers/anecdotal). See Subtidal Ecology Chapter.
<i>Modiolus modiolus</i> beds (horse mussel reefs)	All	All where they occur	Reef habitats known to occur in at least 4 locations around the Island: Ballacash Channel, Little Ness (south of Douglas), off Langness and off Jurby. See Subtidal Ecology Chapter. In Bruce et al (1963) "Fairly common on all coarse grounds round the S. of the island, 6-33 fms., and very abundant, forming large masses on the bottom, in a narrow belt extending eastwards from about 4 mi S. of

			Spanish Head, 20-33 fms. (Often containing <i>Pinnotheres</i> spp. [peacrabs]).
Intertidal <i>Mytilus edulis</i> (blue/edible mussels) beds on mixed and sandy sediments	II, III	All where they occur	Blue mussels occur at several intertidal locations around the Island, e.g. Fenella Beach, Niarbyl, Peel and on the Queen’s Pier, Ramsey. Reported subtidally from Ramsey Bay (Veale et al 1998) and Chicken Rock. In Bruce et al. (1963): “Not common in the S. of the Island; on the rocks below the old Biological Station, outside Bradda Head, and at the Sloc. Poyllvaish. In the North, very abundant and well-grown on the Queen’s Pier, Ramsey, where they often contain <i>Pinnotheres</i> spp. [pea crabs]”
<i>Ostrea edulis</i> beds (native oyster beds)	II, III, IV	All where they occur	There are historical records of oyster beds in Manx waters. Live specimens rarely recorded now in Manx waters. In Bruce et al. (1963): “present in small numbers all round the island, and formerly abundant on banks round the north, especially off Maughold Head, 1939.”
<i>Sabellaria spinulosa</i> reefs (Ross worm reefs)	All	II, III	Recorded in the extreme south of Manx waters but uncertain if reef forming. See Subtidal Ecology Chapter and Hinz et al (2010). In Bruce et al (1963): “On empty shells and shell-gravel, 25 fms., on <i>Modiolus</i> beds S. of Port St. Mary and elsewhere; on rocks and stones at LW, Port Erin and Fleshwick [Fauna, 1937].
Sea-pen and burrowing megafauna communities	I, II, III, IV	II, III	The slender sea pen <i>Virgularia mirabilis</i> was recorded from 7 miles west of Peel in 1896 (Bruce et al 1963). There are muddy habitats/ <i>Nephrops</i> fishing grounds west of Peel with burrowing communities. More information in Hinz et al (2010) and White (2011).
<i>Zostera marina</i> (eelgrass) beds	I, II, III, IV	All where they occur	Eelgrass beds currently known from Langness (Fort Island) Gully, south-west corner of Ramsey Bay, Garwick (Laxey Bay) and Gansey Point. Historical records from Port Erin Bay. See Subtidal Ecology Chapter for more information.

Table 2: Manx occurrences of OSPAR Threatened or Declining Species (adapted and updated from Tomlinson (2008)).

Species	OSPAR Regions where the species occurs	OSPAR Regions where the species is threatened or declining	Isle of Man details
INVERTEBRATES			
<i>Arctica islandica</i> (Linnæus, 1767) Iceland or Arctic clam, or ocean quahog	I, II, III, IV	II	Listed in Bruce <i>et al.</i> 1963 as <i>Cyprina islandica</i> (L.) Present in Manx waters. Best known site off Laxey Bay but also found at many sites around the Isle of Man (see Butler 2009 and Subtidal Chapter)
<i>Nucella lapillus</i> (Linnæus, 1758) Dog whelk	All	II, III, IV	From Bruce <i>et al.</i> 1963: "Extremely abundant on rocks everywhere between tide-marks, usually feeding on <i>Balanus balanoides</i> . Breeding throughout the year." Localised declines have been recorded around harbours in the Isle of Man (Howe 2010). See Marine Pollution Chapter.
<i>Ostrea edulis</i> (Linnæus, 1758) Native oyster	I, II, III, IV	II	From Bruce <i>et al.</i> 1963 "present in small numbers all around the Island, and formerly abundant on banks round the north, especially off Maughold Head, 1939". Few recent records.
FISH			
<i>Acipenser sturio</i> (Linnæus, 1758) Sturgeon	II, IV	All where it occurs	Occasionally recorded. "Single specimens at very long intervals from commercial trawlers." Bruce <i>et al.</i> 1963. Presumed extinct in Manx waters?
* <i>Alosa alosa</i> (Linnæus, 1758) Allis shad	II, III, IV	All where it occurs	Occasionally recorded. "Single specimens in herring nets off Peel, 1933-1948 and one in prawn nets off Port Erin 1960." Bruce <i>et al.</i> 1963.
<i>Anguilla anguilla</i> European eel	I,II,III,IV	All where it occurs	Recent surveys carried out on European eels in Manx rivers (2007 and 2010). "In many streams; elvers in spring; young pigmented specimens in estuaries at all seasons. In shore-pools, and freshwater runnels on the beach". Bruce <i>et al.</i> (1963).
<i>Centroscymnus coelolepis</i> Portuguese dogfish	All	All where it occurs	No catches recorded in Irish Sea waters (AFBI 2009).
<i>Centrophorus squamosus</i> Leafscale gulper shark	All	All where it occurs	Status in Manx waters unknown

* <i>Cetorhinus maximus</i> (Gunnerus, 1763) Basking shark	All	All where it occurs	Frequently recorded in Manx waters in summer, albeit numbers have been lower over the last few years. See Basking Shark Chapter. One of the species on the Convention on Migratory Species Memorandum of Understanding on Migratory Sharks.
* <i>Dipturus batis</i> (Linnæus, 1758) (synonym: <i>Raja batis</i>) Common skate	All	All where it occurs	Recorded occasionally, including a record from 2018. "Not uncommon in trawl catches." Bruce <i>et al.</i> 1963.
* <i>Raja montagui</i> (Fowler, 1910) Spotted ray	II, III, IV, V	All where it occurs	Current status unknown. "Common in trawl catches." Bruce <i>et al.</i> 1963.
* <i>Gadus morhua</i> (Linnæus, 1758)– Atlantic cod	All	II, III	No longer common in Manx waters. Approx. 1 tonne per year landed commercially "Common in trawl catches." Bruce <i>et al.</i> 1963.
<i>Hippocampus guttulatus</i> (Cuvier, 1820) Long-snouted seahorse	II, III, IV, V	All where it occurs	No formal records in Bruce <i>et al.</i> 1963 but some anecdotal historical records of seahorses from public.
<i>Hippocampus hippocampus</i> Short-snouted seahorse	II, III, IV, V	All where it occurs	No formal records in Bruce <i>et al.</i> 1963 but some anecdotal historical records of seahorses from public.
<i>Lamna nasus</i> Porbeagle	All	All where it occurs	Occasionally reported from Manx waters. No longer commercially targeted. Listed species on the Convention on Migratory Species Memorandum of Understanding on Migratory Sharks. "Single specimens in summer, at long intervals, off W and S coasts." Bruce <i>et al.</i> 1963.
<i>Petromyzon marinus</i> (Linnæus, 1758) Sea lamprey	I, II, III, IV	All where it occurs	One recorded attached to mackerel in 2005. Lamprey are common on basking sharks in Manx waters but the species hasn't been confirmed. "One 1919, one in herring nets off Niarbyl, 1955." Bruce <i>et al.</i> 1963.
<i>Raja clavata</i> Thornback ray	I,II,III,IV,V	II	Occasionally caught as bycatch in queen scallop fishery (Duncan 2009). "Common in trawl catches." Bruce <i>et al.</i> 1963.
<i>Rostroraja alba</i> White skate	II,III,IV	All where it occurs	"Formerly taken in local target fisheries in the western Channel and Irish Sea (Isle of Man). Now extirpated from the Irish Sea." OSPAR Commission (2010).
* <i>Salmo salar</i> (Linnæus, 1758) Salmon	I, II, III, IV	All where it occurs	Salmon populations in Manx rivers are regularly monitored by DEFA Inland Fisheries staff. Main salmon rivers the Ned, the Douglas and the Sulby. 'Runs up the Sulby, Santon and Douglas rivers in autumn, net fishery Ramsey Bay and occasional fish netted in all bays of the island." Bruce <i>et al.</i> 1963.

