

NPWS

**Inishmore Island SAC
(site code: 213)**

**Conservation objectives supporting document -
Marine Habitats**

**Version 1
January 2015**

Introduction

Inishmore Island SAC is designated for the marine Annex I qualifying interests of Reefs and Submerged or partially submerged sea caves (Figures 1 and 2).

A BioMar survey of this site was carried out in 1993 (Picton and Costello, 1997), a seacave survey and intertidal and subtidal reef surveys were undertaken in 2012 (MERC, 2012 and MERC, 2013); these data were used to determine the physical and biological nature of this SAC.

The distribution and ecology of intertidal or subtidal seacaves has not previously been the subject of scientific investigation in Ireland and the extents of very few individual caves have been mapped in detail. Whilst surveys undertaken in the UK indicate the structure and functions of seacaves are largely influenced by hydrodynamic forces and water quality, no such information is yet available for Ireland.

Aspects of the biology and ecology of the Annex I habitat are provided in Section 1. The corresponding site-specific conservation objectives will facilitate Ireland delivering on its surveillance and reporting obligations under the EU Habitats Directive (92/43/EC).

Ireland also has an obligation to ensure that consent decisions concerning operations/activities planned for Natura 2000 sites are informed by an appropriate assessment where the likelihood of such operations or activities having a significant effect on the SAC cannot be excluded. Further ancillary information concerning the practical application of the site-specific objectives and targets in the completion of such assessments is provided in Section 2.

Section 1

Principal Benthic Communities

Within Inishmore Island SAC, four community types are recorded in the reefs and caves habitats. The Annex I habitats in which they are recorded is presented in table 1 and a description of each community type is given below.

	Annex I Habitats	
	Reefs (1170)	Submerged or partially submerged sea caves (8330)
Intertidal reef community complex	✓	
Subtidal reef community complex	✓	
<i>Laminaria</i> -dominated community complex	✓	
Sea cave community complex		✓

Table 1 The community types recorded in Inishmore Island SAC and their occurrence the Annex I habitats for which the site is designated.

Estimated areas of each community type within the Annex I habitat, based on interpolation, are given in the objective targets in Section 2.

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. In this case, examination of the available data from Inishmore Island identified a number of biological communities whose species composition overlapped significantly. Such biological communities are grouped together into what experts consider are sufficiently stable units (i.e. a complex) for conservation targets.

INTERTIDAL REEF COMMUNITY COMPLEX

This reef community complex occurs extensively on the eastern shore of the island with only two breaks at Killeaney Bay and Portmurvey; it occurs on the south western shore from Poll na hPeist to An Poll Gorm and from Dabhach an tSnamha to Aill na nGlasog. It is also recorded around Brannock Island and Rock Island in the northwest of the site (Figure 3).

The exposure regime throughout is that of exposed reef, being slightly less exposed on the northern shore of the island, with a very small area of moderately exposed reef at Cill Mhuirbhigh Beach. Less exposed shores can also be found on the North Sound in inlets whose sides greatly reduce the amount of Atlantic swell that can enter them. They are however, affected by the winter Atlantic storms, which practically denude them of vegetation.

The reef consists of vertical sea cliffs, particularly on the south western shore of the island. These cliffs occur with wave cut platforms, crevices and ledges; the platforms consist of pitted limestone forming a series of terraces interspersed with rock pools. On the more gently sloping north eastern side of the island occasional cobble and boulder beaches occur.

This community complex ranges from barnacles and fucoids to mussels and barnacles with the lichens *Xanthoria parietina*, *Lichina pygmaea* and *Verrucaria maura* (Table 2). The green alga, *Ulva intestinalis* is abundant on the level sections of terrace while the red alga *Porphyra umbilicalis* is recorded on the Atlantic side of the island. The coralline alga *Jania rubens* and encrusting coralline algal species are frequent in the rock pools throughout, with the brown alga *Laminaria digitata*, *Halidrys siliquosa* and *Bifurcaria bifurcata* occasionally occurring in the deeper pools.

