NPWS

Galway Bay Complex SAC (site code: 0268)

Conservation objectives supporting document - Marine habitats and species

Version 1

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Introduction

The Galway Bay Complex SAC is designated for the marine Annex I qualifying interests of Large shallow inlets and bays, Mudflats and sandflats not covered by sea water at low tide and Reefs (Figures 1, 2 and 3) and the Annex II species *Phoca vitulina* (harbour seal, also known as 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 were undertaken in 2009 and 2010 (Aquafact, 2010a; Aquafact, 2010b; RPS, 2012). In 2006, a dive survey was carried out to map the sensitive communities at this site (MERC, 2006). These data were used to determine the physical and biological nature of this SAC and in the overlapping Inner Galway Bay Special Protection Area (SPA) (Site code 4031).

In addition to the records compiled from historical Wildlife Service site visits and regional surveys (Summers *et al.*, 1980; Warner, 1983; Harrington, 1990; Lyons, 2004), a comprehensive survey of the Irish harbour seal population was carried out in 2003 (Cronin *et al.*, 2004). Annual monitoring surveys for harbour seal within Galway Bay Complex SAC have also been carried out since 2009 (NPWS, 2010; NPWS, 2011; NPWS, 2012).

Aspects of the biology and ecology of Annex I habitats and Annex II species are provided in Section 1. These surveys of habitat and species facilitated the development of site-specific conservation objectives that will allow Ireland deliver 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 the Galway Bay Complex SAC 12 community types are described; the Annex I habitats in which they occur and their occurrence in the overlapping SPA is presented in Table 1 and a description of each community type is given below.

Community Type	SAC Annex I habitats			SPA
	Large shallow inlets and bays (1160)	Mudflats and sandflats not covered by seawater at low tide (1140)	Reefs (1170)	
Intertidal sandy mud community complex	✓	✓		✓
Intertidal sand community complex	✓	✓		✓
Maërl-dominated community	✓			✓
Zostera-dominated community complex	✓			✓
Fine to medium sand with bivalves community complex	✓			✓
Sandy mud to mixed sediment community complex	✓			✓
Mixed sediment dominated by Mytilidae community complex	✓			✓
Shingle	✓			✓
Mytilus-dominated reef community			✓	✓
Fucoid-dominated community complex	✓		✓	✓
Laminaria-dominated community complex	✓		✓	✓
Shallow sponge-dominated reef community complex	✓		✓	✓

Table 1 The community types recorded in Galway Bay Complex SAC and their occurrence in the Annex I habitats and the overlapping SPA.

Estimated areas of each community type per 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 Galway Bay Complex 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.

INTERTIDAL SANDY MUD COMMUNITY COMPLEX

This intertidal community complex is recorded extensively within this site. It occurs from Rusheen Bay to Oranmore Bay on the north shore of the bay and on its eastern shore at St Brendan's Island, east of Tawin Island and in the Dunkellin Estuary. On the southern shore it is recorded in the northwest reaches of Kinvarra Bay, in the soft sediment between Cregboy and Aughinish, in Aughinish and Muckinish Bays and in Bell Harbour (Figure 4a & b).

The sediment here is largely that of sandy mud with the fine sand fraction ranging from 19% to 79%, very fine sand from 0% to 70% and silt-clay from 1% to 53%. In the eastern portion of the bay the considerable amounts of coarse material within the substrate are the result of glacial deposits rather than hydrodynamic conditions. This is particularly evident at Hare Island in the northern bay and on the upper shore at Muckinish and Scanlan's Island in the southern bay. Consequently the proportion of coarse material within this complex is very variable (gravel from 0% to 67%, very coarse sand from 0% to 21% and coarse sand from 0% to 38%).

The fauna of this complex is distinguished by the bivalves *Tellina tenuis, Macoma balthica* and *Cerastoderma edule* and the polychaete *Glycera tridactyla* and *Nephtys hombergii* (Table 2). The crustacean *Crangon crangon*, the polychaete *Arenicola marina* and the bivalve *Scrobicularia plana* have a patchy distribution within this complex and are recorded locally in moderate abundances. In areas where the proportion of coarse material is high (up to 67%) the polychaete *Cirriformia tentaculata* occurs in moderate abundances.

Distinguishing species of the Intertidal sandy mud community complex	
Tellina tenuis	*Macoma balthica*
Glycera tridactyla	*Cerastoderma edule*
Nephtys hombergii	*Heteromastus filiformis*
Crangon crangon	*Arenicola marina*
Scrobicularia plana	*Cirriformia tentaculata*

Table 2 Distinguishing species of the Intertidal sandy mud community complex.

INTERTIDAL SAND COMMUNITY COMPLEX

This community complex occurs on the southern shores of Galway Bay at Ballyvaghan Bay, on its eastern shores around Glasheen, Eddy and Mweenish Islands and in the Dunkellin Estuary and on the northern shore at Silverstrand, Rusheen Bay and Blake's Hill (Figure 4a & b).

The sediment is largely that of sand with coarse sand ranging from 1% to 25%, medium sand from 1% to 65% and fine sand from 1% to 81%. Glacial deposits also occur within this complex and therefore there is considerable variation in the proportion of coarse material in this complex (gravel ranging from 0% to 79% and very coarse sand from 0% to 48%). This is particularly evident on the upper shores of Eddy Island.

The fauna of this community complex reflect the variability in the sediment. Species such as the polychaetes *Spio martinensis* and *Scoloplos armiger* and the bivalve *Cerastoderma edule* are indicative of a sandy substrate whilst the polychaetes *Exogone* (*Parexogone*) *hebes, Pomatoceros lamarcki, Travisia forbesii* and the chiton *Lepidochitona cinerea* suggest the presence of coarser material (Table 3).

In the eastern portion of the site where there is a mix of medium to fine sand with very coarse material, a number of species are recorded in high abundance. These include the polychaetes *Polyophthalmus pictus* and *Aonides oxycephala*, the oligochaete *Paranais litoralis* and nemerteans.

Distinguishing species of the Intertidal sand community complex	
Travisia forbesii	*Exogone* (*Parexogone*) *hebes*
Tellina tenuis	*Pomatoceros lamarcki*
Cerastoderma edule	*Lepidochitona cinerea*
Spio martinensis	*Scoloplos armiger*
Crangon crangon	*Nephtys hombergii*
Arenicola marina	*Protodorvillea kefersteini*
Paranais litoralis	Nemertea spp.
Aonides oxycephala	*Polyophthalmus pictus*
Lasaea adansoni	*Glycera tridactyla*
Notomastus sp.	*Parvicardium exiguum*
Lepidochitona cinerea	

Table 3 Distinguishing species of the Intertidal sand community complex.

