

NPWS

Porcupine Bank Canyon SAC
(site code: 003001)

Conservation objectives supporting document -
Marine Habitats

Version 1

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Contents

Introduction	3
Section 1.....	5
Principal Benthic Communities	5
Porcupine Bank Canyon Reef Community Complex	5
Section 2.....	8
Appropriate Assessment Notes.....	8
Annex I Habitats	8
Bibliography	12
Figure 1. Mapped Annex I Reefs habitat in Porcupine Bank Canyon SAC	13
Figure 2. Mapped geological features which are used as indicators of the reef community complex in Porcupine Bank Canyon SAC	14

Please note that this document should be read in conjunction with the following report: NPWS (2022) Conservation Objectives: Porcupine Bank Canyon SAC 003001. Version 1.0. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

Introduction

The Porcupine Bank Canyon SAC is located in the south-west Porcupine Bank, along its western edge where it slopes down to the south-eastern Rockall Trough. It is located approximately 490km off the County Kerry coastline, and is designated for the marine Annex I qualifying interest of Reefs (1170) (Figure 1).

The national seabed mapping programme INFOMAR (Dorschel *et al.*, 2010) and the Irish National Seabed Survey (GSI, 2002) provided the offshore bathymetry data that allowed the identification of likely carbonate mounds, canyons and escarpments and these features are used as indicators of reef habitat in this SAC (Figure 2). Surveys within Porcupine Bank Canyon SAC provided information on the geology of some of these mounds (Rengstorf *et al.*, 2013), while other surveys provided biological data on a variety of geological formations within the SAC, including canyons and mounds (Guinan & Leahy, 2010; La Bianca *et al.*, 2019). A synthesis report commissioned by NPWS in 2017 (Forde *et al.*, in prep.) outlines the ecological setting, distribution and structure of reef habitat and associated communities in Irish offshore waters.

In the Irish offshore environment (i.e. waters greater than 200m in depth), reef communities are associated with geological features such as sea mounds, canyons, escarpments, flat and sloping bedrock, and boulder, cobble and/or drop-stone pavements. Some of these features are the result of erosion or glacial depositional events. The reef communities can be broadly divided into geogenic and biogenic reef. Geogenic reef is defined as rock substrate on which marine species attach and grow; biogenic reef is defined as hard substrate formed by the growth of animals which can accumulate over successive generations.

Geogenic reef in deeper water tends to be found on the continental slope, particularly in submarine canyons and on the flanks of seamounts. The communities that occur here commonly form multispecies assemblages of octocorals and antipatharians, known as coral gardens, which in turn create structural habitat for other fauna.

In Irish offshore waters, biogenic reef is largely the result of the scleractinian coral *Desmophyllum pertusum* (syn. *Lophelia pertusa*), which is common and widespread here (Forde *et al.*, in prep.). The secondary scleractinians reef-forming species *Madrepora oculata* and *Solenosmilia variabilis* also occur, the latter occurring at water depths greater than 1,000m. Coral carbonate mounds are distinct features that are formed over timescales of 1 to 2 million years by successive periods of growth, erosion and sedimentation of reef-forming corals. Morphological variation between mounds is attributed to the local environmental conditions under which the mounds are initiated and grow.

These mounds can comprise a variety of community types including coral reef, coral rubble, stabilised and mobile sediments, and cobble grounds, each supporting distinct macrofaunal communities.

In the offshore environment where reef occurs, regardless of whether it is geogenic or biogenic, biodiversity is greatly increased and therefore these communities are considered to be keystone communities. Reefs can be considered an oasis of biodiversity above what is found in surrounding waters.

Aspects of the ecology of the Annex I Reefs habitat are provided in Section 1. The corresponding site-specific conservation objective will facilitate Ireland delivering on its surveillance and reporting obligations under the EU Habitats Directive (92/43/EC), and the preservation or restoration of the integrity of the Natura 2000 site.

Ireland also has an obligation to ensure that consent decisions concerning operations/activities planned for Natura 2000 sites (also known as European sites) are informed by an appropriate assessment of the likelihood that such operations or activities are having a significant effect on the site, or adversely affecting site integrity. Further ancillary information concerning the practical application of the site-specific conservation objective and its associated targets in the completion of such assessments is provided in Section 2.

