



**Fisheries Management Options Paper:  
ANTON DOHRN SEAMOUNT SPECIAL AREA OF CONSERVATION**

**JNCC**

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# 1. Management Options Summary

**Table 1.** Fisheries management options for mobile and static bottom contact fishing gears.

Fishing Activity	Management options
<p><b>Mobile bottom contact gears</b></p>	<p><b>No additional management:</b> The conservation objectives for the <b>biogenic reef</b> feature would not be met under this option. There is a significant risk of not achieving the conservation objectives for the <b>bedrock and stony reef</b> features.</p> <p><b>Reduce/limit pressures:</b> This option would reduce the risk of not achieving the conservation objectives for the <b>reef</b> feature. Appropriate management could include exclusion of mobile bottom contact gears over the main areas of <b>bedrock and stony reef</b> and all known areas of <b>biogenic reef</b>, allowing fishing to continue in fishable areas around the features. It is possible that these areas may include some areas where the distribution of reef is unknown or uncertain, and some very small areas of known <b>bedrock and stony reef</b> and there would therefore be a risk of localised damage to the structure and function of reef communities in these areas. The location of areas to be covered by management restrictions would include a buffer zone to reduce any risk of accidental contact with the feature. The location of areas to be covered by management restrictions would be decided in consultation with fishers.</p> <p><b>Remove/avoid pressures:</b> This option would reduce the risk of not achieving the conservation objectives for the <b>reef</b> feature within the site boundary to the lowest possible levels. Restrictions would be required for all mobile bottom contact gears within the full extent of the site boundary. The site boundary excludes the central summit of the seamount, which comprises mostly sands and gravels, in order to reduce the area of 'non-interest-feature' included within the site boundary. The outer and inner site boundaries already include a buffer zone around the known features to reduce any risk of accidental contact with the feature (4,000m buffer for the outer extent and 2,000m buffer for the inner extent).</p> <p>ICES have recommended closure to all bottom contact gears of an area similar to the SAC but with a slightly shallower outer boundary (ICES, 2011). If implemented, this would provide a level of protection equivalent to the remove/avoid option.</p>
<p><b>Static bottom contact gears</b></p>	<p><b>No additional management:</b> The conservation objectives for <b>biogenic reef</b> would not be met under this option. There is a risk of not achieving the conservation objectives for the <b>bedrock and stony reef</b> features.</p>

Fishing Activity	Management options
	<p><b>Reduce/limit pressures:</b> This option would reduce the risk of not achieving the conservation objectives for the <b>reef</b> feature. Appropriate management could include closure of the known extent of the <b>biogenic reef</b> feature within the site. However, a risk of impact with patches of feature not identified during survey would remain. The location of areas to be covered by management restrictions would include a buffer zone based on fishing warp length to depth ratio, to reduce any risk of accidental contact with the feature. The location of areas to be covered by management restrictions would be decided in consultation with fishers.</p> <p><b>Remove/avoid pressures:</b> This option would reduce the risk of not achieving the conservation objectives for the <b>reef</b> feature within the site boundary to the lowest possible levels. Restrictions would be required for all bottom contacting static gears within the full extent of the site boundary. The site boundary excludes the central summit of the seamount, which comprises mostly sands and gravels, in order to reduce the area of 'non-interest-feature' included within the site boundary. The outer and inner site boundaries already include a buffer zone around the known features to reduce any risk of accidental contact with the feature (4,000m buffer for the outer extent and 2,000m buffer for the inner extent).</p> <p>ICES have recommended closure to all bottom contact gears of an area similar to the SAC but with a slightly shallower outer boundary (ICES, 2011). If implemented, this would provide a level of protection equivalent to the remove/avoid option.</p>