MAËRL-DOMINATED COMMUNITY

Extensive beds of the free living calcareous algae known as maërl are recorded from the southern and eastern areas of the site in depths of between 1m and 13m (Figures 4a & b). The maërl consists almost entirely of *Lithothamnion corallioides*. The discoidal form of this species occurs north-west of Finavarra Point while the finely branched form is recorded in the Doorus Strait and to the north of the Tawin Peninsula. Extensive beds of the maërl species *Phymatolithon calcareum* are recorded in the strong tidal currents of the Muckinish Straits.

These thick dense beds of living and dead maërl provide a variety of niche types resulting in a large number of species occurring in moderate abundance here. Both epifaunal and infaunal species are recorded, including the crustaceans *Caprella acanthifera*, *Verruca stroemia*, *Balanus* sp. *Microdeutopus* sp. and *Phtisica marina*, and the polychaetes *Pomatoceros* sp., *Platynereis dumerilii* and *Pholoe baltica* (sensu Petersen) and the chiton *Leptochiton cancellatus* (Table 4).

Other more conspicuous species which occur here include the anemone *Anthopleura* sp., the asteroids *Marthasterias glacialis* and *Asterias rubens* and the algae *Dilsea carnosa*, *Ahnfeltia* sp., *Desmarestia* sp., *Calliblepharis* sp. and *Lithophyllum incrustans*.

Species associated with the Maërl-dominated community	
Lithothamnion corallioides	*Leptocheirus hirsutimanus*
Phymatolithon calcareum	*Platynereis dumerilii*
Pomatoceros sp.	*Phtisica marina*
Microdeutopus sp.	*Caprella acanthifera*
Leptochiton cancellatus	*Balanus* sp.
Verruca stroemia	*Mytilidae* spp.
Balanus crenatus	*Anthopleura* sp.
Pholoe baltica	*Asterias rubens*
Marthasterias glacialis	*Ahnfeltia* sp.
Dilsea carnosa	*Calliblepharis* sp.
Desmarestia sp.	*Harmothoe* sp.
Lithophyllum incrustans	*Ericthonius* sp.
Polyophthalmus pictus	*Monocorophium sextonae*
Pomatoceros triqueter	*Macrochaeta clavicornis*
Hesiospina aurantiaca	*Goodallia triangularis*
Capitomastus minimus	*Ophiuroidea* sp.
Socarnes erythrophthalmus	*Protodorvillea kefersteini*

Table 4 Species associated with the Maërl-dominated community.

ZOSTERA-DOMINATED COMMUNITY COMPLEX

In the southern part of the bay subtidal beds of *Zostera marina* are recorded south of Island Eddy and off Cregboy in depths of between 1m and 5m (Figures 4a & b). Densities within these beds are generally frequent (6 to 11 individuals m^{-2}) to occasional (2 to 5 individuals m^{-2}). A small bed of *Zostera noltii* occurs intertidally off Blake's Hill on the north shore of the bay.

The associated fauna is that of the surrounding sediments (see Tables 2, 5 and 6)

FINE TO MEDIUM SAND WITH BIVALVES COMMUNITY COMPLEX

This subtidal community complex is recorded extensively in the southern part of the site. It occurs from south of Tawin into Mweeloon Bay, from Ballyvaghan Bay, off Newquay and between Cregboy and Deer Island. It occurs in depths of between 0m and 15m (Figures 4a & b).

The sediment here varies from fine sand (ranging from 15% to 83%) to medium sand (1% to 66%). The sediment is coarser in more exposed areas whilst in the sheltered areas a higher proportion of fine material is recorded.

The amphipod *Siphonocetes kroyeranus* and mytilid bivalves are recorded in high to moderate abundances within this complex. The bivalves *Chamelea striatula* and *Thracia papyracea* and the polychaetes *Nephtys cirrosa* and *Armandia polyophthalma* occur in moderate abundances here (Table 5). The amphipod *Caprella acanthifera* is commonly recorded in this area.

Distinguishing species of the Fine to medium sand with bivalves community complex	
Mytilidae sp.	*Siphonocetes kroyeranus*
Chamelea striatula	*Thracia papyracea*
Nephtys cirrosa	*Armandia polyophthalma*
Caprella acanthifera	*Fabulina fabula*
Tellina tenuis	

Table 5 Distinguishing species of the Fine to medium sand with bivalves community complex.

SANDY MUD TO MIXED SEDIMENT COMMUNITY COMPLEX

This subtidal community complex is recorded extensively in the northern part of Galway Bay from western boundary of the site to Ardfry Point, between Tawin Island and Lackanaloy Creek and Loughnahulla Bay. In the southern part of the bay it occurs from the western boundary eastward into the Dunkellin Estuary and the Doorus Strait (Figures 4a & b). It occurs in depths of between 0m and 16m.

The sediment is largely sandy mud with fine sand ranging from 25% to 80%, very fine sand from 13% to 50% and silt-clay from 0% to 21%. The coarser fractions are generally less than 3%; however in some areas in the eastern bay the gravel fraction can be as high as 88% reflecting the presence of glacial deposits here.

The polychaete *Scalibregma inflatum* and the bivalve *Thyasira flexuosa* occur in high abundances within this complex; the polychaetes *Pholoe baltica* (sensu Petersen), the amphipod *Ampelisca brevicornis* and unidentified nemerteans are recorded in moderate abundances here (Table 6).

A number of species have a patchy distribution within this complex and are recorded in certain areas in high abundances; these include the ophiuroid *Amphiura filiformis*, the polychaetes *Euclymene oerstedii*, *Nephtys assimilis, Melinna palmata* and *Lumbrineris* sp. and the bivalves *Kurtiella bidentata* and *Fabulina fabula*. In those areas with a high proportion of coarse material, the polychaetes *Eteone* sp., *Platynereis dumerilii* and *Pomatoceros* sp. and the chiton *Leptochiton cancellatus* occur in moderate abundances. The bivalve *Ostrea edulis* is recorded in low abundances (>1m^{-2}) in the south-eastern of part Galway Bay, from Mweenish Point and Island Eddy eastward toward Dunbulcaun Bay and in Doorus Strait from Rincarna Point south to the outer reached of Kinvara Bay; higher densities (2.5m^{-2}) are recorded within Rincarna Bay.

Sandy mud to mixed sediment community complex	
Scalibregma inflatum	*Thyasira flexuosa*
Pholoe baltica	*Ampelisca brevicornis*
Nemertea sp.	*Amphiura filiformis*
Euclymene oerstedii	*Kurtiella bidentata*
Nephtys assimilis	*Fabulina fabula*
Melinna palmata	*Lumbrineris* sp.
Eteone sp.	*Platynereis dumerilii*
Pomatoceros sp.	*Leptochiton cancellatus*
Tubificoides benedii	*Capitomastus minimus*
Terebellides stroemi	*Ostrea edulis*

Table 6 Distinguishing species of the Sandy mud to mixed sediment community complex.

