



Scottish Government
Riaghaltas na h-Alba
gov.scot

Marine Scotland Science

Scottish Marine Protected Areas Socioeconomic Monitoring
2016 Report



marinescotland
science

Scotland Marine Protected Areas Socioeconomic Monitoring

2016 Report

**Marine Analytical Unit
Marine Scotland Science
Scottish Government**

Contents

Executive Summary	4
1. Background	7
2. Approach to monitoring socioeconomic impacts of MPAs	10
2.1 Key Informant Interviews	10
2.2 Case Studies	11
2.3 Activity Data Analysis	11
3. Implementation of MPAs: Compliance Enforcement and Monitoring	14
4. Socioeconomic Impacts of MPAs: Results	17
4.1 Fishing Catching Sector.....	17
4.2 Other Marine Users	24
4.3 Wider Socioeconomic Impacts	25
4.4 Looking Ahead.....	27
5. Conclusions and Next steps	29
5.1 Conclusion.....	29
5.2 Further Monitoring	30
5.2.2 Timelines for Future Work	31
Annexes.....	33
Annex 1: Overview of the management measures in each MPA/SAC	33
Annex 2: Key Informants invited for Interview	34
Annex 3: Key Informant Interview Questions.....	35
Annex 4: Case Study Interviewees.....	37
Annex 5: Case Study Interview Questions	38
Annex 6: Baseline assessment of other marine users.....	40
Annex 7: Analysis of fishing activity data: detailed methodology.....	44

List of Figures

Figure 1: Spatial distribution of Scotland's MPAs	8
Figure 2: Summary of approaches to gathering evidence of the socioeconomic impacts of MPA management measures	10
Figure 3: Map of 'study area'- ICES area VIa and rectangles 38E4, 38E5 and 38E6 in ICES area VIIa.....	12
Figure 4: Marine Scotland Compliance's assessment of risk of lack of compliance with MPA management measures	14
Figure 5: Number of days per month vessels and planes patrolled MPAs.....	15
Figure 6: Number of alarms triggered by vessels transiting (blue) verse number of alarms triggered due to an incursion (red) of the MPA	15

List of Boxes

Box 1: Vessels reported by key informants as having left the industry because of MPAs.	18
Box 2: Displacement of mobile dredge	19
Box 3: Displacement of mobile trawl.....	20
Box 4: Changes in static effort in the South Arran MPA	22
Box 5: Tourism plans and project development.....	25
Box 6: Recognising tourism opportunities for MPAs through a healthy environment.....	28

List of Tables

Table 1: Six key indicators for short-term monitoring prior to the second impact report in 2018.....	32
--	----

Executive Summary

Introduction

This report provides an assessment of emerging evidence on the socio-economic impacts of Scotland's Marine Protected Areas (MPAs). It provides Scottish Ministers with evidence of observed socioeconomic impacts of MPA management measures across sites in Scotland. The specific objectives are:

- To develop a methodology for monitoring the socioeconomic impacts of MPA management measures;
- To gather and analyse evidence on the ex post socioeconomic impacts of MPA management measures;

This report presents evidence from key informant interviews, analysis of fishing activity data and three case studies of the South Arran and Wester Ross MPAs and the East Mingulay Special Area of Conservation (SAC).

Findings

Compliance with MPA management measures

Key informant interviews and evidence from Marine Scotland's monitoring of activities around MPAs suggest compliance with management measures has been high. There were very few suspected cases of deliberate incursion into MPAs or breaches of management measures.

Fishing activity

Analysis of fishing activity in ICES area VIa including rectangles 38E4, 38E5 and 38E6 from ICES area VIIa, hereinafter called the 'study area', found no notable changes in the number of fishing voyages and effort days following the introduction of MPA management measures. Evidence from key informant interviews suggested that three fishing vessels may have left the industry because of MPA management measures. Further inquiry found supporting evidence for only one of these vessels.

Analysis of fishing activity by gear type found that **mobile dredge** activity decreased in the majority of rectangles containing MPA management measures, though in these rectangles the baseline activity level was low. The analysis also indicates that in a small number of rectangles affected by MPA management measures mobile dredging activity increased to an extent that during 2016 total activity in all rectangles was higher than in 2015. Key informant interviews and case studies suggest this was a result of mobile dredge effort shifting and increasing to fishing grounds outside of the MPAs, but still in the same rectangles.

Fishing activity using **mobile trawls** and **static gear** decreased for the whole study area. Mobile trawl effort increased in two of the rectangles affected by MPA management measures, suggesting displacement to other areas within these rectangles. Overall, mobile trawl effort decreased in all rectangles, indicating there may be other factors driving changes in fishing effort. Similarly, there may also be other factors driving static gear effort, which decreased in all rectangles yet only two of the MPAs with management measures had restrictions on use of static gear.

Concerns by key informants that static effort may have increased inside MPAs were not supported by the case study evidence. There was no noteworthy evidence of increases in the number of creels deployed by static vessels in any of the MPAs.

The volume of landings of key species likely to be affected by MPA management measures – *Nephrops*, queen scallops and king scallops – show no notable changes in 2016 relative to the comparable period in 2015. This is supported by evidence from key informant interviews and the case studies, which suggested there had been no overall decreases in fish landings since the introduction of MPA management measures. The key informant interviews and case studies suggested that it was too early to observe significant changes in landings due to MPA management measures.

Other marine sectors

None of the key informants interviewed expressed concerns about the impact of MPA management measures on current **aquaculture** operations or in relation to broader **marine** or **coastal development**.

No key informants observed direct changes to **tourism** related businesses either in the form of new start-ups or current tourism activities because of the MPA management measures. Most key informants felt it was too early to observe changes in tourism activity linked to MPAs, but a number of interviewees described MPA-related tourism projects that were being developed in their areas.

Representatives of **seafood processing** businesses reported no declines in overall supplies of raw materials as previously feared. This is because they had sourced raw material from vessels working in other areas of Scotland. Some processors, however, pointed out that the MPA management measures had impacted on the size distribution and the quality of fish landings in certain months over the summer. Generally, processors were concerned about the sustainability of fishing grounds outside of the MPAs and the risk to future supplies. Seafood processing representatives also suggested that confidence in the viability of the seafood sector has reduced because the management restrictions in MPAs which could affect the supply of seafood in the future.

There is emerging evidence that MPA management measures may deliver other socioeconomic benefits for some local **communities**. Most of these opportunities, such as education programmes and facilities as well as tourism and other local community activities, are still in developmental stages. For example, one new community group has

been established to raise awareness of the local MPA, and two other community groups are shifting attention towards raising funds to invest in developments related to MPAs.

Conclusion and Next Steps

At the national level, there is no evidence to-date of significant socioeconomic impacts that could be attributed to the introduction of MPA management measures. This is consistent with evidence provided by Marine Scotland prior to the introduction of MPA management measures.

It is possible that the various marine sectors are still adjusting to the introduction of MPA management measures. Key informant interviews and case studies suggest that at the local level socioeconomic impacts of MPA management measures could increase over time as various sectors fully adapt to the measures; the productivity of available fishing grounds change due to a shift in fishing pressure; and, as further management measures are introduced.

This report proposes that Marine Scotland continues to monitor the socioeconomic impacts of MPAs on all sectors and commissions another evaluation of the socioeconomic impacts of MPA management measures in 2018 to allow time for the various marine sectors to adapt. Six indicators are proposed to track the socioeconomic impacts of MPAs between now and 2018 on two priority sectors: fishing and onshore processing. Ongoing monitoring should provide evidence to inform if an earlier evaluation is needed and for Ministers to respond to any significant changes occurring between now and 2018.

1. Background

This report provides an assessment of emerging evidence on the socio-economic impacts of Scotland's Marine Protected Areas (MPA) since new management measures were introduced on 8 February and 23 March 2016. These new management measures, affect fishing activity in a number of MPA sites. Other marine users were already affected by the protective provisions of the Marine (Scotland) Act 2010 since MPA were designated in August 2014. For Special Areas of Conservation (SACs) the provisions of Article 6 of the EU Habitats Directive have applied to other marine activities since designation. Scottish Ministers committed to monitor and report on the socioeconomic impacts of management measures, in order that appropriate actions can be taken to mitigate any severe impacts on marine users and to support emerging opportunities.

Approximately 20% of Scotland's sea area is protected under a number of regulatory frameworks¹. This report focuses on the first tranche of management measures for ten MPAs that are governed under the Marine (Scotland) Act 2010 and ten inshore Special Areas of Conservation (SAC) that are governed under the EU Habitats Directive. It should be noted that some of these sites overlap. These are shown in Figure 1.

Scotland's MPAs and SACs have been established to meet ecological objectives; to conserve marine features, including bio-diversity (species and habitats) and marine geo-diversity (the variety of landforms and natural processes that underpin marine landscapes). At the time of MPA and SAC designation, activities for a number of sectors were restricted. Fisheries management measures were introduced at a number of sites in February and March 2016 which restrict certain fishing gears in either the whole conservation area or specific zones within the conservation area (see Annex 1). In most cases, fisheries management measures have been introduced to conserve or recover areas/species found in each MPA or SAC.