Section 1

Principal Benthic Communities

Marine habitats are frequently composed of a number of different biological communities. The development of a community complex target arises when an area possesses similar abiotic features but records a number of biological communities that are not regarded as being sufficiently stable and/or distinct, temporally or spatially, to become the focus of conservation efforts. The biological communities recorded within Porcupine Bank Canyon SAC exhibit this pattern and have been grouped together into a suitable ecological unit (i.e. community complex) upon which to develop conservation targets. The components of this complex may have certain species in common, albeit with varying prevalence, as well as physical parameters that may or may not overlap; this is recognised by identifying the relevant Marine Habitat Classification of Britain and Ireland (MHCBI) communities (Parry *et al.*, 2015) that occur within this complex.

Porcupine Bank Canyon Reef Community Complex

Within Porcupine Bank Canyon SAC, the geological features of interest are canyon systems and sea mounds (Figure 2). A large canyon runs through the site in a northeast-southwest direction, with depth ranges from approximately 500m in the east to greater than 2,500m towards the south-western boundary of the SAC. A second canyon occurs in the southern reaches of the SAC in depths greater than 2,000m. Sea mounds are largely confined to two areas within the SAC, one in the very northern margins of the site and a second area on the shelf edge midway long the main channel feature. The northern sea mounds are large, with mound bases of between 1,660ha to 108ha compared to 17ha to 93ha elsewhere.

On sea mounds at depths of between 700m and 1,100m Atlantic mid bathyal cold water coral reef (biogenic structure)¹ community occurs. This cold water coral reef is comprised of up to 10% of living scleractinian corals *Desmophyllum pertusum* (syn. *Lophelia pertusa*) and *Madrepora oculata*.

The fauna within this scleractinian framework is highly diverse. Black corals, including *Leiopathes* sp., soft corals, including *Anthomastus* sp., and a variety of gorgonian corals occur. Sponges including encrusting forms, desmospongia and glass sponges, particularly *Aphrocallistes* sp., are also present. Stalked crinoids and the unstalked crinoid *Koehlermetra porrecta* occur here. Crustaceans, including *Bathynectes* sp., *Chaecon* sp. and *Chirostylus* sp., and anemones, including *Phelliactis* sp., are present

¹ M.AtMB.Bi.CorRee

on and amongst the corals. The sea pen *Pennatula* sp. is present on the soft sediment that occurs between the coral framework.

At these depths on vertical exposed bedrock, a Mixed cold water coral community on Atlantic mid bathyal rock and other hard substrata² community occurs. While scleractinian coral species are absent, the associated species similar to those described in the previous community and the soft coral *Anthomastus* sp. is particularly prevalent here.

At depths greater than 1,450m on the flanks of canyons, a Atlantic lower bathyal cold water coral reef³ community occurs. The reef here is formed by the scleractinian coral *Solenosmilia variabilis*. Many epifaunal species occur within this framework, including the black coral *Leiopathes* sp., the bamboo coral *Eknomisis* sp., crinoids and brisingiids. Large sponge aggregations also occur here.

In areas of carbonate crust or boulders, the community Mixed cold water coral community on Atlantic lower bathyal rock and hard substrata⁴ is present. Here, coral gardens comprising of *Solenosmilia variabilis* living on boulders and rocky outcrop occur along with gardens of various corals on hard ground. Corals species present include the black corals *Stichopathes* sp., *Leiopathes* sp., the gorgonian coral *Paramuricea* sp. and bamboo corals such as *Eknomisis* sp. and *Jasonisis* sp. Brisingiids and the crinoid *Koehlermetra porrecta* are also present here. Where these gardens occur without *S. variabilis*, is Atlantic lower bathyal rock and other hard substrata⁵.

On carbonate mounds in depths of greater than 2,400m, the Atlantic upper abyssal rock and other hard substrata carbonate mounds⁶ community is present; here the stalked crinoid *Bathycrinidae* sp. dominates. On the slopes, stalked crinoids and black corals are prevalent, while on terraces the black coral *Stichopathes* sp. and the soft coral *Anthomastus grandiflorus* co-dominate.

² M.AtMB.Ro.MixCor.

