NPWS

# Kilkieran Bay and Islands SAC (site code: 2111)

## Conservation objectives supporting document - marine habitats and species

Version 1

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## Introduction

Kilkieran Bay and Islands SAC is designated for the Annex I qualifying interests of Large shallow inlets and bays, Mudflats and sandflats not covered by seawater at low tide and Reefs (Figures 1, 2 and 3) and the Annex II species *Phoca vitulina* (harbour seal, also known as the common seal). The Annex I habitat Large shallow inlets and bays is a large physiographic feature that may wholly or partly incorporate other Annex I habitats including mudflats and sandflats and reefs within its area.

Intertidal and subtidal surveys of Kilkieran Bay and Islands SAC were undertaken in 2001 and 2002 (SSI, 2003) and 2010 (APEM, 2011; Aquafact, 2011a; Aquafact, 2011b). In 2005, a dive survey was carried out to map the sensitive communities at this site (MERC, 2005). All of these data, together with data from the BioMar survey carried out in 1997 (Picton & Costello, 1997) and a Marine Institute oyster survey in winter 2010-2011 (Tully & Clarke, 2012), were used to investigate the physical and biological structure of this site.

In addition to the records compiled from historical Wildlife Service site visits and regional surveys (Summers *et al.*, 1980; Warner, 1983; Harrington, 1990; Doyle, 2002; Lyons, 2004), a comprehensive survey of the Irish harbour seal population was carried out in 2003 (Cronin *et al*, 2004). A repeat survey was conducted in the west of Ireland in 2011 and the associated distribution data have been included in this document.

Aspects of the biology and ecology of the Annex I habitats and the Annex II species 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 site 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 Kilkieran Bay and Islands SAC twelve community types are recorded; the Annex I habitats in which they occur are presented in Table 1 and a description of each of these is given below.

| Community Type | Habitat Code | | |
|---|---|---|---|
| | 1140 | 1160 | 1170 |
| *Zostera*-dominated community complex | | ✓ | |
| Maërl-dominated community complex | | ✓ | |
| *Pachycerianthus multiplicatus*-dominated community | | ✓ | |
| Intertidal sand with polychaetes community complex | ✓ | ✓ | |
| Mixed sediment dominated by polychaetes community complex | | ✓ | |
| Sand with nemerteans and crustaceans community complex | | ✓ | |
| Deep water sand dominated by bivalves and polychaetes community complex | | ✓ | |
| Intertidal reef community complex | | ✓ | ✓ |
| Subtidal sponge and ascidian community complex | | ✓ | ✓ |
| Deep water faunal crust and sponge community complex | | ✓ | ✓ |
| Exposed to moderately exposed subtidal reef community complex | | ✓ | ✓ |
| *Laminaria*-dominated community complex | | ✓ | ✓ |

**Table 1** The community types recorded in Kilkieran Bay and Islands SAC and the Annex I habitats in which they occur.

Estimated areas of each community type within each 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 the Kilkieran Bay and Islands SAC 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.

### *ZOSTERA*-DOMINATED COMMUNITY COMPLEX

Extensive areas of the sea grass *Zostera marina* occur within this site at depths of less than 10m. In Kilkieran Bay they are recorded due west of Greeve Island, between Kinnelly Islands and Illaunnakirka, north-west of Lettermore Island and between Ardmore Point and the Birmore Islands. Smaller areas occur at the mouth of Ard Bay, in Mweenish Bay and in Greatman's Bay at Carraveg (Figure 4 a & b). Scattered patches occur elsewhere within the site.

Within the beds, density of *Z. marina* is generally recorded as abundant (>12 individuals per $m^2$), however the size of these beds vary considerably. They may occur as a continuous large bed as in Mweenish Bay or as scattered smaller patches as between Ardmore Point and Finish Island and also in upper Greatman's Bay. It co-occurs with maërl in a number of areas, notably upper Greatman's Bay, west of Greeve Island and south of Kinnelly Islands and Illaunnakirka.

The sediment within this complex ranges from sand (medium sand ranges from 1% to 20% and fine sand from 1% to 25%) to coarse sediment (gravel from 10% to 37% and very coarse sand from 30% to 52%).

The polychaetes *Mediomastus fragilis*, *Minuspio multibranchiata* and *Polyophthalmus pictus*, the amphipod *Parametaphoxus fultoni* and the bivalve *Parvicardium scabrum* all occur in moderate abundances within this community complex. To the west of Greeve Island the bivalve *Ostrea edulis* is recorded densities of between 0.5 and 2.5$m^{-2}$. The anemone *Anemonia viridis* is also recorded here (Table 2).

| Species associated with the *Zostera*-dominated community complex | |
|---|---|
| *Zostera marina* | *Minuspio multibranchiata* |
| *Parametaphoxus fultoni* | *Parvicardium scabrum* |
| *Polyophthalmus pictus* | *Prionospio fallax* |
| Nemertea spp. | *Paradialychone filicaudata* |
| *Caulleriella alata* | *Eteone longa* |
| *Sthenelais boa* | *Anemonia viridis* |
| *Exogone hebes* | *Ostrea edulis* |
| *Mediomastus fragilis* | |

**Table 2** Species associated with the *Zostera*-dominated community complex.

### MAËRL-DOMINATED COMMUNITY COMPLEX

This community complex is found extensively throughout the site in depths between 3m and 21m. Within the main channel of Kilkieran extensive beds occur from Turlough Point in the north of the bay to Illaunerragh in its outer reaches. A similarly extensive bed occurs from the mouth of Greatman's Bay to its inner reaches at Illaunnanunra. Smaller beds are recorded within Camus Bay from Greeve Island to Muckanaghederdauhaulia (Figure 4 a & b).

Kilkieran Bay is one of three localities in Ireland where three species of the free-living red calcareous algae (maërl) *Lithothamnion corallioides*, *Lithophyllum dentatum* and *Lithothamnion fasciculatum* are known to co-occur. Of these, *L. corallioides* is the dominant species within this community complex. Maërl, as noted above, occasionally co-occurs with *Zostera marina*.

Within this site maërl exists in a number of forms; it may be live maërl, dead maërl (maërl gravel) or mixtures of gravel, mud and maërl. It also occurs as dunes.

In areas of maërl gravel the brittlestar *Amphipholis squamata* is numerically dominant. This species along with the holothurian *Leptosynapta minuta* are also recorded where the sediment is a mix of maërl gravel and mud. Off Ardmore Point maërl occurs in dunes consisting of live maërl and shell debris; here the burrowing holothurian *Neopentadactyla mixta* is recorded in densities thought to reach several hundred per square metre.

Other species which occur in moderate abundances within this community complex include the crustaceans *Caprella linearis*, *Lysianassa ceratina*, *Janira maculosa*, *Pisidia longicornis*, *Microdeutopus anomalus* and the polychaetes *Polyophthalmus pictus*, *Polycirrus norvegicus* and *Hesiospina similis* (Table 3). The chaetognath *Spadella cephaloptera* and a number of rare anemones, *Edwardsia claparedii*, *Scolanthus callimorphus*, *Mesacmaea mitchellii* and *Aureliana heterocera*, have also been recorded here.

In the inner reaches of Kilkieran Bay the bivalve *Ostrea edulis* is recorded within the maërl beds. The densities are generally low, i.e. $<0.5m^{-2}$, however to the west of Greeve Island and to the west and south of Leckin Rock densities of $1m^{-2}$ to $2.5m^{-2}$ have been recorded. In the maërl bed off Kilkieran Pier the bivalve *Pecten maximus* is recorded in densities of between 0.1 to $0.4m^{-2}$.