These new management measures along with the original affect activities of marine users and are likely to have socioeconomic impacts. This report provides an assessment of these impacts of all management measures. In the remainder of this report, the original measures and the new fisheries measures for both MPAs and SACs are jointly referred to as 'MPA management measures'.

There are no direct social or economic objectives for MPAs and SACs under the Marine (Scotland) Act 2010 or the EU Habitats Directive. The MPA management measures to

¹ Scotland's MPA network consists of 47 Special Areas of Conservation (SACs) to protect species and habitats such as bottlenose dolphin, cold-water coral reefs and seals; 45 Special Protection Areas (SPAs) for colonies of seabirds; 61 Sites of Specific Scientific Interest (SSSI) for the protection of seabirds, seals and habitats; and, 30 Marine Protected Areas (MPAs) to protect benthic species and habitats such as maerl beds and common skate. 17 of these MPA sites fall under the Marine (Scotland) Act for inshore waters, and 13 under the UK Marine and Coastal Access Act for offshore waters.

protect ecological features are, however, likely to have a range of indirect socioeconomic impacts on a variety of marine users and communities.

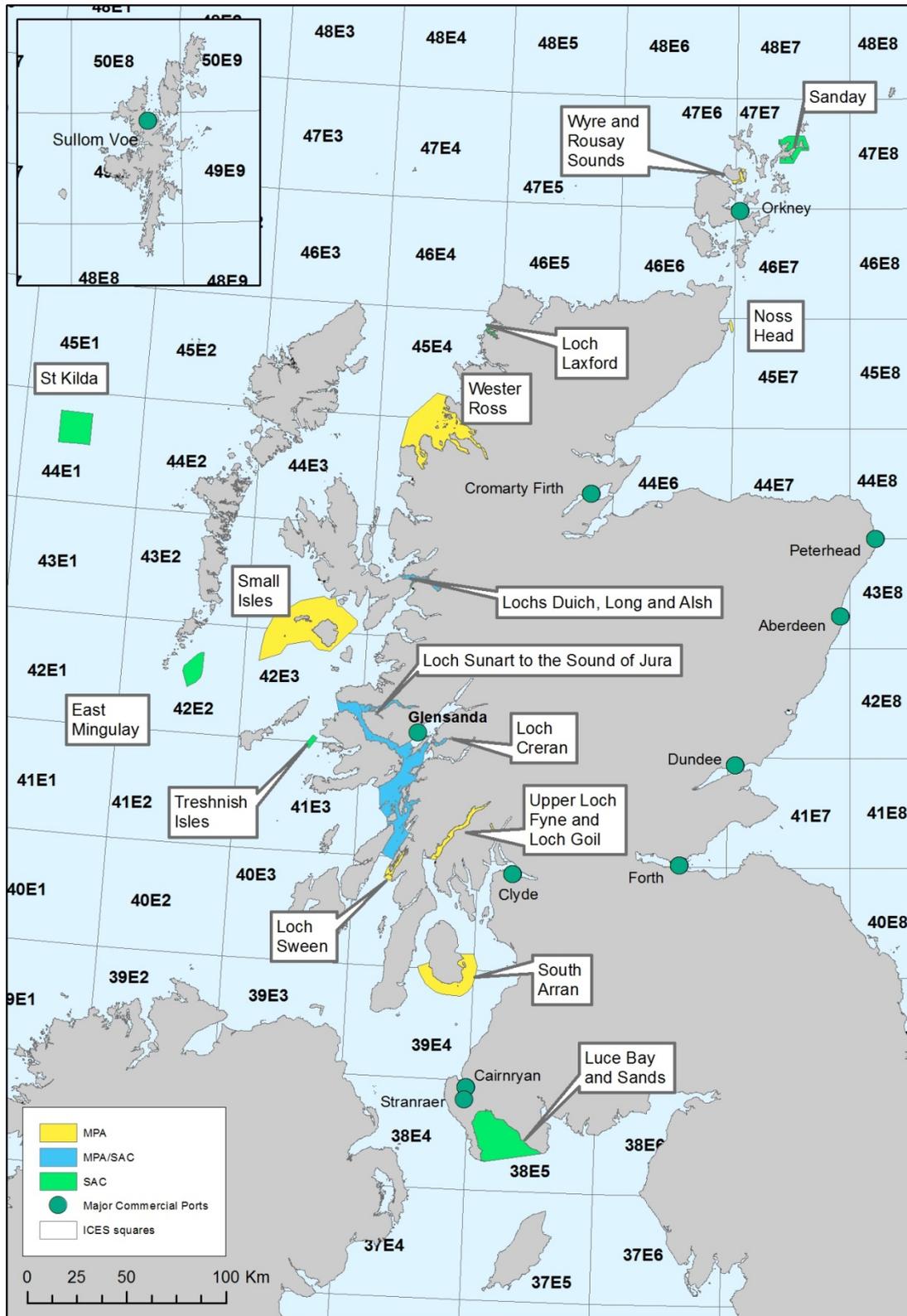


Figure 1: Spatial distribution of Scotland’s MPAs

This report seeks to identify positive and negative socioeconomic impacts that have been observed following the introduction of MPA management measures. It provides Scottish Ministers with evidence of ex post or observed socioeconomic impacts of MPA management measures across sites in Scotland. The specific objectives are:

- To develop a methodology for monitoring the socioeconomic impacts of MPA management measures; and,
- To gather and analyse evidence on the ex post socioeconomic impacts of MPA management measures.

2. Approach to monitoring socioeconomic impacts of MPAs

This section outlines the approach taken by Marine Scotland to gather evidence on the socioeconomic impacts of MPA management measures since their introduction in February 2016. These are summarised in Figure 2.

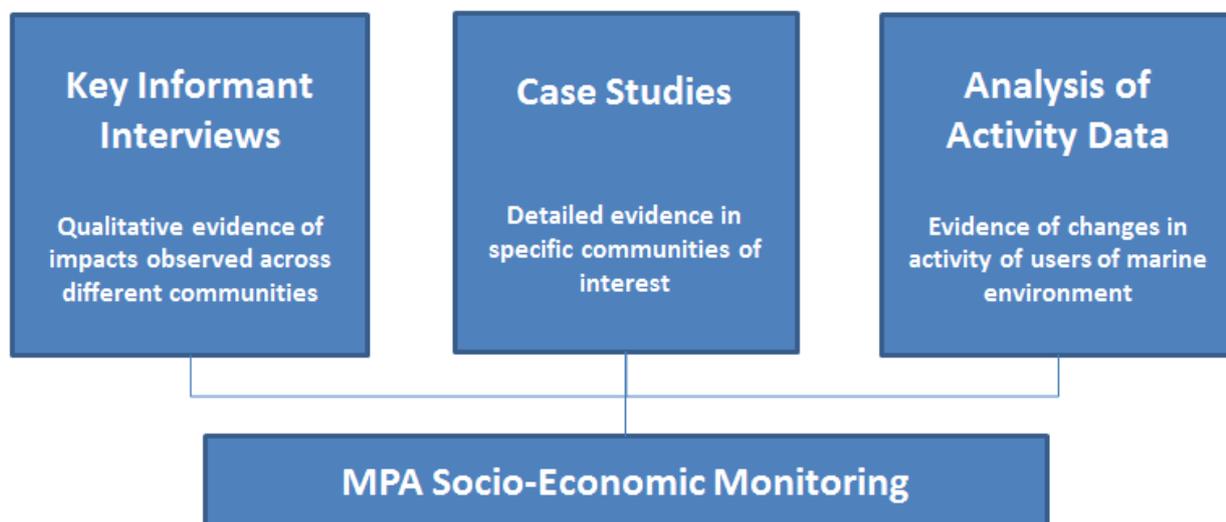


Figure 2: Summary of approaches to gathering evidence of the socioeconomic impacts of MPA management measures

2.1 Key Informant Interviews

Marine Scotland used key informant interviews with industry representatives for the fishing sector, seafood processing sector, local authorities and wider community interests to get an overview of observed positive or negative socioeconomic changes following the introduction of MPA management measures. Key informants were selected from a list of individuals and organisations who had engaged with processes to designate MPA sites and to develop the MPA management measures. The interviews were semi-structured (see Annex 3 for list of interview questions) and conducted by telephone or face-to-face.

Twenty four key informants were invited for interview of which eighteen were interviewed (see Annex 2 for the list of key informants). Six of those interviewed represented the fishing industry; four represented environmental non-governmental organisations (NGOs); two local authorities; three the seafood processing, aquaculture and shellfish growing sectors; two local community groups; and one port authority.

Based on information provided by the key informants, of the eighteen interviewed, eight had previously taken a public position in favour of MPA management measures, four a public position against MPA management measures and six had taken no position either in favour or against the MPA management measures.

2.2 Case Studies

The case studies gathered site specific evidence on the impacts of individual MPAs on businesses and communities linked to the South Arran MPA in the Firth of Clyde, Wester Ross MPA in the North West Highlands and East Mingulay SAC in the Inner Minch off the Island of Barra. Case studies comprised of interviews with local stakeholders and businesses on observed socioeconomic changes in their communities that they could link to the introduction of MPA management measures (see Annex 4). Marine Scotland also collected evidence to identify or map hotspots of immediate and potential changes in fishing activity and other socioeconomic changes linked to MPA management measures.