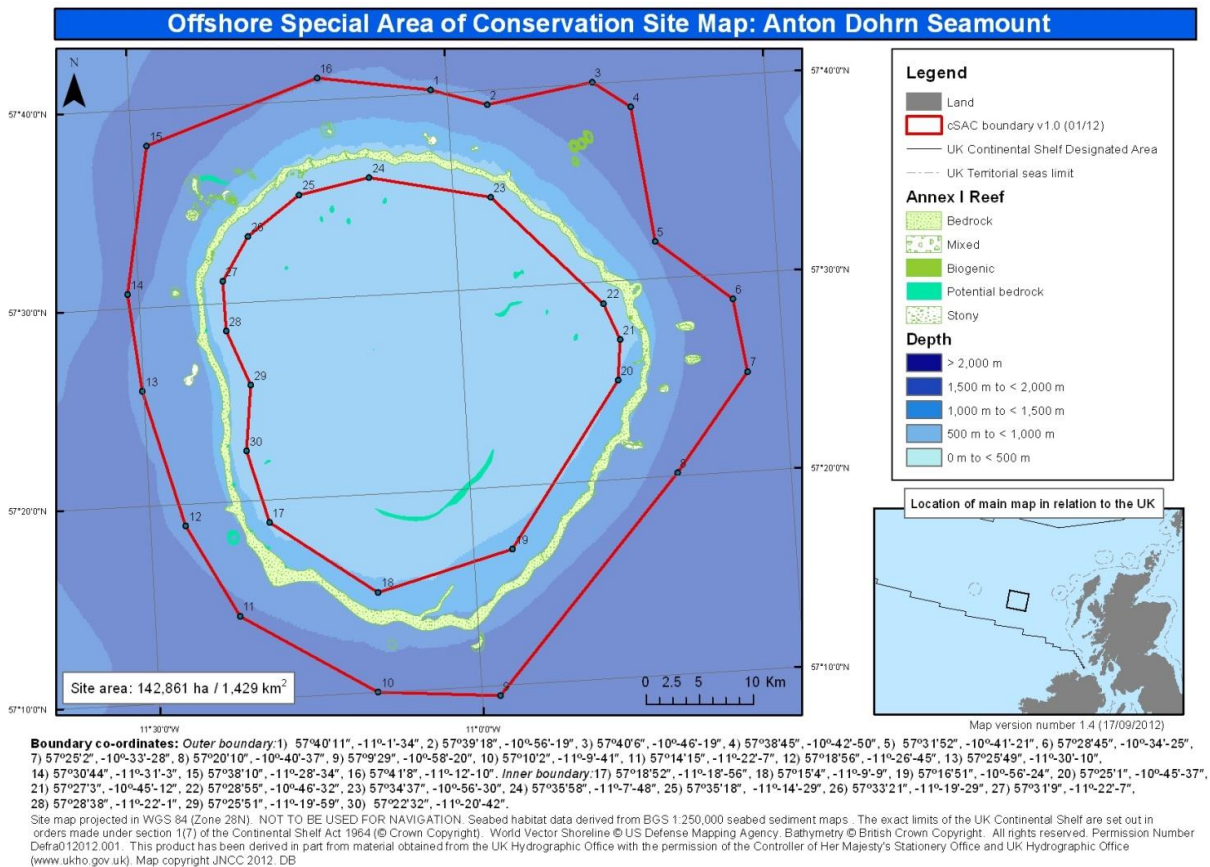
## 2. Introduction

Anton Dohrn Seamount (Figure 1) is located to the west of Scotland, about 200km from the Outer Hebrides in the central Rockall Trough. The seamount is a former volcano, roughly circular in shape. The top is fairly uniform in depth (at 1,100m) and is interspersed with features extending to a maximum height of around 530m below sea level. The top is surrounded by steep (20 - 50°) cliff slopes extending down towards a moat at approximately 2,400m depth. The seamount is approximately 1,800m high from the deepest point of the moat to the crest of the feature, and about 40km in diameter (Long *et al.* 2010).

