The Scottish Government
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Marine Scotland

2014 Consultation on the Management of Inshore Special Areas of Conservation and Marine Protected Areas

Approaches

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2014 Consultation on the management of inshore Special Areas of Conservation and Marine Protected Areas

Approaches

The document describes the various approaches to management for the protected areas which are the subject of this consultation. The main consultation document will refer to the site by site descriptions of the approaches.

Contents

Formulation of the approaches to management

The formulation of the possible approaches began with the statutory nature conservation advice from Scottish Natural Heritage. This provided advice on a habitat or species basis for each type of activity. In the case of SACs this was fisheries activities only. For MPAs the management options papers provide advice for all types of marine activity.

This advice was provided in 3 broad options for any given activity. These were;

1. That pressure should be removed or avoided;
2. That pressure should be reduced or limited;
3. That no additional management was required.

The main priority was to design measures for the protected features with remove / avoid pressure conservation advice. For each of these features a buffer of at least double the water depth was applied. Margins for recovery features is generally greater and have been defined with reference to independent advice. Where there were multiple features with the same advice consideration was given to creating a single zone around them depending upon proximity.

Stakeholder data, information, and preferences have been incorporated where possible. These were expressed during the Planning Scotland's Seas consultation and the fisheries displacement study.

As all of the protected areas are unique in terms of the environment, and the types and intensity of activity, the approaches to management vary from site to site. For sites with multiple approaches there can be considerable variation leading to the same environmental outcomes.

For sites which also have features with reduce / limit pressure advice consideration was given to potential approaches which deliver all the management measures in one batch. Some site have possible approaches that would deliver all the statutory management in one go. However some of the multiple feature sites have possible approaches that deliver management for the highly sensitive features only.

Discussions with stakeholders

Marine Scotland hosted a series of regional workshops in October 2014. Representatives of community groups, the fishing industry, environmental NGOs, local authorities, and other interested parties attended. The purpose of these events was to validate the proposed management approaches. Most of those approaches are included in this consultation together with some amended ones, and some entirely new ones.

Assessment of the fisheries activity data

This was undertaken for each approach in 2 parts.

Assessment of over 15m data

This dataset is an amalgamation of logbook and landings data with Vessel Monitoring System (VMS) data. Logbook and landings data for ICES rectangles where there are protected areas is identified. The VMS data for each corresponding date and vessel in the logbook data is identified. It is filtered by speed (between 0 and 5 knots) to limit it to reports that are indicative of fishing activity. The two data sets are then merged giving each VMS report a notional value. Each VMS report is considered to be worth 2 hours of effort unless it is clear that the reporting frequency is much greater. In that circumstance adjustments have been made.

There are some potential sources of error in this estimate. If the wrong rectangle has been recorded in the logbook then data will be omitted. The total catch value for the trip is divided in proportion with the daily logged amount for a species. Therefore it is impossible to account for possible variations in catch quality which in turn influences the actual daily value.

In some cases a vessel may have a reported position outside an area in consecutive reports. If the intervening time was spent inside an area then this is missed by the analysis. By the same token a vessel may have just entered the area before a VMS report meaning it is included in the analysis.

This resulting dataset is then plotted using a Geographic Information System (GIS) and VMS reports that would be affected by a particular management approach identified. These are then summarised into the tables in this document for each site detailing the percentage of activity affected.

Assessment of under 15m data

For vessels in the range of 10 to 15m there is a requirement to keep a logbook detailing catches at ICES rectangle level. VMS is presently being rolled out to vessels in this size range but there is no industry wide dataset available yet.

Marine Scotland undertook the Scotmap project to get a better understanding of the distribution of activities by under 15m vessels. The resultant amalgamation of all the data gathered is presented with each ICES rectangle split into 800 cells. However not all vessels participated in Scotmap meaning that the values are an under estimate of total fleet activity.

From the Scotmap data the total value of each ICES rectangle for a particular gear type was calculated. In the same manner the value of each SAC or MPA was calculated. From this the proportion of value from an ICES rectangle that was taken in the MPA could be estimated from the Scotmap data.

This proportion was used to estimate the level of value and effort in each MPA based upon the total catch and effort from the logbook data. For each management approach the proportion of activity affected was estimated using the same percentage identified from over 15m vessels.

There are potential sources of error within this estimate. It assumes that vessels which did not participate in Scotmap have the same distribution of activity in an ICES rectangle. It also assumes that the proportion of fishing effort in the same as the proportion of value. This may not always be the case due to variations in catch quality. Finally for each management approach it assumes that the proportion of activity affected for a gear type is the same as for over 15m vessels.

No attempt has been made to estimate the value of under 10m activities due to the lack of spatial data. However the Scotmap data includes these vessels so it can be seen from these maps whether important fishing grounds will be affected by the management approaches or not.

Any additional information on fleet activity, under 10m in particular, that can be provided during this consultation is welcomed. This would help ensure the final assessment that accompanies the resultant Statutory Instruments is as accurate as possible.

Availability of other fishing grounds

Where some activity is likely to be displaced consideration has been given to where alternative fishing grounds may be. As a general rule grounds within 20 nm have been considered, which would be within reasonable daily reach. It is recognised that some of these grounds may not be suitable for smaller vessels during bad weather.

Implementation of measures

There are 2 possible ways to implement the new management measures;

The first is to use powers under the Inshore (Fishing) Scotland Act 1984. Clearly this can only be used for fisheries measures. Generally this route will be used for relatively straightforward spatial measures. It is the only way to deliver measures for Special Areas of Conservation (SACs) that do not overlap with a Marine Protected Areas (MPAs).

The second is to use powers under the Marine (Scotland) Act 2010 to put in place Marine Conservation Orders (MCOs). This can be used for MPAs and overlapping SACs for management measures of any activity. This route will be used where measures are required for other activities as well as fisheries. The powers under the 2010 Act to create MCOs also allows for permit schemes. This may allow for novel or intricate management approaches to be used in some cases.

In the site by site section there will be reference to the current thinking regarding the implementation of management. This is subject to change post consultation depending on the final design of the measures. Ensuring that the final measures are robust will be the deciding factor in choosing the implementation route.

Duty to assess the impact of prohibition or restriction of activities

The Marine (Scotland) Act 2010 requires Scottish Ministers to assess the impact of a Marine Conservation Order. Although this does not apply to measures under the Inshore Fishing (Scotland) Act 1984 we are undertaking the assessment in the same manner.

The assessment must consider the socio-economic effects of the measures. It must also consider the environmental effects on the MPA in question and elsewhere in Scotland's seas. If there is an adverse effect identified then reasonable practical steps should be taken to minimise this.

Adaptive management

The approaches presented in this consultation are designed to implement the current statutory nature conservation advice given by Scottish Natural Heritage (SNH). In the future our knowledge of the protected features, and the impact that activities have on them, will evolve. This may result in changes to the management of a protected area. Any such change would be subject to further public consultation.

How to use the site by site description of approaches

Each site description starts out with an introduction explaining how many possible approaches there are and which is preferred at this time. It states the relevant sections of the other main consultation documents. Individual sites have an identifying letter which is used in all of the consultation documents.

For each site there is a description of the protected or qualifying features, the conservation objectives, and a short summary of the management advice given by SNH.

The various approaches are then set out. A description of the measures is given and an explanation for no proposal where appropriate. This is followed by the description of the benefits and an analysis of the costs. No attempt has been made to valorise benefits in these assessments. Please see the Business and Regulatory Impact Assessment of the relevant protected area for details of this. Finally a description of the possible effect of displacement is given.

Protected Area A – East Mingulay SAC

Introduction

This section sets out 2 possible management approaches for this protected area. This is one of the few sites where management of static gear fisheries is proposed due to the presence of fragile Lophelia Pertusa reefs.

Approach 1 is preferred because it would put in place the necessary management measures to protect the reefs but still allow the relatively low amount of fishing to continue between them. The fishery here is of economic importance to catching and processing sector on Barra.

A description of this protected area can be found in the main consultation document is Annex A, Protected Area A.

Maps to support understanding of the approaches can be found under Protected Area A in the technical maps document. Figure A1 shows East Mingulay in context with other protected areas

Measures for East Mingulay would be delivered by Statutory Instrument using powers under the Inshore Fishing (Scotland) Act 1984.

Questions 1 to 3 refer to East Mingulay.

The site features and conservation objectives

Qualifying Feature	Conservation objective
Reefs (Biogenic, bedrock and stony)	maintain

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Reefs	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Remove / avoid pressure from the Lophelia Pertusa reef habitat. Consider reduce / limit pressure on stony reef	

The sensitivity of bedrock reef, stony reef and Lophelia Pertusa reef primarily relates to activities which cause abrasion and physical disturbance to the seabed surface, such as those caused by mobile/active fishing gear. The delicate structure and very slow growth rates of L. Pertusa mean that reefs created by this species are highly sensitive to surface abrasion. Therefore any interaction with mobile/active gear can result in mortality of the coral by crushing, burying or wounding corals, increasing susceptibility to infection and growth of other flora and fauna on the coral surface that may eventually smother corals.

Additionally, mobile fishing gear e.g. the passing of a trawl reduces the three-dimensional structure of the coral to rubble, decreasing the complexity of the habitat with subsequent impacts on the associated community composition. For bedrock reef there is a risk of direct impact to the fauna living attached to the reef, especially where trawling/dredging activities are targeting grounds very close to bedrock reef.

Mobile/active fishing gear may be used over stony reef where this is interspersed with areas of target ground types. This can result in the damage or death of fragile, erect species, such as sponges and corals, and changes to the structure of the habitat and the long term survival of its associated species.

In addition to direct impacts, bedrock reef, stony reef and L. Pertusa are sensitive to smothering from increased levels of sedimentation which can be triggered by passing mobile/active fishing gear, and for L. Pertusa, can result in the mortality of individual corals.

For static gear there is potential for surface abrasion, entanglement and subsequent damage to L. Pertusa reef, especially during the setting and hauling of equipment. For bedrock and rocky reef, static gear can also cause surface abrasion when being deployed or recovered, and this has the potential to cause mortality of the fragile epifauna on the reef habitat. However, the extent of these impacts on reef environments in variable, and will be dependent on intensity of fishing and the recovery rates of the species involved.

The approaches to management

Approach 1 (preferred approach)

This approach would apply zonal management within the SAC and limit the size of vessel permitted to fish in the area to vessels of less than 100 Gross Registered Tonnage (GRT).

The proposed measures

Within the purple areas defined in figure A2 the following activities would be prohibited all year round;

Demersal trawling
Mechanical Dredging
Suction Dredging
Hydraulic Dredging
Creel fishing
Long lining
Bottom set nets

The benefit

By removing or avoiding the pressures being exerted on the reef habitat the measures will ensure that these activities will not prevent the achievement of the conservation objectives. It also would mean that future changes to fisheries policy and management are unlikely to require an appropriate assessment. This would also allow local fishermen to continue to benefit from the fishing grounds known locally as "The Jungle". The local processing factory has reported that the nephrops from this area are of the highest quality and sought after by customers.

The costs

These costs have been derived by using data from historic years to estimate the impact of the management approach. Table A1 shows the average for approach 1 at East Mingulay SAC for the years 2010 – 2013. Graphs A1 and A2 break this down into yearly estimates for value and effort respectively.

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl	£4.8	£1.7	35%	56	21	37%

Table A1: Average annual impact of approach 1 based on 2010 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Analysis of Scotmap data has shown that 5% of nephrops trawl value, and 19% of nephrops creel value, from ICES rectangle 42E2 is taken from East Mingulay SAC. When applied to the catch data from 2013 for that rectangle it equates to less than £1,000 per year and 1 day fishing for trawling, and approximately £19,000 for creeling. A proportion of these values would be affected by these measures.

The displacement effects

This approach keeps displacement to a minimal amount. There is a significant amount of burrowed mud habitat suitable for both nephrops trawl and creel fisheries within 20 nm which equates approximately 3 hours steaming time. Therefore any displacement of activity from the SAC can be dispersed over a wide area (See figures A4, A5, A6). Given the relatively low amount of effort this is unlikely to have any effect on the environment out with the SAC.

Approach 2

This approach would apply measures across the whole site and zonal management within the SAC.

The proposed measures

The following would be prohibited within the whole SAC all year round;
Demersal trawling
Mechanical Dredging
Suction Dredging
Hydraulic Dredging

Within the purple areas defined in figure A3 the following activities would be prohibited all year round;
Creel fishing
Long lining
Bottom set nets

The benefit

By removing or avoiding the pressures being exerted on the reef habitat the measures will ensure that these activities will not prevent the achievement of the conservation objectives. It also would mean that future changes to fisheries policy and management are unlikely to require an appropriate assessment. Removing mobile gear pressure from the whole SAC reduces risk of accidental impact to the lowest possible level.

The costs

Gear	Effort (Hours)	Value (£s)
Demersal trawl	56	£4,808

Table A2: Impact of Approach 2 for over 15 metre vessels based on data from 2010 to 2013

Analysis of Scotmap data has shown that 5% of nephrops trawl value, and 19% of nephrops creel value, from ICES rectangle 42E2 is taken from East Mingulay SAC. When applied to the catch data from 2013 for that rectangle it equates to less than £1,000 per year and 1 day fishing for trawling, and approximately £19,000 for creeling. All of the trawl value and effort would be affected and a proportion of the creel value would be affected by these measures.