Data collection at each site took place over three to four days. Questionnaires were used to collect data (see Annex 5) and to map observed changes in specific areas. Evidence gathering at each site focused on themes that Marine Scotland identified as most prominent from the analysis of evidence from key informant interviews as follows:

- **South Arran MPA:** sought to gather evidence on changes in fishing effort and to explore emerging opportunities for tourism and community groups. Interviewees providing evidence on tourism were based on Arran, whilst interviewees providing evidence on fishing effort were based in Troon and Campbeltown.
- **Wester Ross MPA:** focused on assessing changes in fishing patterns and the extent of displacement of fishing effort. It also explored projects and activities that local community groups were undertaking linked to MPAs. Interviews took place in Ullapool and Gairloch.
- **East Mingulay SAC:** focused on assessing changes in fishing patterns and impacts on onshore fish processing to test suggestions that reduced landings, of mainly *Nephrops*, had impacted on the availability of supplies to local fish processing businesses. Interviews for this case study took place on the Isle of Barra.

2.3 Activity Data Analysis

2.3.1 Fisheries activity

Analysis of spatial changes in fishing activity used data from IFISH, the UK's warehouse for fisheries data. The analysis used 2015 as a baseline for assessing changes in the level and spatial distribution of fishing activity following the introduction of MPA management measures in February 2016. When comparing 2015 with 2016, only data from January to September for each year was used as 2016 was not a complete year at the time of analysis.

Data on *Nephrops* (*Nephrops norvegicus*), king scallops (*Pecten maximus*) and queen scallops (*Aequipecten opercularis*) landed into Scottish ports by UK vessels was apportioned equally to where the fishing activity was declared within ICES area VIa and

rectangles 38E4, 38E5 and 38E6 in ICES area VIIa. These are the sea areas considered relevant for monitoring the impacts of current MPA management measures on fishing activity, hereinafter referred to as the 'study area' (see Figure 2). The analysis used effort days and the number of voyages as proxies of fishing effort. Analysis examined if there were any changes in fishing activity and landings by: month of landing; ICES rectangle and; gear type.

The reader should note that the 2016 data used in this analysis is not officially published and may be revised with further data validation and quality checks. In addition ICES rectangles are large areas which in some cases encompass one or more MPAs as well as fishing grounds. For this reason no figures from this data analysis are referenced in the report; only qualitative changes in fishing activity are reported. Marine Scotland proposes future analysis using complete and official statistics and conducted at a finer spatial resolution, which will provide a more comprehensive report of changes relative to baselines before MPA management measures were in place. For more detail on the methodology used for this analysis please see Annex 7.

The approach taken for this report does not explicitly identify when fishing activity shifts within an ICES rectangle. Thus results using fisheries data should be treated as indicative of displacement effects.

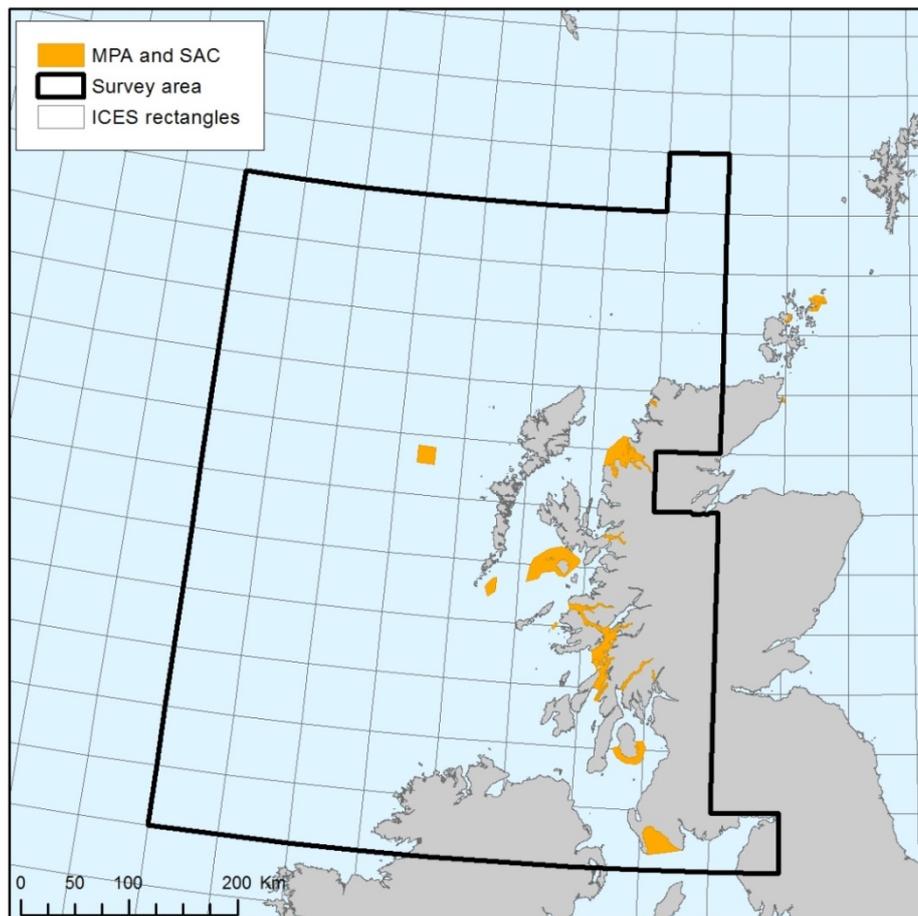


Figure 3: Map of 'study area'- ICES area VIIa and rectangles 38E4, 38E5 and 38E6 in ICES area VIIa

2.3.2 Other marine activities

The analysis of baseline data on the activity of other marine users used business registration data from the national Business Register and Employment Survey (BRES). BRES collects data on the number of people employed in registered businesses by sector. Due to data reporting protocols, this report presents percentage changes in the number of people employed in registered businesses in different sectors between 2012 and 2015. Four sectors were analysed:

- Marine fishing
- Marine aquaculture
- Processing
- Marine tourism

A range of other marine spatial data is housed in the Marine National Plan interactive (NMPi) – Marine Scotland’s online warehouse of data for marine-based activities. The spatial distribution of the following marine-based activities was explored to provide background evidence for the case studies and a baseline of the spatial distribution of different marine activities for future monitoring:

- Scuba diving and dive sites
- Canoeing and kayaking
- Sea angling activity
- Royal Yachting Association (RYA) areas
- Heritage sites (coastal and marine)
- Climbing and wildlife watching
- Keep Scotland Beautiful (KSB) beach awards - Blue Flag and Seaside Awards
- Scotland’s ferry routes

3. Implementation of MPAs: Compliance Enforcement and Monitoring

Marine Scotland Compliance is responsible for enforcing compliance with MPA management measures and for monitoring activity across the MPA network. Enforcement and monitoring uses a risk-based approach which assesses the 'likelihood of a breach or lack of compliance', and the resulting 'likely level of impact'. Subject to intelligence gathered, Marine Scotland Compliance assign a single risk rating for the MPAs, which is used to determine the level of resources allocated to monitor fishing vessel activities within or around the MPAs.

Figure 3 presents Marine Scotland Compliance's assessment of the risk of breaches or lack of compliance with the management measures from February 2016. The risks were assessed as high (awarded a maximum rating of five) during the early months after MPA management measure came into effect. Over time, Marine Scotland Compliance has downgraded the risk – beginning at the end of summer 2016, and the risk rating has remained between 3 and 4 over the autumn.

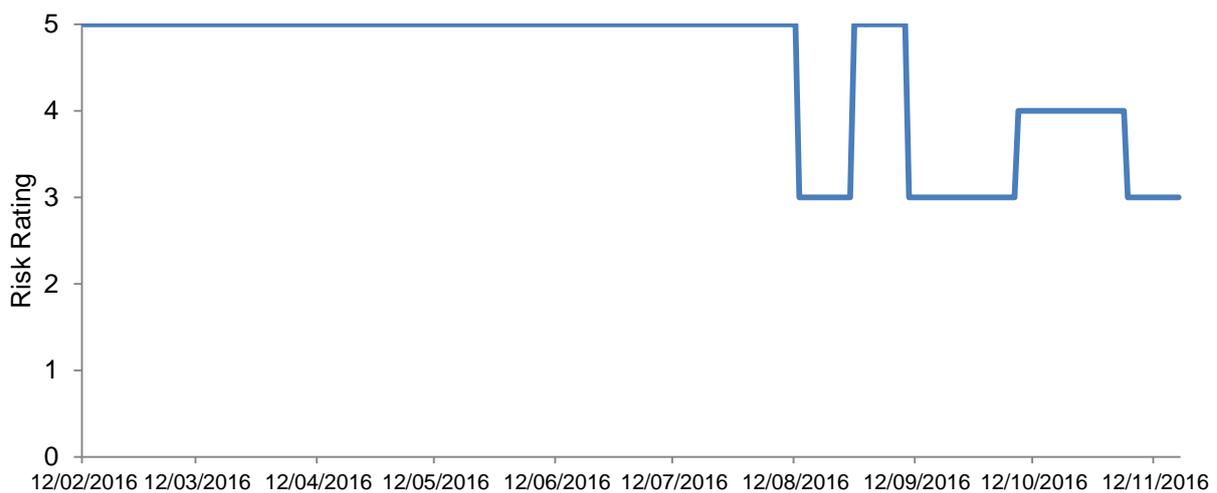


Figure 4: Marine Scotland Compliance's assessment of risk of lack of compliance with MPA management measures

Since the introduction of MPA management measures, Marine Scotland Compliance has undertaken a range of enforcement and monitoring activities across the MPA network. These include: intelligence gathering through Marine Scotland Coastal Fisheries Offices and from the public; remote tracking of seagoing vessels using alarms set around MPAs to detect when vessels enter and/or exit the area; and, routine patrols. Two large enforcement vessels, several shore based ridged inflatable boats (RIBs) and two surveillance aircrafts are used to monitor and enforce MPA management measures.