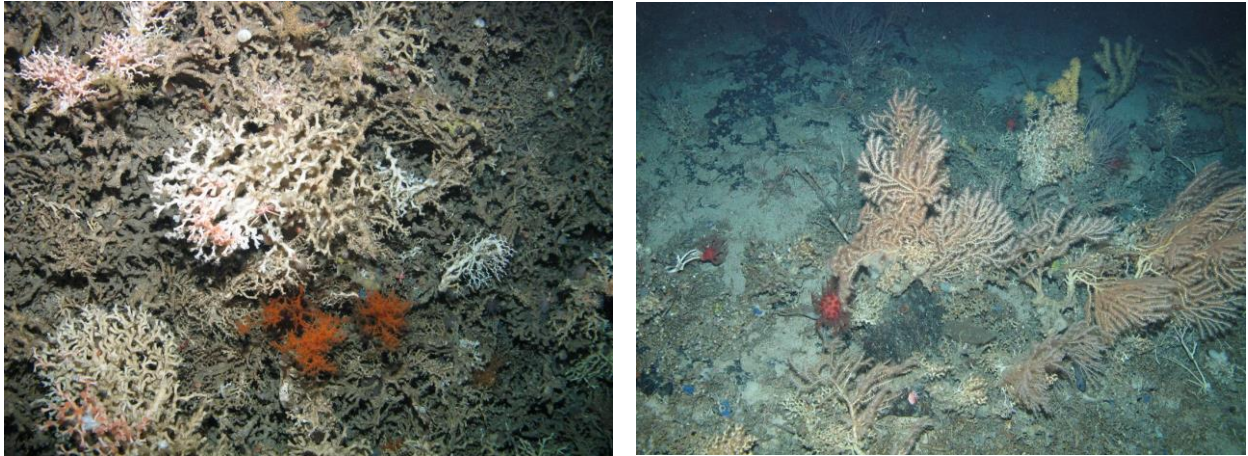
The site is proposed for Annex I reef (Figure 2), consisting of bedrock, biogenic and stony reef. The upper regions of the seamount flanks are bedrock reef grading to stony reef on the lower flanks. These habitats support assemblages of holothurians (sea cucumbers), brittlestars, encrusting sponges, caryophyllid corals and lamellate sponges. At the base of the seamount flanks, bedrock, and stony reef outcrop on radial ridges and on parasitic cones, formed when volcanic material erupted from lateral vents rather than the central vent.

Both these features support dense aggregations of gorgonians (sea whips or sea fans) and other corals.

Biogenic reef, in the form of live cold-water coral reef (*Lophelia pertusa*), occurs on the top of small mounds which are located along the edge of the cliff. Sediment in-filled dead *L. pertusa* frameworks are situated on the radial ridges, parasitic cones, and the rockfall-landslide feature. The dead coral frameworks also represent the Annex I reef sub-type, biogenic reef. These frameworks were probably produced during the growth stages of *L. pertusa* (Wilson, 1979) and support a rich assemblage of associated fauna. Corals associated with the live and dead *L. pertusa* biogenic reef include *Madrepora oculata*, antipatharians and gorgonians. Also found were a squat lobster (*Munida* sp.) and the pencil urchin, *Cidaris cidaris*.



**Figure 1.** Anton Dohrn Seamount site map showing its location in relation to the UK, and the differing depths and Annex I reefs within its site boundary.



**Figure 2.** Examples of Annex I Reef feature and associated fauna within the Anton Dohrn Seamount SAC.

*Left image:* Dead sediment in-filled *L. pertusa* framework on a mound feature with live *L. pertusa* and *M. oculata* growing on the coral debris. Associated fauna includes *C. cidaris* and *Actinaria* sp. (Station AD\_DC\_09, © JNCC).

*Right image:* Coral garden habitat on a parasitic cone feature with dead *L. pertusa*, gorgonians, antipatharians and abundant associated fauna. (Station AD\_DC\_13, © JNCC).

### 3. Protected features and conservation objectives

The Anton Dohrn Seamount SAC contains the Annex I habitat 'Reefs'.