<i>Squalus acanthias</i> Northeast Atlantic spurdog	All	All where it occurs	No longer taken commercially in Manx waters. Small numbers taken as bycatch in queen scallop fishery (Duncan 2009). One of the species on the Convention on Migratory Species Memorandum of Understanding on Migratory Sharks. "Common; occasionally taken in very large numbers by trawl or in herring nets." Bruce <i>et al.</i> (1963)
<i>Squatina squatina</i> Angel shark	II,III,IV	All where it occurs	Current status in Manx waters unknown. Last record 20 th March 2015 when an angler (Grant Lopes) caught one off SE Douglas. "Single specimens at long intervals in trawl catches." Bruce <i>et al.</i> 1963.
REPTILES			
<i>Dermochelys coriacea</i> (Vandelli, 1761). Leatherback turtle	All	All where it occurs	Between 2001 and 2016, 17 leatherback turtles were recorded in Manx waters and an additional 4 unidentified turtles. See Sea Turtles Chapter.
MAMMALS			
<i>Balaenoptera musculus</i> (Linnæus, 1758) Blue whale	All	All where it occurs	Not known to occur in Manx waters (but have been recorded from Irish waters)
<i>Eubalaena glacialis</i> (Müller, 1776) Northern right whale	All	All where it occurs	One recorded to the south of the Isle of Man (Reid <i>et al.</i> 2003).
<i>Phocoena phocoena</i> (Linnæus, 1758) Harbour porpoise	All	II, III	The most common cetacean in Manx waters. See Marine Mammals – Cetaceans Chapter. "Numerous in Manx waters esp. in summer months." Bruce <i>et al.</i> 1963.



An Iceland clam (*Arctica islandica*) off Laxey, Isle of Man. This species is one of the OSPAR Threatened or Declining Species and is known to live for over 300 years in Manx waters. Photo: T. Nicholson.

Species Protection

The Wildlife Act 1990 is the legal basis for species protection in the Isle of Man. Many of the species on the schedules for protection have been protected since 1990 but there have been amendments over the years to add and remove species where appropriate.

The full list of species currently protected under the Wildlife Act 1990 can be found at:

<https://www.gov.im/about-the-government/departments/environment-food-and-agriculture/ecosystem-policy-and-energy/wildlife-biodiversity-and-protected-sites/wildlifebiodiversityandprotectedsites/protected-species/>

The marine species protected by the Act are relatively limited. Under Schedule 5 “Animals which are protected”, the following species are protected:

Basking sharks – *Cetorhinus maximus*

Seals (all species) – Pinnepedia

Turtle (marine) (all species) – Dermochelyidae and Cheloniidae

Whales (all species) - Cetacea

Under Schedule 7 “Plants which are protected” one marine species is protected:

Eelgrass – *Zostera marina*

Coastal species include:

Common sea lavender – *Limonium vulgare*

Dune fescue – *Vulpia fasciculata*

Isle of Man Cabbage – *Coincya monensis monensis*

Oyster plant - *Mertensia maritima*

Portland spurge - *Euphorbia portlandica*

Rock sea lavender - *Limonium binervosum agg.*

Saltmarsh flat sedge - *Blysmus rufus*



A basking shark near the Sound. Photo: F. Gell.

All birds are protected under the Wildlife Act 1990 (as amended), against intentional or reckless killing, injuring or taking, and their eggs and active nests are also protected. Schedule 1 species receive special protection, including offences involving disturbance at the nest. A full list of Schedule 1 birds can be found in the Bird Chapter of this report but examples of Schedule 1 coastal bird species include all species of terns (*Sternidae*) and the Manx shearwater (*Puffinus puffinus*).

Detailed information about the status of basking shark, turtles, seals, cetaceans and birds in the Isle of Man are provided in separate chapters of this report and the status of eelgrass is addressed in the Subtidal Ecology chapter.

Under some circumstances, e.g. for research, development or educational purposes, licences can be issued for activities that will disturb protected species or otherwise impact on them. For example, DEFA Fisheries Directorate issues licences for basking shark research, including tagging work and for filming basking sharks in the water, and for seismic surveys. These licences are issued with clear conditions for the work to minimise the impact on the protected species and a requirement to provide a report on the work.

DEFA Biodiversity Officers are supported in their enforcement of the Wildlife Act by the Isle of Man Constabulary Wildlife Crime Officers who take an active role in investigating wildlife

crime incidents. A number of prosecutions have been made under the Wildlife Act, particularly related to birds. Successful prosecutions have also been made under the Fisheries Act 2012 regarding fishing outside of appropriate areas or exceeded quotas. Education and awareness-raising are key to reducing the risk of marine wildlife crime.

Marine Site Protection

In addition to species protection, the Wildlife Act also provides a wide range of tools for site/area protection.

Section 27 of the Wildlife Act includes the following provision:

(1) Where the Department, after consultation with the Wildlife Committee is of the opinion that any area of land is of special interest by reason of any of its flora, fauna, or geological or physiographical features, it may notify that fact to-

(a) the Department of Local Government and the Environment; and

(b) to every owner and occupier of any of that land.

Such areas include Areas of Special Scientific Interest (ASSIs), Areas of Special Protection, National Nature Reserves and Marine Nature Reserves. There are a variety of other non-statutory designations applicable to the Isle of Man, including locally important Wildlife Sites and internationally recognised Ramsar Sites.

Marine Nature Reserves

The Isle of Man has had legislation for Marine Nature Reserves (MNRs) since the Wildlife Act was introduced in 1990. The Wildlife Act states that:

“(1) Where, in the case of any land covered (continuously or intermittently) by tidal waters or parts of the sea in or adjacent to the Island up to the seaward limits of territorial waters it appears to the Department expedient, on an application made by the Wildlife Committee that the land and waters covering it should be managed by the Department for the purpose of-

(a) Conserving marine flora or fauna or geological or physiographical features of special interest in the area; or

(b) Providing, under suitable conditions and control, special opportunities for the study of, and research into, matters relating to marine flora and fauna and the physical conditions in which they live, or for the study of geological and physiographical features of special interest in the area, the Department may, subject to section 37(3), by order designate the area comprising the land and those waters as a marine nature reserve; and the Department shall manage any area so designated for either or both of those purposes.”

There was an initial attempt to designate a Marine Nature Reserve in 1992 (DAFF 1992). The Calf Marine Trust put forward a detailed proposal for an extensive MNR around the Calf of Man, based on a high level of scientific information from the Port Erin Marine Laboratory.

A misunderstanding at the consultation stage, whereby stakeholders believed that decisions had already been made without their input, led to a group being formed to oppose the proposal. The proposal was eventually abandoned and although conservation organisations like Manx Wildlife Trust have continued to support the idea of MNRs, no further attempt was made to establish the Calf of Man or any other site as an MPA for many years.

Public consultation on Marine Nature Reserves

From 2004 onwards the Department of Agriculture, Fisheries and Forestry began to consider the best approach to conserving important marine sites. The department hosted public lectures, courses and other opportunities for stakeholders to learn more about marine conservation and Marine Protected Areas. New research and surveys were also carried out by local students, visiting scientists and in partnership with other organisations. The new research included ecological aspects of Manx waters and also social and economic issues.

For example, in 2007 an Aberdeen University undergraduate project, working with DAFF, carried out a postal survey of a random sample of Manx residents to gauge public support for marine conservation and Marine Protected Areas (Halsall 2008). Out of a total of 2000 questionnaires sent out, 741 responses were received, an extremely high response for a random postal survey. The majority of respondents (91%) valued the health of the marine environment very highly and were aware of its importance to habitats and wildlife and 95% of the respondents considered Marine Protected Areas to be a good idea. A large proportion (85%) of the respondents also believed that there should be a percentage of the Manx seas protected from all harmful practices (known as a No-Take Zone).

In 2008, a new process to designate a Marine Nature Reserve in Manx waters was launched with the intention of involving stakeholders from the outset to achieve good community support for the site eventually selected. The main aim of the Manx Marine Nature Reserve Project was to establish the Isle of Man's first Marine Nature Reserve by the end of 2011, effectively protecting important marine habitats and species with the involvement and support of stakeholders.

In October 2008 the first public meeting about the project was held for fishermen. The meeting was attended by over 30 fishermen. In November 2008 over 130 people were invited to a full day Marine Nature Reserve Project Stakeholder Workshop to introduce the project and give key marine stakeholders the opportunity to participate at the earliest stage of the project. In total, 74 people attended representing a wide variety of marine groups, including commercial and recreational fishermen, divers, government officers involved in marine management and representatives of local conservation organisations.

Following on from these initial meetings, community meetings were held around the Island during January and February 2009. The aim of these meetings was to make people aware of the MNR project, collect local information and make contact with key stakeholders. The meetings were also an opportunity for stakeholders to raise concerns about the designation of MNRs and to ask questions. Meetings were held in Port Erin, Port St Mary, Peel, Castletown, Onchan, Douglas, Laxey and Ramsey.