Figure 4 shows the total number of compliance operations for MPAs using vessels and aircraft since the introduction of management measures in February 2016. Compliance

activity around MPAs has reduced with assessed risk of a lack of compliance, and aircraft have taken over the bulk of monitoring in the later months.

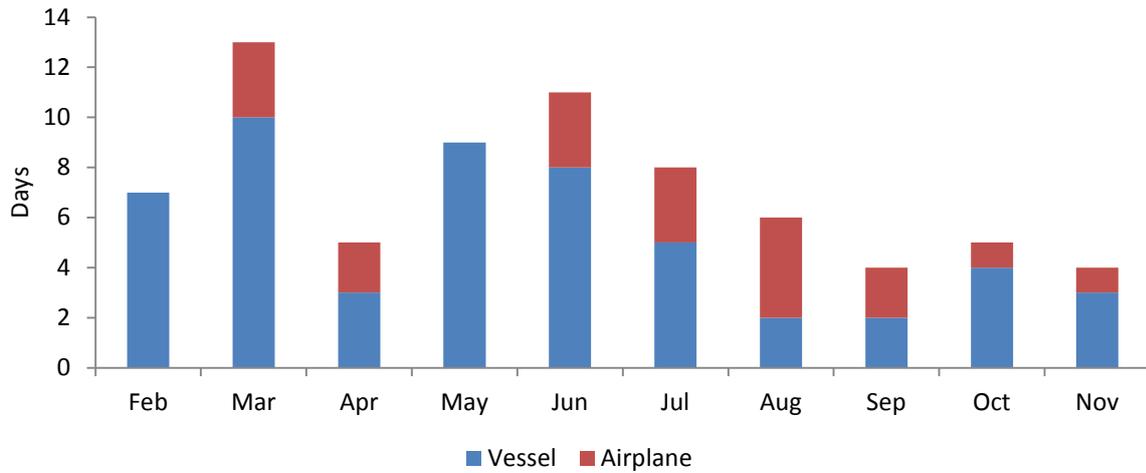


Figure 5: Number of days per month vessels and planes patrolled MPAs

Marine Scotland Compliance also monitors and investigates alarms triggered by vessels entering and exiting MPA sites. Figure 5 shows the number of cases when alarms were triggered across the different MPA sites (blue), and the number of cases that were investigated further as suspected incursions (red).

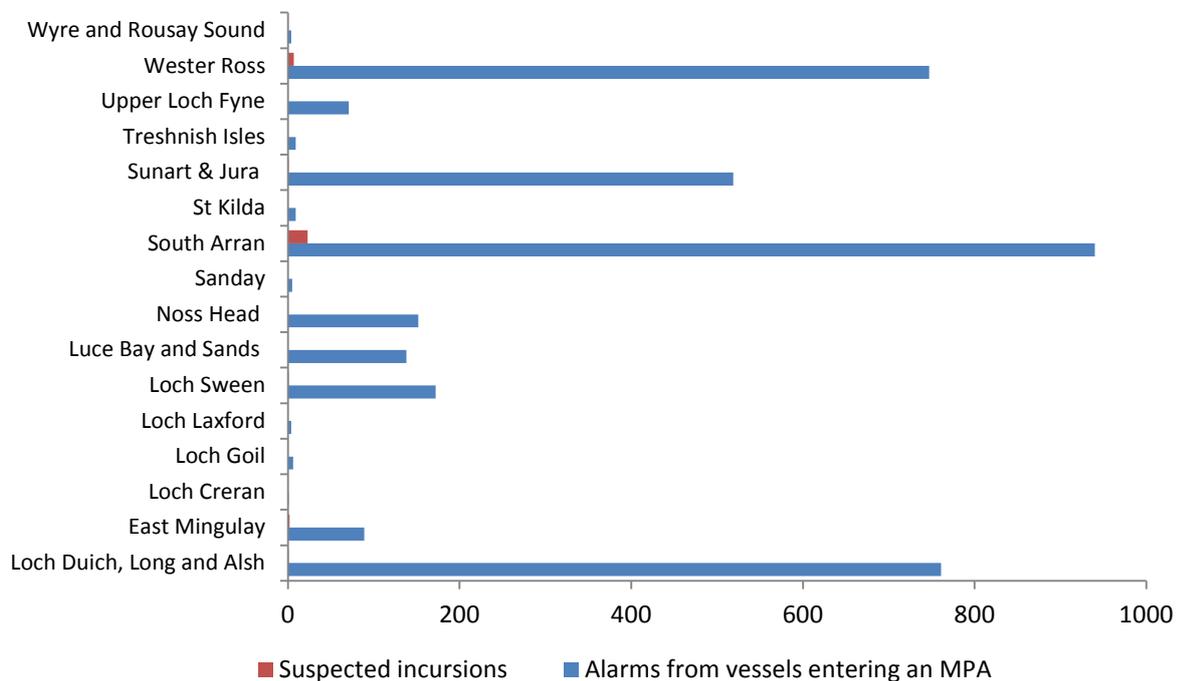


Figure 6: Number of alarms triggered by vessels transiting (blue) verse number of alarms triggered due to an incursion (red) of the MPA

The majority of alarms triggered were concentrated around four MPAs – Lochs Duich, Long and Alsh MPA/SAC; South Arran MPA; Loch Sunart to Sound of Jura MPA and Wester Ross MPA. Alarm triggers at these four sites are high because of the large

number of vessels transiting to harbours located in or near the MPAs. For example, in the case of Wester Ross MPA, all vessels utilising Ullapool harbour transit through the MPA. For Lochs Duich, Long and Alsh MPA/SAC, all vessels transiting under the Skye Bridge pass through the site. Thus, from the number of alarms triggered, only a small proportion are considered suspicious and were investigated further as potential breaches of MPA management measures.

Overall, the evidence available suggests that widespread breaches of compliance with MPA management measures have not occurred, despite initial risks being assessed as high. This is supported by evidence from the majority of key informants who felt that marine users were complying with MPA management measures. Two key informant interviewees questioned whether the Scottish Government had sufficient capacity or technology to monitor vessel activity around MPAs, and thus expressed doubt on the reliability of reporting on compliance with MPA management measures.

4. Socioeconomic Impacts of MPAs: Results

The assessment of socioeconomic impacts of MPA management measures has been divided into three sections, namely, the fish catching sector, other marine users and impacts on wider onshore activities such as fish processing, local communities and other marine/coastal developments.

4.1 Fishing Catching Sector

This section looks at changes to activity and impacts on landings for the fishing sector as recorded in IFISH, the UK data warehouse for fisheries data. Analysis is based on the assumption that if the MPA management measures are having an impact on fishing vessels, this would reduce activity and landings in areas affected by management measures. Further, if MPA management measures are 'displacing' vessel activity (i.e. forcing them to fish in alternative locations because of restrictions on some of their traditional fishing grounds), there would be increased activity and landings in areas not affected by MPA management measures.

4.1.1 Fishing activity by ICES rectangle

Analysis of fishing activity in ICES area VIa and rectangles 38E4, 38E5 and 38E6 in ICES area VIIa (see figure 2) indicates that for the period from January to September there was a reduction in the overall number of voyages and the number of effort days between 2015 and 2016².

ICES rectangles with MPA management measures show some evidence of a decline in activity as measured by number of voyages and number of effort days. However, analysis also shows, that there were declines in the number of voyages and effort days in rectangles without MPA management measures. This suggests that other factors, beyond MPA management measures, may have affected fishing activity over this period.

Evidence collected from key informant interviews with representatives of the fishing industry suggests that it is too early to observe the impacts of MPA management measures on the amount and spatial distribution of fishing activity. A number of key informants explained that the majority of MPAs offer winter fishing grounds and potential impacts on vessels that have, in the past, fished these areas will most probably only be observed outside of the study period or over the next few years given the natural variation in fishing activity year on year.

Other key informants indicated they were not aware of any evidence of fishing vessels that were displaced because of the MPA management measures, but also stated that it was too early to tell if this would be the case in future. Several key informants were keen to stress that it will be challenging to attribute any changes in fishing activity directly to one policy such as MPA management measures, given there are a wide range of factors that influence fishing activity.