In addition to the above species a variety of more conspicuous species including decapods, asteroids, ascidians and anemones occur within this community complex.

| Species associated with the Maërl-dominated community complex | |
|---|---|
| *Lithothamnion corallioides* | *Lithophyllum dentatum* |
| *Lithothamnion fasciculatum* | *Lysianassa ceratina* |
| *Polyophthalmus pictus* | *Caprella linearis* |
| *Neopentadactyla mixta* | *Hesiospina similis* |
| *Amphipholis squamata* | *Janira maculosa* |
| *Pisidia longicornis* | *Microdeutopus anomalus* |
| *Polycirrus norvegicus* | *Virgularia mirabilis* |
| *Pagurus bernhardus* | *Leptosynapta minuta* |
| *Hydractinia echinata* | *Marthasterias glacialis* |
| *Ascidiella aspersa* | *Carcinus maenas* |
| *Liocarcinus depurator* | *Cereus pedunculatus* |
| *Liocarcinus puber* | *Henricia oculata* |
| *Pecten maximus* | *Aequipecten opercularis* |
| *Anemonia viridis* | *Suberites carnosus* |
| *Cerianthus lloydii* | *Clathrina coriacea* |
| *Luidia ciliaris* | *Myxilla incrustans* |
| *Cancer pagurus* | *Ensis* sp. |
| *Maja squinado* | *Anthopleura ballii* |
| *Macropodia rostrata* | *Calliostoma zizyphinum* |
| *Asterias rubens* | *Terebellidae* indet. |
| *Chaetopterus variopedatus* | *Scolanthus callimorphus* |
| *Mesacmaea mitchellii* | *Aureliana heterocera* |
| *Ostrea edulis* | |

**Table 3** Species associated with the Maërl-dominated community complex.

### *PACHYCERIANTHUS MULTIPLICATUS*-DOMINATED COMMUNITY

Roskeeda Bay is one of a very small number of sites in Ireland where the large, tube-dwelling anthozoan *Pachycerianthus multiplicatus* is known to occur (Figure 4 a & b). This species with its 1m long tube provides a variety of microniches in the otherwise niche-poor environment of soft sediment, thus resulting in localised increases in biodiversity (Table 4).

*Pachycerianthus multiplicatus* is recorded in inner Roskeeda Bay on soft mud. Although it occurs from 7m depth, it is most abundant (8-10 individuals per 50m²) at depths between 14m to 32m.

The sea pen *Virgularia mirabilis* is also recorded within this community, it is most abundant between 5m to 14m depth.

| Species associated with the *Pachycerianthus multiplicatus*-dominated community | |
|---|---|
| *Pachycerianthus multiplicatus* | *Myxicola infundibulum* |
| *Golfingia (Golfingia) elongata* | *Virgularia mirabilis* |
| *Sagartiogeton undatus* | *Thyasira flexuosa* |
| *Abra nitida* | *Notomastus latericeus* |
| *Scalibregma inflatum* | *Lysilla macintoshi* |
| *Nephtys hombergii* | *Scoloplos armiger* |
| *Abra alba* | *Prionospio malmgreni* |
| *Amaea trilobata* | *Thelepus cincinnatus* |
| *Branchiomma bombyx* | *Potamilla torelli* |
| *Kurtiella bidentata* | *Malmgreniella lunulata* |
| *Chrysallida interstincta* | *Branchiomma vesiculosum* |
| *Harmothoe imbricata* | *Sthenelais boa* |
| *Pholoe minuta* | *Eulalia viridis* |
| *Kefersteinia cirrata* | *Syllis gracilis* |
| *Syllis* sp. | *Nereis fucata* |
| *Platynereis dumerilii* | *Glycera alba* |
| *Lysidice ninetta* | *Lumbrineris gracilis* |
| *Lumbrineris latreilli* | *Protodorvillea kefersteini* |
| *Tharyx marioni* | *Paraonis fulgens* |
| *Pherusa plumosa* | Cirratulid sp. |
| *Melinna palmata* | *Eupolymnia nebulosa* |
| *Sabella pavonina* | *Priapulus caudatus* |
| *Golfingia (Golfingia) vulgaris* | *Nephasoma (Nephasoma) minuta* |
| *Turritella minuta* | *Corbula gibba* |
| *Microdeutopus anomalus* | *Leucothoe lilljeborgi* |
| *Leucothoe incisa* | *Ampelisca tenuicornis* |

**Table 4** Species associated with the *Pachycerianthus multiplicatus*-dominated community.

INTERTIDAL SAND WITH POLYCHAETES COMMUNITY COMPLEX

This community complex occurs in the western margins of the site. It is recorded on the large intertidal flats between Finish Island and the coast due west of Ardmore Point and between Mweenish Island and Rusheenacholla. It also occurs, although less extensively, around Mweenish and Finish Islands, on the eastern shore of Masson Island and between Furnace and Dinish Islands. Within the inner Kilkieran Bay small areas are recorded at Annavagh and Rosmuc and in the small inlets of Kylesalia and Lough Nalannagh (Figure 4 a & b).

The sediment is that of sand (ranging from 78% to 98%) with small amounts of gravel (<5%) and mud (<10%).

The polychaetes *Spio martinensis*, *Pygospio elegans, Scoloplos armiger* and *Capitella* sp. and the gastropod *Retusa obtusa* all occur in moderate abundances within this community complex; the bivalve *Tellina tenuis* is recorded as locally dominant (Table 5).

| Distinguishing species of the Intertidal sand with polychaetes community complex | |
|---|---|
| *Spio martinensis* | *Scoloplos armiger* |
| *Pygospio elegans* | *Retusa obtusa* |
| *Capitella* sp. | *Tellina tenuis* |
| Nematoda spp. | Enchytraeidae spp. |
| *Scolelepis squamata* | *Malacoceros fuliginosus* |
| Nemertea spp. | |

**Table 5** Distinguishing species of the Intertidal sand with polychaetes community complex.

A variant of this community occurs where there is a higher percentage of coarse material present. It is recorded most extensively in the southern shore of Lettermore Island and on the northern shore of Gorumna Island. Smaller areas are recorded at Bealadangan, Kylesalia, Rosmuck, Lough Nalannagh, on the western shore of Mweenish Island and on the Coral Strand at Carrowroe South (Figure 4 a & b).

The fauna of this variant is dominated by nematodes with unidentified nemerteans, the oligochaetes of the family Enchytraeidae and the polychaetes *Scolelepis squamata* and *Malacoceros fuliginosus* occurring in moderate abundances (Table 3).

### MIXED SEDIMENT DOMINATED BY POLYCHAETES COMMUNITY COMPLEX

This community complex occurs widely throughout the site, from the open water areas in the west and southwest through to the more sheltered locations in the inner reaches of the site (Figure 4 a & b).

It is recorded in depths between 5m and 10m in the inner parts of the site but reaches depths of up to 40m in the outer regions.

The sediment within this community complex is mixed, with gravel ranging from 4% to 60%, sand from 16% to 95% and mud from 0% to 75%. The higher levels of fine material are associated with the more sheltered locations in the northern part of the site. In the outer reaches of the site or in areas, such as the Gurraig Sound, which are subjected to strong tidal currents, the sediment is that of clean coarse material with no fine fractions.

The fauna here is dominated by the polychaetes *Notomastus latericeus*, the bivalve *Thyasira flexuosa* and unidentified nemerteans. These species are indicative of a considerable fines fraction within the sediment; however the presences of polychaete species such as *Protodorvillea kefersteini, Trypanosyllis coeliaca*, *Pisione remota*, *Syllis* "species h" and *Polygordius appendiculatus*, which are recorded in moderate abundances here, reflect the high proportion of coarse material present in the sediment of this complex (Table 6).

The sea pen *Virgularia mirabilis* has a patchy distribution within this complex. It is recorded in Camus Bay, south of Roscam, north of Yellow Rock and east of Leighon Island, often in densities of up to 500 individuals per 50m². At the mouth of Roskeeda Bay the bivalve *Ostrea edulis* is recorded in densities of between 0.5 and 2.5 individuals per $m^2$.

| Distinguishing species of the Mixed sediment dominated by polychaetes community complex | |
|---|---|
| *Notomastus latericeus* | *Thyasira flexuosa* |
| Nemertea spp. | *Protodorvillea kefersteini* |
| *Paradoneis lyra* | *Pisione remota* |
| *Trypanosyllis coeliaca* | *Syllis "species h"* |
| *Polygordius appendiculatus* | *Chone duneri* |
| *Aricidea cerutii* | *Lumbrineris gracilis* |
| *Virgularia mirabilis* | *Ostrea edulis* |

**Table 6** Distinguishing species of the Mixed sediment dominated by polychaetes community complex.

### SAND WITH NEMERTEANS AND CRUSTACEANS COMMUNITY COMPLEX

This community complex occurs from the northern end of Finish Island to Inishmuskerry and Birmore Island and in Kiggaul Bay. It is recorded in depths between 1m and 10m (Figure 4 a & b).