The displacement effects

This approach keeps displacement of the creel fishery to a minimal amount. However there would be greater displacement in the trawl fishery which could be distributed to other grounds with 20 nm. (See figures A4, A5, A6) Given the relatively low amount of effort this is unlikely to have any effect on the environment out with the SAC.

Protected Area B – Loch Creran SAC / MPA

Introduction

This section sets out 2 possible management approaches for this protected area. There are already protective measures in place for the serpulid aggregations and horse mussel beds. This restricts trawl, scallop dredge, and creel activity. These measures are detailed in The Inshore Fishing (Prohibited Methods of fishing) (Loch Creran) Order 2007.

Approach 1 is preferred because it would put in place the necessary management measures to protect the flame shell beds but allow the single trawler to continue operating in the Loch. It may be preferable to have a permit scheme to limit the fishery to this one vessel.

A description of this protected area can be found in the main consultation document is Annex A, Protected Area B.

Maps to support understanding of the approaches can be found under Protected Area B in the technical maps document. Figure B1 shows Loch Creran in context with other protected areas.

Measures for Loch Creran would be delivered by Statutory Instrument using powers under the Inshore Fishing (Scotland) Act 1984 or the Marine (Scotland) Act 2010. This would be dependent on the outcome of this consultation. The new instrument would either complement the existing measures or replace them entirely.

Questions 4 to 7 refer to Loch Creran.

The site features and conservation objectives

MPA

Protected Feature	Conservation objective
Flame shell bed	Conserve

SAC

Qualifying Feature	Conservation objective
Reefs (serpulid , horse mussel, and bedrock)	Maintain

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Serpulid reefs and Horse mussel beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Remove / avoid pressure on Serpulid reefs. Consider reduce / limit pressure on horse mussel beds	Remove / avoid pressure from diver operated suction dredging
Flame shell beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging

Serpulid reefs are extremely fragile and therefore are highly sensitive to mobile fishing gear, which causes to physical pressures such as abrasion. Previous damage of the reef has been documented in the site from what is assumed to be mobile gear and also from mooring block chain scour. Whilst there is no direct evidence of the effects of static gears on serpulid reef, given that the habitat has been found to be highly sensitive to physical impacts, it is reasonable to assume that static fishing fear and its associated ground lines are likely to have a similar effect during deployment and recovery.

The physical impacts from mobile gear can affect flame shell beds and horse mussel beds through direct mortality from damage to the shells, by breaking up the bed and by affecting or removing associated fauna attached to the bed. Both types of bed are assessed as highly sensitive to the type of pressures caused by mobile, i.e. surface and sub-surface abrasion. Flame shell beds and horse mussel beds are also sensitive to the indirect effects of increased sedimentation, which can result in smothering and can result in the subsequent mortality of individuals.

Whilst there is no direct evidence on the sensitivity of flame shell beds to static gear, given their high sensitivity to abrasion and due to the delicate nature of their shells and the nests, intense levels of fishing with heavy static gear could have damaging effects. For horse mussel beds whilst the sensitivity to static gears is lower than for mobile, depending on the type of epifauna present this may increase if sustaining high fishing intensity.

The approaches to management

Static gear assessment

Static gear activity is relatively low in the Loch according to Scotmap. The flame shell beds are located in tidal narrows meaning they are unlikely to be subjected to significant pressure from static gear. Consequently no additional static gear management is proposed. However if future studies found there to be a negative effect then this would be addressed then.

Measures applicable to both approaches

The use of suction dredges (boat or diver operated) would be prohibited throughout the protected area.

Approach 1 (preferred approach)

This approach would deliver a new specific zonal measure, whilst maintaining the existing management measures as shown in figure B2).

Question 5 asks if there should be a permit scheme to maintain trawl effort at current levels.

The proposed measures

No demersal trawling in the area defined at Eriska Narrows (see figure B3) where the flame shell bed that is not covered by existing management measures is found.

The benefit

The existing management does not cover hydraulic or suction dredging. Whilst they are not believed to currently take place it is considered good practice to rectify this anomaly. The measure for the other flame shell bed would ensure that no trawl effort was ever expended on the habitats. This would help further the conservation objectives of the flame shell beds and the serpulid reefs.

The costs

The only current fishery that could be affected by these measures is u10m trawling. However the location of the flame shell bed that this measure would protect is unlikely to be near current fishing grounds in the Loch. Therefore no actual impact is predicted.

The displacement effects

SCOTMAP data shows no 15m trawl effort inside Loch Creran, although there is believed to be one trawler active. This vessel did not participate in the Scotmap project. Trawling is unlikely to take place where the flame shell bed, and therefore no displacement is anticipated. There is no evidence of suction or hydraulic dredging taking place in Loch Creran. Therefore prohibiting these activities would have no displacement effect.

Approach 2

This approach would apply additional management across the entire MPA, and maintain the existing creel measures.

The proposed measures

In addition to existing prohibitions, trawling would be prohibited all year round. This would cover the whole MPA / SAC. This is not shown on a specific map.

The benefit

Removing all potential pressure from trawling, suction dredging, and hydraulic dredging (boat and diver operated) would reduce the risk of negative effect on the flame shell beds and the serpulid reefs to the lowest possible levels. This would further the achievement of the conservation objectives under both designations.

The costs

This would affect possibly only one vessel. Therefore no estimate of cost is included here as it would reveal the earnings of that individual.

The displacement effects

SCOTMAP data shows virtually no 15m trawl overlap with Loch Creran. However the one active vessel believed to be active did not participate in Scotmap. The original management allowed the very low level of under 10m trawling to continue. Displacing the current level of trawl activity would be unlikely to have a significant negative effect on the environment, but would affect the earnings of that one vessel. There is no evidence of suction or hydraulic dredging taking place in Loch Creran. Therefore prohibiting these activities would have no displacement effect.

Protected Area C - Loch Laxford SAC

This section sets out the proposed management approach for this protected area. A description of this protected area can be found in the main consultation document is Annex A, Protected Area C. Maps to support understanding of the approaches can be found under Protected Area C in the technical maps document. Figure C1 shows Loch Laxford in context with other protected areas.

Measures for Loch Laxford would be delivered by Statutory Instrument using powers under the Inshore Fishing (Scotland) Act 1984.

Questions 8 and 9 refer to Loch Laxford.

The site features and conservation objectives

Qualifying Feature	Conservation objective
Large shallow inlet and bay	maintain
Reefs (bedrock and stony)	maintain

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Maerl beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Reefs	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging

The sensitivity of bedrock reef and stony reef primarily relates to activities which cause abrasion and physical disturbance to the seabed surface, such as those caused by mobile/active fishing gear. For bedrock reef there is a risk of direct impact to the fauna living attached to the reef, especially where trawling/dredging activities are targeting grounds very close to bedrock reef.

Mobile/active fishing gear may be used over stony reef where this is interspersed with areas of target ground types. This can result in the damage or death of fragile, erect species such as sponges and corals. This then leads to changes in the structure of the habitat and the long term survival of its associated species.

In addition to direct impacts, bedrock reef and stony reef are sensitive to smothering from increased levels of sedimentation which can be caused by passing mobile/active fishing fear which causes smothering of fauna and flora on the rock surface. Static gear over bedrock and stony reef can also cause surface abrasion when being deployed or recovered, and this has the potential to cause mortality of the fragile epifauna on the reef communities. However, the extent of these impacts on reef environments is variable, and will be dependent on intensity of fishing and the recovery rates of the species involved.

Maerl beds are highly sensitive to physical disturbance caused by mobile gears and have a low rate of recovery due to their very slow growth rate. The three dimensional structure, quality and associated communities of maerl beds can be substantially affected by mobile gear fishing from crushing, burial of live maerl and disruption of the surface and underlying sediment.

In addition to direct impacts, maerl beds are sensitive to increased levels of sedimentation which can be caused by passing mobile/active fishing gear, which causes smothering of the maerl itself as well as associated fauna and flora. The deployment and retrieval of static gear over maerl beds has the potential to cause sufficient surface abrasion that would result in a detrimental effect. However, the extent of these impacts on maerl beds would be dependent on the intensity of fishing.

The approach to management

Static gear assessment

Static gear activity is low in the Loch Laxford according to Scotmap. Consequently no static gear management is proposed. However if future studies found there to be a negative effect then this would be addressed then.

The proposed measures

This use of demersal trawl, mechanical dredge, or suction dredging (boat and diver operated) would be prohibited throughout the SAC as shown in Figure C2;

The benefit

By removing or avoiding the pressures being exerted on the habitats, within the shallow inlet and bay, the measures will ensure that these activities will not prevent the achievement of the conservation objectives. It also would mean that future changes to fisheries policy and management are unlikely to require an appropriate assessment.

The costs

Little or no mobile gear fishing has taken place in Loch Laxford SAC between 2010 and 2013. It is estimated that these fisheries are worth less than £1,000 and 1 effort day per year. No further details are provided to avoid potential identification of individuals.

The displacement effects

Over 4 years there has been a minimal amount of effort. Displacing this effort is unlikely to have any effect on the environment out with the SAC. The distribution of relevant activities can be seen in Figures C3 and C4.

Protected Area D - Loch Sunart to Sound of Jura MPA
(Incorporating Loch Sunart MPA and Loch Sunart SAC)

This section sets out 2 possible management approaches for this protected area.

Approach 2 is preferred because it would protect the common skate whilst in the deep areas that they are known to inhabit. It also gives protection to the shallower waters that connect these 3 areas together which should help protect transients.

A description of this protected area can be found in the main consultation document is Annex A, Protected Area D.

Maps to support understanding of the approaches can be found under Protected Area D in the technical maps document. Figure D1 shows Loch Sunart to Sound of Jura in context with other protected areas.

Measures for Loch Sunart to Sound of Jura would be delivered by Statutory Instrument using powers under the Marine (Scotland) Act 2010.

Questions 10 to 12 refer to Loch Sunart to Sound of Jura.

The site features and conservation objectives

Loch Sunart to Sound of Jura MPA

Protected Feature	**Conservation objective**
Common Skate	Conserve

Loch Sunart MPA

Protected Feature	**Conservation objective**
Flame shell beds	Conserve
Northern Featherstars	Conserve
Serpulid Aggregations	Conserve

Loch Sunart SAC

Qualifying Feature	**Conservation objective**
Reefs	Maintain

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Common Skate	Consider limitation (spatial or temporal) to minimise fishing mortality	Remove / avoid pressure from bottom-set nets and long lines	
Serpulid Aggregations	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Remove / avoid pressure from all bottom contacting gears	Remove / avoid pressure from diver operated suction dredging
Flame shell beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Northern featherstar Aggregations	Consider reduce / limit pressure from demersal trawl, mechanical dredges, or suction dredges.	No advice	
Reefs	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging

Serpulid aggregations are extremely fragile and are therefore highly sensitive to mobile fishing gear, which causes physical pressures such as abrasion. Previous damage to serpulid reefs (larger structures) has been documented in Loch Creran from what is assumed to be mobile fishing gear and also from mooring block chain scour. Whilst there is no direct evidence of the effects of static gears on serpulid aggregations, given that the habitat has been found to be highly sensitive to physical impacts, it is reasonable to assume that static fishing fear and its associated ground lines are likely to have a similar effect during deployment and recovery.

The physical impacts from mobile gear can affect flame shell beds through direct mortality from damage to the shells, by breaking up the bed and by affecting or removing associated fauna attached to the bed. Flame shell beds are considered highly sensitive to the type of pressures caused by mobile, i.e. surface and sub-surface abrasion. Flame shell beds are also sensitive to the indirect effects of increased sedimentation, which can result in smothering and can result in the subsequent mortality of individuals.

Whilst there is no direct evidence on the sensitivity of flame shell beds to static gear, given their high sensitivity to abrasion and due to the delicate nature of their shells and the nests, intense levels of fishing with heavy static gear could have damaging effects.

The approaches to management

Static gear assessment

Static gear activity is relatively low in Loch Sunart according to Scotmap. The flame shell beds are located in tidal narrows meaning they are unlikely to be subjected to significant pressure from static gear. The intensity of activity is unlikely to be affecting the reefs or the northern featherstars. Consequently no additional static gear management is proposed, beyond those detailed in the measures common to both approaches. However if future studies found there to be a negative effect then this would be addressed then.

Measures common to both approaches

The use of suction dredges (boat or diver operated), long lines, and bottom set nets would be prohibited throughout the MPA. In addition the use of tickler chains on trawls would be prohibited throughout as research my Marine Scotland Science has shown that this reduces accidental by catch of common skate by at least 50% (report in prep.).

In both approaches there would be no demersal trawling or mechanical dredging east of the blue line at the mouth of Loch Sunart as shown in figure D5.

In addition, in Loch Teacuis the deployment of creels and anchoring (or deployment of other bottom contacting implements) would be prohibited as shown in figure D6. A permit scheme could operate to enable local moorings to be maintained or replaced in a manner that would not impact on the serpulid aggregations.

Approach 1

In addition the following spatial measures would apply;

No demersal trawling on mechanical dredging in the 4 deep areas as defined in Figures D2 and D4.

The benefits

The prohibition on using long lines and bottom set nets, along with the technical measure to prevent the use of tickler chains will reduce the risk of accidental by-catch of common skate. The additional spatial prohibitions will reduce disturbance of adult common skate (the reproductive population) in the various deep areas. The measures in Loch Sunart will also protect the flame shell beds, northern featherstars, and the bedrock reef. Giving a high level of protection to the serpulid aggregations should ensure that these structures continue to develop and hopefully form a reef like the ones in Loch Creran. As a total package these measures should further the conservation objectives of all the qualifying features.