² 2016 data is not officially published data and has not been finalised – see methodology section.

Two key informants supplied lists of vessels they believed had been displaced from fishing grounds following introduction of MPA management measures introduced in the South Arran and Wester Ross MPAs, the East Mingulay SAC and St Kilda SAC/SPA. Three key informants gave details of three vessels they believed had stopped fishing because of the introduction of MPA management measures. These lists guided the identification and sampling of skippers that were interviewed during the case studies of selected MPA sites.

The case studies found that one vessel had been sold, and one vessel is currently tied-up while the owner delays making any longer term plans. It was suggested that a further vessel was not being replaced because of a loss of *Nephrops* grounds to MPAs, although there is limited evidence to support this. Box 1 summarises results from the follow-up on vessels listed as having stopped fishing.

Box 1: Vessels reported by key informants as having left the industry because of MPAs.

1. A scallop vessel with five crew was cited as sold because reduced access to scallop grounds due to MPA management measures had made the business uneconomical. The owner is now fishing his one remaining vessel.
2. A pot and trap vessel with three crew stopped fishing because its most productive *Nephrops* grounds are situated in the East Mingulay SAC which restricts the use of static gear. The owner recorded a decrease in gross income of about 40% that cannot be compensated by fishing in other areas due to the amount of gear required to catch the equivalent value of *Nephrops* which they used to catch in the SAC. They also cited high risk of gear loss in exposed trawler grounds outside of the SAC as a problem. The vessel owner said these factors are making the business unviable.
3. A pot and trap vessel targeting brown crab with four crew was cited as not having been replaced because of loss of *Nephrops* ground in the East Mingulay SAC. Landings data did not indicate that *Nephrops* were a large contributor to this vessel's income and there is no independent evidence indicating that MPA were the sole reason for the decision not to replace this vessel.

4.1.2 Activity by types of gear

Management measures introduced at MPAs and SACs do not affect all fishing sectors (see Annex 1). Analysis of fishing activity data therefore focused on three gear types that were most likely to be affected by the management measures introduced in February 2016. These are mobile dredges – predominantly targeting scallops; mobile trawl – targeting *Nephrops*; and static vessels – targeting a mixture of crab, lobster and *Nephrops* using pots and traps as well as some vessels using gill nets to target crawfish.

a) Mobile dredges

Overall activity, as measured by effort days and number of voyages, has increased for **mobile dredges** over the period January to September 2016 compared with the same period in 2015. The majority of rectangles containing management measures saw a small decrease in mobile dredge activity, but baseline level of activity in these rectangles was already low. Analysis also shows, however, that some of the other rectangles affected by management measures saw an increase in the level of activity, to the extent that overall activity in all rectangles affected by mobile dredging management measures had increased.

Qualitative evidence from key informant and case study interviews appears to support the above findings on impacts on mobile dredgers. Many interviewees remarked that overall mobile dredge effort has not decreased, but shifted to other fishing grounds outside the MPAs. A number of respondents pointed out that the nomadic nature of dredgers means vessels were unlikely to be affected by individual MPAs as long as they can relocate to other grounds. Respondents indicated that mobile dredgers were displaced by management measures in the South Arran and Wester Ross MPAs, and it is anticipated that Loch Sunart to the Sound of Jura MPA will impact on these vessels over the winter months. Some areas of the Loch Sunart to Sound of Jura MPA should have opened to mobile dredge on the 1 October 2016, however, this remained closed until the 31 December 2016 under a voluntary agreement made by the fishing industry via the West Coast Regional Inshore Fisheries Group (RIFG).

Box 2: Displacement of mobile dredge

One key informant listed 4 mobile dredge vessels as having been displaced from different MPAs because of the management measures.

- The skipper of one dredge vessel stated that around 20% of winter income was earned from the Wester Ross MPA over the winter months when taking shelter from the south-westerly winds.
- The management measures had not had a major impact in the first year (around 8% down on income) because dredging vessels had shifted their effort south of the Wester Ross MPA. This is potentially leading to increased pressure on those scallop grounds, with the risk of overfishing in that area.
- There is concern over the long-term sustainability of scallop stocks. One interviewee expressed concerns about the sustainability of areas outside of the MPAs due to increased fishing pressure. This interviewee was concerned about the overall management of scallop stocks which he felt requires monitoring at a regional level.
- One interviewee was keen to stress that technology is now available which can manage fishing inside each MPA. This has been communicated to Marine Scotland.

There was one reported case of a dredging vessel that may have stopped fishing because of MPA management measures. One scallop vessel, which traditionally fished

the west coast of Scotland, has been sold to Ireland. The introduction of the MPA management measures was cited by the owner as the reason for the sale (see Box 1).

b) Mobile trawls

The majority of rectangles affected by MPA management measures that restrict the use of **mobile trawls** showed a very small decrease in activity. Only two of the rectangles affected by MPA management measures have seen increases in effort days and voyages. This suggests effort may have been displaced to other areas within these rectangles following the introduction of management measures. Overall, effort days and number of voyages for vessels using mobile trawls in all rectangles decreased, highlighting that other factors are probably driving changes in effort.

Evidence from key informant and case study interviews suggest that effort is not expected to decrease significantly, but there is likely to be a shift to other grounds outside the MPAs. Mobile trawls tend to fish in more localised grounds compared to mobile dredges which travel longer distances between sites. Interviews with skippers indicated that trawl vessels had been displaced only from one MPA, compared to dredging vessels that were displaced from more than one MPA. Most skippers of mobile trawl vessels interviewed in the South Arran MPA were concerned about the loss of grounds during the winter months, even though a mobile trawl derogation is in place for vessels of less than 120 gross tonnage enabling year-round access to 62% of the protected habitat. The loss of winter grounds was less of a concern in relation to the East Mingulay SAC which supports a summer fishery and the Wester Ross MPA which has derogations in place for mobile trawls.

Box 3: Displacement of mobile trawl

East Mingulay SAC

- A skipper of one *Nephrops* fishing vessel stated that their gross income had reduced by £60K (landed value) over the summer months (June/July and August). This business has changed vessels making comparisons of income between years challenging. The analysis of landings data, however, showed no notable change in the value of landings of *Nephrops* between the two vessels.
- The skipper stated that the grounds lost to this vessel have high quality, larger prawns over the summer months. The skipper indicated that higher (larger) quality *Nephrops* tended to earn £2-2.40 per kg more than smaller ones.

South Arran MPA

- The South Arran MPA case study found that trawler vessels fished around 5-6 weeks a year in the area affected by management measures, mainly in poor weather during winter months. The affected area is estimated to have historically accounted for around 10-15% of a vessels' winter income. This report was undertaken prior to the winter season, and landings data was not available to verify these claims.

A number of interviewees were concerned about the introduction of management measures in other MPA sites, particularly restrictions to fishing in the Small Isles MPA and the Sound of Barra SAC where a number of skippers suggested they catch between 10-20% of their annual landings.

c) Static gears

Only two of the six rectangles with MPA management measures restricting use of **static gear** had a decrease in effort days and voyages. The other rectangles with management measures had small increases in activity. This suggests vessels displaced by the management measures increased effort in parts of the rectangles that remain open to fishing. Overall, however, effort days and voyages using static gear in all rectangles have decreased slightly, indicating there may be other factors driving changes.

Some key informants suggested there had been an increase in static gear activity where MPA management measures exclude mobile gears. They suggested the number of creels in the MPAs had increased, especially in the South Arran MPA. The case studies found no evidence of any noteworthy increases in the number of creels being used by static vessels in any MPA. The case studies found one new creeling vessel operating in an MPA. Further discussions found that the new vessel was operated by a trawler fisher who previously worked on a trawling vessel, but due to an accident was unable to continue, so purchase this new static vessel to work pots and traps. The case studies also found that static vessels operating inside the South Arran MPA are moving their gear from shallow to deeper waters within the MPA because of reduced interactions with mobile vessels (see Box 4 for more information).

One static vessel using mostly pots and traps had deployed gill nets to target crawfish (*Panulirus spp*) in the St Kilda SAC during a two month period over the last two years. It was suggested that around £20k was earned from these grounds from both pots and gill nets. Because of the management measures, steaming to these distant fishing grounds is no longer economically viable as gill nets cannot be deployed and as a result the owner stopped fishing in this area. The owner indicated this had not undermined overall business viability and suggested that the vessel will shift its effort to focus solely on pot and trap fishing in other grounds.

Box 4: Changes in Static effort in the South Arran MPA

There have been reports of a significant increase in static effort since management measures came into effect in the South Arran MPA. Data collected from case study interviews found limited evidence to support this. The South Arran MPA case study found that:

- One new static vessel started fishing in and around the South Arran MPA because of an accident which limited the crews' ability to work on the family trawler. This new vessel fishes 290 *Nephrops* pots and 15 lobster pots.
- None of the skippers interviewed using static gear reported an increase in effort within the MPA. Instead they reported that gear had shifted from shallow to deeper water. One mobile skipper said he had heard of a static fisher leaving the MPA because of gear saturation though there is currently no evidence to support this claim.
- Interviewees suggested lobster effort is now more concentrated in inshore grounds because of the restrictions on static gear in three areas inside the South Arran MPA.