The barnacle *Semibalanus balanoides*, the bivalve *Mytilus edulis* and *Fucus vesiculosus* and the gastropod *Patella vulgata* are common within this complex. Other species present include the algae *Pelvetia canaliculata*, *Fucus serratus*, *Himanthalia elongata*, *Mastocarpus stellatus*, *Ulva* sp. and *Alaria esculenta* and the gastropods *Osilinus lineatus*, *Gibbula cineraria*, *Gibbula umbilicalis*, *Calliostoma zizyphinum* and *Nucella lapillus* and the anthozoan *Actinia equina*. The green alga *Codium* sp. is rare and only recorded from Frenchman's Bay where the gastropod *Littorina littorea* is abundant. Large individuals of the mussel *Mytilus edulis* are recorded where the reef is somewhat less exposed.

Species associated with the Intertidal community complex	
<i>Pelvetia canaliculata</i>	<i>Semibalanus balanoides</i>
<i>Jania rubens</i>	<i>Ulva intestinalis</i>
<i>Fucus vesiculosus</i>	<i>Mytilus edulis</i>
<i>Laminaria digitata</i>	<i>Xanthoria parietina</i>
<i>Fucus serratus</i>	<i>Marthasterias glacialis</i>
<i>Alcyonium digitatum</i>	<i>Lichina pygmaea</i>
<i>Patella vulgata</i>	<i>Verrucaria maura</i>
<i>Echinus esculentus</i>	<i>Porphyra umbilicalis</i>

Table 2 Species associated with the Intertidal community complex.

SUBTIDAL REEF COMMUNITY COMPLEX

This community complex occurs off the Atlantic coast of Inishmore, through Gregory's Sound and at the northern extreme of the site (Figure 3). It is recorded in water depths of between 25m and 60m. The exposure regime throughout is that of exposed reef.

The substrate is that of limestone bedrock which forms steep vertical cliff faces with limestone terraces and flat bedrock, particularly on the Atlantic side of the island. The terraces form vertical walls and ledges as they slope towards the deepest reefs composed almost entirely of limestone platforms.

The species associated with this community complex include the sponge *Cliona celata*, the anthozoans *Urticina felina* and *Caryophyllia smithii* and the hydroid *Nemertesia antennina* with the soft coral *Alcyonium digitatum* being frequent on the vertical faces (Table 3). The echinoderms *Echinus esculentus*, *Pawsonia saxicola*, *Henricia oculata* and *Marthasterias glacialis* are also recorded here. A number of the limestone ledges surrounding Inishmore support communities of the anthozoan *Eunicella verrucosa*, and the site is also known to host one of Ireland's few populations of the purple sea urchin *Paracentrotus lividus*.

Species associated with the Subtidal reef community complex	
<i>Cliona celata</i>	<i>Ctenolabrus rupestris</i>
<i>Nemertesia antennina</i>	<i>Polymastia boletiformis</i>
<i>Urticina felina</i>	<i>Haliclona viscosa</i>
<i>Henricia oculata</i>	<i>Caryophyllia smithii</i>
<i>Echinus esculentus</i>	<i>Pawsonia saxicola</i>
<i>Trisopterus minutus</i>	

Table 3 Species associated with the Subtidal reef community complex.

LAMINARIA-DOMINATED COMMUNITY COMPLEX

With the exception of Killeaney Bay and Portmurvey, this community surrounds the islands within this SAC. This exposure regime ranges from sheltered to exposed reef and it occurs on a range of substrates including flat and sloping bedrock to boulder/cobble fields. The water clarity at this site results in a kelp zone (dominated by *Laminaria hyperborea*) extending to at least 25m depth.

The species associated with this community include the kelp species *Laminaria hyperborea* and foliose red algae including *Acrosorium ciliolatum*, *Delesseria sanguinea*, *Kallymenia reniformis* and *Phycodrys rubens* (Table 4). Near Poll na bPeist a band of *Laminaria digitata* occurs on a vertical wall along the sublittoral fringe followed by a dense carpet of barnacles with abundant seed mussel on pitted limestone terrace. Fauna recorded within this complex

include the echinoderms *Echinus esculentus*, *Luidia ciliaris*, *Asterias rubens*, *Henricia oculata* and *Holothuria (Panningothuria) forskali*, the sponges *Clathrina coriacea* and *Pachymatisma johnstonia*, the hydroids *Sertularella polyzonias*, *Aglaophenia pluma* and *Plumularia setacea* and the colonial ascidian *Botryllus schlosseri*.