The costs

The VMS data in this area appears to be more cluttered with data inward / outward from Oban as well as other anchorages and creeks. This makes estimates more difficult. All affected methods (trawl, mechanical dredge, and long lines) have been amalgamated to avoid identifying individual vessels.

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl /Dredge / Long Lines	£307	£6.5	2%	4296	88	2%

Table D1: Average annual impact of approach 1 based on 2007 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Loch Sunart to Sound of Jura covers part of ICES rectangles 40E4, 41E4, 42E3, and 42E4. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 2% of the total value of these ICES Rectangles is taken from the MPA. For 2013 this equates to approximately 49 effort days and £57,000. If the same proportion of activity was affected by the measures this would equate to 1 effort day and £1,140 for the year.

The displacement effects

The data shows a very low level of activity would be prohibited by the measures in Loch Sunart, particularly when you factor in the amended area at the muddy basin at the mouth. There is low activity in the 4 deep areas, therefore minimal displacement will occur, and there are plenty of nephrops trawl and scallop dredge grounds within the MPA that could absorb this effort.

Bottom set netting and long lining do not currently take place and therefore these measures will not cause any displacement. The same could be said for hydraulic and suction dredging which are not believed to be currently taking place.

Loch Teacuis is relatively inaccessible which means that loss of the anchorage is unlikely to cause any major problems. There are other more accessible anchorages in Loch Sunart.

Approach 2 (preferred approach)

In addition the following spatial measures would apply;

No demersal trawling or mechanical dredging in the deep area in Sound of Jura and the adjoined deep areas at the Sound of Mull as defined in Figures D2 and D4.

The benefits

The prohibition on using long lines and bottom set nets, along with the technical measure to prevent the use of tickler chains will reduce the risk of accidental by-catch of common skate. The additional spatial prohibitions will reduce disturbance of adult common skate (the reproductive population) in the various deep areas with added protection for transients in shallow water between these. The measures in Loch Sunart will also protect the flame shell beds, northern featherstars, and the bedrock reef. Giving a high level of protection to the serpulid aggregations should ensure that these structures continue to develop and hopefully form a reef like the ones in Loch Creran. As a total package these measures should further the conservation objectives of all the qualifying features.

The costs

The VMS data in this area appears to be more cluttered with data inward / outward from Oban as well as other anchorages and creeks. This makes estimates more difficult.

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl /Dredge / Long Lines	£307	£16.5	5.5%	4296	217	5%

Table D2: Average annual impact of approach 2 based on 2007 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Loch Sunart to Sound of Jura covers part of ICES rectangles 40E4, 41E4, 42E3, and 42E4. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 2% of the total value of these ICES Rectangles is taken from the MPA. For 2013 this equates to approximately 49 effort days and £57,000. If the same proportion of activity was affected by the measures this would equate to 2.5 effort days and £2,850 for the year.

The displacement effects

This will be similar to approach 1 with a slight increase in potential displacement from the area adjoining the 3 deeps. However this avoids all the most significant fishing grounds in the entire MPA leaving plenty of fishing opportunities within.

Protected Area E – Loch Sween MPA

This section sets out 2 possible management approaches for this protected area.

Approach 2 is preferred because it would deliver all the management requirements in one batch. If approach 1 was implemented then further measures would be required in the 2nd batch.

A description of this protected area can be found in the main consultation document is Annex A, Protected Area E.

Maps to support understanding of the approaches can be found under Protected Area E in the technical maps document. Figure E1 shows Loch Sween in context with other protected areas.

Measures for Loch Sween would be delivered by Statutory Instrument using powers under the Marine (Scotland) Act 2010.

Questions 13 to 15 refer to Loch Sween.

The site features and conservation objectives

Protected Feature	**Conservation objective**
Native Oyster	Conserve
Maerl Beds	Conserve
Burrowed mud	Conserve
Sublittoral mud and mixed sediment communities	Conserve

Summary of the management advice

Feature	**Mobile gear**	**Static gear**	**Other gear**
Native Oyster	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging or hand gathering
Maerl beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Burrowed mud	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	
Sublittoral mud and mixed sediment communities	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	

Native oysters and maerl beds are highly sensitive to physical disturbance caused by mobile gears which can cause surface and sub-surface abrasion/penetration. These pressures can cause damage to the native oyster shells and remove a proportion of the population.

Additionally, mobile gear such as mechanical dredges may remove the underlying sediment, cobbles and shell material thereby resulting in substratum loss for the feature to grow on. Native oysters are also considered to be highly sensitive to fisheries which specifically target this species, e.g. through hand gathering.

For maerl beds, the three dimensional structure, quality and associated communities can be substantially affected by mobile demersal gear fishing from crushing, burial of live maerl and disruption of the surface and underlying sediment. Maerl beds have a low rate of recovery due to their very slow growth rate. In addition to direct impacts, maerl beds are sensitive to increased levels of sedimentation.

The approaches to management

Static gear assessment

Static gear activity is relatively low in Loch Sween according to Scotmap. It is unlikely to be used in locations with maerl beds, or the majority of locations with native oysters. The current levels are not considered to be impacting on the sedimentary habitats. Consequently no static gear management is proposed. However if future studies found there to be a negative effect then this would be addressed then.

Measures common to both approaches

The use of suction dredges (boat or diver operated) would be prohibited throughout the MPA. The hand collection of shellfish would be prohibited within Loch Sween itself but not the outer part of the MPA where scallop divers may be active. The size of vessel which can fish in the MPA would be restricted to 75 Gross Registered Tonnage (GRT).

Approach 1

This approach would apply specific zonal measures, but would not deliver all the management requirements. Further consideration of the sublittoral mud and mixed sediment communities would be required in the 2nd batch of measures.

The proposed measures

The following activities would be prohibited all year round;

In addition to the common measures, there would be no demersal trawling or mechanical dredging in Linne Mhurrich or at the head of the Loch Sween. Figure E2 shows a map of the measures under approach 1

The benefit

Not permitting any hand gathering of shellfish in effect removes the risk of Native Oysters being removed. The spatial measures will ensure that the main maerl beds are fully protected. In addition the area at the head of Loch Sween is an exceptional example of burrowed mud and worthy of the same level of protection as a "remove / avoid" pressure feature.

The capacity restriction would go some way to delivering the conservation objectives for the sedimentary habitats throughout the rest of the MPA.

The costs

The amount of fishing effort is relatively low in Loch Sween when compared with the surrounding waters. This can be clearly seen in figures E4 and E5. The impact of the measures under approach 1 is very low. However this approach requires further measures to be taken later. Trawl and dredge data has been amalgamated to avoid disclosure issues.

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl / Dredge	£28.5	£2	7%	319	25	8%

Table E1: Average annual impact of approach 1 based on 2007 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Loch Sween covers part of ICES rectangles 40E4, and 41E4. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 0.7% of the total value of these ICES Rectangles is taken from the MPA. For 2013 this equates to approximately 3 effort days and £2,500. If the same proportion of activity (8%) was affected by the measures this would equate to 0.2 effort days and £200 for the year.

The displacement effects

SCOTMAP data shows little under 15m trawl or dredge effort inside the body of Loch Sween (see figures E6 and E7). Loch Sween is reportedly used during poorer weather when fishing would be restricted or curtailed in the wider Sound of Jura / Gigha area. This means that the vessels would be unlikely to fish on such days if the head of Loch Sween was not available but could still operate in the rest of the loch. Consequently there would be no significant environmental consequences of this displacement. The capacity restriction would affect the periodic visiting scallop dredgers. There are significant scallop grounds within 20 nm of Loch Sween MPA as shown in figure E5. Therefore any effort displaced is likely to be dispersed over a broad area.

Approach 2 (preferred approach)

This approach would apply management specific zonal measures and a curfew on mechanical dredging. This approach would deliver all of the management requirements.

The proposed measures

In addition to the common measures, there would be no demersal trawling or mechanical dredging in the body of Loch Sween itself. In the rest of the MPA a curfew on scallop dredging would be implemented to reduce / limit pressure on the sublittoral mud and mixed sediment communities. Fishing operations would only be permitted between 0700 – 2100 Monday to Friday each week. See Figure E3.

The benefit

Not permitting any hand gathering of shellfish in effect removes the risk of Native Oysters being removed. The spatial measures will ensure that the main maerl beds are fully protected. In addition the area at the head of Loch Sween is an exceptional example of burrowed mud and worthy of the same level of protection as a "remove / avoid" pressure feature. In addition the sedimentary habitats within the main body of the loch would have a high level of protection.

The capacity restriction would help reduce / limit pressure on the sedimentary habitats throughout the rest of the MPA.

The costs

For over 15m vessels which have VMS the following data can be derived using a dataset from 2007 to 2013.

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl / Dredge	£28.5	£5	17.5%	319	58	18%

Table E2: Average annual impact of approach 2 based on 2007 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Loch Sween covers part of ICES rectangles 40E4, and 41E4. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 0.07% of the total value of these ICES Rectangles is taken from the MPA. For 2013 this equates to approximately 3 effort days and £2,500. If the same proportion of activity (18%) was affected by the measures this would equate to 0.5 effort days and £450 for the year.

The displacement effects

SCOTMAP data shows little under 15m trawl effort inside the body of Loch Sween (see figure E6). However during the displacement study skippers reported trying it during 2012 and 2013. It was indicated that it is mostly used during poorer weather when fishing would be restricted or curtailed in the wider Sound of Jura / Gigha area. This means that the vessels would be unlikely to fish on such days if Loch Sween was not available. Consequently there would be no significant environmental consequences of this displacement.

Vessel Monitoring System data shows very low amounts of presence in body of the loch itself by vessels who use trawl or mechanical dredge gears. Therefore displacing this activity is unlikely to have a negative effect on the environment or the earnings of any vessel concerned.

The capacity restriction would affect the periodic visiting scallop dredgers. There are significant scallop grounds within 20 nm of Loch Sween MPA as shown in figure E5. Therefore any effort displaced is likely to be dispersed over a broad area.

Protected Area F – Lochs Duich Long & Alsh SAC / MPA

This section sets out the proposed management approach for this protected area. A description of this protected area can be found in the main consultation document is Annex A, Protected Area F. Maps to support understanding of the approaches can be found under Protected Area F in the technical maps document. Figure F1 shows Lochs Duich Long & Alsh in context with other protected areas.

Measures for Lochs Duich Long & Alsh would be delivered by Statutory Instrument using powers under the Inshore Fishing (Scotland) Act 1984. This would replace the current licence condition which took effect in April 2014. The new measures may consolidate the existing seasonal closure, or standalone beside it.

Questions 16 and 17 refer to Lochs Duich Long & Alsh

The site features and conservation objectives

MPA

Protected Feature	Conservation objective
Burrowed mud	Conserve
Flame shell beds	Conserve

SAC

Protected Feature	Conservation objective
Reefs (Biogenic, Bedrock, Stony)	Maintain

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Flame shell beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Burrowed mud	Consider reduce / Limit pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	
Reefs	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.		Remove / avoid pressure from diver operated suction dredging

The physical impacts from mobile demersal gear can affect flame shell beds through direct mortality from damage to the shells, by breaking up the bed and by affecting or removing associated fauna attached to the bed. Flame shell beds are assessed as highly sensitive to the type of pressures caused by mobile demersal fishing gear, i.e. surface and sub-surface abrasion. Flame shell beds are also sensitive to the indirect effects of increased sedimentation, which can result in smothering and can result in the subsequent mortality of individuals.

Whilst there is no published evidence on the sensitivity of flame shell beds to static gear, given their high sensitivity to abrasion and due to the delicate nature of their shells and the nests, intense levels of fishing with heavy static gear could have damaging effects. There is also potential for nest material to be removed through the entanglement of creels with kelp that grows in association with flame shell beds.

Burrowed mud has medium sensitivity to physical pressures associated with mobile demersal fishing gear e.g. surface and sub-surface abrasion. Physical disturbance of the surface of the seabed is likely to affect mobile and sessile epifaunal and shallow burrowers, for example damage to seapen species is likely to take place as a result of greater sediment disturbance from towed demersal gear. Trawling for Nephrops can, by reducing the number and size of burrowing individuals present, also affect the habitat structure itself in terms of the number and size of burrows present.

However, the degree of impact in terms of diversity and relative abundance of species is likely to be related to the intensity of fishing activity, and there is scope for recovery. For static gear, it is likely that when fishing activity is low, direct impacts on the habitat is likely to be minimal and seabed structure is likely to be maintained in a slightly modified state. However the impacts of increasing static gear fishing intensity and the subsequent impacts on the habitat are less well understood.

The approach to management

The reefs of Lochs Duich Long & Alsh are currently protected by a licence condition which was implemented in April 2014, but will be replaced by the new measures

There is also a mobile gear seasonal closure which means that trawling and dredging may only take place between 1st April and 30th September each year. There is also a restriction on trawling where only vessels under 12m registered length using a single trawl can operate there. These measures would continue to be in place.

Static gear assessment

According to Scotmap there are a low number of creel vessels operating in the protected area. The measures being proposed for mobile gear are unlikely to cause any change in activity level. However if future studies found there to be a negative effect then this would be addressed then.