³ M.AtLB.Bi.CorRee

⁴ M.AtLB.Ro.MixCor

⁵ M.AtLB.Ro

⁶ M.AtUA.Ro

Porcupine Bank Canyon Reef Community Complex	
<i>Desmophyllum pertusum</i> (syn. <i>Lophelia pertusa</i>)	<i>Madrepora oculata</i>
<i>Solenosmilia variabilis</i>	<i>Anthomastus</i> sp. *
Stalked crinoids	<i>Koehlermetra porrecta</i>
<i>Leiopathes</i> sp. *	<i>Stichopathes</i> sp. *
<i>Jasonisis</i> sp. *	<i>Eknomisis</i> sp. *
a variety of gorgonian corals	<i>Paramuricea</i> sp. *
a variety of sponges	<i>Aphrocallistes</i> sp. *
Brisingiids	<i>Bathycrinidae</i> sp. *

* As per Howell & Davies (2010)

Section 2

Appropriate Assessment Notes

Many plans and projects of a particular nature and/or size require the preparation of an environmental impact assessment of the likely effects of their planned development. While smaller operations/activities (i.e. sub-threshold developments) may not require the undertaking of such an assessment, an appropriate assessment and Natura Impact Statement is required of any project that may significantly affect the integrity of a Natura or European site. The assessment is to be used as part of the decision-making process, as to whether the project proceeds or not. The assessment should be recorded in a transparent manner, and should assess, in a reasoned manner, the likely effects on a Natura 2000 site of a proposed plan or project. General guidance on the completion of such assessments has been prepared and is available at www.npws.ie and at https://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm.

Annex I Habitats

It is worth considering at the outset that the extent and quality of all habitats varies considerably in space and time, and marine habitats are particularly prone to such variation. Habitats which are varying naturally, i.e. biotic and/or abiotic variables are changing within an envelope of natural variation, must be considered to have favourable conservation condition. Anthropogenic disturbance may be considered significant when it causes a change in biotic and/or abiotic variables in excess of what could reasonably be envisaged under natural processes. The capacity of the habitat to recover from this change is obviously an important consideration (i.e. habitat resilience) thereafter.

This Department has adopted a prioritized approach to the conservation of structure and function in marine Annex I habitats.

1. Those communities that are key contributors to overall biodiversity at a site, by virtue of their structure and/or function (keystone communities), and their low resilience should be afforded the highest degree of protection; any significant anthropogenic disturbance should be avoided.
2. In relation to the remaining constituent communities that are structurally important (e.g. broad sedimentary communities) within an Annex I marine habitat, the following must be considered:
 - 2.1. Significant anthropogenic disturbance may occur with such intensity and/or frequency as to effectively represent a continuous or ongoing source of disturbance over time and space (e.g. effluent discharge within a given area). Drawing from the principle outlined in the European Commission's Article 17 reporting framework that disturbance of greater than 25% of the

area of an Annex I habitat represents unfavourable conservation status, this Department takes the view that the cumulative area of continuous disturbance of each community type should not exceed an approximate area of 15%. Thereafter, an increasingly cautious approach is advocated. Prior to any consent being granted for any project or activities that would result in more than 15% of any Annexed marine habitat community type within a Natura site being disturbed on a cumulative basis, an inter-Departmental management review (considering *inter alia* robustness of available scientific knowledge, future site requirements, etc.) of the site is recommended.

- 2.2. Some activities may cause significant disturbance but may not necessarily represent a continuous or ongoing source of disturbance over time and space. This may arise for intermittent or episodic activities for which the receiving environment would have some resilience and may be expected to recover within a reasonable timeframe relative to the six-year reporting cycle (as required under Article 17 of the Directive). This Department is satisfied that such activities could be assessed in a context-specific manner giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat, in combination with other activities within the designated site.

The following technical clarification is provided in relation to specific conservation objectives and targets for Annex I habitat Reefs in order to facilitate the analysis required for the appropriate assessment process:

Objective To maintain the favourable conservation condition of reefs in Porcupine Bank Canyon SAC, which is defined by the following list of attributes and targets

Target 1	The permanent habitat area is stable or increasing, subject to natural processes
▪	In the deep water environment, reef habitat is associated with geological features such as canyons, sea mounds, terraces and escarpments. In Porcupine Bank Canyon SAC, sea mounds, canyons and escarpments features have been used as indicators of the likely distribution of reef habitat in this SAC (Figure 2). However, it should be noted that the area and distribution of Reefs within this SAC is an approximation. The full extent of the aforementioned geological features and certain topographies, such as rock outcrops and cobble or boulder fields, may not have been mapped.

- Reefs may further encompass other topographic features, including vertical rock wall, ledges, overhangs, sloping or flat bedrock, and boulder and cobbles fields. Therefore, the reference area for the habitat is likely to be a gross underestimate of the actual area present due to the three-dimensional nature of this habitat.
- This target refers to the permanent amount of habitat area within the site. It needs to be considered particularly when assessing the effects of projects, plans, activities or operations that propose to permanently remove habitat from the site, thereby reducing the permanent amount of habitat area within it. It does not incorporate the consideration of long or short term disturbance of the biology of a site.
- Early consultation or scoping with this Department in advance of a formal application to a consenting authority is advisable for such proposals.