Although finer material does occur in Kiggaul Bay, the sediment of this complex is predominantly sand, with coarse sand ranging from 18% to 43%, medium sand from 2% to 33% and fine sand from 1% to 25%.

Unidentified nemerteans, the amphipods *Bathyporeia nana* and *Pontocrates arenarius*, the bivalve *Moerella donacina* and oligochaetes of the Enchytraeidae family are all recorded in moderate abundances within this community complex (Table 7).

| Distinguishing species of the Sand with nemerteans and crustaceans community complex | |
|---|---|
| Nemertea spp. | *Moerella donacina* |
| *Bathyporeia nana* | Enchytraeidae spp. |
| *Pontocrates arenarius* | |

**Table 7** Distinguishing species for the Sand with nemerteans and crustaceans community complex.

### DEEP WATER SAND DOMINATED BY BIVALVES AND POLYCHAETES COMMUNITY COMPLEX

This community complex is recorded in the south-eastern of the site in deep water (ca. 40m) from off Loughcarrigh Island to the eastern margin of the site (Figure 4 a & b).

The sediment is that of sand to sandy mud, with medium sand ranging from 12% to 19%, fine sand from 48% to 65%, very fine sand from 12% to 15% and silt-clay from 9% to 12%.

The bivalves *Nucula nitidosa*, *Corbula gibba* and *Chamelea gallina* and the polychaetes *Chaetozone christiei*, *Owenia fusiformis* and *Spiophanes bombyx* all occur in moderate abundances here (Table 8).

| Distinguishing species of the Deep water sand dominated by bivalves and polychaetes community complex | |
|---|---|
| *Nucula nitidosa* | *Corbula gibba* |
| *Chaetozone christiei* | *Chamelea gallina* |
| *Owenia fusiformis* | *Spiophanes bombyx* |

**Table 8** Distinguishing species of the Deep water sand dominated by bivalves and polychaetes community complex.

### INTERTIDAL REEF COMMUNITY COMPLEX

This community complex is widespread throughout the site; it occurs all along the coastline and also on the small rocks and islands in open water in the south-west of the site (Figure 4 a & b). It is present in all exposure regimes from very sheltered to exposed reef.

In more sheltered areas the substrate is predominantly that of boulder and cobble with some flat or sloping bedrock. However in moderately exposed to exposed sites it is largely that of flat or sloping bedrock.

This community complex is dominated by the algal species *Pelvetia canaliculata*, *Fucus spiralis, F. serratus*, and the gastropod *Patella vulgata* (Table 9). In more sheltered locations the algal species *F. vesiculosus* and *Ascophyllum nodosum* are commonly recorded along with the gastropod *Littorina* sp., the cirriped *Semibalanus balanoides* and the anthozoan *Actinia* sp. In more exposed conditions the barnacle *Chthamalus* sp. is more abundant with the gastropod *Nucella lapillus* commonly occurring here.

| Species associated with the Intertidal reef community complex | |
|---|---|
| *Pelvetia canaliculata* | *Fucus spiralis* |
| *Fucus serratus* | *Patella vulgata* |
| *Fucus vesiculosus* | *Ascophyllum nodosum* |
| *Littorina* sp. | *Actinia* sp. |
| *Semibalanus balanoides* | *Chthamalus* sp. |
| *Nucella lapillus* | |

**Table 9** Species associated with the Intertidal reef community complex.

### SUBTIDAL SPONGE AND ASCIDIAN COMMUNITY COMPLEX

This reef community complex occurs in Kilkieran Bay from between Ardmore Point and Illauneeragh Island to Rosduggan Point and also in the Gurraig Sound (Figure 4 a & b).

The substrate here varies from flat or sloping bedrock, vertical walls to boulders and bedrock with sediment. The exposure regime is that of moderate to exposed reef and it is recorded in depths between 11m and 25m.

The fauna is dominated the sponges (including *Esperiopsis fucorum*, *Haliclona simulans, Haliclona* spp., *Myxilla incrustans*, *Polymastia mamillaris, Raspailia* sp. and *Suberites* sp.) and the ascidians (including *Ascidiella aspersa, Ascidia mentula, Ciona intestinalis, Corella parallelogram* and *Dendrodoa grossularia*). The echinoid *Echinus esculentus*, the hydroid *Kirchenpaueria pinnata,* the bryozoan *Alcyonidium diaphanum* and the polychaete *Bispira*

*volutacornis* are also associated with this complex (Table 10). The rare sponges *Plakortis simplex* and *Tricheurypon viride* are found in this community complex. The Gurraig Sound is the best known example in Ireland of this sponge and ascidian community..

| Species associated with the Subtidal sponge and ascidian community complex | |
|---|---|
| *Raspailia* sp. | *Corella parallelogram* |
| *Esperiopsis fucorum* | *Haliclona simulans* |
| *Haliclona* spp. | *Myxilla incrustans* |
| *Polymastia mamillaris* | *Suberites* sp. |
| *Ascidiella aspersa* | *Ascidia mentula* |
| *Ciona intestinalis* | *Dendrodoa grossularia* |
| *Echinus esculentus* | *Kirchenpaueria pinnata* |
| *Alcyonidium diaphanum* | *Bispira volutacornis* |
| *Plakortis simplex* | *Tricheurypon viride* |

**Table 10** Species associated with the Subtidal sponge and ascidian community complex.

DEEP WATER FAUNAL CRUST AND SPONGE COMMUNITY COMPLEX

This reef community complex occurs in depths between 30m and 60m from the Namackan Rocks to the eastern margin of the site (Figure 4a).

The substrate here is that of bedrock and/or boulders and bedrock on exposed reef.

The deep-water sponge *Phakellia vermiculata*, which has been recorded in shallow water at only a limited number of locations on the south-west and west coasts of Ireland, occurs here. Similarly, the sponge *Axinella damicornis* which is limited in its distribution in Ireland is also recorded here. Other species associated with this community include the sea fan *Eunicella verrucosa*, the bryozoan *Pentapora foliacea*, the urchin *Echinus esculentus,* the sea cucumber *Holothuria* (*Panningothuria*) *forskali* and the starfish *Asterias rubens* (Table 11).

| Species associated with the Deep water faunal crust and sponge community complex | |
|---|---|
| *Phakellia vermiculata* | *Axinella damicornis* |
| *Eunicella verrucosa*, | *Pentapora foliacea* |
| *Echinus esculentus* | *Holothuria* (*Panningothuria*)*forskali* |
| *Asterias rubens* | |

**Table 11** Species associated with the Deep water faunal crust and sponge community complex.

#### EXPOSED TO MODERATELY EXPOSED SUBTIDAL REEF COMMUNITY COMPLEX

In the outer bay this reef community complex runs as a continuous band from the Namackan Rocks to Killeen Point. It is also recorded between the Namackan rocks and Mweenish Island, between Ardmore Point and Lettermore, and in the Gurraig Sound (Figure 4 a & b).

It occurs on exposed to moderately exposed reef between 15m and 30m depth. The substrate here varies from boulders and/or bedrock, and boulders with sediment.

The red algal species *Delesseria sanguinea* and *Phycodrys rubens* are recorded as common within this community complex. A variety of echinoderm species, primarily the holothurian *Holothuria* (*Panningothuria*) *forskali*, but also the echinoid *Echinus esculentus* and the asteroids *Asterias rubens*, *Marthasterias glacialis* and *Luidia ciliaris* frequently occur here. Aggregates of the crinoid *Antedon bifida* are locally abundant. The sponge *Cliona celata* and the soft coral *Alcyonium digitatum*, bryozoans and coralline algae are also recorded here (Table 12).

| Species associated with the Exposed to moderately exposed subtidal reef community complex | |
|---|---|
| *Delesseria sanguinea* | *Phycodrys rubens* |
| *Holothuria* (*Panningothuria*)*forskali* | *Echinus esculentus* |
| *Asterias rubens* | *Marthasterias glacialis* |
| *Cliona celata* | *Alcyonium digitatum* |
| *Luidia ciliaris* | *Antedon bifida* |
| Bryozoans | Coralline algae |

**Table 12** Species associated with the Exposed to moderately exposed subtidal reef community complex.

### *LAMINARIA*-DOMINATED COMMUNITY COMPLEX

In the outer margins of the site reef dominated by *Laminaria* occurs as almost a continuous band from its north-western extreme at Masson Island to the eastern boundary. Within Kilkieran Bay, it forms an unbroken band from Birmore Rocks to Dinish Island; extensive areas also occur on the northern shore of Lettermore Island and in the channel into Camus Bay. Smaller patches of this community type are found throughout Kilkieran Bay and in Greatman's Bay but it is absent from the inner reaches of all the bays within the site (Figure 4 a & b).