In April 2009 the Wildlife Committee of DEFA approved selection criteria for Manx Marine Nature Reserves based on the OSPAR “Guidelines for the Identification and Selection of Marine Protected Areas in the OSPAR Maritime Area” which include Ecological Criteria/Considerations and Practical Criteria/Considerations (including socio-economic aspects). DEFA made an assessment of sites meeting the OSPAR Marine Protected Area selection criteria and the intention was to use a further round of stakeholder consultation to arrive at the best possible site to take forward for designation. The sites identified as candidate Marine Nature Reserves in the initial assessment against the OSPAR criteria are given in the Subtidal Ecology chapter (MMEA Chapter 3.3). See Gell and Hanley (2010) for more details.



Marine Nature Reserve Project Stakeholder Workshop November 2008. Photo: L Hanley.

Background to the designation of Ramsey Marine Nature Reserve

The original intention of the Manx Marine Nature Reserve Project was to use the list of sites meeting OSPAR criteria as a basis for further stakeholder consultation to identify the most suitable site for the Marine Nature Reserve. However, this plan was overtaken by events and the identification of the site happened much earlier than expected.

In June 2010 the Manx Fish Producers’ Organisation, which represents most of the Manx scallop industry, proposed Ramsey Bay as the Island’s first MNR. At that time Ramsey Bay was already closed to scallop fishing as an Emergency Closure and the fishermen were willing to see some of the bay closed permanently. The MFPO made some initial suggestions about combining a Marine Nature Reserve with a Fisheries Ranching Area. Further negotiation between DEFA and the MFPO resulted in a proposal for protecting part of Ramsey Bay, to include part of the maerl habitat and the eelgrass beds, and also protecting the horse mussel reef in the Ballacash Channel.

The two sites which made up the proposed Ramsey Marine Nature Reserve, Ramsey Bay and the Ballacash Channel, had already been assessed as meeting OSPAR criteria and had been suggested as candidate sites through the initial stakeholder consultation. Additional information

was put together for the whole site and in August 2010 a paper went to the Fisheries Directorate Committee of DEFA where the change in process was approved from a political and management perspective. In October 2010, a paper was submitted to the Wildlife Committee of DEFA and to additional marine scientists for their technical advice. The Wildlife Committee approved the proposal from a scientific perspective. DEFA and the Manx Fish Producers' Organisation issued a joint press release in 2010 announcing the intention to work together to develop the Marine Nature Reserve ("Fisherman lead the way in Marine Nature Reserve Selection").

In December 2010 a formal consultation process was launched to get specific stakeholder input on the options for designating Ramsey Bay as a Marine Nature Reserve. The consultation closed in February 2011 and over 200 people responded formally, with many more attending drop in sessions in Ramsey to ask questions and provide information. The majority of respondents (86%) were users of Ramsey Bay, representing a wide range of commercial, recreational and interest groups. The majority of respondents (86%) supported the designation of the MNR (42% supported and 43% strongly supported). Only 1.5% of respondents said that they were opposed the MNR.

Based on the input from the consultation and the available science a zoning plan of Ramsey Marine Nature Reserve was developed. This plan was released to stakeholders in July 2011. Additional marine survey was carried out in Ramsey Bay, improving the scientific baseline for the area. The proposed zones (shown in Figure 2) were approved in October 2011 and went into immediate operation. Following input from a small group of recreational anglers, changes were proposed to the Marine Nature Reserve byelaws and these were incorporated in the final version of the Marine Nature Reserve byelaws which were approved by Tynwald in January 2012.

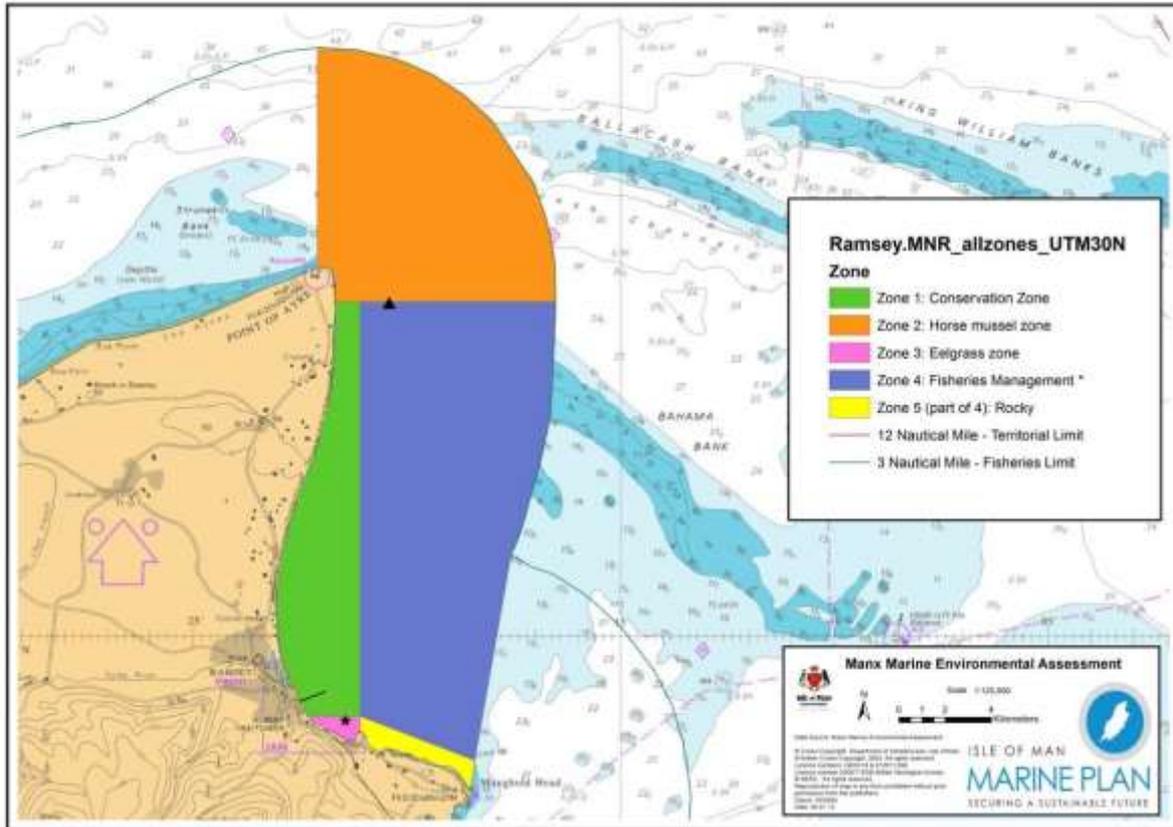


Figure 2. Ramsey Marine Nature Reserve, showing the five management zones.

Table 3 shows the management regulations in each zone of the Marine Nature Reserve.

Table 3. Summary of management in the MNR zones.

Name of Zone	Location	Area (km ²)	Permitted	Not Permitted
Conservation Zone	Inshore Ramsey Bay	13.9	Potting, Angling	Trawling, Dredging, Other extraction of scallops and queenies
Horse Mussel Zone	Point of Ayre to Ballacash Channel	31.0	Angling	Potting, Trawling, Dredging, Other extraction of scallops and queenies.
Eelgrass Zone	South-east corner of Ramsey Bay (Port Lewaigue to Ballure)	0.5	Restricted bait digging, keep pots	Potting, Trawling, Dredging, Angling, any extraction of living resources
Fisheries Zone	Outer Ramsey Bay	47.4	Potting and Angling. Restricted Trawling, Dredging and scallop diving under MFPO and DEFA control.	Trawling and dredging not authorised by MFPO and DEFA.
Rocky Coast Zone	Narrow strip from <i>Gob ny Rona</i> to Maughold Head	1.6	Potting, Angling	Trawling, Dredging, Other extraction of scallops and queenies

Management in all zones

Some regulations apply to all zones in the Marine Nature Reserve. Gill-netting, long-lining, aggregate extraction, dumping of dredged material, littering, construction (unless licensed by DEFA) are not permitted anywhere in the Marine Nature Reserve.

Conservation Zone (green in Figure 1, Table 1)

Trawling and dredging and any other extraction of scallops and queenies are not permitted in the Conservation Zone. Potting, angling and many other activities are permitted in this area. This provides protection to maerl beds, kelp forests and other important marine habitats.

Horse Mussel Zones (orange in Figure 1, Table 1)

Trawling, dredging and potting are not permitted in the Horse Mussel Zone, primarily protecting the extensive horse mussel reef in the Ballacash Channel and other important habitats.