Static fishers were of the view that:

- The management measures are of benefit to vessels using static gear as they can be more flexible in how they fish without the risk of losing gear to mobile vessels.

Some skippers of vessels using static gear stated they were likely to stay south inside the MPA because unlike previous years they will not be displaced to other grounds. It was suggested this will reduce their fuel costs and improve business profitability.

4.1.3 Fish landings by ICES rectangle

The live weight of landings of key species likely to be affected by MPA management measures do not show significant changes in 2016 relative to the comparable period in 2015³. Month by month, total landings of *Nephrops* in 2016 exceeded 2015 levels with the exception of September⁴. Similarly, monthly landings for king scallops in 2016 exceeded 2015 levels, with the exception of August and September. Overall the cumulative landings of queen scallops up to September 2016 exceeded landings for the same period in 2015. Seasonal patterns in landings for both *Nephrops* and king scallops are comparable between 2015 and 2016. However, for queen scallops the seasonal distribution in 2016 is different to that in 2015. There is no reason, at this stage, to believe that this change is due to the introduction of MPA management measures.

Landings by ICES rectangles show that only two of the nine rectangles with measures affecting the use of mobile trawls had a decrease in *Nephrops* landings. Five of the rectangles with MPA management measures restricting dredging had a decrease in king scallop landings. There are two main rectangles that account for queen scallop landings and both saw an increase in live weight landed. While landings of *Nephrops* and king and

³ 2016 data is not officially published data and has not been finalised – see methodology section.

⁴ Possible that data for these months is still incomplete – see methodology section

queen scallops decreased in some rectangles with out MPA management measures, these do not account for large amounts of landings of these species.

Qualitative evidence from key informant interviewees and case studies suggests there have been no decreases in fish landings attributable to the introduction of MPA management measures. Some fishing industry interviewees suggested changes in landings were likely to be seen in future as increased pressure on stocks outside of the MPAs starts to affect sustainability and ultimately catches. This was also the view of one seafood processing business. Marine Scotland will undertake further monitoring of fishing activity and fish landings to test this hypothesis.

4.1.4 Fish landings by district

Five districts experienced decreases in *Nephrops* landings in 2016 relative to 2015 for the period January to September. These include Anstruther, Fraserburgh, Lochinver, Peterhead and Scrabster. Of these districts, only Lochinver appears to have significant landings. Relative to the location of MPAs and fishing grounds, the decrease in landings in these districts could be associated with management measures introduced in the Wester Ross MPA. Case study evidence, however, suggests that the Wester Ross MPA would not have affected *Nephrops* landings because the site had derogations for *Nephrops* trawling. Hence, observed changes in landings in Wester Ross may be due to the nomadic nature of vessels rather than MPA management measures.

From January to September, king scallop landings in four districts decreased between 2015 and 2016. These were Buckie, Lochinver, Oban and Ullapool. Of these four districts, Oban is the only one that has a high volume of king scallop landings. The key informant interviews suggest that changes in landings could be associated with displacement from Loch Sunart to the Sound of Jura MPA. As mentioned previously some parts of the Loch Sunart to Sound of Jura MPA should have opened on the 1 October 2016. However this was delayed until 31 December 2016 due to an industry-led voluntary closure. Ayr was the only district that received notable landings of queen scallops and these increased between 2015 and 2016. To date there is no evidence that MPAs have affected overall landings of queen scallops. The data suggests a spatial redistribution on landing patterns across districts.

4.1.5 EMFF measures

Key informant interviews and case studies sought to establish if vessels were implementing other practices, besides the spatial redistribution of effort, to mitigate the impacts of MPA management measures. Four vessels sought assistance from the European Maritime and Fisheries Fund (EMFF) to support diversification of fishing activity. All applicants who previously operated mobile dredgers were awarded grants to facilitate diversification of their fishing operations. In two cases this was to adapt their vessels to operate static gear, and for the other two cases this was to adapt their vessels and retrain crew for scallop diving. The resulting change in effort has not been measured

in this report as these vessels were finalising this process and were not operational at the time of survey.

Outside of these vessels, there was no evidence of other vessels changing fishing gear since the introduction of MPA management measures. Some key informants suggested that vessels with the capacity to operate both static and mobile gears are likely to have reduced the amount of time they fished with mobile gear. Nonetheless, no evidence was found to support this during case study interviews.

4.2 Other Marine Users

Key informant interviews provided information on how other marine users were interacting with MPAs, and whether they were positively or negatively impacted by management measures introduced when protected areas were designated or the additional measures in February 2016. Other marine users included the aquaculture industry as well as different tourism sectors. Details from key informants were supplemented with evidence from case studies where interviewees suggested there had been some impact. The impact of MPA management measures on these sectors is discussed below.

4.2.1. Aquaculture

None of the key informants expressed concerns about the impact of MPA management measures either from designation or the additional fisheries management measures on current aquaculture operations. There were some concerns from the aquaculture industry that insufficient survey data for protected habitats could affect future expansion and investment plans. Aquaculture stakeholders also felt the introduction of more restrictions on MPAs might put pressure on the industry if there are perceptions that their operations threaten the conservation status of MPAs.

4.2.2 Tourism

Key informants stated that marine related tourism – either in the form of new start-ups or level activity, had not changed since the introduction of the MPA management measures. The general message is that it is too early to see any changes in marine tourism activity linked to MPAs.

Ten of the eighteen key informants pointed out a number of tourism related plans and projects across different communities to take advantage of MPAs. A number had already been submitted for consideration for funding. It was expected that new tourism projects would be implemented from Spring 2017. Box 5 summarises some of these projects.

Box 5: Tourism plans and project development

- Snorkel trails have been mapped in and around the Wester Ross MPA. Twelve volunteers from the local community have been trained to run snorkel tours for tourists, local school groups and community members from spring 2017.
- National Trust Scotland has launched a website which links National Trust properties and estates to MPAs and other marine conservation sites. This can be viewed [here](#).
- The Arran Marine Activities Centre has a two-phase development project to construct a hub for marine related businesses (marine tourism, seafood catering, seafood cooking courses) and a Family Discovery Centre which will include interactive exhibition spaces, a coffee shop and education facilities. Both aim to raise awareness about marine life in the South Arran MPA and marine industries associated with the area. At the time of interview, the project had identified a site for the development and has submitted a planning application. Fifty percent of the funds for phase one have been raised and the remainder is subject of a funding application. A proposal is in place for the second phase, with plans to raise £1 million capital for the build.
- One project, a collaboration between the local community groups and the Arran Access Trust, proposes to construct education and information boards on the South Arran MPA, along the “Arran Coastal Way”.
- The North Isles (Orkney Isles) Landscape Partnership Scheme has bid for funding from the National Lottery to develop a virtual interpretation and MPA dive experience facility. This is a collaboration between Orkney Council (lead), Scottish Natural Heritage, Royal Society for the Protection of Birds, Highlands Island Enterprise and Orkney College.
- The diving communities on the Isle of Mull and Oban have met to develop a marketing strategy on the back of the Loch Sunart to Sound of Jura MPA.

4.3 Wider Socioeconomic Impacts

4.3.1 Seafood Processing

A number of processing facilities in the Western Isles, Highlands and mainland Scotland are dependent on local fishing fleets and the seafood they land into local ports. Some processors reported that they had not experienced any decline in the supply of seafood raw materials following the introduction of MPA management measures because they had managed to source raw material from vessels working in other areas of Scotland. One processor suggested, however, that MPA management measures had impacted on the size composition (shift from larger to smaller animals) and the quality of raw materials. Generally, processors were concerned about the sustainability of fishing grounds outside the MPAs and potential for negative impacts on future supplies.

For example, one processor pointed out that the size composition of landed *Nephrops* had changed during the summer months due to local vessels no longer having access to some grounds because of MPA management measures. This impacted on the supply of high value catches during the months of June, July and August. The processor

suggested this loss in grounds was estimated to be worth around £100,000 in fish landings for local vessels and £300,000 in processing factory revenues. Another processor stated that around 5% of their annual intake of king scallops came from the Wester Ross MPA. Whilst this is now being caught in grounds outside of the MPA, they were concerned about long-term sustainability of grounds outside MPAs.

Key informants for the seafood processing sector suggested that confidence in the viability of the sector has been impacted because of the fisheries restrictions in MPAs which could affect the supply of raw material in the coming years. This was of particular concern for king scallop processors in the Western Isles where employees are also becoming concerned about job security. This is important for remote areas where seafood processing provides significant employment.

4.3.2 Community involvement

There is a range of community groups linked to different MPAs. The Community of Arran Seabed Trust (COAST) linked to the South Arran MPA is one of the well-established groups. New groups are also emerging in respect to other MPAs. These include Sea Change which is linked to the Wester Ross MPA, and the Community Association of Lochs and Sounds (CAOLAS) – a social enterprise linked to the Loch Sunart to Sound of Jura MPA. CAOLAS consists of eight committee members and has around 100 names registered with the association. There are two other community groups working on terrestrial programmes (conservation and business development of rural estates) that indicated they are exploring links to MPAs through local programmes under development by other MPA community groups.