This community complex occurs on bedrock and boulders in depths between 6m and 18m. It is recorded in all exposure regimes from exposed to sheltered reef.

Kelp coverage is variable, ranging from dense to sparse. The kelp species *Laminaria hyperborea* dominate this community complex, but *L. digitata* and *Saccharina latissima* are also recorded here. The latter frequently occurs with *L. hyperborea* in the more sheltered sites.

The composition of the associated fauna is dependant on the density of the overlying canopy. Encrusting hydroids and bryozoans and the echinoid *Echinus esculentus* are common where kelp stands are dense. In areas where the kelp is sparse a rich biota includes red algae, anthozoans, ascidians, hydroids and bryozoans (Table 13).

| Species associated with the *Laminaria*-dominated community complex | |
|---|---|
| *Laminaria hyperborea* | *Laminaria digitata* |
| *Saccharina latissima* | *Delesseria sanguinea* |
| Hydroids | Bryozoans |
| *Cliona celata* | *Alcyonium digitatum* |
| *Corynactis viridis* | *Ascidiella aspersa* |
| *Ciona intestinalis* | *Ascidia virginea* |
| *Corella parallelogramma* | *Raspailia ramosa* |
| *Echinus esculentus* | |

**Table 13** Species associated with the *Laminaria*-dominated community complex.

# Annex II Marine Species

*PHOCA VITULINA* (HARBOUR SEAL)

This marine mammal species occurs in estuarine, coastal and offshore waters but also utilises a range of intertidal and terrestrial habitats for important life history functions such as breeding, moulting, resting and social activity. Its aquatic range for foraging and inter-site movement extends into continental shelf waters. When hauling out ashore, harbour seals tend to prefer comparatively sheltered locations where exposure to wind, wave action and precipitation, for example, are minimised. Thus in Ireland the species is more commonly found ashore in sheltered bays, inlets and enclosed estuaries.

Harbour seals in Kilkieran Bay and Islands SAC occupy both aquatic habitats and intertidal shorelines that become exposed during the tidal cycle. The species is present at the site throughout the year during all aspects of its annual life cycle, which includes breeding (May to July approx.), moulting (August to September approx.) and non-breeding foraging and resting phases. Comparatively limited information is available from the last period in the annual cycle spanning the months of October to May. In acknowledging the limited understanding of aquatic habitat use by the species within the site it should be noted that all suitable aquatic habitat is considered relevant to the species range and ecological requirements at the site and is therefore of potential use by harbour seals.

Harbour seals are vulnerable to disturbance during periods when time is spent ashore, or in shallow waters, by individuals or groups of animals. This occurs immediately prior to and during the annual breeding season which takes place predominantly during the months of May to July. Pups are born on land, usually on sheltered shorelines, islets or skerries and uninhabited islands removed from the risk of predation and human interference. While there may be outliers in any year, specific established locations tend to be used annually for breeding-associated behaviour by adult males, adult females and their newborn pups. Such habitats are critical to the maintenance of the species within any site. Pups are able to swim soon after birth and may be observed accompanying their mother close to shore in the early days or weeks of life. They are nursed for a period of several weeks by the mother prior to weaning and abandonment. During this period adult females mate with adult males, an activity that takes place in the water. Known and suitable habitats for the species in Kilkieran Bay and Islands SAC during the breeding season are indicated in figure 5. Current sites are broadly within the following areas: Ard Bay, Mweenish Bay, Casheen Bay, Kiggaul Bay, Kilkieran Bay, Greatman's Bay and Camus Bay.

The necessity for individual seals to undergo an annual moult (i.e. hair shedding and replacement), which generally results in seals spending more time ashore during a relatively discrete season, provides an opportunity to record the minimum number of harbour seals occurring in a given area (i.e. minimum population estimate). Moulting is considered an

intensive, energetically-demanding process which incurs further vulnerability for individuals during this period. Terrestrial or intertidal locations where seals can be found ashore are known as haul-out sites. The harbour seal moult season takes place predominantly during the months of August to September. A total of 116 harbour seals were recorded ashore within Kilkieran Bay and Islands SAC in August 2003 during a national aerial survey for the species. Suitable habitat for the species along with known moult haul-out locations in Kilkieran Bay and Islands SAC are indicated in figure 6, broadly consisting of Ard Bay, Mweenish Bay, Golam Island, Kiggaul Bay, channel areas lying between Casheen Bay, Lettermore Island and Gorumna Island, Kilkieran Bay, and Greatman's Bay.

Harbour seal is a successful aquatic predator that feeds on a wide variety of fish, cephalopod and crustacean species. For individual harbour seals of all ages intervals between foraging trips in coastal or offshore waters are spent resting ashore at terrestrial or intertidal haul-out sites, or in the water. Outside the breeding and moulting seasons (i.e. from October to April) the location and composition of haul-out groups and individual seals may be different to those normally observed during breeding or moulting. Current information on resting locations selected by harbour seals in Kilkieran Bay and Islands SAC outside the breeding and moulting seasons is comparatively limited. Known and suitable habitats for resting by the species are indicated in figure 7. Current sites described in Kilkieran Bay and Islands SAC are broadly within the following areas: Mweenish Bay, channel areas lying between Casheen Bay, Lettermore Island and Gorumna Island, Kilkieran Bay and Greatman's Bay.

# 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. The Department of the Environment, Heritage and Local Government has prepared general guidance on the completion of such assessments (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 vary 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 and Annex II species to facilitate the appropriate assessment process:

**Objective** **To maintain the favourable conservation condition of Large shallow inlets and bays in the Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets.**

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| **Target 1** | The permanent habitat area is stable or increasing, subject to natural processes. |

- This habitat also encompasses the Annex I habitats, Mudflats and sandflats not covered by water at low tide and Reefs. In such areas, the specific targets for those Annex I habitats will address requirements within the Annex I habitat Large shallow inlets and bays.
- 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.

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| **Target 2** | Maintain the extent of the *Zostera*- and maërl-dominated community complexes and the *Pachycerianthus multiplicatus*-dominated community, subject to natural processes. |

- Zostera- and maërl-dominated 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, e.g. they serve as important nursery grounds for commercial and non-commercial species.

- This site is one of only a few recorded locations in Ireland of the large, tube-dwelling anthozoan *Pachycerianthus multiplicatus* whose presence results in increased biodiversity within this otherwise impoverished community.
- Any significant anthropogenic disturbance to the extent of these communities should be avoided.
- An interpolation of the likely distribution of these communities is provided in figure 4 a & b. The areas given below are based on spatial interpolation and therefore should be considered indicative:
  - *Zostera*-dominated community complex- 333ha
  - Maërl-dominated community complex – 1,321ha
  - *Pachycerianthus multiplicatus*-dominated community- 10ha

[The estimated area for the maërl-dominated community complex includes those areas where *Zostera* and maërl co-occur. These areas of co-occurrence are not included in the estimated area for the *Zostera*-dominated community complex]

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| **Target 3** | Conserve the high quality of *Zostera*-dominated community complex, subject to natural processes. |

- It is important to ensure the quality as well as the extent of the Zostera-dominated community complex is conserved. Shoot density provides an indication of the habitat quality as well as giving information on the habitat complexity and refuge capability; all are important components in maintaining the structural and functional integrity of the habitat.
- Within this SAC, the density of Zostera in 2005 was estimated to range from abundant to patchy abundant on the AFOR scale (semi-quantitative abundance measure) with considerable variation in the size of the beds.
- Any significant anthropogenic disturbance to the quality (i.e. shoot density) of this community complex should be avoided.

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| **Target 4** | Conserve the high quality of the maërl-dominated community complex, subject to natural processes. |

- Every effort should be made to avoid any death to living maërl.
- Any significant anthropogenic disturbance to the quality of maërl-dominated community complex (i.e. volume of live maërl, thallus structure) should be avoided.

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| **Target 5** | Conserve the high quality of the *Pachycerianthus multiplicatus*-dominated community, subject to natural processes. |

- Every effort should be made to avoid any death to living *Pachycerianthus multiplicatus*.
- Any significant anthropogenic disturbance to the quality of this community should be avoided.

