

**NPWS**

**Connemara Bog Complex SAC  
(site code: 2034)**

**Conservation objectives supporting document -  
Marine Habitats**

**Version 1  
September 2015**

## **Introduction**

Connemara Bog Complex SAC is designated for the marine Annex I qualifying interest of Reefs (Figure 1). This SAC is also designated for Coastal Lagoon one of which, Ardbear Salt Lake, contains the biogenic reef community - *Serpula vermicularis*-dominated community complex.

BioMar surveys of Ardbear Salt Lake were carried out in 1994 and 1995 (Picton and Costello, 1997). A subtidal survey was undertaken in 2011 (MERC, 2011) and an intertidal walkover in 2014. These data were used to determine the physical and biological nature of the Reefs habitat in this SAC.

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

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 objective and targets in the completion of such assessments is provided in Section 2.

# Section 1

## Principal Benthic Communities

Within Connemara Bog Complex SAC, two community types are recorded in the Annex I habitat Reefs as presented in table 1; a description of each community type is given below.

	Habitat
	Reefs (1170)
<i>Serpula vermicularis</i> -dominated community complex	✓
Intertidal reef community complex	✓
<i>Ruppia maritima</i> -dominated community	
Anoxic mud community	

**Table 1** The community types recorded in Connemara Bog Complex SAC and their occurrence the Annex I habitat for which the site is designated.

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

The development of a community complex target arises when an area possesses similar abiotic features but records a number of biological communities that are not regarded as being sufficiently stable and/or distinct temporally or spatially to become the focus of conservation efforts. In this case, examination of the available data from Connemara Bog Complex 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.

### ***SERPULA VERMICULARIS*-DOMINATED COMMUNITY COMPLEX**

This subtidal community complex occurs in Ardbear Salt Lake located in the north-western extreme of the site (Figure 2). This lake is a semi-enclosed water body subject to strong environment fluctuations. The tidal range (1.0m Spring and 0.4m Neap) is much reduced compared to the adjacent Ardbear and Clifden Bays. There are influential freshwater inputs from two rivers on the eastern shore, the Derryvraun and the Derryehorraun and also from diffuse freshwater inputs from the low lying bog to the east and south; the impervious high ground to the north is another source of freshwater input.

This community occurs in depths of 2m to 10m and is dominated by the biogenic reef forming serpulid polychaete, *Serpula vermicularis*. This species forms a calcareous tube which is anchored to the substratum. The enclosed nature of the salt lake and its restricted tidal flow results in the larvae being retained within the lake and their preferential settlement on conspecifics (Leahy, 1991). This leads to the formation of twisted aggregations of the calcareous

tubes which eventually form a biogenic reef. *Serpula* reef acts as a substratum for a wide variety of other organisms leading to a higher biodiversity than on the surrounding substrate.

Over large areas of the lake the substrate is that of fine sediment. *Serpula* reefs occur on the east side of the lake, in the centre of the lake surrounding a small rocky island and to the south of the lake near Ardbear Bridge. The reefs occur on hard substrate, on patches of coarse sediments and on cobble. Isolated individuals of *Serpula vermicularis* may occur on hard substrate within the fine sediments.

The distinguishing species of this community complex are the polychaete *Serpula vermicularis*, mixed faunal turf (including bryozoans), the red alga *Plocamium cartilagineum* and the brown alga *Ascophyllum nodosum*. Other fauna associated with this community include the sponges *Halichondria (Halichondria) panicea* and *Amphilectus fucorum*, the echinoderm *Asterias rubens*, the ascidian *Asciella* sp. and the cnidarians *Nemertesia* spp. and *Anemonia viridis* (Table 2). Flora associated with the community include the red alga *Corallina officinalis*, the green algae *Codium* sp. and *Ulva* sp. and the brown algae *Fucus* sp. and *Halidrys siliquosa*.