A variant of this community complex occurs in south Galway Bay from Deer Island Spit to the Aughinish Shoal, south and west of Island Eddy and in north Galway Bay north of Kilcolgan Point and on the Twain Shoals. Here maërl forms a thin and broken veneer, one layer thick (i.e. the thickness of a single rhodolith) over sediment surface. This covering can vary from 100% to as little as 10% cover.

A second variant of this community complex occurs in the sheltered embayment at Mweenisharan where the sediment has a higher proportion of fine material. Here the oligochaete *Tubificoides benedii*, the bivalve *Kurtiella bidentata* and the polychaetes *Capitomastus minimus* and *Terebellides stroemi* are recorded as abundant.

MIXED SEDIMENT DOMINATED BY MYTILIDAE COMMUNITY COMPLEX

This community complex occurs subtidally in Ballyvaghan Bay, in the Muckinish Straits into Poulnaclogh Bay as far as Bell Harbour, in Aughinish Bay and west of Island Eddy. In the northern part of the bay it is recorded from the outer reaches of Oranmore Bay to Hare Island and into New Harbour at Rinville (Figures 4a & b). It occurs in depths of between 0m and 5m.

The sediment within this complex shows a high degree of variation from coarse sediment, mixed sediment to sand and sandy mud. This variability is reflected in the ranges of the sediment fractions, with gravel ranging from 1% to 35%, very coarse sand from 0.4% to 47%, coarse sand from 0.3% to 59%, medium sand from 1% to 31%, fine sand from 1% to 55%, very fine sand from 0.2% to 48% and silt-clay 0.1% to 6%. In the Muckinish Straits areas of maërl gravel are recorded.

The community is dominated by unidentified mytilid bivalves which are recorded in very high abundances and reflect the high levels of coarse material here. A large number of species have a patchy distribution within this complex and occur in some locations in high abundances, reflecting the heterogeneous nature of the sediment here. These species include unidentified copepods and nematodes, the crustaceans *Corophium* sp., *Microdeutopus* sp. and *Monocorophium sextonae*, the polychaetes *Platynereis dumerilii*, *Pholoe baltica* (sensu Petersen) and *Pomatoceros* sp. and the oligochaete *Tubificoides benedii* (Table 7).

Mixed sediment dominated by Mytilidae community complex	
Mytilidae spp.	Copepoda spp.
Nematoda spp.	*Microdeutopus* sp.
Platynereis dumerilii	*Pholoe baltica*
Corophium sp.	*Tubificoides benedii*
Kurtiella bidentata	*Guernea (Guernea) coalita*
Monocorophium sextonae	*Polyophthalmus pictus*
Ophiuroidea	*Harmothoe* sp.
Syllidia armata	*Eumida bahusiensis*
Stenothoe monoculoides	*Pontonema simile*
Harmothoe sp.	*Dosinia* sp.
Nemertea sp.	*Modiolarca subpicta*
Crassicorophium crassicorne	*Grania* sp.
Venerupis sp.	Ostracoda sp.
Goodallia triangularis	

Table 7 Distinguishing species of the Mixed sediment dominated by Mytilidae community complex.

SHINGLE

Shingle (pebbles and gravel) is widely recorded within the bay. It is recorded on exposed and moderately exposed shores west of Galway City, on Hare Island and at Rinville and Mweeloon. In the Dunkellin Estuary shingle occurs from Tawin to Rincarna Point. On the southern shores it is recorded from Doorus to Cregboy and in the exposed areas of Ballyvaghan Bay at Finavarra and Rine Point (Figures 4a & b). These shingle shores are interspersed with both soft and hard substrates. Talitrid amphipods are recorded where dead algae accumulates here.

FUCOID-DOMINATED COMMUNITY COMPLEX

This intertidal community complex is recorded extensively throughout the site. The substrate on which it occurs ranges from boulders and cobble fields to bedrock; the exposure regime is that of exposed to moderately exposed reef (Figures 4a & b).

The community is dominated by *Fucus vesiculosus*, *Fucus serratus*, *Ulva* sp. and *Patella* sp. The algal species *Ascophyllum nodosum* and *Pelvetia canaliculata* and unidentified barnacles have a patchy distribution within this community while algal species *Himanthalia* sp. and *Codium* sp. and unidentified sponges and anemones are common in rock pools (Table 8).

Species associated with Fucoid-dominated community complex	
Fucus vesiculosus	*Pelvetia canaliculata*
Fucus serratus	*Himanthalia* sp.
Patella sp.	*Codium* sp.
Ulva sp.	Sponges
Barnacles	Anthozoan spp.
Ascophyllum nodosum	

Table 8 Species associated with Fucoid-dominated community complex.

On the northern shore of Galway Bay between Blake's Hill and Seamount the reef-building polychaete *Sabellaria alveolata* occurs on rocks among fucoids. It distribution is recorded as patchy over an area of approximately 0.02km^2.

LAMINARIA-DOMINATED COMMUNITY COMPLEX

This community complex occurs subtidally throughout this site. It is recorded in the northern bay from Seaweed Point and Black Rock to Salthill, at Roscam and Kilcolgan Point. In the southern bay it occurs at Aughinish and Finavarra and from Rine Point to the western boundary of the site. It is also recorded around many of the islands within the bay (Figures 4a & b)

It occurs in depths of less than 10m on a substrate of bedrock and boulders. The exposure regime here ranges from that of moderately exposed to sheltered reef.

The kelp species *Laminaria digitata* dominates this community complex, although *Saccharina latissima* is also recorded. Other algal species occurring here include the encrusting coralline algae *Lithophyllum incrustans*, red algae *Dilsea carnosa* and the brown algae *Halidrys* sp. (Table 9). Fauna commonly recorded here include barnacles and the echinoderms *Echinus* sp. and *Asterias rubens*.

Species associated with *Laminaria*-dominated community complex	
Laminaria digitata	*Echinus* sp.
Lithophyllum incrustans	Barnacles
Dilsea carnosa	*Palmaria* sp.
Halidrys sp.	Foliose red algal sp.
Asterias rubens	*Mastocarpus stellatus*
Saccharina latissima	*Chondrus* sp.
Delesseria sanguinea	*Fucus serratus*
Marthasterias glacialis	*Polysiphonia* sp.
Cliona celata	

Table 9 Species associated with *Laminaria*-dominated community complex.

SHALLOW SPONGE-DOMINATED REEF COMMUNITY COMPLEX

This subtidal community complex occurs most extensively in the northern bay from Rinville to Ardfry Point and the Margaretta Shoal; it also occurs around the islands and on shallow rocks in this area. In the southern bay it is recorded at the western boundary of the site (Figures 4a & b).

The substrate is largely that of cobble and boulder fields in depths of between 0m and 12m. The exposure regime ranges from exposed to moderately exposed reef.