Eelgrass Zone (pink in Figure 1, Table 1)

The eelgrass zone has an area of 0.5km² and is the most highly protected zone in Ramsey Marine Nature Reserve. It is protected from all extractive activities with the exception of bait collection for lugworms and razorshells from 1 October to 31 March. This concession to bait collectors will be reviewed in 2014. The Eelgrass Zone is also protected from anchoring which can damage eelgrass habitats. (The anglers were concerned about losing the opportunity to dig for bait in the highly protected Eelgrass Zone so the new byelaw permits winter digging for razorshells and lugworms, as requested by the anglers until 2014 when this byelaw will be reviewed.)

Rocky Shore Zone (yellow in Figure 1, Table 1)

The rocky shore zone is an area which is protected voluntarily from trawling and dredging. This was offered by the Manx Fish Producers Organisation as part of their proposed responsible management of the Fisheries Management Zone. The area was negotiated with the MFPO after survey dives in July 2012 showed that eelgrass beds extend from Carrick Bay to *Cor Stack*.

Fisheries Management Zone (purple in Figure 1, Table 1)

The Fisheries Management Zone (FMZ) encompasses 47.5 km² (of the total MNR's 94.5 km²) and was closed to dredging between 2009-2013 to allow recovery, whereupon surveys indicated that limited fishing could be commenced. A short (two-week fishery) has occurred since 2013 during December, in order to maximise market returns. The fishery is based on a pre-survey, a negotiated total allowable catch and is harvested from an area of less than 15 km², or <31% of the available FMZ. The fishery is co-managed by DEFA and the Manx Fish Producers' Organisation.

ArcView shapefiles of Ramsey Marine Nature Reserve and the management zones are available from the Fisheries Directorate of DEFA.

DEFA Habitat Surveys in Ramsey Marine Nature Reserve

Detailed benthic habitat information has been collected by DEFA (Isle of Man Government) in Ramsey Bay as part of the survey and monitoring for Ramsey Marine Nature Reserve (Kennington 2011). In August 2011, a boat-based survey from the Fisheries Protection Vessel *Barrule* used Hy-Pack ground discrimination system to map seafloor characteristics and they were ground-truthed using sledge-mounted video surveys and grab sampling. Figure 3 shows the area covered during these surveys.

Higher resolution information was collected in July 2011 by a team of volunteer Seasearch divers in collaboration with DEFA. They carried out Seasearch surveys and 50m by 3m transects, recording main habitat types and abundance of key marine species such as scallops. Four main sites were surveyed – maerl beds at the High Shellags and north of Ramsey and eelgrass beds at *Port-e-Vullen* and Maughold Brooghs.

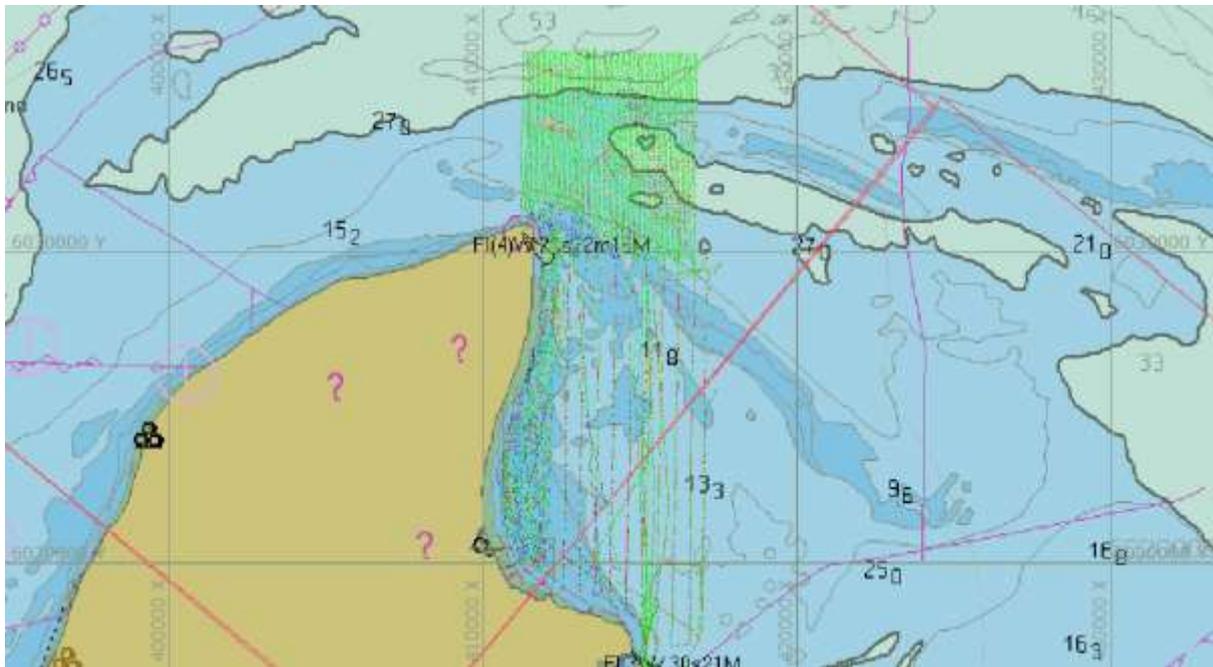


Figure 3. Area covered by the Hypack Ground Discrimination Survey of Ramsey Marine Nature Reserve (from Kennington 2011). Transect distance separations are; Horse Mussel Zone = 100m, Conservation Zone = 75m, Fisheries Management Zone = 500m.

The results of the boat-based survey were analysed for each zone of the Marine Nature Reserve. The Horse Mussel Conservation Zone was found to be dominated with a substrate of mobile sediments of medium to coarse grade sands and gravels. Dead shell (primarily horse mussel shell) was also found to be an important feature of the site. The video surveys confirmed the presence of horse mussel reefs of varying quality overlaying sand substrate. Some of the horse mussel reefs showed a high level of structural complexity and species diversity.

The Conservation Zone (inner Ramsey Bay) was found to be primarily composed of mobile sediment, varying in grade from fine sand to small stones. Around the Shellags there are also occasional rocky outcrops. Boulder clay deposits were also identified, overlain by coarse sands. Areas of kelp were common within this area. The grab samples also confirmed the presence of live maerl over significant areas. The rocky outcrops were colonised by kelp forest. Additional dive surveys revealed a high level of biodiversity in the live maerl sites.

The Fisheries Zone, in the middle of Ramsey Bay was found to be dominated by mixed sandy substrate from very fine sands to coarse sands and small stones. Occasional rocky outcrops were also identified. The associated communities included abundant soft corals (*Alcyonium digitatum*) and occasional clumps of horse mussel. Cobbles and boulders in this area were often found to be colonised by large numbers of plumose anemones (*Metridium senile*). The Rocky Shore Zone, the stretch of subtidal habitat off the Maughold Brooghs, had a mixture of rocky shore habitat dominated by kelp and sandy substrate. Video surveys and additional dive surveys revealed a substantial area of eelgrass *Zostera marina* in a narrow band on the 5-7m contour along the coast. Additional surveys revealed deeper eelgrass beds further offshore in 10-12m.

To calibrate the sediment information obtained from the ground discrimination, ten Van Veen grab samples were taken across the Marine Nature Reserve, samples of the sediment were analysed in more detail and the infauna species identified by a taxonomic expert (Salma Shalla at CMACS). In total, 260 species were identified including 82 species of worms, 59 species of crustacea, 23 species of bryozoans, 14 species of cnidaria and 11 species of echinoderms. This demonstrates a high level of diversity, considering the small volume of samples used in this study. For more information and a full species list see Kennington (2011).

Annual surveys are undertaken in Ramsey Marine Nature Reserve to monitor changes in habitat quality and abundances of scallops and other marine species.



Ramsey Marine Nature Reserve with Maughold Cliffs and Brooghs Area of Special Scientific Interest in the foreground. Photo: F. Gell.

Fisheries Closed Areas and Restricted Areas

The first closed area in Manx waters was established in Port Erin Bay in 1989 as an experimental area for aquaculture and fisheries purposes. An area of 2 km² was originally closed to scallop dredging and managed by the Port Erin Marine Laboratory, University of Liverpool. The area showed improvements in habitat quality and complexity (Bradshaw *et al.* 2001) and dramatic increases in scallop densities compared to surrounding areas (Beukers-Stewart *et al.* 2005). Crucially, after the closed area had been in place for several years, fishermen also saw the benefits of the area in their catches from adjacent fishing grounds.