Approach 1

This approach would apply new management across the entire area using general measures and a specific seasonal derogation which is already in place.

The proposed measures

The following activities would be prohibited all year round throughout the area;

Demersal Trawling
Mechanical Dredging
Suction Dredging (boat and diver operated)

There would be derogation between 01 April and 30 September each year to allow demersal trawling by vessels less that 12 metres registered length using a single net or mechanical dredging. These activities would only be permitted in the existing fishing area shown in yellow in figure F2.

The benefit

The existing management does not cover hydraulic or suction dredging. Whilst they are not believed to currently take place it is considered good practice to rectify this anomaly. No mobile gear in Loch Duich will ensure that the burrowed mud habitat remains in pristine condition. Only permitting trawl and dredge activity in the defined area means that the conservation objectives of the flame shell beds, the horse mussel beds, the burrowed mud, and the rocky reef will be furthered.

The costs

For over 15m vessels which have VMS the following data can be derived using a dataset from 2007 to 2013.

Method	Average annual value	Average annual value affected	% of value affected	Average annual effort hours	Average annual effort hours affected	% of effort affected
Dredge	£15	£6.5	44%	224	84	38%

Table F1: Average annual impact of approach 1 based on 2007 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Lochs Duich Long & Alsh covers part of ICES rectangle 43E4. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 0.4% of the total value of these ICES Rectangles is taken from the MPA / SAC. For 2013 this equates to approximately 1 effort day and £700. If the same proportion of activity (38%) was affected by the measures this would equate to 0.6 effort days and £450 for the year.

The displacement effects

SCOTMAP data shows some trawl effort in Loch Alsh which aligns roughly with the existing fishing area (see figure F6). This activity will be taking place on the burrowed mud habitat. A significant proportion of the scallop dredge grounds will still be available meaning that displacement would be minimised.

In both cases there are significant other fishing grounds within 20 nm for both types (see figures F4 and F7). This means that the low level of activity displacement would be widely dispersed and absorbed into other fishing grounds. This is unlikely to have any adverse effect on the environment elsewhere.

Protected Area G – Luce Bay & Sands SAC

This section sets out 3 possible management approaches for this protected area.

Approach 2 is preferred because it would put in place the necessary management measures to safeguard the most sensitive habitats of the protected

A description of this protected area can be found in the main consultation document is Annex A, Protected Area G.

Maps to support understanding of the approaches can be found under Protected Area G in the technical maps document. Figure G1 shows Luce Bay & Sands in context with other protected areas.

Measures for Luce Bay & Sands SAC would be delivered by Statutory Instrument using powers under the Inshore Fishing (Scotland) Act 1984.

Questions 18 to 20 refer to Luce Bay & Sands.

The site features and conservation objectives

Qualifying Feature	**Conservation objective**
Large shallow inlets and bays	Maintain
Reefs (bedrock and stony)	Maintain
Mudflats and sandflats	Maintain
Sandbanks	Maintain

Summary of the management advice

Feature	**Mobile gear**	**Static gear**	**Other gear**
Reefs	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Maerl beds	Remove / avoid pressure demersal trawl, mechanical dredges, or suction dredges	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Sabelleria Spp	Remove / avoid pressure demersal trawl, mechanical dredges, or suction dredges		Remove / avoid pressure from diver operated suction dredging or tractor dredging
Sandbanks	Reduce / limit pressure from demersal trawl, mechanical dredges, or suction dredges on ‘subtidal gravely and clean sands’ and ‘subtidal muddy sands’		Remove / avoid pressure from diver operated suction dredging or tractor dredging on ‘subtidal gravely and clean sands’, ‘subtidal muddy sands’ and ‘Intertidal clean sands’

Reefs and maerl beds are highly sensitive to abrasion caused by mobile gears and have a high potential for interaction with dredging (especially maerl and stony reef). Furthermore, the character and quality of maerl habitat can be substantially affected by fishing for bivalves with hydraulic fishing gears due to disruption of the surface and underlying sediment.

Sabellaria reef is sensitive to physical disturbance, although noting that the likelihood of interaction with mobile gears is relatively low. Intertidal fisheries could, however, be relevant.

The sandbank features are sensitive to hydraulic gears in a similar way to maerl, however they are likely to be more tolerant of surface abrasion by mobile gears – hence the advice being to reduce or limit fishing intensity. Also, the seasonal restriction would facilitate recovery the benthic communities between periods of fishing.

The approaches to management

Static gear assessment

According to Scotmap there are a low number of creel vessels operating in the protected area. The measures being proposed for mobile gear are unlikely to cause any change in activity level. However if future studies found there to be a negative effect then this would be addressed then.

Existing management measures

The Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Scotland) Order 2004 (276/2004) prohibits the use of mobile or active gear from 1st March to 31st August in each year.

The Scallops (Irish Sea) (Prohibition of Fishing) (Variation) Order 1986 prohibits fishing for scallops (Pecten maximus) between 1st June and 31st October each year.

In combination this means that a scallop dredge fishery may only take place in Luce Bay during January, February, November & December each year.

Approach 1

This approach would apply management across the entire SAC.

The proposed measures

The following activities would be prohibited all year round as shown in figure G2;

Demersal trawling
Mechanical Dredging (boat and tractor operated)
Suction Dredging (boat, tractor, and diver operated)

The benefit

By removing or avoiding the pressures being exerted on the qualifying habitats the measures will ensure that these activities will not prevent the achievement of the conservation objectives. It also would mean that future changes to fisheries policy and management are unlikely to require an appropriate assessment.

The costs

For over 15m vessels which have VMS the following data can be derived using a dataset from 2010 to 2013. There have only been scallop dredgers active in Luce Bay in that time period

Gear	Effort (Hours)	Value
Dredge	744	£69

Table G1: Average annual impact of approach 1 based on 2010 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Luce Bay and Sands covers part of ICES rectangle 38E5. According to the analysis of Scotmap data dredge fisheries approximately 63% of the total value of that ICES Rectangle is taken from the SAC. For 2013 this equates to approximately 20 effort days and £25,000.

The displacement effects

There are significant scallop dredge grounds within 20 nm which equates to 2-3 hours steaming time (see figures 5 and 7). Therefore any displacement of activity from the SAC can be dispersed over a wide area stretching from Corsewall point to Kirkcudbright. Given the relatively low amount of effort this is unlikely to have any effect on the environment outwith the SAC. The Luce Bay fishery tends to provide a bad weather refuge which means that the grounds in more open waters may not be available to the fleet.

It is presently unknown whether there is a tractor based fishery in Luce Bay.

Approach 2 (preferred approach)

This would apply management across the whole SAC but provide a permitted area for mechanical dredging for catching scallops.

The proposed measures

The following activities would be prohibited all year round;

Demersal trawling
Mechanical Dredging (by tractor)
Suction Dredging (boat, tractor and diver operated)

The following activities would be permitted under specific circumstances;

Mechanical Dredging (by vessel)

This would be permitted in the light pink area outlined on the map (see figure G3) during the months of January, February, November, and December each year. The current seasonal prohibitions would be combined into one and therefore management would not be affected should the wider Irish Sea measures reduce in the future.

The benefit

By removing or avoiding the pressures being exerted on the most sensitive qualifying habitats and reducing or limiting pressure on the other qualifying habitats, the measures will ensure that these activities will not prevent the achievement of the conservation objectives. It also would mean that future changes to fisheries policy and management are unlikely to require an appropriate assessment.

The costs

Method	Average annual SAC value	Average annual value affected	% of value affected	Average annual effort hours in SAC	Average annual effort hours affected	% of effort affected
Dredge	£69	£33	47.5%	744	293	39%

Table G2: Average annual impact of approach 2 based on 2010 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Luce Bay and Sands covers part of ICES rectangle 38E5. According to the analysis of Scotmap data dredge fisheries approximately 63% of the total value of that ICES Rectangle is taken from the SAC. For 2013 this equates to approximately 20 effort days and £25,000. If the same proportion of activity (39%) was affected by the measures this would equate to 8 effort days and £9,750 for the year.

The displacement effects

There are significant scallop dredge grounds within 20 nm which equates to 2-3 hours steaming time (see figures 5 and 7). Therefore any displacement of activity from the SAC can be dispersed over a wide area stretching from Corsewall point to Kirkcudbright. Given the relatively low amount of effort this is unlikely to have any effect on the environment outwith the SAC. The larger vessels in the fleet have greater range and capability to operate in poorer weather and the smaller vessels would still be able to operate in Luce Bay on a more limited scale than at present.

It is presently unknown whether there is a tractor based fishery in Luce Bay.

Approach 3

This would apply management across the whole SAC but only restrict mechanical dredging where there is reef habitat or maerl beds. If taking this approach there would be a need for the industry to collaborate with Marine Scotland and Scottish Natural Heritage to monitor the effects of the measures. If there was a negative effect then the measures would have to be changed at a later date.

The proposed measures

The following activities would be prohibited all year round;

Demersal trawling
Mechanical Dredging (by tractor)
Suction Dredging (boat, tractor and diver operated)

Mechanical Dredging (by vessel) would only be prohibited in the 2 areas in dark pink (see figure G4). The current seasonal prohibitions would be combined into one and therefore management would not be affected should the wider Irish Sea measures reduce in the future.

The benefit

By removing or avoiding the pressures being exerted on the most sensitive qualifying habitats and reducing or limiting pressure on the other qualifying habitats, the measures will ensure that these activities will not prevent the achievement of the conservation objectives. It also would mean that future changes to fisheries policy and management are unlikely to require an appropriate assessment. This approach would be the highest risk but would maximise the return from the scallop fishery

The costs

In addition to these impacts there would be some minor additional costs for industry for their part in the condition monitoring programme. It has been assumed that the same value can be gained from the area even through a curfew would reduce effort somewhat.

Method	Average annual SAC value	Average annual value affected	% of value affected	Average annual effort hours in SAC	Average annual effort hours affected	% of effort affected
Dredge	£69	£8	11.5%	744	92.5	12.5%

Table G3: Average annual impact of approach 3 based on 2010 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Luce Bay and Sands covers part of ICES rectangle 38E5. According to the analysis of Scotmap data dredge fisheries approximately 63% of the total value of that ICES Rectangle is taken from the SAC. For 2013 this equates to approximately 20 effort days and £25,000. If the same proportion of activity (12.5%) was affected by the measures this would equate to 2.5 effort days and £3,125 for the year.

The displacement effects

Under this approach there would be little displacement of the mechanical dredge activity that takes place in the winter months. There would be other grounds within Luce Bay that could absorb this.

It is presently unknown whether there is a tractor based fishery in Luce Bay.

Protected Area H – Noss Head MPA

This section sets out the proposed management approach for this protected area. A description of this protected area can be found in the main consultation document is Annex A, Protected Area H. Maps to support understanding of the approaches can be found under Protected Area H in the technical maps document. Figure H1 shows Noss Head in context with other protected areas.

Measures for Noss Head would be delivered by Statutory Instrument using powers under the Inshore Fishing (Scotland) Act 1984.

Questions 21 and 22 refer to Noss Head.

The site features and conservation objectives

Protected Feature	Conservation objective
Horse mussel beds	Conserve

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Horse mussel beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges	Consider reduce / limit pressure	

Horse mussel beds are highly sensitive to mobile demersal gear activities that cause pressures including surface and subsurface disturbance and abrasion. The physical impacts from mobile gear can affect horse mussel beds through direct mortality from shell damage, by breaking up the bed and by affecting or removing associated fauna attached to the bed.

Horse mussel beds are also sensitive to the indirect effects of increased sedimentation, which can result in smothering and can result in the subsequent mortality of individuals. Horse mussel beds are less sensitive to static gears compared to mobile gear, but depending on the type of epifauna present this may increase if sustaining high fishing intensity.

The approach to management

Static gear assessment

According to Scotmap there are a low number of creel vessels operating in the protected area. The measures being proposed for mobile gear are unlikely to cause any change in activity level. However if future studies found there to be a negative effect then this would be addressed then.

The proposed measures

Demersal trawl, mechanical dredging and suction dredging (boat and diver operated) would be prohibited all year round as shown in figure H2.

The benefit

The new measures would remove / avoid pressure from fishing methods that could have an impact on the Horse Mussel bed. This would ensure that from a fisheries perspective the conservation objective would be furthered and the largest known example of a horse mussel bed conserved.

The costs

Gear	Effort (Hours)	Value (£s)
Demersal trawl / dredge	15	1,371

Table H1: Average fishing effort by over 15m vessels in MPA (2007-2013)

Noss Head covers part of ICES rectangle 45E6. According to the analysis of Scotmap data of trawl and dredge fisheries approximately 0.3% of the total value of that ICES Rectangle is taken from the MPA. For 2013 this equates to approximately 0.5 effort days and £550.

The displacement effects

VMS data shows that there is a scallop dredge fishery just to the east of the MPA (see figures H3 and H6). Over the 7 years of data there are relatively few “pings” within the MPA. There is a low value overlap from SCOTMAP scallop dredge data (see figure H4) and no value from nephrops trawl (see figure H5). It’s reasonable to assume that any vessel below VMS size are likely to be working on the same grounds as the larger vessels. With fishing grounds close to the MPA any displacement would most likely be absorbed by these areas.

Protected Area J – Sanday SAC

This section sets out the proposed management approach for this protected area. A description of this protected area can be found in the main consultation document is Annex A, Protected Area J. Maps to support understanding of the approaches can be found under Protected Area J in the technical maps document. Figure J1 shows Sanday in context with other protected areas.