The species commonly occurring within this complex include the sponges *Cliona celata* and *Alcyonium diaphanum*, the asteroids *Marthasterias glacialis* and *Asterias rubens* and the algal species *Fucus serratus*, *Fucus vesiculosus* and *Lithophyllum incrustans* (Table 10).

Species associated with the Shallow sponge-dominated reef community complex	
Cliona celata	Barnacles
Alcyonium diaphanum	Foliose red algae
Fucus serratus	*Delesseria sanguinea*
Lithophyllum incrustans	*Nemertesia* sp.
Marthasterias glacialis	*Calliblepharis* sp.
Asterias rubens	*Halidrys* sp.
Fucus vesiculosus	*Polysiphonia* sp.
Echinus sp.	*Patella* sp.

Table 10 Species associated with the Shallow sponge-dominated reef community complex.

MYTILUS-DOMINATED REEF COMMUNITY

This intertidal mussel bed occurs on the northern shore of the bay at Roscam (Figure 4a). This is a well defined bed as distinct from the accumulations of mussel spatfall commonly seen on hard substrate along the north shore between Salthill and Galway.

On the mid shore the bed overlies a mud substrate, lower down the shore it occurs over rocks and boulders.

The associated fauna present include the gastropods *Nucella lapillus* and *Littorina littorea* and unidentified barnacles, while the flora is dominated by *Fucus vesiculosus* and *Fucus serratus* (Table 11).

Species associated with *Mytilus*-dominated reef community	
Mytilus edulis	Barnacles
Nucella lapillus	*Fucus vesiculosus*
Littorina littorea	*Fucus serratus*

Table 11 Species associated with *Mytilus*-dominated reef community

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 Galway Bay Complex 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. In particular, 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 in which 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 Galway Bay Complex SAC during the breeding season are indicated in figure 5. Current known sites are broadly within the following areas: Oranmore Bay, Kinvarra Bay, Aughinish Bay, Poulnaclogh Bay, Ballyvaghan Bay, Rabbit Island, Earl's Rock, St. Brendan's Island, Ardfry Point, Tawin Island, Glasheen Island and Deer Island.

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 317 harbour seals were recorded ashore within Galway Bay Complex 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 Galway Bay Complex SAC are indicated in figure 6. This broadly consists of Oranmore Bay, Kinvarra Bay, Aughinish Bay, Poulnaclogh Bay, Ballyvaghan Bay and on Black Rock, Earl's Rock and St. Brendan's Island, Tawin Island and Glasheen Island, Ringeelaun Point and Deer Island.

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 Galway Bay Complex 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 Galway Bay Complex SAC are broadly within the following areas: Lough Atalia, Oranmore Bay, Kinvarra Bay, Aughinish Bay, Poulnaclogh Bay, Ballyvaghan Bay and on Tawin Island and Glasheen Island.

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 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 and Annex II species to facilitate the appropriate assessment process:

Objective **To maintain the favourable conservation condition of Large shallow inlets and bays in Galway Bay Complex 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

- This habitat partly encompasses the Annex I habitats of Mudflats and sandflats not covered by seawater at low tide and Reefs. Targets for these habitats should be addressed in their own right.
- 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	Maintain the extent of the *Zostera*-dominated community complex and maërl-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.

- 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 4a and 4b. The areas given below are based on spatial interpolation and therefore should be considered indicative:
  - *Zostera*-dominated community complex – 12ha
  - Maërl-dominated community – 350ha

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 the Galway Bay Complex SAC, the density of the Zostera at this site in 2006 was estimated to range from frequent (6 to 11 individual m^{-2}) to occasional (2 to 5 individual m^{-2}) on the AFOR scale (semi-quantitative abundance measure).
- Any significant anthropogenic disturbance to the quality (i.e. shoot density) of this community complex should be avoided.

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

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

Target 5	Conserve the following community types in a natural condition: Intertidal sandy mud community complex; Intertidal sand community complex; Fine to medium sand with bivalves community complex; Sandy mud to mixed sediment community complex; Mixed sediment dominated by Mytilidae community complex; Shingle; Fucoid-dominated community complex; *Laminaria*-dominated community complex; and Shallow sponge-dominated reef 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 4a and 4b.
- 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 sandy mud community complex – 264ha
  - Intertidal sand community complex – 230ha
  - Fine to medium sand with bivalves community complex – 1879ha
  - Sandy mud to mixed sediment community complex – 4560ha
  - Mixed sediment dominated by Mytilidae community complex –1139ha
  - Shingle – 55ha
  - Fucoid-dominated community complex - 835ha
  - *Laminaria*-dominated community complex - 824ha
  - Shallow sponge-dominated reef community complex – 596ha
- 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 Mudflats and sandflats not covered by seawater at low tide in Galway Bay Complex 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

- 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.

Target 2	Conserve the following community types in a natural condition: Intertidal sandy mud community complex; and Intertidal sand 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 4a and 4b.
- The estimated areas of the communities within the Mudflats and sandflats not covered by seawater at low tide habitat given below are based on spatial interpolation and therefore should be considered indicative:
  - Intertidal sandy mud community complex – 513ha
  - Intertidal sand community complex – 232ha
- 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 Reefs in the Galway Bay Complex SAC, which is defined by the following list of attributes and targets**

Target 1	The distribution of reefs is stable or increasing, subject to natural processes.

- The likely distribution of reef habitat in this SAC is indicated in 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.

Target 2	The permanent 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.

Target 3	Maintain the extent of the *Mytilus*-dominated reef community, subject to natural processes

- *Mytilus edulis* form reef structures and therefore act as an ecosystem engineer, increasing availability of habitat for other species.
- Any significant anthropogenic disturbance to the extent of this community should be avoided.
- The estimated area of this community within the Reefs habitat given below is based on spatial interpolation and therefore should be considered indicative:

  - *Mytilus edulis*-dominated community- >1ha

Target 4	Conserve the high quality of the *Mytilus*-dominated reef community, subject to natural processes

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

Target 5	Conserve the following community types in a natural condition: Fucoid-dominated community complex; *Laminaria*-dominated community complex; and Shallow sponge-dominated 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 4b.
- The estimated areas of these communities within the Reefs habitat given below are based on spatial interpolation and therefore should considered indicative:
  - Fucoid-dominated community complex - 1227ha
  - *Laminaria*-dominated community complex – 906ha
  - Shallow sponge-dominated reef community complex – 640ha
- 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 harbour seal in Galway Bay Complex SAC, which is defined by the following list of attributes and targets**

Target 1	Species range within the site should not be 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.

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.

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.

Target 4	Conserve the resting 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.