For the well-established groups, the implementation of the MPA management measures resulted in a shift of focus from lobbying for change to raising awareness in the local communities together with promoting opportunities for businesses and recreation in newly established MPAs. This has included:

- meetings with different community members/business sectors;
- developing programmes that offer communities and young people the opportunity to interact with MPAs;
- raising funds (Big Lottery, Esmee Fairbairn Foundation and private sector);
- producing interpretation facilities; and,
- promoting the potential for citizen science.

A short [film](#) has been produced to raise awareness of the Wester Ross MPA. CAOLAS is running a series of environmental talks on marine wildlife over the winter months regarding the Loch Sunart to Sound of Jura MPA to raise awareness in local communities.

Well-established community groups stated that they were focused on marine sustainability (environmental, social, and economic sustainability) and were inclusive of all sectors which embody these principles. COAST has jointly developed scientific

research proposals for the South Arran MPA in collaboration with the University of Glasgow, Herriot Watt University and the University of York. A PhD application has been submitted for funding with The University of Edinburgh and the Scottish Association for Marine Science (SAMS) which if successful will focus on MPAs.

At the time of interviews no funds or applications associated with MPAs had been received by any Fisheries Local Action Groups (FLAGs) for the Community Led Local Development (CLLD) fund of the European and Marine Fisheries Fund (EMFF) though some of the FLAGs were still to seek applications at the time of this study.

4.3.3 Other marine/coastal developments

None of the key informants suggested that the introduction of MPA management measures was affecting broader marine or coastal developments. The key informant representing ports and harbours suggested there was no evidence of any impacts on the sector from either from protected area designation or the new fisheries measures. There was concern, however, that the conservation status of MPAs might impact on ongoing maintenance, operations or expansions in the future.

Two key informants stressed that it was too early to gauge the impact of MPAs on wider marine and coastal developments. It is believed that in most cases impacts will be a cumulative results of past, current and future activities/limitations, associated with management restrictions in the marine environment including MPAs. One key informant raised concerns that in future renewable energy developments in the vicinity of MPAs may be affected, for example the testing of wave and tidal devices.

4.4 Looking Ahead

Key informants and other stakeholders were also asked about expected future impacts and opportunities likely to emerge following the introduction of MPA management measures.

4.4.1 Anticipated future impacts of current MPA management measures

Key informants in favour of MPAs believe that there are a range of opportunities, including for the scallop diving industry, static gear fishing, community involvement and co-management, tourism (see Box 6), recreational diving, sea angling, marine-based sports, environmentally friendly marketing/branding and scientific research. Key informants who were not supportive of MPAs highlighted similar opportunities - potential benefits for tourism; static gear fishing; recreational diving; and, environmentally friendly marketing/branding. They were, however, sceptical about the scale of these opportunities, and most pointed to the seasonal nature of some of the sectors that might benefit.

Four of the eighteen key informants who were interviewed were very keen to stress that the main opportunities were in the protection and recovery of the marine environment. Any additional socioeconomic benefits would take time to be realised and these should

not be the focus for measuring MPA success. Interviewees stressed the importance of monitoring ecological benefits from MPA management measures to gauge the impacts of this policy and that the socioeconomic benefits should be viewed as additional benefits.

Box 6: Recognising tourism opportunities for MPAs through a healthy environment

The majority of key informants said that they felt it was too early to evaluate the potential change to tourism or to fully comprehend tourism opportunities linked to MPAs. Many discussed opportunities for the future with mixed opinions on the tourism activities that might be associated with MPAs. Some pointed out that the main attraction for tourists to the West Coast of Scotland is the scenery (land and seascapes) and wildlife, and that MPAs contribute to the conservation of nature and wildlife. Others felt MPAs are unlikely to deliver many additional benefits to the tourism industry, beyond their role in protecting and conserving the marine environment.

4.4.2 Future Prospects on long term viability of fishing industry

There was no widespread evidence of impacts on the long-term viability of marine businesses as a result of the introduction of MPA management measures with the exception of one fishing business (section 4.1). Key informants and case study interviewees expressed concern about the cumulative impacts of wider marine environment management measures which restrict the way businesses operate, and highlighted that the MPA management measures were adding to the pressures on the fishing industry. Some key informants suggested that business confidence for industries directly dependent on marine resources has been impacted by MPA management measures, and that this needs to be closely monitored in future. This was of particular concern to the seafood processing sector.

5. Conclusions and Next steps

5.1 Conclusion

The analysis of fishing activity and fish landings data, together with evidence from key informant interviews and case studies found no evidence, at the Scotland level, of significant positive or negative socioeconomic impacts linked to MPA management measures introduced in February 2016. This applies to the fishing industry, aquaculture, tourism, seafood processing and other marine and coastal developments. Data gathered and analysed for this report is consistent with the ex ante socioeconomic impact assessment conducted prior to the establishment of MPA management measures. Notwithstanding this, further monitoring is required over the next few years given the MPA management measures had only been in place for a very short period at the time evidence for this report was gathered.

At more localised levels, individual fishing vessels have been displaced from some fishing grounds to adapt to management measures introduced. With the exception of one vessel, all displaced vessels were still operating at the time evidence was gathered for this report. In the case of the vessel that stopped fishing, there is evidence to suggest business viability had been impacted by the introduction of the MPA management measures.

The fish landings and fishing activity evidence indicates that losses of fishing grounds within MPAs have largely been substituted by increased effort outside MPAs, or that the reduction in income has been small relative to annual variations in earnings for fishing businesses. Some concern was raised regarding the sustainability of stocks in areas outside MPAs where activity has increased because of displacement of fishing effort from MPAs. This will require ongoing monitoring.

Two vessels have stopped fishing (either sold or not replaced). There is, however, limited independent evidence to confirm that decisions to stop fishing with these vessels were linked directly to the implementation of MPA management measures, and not a result of other factors. Future monitoring of the activities of fishing vessels is required to ascertain if this remains a trend in the future.

MPA management measures appear to have had a benign impact on other marine users. The change in the composition of landings observed by seafood processing businesses requires monitoring as does the long-term viability of this sector, given the concerns about the importance of these businesses to some rural economies and island communities.

There is emerging evidence of possible future socioeconomic benefits at the local community level, with opportunities being explored in the tourism sector. Most of these opportunities are still in developmental stages, and it will take time to identify and measure the socioeconomic impacts of tourism activities linked to MPAs. One new group has been established to take advantage of opportunities linked to MPAs, and other

established groups are shifting their attention towards raising funds to invest in future developments around MPAs.

Overall, this report concludes that it is still too early to make confident judgements about the socioeconomic impacts of MPA management measures, and longer term monitoring is required. All key informants and case study interviewees agreed that it is too early to measure the impacts, as the various marine sectors are still adjusting to the restrictions and opportunities linked to the management measures. Many stakeholders stressed the need to monitor cumulative impacts which will take time to understand as marine users continue to adjust and respond to different constraints and opportunities, which may in turn impact on other sectors not directly linked to MPAs.

5.2 Further Monitoring

It is recommended that Marine Scotland should undertake a second review of the socioeconomic impacts of MPA management measures. This will focus on the four key sectors identified in this assessment as experiencing change, and to a lesser extent on the sectors that have so far not reported impacts linked to the MPA management measures. The four key sectors are:

- marine/commercial fishing
- onshore seafood processing
- tourism
- community involvement

Other sectors where less focus is required are:

- aquaculture
- ports and harbours
- coastal development
- renewables

To build on the evidence gathered for this report, there is need for further spatial analysis of changes in activity of marine-based industries and employment as a result of MPAs. Marine Scotland has established baselines (see Section 5.2.1) for activity of a number of the industries using Business Register Employment Survey (BRES) data and Marine Scotland's National Marine Plan interactive. Against these baselines, changes for these sectors will be explored in the future, together with their potential links to MPA management measures.

More broadly, there is a need to collect new data to accurately measure the impacts of MPAs. Marine Scotland and its partners propose taking an integrated approach to developing a long-term monitoring strategy that pays attention to all sectors and groups involved in MPAs, to understand the broad range of positive and negative impacts associated with MPA management measures. Marine Scotland is also exploring new methods of collecting data for assessing the impacts of MPAs. This work will explore the

range of options to integrate inshore fisheries data collection and ecological monitoring of MPAs.

5.2.1 Baseline Evidence for Future Socioeconomic Monitoring

This section focuses on the potential value the baseline data referred above using the Clyde and South Arran MPA. Marine Scotland established baselines for the location and levels of activity and employment in the period **before** MPA management measure came into effect. These baselines cover the whole of Scotland, and illustrative maps are presented in Annex 6 for the Clyde sea area and the South Arran MPA.

The first map (Annex 6) presents the percentage change in the number of people employed in registered businesses in three marine sectors (marine fishing, marine aquaculture and fresh water aquaculture) between 2012 and 2015 using BRES. Colour coding from red to green represents the areas that have seen changes, (red a negative change, green a positive change - grey means no change).