Conservation objectives set out the desired quality of the protected features within each MPA. They are a set of site specific objectives to be met in order for a site to maximise its contribution to Favourable Conservation Status.

The conservation objective for the Anton Dohrn Seamount SAC is to, subject to natural change, restore the reef to favourable condition such that:

- the natural environmental quality is restored;
- the natural environmental processes are maintained;
- the extent, physical structure, diversity, community structure and typical species representative of bedrock, biogenic and stony reef in the Rockall Trough and Bank Regional Sea are restored.

### 4. Roles

The role of JNCC is to advise the Scottish Government on management options for the Anton Dohrn Seamount SAC. In doing this, JNCC's aim is to ensure the conservation objectives for the protected features are met.

Marine Scotland will lead discussions on management with stakeholders. They will consider JNCC's advice and will lead on the development of specific management measures. They will be responsible for making recommendations to Scottish Ministers on these measures.

Stakeholders can provide additional evidence to support the development of management measures, including local knowledge of the environment and activities. Discussions with stakeholders will be one way of highlighting the implications of any management measures to both JNCC and Scottish Government. This will contribute to the development of well-designed and effective management measures.

## 5. Effects of fishing on the features

Whilst it is unlikely that mobile bottom contact gear can affect the long-term natural distribution of **bedrock and stony reef** features, there is evidence to indicate that the use of bottom contacting mobile gears can impact the structure and function of the habitat and the long term survival of its associated species.

The animal communities found on **bedrock and stony reefs** on seamounts tend to be composed of erect and fragile species that are sensitive to physical disturbance, particularly deep-sea stony corals, gorgonians and black corals, sea anemones, hydroids, and sponges (Clark and Tittensor, 2010; Long *et al.* 2010; Clark *et al.* 2010). The use of towed fishing gears is likely to cause damage or death of fragile, erect species, such as sponges and corals (Løkkeborg, 2005; Freese *et al.* 1999). Other species such as hydroids, anemones, bryozoans, tunicates, and echinoderms may also be vulnerable (McConnaughey *et al.* 2000; Sewell and Hiscock 2005). Where fragile, slow growing species occur, even low levels of fishing have the potential to change the structure and function of the habitats and may result in the loss of some characteristic species. Recovery from such damage is estimated to be measured in decades, depending on the environmental conditions (Clark *et al.* 2010; ICES, 2010).

Mobile bottom contact gears reduce the long-term natural distribution of cold water coral (**biogenic reef**) features, as well as impacting the structure and function of the habitat and the long term survival of its associated species. The passage of trawls may increase mortality of the coral by crushing, burying, or wounding corals, increasing susceptibility to infection and epifaunal recruitment that may eventually smother corals (Fosså *et al.* 2002). The passing of a heavy trawl reduces the three-dimensional structure of the coral to rubble, decreasing the complexity of the habitat with impacts on the associated community composition (Koslow *et al.* 2001; Fosså *et al.* 2002). Indirect impacts on cold water coral reefs from trawling are from increased levels of suspended particles in the water column causing smothering and polyp mortality (Larsson and Purser, 2011). Corals are slow growing so any damage will take many years to repair (ICES, 2010).

No studies providing evidence of the effects of static bottom contact gear on **bedrock and stony reef** on seamounts have been found, however impacts occurring on comparable vulnerable habitats and species, such as sponges and corals in Scottish waters are applicable (Muñoz *et al.* 2010). Impacts can arise from hooks, lines, nets, and ropes becoming entangled with corals and other fragile species, including 'plucking' them from the seabed during hauling (ICES, 2010; Muñoz *et al.* 2010; OSPAR, 2010; Mortensen *et al.* 2005). While the degree of damage from individual fishing operations is likely to be lower than for trawling, cumulative damage may be significant (ICES, 2010; Muñoz *et al.* 2010).