Species associated with the <i>Laminaria</i> -dominated community complex	
<i>Acrosorium venulosum</i>	<i>Henricia oculata</i>
Coralline algae indet.	<i>Holothuria (Panningothuria) forskali</i>
<i>Kallymenia reniformis</i>	<i>Clathrina coriacea</i>
<i>Laminaria hyperborea</i>	<i>Pachymatisma johnstonia</i>
<i>Dictyopterus membranacea</i>	<i>Callophyllis laciniata</i>
<i>Ctenolabrus rupestris</i>	<i>Phyllophora crispa</i>
<i>Delesseria sanguinea</i>	<i>Plocamium cartilagineum</i>
<i>Echinus esculentus</i>	<i>Phycodrys rubens</i>
<i>Dictyota dichotoma</i>	<i>Sertularella polyzonias</i>
<i>Luidia ciliaris</i>	<i>Aglaophenia pluma</i>
<i>Cliona celata</i>	<i>Haraldiophyllum bonnemaisonii</i>
<i>Electra pilosa</i>	<i>Botryllus schlosseri</i>
<i>Corynactis viridis</i>	<i>Labrus bergylta</i>
<i>Alcyonium digitatum</i>	<i>Phoronis hippocrepia</i>
<i>Caryophyllia smithii</i>	<i>Bonnemaisonia asparagoides</i>
<i>Dilsea carnosa</i>	<i>Plumularia setacea</i>
<i>Asterias rubens</i>	<i>Meredithia microphylla</i>

Table 4 Species associated with the *Laminaria*-dominated community complex.

SEA CAVE COMMUNITY COMPLEX

Two known submerged seacaves on south western shore of Inishmore Island, namely Poll na pBeist (also known as the Worm Hole) and Glassan Cave, were surveyed. The former is located just south of the Blind Sound at Dunaengus, while the latter is located on the most southern tip towards the Gregory Sound (Figure 2).

Poll na bPeist has an entrance at approximately 12m BCD on a vertical cliff face. An unusual feature is the second opening of the cave on the landward side thought to be the remnants of a blow hole (c. 24m x 9m). The floor is undulating and composed of scattered bedrock and boulders. The cave runs approximately 49m south-north through limestone pavement. The walls are undercut in a series of ledges forming horizontal crevices in the limestone. This cave

comprises of a gently sloping tunnel section (20m long) ranging from 7m to 8m height at the mouth to 5m at the cavern and landward end of the cave.

The entrance to Glassan Cave is located on a vertical limestone cliff face approximately 12m BCD. It is an extensive sea cave extending inland for a distance of 120m and is the most extensive submerged sea cave known on the Aran Islands. The cave ranges from 8m height at the entrance to 5m towards the centre and back. The width ranges between 27m and 40m with the minimum width of 27m towards the centre of the cave. The area of cliff face above the cave entrance protrudes, reducing the amount of available light from above. Natural light filtering into the cave quickly disappears, leaving the cave in complete darkness within approximately 50m of the mouth. The cave floor, formed from limestone bedrock, is relatively level and slopes very gently upwards from the mouth. A layer of rippled sediment (medium sand with broken shell) approximately 15cm to 20cm deep covers the entire floor of the cave. Large ledges/crevices have formed as a horizontal undercut along the walls of the cave on either side for most of its length. Some of these ledges have an accumulation of fine sand and silt on the lower surface. Large and small boulders occur towards the rear of the cave. Some freshwater seepage into the cave is apparent.

At the entrance to the caves the brown algae, *Laminaria hyperborea* with heavily epiphytised stipes, *Delesseria sanguinea* and occasionally *Dictyota dichotoma* are recorded. The echinoderms *Asterias rubens* and *Marthasterias glacialis* are frequently present with the urchin *Echinus esculentus* present to almost mid-way into the cave systems on the lower section of the cave walls. Where medium grained rippled sand covers the floor of the cave patches of the sulfur-oxidising bacteria *Beggiatoa* are common and large specimens of the anemone *Urticina felina* (> 20cm across) occur; otherwise this sediment is species poor. The soft coral *Alcyonium digitatum* is present at the cave entrance at Poll na bPeist and on the ledges at its outer reaches but it is absent further into the cave, while at the Glassan Cave it is recorded 20m into the cave as part of the diverse sponge community.