Once fishermen observed the potential for closed areas to help with fisheries management, they were proactive in supporting additional closures. Douglas Closed Area was established in 2008 as a second protected area from scallop dredging, and to act as a replenishment zone to surrounding fishing grounds. In 2009, Laxey Bay and Niarbyl Bay were closed to scallop dredging as Restricted Areas, for the purposes of stock enhancement and reseeding experiments, again with the support of the fishing industry. These were, in order of timing, Douglas Bay (2008), Laxey Bay and Niarbyl Bay (2009). All of these sites were established under the Sea Fisheries Act 1971 (and subsequently amended as the Fisheries Act 2012). Laxey Bay and Niarbyl Bay have had several scallop and other benthic surveys conducted in them since their closure (e.g. Allison 2016).

Please note: in addition to these statutory and essentially permanent closed areas, additional temporary (annual or multiannual) closures exist in Manx waters. These have been exclusively for fisheries management purposes and further details can be found in the MMEA Chapter 4.1 Commercial Fisheries and Sea Angling.

Other Marine Protected Areas

As previously noted Ramsey Bay Marine Nature Reserve was designated in 2011, and in 2012 *Baie ny Carrickey* (Carrick Bay) was also closed to mobile fishing gear as a result of complaints about habitat and crustacean stock damage. A public consultation process occurred and closure of the bay resulted, from Black Head to Scarlett. A crustacean fisheries management trial was subsequently undertaken within the closed area and Bangor University undertook significant habitat and fishery monitoring studies (May 2015).

Most recently, in 2016, and partly informed by a positive public consultation on the concept of marine zoning and inshore marine spatial management, four marine conservation zones (CZ) were established. These were essentially mechanisms to differentiate conservation from fishing areas as part of a future inshore fisheries management strategy. The four CZs were at Little Ness, south of Douglas, Off Langness, the Calf of Man and Wart Bank, and an area from Niarbyl Point to the Point of Ayre. All of these zones were within the 3 M limit, and primarily introduced the exclusion of mobile fishing gear.

Marine Nature Reserves Designations 2018

The Manx Marine Nature Reserve project was established in 2008, and identified a series of candidate MNRs, which contained good representative examples of important habitats and

species, as well as unique, rare or threatened features. The public consultation in 2016 on marine inshore zoning was followed by another on the designation of marine nature reserves in 2017¹, which sought views on the re-designation of all existing marine protected areas as marine nature reserves, under the Wildlife Act 1990.

A positive response resulted in the legislation² passing through Tynwald in July 2018, and coming into force on 1st September 2018. The ten current MNRs are shown in Figure 4, and constitute 51.8% of the 0-3 M zone and 10.8% of the 0-12 M (territorial sea area).

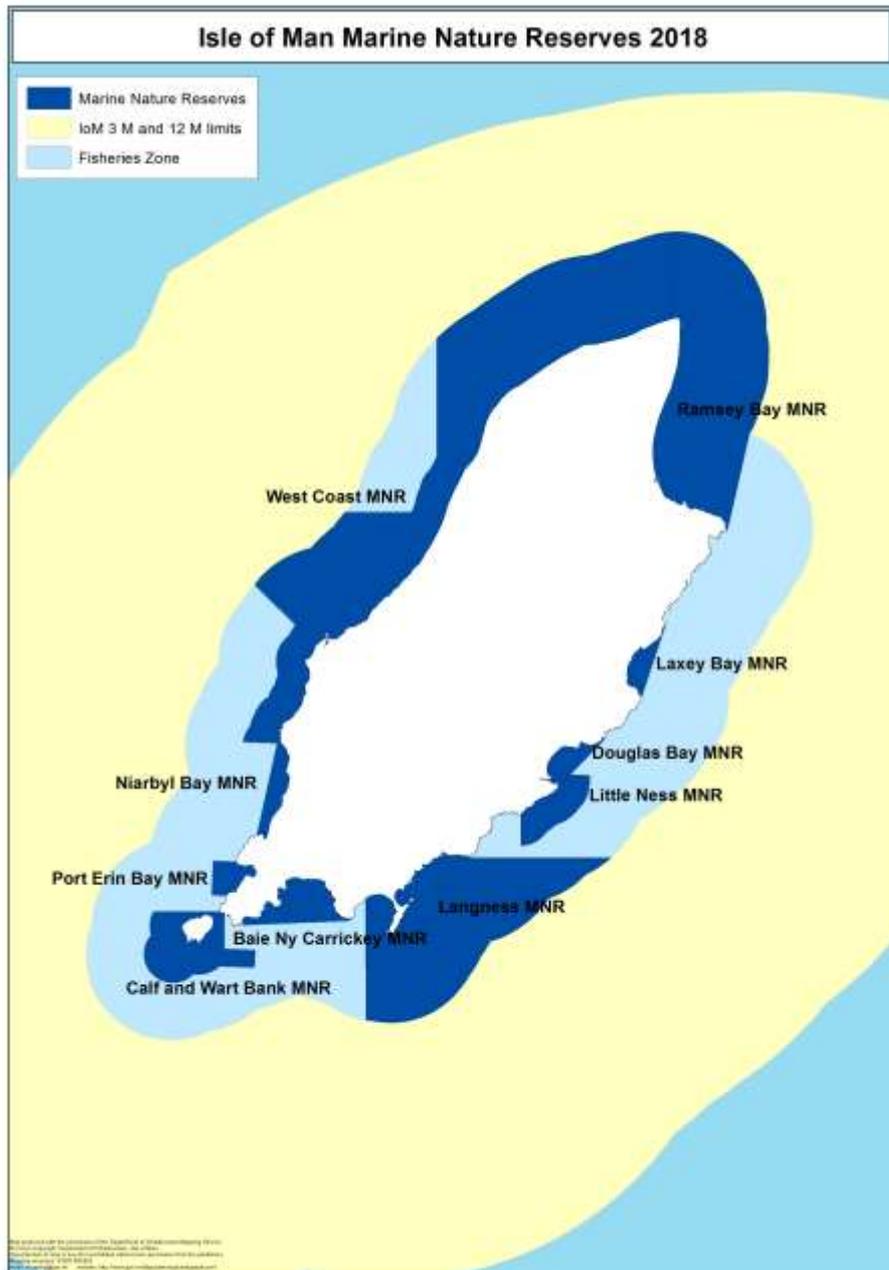


Figure 4. Marine Nature Reserves in Manx waters. These areas were designated July 2018, and came into operation in September that year. The new designations were based on existing closed, restricted and conservation zones.

¹ <https://consult.gov.im/environment-food-and-agriculture/designation-of-inshore-marine-nature-reserves/>

² <http://www.tynwald.org.im/links/tls/SD/2018/2018-SD-0185.pdf>
<http://www.tynwald.org.im/links/tls/SD/2018/2018-SD-0186.pdf>

Table 4. A summary of the Marine Nature Reserves in Manx waters.

Marine Nature Reserve	Legislation	Year implemented	Area
<i>Baie ny Carrickey</i> MNR	Manx Marine Nature Reserves (Designation) Order 2018 & Manx Marine Nature Reserves Byelaws 2018 (Sea Fisheries (Baie Ny Carrickey Closed Area) Byelaws 2012)	2018 (For the Closed Area: 2012 (renewed in 2013))	11.4 km ²
Douglas Bay MNR	Manx Marine Nature Reserves (Designation) Order 2018 & Manx Marine Nature Reserves Byelaws 2018 (Sea Fisheries (Douglas Bay Closed Area) Byelaws 2008)	2018 (for the closed area: 2008)	4.6 km ²
Langness MNR	Manx Marine Nature Reserves (Designation) Order 2018 & Manx Marine Nature Reserves Byelaws 2018	2018	88.7 km ²
Laxey MNR	Manx Marine Nature Reserves (Designation) Order 2018 & Manx Marine Nature Reserves Byelaws 2018 (Sea Fisheries (Scallop Ranching) (Restricted Area) Byelaws 2009)	2018 (for the restricted area: 2009)	4.0 km ²
Little Ness MNR	Manx Marine Nature Reserves (Designation) Order 2018 & Manx Marine Nature Reserves Byelaws 2018	2018	10.0 km ²
Niarbyl Bay MNR	Manx Marine Nature Reserves (Designation) Order 2018 & Manx Marine Nature Reserves Byelaws 2018 (Sea Fisheries (Scallop Ranching) (Restricted Area) Byelaws 2009)	2018 (for the restricted area: 2009)	5.7 km ²
Port Erin MNR	Manx Marine Nature Reserves (Designation) Order 2018 & Manx Marine Nature Reserves Byelaws 2018 (Sea Fisheries (Experimental Area) Byelaws 2006 (I) & Amendments in 2007 (II), 2009 (III))	2018 (for the experimental area: 1989 (extended in 2003 + 2006))	4.3 km ²
Ramsey Bay MNR	Manx Marine Nature Reserves (Designation) Order 2018 & Manx	2018	97.0 km ²