Static bottom contact gears are likely to reduce the long-term natural distribution of cold water coral (**biogenic reef**) features, as well as impacting the structure and function of the habitat and the long term survival of its associated species. Hooks, lines, nets, and ropes entangle corals and 'pluck' them during hauling (Grehan *et al.* 2004; ICES, 2010). Physical damage to the seabed has been observed which may be caused by dragged anchors (Grehan *et al.* 2004; ICES, 2010). The individual impact of a single fishing operation may be

slight but cumulative damage can be significant. Given the slow growth rate of the reefs, they may take centuries to recover from damage, if at all (ICES, 2010).

## 6. Development of management options

Management options are being developed where we consider that some form of management may be necessary to achieve the conservation objectives for the feature. The approach to identifying management options for each activity will be risk-based, i.e., we are focusing on providing advice where we believe there is a risk to achieving the conservation objectives. To do this, we are using existing data and information on protected features and relevant activities, and also our understanding of the relationships between the feature and relevant activities.

We have identified risks to achieving the conservation objectives where there is an overlap between protected features and activities associated with pressures the features are sensitive to. Our identification of the risk has been refined using available information on the interaction between the features and activities where this is available (see section 5). We have recommended management options to manage this risk. The text focuses on interactions in terms of physical overlap but the assessment of risk in future should also take account of the intensity and frequency of activities within the SAC. Specific details of the recommended management options for mobile bottom contact and static bottom contact gears are provided in Tables 3 & 4.

A gradient of management options has been considered to reduce the feature's exposure to pressures. These have been described under three potential management option categories:

- a) **No additional management** – where there are currently no site specific fisheries management measures in place, and these are not deemed necessary at this time to achieve the conservation objectives for the site.
- b) **Additional management to reduce pressures** – where fisheries managers may wish to consider a range of measures that could be used to reduce the risk to features by managing fishing activity. These could include:
  - Area restrictions (permanently closing some or all of the feature's area – note this option may be limited due to recent evidence on distribution of the feature.
  - Gear restrictions (e.g., restricting use of the more damaging gears)

Ideally, any measures would generally apply only to the part of the site where the feature is present. However, there may be some circumstances in which it could be desirable to extend management measures beyond the known area of feature distribution, for example, where conditions are suitable for a feature to exist but there are insufficient data to confirm its presence.

- c) **Additional management to remove pressures** – where fishing activities known to adversely affect the feature would be excluded. Such exclusion would generally apply only to the part of the site where the feature is present, although it may occasionally be necessary to apply them to a wider area.

We recognise that stakeholders can provide local environmental knowledge and more detailed information on activities, including distribution and intensity of effort, frequency of



activity, and fishing methods employed. This additional information will help us to develop more specific management options, focussed on interactions between features and activities.

## 7. Overview of fishing activities

Table 2 below lists fishing activities which take place within or close to the Anton Dohrn Seamount SAC. Further discussions with those who use the area will improve our understanding of these activities (distribution and intensity etc). Those fishing activities which the protected features are sensitive to are explored in greater detail in the next section. Fishing activities which the protected features are not thought to be sensitive to (i.e., any connection between the activity and the features is considered to be minimal) will not be considered further within this document. New or other fishing activities not identified within the table would need to be considered on a case-by-case basis.

**Table 2.** Overview of existing fishing activities believed to take place within or close to the Anton Dohrn Seamount SAC (UK aggregated only, gear types unverified). \*Only the specific examples of activities listed in the table have been excluded, rather than the broad activity types.

Activities considered capable of affecting the integrity of the SAC	Activities <i>not</i> considered capable of affecting the integrity of the SAC*
<ul style="list-style-type: none"> <li>• Demersal otter trawling</li> <li>• Demersal set nets</li> <li>• Demersal longline</li> </ul>	<ul style="list-style-type: none"> <li>• Mid-water otter trawling</li> <li>• Mid-water pair trawling</li> </ul>

Non-UK nationalities with interest in the relevant ICES rectangles:

- France;
- Norway;
- Germany;
- Faroe Islands;
- The Netherlands.