Distinguishing species <i>Serpula vermicularis</i> -dominated community complex	
<i>Serpula vermicularis</i>	<i>Corallina officinalis</i>
<i>Anemonia viridis</i>	<i>Plocamium cartilagineum</i>
<i>Nemertesia</i> sp.	<i>Fucus</i> sp.
<i>Asciella</i> sp.	<i>Halidrys siliquosa</i>
<i>Asterias rubens</i>	<i>Ascophyllum nodosum</i>
<i>Halichondria (Halichondria) panicea</i>	<i>Ulva</i> sp.
<i>Amphilectus fucorum</i>	<i>Codium</i> sp.

**Table 2** Distinguishing species of *Serpula vermicularis*-dominated community complex.

Strong vertical and horizontal salinity gradients occur on occasion within the lake which leads to a vertical stratification of the water body when warm low salinity water overlies cooler more saline waters. Seasonal hypoxia may occur in the deeper waters of the lake during prolonged periods of calm weather which reduces wind induced mixing in summer months. This has in the past caused widespread mortality of *Serpula vermicularis* and the associated reef community (Leahy, 1991).

#### INTERTIDAL REEF COMMUNITY COMPLEX

This community occurs in Bertraghboy Bay to the north of Glinsk and to the west of Gowla. The substrate is that of bedrock and boulders. On the mid to lower shore, the community is dominated by furoid brown algae, barnacles and limpets. On the upper shore, the community is dominated by lichens.

#### *RUPPIA MARITIMA*-DOMINATED COMMUNITY COMPLEX

This community is recorded in Ardbear Salt Lake in sheltered locations with fine sediments and reduced salinity (Figure 2). It occurs to northeast of the lake adjacent to the discharge of the Derryehorraun River and to the southeast adjacent to the discharge of the Derryvraun River and two smaller streams. This community occurs from the intertidal to a depth of 2m. It is dominated by the aquatic angiosperm *Ruppia maritima* (Table 3).

Distinguishing species <i>Ruppia maritima</i> -dominated community complex
<i>Ruppia maritima</i>

**Table 3** Distinguishing species of *Ruppia maritima*-dominated community complex.

#### ANOXIC MUD COMMUNITY

This community occurs extensively in the subtidal sediments within Ardbear Salt Lake in depths of between 0m to 30m (Figure 2) and is subject to variable salinities. Salinity is highest close to Ardbear Bridge at the western extreme of the lake and reduces with distance from the bridge. The sediment type is predominantly anoxic peaty mud. This community may be subject to periodic seasonal hypoxia in the deeper parts of the lake associated with stratification of the water column during periods of high freshwater input, reduced wind induced mixing and warming of the surface waters in summer months.

The fauna is characterised by low species diversity and abundance. It is notable for having very small numbers of burrowing species, which may be related to seasonal hypoxia within the lake.

Species distinguishing this community include the polychaete *Nephtys hombergii*, the gastropod *Philine aperta*, the bivalve *Corbula gibba*, the echinoderms *Asterias rubens* and *Psammechinus miliaris* and the decapod crustacean *Homarus gammarus* (Table 4) (Henry, 2002). Single individuals of *Serpula vermicularis* occur on rock outcrops in the muddy sediment.

Distinguishing species Anoxic mud community complex	
<i>Nephtys hombergii</i>	<i>Asterias rubens</i>
<i>Philine aperta</i>	<i>Psammechinus miliaris</i>
<i>Corbula gibba</i>	<i>Homarus gammarus</i>

**Table 4** Distinguishing species Anoxic mud community complex.

A variant of this community occurs in the south west of the salt lake, immediately adjacent to the bridge; here tidal currents prevent the accumulation of muddy sediments and the substrate type is exposed rock, gravel and shell debris. No fauna has been reported from this variant.