The upper section of the cave walls and the roof are completely carpeted with a diverse sponge community dominated by *Pachymatisma johnstonia* and *Cliona celata*, the former occurring as very large specimens. The sponges *Dercitus bucklandi* with *Haliclona viscosa* and *Clathrina coriacea* are frequent at Poll na bPeist while the hydroid *Nemertesia antennina* and the sponge *Alcyonium digitatum* are frequent and abundant respectively at the Glassan Cave. The anthozoans *Corynactis viridis* and *Sagartia elegans* are occasionally recorded on the upper walls and roof of the tunnels. On ledges and overhangs within the tunnel section crustaceans such as *Homarus gammarus*, *Maja squinado* and *Necora puber* are recorded in Poll na bPeist while in Glassan Cave echinoderms such as *Echinus esculentus* and *Holothuria forskali* are recorded.

Towards the back of the Poll na bPeist cave, where light penetration from the opening above occurs, the algae *Laminaria digitata* and *Alaria esculenta* and occasionally *Laminaria hyperborea* occur; the anemone *Caryophyllia smithii*, the echinoderm *Asterias rubens* and the sponge *Cliona celata* are also recorded here. In contrast, further into the Glassan Cave beyond 20m, the anemone *Cerianthus lloydii* is abundant with the anemones *Peachia cylindrica* and *Urticina felina* recorded as frequent and occasional, respectively. The species associated with this complex are given in Table 5.

Species associated with the Sea cave community complex	
<i>Ophiactis balli</i>	<i>Pachymatisma johnstonia</i>
<i>Laminaria hyperborea</i>	<i>Alcyonium digitatum</i>
<i>Cliona celata</i>	<i>Nemertesia antennina</i>
<i>Corallinaceae</i>	<i>Asterias rubens</i>
<i>Aurelia aurita</i>	<i>Bugula flabellata</i>
<i>Delesseria sanguinea</i>	<i>Caryophyllia smithii</i>
<i>Dercitus bucklandi</i>	<i>Sagartia elegans</i>
<i>Urticina felina</i>	<i>Corynactis viridis</i>
<i>Holothuria forskali</i>	<i>Echinus esculentus</i>
<i>Stelligera rigida</i>	<i>Clathrina coriacea</i>
<i>Cerianthus lloydii</i>	<i>Thyrosia guernei</i>
<i>Spirorbinae indet.</i>	<i>Peachia cylindrica</i>
<i>Maja squinado</i>	<i>Palaemon serratus</i>
<i>Aspersa conchilega</i>	<i>Homarus gammarus</i>
<i>Dendrodoa grossularia</i>	

Table 5 Species associated with the Sea cave community complex.

Section 2

Appropriate Assessment Notes

Many operations/activities of a particular nature and/or size require the preparation of an environmental impact statement of the likely effects of their planned development. While smaller operations/activities (i.e. sub threshold developments) are not required to prepare such statements, an appropriate assessment and Natura Impact Statement is required to inform the decision-making process in or adjacent to Natura 2000 sites. The purpose of such an assessment is to record in a transparent and reasoned manner the likely effects on a Natura 2000 site of a proposed development. General guidance on the completion of such assessments has been prepared and is available at www.npws.ie.

Annex I Habitats

It is worth considering at the outset that in relation to Annex I habitat structure and function, 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 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 and 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, there are two considerations.
 - 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 licensing of activities likely to cause continuous disturbance of each community type should not exceed an approximate area of 15%. Thereafter, an increasingly cautious approach

is advocated. Prior to any further licensing of this category of activities, 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 habitats to facilitate the appropriate assessment process:

Objective **To maintain the favourable conservation condition of Reefs in Inishmore Island SAC, which is defined by the following list of attributes and targets**

Target 1	The permanent area is stable or increasing, subject to natural processes.
	<ul style="list-style-type: none">▪ The area of this habitat represents the minimum estimated area of reef at this site and underestimates the actual area due to the many areas of sheer and steeply sloping rock within the reef habitat.▪ This target refers to activities or operations that propose to permanently remove habitat from the site, thereby reducing the permanent amount of habitat area. It does not refer to long or short term disturbance of the biology of a site.▪ Early consultation or scoping with the Department in advance of formal application is advisable for such proposals.