	Marine Nature Reserves Byelaws 2018 (Ramsey Bay (Marine Nature Reserve)(Designation) Order 2011) and (Ramsey Bay (Marine Nature Reserve) (No. 2) Byelaws 2011)	(Original MNR designation and byelaws: 2011)	
Calf of Man and Wart Bank MNR	Manx Marine Nature Reserves (Designation) Order 2018 & Manx Marine Nature Reserves Byelaws 2018	2018	20.1 km ²
West Coast MNR	Manx Marine Nature Reserves (Designation) Order 2018 & Manx Marine Nature Reserves Byelaws 2018	2018	184.8 km ²

Future Marine Protected Area Work

Effective marine conservation, including the implementation of marine protected areas, requires the establishment of conservation objectives and the capacity to monitor progress towards those objectives. Typically, the development of a management plan would be considered appropriate for these purposes, and it is expected these will be developed for the MNR in the future.

There are still marine areas that remain unprotected, for example soft sediment habitats in the 3-12 nm, and may be future candidates for spatial protection. The quality of marine habitats and species populations in such sites may vary from extremely modified (for example by intense fishing activity) through to examples of well-established marine habitats such as horse mussel reefs. As knowledge of the Manx marine environment improves then additional areas for protection may become apparent. Priorities for site and species protection may also be informed by the Isle of Man Government's statutory responsibilities arising from international treaties and agreements, for example: OSPAR, UN Convention on Biological Diversity, Bern and Bonn Conventions and ASCOBANS.

For further relevance to marine protected areas see also MMEA Chapter 4.1 (Commercial Fisheries and Sea Angling) and MMEA Chapter 3.3 (Subtidal Ecology).

Coastal Site Protection

A range of protective measures are available for conservation of terrestrial coastal sites, based on the level of importance of the site, as shown in Table 5.

Table 5: Summary of nature conservation site protection measures on the Isle of Man.

Scale of priority for protection				
Greater priority ←		→ Lesser priority		
Ramsar Sites	National Nature Reserves (NNRs)	Wildlife Sites	Habitats in wider coastal and marine environments	Heavily trawled/dredged/developed areas
Emerald Network Sites	Areas of Special Scientific Interest (ASSIs)			
	Marine Nature Reserves (MNRs)			
	Areas of Special Protection (ASPs)			
	Bird Sanctuaries			
Manx National Trust land – could apply to any of the above.				

Other Related Protected Areas

Bird Sanctuaries

These sites were designated under the Protection of Birds Acts 1932 & 1955, and remain protected although this legislation has now been superseded by the Wildlife Act 1990.

The Bird Sanctuaries designated in the Isle of Man are:

- Langness, Derbyhaven & Fort Island, Malew; including a significant coastal area
- Ballamoar Reservoir, Patrick
- Renscault and East Baldwin
- The Willows, Ballamodha
- Tynwald Park and Arboretum, St Johns

Areas of Special Protection

Areas of Special Protection may be designated under Section 13 of the Wildlife Act 1990 in order to extend the provision of the Wildlife Act for certain species in certain areas. The only current Area of Special Protection for Birds is the Ayres Gravel Pits.

National Nature Reserves (NNRs)

Designated under Section 31 of the Wildlife Act 1990, may be on private or public land, and may be subject to protective byelaws. NNRs are likely to be of ASSI quality or higher, i.e. of national importance.

There is one National Nature Reserve in the Isle of Man, the Ayres National Nature Reserve, which includes a long stretch of coast with important coastal and intertidal habitats. For detailed information about the Ayres National Nature Reserve see: <https://www.gov.im/about-the-government/departments/environment-food-and-agriculture/protected-sites/the-ayres-national-nature-reserve/>

Annual reports on species and habitat monitoring and management measures are produced for the Ayres National Nature Reserve, including numbers and breeding success of Arctic terns, little terns and sandwich terns in the area (e.g. Spencer 2010, Samson 2013, 2014, 2015, 2016).

Land in the ownership of the Manx Museum and National Trust (administered as Manx National Heritage).

This land is protected under the Manx Museum and National Trust Act (1959-1982), which provides for the protection of places 'of natural interest or beauty' and places of historic interest. This includes wildlife, historic buildings and also the landscape setting and physical features within it. Whilst land owned by Manx National Heritage will not always be acquired on the basis of its wildlife interest alone (since cultural heritage and landscape setting may also be important factors), the fauna and flora of that land is protected by byelaws whether they are of local, Manx national, or international value.

Manx Wildlife Trust Reserves

Manx Wildlife Trust own a number of important wildlife sites which they manage as Reserves. Manx Wildlife Trust Reserves may meet the criteria for ASSI designation while other areas may meet Wildlife Site selection criteria. Information about Manx Wildlife Trust Reserves can be found at: <http://manxwt.org.uk/nature-reserves>

Ramsar Sites

Ramsar Sites are internationally important wetland sites chosen according to criteria agreed by parties to the Ramsar Convention on Wetlands (1971). The Isle of Man is a signatory to this convention, and thus has an obligation to investigate potential Ramsar Sites on the Island. Such sites will be of ASSI or higher status.

The only Ramsar Site in the Isle of Man at present is a wetland (*curragh*) area in the north of the Island, the Ballaugh Curragh Ramsar Site. There are no coastal Ramsar Sites in the Isle of Man.

Prior to the designation of Ballaugh Curraghs Ramsar Site in 2006, Pienkowski (2005) carried out an assessment of potential Ramsar sites in the Isle of Man for Defra and identified a number of coastal and marine sites that meet Ramsar criteria.

Emerald Network

Emerald sites (Areas of Special Conservation Interest) are internationally important wildlife areas designated under the Bern Convention. They are equivalent to the European Union's Natura 2000 network. Thus, although not part of the EU and its Natura 2000 network (which includes Special Areas of Conservation in the UK), the Island may still designate internationally important sites at the same level. No Emerald Sites have yet been identified in the Isle of Man but if designated, these sites are likely to include the most important ASSIs on the Island, but MNRs have the potential too. In terms of UK equivalents they would be equivalent to Special Protection Areas (SPAs) and SACs. There are, however, five areas identified as Important Bird Areas with a view to consideration as Emerald Sites, or Ramsar or ASSI. These are the Isle of Man Sea Cliffs, the Calf of Man, The Ayres, Ballaugh Curraghs and The Isle of Man Hills (Pritchard et al. 1992).

Areas of Special Scientific Interest (ASSI)

ASSIs are the main terrestrial conservation designations in the Isle of Man and are established as part of a system, or network of sites. Through the ASSI network DEFA aims to:

- ensure the survival of the full diversity of Manx plants and animals by protecting a network of sites which are important for the survival of Manx species both now and into the future;
- protect the full range of semi-natural habitats in existence today for the future use and enjoyment of succeeding generations by protecting the best examples of each habitat type; and
- maintain the selected areas in favourable conservation status.

As part of the notification of designation pack for each ASSI there is a list of 'operations requiring DEFA's consent' (sometimes called "potentially damaging operations' or 'Operations likely to damage the special interest of the site'). This is a list of the activities that the owners/occupiers of a site must apply to DEFA for consent to carry out whether it is to be carried out by them or a third party such as a developer. Applications are made on a Notice Form which is signed by the owner/occupier and returned to the Ecosystem Policy team of DEFA. DEFA then has four months to consider the effect of the proposed activity on the special interest of the ASSI before deciding whether to issue consent. If consent is refused then DEFA is obliged to offer a Management Agreement (under Section 27 of the Wildlife Act) for positive management of the land.

An Island-based approach

The Selection Criteria have been written to fulfil the needs of wildlife conservation in the context of the Isle of Man as a Crown Dependency, with its own Wildlife Act. Sites will be selected based on what is important for the Island as a nation rather than as if it was a country of the UK.

The reasons for an Island-based approach, rather than simply using the JNCC criteria for Sites of Special Scientific Interest in the UK, are:

- the need to retain areas of habitat and populations of species that are rare on the Island, even if they are commoner elsewhere, to maintain the biodiversity of the Island;
- the isolation of the Island, resulting in limited prospects for natural re-colonisation from surrounding land masses if species are lost and become extinct here;
- because small populations are more vulnerable to extinction, therefore wider habitat protection may be needed in order to maintain a viable population;
- to ensure the protection of any species or habitats which show a distinctly Manx characteristic not found elsewhere.