## Section 2

### Appropriate Assessment Notes

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

#### Annex I Habitats

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

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

1. Those communities that are key contributors to overall biodiversity at a site by virtue of their structure and/or function (keystone communities) and their low resilience should be afforded the highest degree of protection and any significant anthropogenic disturbance should be avoided.
2. In relation to the remaining constituent communities that are structurally important (e.g. broad sedimentary communities) within an Annex I marine habitat, there are two considerations.
  - 2.1. Significant anthropogenic disturbance may occur with such intensity and/or frequency as to effectively represent a continuous or ongoing source of disturbance over time and space (e.g. effluent discharge within a given area). Drawing from the principle outlined in the European Commission's Article 17 reporting framework that disturbance of greater than 25% of the area of an Annex I habitat represents unfavourable conservation status, this Department takes the view that licensing of activities likely to cause continuous disturbance of each community type should not exceed an approximate area of 15%. Thereafter, an increasingly cautious approach

is advocated. Prior to any further licensing of this category of activities, an inter-Departmental management review (considering *inter alia* robustness of available scientific knowledge, future site requirements, etc) of the site is recommended.

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

The following technical clarification is provided in relation to specific conservation objectives and targets for Annex I habitats to facilitate the appropriate assessment process:

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

<b>Target 1</b>	The permanent area is stable or increasing, subject to natural processes.
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- The area of this habitat represents the minimum estimated area of reef at this site and underestimates the actual area due to the many areas of sheer and steeply sloping rock within the reef habitat.
- This target refers to activities or operations that propose to permanently remove habitat from the site, thereby reducing the permanent amount of habitat area. It does not refer to long or short term disturbance of the biology of a site.
- Early consultation or scoping with the Department in advance of formal application is advisable for such proposals.

<b>Target 2</b>	The distribution of reefs is stable or increasing, subject to natural processes.
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- The likely distribution of reef habitat in this SAC is indicated in figure 1.
- This target refers to activities or operations that propose to permanently remove reef habitat, thus reducing the range over which this habitat occurs within the site. It does not refer to long or short term disturbance of the biology of reef habitats.
- Early consultation or scoping with the Department in advance of formal application is advisable for such proposals.



**Target 3** Maintain the extent of the *Serpula vermicularis*-dominated community complex, subject to natural processes.

- *Serpula vermicularis*-dominated community complex is considered to be one of the keystone communities that are of considerable importance to the overall ecology and biodiversity of a habitat by virtue of their physical complexity.
- Any significant anthropogenic disturbance to the extent of this community complex should be avoided.
- An interpolation of the likely distribution of this community complex is provided in figure 2. The area given below is based on spatial interpolation and therefore should be considered indicative:
  - *Serpula vermicularis*-dominated community complex- 1ha

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

- Every effort should be made to avoid any death to living *Serpula* reef.
- Any significant anthropogenic disturbance to the quality of the *Serpula vermicularis* -dominated community (i.e. destruction of reef structures) should be avoided.

**Target 5** Conserve the following community type in a natural condition: Intertidal reef community complex.

- A semi-quantitative description of the community has been provided in Section 1.
- An interpolation of its likely distribution is provided in figure 2.
- The estimated area of the community within the Reefs habitat given below is based on spatial interpolation and therefore should be considered indicative.
  - Intertidal reef community complex -5ha
- 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 the community should not exceed an approximate area of 15% of the interpolated area of the 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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Henry, L.M. 2002 A study of the Ardbear Salt Lake (Clifden, Ireland) ecosystem with particular reference to (A) Periodic hypoxia, and (B) Aspects of the biology of *Serpula vermicularis* Linnaeus (Polychaeta: Serpulidae). Unpublished Ph.D. thesis, National University of Ireland, Galway

Leahy, Y. 1991. Polychaete studies on the west coast of Ireland I. Benthic characterisation of the Dunkellin estuary with particular reference to the Polychaeta II. Aspects of the biology and ecology of the serpulid *Serpula vermicularis* Linnaeus from Ardbear Salt Lake. Unpublished Ph.D. thesis, National University of Ireland, Galway