Measures for Sanday would be delivered by Statutory Instrument using powers under the Inshore Fishing (Scotland) Act 1984.

Questions 23 and 24 refer to Sanday.

The site features and conservation objectives

The table below lists only those features that are seabed habitats.

Qualifying Feature	**Conservation objective**
Reefs (bedrock and stony)	Maintain
Subtidal sandbanks	Maintain

Summary of the management advice

Feature	**Mobile gear**	**Static gear**	**Other gear**
Reefs	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Sandbanks	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges on Seagrass beds	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging

The sensitivity of bedrock reef and stony reef primarily relates to activities which cause abrasion and physical disturbance to the seabed surface, such as those caused by mobile/active fishing gear. For bedrock reef there is a risk of direct impact to the fauna living attached to the reef, especially where trawling/dredging activities are targeting grounds very close to bedrock reef.

Mobile/active fishing gear may be used over stony reef where this is interspersed with areas of target ground types. This can result in the damage or death of fragile, erect species, such as sponges and corals, and changes to the structure of the habitat and the long term survival of its associated species. In addition to direct impacts, bedrock reef and stony reef are sensitive to smothering from increased levels of sedimentation which can be caused by passing mobile/active fishing gear which causes smothering of fauna and flora on the rock surface.

Static gear over bedrock and stony reef can also cause surface abrasion when being deployed or recovered, and this has the potential to cause mortality of the fragile epifauna on the reef habitat. However, the extent of these impacts on reef environments is variable, and will be dependent on intensity of fishing and the recovery rates of the species involved.

The approach to management

There is 1 approach proposed which would prohibit the use of certain fishing gears throughout the SAC.

The proposed measures

Demersal trawl, mechanical dredging and suction dredging (boat and diver operated) would be prohibited all year round as shown in figure J2.

The benefit

By removing or avoiding the pressures being exerted on the habitats, within the SAC, the measures will ensure that these activities will not prevent the achievement of the conservation objectives. It would also mean that future changes to fisheries policy and management are unlikely to require an appropriate assessment.

The costs

In the 4 year data set (2010 – 2013) there is only one scallop dredge VMS report and none for trawls. According to Scotmap data there may be up to 3 vessels active. If all of the value of overlapping cells is derived with the SAC boundary then this would be worth approximately £12,000 per year.

Sanday covers part of ICES rectangle 47E7. According to the analysis of Scotmap data of trawl and dredge fisheries approximately 5.5% of the total value of that ICES Rectangle is taken from the MPA. For 2013 this equates to approximately 2.5 effort days and £2,700.

The displacement effects

The amount of annual activity is so low that displacement of it is unlikely to have any negative effect on the environment.

Protected Area K – Small Isles MPA

Introduction

This section sets out 2 possible management approaches for this protected area. Under both of these approaches further measures will be required for northern seafan and sponge communities, black guillemot, and possibly burrowed mud.

Approach 2 is preferred because it would minimise the buffer area around the mosaic of habitats in the Sound of Canna.

A description of this protected area can be found in the main consultation document is Annex A, Protected Area K.

Maps to support understanding of the approaches can be found under Protected Area K in the technical maps document. Figure K1 shows Small Isles in context with other protected areas. Figure K2 shows the distribution of the protected features

Measures for Small Isles would be delivered by Statutory Instrument using powers under the Inshore Fishing (Scotland) Act 1984.

Questions 25 to 27 refer to Small Isles.

The site features and conservation objectives

Protected Feature	Conservation objective
Fan mussel aggregations	Conserve
Horse mussel beds	Conserve
Black guillemot	Conserve
Burrowed mud	Conserve
Circalittoral sand and mud communities	Conserve
northern seafan and sponge communities	Conserve
Northern featherstar aggregations	Conserve
White cluster anemone	Conserve

Summary of the management advice

Feature	Mobile Gear	Static Gear	Other gear
Fan mussel aggregations and horse mussel beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	
Burrowed mud	Consider reduce / limit pressure from demersal trawl, mechanical dredges, or suction dredges especially where there are aggregations of tall sea pens or other epibenthic species	Consider reduce / limit pressure where there are aggregations of tall sea pens or other epibenthic species	
Circalittoral sand and course sediment communities	No specific recommendation (likely to be delivered by burrowed mud management)	No advice	
Black guillemot	No management required	Remove / avoid pressure from set nets	
Northern featherstars aggregations on mixed substrata	Consider reduce / limit pressure from demersal trawl, mechanical dredges, or suction dredges.	No management required	
Northern seafan and sponge communities	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	
White cluster anemones	Management put in place for the northern sea fan and sponge communities would ensure protection of this feature.	Consider reduce / limit pressure	

Fan mussels are highly sensitive to mobile demersal gear as they can have a significant proportion of their shell projecting above the sediment surface making them particularly vulnerable to towed gear, which can cause damage to the shell. In addition, they cannot survive being uprooted from the seabed. There is no published information relating to interactions between fan mussels and static gears but there is the potential for pots or nets to cause disturbance either via direct impact during deployment or recovery of gear, or entanglement.

Horse mussel beds are highly sensitive to the physical impacts associated with mobile demersal gear which can cause direct mortality from shell damage, by breaking up the bed and by affecting or removing associated fauna attached to the bed. Horse mussel beds are also sensitive to the indirect effects of increased sedimentation, which can result in smothering and can result in the subsequent mortality of individuals. Whilst the sensitivity to static gears is lower than for mobile gears, depending on the type of epifauna present on the horse mussel beds this may increase if fishing intensity is high.

Northern feather star aggregations and northern seafan and sponge communities have medium sensitivity to pressures associated with demersal mobile gear e.g. surface abrasion and removal of species. The potential effects on northern feather star aggregations are through direct mortality through capture or contact with gear and possible indirect effects from smothering and/or increased suspended sediment. The degree of effects will depend on the gear type, substrate composition and local hydrodynamic conditions.

Northern seafan and sponge communities are at most risk where rocks or boulders which they grow on are of low relief and these areas may be fishable (e.g. with rockhopper gear). Where mobile demersal fishing gears come into contact with these communities the slower growing fragile fauna such as sponges and sea fans are liable to suffer high mortality from direct impact and from disturbance of their substrate (e.g. overturning of boulders). For static gear whilst there is potential for abrasion on fauna when being deployed or recovered, this impact may be limited and will be dependent on intensity of fishing.

Burrowed mud has medium sensitivity to physical pressures associated with mobile demersal fishing gear e.g. surface and sub-surface abrasion. Physical disturbance of the surface of the seabed is likely to affect mobile and sessile epifaunal and shallow burrowers, for example damage to seapen species is likely to take place as a result of greater sediment disturbance from towed demersal gear.

Trawling for Nephrops can, by reducing the number and size of burrowing individuals present, also affect the habitat structure itself in terms of the number and size of burrows present. However the degree of impact in terms of diversity and relative abundance of species is likely to be related to the intensity of fishing activity, and there is scope for recovery. For static gear, it is likely that when fishing activity is low, direct impacts on the habitat is likely to be minimal and seabed structure is likely to be maintained in a slightly modified state. However the impacts of increasing static gear fishing intensity and the subsequent impacts on the habitat are less well understood.

There is a potential risk of bycatch / entanglement of black guillemot in fishing nets, set nets in Scotland pose the potential biggest risk and therefore management advice has been given relating to this gear type.

The approaches to management

Static gear assessment

Static gear activity is moderate in Sound of Canna according to Scotmap. The current levels are not considered to be impacting on the habitats. Consequently no static gear management is proposed. However if future studies found there to be a negative effect then this would be addressed then.

Measures common to both approaches

The use of suction dredges (boat or diver operated) would be prohibited throughout the MPA. The size of vessel which can fish in the MPA would be restricted to 150 Gross Registered Tonnage (GRT).

Approach 1

The proposed measures

In addition to the common measures demersal trawling and mechanical dredging would be prohibited in the area shown in blue in figure K3.

The benefit

The new measures would remove / avoid pressure from fishing methods that could have an impact on the fan mussel aggregation and the horse mussel bed, as well as for the northern sea fan and sponge communities and the white cluster anemone. This would ensure that from a fisheries perspective the conservation objective for these habitats would be furthered and the only known example of a fan mussel aggregation conserved. It would also contribute to reducing/limiting pressure for the northern feather star aggregations.

The extended area to the north of Sound of Canna would bring considerable amounts of burrowed mud and the circalittoral sand and coarse sediment into the prohibited area. This means that less management would be required in the 2nd batch of measures for these habitats.

The capacity restriction and prohibition on hydraulic and suction dredging would put a limit on pressure on the benthic habitats.

The costs

For over 15m vessels which have VMS the following data can be derived using a dataset from 2007 to 2013.

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl	£619	£75	12%	8113	913	11%
Dredge	£58	£10.5	18%	719	114	16%

Table K1: Average annual impact of approach 1 based on 2007 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Small Isles covers part of ICES rectangles 42E3 and 43E3. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 20% of the total value of those ICES Rectangles is taken from the MPA. Amount affected is based upon the effort proportion affected for trawling by over 15 metre vessels.

Method	Total effort days	Effort days affected	Total value	Value effected
Trawl / Dredge	372	41	£417	£46

Table K2: Average annual impact of approach 1 based on 2013 data for under 15 metre vessels (rounded to nearest £000s)

The displacement effects

The area to the north and South of the Sound of Canna are important fishing grounds. Not being able to fish here will intensify fishing on the rest of the burrowed mud habitat within the MPA. The intensity is fairly evenly spread across the habitat as can be seen in figure K6. This would likely have a greater impact on smaller vessels who work nearer the islands on a more frequent basis. The main scallop grounds have mainly been avoided as can be seen in figure K5.

Approach 2 (preferred approach)

The proposed measures

In addition to the common measures demersal trawling and mechanical dredging would be prohibited in the area shown in yellow in figure K4.

The benefit

The new measures would remove / avoid pressure from fishing methods that could have an impact on the fan mussel aggregation and the horse mussel bed, as well as for the northern sea fan and sponge communities and the white cluster anemone. This would ensure that from a fisheries perspective the conservation objective for these habitats would be furthered and the only known example of a fan mussel aggregation conserved. It would also contribute to reducing/limiting pressure for the northern feather star aggregations.

The capacity restriction and prohibition on hydraulic and suction dredging would put a limit on pressure on the benthic habitats.

The costs

For over 15m vessels which have VMS the following data can be derived using a dataset from 2007 to 2013.

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl	£619	£42	7%	8113	527	6.5%
Dredge	£58	£7	12%	719	77	11%

Table K3: Average annual impact of approach 2 based on 2007 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Small Isles covers part of ICES rectangles 42E3 and 43E3. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 20% of the total value of those ICES Rectangles is taken from the MPA. Amount affected is based upon the effort proportion affected for trawling by over 15 metre vessels.

Method	Total effort days	Effort days affected	Total value	Value effected
Trawl / Dredge	372	24	£417	£27

Table K4: Average annual impact of approach 2 based on 2013 data for under 15 metre vessels (rounded to nearest £000s)

The displacement effects

The area to the north and south of the Sound of Canna are important fishing grounds. Not being able to fish here will intensify fishing on the rest of the burrowed mud habitat within the MPA, so by keeping the inclusion of nephrops trawl grounds as low as possible will minimise displacement.

Protected Area L – South Arran MPA

This section sets out 3 possible management approaches for this protected area. Under the 1st approach further measures will be required for burrowed mud. Approaches 2 and 3 will deliver sufficient protection for all the protected habitats and species.

Approach 3 is preferred because it would deliver all the measures necessary. It would further the conservation objectives of the maerl beds by removing the risk of physical disturbance. It would also reduce the risk of any sedimentation effect. Although the scallop fishery would be more spatially constrained there would be no seasonality or effort restriction.

A description of this protected area can be found in the main consultation document is Annex A, Protected Area L.

Maps to support understanding of the approaches can be found under Protected Area L in the technical maps document. Figure L1 shows South Arran in context with other protected areas.

Measures for South Arran would be delivered by Statutory Instrument using powers under the Marine (Scotland) Act 2010.

Questions 28 – 32 refer to South Arran.

The site features and conservation objectives

Protected Feature	**Conservation objective**
Maerl beds	Recover
Kelp and seaweed communities on sublittoral sediments	Conserve
Burrowed mud	Conserve
Maerl or coarse shell gravel with burrowing sea cucumbers	Conserve
Seagrass beds	Conserve
Ocean quahog aggregations	Conserve
Shallow tide-swept coarse sands with burrowing bivalves	Conserve

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Maerl beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Burrowed mud	Consider reduce / Limit pressure demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	
Kelp and seaweed communities on sublittoral sediments	Given the existing management in Lamlash Bay and should measures be put in place for the other features (particularly maerl beds and seagrass beds), there would be no need for additional management of this feature.		
Shallow tide-swept coarse sands with burrowing bivalves	Consider reduce / Limit pressure demersal trawl, mechanical dredges, or suction dredges.		Consider reduce / limit pressure from diver operated suction dredging and hand gathering
Maerl or coarse shell gravel with burrowing sea cucumbers	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges. (Reduce / Limit pressure in winter)	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Seagrass beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Ocean quahog aggregations	Remove targeted fishing for ocean quahog		

Burrowed mud has medium sensitivity to physical pressures associated with mobile demersal fishing gear e.g. surface and sub-surface abrasion. Physical disturbance of surface of seabed is likely to affect mobile and sessile epifauna and shallow burrowers, for example damage to seapen species is likely to take place as a result of greater sediment disturbance from towed demersal gear. Trawling for Nephrops can, by reducing the number and size of burrowing individuals present, also affect the habitat structure itself in terms of the number and size of burrows present. However, the degree of impact in terms of diversity and relative abundance of species is likely to be related to the intensity of fishing activity, and there is scope for recovery. For static gear, it is likely that when fishing activity is low, direct impact on the habitat is minimal and seabed structure is likely to be maintained in a slightly modified state. However the impacts of increasing static gear fishing intensity and the subsequent impacts on the habitat are less well understood.