Target 2	The distribution of reefs is stable or increasing, subject to natural processes.
	<ul style="list-style-type: none">▪ The likely distribution of reef habitat in this SAC is indicated in figure 1.▪ This target refers to activities or operations that propose to permanently remove reef habitat, thus reducing the range over which this habitat occurs within the site. It does not refer to long or short term disturbance of the biology of reef habitats.▪ Early consultation or scoping with the Department in advance of formal application is advisable for such proposals.

Target 3 Conserve the following community types in a natural condition: Intertidal reef community complex, *Laminaria*-dominated community complex and Subtidal reef community complex.

- A semi-quantitative description of the communities has been provided in Section 1.
- An interpolation of their likely distribution is provided in figure 3.
- The estimated areas of the communities within the Reefs habitat given below are based on spatial interpolation and therefore should be considered indicative. In addition, as this habitat contains significant areas of sheer and steeply sloping rock, the mapped community extents will be underestimated:
 - Intertidal reef community complex - 281ha
 - *Laminaria*-dominated community complex -4,167ha
 - Subtidal reef community complex -1,883ha
- 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.
- Significant continuous or ongoing disturbance of communities should not exceed an approximate area of 15% of the interpolated area of each community type, at which point an inter-Departmental management review is recommended prior to further licensing of such activities.
- Proposed activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may 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.

Objective To maintain the favourable conservation condition of Submerged or partially submerged sea caves in Inishmore Island SAC, which is defined by the following list of attributes and targets

Target 1 The permanent area of known sea caves is stable or increasing, subject to natural processes.

- The area of this habitat represents the minimum estimated area of sea caves at this site. Only two seacaves have been mapped and there may be as yet unknown seacaves at this site.
- This target refers to activities or operations that propose to permanently remove habitat from the site, thereby reducing the permanent amount of habitat area. It does not refer to long or short term disturbance of the biology of a site.

- Early consultation or scoping with the Department in advance of formal application is advisable for such proposals.

Target 2 The distribution of sea caves occurring in the site is stable, subject to natural processes.

- The likely distribution of seacaves in this SAC is indicated in figure 2.
- This target refers to activities or operations that propose to permanently remove seacave habitat thus reducing the range over which this habitat occurs within the site. It does not refer to long or short term disturbance of the biology of seacave habitats.
- Early consultation or scoping with the Department in advance of formal application is advisable for such proposals.

Target 3 Conserve the following community type in a natural condition: Sea cave community complex.

- A semi-quantitative description of this community complex has been provided in Section 1.
- The estimated area of this community complex within the Submerged or partially submerged sea caves habitat given below is based on measurements taken at fixed points within the cave; therefore given the irregular shape and the stylised three-dimensional representation of the cave it should be considered indicative.
 - Sea cave community complex - 1.0ha
- This target relates to the structure and function of the sea cave and therefore it is of relevance to those activities that may cause disturbance to the ecology of the habitat.
- Significant continuous or ongoing disturbance of the community should not exceed an approximate area of 15% of the interpolated area of each community type, at which point an inter-Departmental management review is recommended prior to further licensing of such activities.
- Proposed activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may 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.

Target 4 Human activities should occur at levels that do not adversely affect the ecology of sea caves at the site.

- This target relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality) that are likely to drive or influence community structure of sea caves in the site. In the absence of complete knowledge on these elements in this site, such considerations should be assessed where appropriate on a case-by-case basis.

Bibliography:

MERC (2012). Survey of Irish Sea Caves. Carried out by MERC on behalf of the Marine Institute in partnership with National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

MERC (2013). Intertidal and Subtidal Reef Survey of Inishmore Island SAC and Inishmore SPA. Carried out by MERC on behalf of the Marine Institute National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Picton, B.E. and Costello M. J. (1997). The BioMar biotope viewer: a guide to marine habitats, fauna and flora in Britain and Ireland, Environmental Sciences Unit, Trinity College, Dublin.