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 Large shallow inlets and bays in Galway Bay Complex SAC

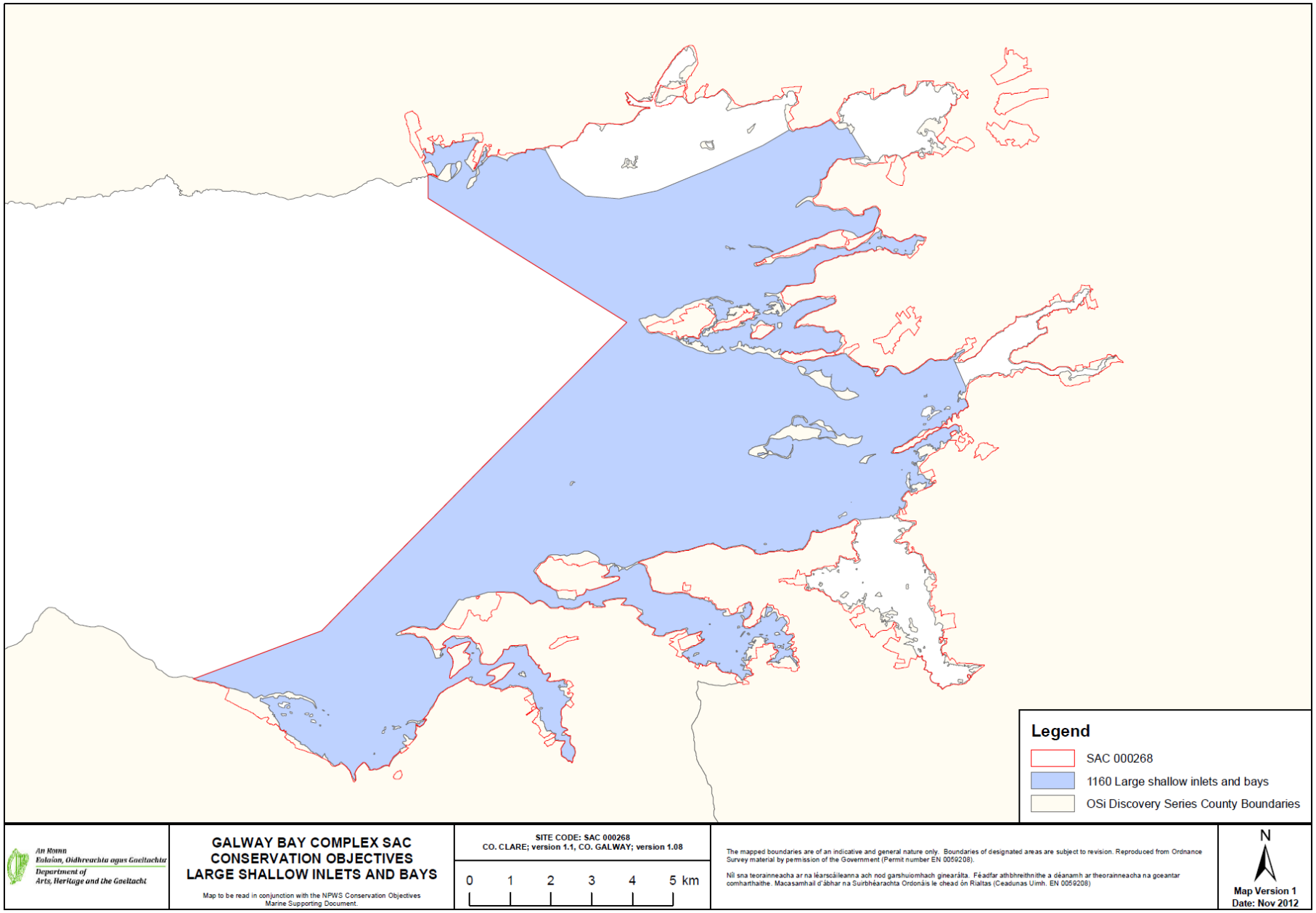

Figure 2. Extent of Mudflats and sandflats not covered by seawater at low tide in Galway Bay Complex SAC.

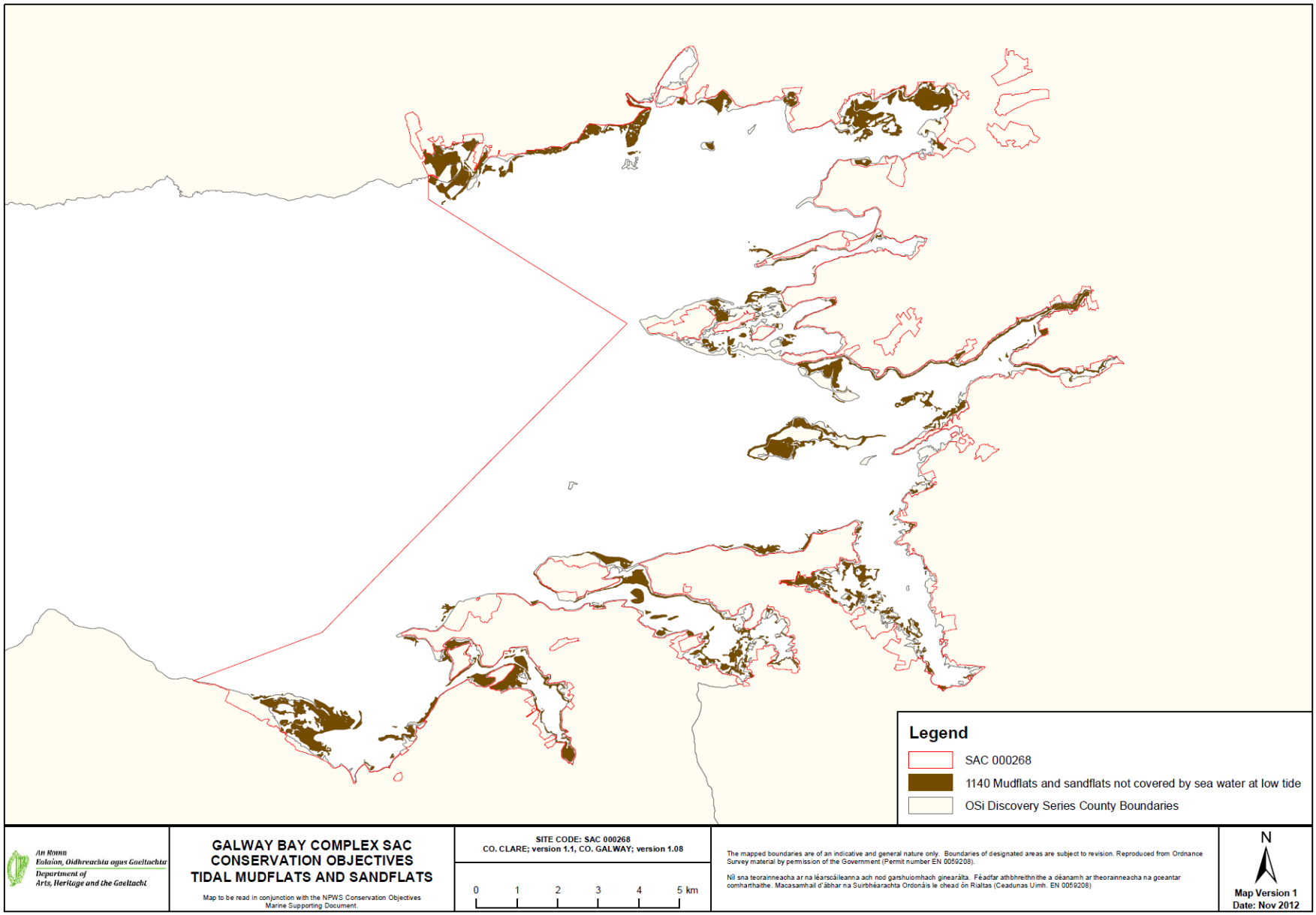

Figure 3. Extent of Reefs in Galway Bay Complex SAC.