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| **Target 6** | Conserve the following community types in a natural condition: Intertidal sand with polychaetes community complex; Mixed sediment dominated by polychaetes community complex; Sand with nemerteans and crustaceans community complex; Deep water sand dominated by bivalves and polychaetes community complex; Intertidal reef community complex; Subtidal sponge and ascidian community complex; Deep water faunal crust and sponge community complex; Exposed to moderately exposed subtidal reef community complex; *Laminaria*-dominated community complex. |

- A semi-quantitative description of these communities has been provided in Section 1.
- An interpolation of their likely distribution is provided in figure 4 a & b.
- The estimated areas of the communities within Large shallow inlets and bays given below are based on spatial interpolation and therefore should be considered indicative:
  - Intertidal sand with polychaetes community complex - 166ha
  - Mixed sediment dominated by polychaetes community complex - 6734ha
  - Sand with nemerteans and crustaceans community complex - 233ha
  - Deep water sand dominated by bivalves and polychaetes community complex - 808ha
  - Intertidal reef community complex – 2,157ha
  - Subtidal sponge and ascidian community complex – 119ha
  - Deep water faunal crust and sponge community complex – 882ha
  - Exposed to moderately exposed subtidal reef community complex – 1,324ha
  - *Laminaria*-dominated community complex – 4,215ha
- 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.

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| Objective | **To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in the Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets.** |

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| **Target 1** | The permanent habitat area is stable or increasing, subject to natural processes. |

- This target refers to activities or operations that propose to permanently remove habitat from a 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.

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| **Target 2** | Conserve the following community type in a natural condition: Intertidal sand with polychaetes community complex. |

- A semi-quantitative description of this community has been provided in Section 1.
- An interpolation of its likely distribution is provided in figure 4 a & b.
- The estimated area of the community within the Mudflats and sandflats not covered by seawater at low tide habitat given below is based on spatial interpolation and therefore should be considered indicative:

  - Intertidal sand with polychaetes community complex – 180ha
- Significant continuous or ongoing disturbance of the community should not exceed an approximate area of 15% of the interpolated area, 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 the community 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.

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| **Objective** | **To maintain the favourable conservation condition of Reefs in the Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets.** |

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| **Target 1** | The permanent habitat area is stable or increasing, subject to natural processes. |

- 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.

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| **Target 2** | The distribution of reefs occurring in the site is stable or increasing, subject to natural processes. |

- The likely distribution of reef habitat in this SAC is indicated (figure 3).
- 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.

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| **Target 3** | Conserve the following community types in a natural condition: Intertidal reef community complex; Subtidal sponge and ascidian community complex; Exposed to moderately exposed subtidal reef community complex; Deep water faunal crust and sponge community complex; *Laminaria*-dominated community complex. |

- A semi-quantitative description of these communities has been provided in Section 1.
- An interpolation of their likely distribution is provided in figure 4 a & b.
- The estimated areas of the communities within the Reefs habitat given below are based on spatial interpolation and therefore should be considered indicative:
  - Intertidal reef community complex – 2,412ha
  - Subtidal sponge and ascidian community complex- 122ha
  - Exposed to moderately exposed subtidal reef community complex – 1,336ha
  - Deep water faunal crust and sponge community complex - 882ha
  - *Laminaria*-dominated community complex – 4,333ha

- 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.

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| **Objective** | **To maintain the favourable conservation condition of harbour seal in the Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets.** |

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| **Target 1** | Species range within the site is not restricted by artificial barriers to site use. |

- This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour seal from part of its range within the site, or will permanently prevent access for the species to suitable habitat therein.
- It does not refer to short-term or temporary restriction of access or range.
- Early consultation or scoping with the Department in advance of formal application is advisable for proposals that are likely to result in permanent exclusion.

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| **Target 2** | Conserve the breeding sites in a natural condition. |

- This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) breeding behaviour by harbour seal within the site and/or (b) aquatic/terrestrial/intertidal habitat used during the annual breeding season.
- Operations or activities that cause displacement of individuals from a breeding site or alteration of natural breeding behaviour, and that may result in higher mortality or reduced reproductive success, would be regarded as significant and should therefore be avoided.

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|---|---|
| **Target 3** | Conserve the moult haul-out sites in a natural condition. |

- This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) moulting behaviour by harbour seal within the site and/or (b) aquatic/terrestrial/intertidal habitat used during the annual moult.
- Operations or activities that cause displacement of individuals from a moult haul-out site or alteration of natural moulting behaviour to an extent that may ultimately interfere with key ecological functions would be regarded as significant and should therefore be avoided.

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| **Target 4** | Conserve the moult haul-out sites in a natural condition. |

- This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) resting behaviour by harbour seal within the site and/or (b) aquatic/terrestrial/intertidal habitat used for resting.

- Operations or activities that cause displacement of individuals from a resting haul-out site to an extent that may ultimately interfere with key ecological functions would be regarded as significant and should therefore be avoided.

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| **Target 5** | Human activities should occur at levels that do not adversely affect the harbour seal population at the site. |

- Proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and/or the population of harbour seal within the site. This refers to both the aquatic and terrestrial/intertidal habitats used by the species in addition to important natural behaviours during the species annual cycle.
- This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc) upon which harbour seals depend. In the absence of complete knowledge on the species ecological requirements in this site, such considerations should be assessed where appropriate on a case-by-case basis.
- Proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour seal population at the site.

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Figure 1. Extent of the Annex I habitat of Large shallow inlets and bays in Kilkieran Bay and Islands SAC.

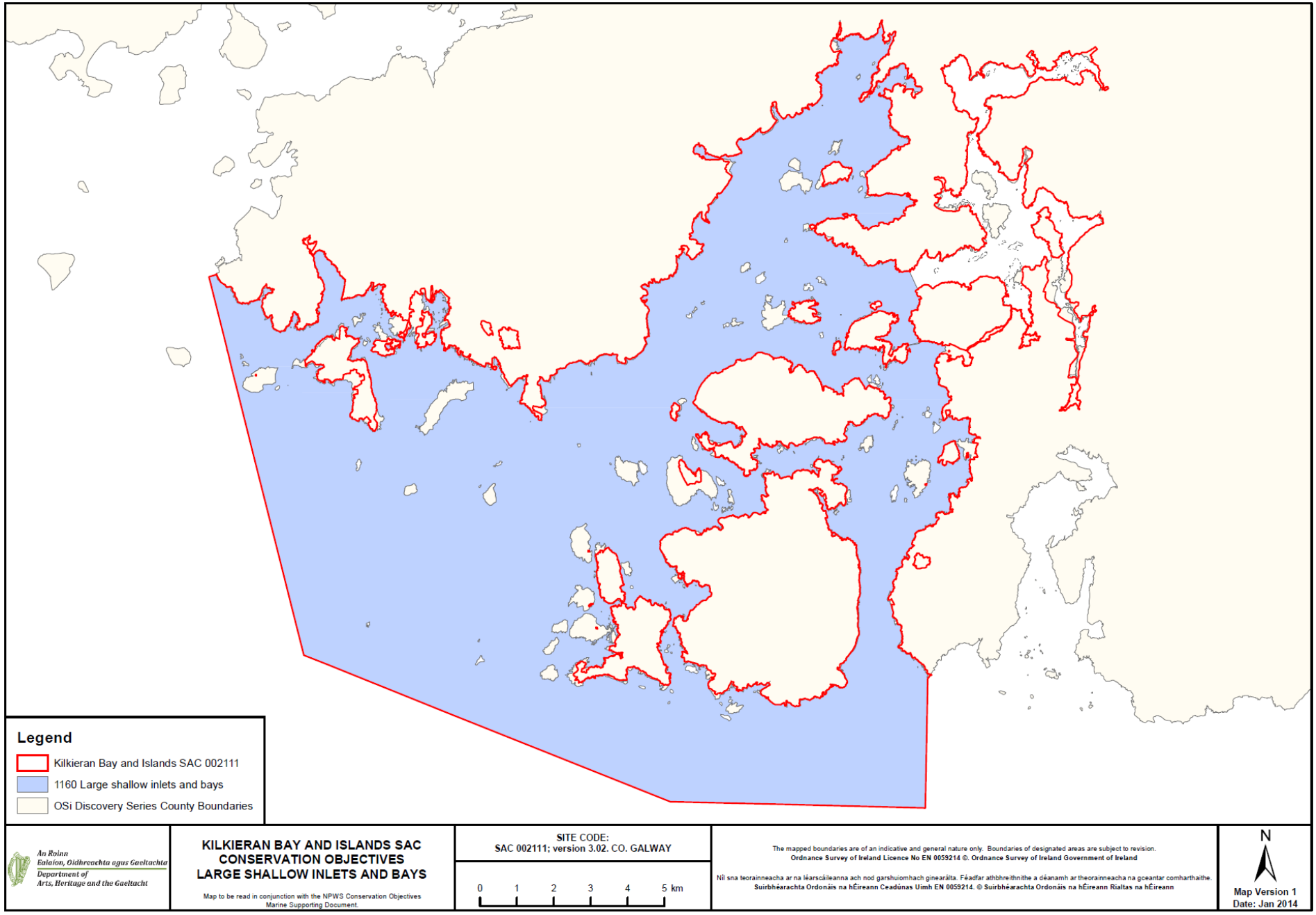

Figure 2. Extent of the Annex I habitat of Mudflats and sandflats not covered by seawater at low tide in Kilkieran Bay and Islands SAC.