Target 2	The distribution of reefs is stable or increasing, subject to natural processes
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- The mapping of the seafloor with sophisticated acoustic systems, followed by surveying of identified features with camera systems attached to Remotely Operated Vehicles (ROV), has allowed the distribution of certain geological features to be used as indicators of the likely distribution of reef habitat. In the case of the Porcupine Bank Canyon SAC, sea mounds and canyons features are the indicators of reef in this SAC (Figure 2).
- Both biogenic and geogenic reef communities are considered to be keystone communities that are of considerable importance to the overall ecology and biodiversity of a habitat by virtue of their physical complexity; any significant anthropogenic disturbance to the distribution of these features within the site should be avoided.
- This target is relevant to activities or operations that propose to permanently remove reef habitat, thus reducing the range over which this habitat occurs within the SAC. Reef habitat includes any hard substrate, including coral rubble. This target does not consider the long or short term disturbance of the biology of reef habitats.
- Early consultation or scoping with the Department in advance of a formal application is advisable for such proposals.

Target 3	Maintain the structural integrity of the Porcupine Bank Canyon reef community complex
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- For biogenic reef, this target requires that the three-dimensional structure of the reef remains intact and that the proportion of living-to-dead reef remains within the range expected through natural processes.
- For geogenic reef, this requires the continuing occurrence of large erect epifaunal species.
- It also requires that no evidence of increased siltation over the reef feature is present.
- Any significant anthropogenic disturbance to the structural integrity of these features within the SAC should be avoided.

Target 4	Conserve the Porcupine Bank Canyon Reef community complex in a natural condition
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- Biodiversity on both biogenic and geogenic reefs is dependent on the presence of habitat-forming coral species. In the Irish waters, three species of scleractinian corals form this biogenic reef. *Desmophyllum pertusum* (syn. *Lophelia pertusa*) occurs at shallower depth than *Solenosmilia variabilis* with the change of species occurring between 1,000m to 1,200m. The third species *Madrepora oculata* is usually found in association with *D. pertusum* reef. On geogenic reef, a number of species of Alcyonacean and Antipatharian corals, as well as large sponge species that have the potential to be habitat-forming, are found in Irish waters.
- A semi-quantitative description of the Porcupine Bank Canyon Reef community complex at this SAC has been provided in Section 1.
- An interpolation of their likely distribution is provided in Figure 2.
- Within Porcupine Bank Canyon SAC, the estimated area of known and likely features are:

Sea mounds	810ha
Canyons	181km

- This target relates to the structure and function of the reef and therefore it is of relevance to those activities that may cause disturbance to the ecology of the habitat.
- Any significant anthropogenic disturbance to the faunal assemblages of reef habitat within the SAC should be avoided.

Bibliography

- Dorschel, B., Wheeler, A.J., Monteys, X. & Verbruggen, K. (2010). Atlas of the deep-water seabed: Ireland. Springer, Netherlands, 1–164.
- Forde, J., Allcock, L. & Grehan, A. (in prep.). Reef Habitat in Irish Offshore Waters – A synthesis of current knowledge. Irish Wildlife Manuals, No. XXX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland).
- Geological Survey of Ireland (GSI) (2002). Report of the Survey in Zone 3 of the Irish National Seabed Survey, Volume 1: Describing the Results and the Methods Used, GOTECH, Dublin.
- Guinan, J. & Leahy, Y. (2010). Habitat Mapping of Geogenic Reef Offshore Ireland. A report to National Parks and Wildlife Service.
- Howell, K.L. & Davies, J.S. (2010). Deep-sea species image catalogue. DeepSeaCRU, Marine Biology and Ecology Research Centre, University of Plymouth. On-line version 2, 2016.
- La Bianca, G., Ross, R. & Howell, K. (2019). SEAROVER 2018 Deep Water Reef Habitat & Species Video Analysis Full Report, Commissioned by Marine Institute, Rinnville, Oranmore, Co. Galway.
- Parry, M.E.V., K.L. Howell, B.E. Narayanaswamy, B.J. Bett, D.O.B. Jones, D.J. Hughes, N. Piechaud, T.D. Nickell, H. Ellwood, N. Askew, C. Jenkins and E. Manca (2015). A Deep-sea Section for the Marine Habitat Classification of Britain and Ireland. JNCC report 530. ISSN 0963 8901 In: JNCC (2015). The Marine Habitat Classification for Britain and Ireland Version 15.03. [Date accessed]. Available from: <https://mhc.jncc.gov.uk/>
- Rengstorf, A.M., Yesson, C., Brown, C. & Grehan, A.J. (2013). Raster grids detailing habitat suitability for *Lophelia pertusa* reefs in the Irish continental margin. PANGAEA, <https://doi.org/10.1594/PANGAEA.810467>