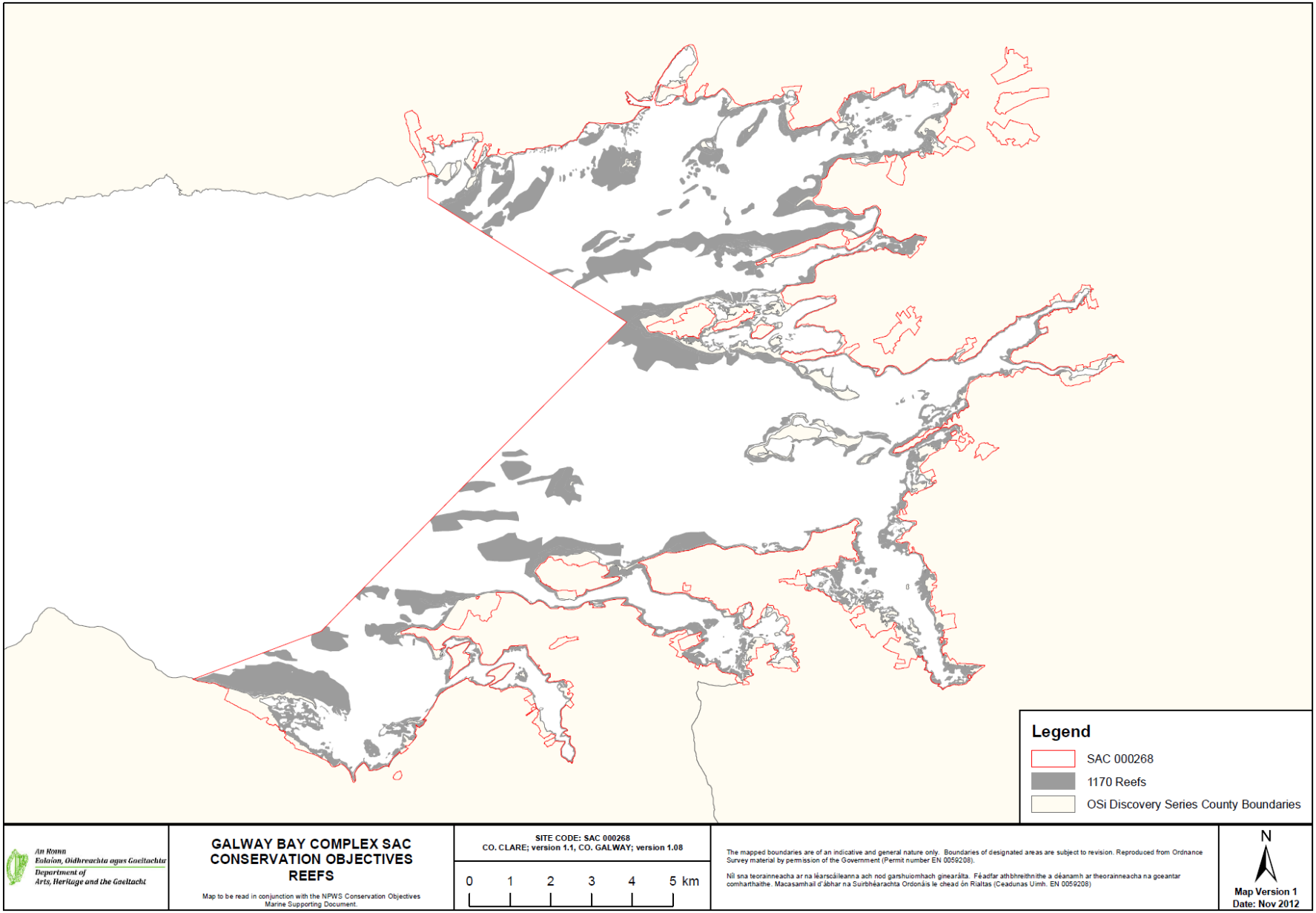

Figure 4a. Distribution of communities in Galway Bay Complex SAC

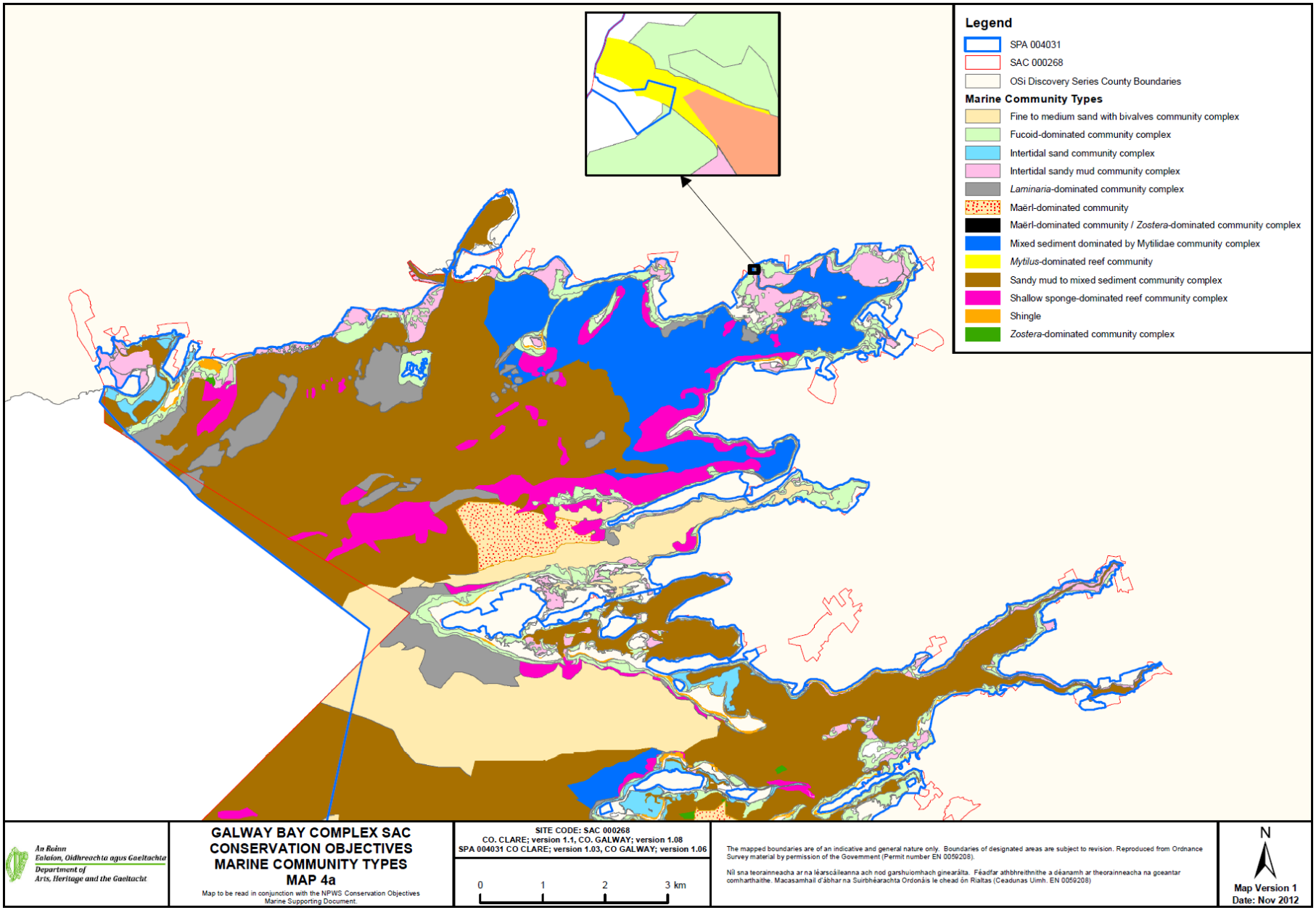