Figure 1. Extent of Reefs in Inishmore Island SAC

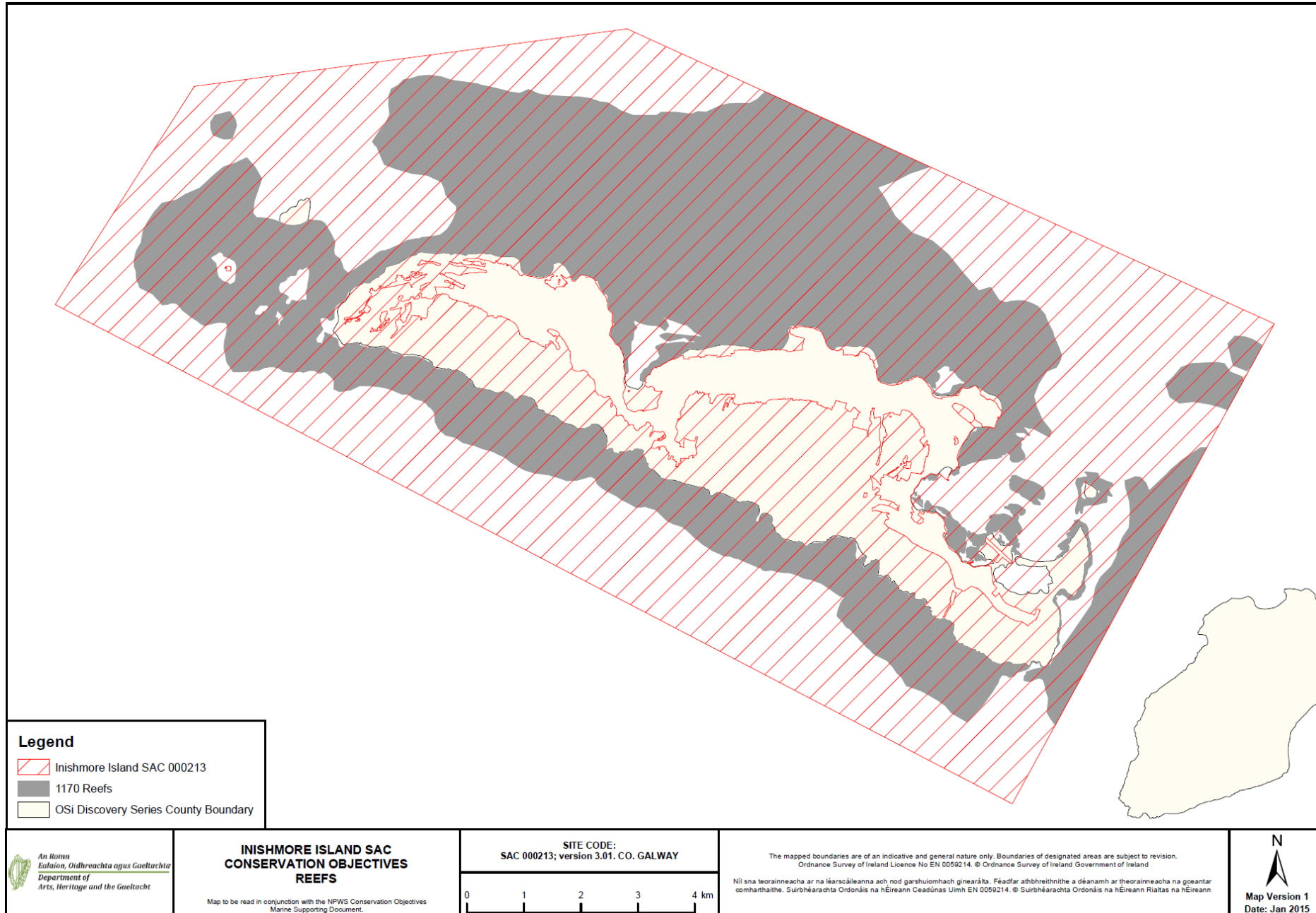


Figure 2. The expected distribution of sea