## 8. Management options

**Table 3.** Management options for mobile bottom contact gear.

Management option	
<b>No additional management:</b>	The conservation objectives for the <b>biogenic reef</b> feature would not be met under this option. There is a significant risk of not achieving the conservation objectives for the <b>bedrock and stony reef</b> features.
<b>Reduce/limit pressures:</b>	This option would reduce the risk of not achieving the conservation objectives for the <b>reef</b> features. Appropriate management could include exclusion of mobile bottom contact gears over the main areas of <b>bedrock and stony reef</b> and all known areas of <b>biogenic reef</b> , allowing fishing to continue in fishable areas around the features. It is possible that these areas may include some areas where the distribution of reef is unknown or uncertain, and some very small areas of known <b>bedrock and stony reef</b> and there would therefore be a risk of localised damage to the structure and function of reef communities in these areas. The location of areas to be covered by management restrictions would include a buffer zone to reduce any risk of accidental contact with the feature. The location of areas to be covered by management restrictions would be decided in consultation with fishers.
<b>Remove/avoid pressures:</b>	<p>This option would reduce the risk of not achieving the conservation objectives for the <b>reef</b> feature within the site boundary to the lowest possible levels. Restrictions would be required for all mobile bottom contact gears within the full extent of the site boundary. The site boundary excludes the central summit of the seamount, which comprises mostly sands and gravels, in order to reduce the area of 'non-interest-feature' included within the site boundary. The outer and inner site boundaries already include a buffer zone around the known features to reduce any risk of accidental contact with the feature (4,000m buffer for the outer extent and 2,000m buffer for the inner extent).</p> <p>ICES have recommended closure to all bottom contact gears of an area similar to the SAC but with a slightly shallower outer boundary (ICES, 2011). If implemented, this would provide a level of protection equivalent to the remove/avoid option.</p>

**Table 4.** Management options for static bottom contact gear.

Management option	
<p><b>No additional management:</b></p> <p><b>Reduce/limit pressures:</b></p> <p><b>Remove/avoid pressures:</b></p>	<p>The conservation objectives would not be met for <b>biogenic reef</b>. There is a risk of not achieving the conservation objectives for the <b>bedrock and stony reef</b> features.</p> <p>This option would reduce the risk of not achieving the conservation objectives for the <b>reef</b> feature. Appropriate management could include closure of the known extent of <b>the biogenic reef</b> feature within the site. However, a risk of impact with patches of feature not identified during survey would remain. The location of areas to be covered by management restrictions would include a buffer zone based on fishing warp length to depth ratio, to reduce any risk of accidental contact with the feature. The location of areas to be covered by management restrictions would be decided in consultation with fishers.</p> <p>This option would reduce the risk of not achieving the conservation objectives for the <b>reef</b> feature within the site boundary to the lowest possible levels. Restrictions would be required for all bottom contacting static gears within the full extent of the site boundary. The site boundary excludes the central summit of the seamount, which comprises mostly sands and gravels, in order to reduce the area of ‘non-interest-feature’ included within the site boundary. The outer and inner site boundaries already include a buffer zone around the known features to reduce any risk of accidental contact with the feature (4,000m buffer for the outer extent and 2,000m buffer for the inner extent).</p> <p>ICES have recommended closure to all bottom contact gears of an area similar to the SAC but with a slightly shallower outer boundary (ICES, 2011). If implemented, this would provide a level of protection equivalent to the remove/avoid option.</p>

## 9. Conclusions and further recommendations

Fisheries management measures for the Anton Dohrn Seamount site will be developed through discussion with stakeholders. Discussions will focus on our understanding of the features and the likely risks to the designated features, where interactions with fishing activities occur. Based on the options presented here, it is hoped that a preferred set of management options will be recommended.

## 10. Further information

The following documents are available for background information on the Anton Dohrn Seamount SAC:

[Anton Dohrn Seamount SAC selection assessment document, Version 5 \(October 2012\)](#)

[Anton Dohrn Seamount Conservation Objectives and Advice on Operations, Versions 1.0 \(March 2018\)](#)

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