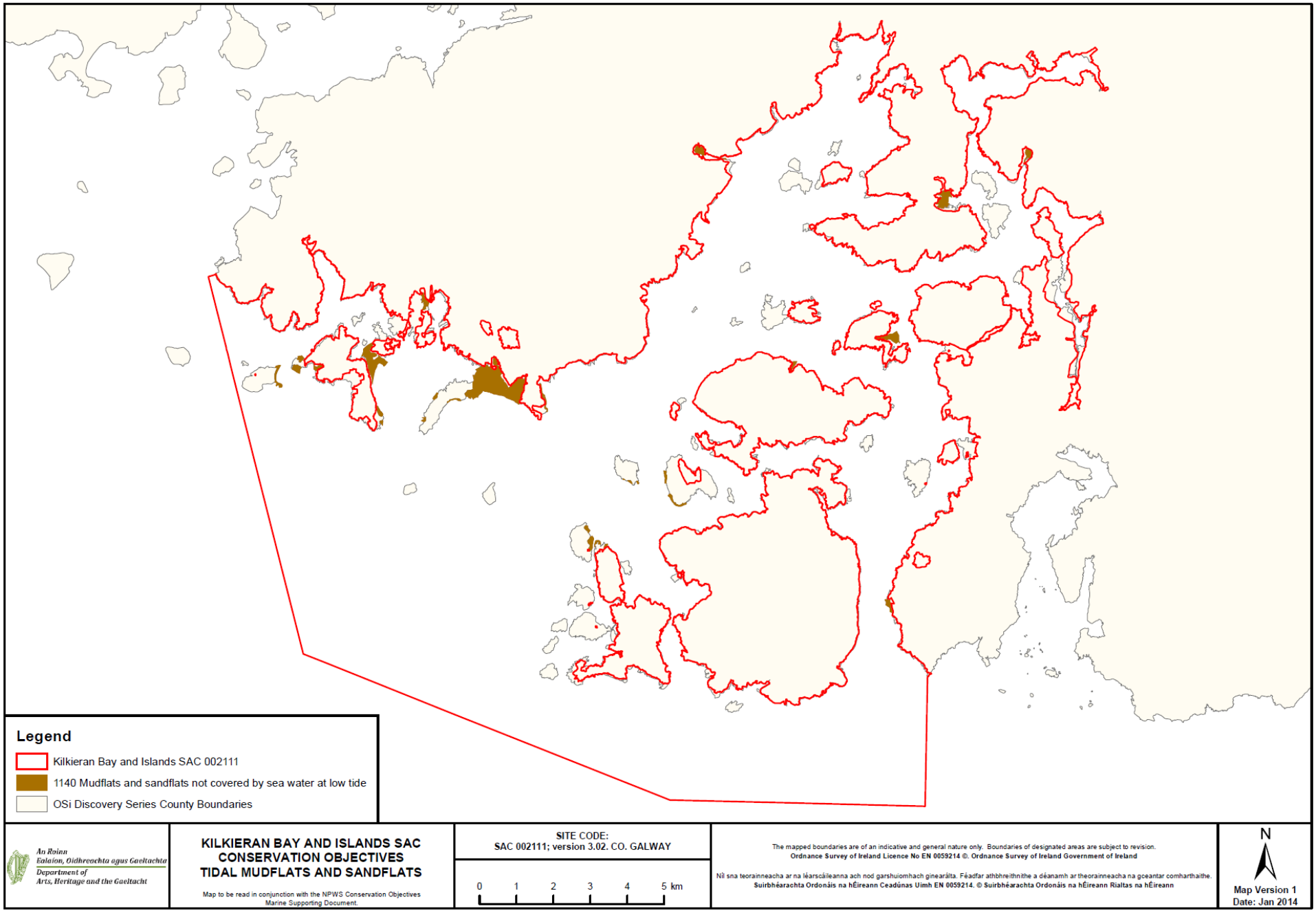

Figure 3. Extent of the Annex I habitat of Reefs in Kilkieran Bay and Islands SAC.

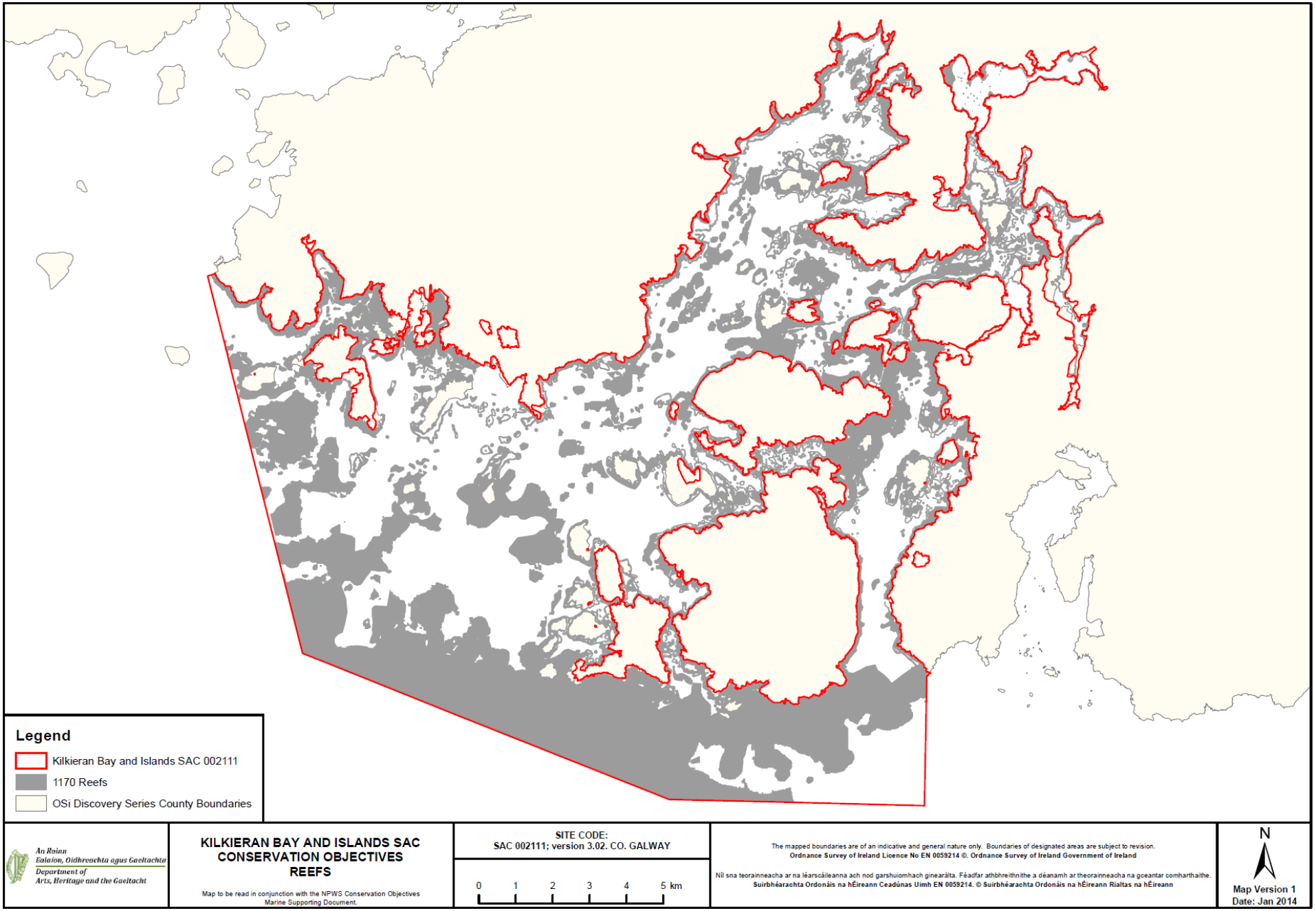

Figure 4a. Distribution of the benthic communities in the southern section of Kilkieran Bay and Islands SAC.