Figure 4b. Distribution of communities in Galway Bay Complex SAC

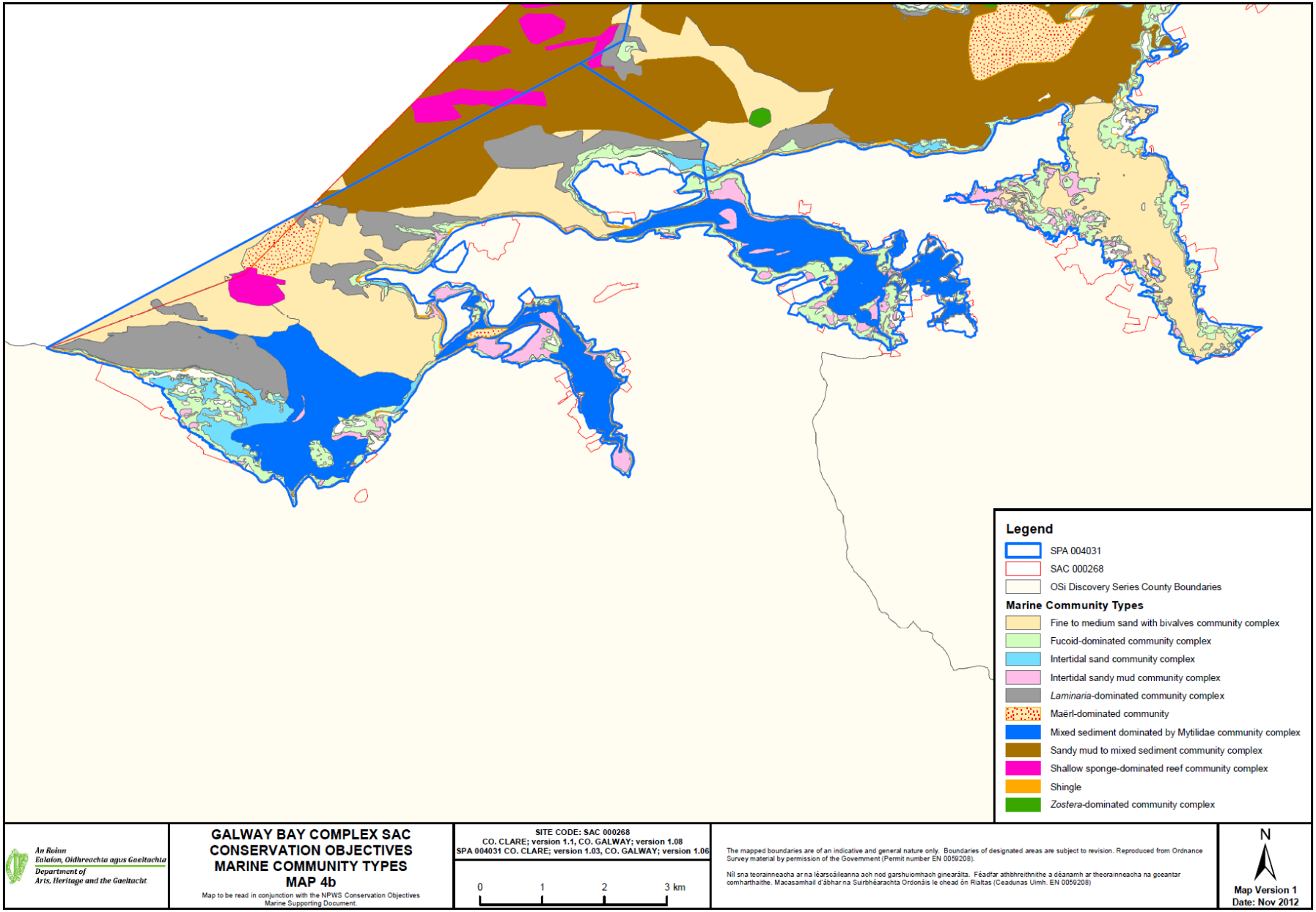

Figure 5. *Phoca vitulina* - Known breeding sites

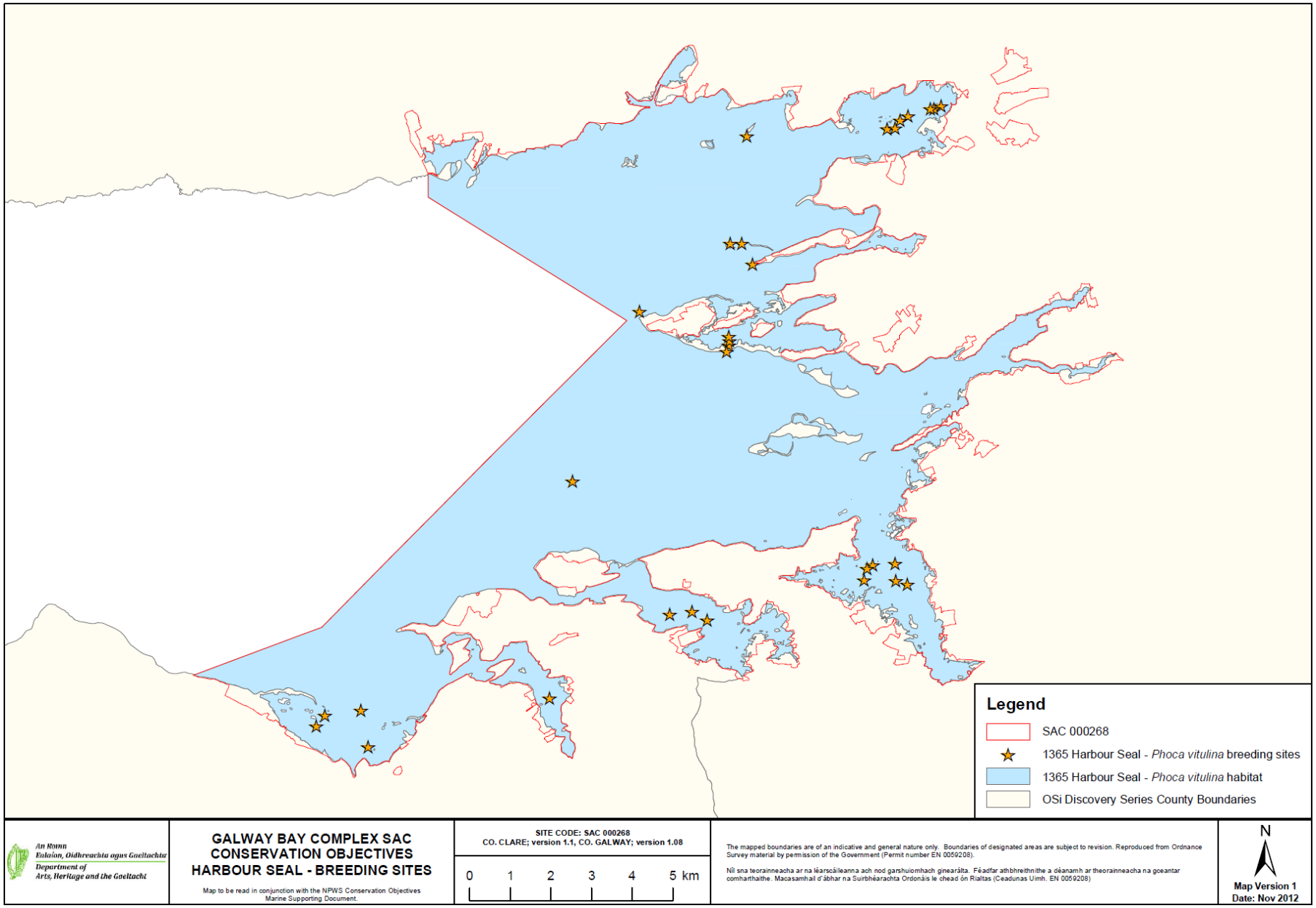