Kelp and seaweed communities on sublittoral sediment have low to medium sensitivity to pressures associated with demersal mobile gear. Species of kelp and seaweed can be removed by passing trawls and dredges, with low energy sites supporting dense kelp and seaweed coverage being the most sensitive. However, many animal species associated with the habitat are mobile or infaunal and so are likely to avoid most effects of surface disturbance.

Maerl beds are highly sensitive to physical disturbance caused by mobile gears and have a low rate of recovery due to their very slow growth rate. The three-dimensional structure, quality and associated communities of maerl beds can be substantially affected by mobile gear fishing from crushing, burial of live maerl and disruption of the surface and underlying sediment. In addition to direct impacts, maerl beds are sensitive to increased levels of sedimentation which can be caused by passing mobile/active fishing gear. This causes smothering of the maerl and associated fauna and flora. The deployment and retrieval of static gear over maerl beds has the potential to cause sufficient surface abrasion to result in a detrimental effect. However, the extent of these impacts on maerl beds would be dependent on the intensity of fishing.

Ocean quahogs are highly sensitive to sub-surface abrasion caused by mobile demersal fishing gear. They are caught and can be damaged by beam trawls and there is some evidence that otter trawl doors may also impact ocean quahogs by bringing them to the surface. The physical impacts of dredging on seabed sediments are similar to those of beam trawls (penetration to depths >5 cm) and so the effects on ocean quahog are likely to be similar. Static gears do not cause the type of pressure to which this species is sensitive (sub-surface abrasion) and so they are unlikely to have any effect.

Seagrass beds are highly sensitive to activities causing physical disturbance, especially where this causes disruption of the root system (rhizomes) within the sediment. Demersal towed gear and hydraulic dredging may result in such physical disturbance. The removal of seagrass plants or the root system can lead to increased patchiness, destabilization and erosion of the seagrass bed. Increased turbidity in the water column as a result of dredging can be a further factor degrading the health of the habitat by limiting the amount of light reaching the seagrass. The potential for disturbance to seagrass arising from demersal static fishing gears is likely to be less than that caused by towed or hydraulic fishing. Some disturbance may arise from deployment and recovery of gear, especially if anchors are used.

There is evidence that communities on or in mobile and coarse sands (shallow tide-swept coarse sands with burrowing bivalves) are expected to have higher resilience and recovery to high frequency disturbance. However, intensive fishing activities such as scallop dredging and hydraulic dredging can modify habitats, slowing down recovery of associated fauna beyond natural capacity. Scallop dredging in sandy habitats has been shown to cause modification of bottom deposits and mortality of fauna. Sessile long-lived bivalves are among the most severally affected bivalve fauna. Even where bivalves remain relatively intact following disturbance by fishing, certain species cannot retract their siphons within the shell. Loss of the siphons is likely to lead to their death.

The net result of ongoing fishing is the habitat may be maintained in a modified condition with reduced abundance (or possibly loss) of sensitive bivalve and epibenthic species. The degree of modification is likely to be dependent on the intensity of fishing, with the size and weight of gear and the depth of penetration into the sediment being factors. Due to the nature of sandy habitats, demersal static gear is considered to have a minimal effect on epifauna.

The approaches to management

Static gear assessment

It is proposed that no static gear be used in the areas essential to the recovery of maerl beds. However given the long-term recovery period for this habitat is may be possible for there to be a limited creel fishery by permit within these recovery areas.

Static gear activity is low according to Scotmap. The current levels are not considered to be impacting on the other habitats. Consequently no additional static gear management is proposed. However if future studies found there to be a negative effect then this would be addressed then.

Measures common to all approaches

The use of suction dredges (boat or diver operated) would be prohibited throughout the MPA. The deployment of any bottom contacting fishing gear within the maerl recovery areas would be prohibited (see figure L2). The deployment of anchors on the seagrass beds of whiting bay would be prohibited (see figure L3). There is potential for a limited creel fishery in the maerl recovery areas, and moorings could be laid in Whiting Bay, under a permit scheme to ensure that they are a certain type and positioned appropriately.

Question 28 asks if there should be a high level of protection to further the recovery of the maerl beds and conservation of the seagrass beds at Whiting Bay. Question 29 asks if there should be a permit scheme to enable a limited creel fishery in those recovery areas, and for moorings adjacent to seagrass beds.

Measures common to approaches 2 and 3

The capacity of trawlers operating (subject to the spatial measures) would be restricted to vessels under 100 Gross Registered Tonnage (GRT).

Approach 1

This approach would apply management across the entire MPA using a mix of general and specific zonal measures. This approach would not deliver all the management requirements. Further consideration of burrowed mud would be required in the 2nd batch of measures.

The proposed measures

No demersal trawling or mechanical dredging within the ½ NM area (shown in purple in figure L4). Mechanical dredging would only be permitted west of Bennan Head during January, February, November and December each year. This line is shown in green in figure L4.

The benefit

All of the most sensitive habitats would be covered by these measures and therefore the conservation objectives would be furthered.

The costs

The trawl data will be an overestimate caused by vessels anchoring overnight in the zone.

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl	£438	£22	5%	5459	184	3%
Dredge	£75	£33	44%	906	330	36%

Table L1: Average annual impact of approach 1 based on 2007 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

South Arran covers part of ICES rectangles 39E4, 39E5, 40E4 and 40E5. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 8% of the total value of those ICES Rectangles is taken from the MPA. Amount affected is based upon the effort proportion affected for over 15 metre vessels.

Method	Total effort days	Effort days affected	Total value	Value effected
Trawl	543	16	£464	£27
Dredge	35	13	£47	£17

Table L2: Average annual impact of approach 1 based on 2013 data for under 15 metre vessels (rounded to nearest £000s)

The displacement effects

Virtually no trawling would be displaced by these measures although further consideration of burrowed mud in the 2nd batch would most likely have an effect. During the displacement study it was understood that any trawl VMS data close to the south of Arran (such as Whiting Bay) would be trawlers at anchor overnight or lying broadside.

Most of the scallop grounds around the south end of Arran (e.g. around Pladda) would remain available, as can be seen in figures L8 and L10. Therefore the low amount of fishing ground lost around here could be absorbed within the MPA without a significant impact. A greater amount of displacement would occur from Lamlash Bay and around the Holy Island. This would either move within the MPA to grounds further south or elsewhere within the Firth of Clyde most likely around Arran or the Kintyre side of the Kilbrannan Sound.

Approach 2

This approach would apply management across the entire MPA using a mix of general and specific zonal measures. This approach would deliver all the management requirements.

The proposed measures

Demersal trawling would be prohibited throughout the MPA. By way of derogation vessels of less than 100 GRT (gross registered tonnes) would be able to fish in the 3 defined trawl areas. (See figure L5)

Mechanical dredging would be prohibited throughout the MPA. By way of derogation vessels operating under a restricted permit scheme would be able to fish in the 3 defined dredge areas (see figure L6)

Terms of the proposed scallop permit scheme (Permits would not be transferable or tradable);

Permits would be valid until end of 2018 (ties with network review)
Only vessels with track record in each of the last 5 years would be eligible.

A maximum total of 60 days fishing in a calendar year would be authorised (and split between successful applicants). This would consist of;

In permit area 1 (around Holy Island) a maximum of 10 days fishing in total permitted in January – March & October – December each year.
In permit area 2 (around Pladda) a maximum of 30 days fishing in total permitted in January – March & October – December each year.
In permit area 3 (Drumnadoon to Bennan) a maximum of 20 days fishing in total permitted in January, February, November, and December each year.

Conditions of a permit;

Vessels would only be permitted to fish between 0700 – 2100 Monday to Friday.
Vessel would only be allowed to be active in one permit area per day.
A day would count as a day irrespective of the number of hours fished.
Maximum bar length would be set to limit gear to 6-a-side.
Vessel must have fully operational Satellite Tracking Device
Vessel must have fully operational data logger recording position every minute.

The benefit

This would further the conservation objectives of all the protected features. Spatially restricting the footprint of demersal trawling and mechanical dredging to provides a good balance between the ecological objectives of the MPA and the economic needs of those who fish there. By limiting the level of effort in the scallop fishery it means that Olympic style fisheries cannot occur.

The costs

The value of fisheries affected is derived by subtracting the value of the fisheries in the Scallop Permit Areas and the Designated Trawl Areas from the total value of the MPA.

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl	£438	£154	35%	5459	1447	26.5%
Dredge	£75	£21	28%	906	225	25%

Table L3: Average annual impact of approach 2 based on 2007 to 2013 data for over 15m vessels (rounded to nearest £000s)

South Arran covers part of ICES rectangles 39E4, 39E5, 40E4 and 40E5. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 8% of the total value of those ICES Rectangles is taken from the MPA. Amount affected is based upon the effort proportion affected for over 15 metre vessels.

Method	Total effort days	Effort days affected	Total value	Value effected
Trawl	543	144	£464	£123
Dredge	35	9	£47	£12

Table L4: Average annual impact of approach 2 based on 2013 data for under 15 metre vessels (rounded to nearest £000s)

The displacement effects

Some trawling would be displaced by these measures. However this has been minimised by ensuring that the most fished grounds remain available (see figures L9 and L11). Given the significant burrowed mud resource in the Firth of Clyde any displacement is likely to be widely dispersed across the nephrops grounds.

Under this approach there will also be a displacement of mechanical dredge activity. Those who most depend upon this area would qualify for a permit and therefore be able to continue fishing there under strict spatial and effort conditions. Any activity displaced would be expected to move elsewhere within the Firth of Clyde most likely around Arran or the Kintyre side of the Kilbrannan Sound.

Approach 3 (preferred approach)

This approach would apply management across the entire MPA using a mix of general and specific zonal measures. This approach would deliver all the management requirements.

The proposed measures

Demersal trawling would be prohibited throughout the MPA. By way of derogation vessels of less than 100 GRT (gross registered tonnes) would be able to fish in the 3 defined trawl areas. (see figure L5)

Mechanical dredging would be prohibited throughout the MPA. By way of derogation vessels operating under a permit scheme would be able to fish in the defined dredge area (see figure L7). Vessels being granted a permit must have fully operational Satellite Tracking Device and a fully operational data logger recording position every 5 minutes.

The benefit

This would further the conservation objectives of all the protected features, and reduce any risks of a negative effect the lowest levels. Spatially restricting the footprint of demersal trawling and mechanical dredging to provides a good balance between the ecological objectives of the MPA and the economic needs of those who fish there.

The costs

The value of fisheries affected is derived by subtracting the value of the fisheries in the Scallop Permit Areas and the Designated Trawl Areas from the total value of the MPA.

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl	£438	£154	35%	5459	1447	26.5%
Dredge	£75	£41	54%	906	441	49%

Table L5: Average annual impact of approach 3 based on 2007 to 2013 data for over 15m vessels (rounded to nearest £000s)

South Arran covers part of ICES rectangles 39E4, 39E5, 40E4 and 40E5. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 8% of the total value of those ICES Rectangles is taken from the MPA. Amount affected is based upon the effort proportion affected for over 15 metre vessels.

Method	Total effort days	Effort days affected	Total value	Value effected
Trawl	543	144	£464	£123
Dredge	35	17	£47	£23

Table L6: Average annual impact of approach 3 based on 2013 data for under 15 metre vessels (rounded to nearest £000s)

The displacement effects

Some trawling would be displaced by these measures. However this has been minimised by ensuring that the most fished grounds remain available (see figures L9 and L11). Given the significant burrowed mud resource in the Firth of Clyde any displacement is likely to be widely dispersed across the nephrops grounds.

Under this approach there will also be a displacement of mechanical dredge activity. However a significant proportion of the fishing grounds would remain available, as can be seen in figures L8 and L10. Any activity displaced would be expected to move elsewhere within the Firth of Clyde most likely around Arran or the Kintyre side of the Kilbrannan Sound.

Protected Area M – St Kilda SAC

This section sets out the proposed management approach for this protected area. A description of this protected area can be found in the main consultation document is Annex A, Protected Area M. Maps to support understanding of the approaches can be found under Protected Area M in the technical maps document. Figure M1 shows St Kilda in context with other protected areas.

Measures for St Kilda would be delivered by Statutory Instrument using powers under the Inshore Fishing (Scotland) Act 1984.

Questions 33 and 34 refer to St Kilda.

The site features and conservation objectives

Qualifying Feature	Conservation objective
Reefs (bedrock and stony)	maintain

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Reefs	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging

The sensitivity of bedrock reef and stony reef primarily relates to activities which cause abrasion and physical disturbance to the seabed surface, such as those caused by mobile/active fishing gear. For bedrock reef there is a risk of direct impact to the fauna living attached to the reef, especially where trawling/dredging activities are targeting grounds very close to bedrock reef.