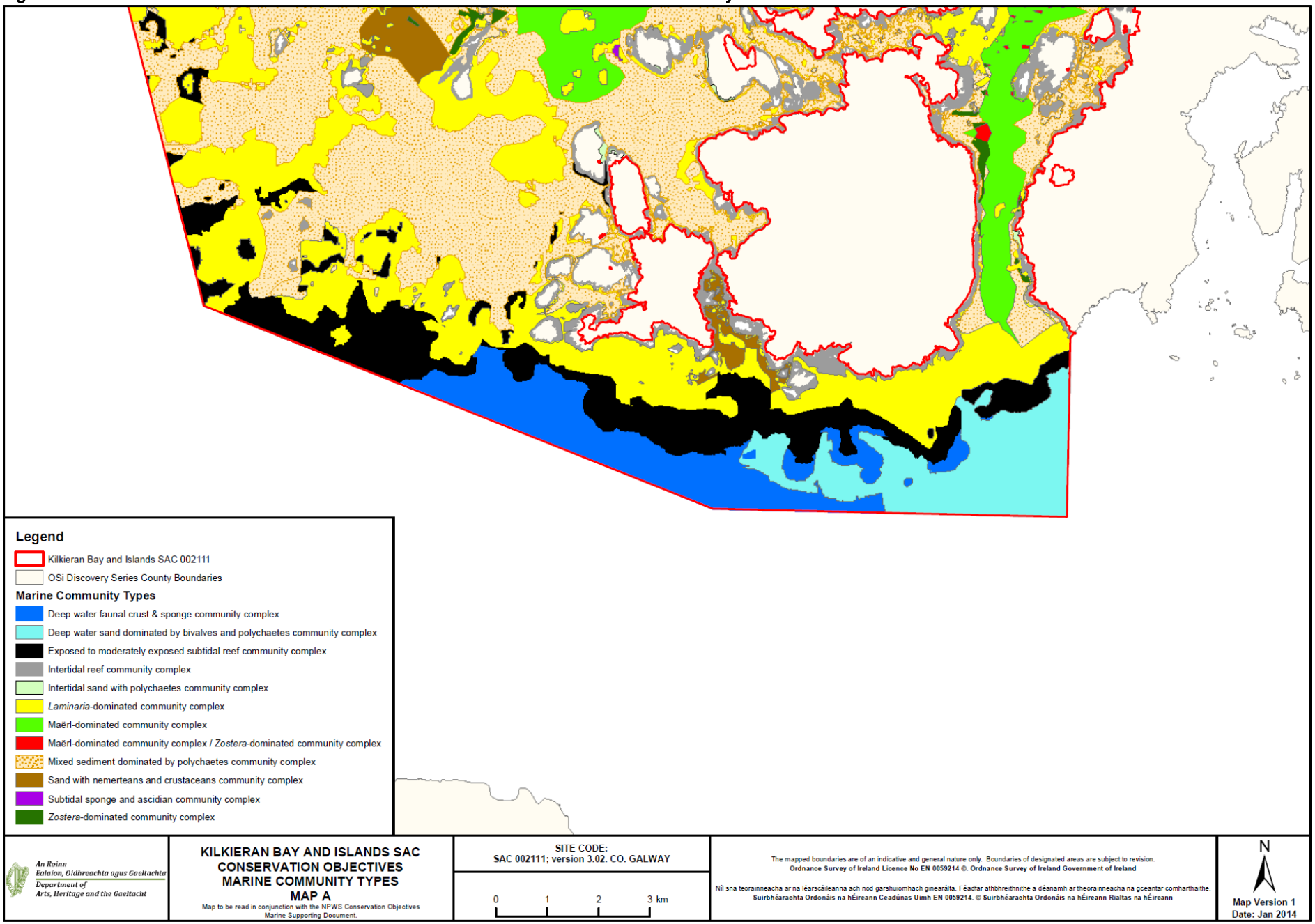

Figure 4b. Distribution of the benthic communities in the northern section of Kilkieran Bay and Islands SAC.

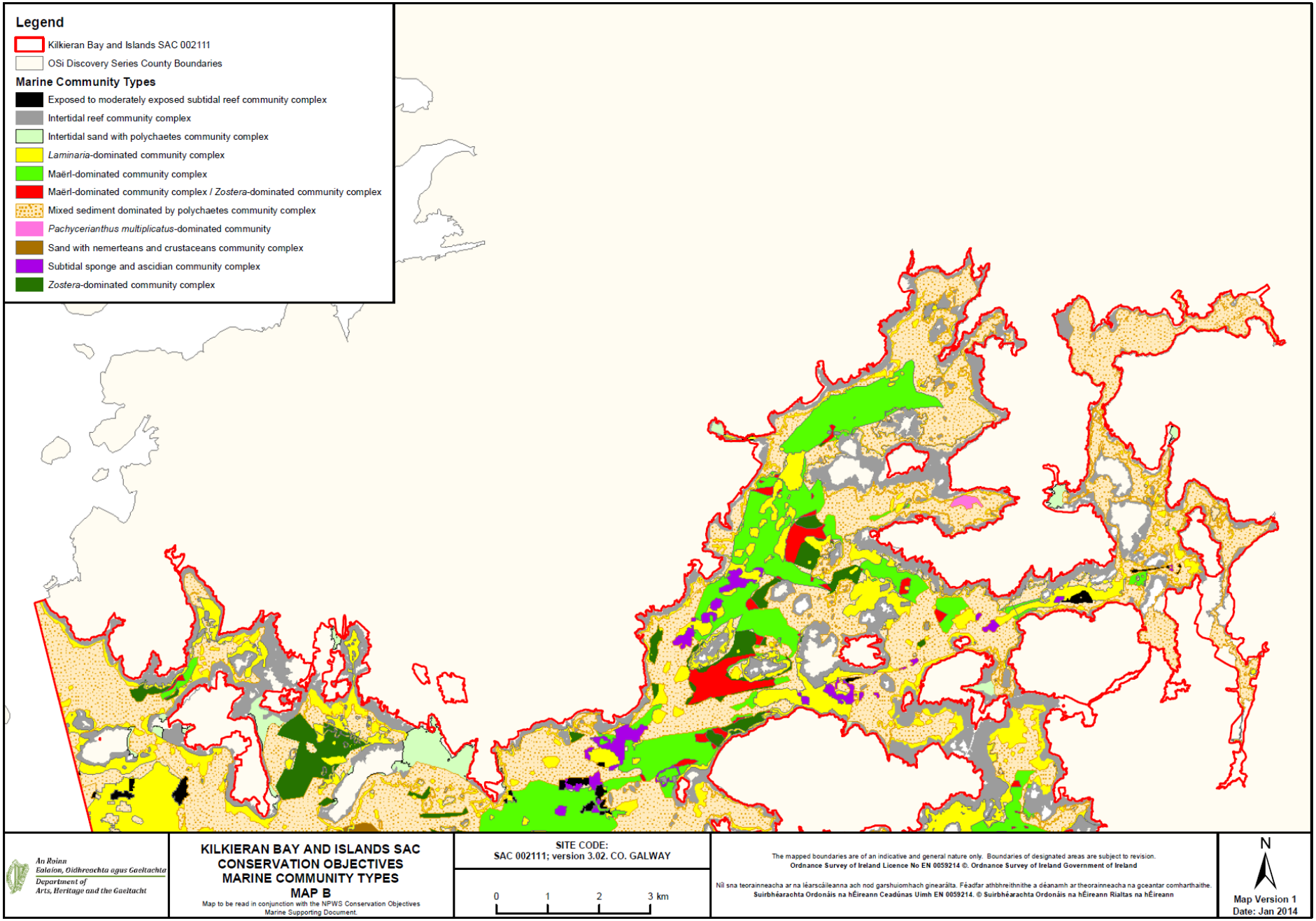

Figure 5. *Phoca vitulina* - Known breeding sites in Kilkieran Bay and Islands SAC.