Figure 1. Mapped Annex I Reefs habitat in Porcupine Bank Canyon SAC

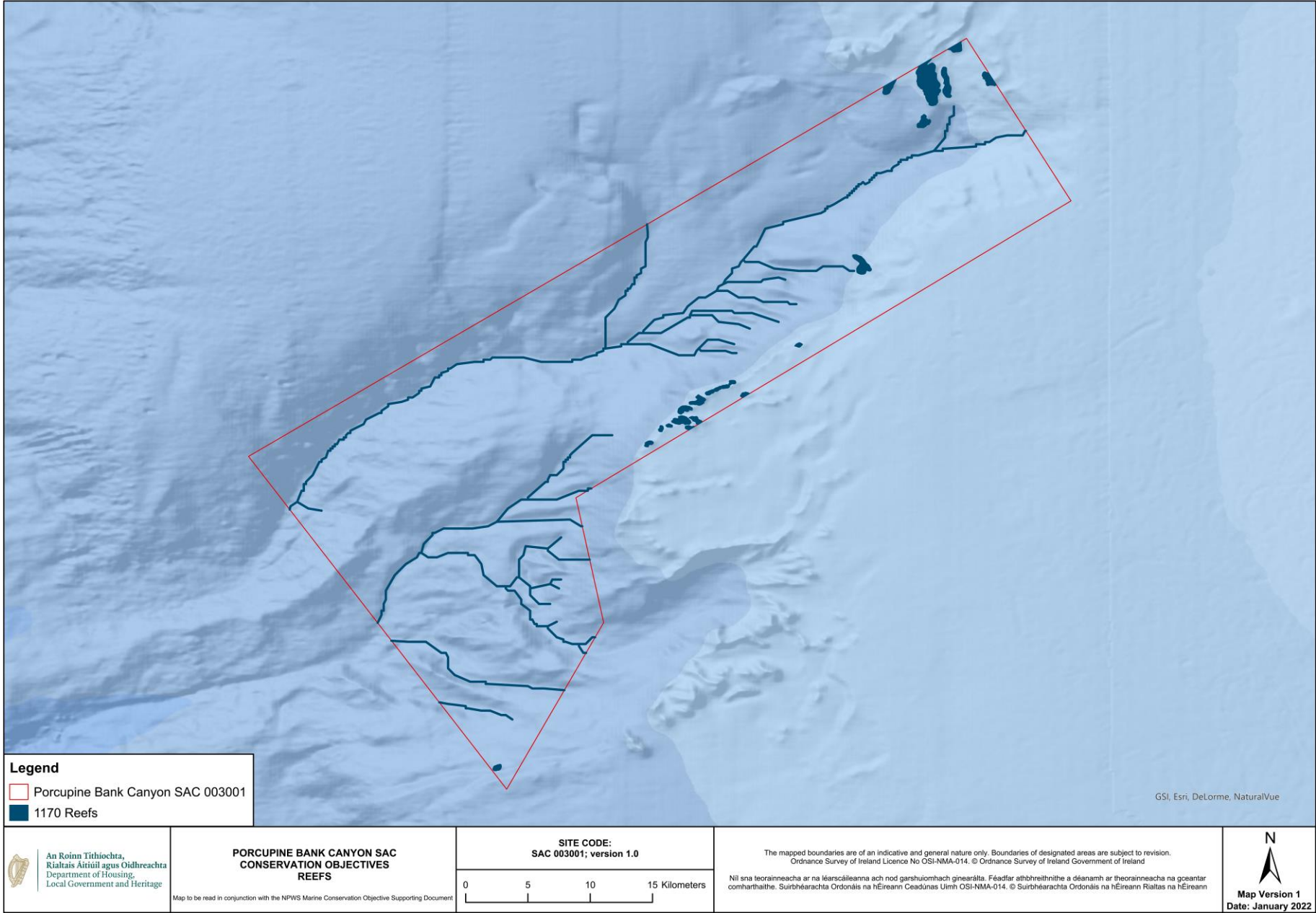


Figure 2. Mapped geological features which are used as indicators of the reef community complex in Porcupine Bank Canyon SAC