Figure 6. *Phoca vitulina* - Known moult haul out sites

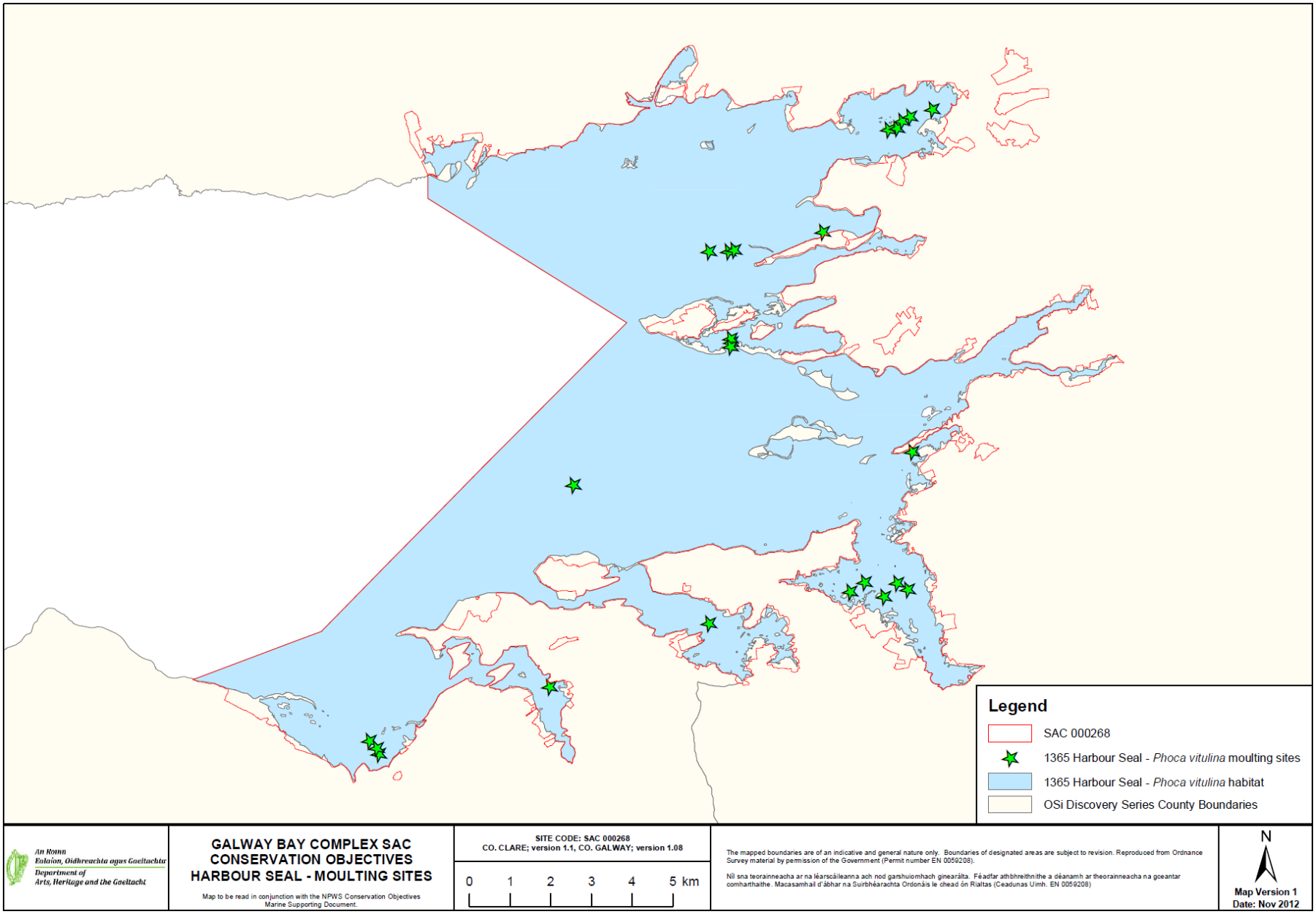

Figure 7. *Phoca vitulina* - Known resting haul-out sites (non-breeding)