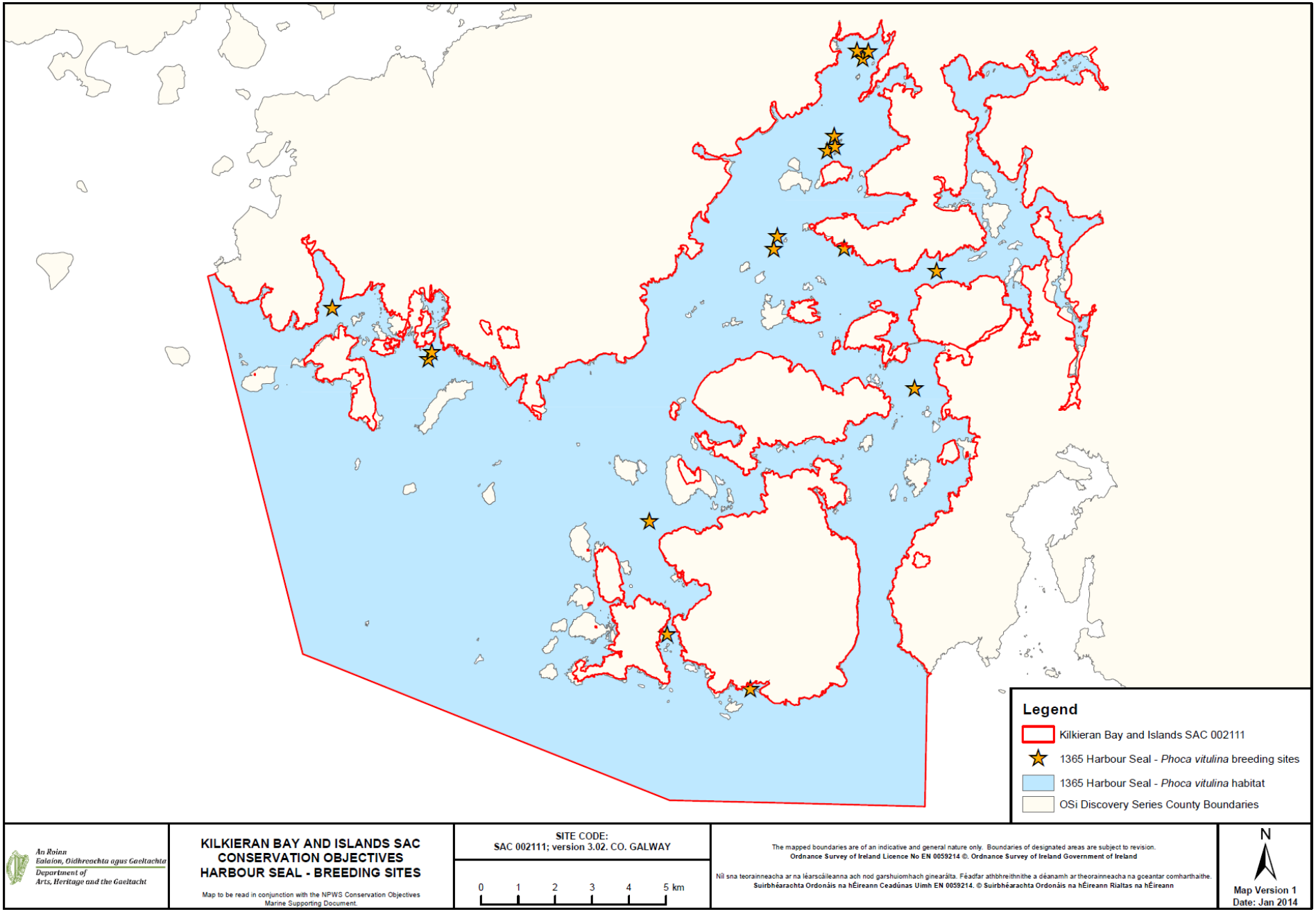

Figure 6. *Phoca vitulina* - Known moult haul out sites in Kilkieran Bay and Islands SAC.

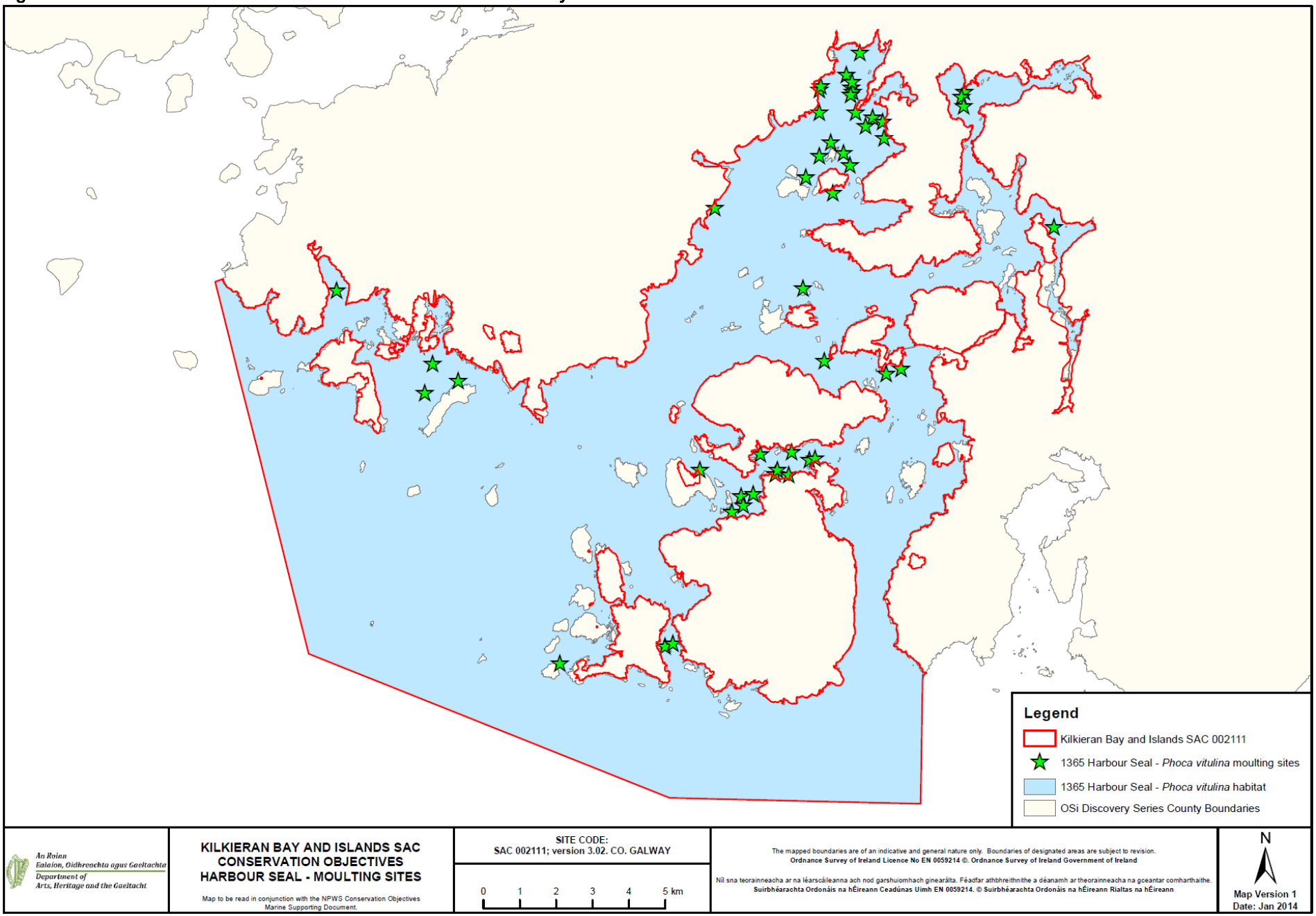

Figure 7. *Phoca vitulina* - Known resting haul-out sites (non-breeding) in Kilkieran Bay and Islands SAC.