The objective is to maximise the conservation of species biodiversity through protection of their habitats. Sites will therefore be considered on the basis of their Island-wide/national, British Isles or international/European importance. The aim is for the ASSI series to include at least one good example of each main semi-natural habitat type and assemblage. For very scarce and important habitats, such as saltmarsh, the majority of examples will require protection.

ASSIs can be designated on land and on inter-tidal areas down as far as Lowest Astronomical Tide level. By comparison, Marine Nature Reserves are designated to the Highest Astronomical Tide level, providing for shared conservation interests in the overlapping zone.

Current ASSI list (as at October 2018)

Table 6. Areas of Special Scientific Interest (ASSI).

Note: *indicates a coastal site

ASSI No.	ASSI name	Area (hectares)
1	Central Ayres*	358.34
2	Langness, Derbyhaven & Sandwick*	310
3	Jurby Airfield	63.04
4	Ballough Curragh	0.55
5	Ballacrye Meadow	193.4
6	Rosehill Quarry	1.37
7	Ramsey Mooragh Shore*	2.65
8	Cronk y Bing*	17.71
9	Dhooon Glen*	20.92
10	Eary Vane	3.96
11	Glen Rushen	12.27
12	Poyll Vaaish Coast*	44.76
13	Glen Maye*	15.92
14	Greeba Mountain & Central Hills	1080.95
15	Dalby Coast*	62.1
16	Ballachurry Meadows	11.9
17	Port St Mary Ledges & Kallow Point*	15.17
18	Maughold Cliffs & Brooghs*	53.63
19	Santon Gorge & Port Soldrick*	26.87
20	Ballateare Meadow	0.96
21	Cronk e King	3.02

Baseline environmental data

Baseline data for the terrestrial environment is provided by Phase 1 and Phase 2 Habitat Surveys. The data is beneficial, but somewhat out of date, since the surveys were carried out 1991-94. DEFA is working towards a repeat survey or sample survey of the Island.

Potential effects of developments on ASSIs and other designated sites

Potential adverse effects of development on protected sites should be assessed. For ASSIs, any activity that is listed as an Operation requiring DEFA's consent (see Appendix 2 of the designation documents for the particular site) requires consent from DEFA in advance of the work. This covers activities carried out by the owner or occupier but there is not currently any control over third party damage to sites. Any development or activity that is planned on or within a protected site will require an Environment Impact Assessment and consultation with DEFA.

Further information on ASSIs and other designated sites

Designation documents for ASSIs are available from DEFA Ecosystem Policy Team and further information about ASSIs is available on the DEFA website <https://www.gov.im/about-the-government/departments/environment-food-and-agriculture/protected-sites/>

An ArcView shape file is available from the Ecosystem Policy Team of DEFA for confirmed ASSIs, Ramsar Sites, Areas of Special Protection, National Nature Reserves and Bird Sanctuaries. The site boundaries are shown on the mapping on the gov.im website.



The shore at Niarbyl, part of the Dalby Coast ASSI. Photo: J. Cubbon.

UNESCO Biosphere Isle of Man

UNESCO Biosphere reserve was achieved in 2016 and makes the Isle of Man the first entire Nation to achieve such status. The main purpose of Biosphere status is to seek a balance between environmental protection and sustainable development, whilst also acknowledging culture, heritage and community. Maintaining and improving our infrastructure and economy whilst supporting our environment, and showcasing what makes the Island so special. The Island is divided into three types of zones with the core zone encompassing areas under formal

protection, such as ASSI's or Marine Nature Reserves. The care zones or buffer zones form links between the zones and are intended to be managed in a way that's compatible with conservation. The sustainable development zones focus on developing our communities and economy in a responsible way. A periodic review of the functioning, zoning and scale of the reserve as well as the involvement of the populations living in the site is undertaken every 10 years.

<https://www.biosphere.im/index.php>

Wider Irish Sea Marine Conservation

Whilst the Isle of Man can manage species and habitats within the 12nm territorial sea, it is also important to consider the conservation of these habitats and species outside Manx waters. The Department of Environment, Food and Agriculture works with partner organisations in surrounding jurisdictions on a variety of conservation initiatives, to ensure the wider conservation of priority species and habitats.

The Irish Sea Conservation Zones Project 2009-2011

The Irish Sea Conservation Zones Project was one of the four UK regional projects set up to develop recommendations for a network of Marine Conservation Zones around the UK (outside of Manx territorial waters). The recommendations were formulated by a Regional Stakeholder Group made up of representatives of different sectors in the project area. The Isle of Man was represented on the project group by the Chief Executive of the Manx Fish Producers' Organisation and the Senior Marine Biodiversity Officer, Department of Environment, Food and Agriculture, Isle of Man Government.

The proposed Marine Conservation Zones and more highly protected Reference Areas have been put forward to the UK's Department of Environment, Food and Rural Affairs for further consideration.

The maps below (Figure 5) show the sea area of the Irish Sea Conservation Zone project and the location of the proposed Marine Conservation Zones and Reference Areas that have been put forward to Defra for consideration.

The Isle of Man actively supported the information gathering and stakeholder consultation process of the Irish Sea Conservation Zones project, assisting Liaison Officers to meet with key stakeholders and co-hosting drop-in sessions for the public. Information about Manx marine ecology and marine protection also assisted in the project, enabling a more regional approach.

For more information see: www.irishseaconservation.org.uk/.



Figure 5: Irish Sea Conservation Zone Project Area and recommended Marine Conservation Zones, reproduced from Irish Sea Conservation Zones (2011).

In preparation for their Marine Conservation Zones work, Defra had a project to bring together relevant data: "Marine Protected Areas - gathering/developing and accessing the data for the planning of a network of Marine Conservation Zones - MB0102". The Isle of Man Government contributed funding and data to this project to ensure that Manx waters were included in the assessment of the Irish Sea. The outputs of this project are available at:

<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16368>

Celtic Seas Partnership

Began in 2013, bringing together people that use the Celtic Seas to set up collaborative and innovative approaches to managing their marine environment and to achieve Good Environmental Status by 2020. The four year EC LIFE+ project involved France, the Republic of Ireland, the UK and the Isle of Man. The Partnership took an ecosystem approach and focused on three main areas:

- Empowering Stakeholders
- Managing seas across borders
- Building relationships

<http://www.celticseaspartnership.eu/>

Marine Invasive species

Over the past few years DEFA have worked with local stakeholders to improve reporting and recording of marine invasive species, which has resulted in the production of a Marine Biosecurity Plan. More recently Manx Wildlife Trust has produced a marine invasive species guide which is available for the public and divers to use and report back any sighting they may find³. Non-native and invasive intertidal species are recorded as part of the work of Steve Hawkins and his team at Southampton University (see Climate Change in Manx Waters chapter). Volunteer Seasearch divers also record any invasive species observed. In 2012 marine invasive species expert Dr Elizabeth Cook, from the Scottish Association of Marine Sciences, visited the Isle of Man and carried out some rapid assessments of invasive species in harbours at Douglas and Peel but did not detect any new species.

Since Wireweed, *Sargassum muticum*, was first recorded in Manx waters in 2005, more records from around the Island have been recorded through intertidal and subtidal surveys. For example, subtidal wireweed is well established within the eelgrass bed in Langness Gully, between the harbour and the breakwater in Port Erin Bay and at many other sites. On the shore, wireweed is well established on the shore at Castletown where it was first recorded, between Niarbyl and White Beach and at many other sites. Giesler (2013) completed an intertidal survey around the Island, showing its presence at many sites. This survey was repeated by Naldrett in 2016. The findings showed that wireweed had spread to new sites and was most abundant in the south of the island.



Wireweed (*Sargassum muticum*) in intertidal pools at Castletown in 2005. Photo: F. Gell.

³ <http://www.manxwt.org.uk/manx-wildlife/manx-marine/marine-invasive-non-native-species>

Pacific oysters (*Crassostrea gigas*) were first recorded in Manx waters in 2005 on the walls of Ramsey's Stone Piers. The species still seems to be confined to the Stone Piers but a comprehensive survey has not been carried out.