Mobile/active fishing gear may be used over stony reef where this is interspersed with areas of target ground types. This can result in the damage or death of fragile, erect species, such as sponges and corals, and changes to the structure of the habitat and the long term survival of its associated species. In addition to direct impacts, bedrock reef and stony reef are sensitive to smothering from increased levels of sedimentation which can be triggered by passing mobile/active fishing gear smothering the fauna and flora on the rock surface.

Static gear over bedrock and stony reef can also cause surface abrasion when being deployed or recovered, and this has the potential to cause mortality of the fragile epifauna on the reef habitat. However, the extent of these impacts on reef environments is variable, and will be dependent on intensity of fishing and the recovery rates of the species involved.

The approach to management

There is 1 approach proposed which would prohibit the use of certain fishing gears throughout the SAC.

Static gear assessment

Static gear activity is virtually non-existent according to Scotmap and Vessel Monitoring System data. Consequently no static gear management is proposed. Given the remote location it is unlikely to ever become a high intensity fishery. However if future studies found there to be a negative effect then this would be addressed then.

The proposed measures

Demersal trawl, mechanical dredging and suction dredging (boat and diver operated) would be prohibited all year round as shown in figure M2.

The benefit

By removing or avoiding the pressures being exerted on the reef habitat the measures will ensure that these activities will not prevent the achievement of the conservation objectives. It also would mean that future changes to fisheries policy and management would not require an appropriate assessment. The measures would also contribute to the management of the Special Protection Area and the World Heritage Site.

The costs

No breakdown of the costs is provided in case it identifies any individual vessel. There was less than 0.5 days fishing for less than £1000 per year on average for the years 2010 – 2013 for vessels over 15 metres. There does not appear to be any active under 15 metre vessels that would be affected by the measures.

The displacement effects

Over 4 years there has been a minimal amount of effort as shown in figure M3. Displacing this effort is unlikely to have any effect on the environment out with the SAC.

Protected Area N – Treshnish Isles SAC

This section sets out 2 possible management approaches for this protected area.

Approach 1 is preferred because it would put in place the necessary management measures to safeguard the most sensitive habitats. Risk of negative effect would be minimised.

A description of this protected area can be found in the main consultation document is Annex A, Protected Area N. Maps to support understanding of the approaches can be found under Protected Area N in the technical maps document. Figure N1 shows Treshnish Isles in context with other protected areas.

Measures for Treshnish Isles SAC would be delivered by Statutory Instrument using powers under the Inshore Fishing (Scotland) Act 1984.

Questions 35 to 37 refer to Treshnish Isles.

The site features and conservation objectives

Qualifying Feature	Conservation objective
Reefs (bedrock and stony)	maintain

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Reefs	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging

The sensitivity of bedrock reef and stony reef primarily relates to activities which cause abrasion and physical disturbance to the seabed surface, such as those caused by mobile/active fishing gear. For bedrock reef there is a risk of direct impact to the attached fauna, especially where trawling/dredging activities are targeting grounds very close to bedrock reef.

Mobile/active fishing gear may be used over stony reef where this is interspersed with areas of target ground types. This can result in the damage or death of fragile, erect species, such as sponges and corals, and changes to the structure of the habitat and the long term survival of its associated species. In addition to direct impacts, bedrock reef and stony reef are sensitive to smothering from increased levels of sedimentation which can be caused by passing mobile/active fishing gear which causes smothering of fauna and flora on the rock surface.

Static gear over bedrock and stony reef can also cause surface abrasion when being deployed or recovered, and this has the potential to cause mortality of the fragile epifauna on the reef habitat. However, the extent of these impacts on reef environments is variable, and will be dependent on intensity of fishing and the recovery rates of the species involved.

The approaches to management

Static gear assessment

Static gear activity is moderate according to Scotmap. Consequently no static gear management is proposed. However if future studies found there to be a negative effect then this would be addressed then.

Measures common to both approaches

The use of suction dredges (boat or diver operated) would be prohibited throughout the SAC.

Approach 1 (preferred approach)

This use of demersal trawl or mechanical dredge would be prohibited throughout the SAC as shown in figure N2.

The benefit

By removing or avoiding the pressures being exerted on the reef habitat the measures will ensure that these activities will not prevent the achievement of the conservation objectives. It also would mean that future changes to fisheries policy and management would not require an appropriate assessment.

The management measures would also protect the significant maerl beds and seagrass beds which are present within the SAC but do not form part of the qualifying features.

The costs

In the table below trawl and mechanical dredge activity have been amalgamated to avoid potential disclosure issues for over 15m vessels.

Gear	Effort (Hours)	Value (£s)
Demersal trawl / Dredge	76.5	8707

Table N1: Average fishing effort by over 15m vessels in SAC (2010-2013)

Treshnish Isles covers part of ICES rectangles 41E3 and 42E3. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 3% of the total value of those ICES Rectangles is taken from the SAC. This equates to approximately 5 effort days and £5,000 for 2013.

The displacement effects

There are a significant amount of nephrops trawl and scallop dredge grounds within 20 nm which equates to 2-3 hours steaming time as shown in figures N5, N6, and N7. Therefore any displacement of activity from the SAC can be dispersed over a wide area. Given the low amount of effort this is unlikely to have any effect on the environment outwith the SAC.

Approach 2

This use of demersal trawl or mechanical dredge would be prohibited on a zonal basis within the SAC as shown in figure N3.

The benefit

By removing or avoiding almost all of the pressures being exerted on the reef habitat the measures will ensure that these activities will not prevent the achievement of the conservation objectives. It also would mean that future changes to fisheries policy and management would not require an appropriate assessment.

The management measures would also protect the significant maerl beds and seagrass beds which are present within the SAC but do not form part of the qualifying features.

The costs

In the table below trawl and mechanical dredge activity have been amalgamated to avoid potential disclosure issues for over 15m vessels.

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl / Dredge	£8.75	£7.5	86%	76.5	63	82%

Table N2: Average annual impact of approach 2 based on 2010 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Treshnish Isles covers part of ICES rectangles 41E3 and 42E3. According to the analysis of Scotmap data for trawl and dredge fisheries approximately 3% of the total value of those ICES Rectangles is taken from the SAC. This equates to approximately 5 effort days and £5,000 for 2013. If the activity affected was the same as the proportion of effort affected for over 15 metre vessels then the impact is approximately 4 effort days and £4,000.

The displacement effects

There are a significant amount of nephrops trawl and scallop dredge grounds within 20 nm which equates to 2-3 hours steaming time as shown in figures N5, N6, and N7. Therefore any displacement of activity from the SAC can be dispersed over a wide area. Given the low amount of effort this is unlikely to have any effect on the environment outwith the SAC.

Protected Area P – Upper Loch Fyne & Loch Goil MPA

This section sets out 2 possible management approaches for recovery of the flame shell beds, and 2 separate approaches for the rest of the protected features. Any combination would deliver sufficient protection for all the protected habitats and species.

Approaches 1a and 2a are preferred for both aspects as it maximises the recovery potential of the flame shell bed and the measures for the other habitats simpler.

A description of this protected area can be found in the main consultation document is Annex A, Protected Area P. Maps to support understanding of the approaches can be found under Protected Area P in the technical maps document. Figure P1 shows Upper Loch Fyne & Loch Goil in context with other protected areas.

Measures for South Arran would be delivered by Statutory Instrument using powers under the Marine (Scotland) Act 2010.

Questions 38 to 44 refer to Upper Loch Fyne & Loch Goil.

The site features and conservation objectives

Protected Feature	**Conservation objective**
Flame shell beds	Recover
Sublittoral mud and specific mixed sediment communities	Conserve
Burrowed mud	Conserve
Horse mussel beds	Conserve
Ocean quahog aggregations	Conserve

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Flame shell beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Sublittoral mud and specific mixed sediment communities	Consider reduce or Limit pressure from demersal trawl, mechanical dredges, or suction dredges.		Remove / avoid pressure from diver operated suction dredging
Burrowed mud	Consider reduce / Limit pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Consider reduce / limit pressure from diver operated suction dredging
Horse mussel beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges.	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction dredging
Ocean quahog aggregations	Remove / avoid targeted fishing		

The physical impacts from mobile demersal gear can affect flame shell beds and horse mussel beds through direct mortality from damage to the shells, by breaking up the bed and by affecting or removing associated fauna attached to the bed. Both types of bed are assessed as highly sensitive to the type of pressures caused by mobile, i.e. surface and sub-surface abrasion. Flame shell beds and horse mussel beds are also sensitive to the indirect effects of increased sedimentation, which can result in smothering and can result in the subsequent mortality of individuals.

Whilst there is no published evidence on the sensitivity of flame shell beds to static gear, given their high sensitivity to abrasion and due to the delicate nature of their shells and the nests, intense levels of fishing with heavy static gear could have damaging effects. There is also potential for nest material to be removed through the entanglement of creels with kelp that grows in association with flame shell beds. For horse mussel beds whilst the sensitivity to static gears is lower than for mobile gears, depending on the type of epifauna present this may increase if fishing intensity is high.

Ocean quahogs are highly sensitive to sub-surface abrasion caused by mobile demersal fishing gear. They are caught and can be damaged by beam trawls and there is some evidence that otter trawl doors may also impact ocean quahogs by bringing them to the surface. The physical impacts of dredging on seabed sediments are similar to those of beam trawls (penetration to depths >5cm) and so the effects on ocean quahog are likely to be similar. Static gears do not cause the type of pressure to which this species is sensitive (sub-surface abrasion) and so they are unlikely to have any effect.

Burrowed mud has medium sensitivity to physical pressures associated with mobile demersal fishing gear e.g. surface and sub-surface abrasion. Physical disturbance of surface of seabed is likely to affect mobile and sessile epifaunal and shallow burrowers, for example damage to seapen species is likely to take place as a result of greater sediment disturbance from towed demersal gear. Trawling for Nephrops can by reducing the number and size of burrowing individuals present, also affect the habitat structure itself in terms of the number and size of burrows present.

However, the degree of impact in terms of diversity and relative abundance of species is likely to be related to the intensity of fishing activity, and there is scope for recovery. For static gear, it is likely that when fishing activity is low, direct impacts on the habitat is likely to be minimal and seabed structure is likely to be maintained in a slightly modified state. However the impacts of increasing static gear fishing intensity and the subsequent impacts on the habitat are less well understood.

The approaches to management

Static gear assessment

It is proposed that no static gear be used in the areas essential to the recovery of flames shell bed. However given the long-term recovery period for this habitat is may be possible for there to be a limited creel fishery by permit within these recovery areas.

Static gear activity is low according to Scotmap. The current levels are not considered to be impacting on the other habitats. Consequently no additional static gear management is proposed. However if future studies found there to be a negative effect then this would be addressed then.

Measures common to all approaches

The use of suction dredges (boat or diver operated) would be prohibited throughout the MPA. A capacity restriction of 75 Gross registered Tonnage (GRT) on vessel size would apply to the whole MPA.

Approaches for the recovery of flame shell beds (Approach 1a is preferred)

There are 2 possible approaches for this and they would both receive a high level of protection to facilitate recovery. Question 38 asks if you support this high level of protection.

Under both approaches it is proposed that no fishing should take place or the deployment of anything onto the seabed, or removal of anything from the seabed. As recovery may take a long time it would be possible to have a permit scheme for certain activities to take place under specific conditions. Question 39 asks if provision should be made for this.

The only difference in the approaches is the spatial extent of the recovery area. One is based upon the existing voluntary fisheries management arrangement. The other is an extended area based upon the potential extent of the flame shell bed as defined in SNH commissioned report CR764. These zones are shown in Figures P2 and P3.

The Benefits

Flame shell beds in Upper Loch Fyne & Loch Goil MPA are one of only 4 protected features with a recovery conservation objective. The benefit of both approaches will be enabling that recovery to begin and progress over the coming years.

The Costs

This cannot be shown (years 2007 – 2013) for demersal trawl and mechanical dredge combined because of potential disclosure issues due to a low number of vessels. Both approaches have an estimated impact of less than £3,000 and 30 fishing hours per year for vessels over 15 metres. For under 15 m vessels the estimated impact is less than 2 effort days and £2,000.

Approaches for the protection of the other habitats

Approach 2a (preferred approach)

This approach would prohibit the use of demersal trawl and mechanical dredges in specific zones within the 2 lochs. These are shown in figure P4.

Approach 2b

This approach would prohibit the use of demersal trawl and mechanical dredges in the 2 lochs. In Upper Loch Fyne this would start from the northern edge of the chosen flame shell recovery area. By way of derogation these activities could continue in the areas defined in figure P5.

The benefit of both approaches

The additional spatial measures have been designed around the sedimentary habitats and the key biotopes – Fireworks anemone, horse mussels, and ocean quahogs. This will provide considerable conservation value of these biotopes ensuring that the conservation objectives are furthered

The Costs

This cannot be shown (years 2007 – 2013) for demersal trawl and mechanical dredge combined because of potential disclosure issues due to a low number of vessels. Both approaches have an estimated impact of less than £5,000 and 70 fishing hours per year for vessels over 15 metres. For under 15 m vessels the estimated impact is less than 6 effort days and £7,000.