caves in Inishmore Island SAC

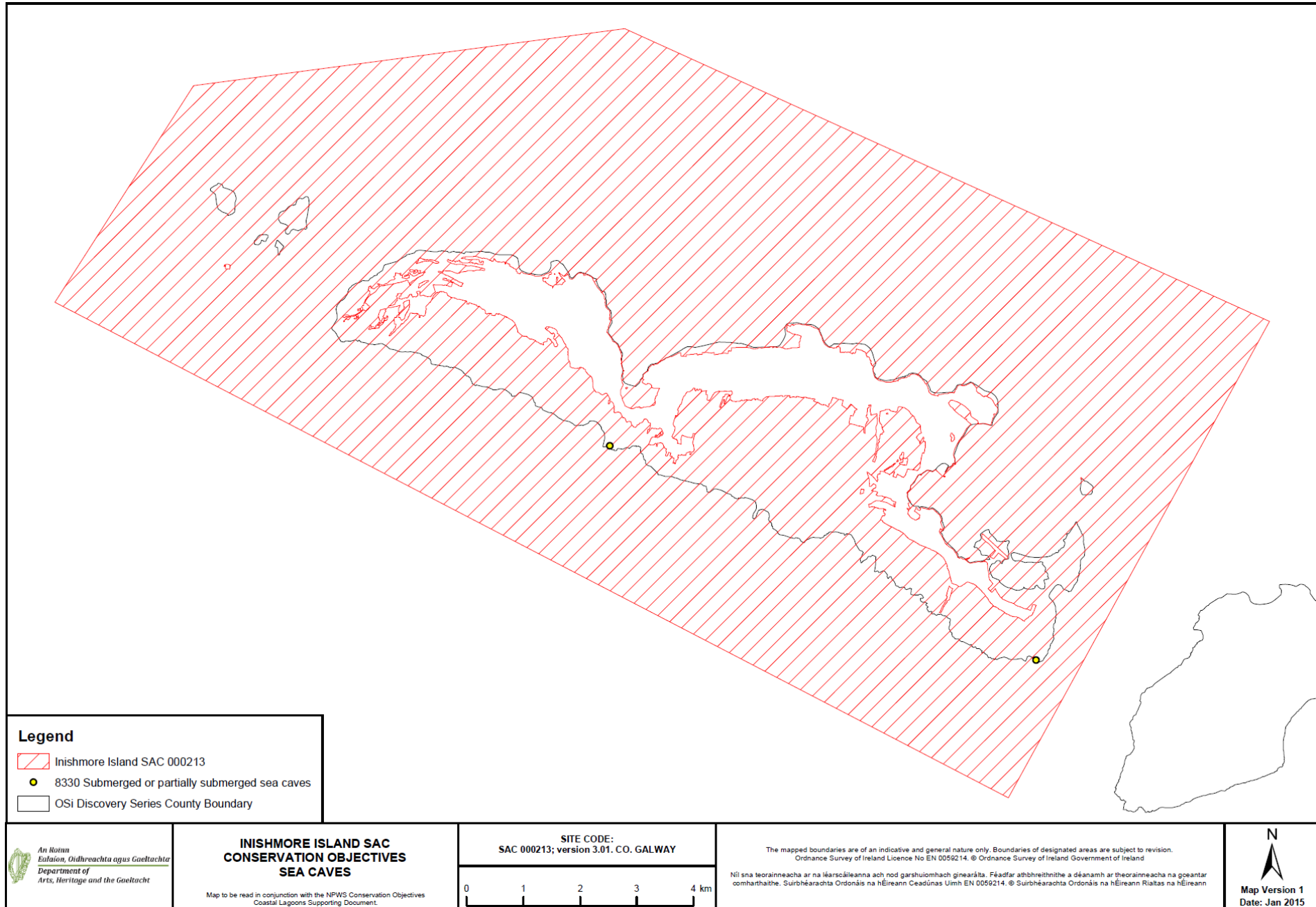


Figure 3. Distribution of community types in Inishmore Island SAC