Another invasive species known from the Ramsey Bay stone piers is the Australian barnacle, or Darwin's barnacle (*Elminius modestus*) which is native to Australasia. It was first recorded from this site in 1954-55 (Crisp 1958), and subsequently surveyed a few years later (Crisp and Southward 1959). Recent preliminary evidence from a small-scale survey suggests no significant increase in abundance of this species at this location, but it has not been actively searched for elsewhere on the island. Some initial surveys have identified it at Langness, Douglas, Laxey, Port St Mary, Peel and Castletown.

Informal surveys of harbours, marinas and coastal waters for damaging invasive species such as the carpet sea squirt *Didemnum vexillum* and the slipper limpet *Crepidula fornicata* have not resulted in records of these species but more survey work and regular monitoring is needed. The carpet seasquirt has been a major issue in Holyhead Marina in Anglesey and subject to an expensive eradication programme. The nearest record of the slipper limpet to the Isle of Man is probably the recent recording in Belfast Lough in 2008 (Guy *et al.* 2011).

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Appendix 1

The algae listed for Manx waters in Hardy and Guiry (2003).

Please check the original reference for details.

Rhodophyceae – Red Algae 128 species

<i>Ascorium venulosum</i>	<i>Dasya hutchinsiae</i>
<i>Aglaothamnion hookeri</i>	<i>Delesseria sanguine</i>
<i>Aglaothamnion sepositum</i>	<i>Dilsea carnosa</i>
<i>Ahnfeltia plicata</i>	<i>Drachiella heterocarpa</i>
<i>Antithamnion cruciatum</i>	<i>Drachiella spectabilis</i>
<i>Antithamnionella spirographidis</i>	<i>Dudresnaya verticillata</i>
<i>Apoglossum ruscolium</i>	<i>Dumontia contorta</i>
<i>Asparagopsis armata</i>	<i>Erythodermis traillii</i>
<i>Boergesenella thuyoides</i>	<i>Erythrogllossum laciniatum</i>
<i>Bonnemaisonia asparagoides</i>	<i>Furcellaria lumbricalis</i>
<i>Bonnemaisonia hamifera</i>	<i>Gastroclonium ovatum</i>
<i>Brongniartella byssoides</i>	<i>Gelidium pusillum</i>
<i>Calliblepharis ciliata</i>	<i>Gelidium spinosum</i>
<i>Calliblepharis jubata</i>	<i>Gracilaria gracilis</i>
<i>Callithamnion corymbosum</i>	<i>Grateloupia filicina</i> var. <i>filicina</i>
<i>Callithamnion granulatum</i>	<i>Halarachnion ligulatum</i>
<i>Callithamnion tetragonum</i>	<i>Halurus equisetifolius</i>
<i>Callocolax neglectus</i>	<i>Halurus flosculosus</i>
<i>Calosiphonia vermicularis</i>	<i>Halymenia latifolia</i>
<i>Callophyllis laciniata</i>	<i>Haraldiophyllum bonnemaisonii</i>
<i>Catenella caespitosa</i>	<i>Hildenbrandia crouaniorum</i>
<i>Ceramium ciliatum</i>	<i>Heterosiphonia plumose</i>
<i>Ceramium diaphanum</i>	<i>Hildenbrandia rubra</i>
<i>Ceramium shuttleworthianum</i>	<i>Holmsella pachyderma</i>
<i>Ceramium virgatum</i>	<i>Hydrolithon farinosum</i>
<i>Chondria dasphylla</i>	<i>Hypoglossum hypoglossoides</i>
<i>Chondrus crispus</i>	<i>Jania rubens</i> var. <i>rubens</i>
<i>Chylocladia verticillata</i>	<i>Laurenica obtusa</i>
<i>Coccotylus truncatus</i>	<i>Lithophyllum crouaniorum</i>
<i>Colaonema daviesii</i>	<i>Lithophyllum nitorum</i>
<i>Compsothamnion thuyoides</i>	<i>Lithophyllum incrustans</i>
<i>Corallina officinalis</i>	<i>Lithophyllum orbiculatum</i>
<i>Cordylecladia erecta</i>	<i>Lithothamnion glaciale</i>
<i>Cruoria pellita</i>	<i>Lithothamnion sonderi</i>
<i>Cryptopleura ramose</i>	<i>Lomentaria articulata</i>
<i>Cystoclonium purpureum</i>	<i>Lomentaria orcadensis</i>
	<i>Lomentaria clavellosa</i>

Red Algae Continued

Mastocarpus stellatus
Melobesia membranacea
Membranoptera alata
Mesophyllum lichenoides
Monospurus pedicellatus
Naccaria wiggii
Nemalion helminthoides
Nitophyllum punctatum
Osmundea hybrida
Odonthalia dentate
Osmundea pinnatifida
Palmaria palmata
Peyssonnelia dubyi
Peyssonnelia atropurpurea
Phyllophora crispa
Phycodrys rubens
Phyllophora pseudoceranoïdes
Phymatolithum calcareum
Phymatolithon laevigatum
Phymatolithon lamii
Phymatolithon lenormandii
Phymatolithon purpureum
Plagiospora gracilis
Plocamium cartilagineum
Plumaria plumosa
Polyides rotundus
Polysiphonia brodiei
Polysiphonia elongella
Polysiphonia elongata
Polysiphonia fucoïdes
Polysiphonia nigra
Polysiphonia lanosa
Polysiphonia stricta
Porphyra linearis
Porphyra purpurea
Porphyra umbilicalis
Porphyropsis coccinea
Pterocladia capillacea
Pterosiphonia parasitica
Pterothamnion plumula
Ptilota gunneria
Ptilothamnion pluma
Rhodochorton purpuruem
Rhodomela confervoides
Rhodophysema elegans
Rhodophyllis divaricata
Rhodothamniella floridula
Rhodymenia pseudopalmata
Schizymenia dubyi
Scinaia furcellata
Schottera nicaeënsis
Spermothamnion repens
Sphaerococcus coronopifolius
Sphondylothamnion multifidum
Titanoderma corallinae
Titanoderma pustulatum

Phaeophyceae –Brown Algae 70 Species

Acrothrix gracilis
Alaria esculenta
Ascophyllum nodosum
Arthrocladia villosa
Asperococcus bullosus
Asperococcus fistulosus
Botrytella micromora
Chorda filum
Chilionema ocellatum
Chordaria flagelliformis
Cladostephus spongiosus
Cutleria multifida
Desmarestia aculeate
Demarestia ligulata
Desmarestia viridis
Dichosporangium chordariae
Dictyopteris polypodioides
Dictyota dichotoma
Ectocarpus fasciculatus
Ectocarpus siliculosus
Elachista scutulata
Elachista fuciola
Eudesme virescens
Fucus ceranoides
Fucus serratus
Fucus spiralis
Fucus vesiculosus
Halidrys siliquosa
Halopteris filicina
Halosiphon tomentosus
Halothrix lumbricalis
Herponema velutinum
Himanthalia elongata
Hincksia hincksiae
Hincksia granulosa
Isthmoplea sphaerophora
Laminaria digitata
Laminaria hyperborea
Laminaria saccharina
Laminariocolax tomentosoides
Leathesia diffornis
Leptonematella fasciculata
Litosiphon laminariae
Mesogloia vermiculata
Mesogloia lanosa
Microspongium immersum
Myrionema strangulans
Pelvetia canaliculata
Petalonia fascia
Petalonia zosterifolia
Punctaria plantaginea
Pylaiella littoralis
Ralfsia verrucosa
Saccorhiza polyschides
*Sargassum muticum** (not in ref but recorded in 2005)
Sauvageaugloia griffithsiana
Scytosiphon lomentaria
Sorapion simulans
Sphacelaria caespitula
Sphacelaria cirrosa
Sphacelaria plumosa
Sphacelaria plumula
Sphaerotrichia divaricata
Sporochnus pedunculatus
Spongonema tomentosum
Stictyosiphon soriferus
Stictyosiphon tortilis
Stypocaulon scoparium
Taonia atomaria
Tilopteris mertensi

Chlorophyceae – Green Algae (26 species)

Acrosiphonia arcta
Blidingia minima
Blidingia marginata
Bryopsis plumosa
Chaetomorpha linum
Chaetomorpha melagonium
Cladophora pellucida
Cladophora sericea
Cladophora rupestris
Codium fragile subsp. tomentosoides
Enteromorpha compressa
Enteromorpha intestinalis
Enteromorpha linza
Enteromorpha muscoides
Epicladia perforans
Eugomontia sacculata
Monostroma grevillei
Ostreobium quekettii
Phaeophilia dendroides
Prasiola stipitata
Rhizoclonium riparium
Rhizoclonium tortuosum
Spongomorpha aeruginosa
Ulothrix flacca
Tellamia contorta
Ulva lactuca