Figure 1. Extent of Reefs in Connemara Bog Complex SAC

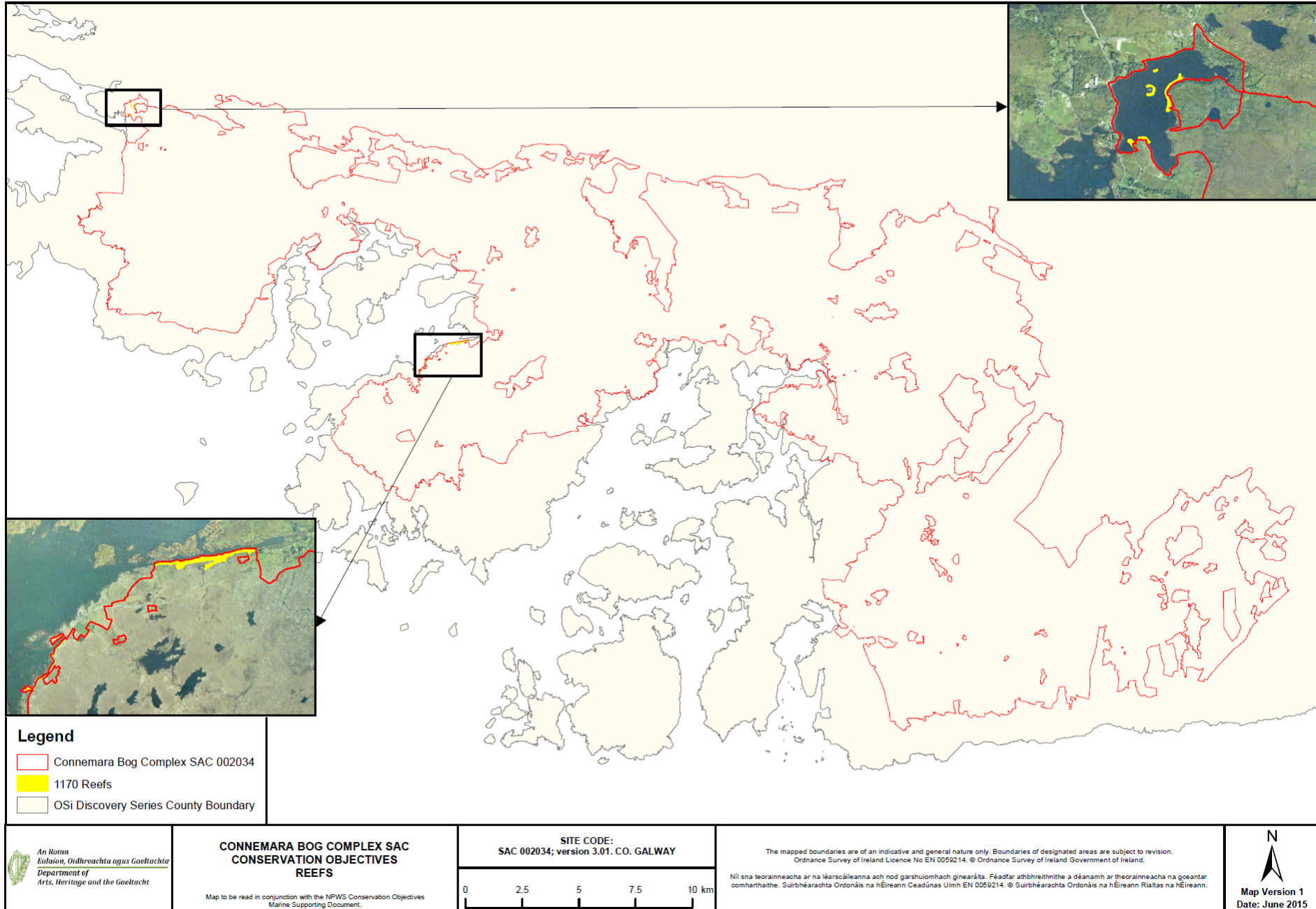


Figure 2. Distribution of community types in Connemara Bog Complex SAC