The displacement effects of both approaches

SCOTMAP data shows that Loch Goil is of significant importance to a small number of nephrops trawl vessels (see figures P10 and P11). The management zones in this loch have been designed to balance the conservation value with the clear economic importance. The level of displacement caused should therefore be insignificant.

The footprint of trawling in Upper Loch Fyne would be reduced by these measures but some fishing grounds would remain. This means that displacement would likely be within the Loch itself, and fishermen could still get economic value particularly during bad weather.

Protected Area Q – Wester Ross MPA

This section sets out 2 possible management approaches for this protected area. Under the 1st approach further measures will be required for burrowed mud and circalittoral muddy sand communities. Approach 2 would deliver sufficient protection for all the protected habitats and species.

Approach 2 is preferred because it would deliver all the measures necessary.

A description of this protected area can be found in the main consultation document is Annex A, Protected Area Q. Maps to support understanding of the approaches can be found under Protected Area Q in the technical maps document. Figure Q1 shows Wester Ross in context with other protected areas. Figure Q2 shows the distribution of protected features within the MPA.

Measures for Wester Ross would be delivered by Statutory Instrument using powers under the Marine (Scotland) Act 2010, or the Inshore Fishing (Scotland) Act 1984.

Questions 45 to 49 refer to Wester Ross.

The site features and conservation objectives

Protected Feature	**Conservation objective**
Maerl beds	Recover
Flame shell beds	Recover
Maerl or coarse shell gravel with burrowing sea cucumbers	Conserve
Burrowed mud	Conserve
Circalittoral muddy sand communities	Conserve
Kelp and seaweed communities on sublittoral sediment	Conserve
Northern feather star aggregations on mixed substrata	Conserve

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Maerl beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction gear
Flame shell beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction gear
Maerl or coarse shell gravel with burrowing sea cucumbers	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges		Remove / avoid pressure from diver operated suction gear
Burrowed mud	Reduce / limit pressure from demersal trawl, mechanical dredges, or suction dredges. (remove / avoid from aggregations of tall seapens)	Consider reduce / limit pressure	
Circalittoral muddy sand communities	Reduce / limit pressure from demersal trawl, mechanical dredges, or suction dredges.		
Kelp and seaweed communities on sublittoral sediment	Reduce / limit pressure from demersal trawl, mechanical dredges, or suction dredges.		
Northern feather star aggregations on mixed substrata	Reduce / limit pressure from demersal trawl, mechanical dredges, or suction dredges.		

Flame shell beds and maerl beds are highly sensitive to physical disturbance caused by mobile gears which can cause surface and sub-surface abrasion/penetration. Flame shell beds are affected directly through mortality from damage to the shells, by breaking up the bed and by affecting or removing associated fauna attached to the bed. The three dimensional structure, quality and associated communities of maerl beds can be substantially affected by mobile demersal gear fishing from crushing, burial of live maerl and disruption of the surface and underlying sediment.

Maerl beds have a low rate of recovery due to their very slow growth rate. In addition to direct impacts, flame shell beds and maerl beds are sensitive to increased levels of sedimentation which can be caused by passing mobile/active fishing gear, which causes smothering of the maerl/flame shells as well as associated fauna and flora. The deployment and retrieval of static gear over maerl beds has the potential to cause sufficient surface abrasion that would result in a detrimental effect.

However, the extent of these impacts on maerl beds would be dependent on the intensity of fishing. Whilst there is no published evidence on the sensitivity of flame shell beds to static gear, given their high sensitivity to abrasion and due to the delicate nature of their shells and the nests, intense levels of fishing with heavy static gear could have damaging effects.

Kelp and seaweed communities on sublittoral sediment have low to medium sensitivity to pressures associated with demersal mobile gear. Species of kelp and seaweed can be removed by passing trawls, dredges with low energy sites with dense kelp and seaweed coverage being the most sensitive. However, many animal species associated with the habitat are mobile or infaunal and so are likely to avoid most effects of surface disturbance. Northern feather star aggregations have medium sensitivity to pressures associated with demersal mobile gear e.g. surface abrasion and removal of species. The potential effects include direct mortality through capture or contact with gear and possible indirect effects from smothering and/or increased suspended sediment. The degree of effects will depend on the gear type, substrate composition and local hydrodynamic conditions.

Burrowed mud has medium sensitivity to physical pressures associated with mobile demersal fishing gear e.g. surface and sub-surface abrasion. Physical disturbance of surface of seabed is likely to affect mobile and sessile epifaunal and shallow burrowers, for example damage to seapen species is likely to take place as a result of greater sediment disturbance from towed demersal gear. Trawling for Nephrops can, by reducing the number and size of burrowing individuals present, also affect the habitat structure itself in terms of the number and size of burrows present. However, the degree of impact in terms of diversity and relative abundance of species is likely to be related to the intensity of fishing activity, and there is scope for recovery. For static gear, it is likely that when fishing activity is low, direct impact on the habitat is likely to be minimal and seabed structure is likely to be maintained in a slightly modified state. However the impacts of increasing static gear fishing intensity and the subsequent impacts on the habitat are less well understood.

The approaches to management

Recovery habitats

Wester Ross MPA has two of the four protected features in the network that have recovery conservation objectives. At present no specific management beyond measures for demersal trawl and mechanical dredge are proposed. Question 47 asks whether static gear fisheries, and other activities that cause similar seabed disturbance, should be restricted in areas essential to the recovery of the maerl beds and flame shell beds.

There is presently a voluntary fisheries management arrangement in place to ensure that no physical disturbance of the maerl beds takes place. Under either of the management approaches the fishing industry would like a similar depth zonation around the Summer Isles to enable a scallop dredge fishery to continue. Question 48 asks whether such an approach should be considered. It should be noted the risk of sedimentation effects would have to be assessed as part of devising such an approach.

Static gear assessment

Static gear activity is low to moderate according to Scotmap. The current levels are not considered to be impacting on the habitats. Subject to views on question 47, no additional static gear management is proposed. However if future studies found there to be a negative effect then this would be addressed then.

Measures common to both approaches

The use of suction dredges (boat or diver operated) would be prohibited throughout the MPA. The size of vessel which can fish in the MPA would be restricted to 150 Gross Registered Tonnage (GRT). Under both approaches the existing seasonal closure in Little Loch Broom and Gruinard Bay would be replaced by a new permanent closure on a lesser boundary.

Approach 1

The approach would deliver zonal management for the protection of the maerl beds and flame shell beds. Further measures for burrowed mud and circalittoral muddy sand communities would be required.

Proposed measures

In addition to the common measures, the use of demersal trawls and mechanical dredges would be prohibited in the purple zones shown in figure Q3.

These could be described as follows;

Summer Isles
Horse Island
Eilean Dubh
Upper Loch Broom
Little Loch Broom and Gruinard Bay
West side of Loch Ewe

The benefits

The spatial measures would deliver the necessary protection for maerl beds and flame shell beds. In addition the areas with the most significant populations of tall sea pen would also be protected. The capacity restriction would go some way to limiting the pressure on the sedimentary habitats. The measures would further the conservation objectives of maerl beds and flame shell beds, but not for all features. This means that further measures (as part of the 2nd batch) would be required for the other features

The costs

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl	£313	£15	5%	4482	87	2%
Dredge	£39	£13	33%	454	132	29%

Table Q1: Average annual impact of approach 1 based on 2007 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Wester Ross covers part of ICES rectangles 44E4 and 44E5. According to the analysis of Scotmap data for trawl fisheries approximately 27% of the total value of those ICES Rectangles is taken from the MPA. Amount affected is based upon the effort proportion affected for trawling (2%) by over 15 metre vessels.

Method	Total effort days	Effort days affected	Total value	Value effected
Trawl	230	5	£283	£5.5

Table Q2: Average annual impact of approach 1 based on 2013 data for under 15 metre vessels (rounded to nearest £000s)

The displacement effects

The area around the Summer Isles is where most of the displacement would occur. There are other scallop grounds within the MPA (which do not have protected features) which would be available to these vessels as shown in figure Q7. In overall terms it does not represent a significant amount of effort.

Vessels over 150GRT are more than capable of fishing on grounds outwith the MPA. There are significant areas of burrowed mud on the North Minch for these vessels to operate on, and consequently any displacement effect would be widely dispersed (see figure Q9).

Therefore there is unlikely to be any significant negative environmental effect.

Approach 2 (preferred approach)

The approach would deliver zonal management for all the habitats.

The proposed measures

No demersal trawling or mechanical dredging in the 5 areas as defined in Figure 5. These could be described as follows;

Summer Isles / Horse Island
Eilean Dubh (extended from approach 1)
Loch Broom
Little Loch Broom and Gruinard Bay (as per approach 1)
Loch Ewe

The benefits

The spatial measures would deliver sufficient protection for all habitats, in combination with the capacity restriction. This would further the conservation objectives for all features from a fisheries perspective.

The costs

Method	Average annual MPA value	Average annual value affected	% of value affected	Average annual effort hours in MPA	Average annual effort hours affected	% of effort affected
Trawl	£313	£39	12.5%	4482	472	11%
Dredge	£39	£16	40%	454	164	36%

Table Q3: Average annual impact of approach 2 based on 2007 to 2013 data for over 15 metre vessels (rounded to nearest £000s)

Wester Ross covers part of ICES rectangles 44E4 and 44E5. According to the analysis of Scotmap data for trawl fisheries approximately 27% of the total value of those ICES Rectangles is taken from the MPA. Amount affected is based upon the effort proportion affected for trawling (11%) by over 15 metre vessels.

Method	Total effort days	Effort days affected	Total value	Value effected
Trawl	230	25	£283	£31

Table Q4: Average annual impact of approach 2 based on 2013 data for under 15 metre vessels (rounded to nearest £000s)

The displacement effects

The area around the Summer Isles is where most of the displacement would occur. There are other grounds within the MPA (which do not have protected features) which would be available to these vessels as shown in figure Q7. In overall terms it does not represent a significant amount of effort.

Vessels over 150GRT are more than capable of fishing on grounds outwith the MPA. There are significant areas of burrowed mud on the North Minch for these vessels to operate on, and consequently any displacement effect would be widely dispersed (see figure Q9). The extended area from Eilean Dubh takes in some of the burrowed mud habitat in the outer part of the MPA but it appears to have a low level of fishing effort when compared to adjacent areas (See figure Q5). The measures also avoid the most valuable grounds to the under 15m nephrops trawl fleet according to Scotmap data, as shown in figure Q6.

Therefore there is unlikely to be any significant negative environmental effect.

Protected Area R – Wyre & Rousay Sounds MPA

This section sets out the proposed management approach for this protected area. A description of this protected area can be found in the main consultation document is Annex A, Protected Area R. Maps to support understanding of the approaches can be found under Protected Area R in the technical maps document. Figure R1 shows Wyre & Rousay Sounds in context with other protected areas.

Measures for Wyre & Rousay Sounds would be delivered by Statutory Instrument using powers under the Inshore Fishing (Scotland) Act 1984.

Questions 50 and 51 refer to Wyre & Rousay Sounds.

The site features and conservation objectives

Protected Feature	Conservation objective
Maerl beds	Conserve
Kelp and seaweed communities on sublittoral sediment	Conserve

Summary of the management advice

Feature	Mobile gear	Static gear	Other gear
Maerl beds	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction gear
Kelp and seaweed communities on sublittoral sediment	Remove / avoid pressure from demersal trawl, mechanical dredges, or suction dredges	Consider reduce / limit pressure	Remove / avoid pressure from diver operated suction gear

Maerl beds are highly sensitive to physical disturbance caused by mobile gears which can cause surface and sub-surface abrasion/penetration. The three dimensional structure, quality and associated communities of maerl beds can be substantially affected by mobile demersal gear fishing from crushing, burial of live maerl and disruption of the surface and underlying sediment. Maerl beds have a low rate of recovery due to their very slow growth rate.

In addition to direct impacts maerl beds are sensitive to increased levels of sedimentation which can be caused by passing mobile/active fishing gear, which causes smothering of the maerl as well as associated fauna and flora. The deployment and retrieval of static gear over maerl beds has the potential to cause sufficient surface abrasion that would result in a detrimental effect. However, the extent of these impacts on maerl beds would be dependent on the intensity of fishing.

Kelp and seaweed communities on sublittoral sediment have low to medium sensitivity to pressures associated with demersal mobile gear. Species of kelp and seaweed can be removed by passing trawls and dredges. Low energy sites with dense kelp and seaweed coverage are the most sensitive. However, many animal species associated with the habitat are mobile or infaunal and so are likely to avoid most effects of surface disturbance.

The approach to management

Static gear assessment

It is evident from the healthy condition of the protected features that the creel fishery does not have any effect on these habitats.

The proposed measures

Demersal trawl, mechanical dredging and suction dredging (boat and diver operated) would be prohibited all year round.

The benefit

The data held by Marine Scotland shows that this area would appear to free of activity from any of the methods noted above. Therefore the new measures would be a case of making the current status quo a permanent statutory arrangement. This would ensure that from a fisheries perspective the conservation objectives would be furthered and an exceptional example of a maerl bed conserved.

The costs

There is no VMS data within the MPA from 2007 to 2013. There is no overlap with the MPA from the Scotmap layers for trawling or dredging. Therefore the impact is considered to be virtually zero.

The displacement effects

SCOTMAP data shows no 15m trawl or dredge effort inside the MPA. In addition VMS data from 2007 to 2013 place no vessel inside the MPA throughout that period. Therefore no displacement is anticipated.

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