The third and fourth maps show the density (graded as low to high due to different scales) and locations of marine tourism and recreation activities. The third map shows the location and density of shore-based sea angling and boat-based sea angling. Assessing the locations and changes in densities of these activities in future will assist in making tangible links between changes in recreational activities which may be affected by MPAs. The fourth map presents a baseline for diving activity and shows the main dive sites in and around the South Arran MPA. A range of other marine based activities can also be mapped using the [National Marine Plan interactive](#).

5.2.2 Timelines for Future Work

It is recommended that a further review of the socioeconomic impacts of MPA management measures is undertaken in 2018. This will allow the first batch of MPA management measures to imbed, and give affected marine users time to adjust their operations. This timeframe will also allow other sectors such as tourism and local communities seeking to capitalise on opportunities provided by MPAs to develop and implement projects to a stage where socioeconomic impacts could be measurable.

In the meantime, Marine Scotland will continue with ongoing monitoring of socioeconomic impacts of MPA management measures between now and 2018 so Ministers can respond to any significant changes that may arise before 2018. Marine Scotland has proposed six indicators (Table 1) that it will use to track the socioeconomic impacts of MPAs which priorities two sectors: fishing and onshore processing, but also one indicators which tracks tourism. Data to monitor these six indicators is available and no additional resources are required beyond populating and updating the indicators regularly.

Table 1: Six key indicators for short-term monitoring prior to the second impact report in 2018

Indicators	Themes investigated by indicator				
	Data source	Fishing	Tourism	Community	Onshore Processing
1. Number of fishing businesses that have changed fishing gear due to loss of fishing opportunity because of MPA establishment.	FIN/Logs/EMFF	√			
2. Change in the number of vessels operating in the industry citing MPA establishment as the cause.	Fisheries Office	√			
3. Number of EMFF applications awarded for compensation/adaptation (e.g. funds for change to fishing gear) because of MPA establishment.	EMFF Database	√			
4. Change in volume and value of landing by sector/species/stocks from an area where MPAs are predominant.	FIN Database	√			
5. Number of new tourism businesses citing MPA establishment as the cause. Number of tourism businesses diversifying because of MPAs.	Local Authority/ Fisheries Office		√		
6. Change in supply of marine products to onshore processing from an area associated by an MPA.	FIN Database/ Fisheries Reps and Fisheries Office	√		√	√

Annexes

Annex 1: Overview of the management measures in each MPA/SAC

Sites	Fishing methods prohibited
Loch Laxford SAC; Noss Head MPA; Wyre and Rousay Sounds MPA.	Whole site: Demersal trawl, demersal seine net, beam trawl, and dredge
Sanday SAC; St Kilda SAC; Treshnish Isles SAC.	Whole site: Demersal trawl, demersal seine net, beam trawl, set nets, and dredge
East Mingulay SAC;	Whole site: Demersal trawl, demersal seine net, beam trawl, and dredge Zonal management: Creel fishing, set nets, and long lines (50% of site)
Lochs Duich, Long & Alsh MPA/SAC	Whole site: Beam trawl, demersal seine net, demersal trawl, and dredge.
Luce Bay & Sands SAC	Whole site: Beam trawl, suction dredge, demersal seine net, and demersal trawl. Zonal management: Mechanical dredge permitted in Jan, Feb, Nov, Dec each year.
Loch Creran MPA/SAC	Whole site: Demersal trawl, demersal seine net, pelagic trawl, set nets, long line, beam trawl, and dredge. Zonal management: Creel fishing
Loch Sunart to Sound of Jura MPA	Whole site: Beam trawl, suction dredge, demersal seine net, set nets, and long lines. Zonal management: demersal trawl without use of tickler chains, and mechanical dredge
Loch Sunart MPA/SAC	Whole site: Demersal trawl, demersal seine net, set nets, long line, beam trawl, and dredge.
Loch Sween MPA	Whole site: Beam trawl, suction dredge, demersal seine net, demersal trawl and mechanical dredge by vessels greater than 75 gross tonnage. Zonal management: Hand gathering, demersal trawl and mechanical dredge by vessels less than or equal to 75 gross tonnage
South Arran MPA	Whole Site: Beam trawl, dredge, demersal seine net, and demersal trawl by vessels greater than 120 gross tonnage. Zonal management: Demersal trawl by vessels less than or equal to 120 gross tonnage. Creel fishing, set nets, and long lines
Upper Loch Fyne & Loch Goil MPA	Whole site: Beam trawl, dredge, demersal seine net, and demersal trawl by vessels greater than 75 gross tonnage. Zonal management: demersal trawl by vessels less than or equal to 75 gross tonnage. Creel fishing, set nets, and long lines
Wester Ross MPA	Whole Site: Beam trawl, dredge, demersal seine net, and demersal trawl by vessels greater than 500 kw engine power. Zonal management: Demersal trawl by vessels less than or equal to 500 kw engine power

Annex 2: Key Informants Invited for Interview

MPA /SAC	Area	Stakeholder group
Wester Ross Lochs Duich, Long and Alsh Small Isles East Mingulay Loch Laxford and Noss Head	1. Highlands 2. North West 3. Western Isles 4. Western Isles 5. Uist	Local Council IFG Local Council Fisheries Association Processor
Loch Crean Loch Sunart to the Sound of Jura, Treshnish Isles, Loch Sween, Upper Loch Fyne and Loch Goil	1. Argyll and Bute 2. South West 3. Clyde 4. Ardtornish 5. Mallaig	Local Council IFG Fisheries Association Community Group Fisheries Association
South Arran Lune Bay and Sands Upper Loch Fyne and Loch Goil	1. Loch Fyne 2. Islay 3. Arran 4. Dumfries	Processor Processor Environmental NGO Local Council
Wyre and Rousay Sounds Sanday	1. Orkney 2. Orkney	Local Council Fisheries Association
All MPAs/SAC	1. Whole West Coast 2. Whole West Coast 3. Whole West Coast 4. Whole West Coast 5. Whole West Coast 6. Whole West Coast 7. Whole West Coast 8. Whole west Coast	Environment NGO Environment NGO Fishing Industry Fishing Industry Shellfish Association Aquaculture Fauna and Flora Environmental NGO

Annex 3: Key Informant Interview Questions

Introduction

1. How have you or your organisation been involved in MPAs in Scotland?
2. Whilst this interview is focused on the potential impacts of the management measures I would like to get your views on the implementation process of the MPAs and how the current management measures are working?
3. What opportunities do you see for different groups because of MPAs?
4. Are you aware of any new activities, plans, projects or changes to existing activities that have emerged in your area following the introduction of MPA management measures? If yes, please specify.
5. Do you know if there are any people seeking funding to respond to opportunities or threats because of MPAs?
6. Are you seeing any evidence of local businesses in your area that are being adversely or positively affected by the introduction of MPA management measures? If so, can you please specify the types of businesses and how they are being affected.
7. Are there any groups or sectors where evidence is emerging which suggest that their long term viability/future is being affected by the introduction of management measures.

Fisheries

8. Have you observed or are you aware of any fishing vessels that use to operate from your area that have relocated elsewhere following the introduction of MPAs? If so, can you give details (what they caught and where they have located to).
9. Have you observed or are you aware of any vessels or fishing crew (skippers, engineers, deckhands) in your area that have left the fishing industry as a result of the introduction of MPA management measures? If so, can you give details (what they caught and where they have re-located to).
10. Have you observed or are you aware of vessels operating in your area that have had to change their gears following the introduction of MPA management measures? If so, can you give details (what they caught and what gear they have changed to).
11. Have you observed or are you aware of vessels operating in your area that have had to change, significantly, the way they run/manage/operate their businesses following the introduction of MPAs management measures. If so, can you give details of how they have change the way they run/manage/operate their business.
12. Have you observed or are you aware of vessels operating in your area that increased or plan to increase their fishing activity following the introduction of MPAs?

Onshore Processing

13. Have you observed or are you aware of any significant changes in fish landings in your area following the introduction of MPAs? If so, can you specify the changes.

14. Have you observed or are you aware of any significant changes in your area to onshore activities linked to fishing following the introduction of MPA management measures. If so, can you specify (which sectors are being affected and how?)

Tourism and Recreational Activities

15. Have you observed or are you aware of planned changes to tourism and recreation related businesses in your area that may be linked to the introduction of MPA management measures?

16. Have you observed or are you aware of plans for new tourism and recreation business start-up related activities that may be linked to MPAs?

Other Industries

17. Have you observed or are you aware of any changes or impacts to the aquaculture industry in your area that may be linked to the introduction of MPA management measures? If so, can you specify the changes.

18. Have you observed or are you aware of any changes or impacts to coastal development proposals or projects because of the introduction of MPAs? If so, can you specify the changes.

Annex 4: Case Study Interviewees

MPA /SAC	Location	Stakeholder group
Wester Ross MPA	Western Isles Western Isles Ullapool Western Isles Ullapool Ullapool Achiltibuie Ullapool Gairloch Achiltibuie Ullapool Ullapool	Mobile Fishing Mobile Fishing Mobile Fishing Static Fishing Community/NGO NGO Community Aquaculture Fisheries Trust Sea angling Fisheries Association Ports and Harbours
East Mingulay SAC	Barra Barra Barra Barra Barra Barra	Mobile Fishing Mobile Fishing Mobile Fishing Static Fishing Community Onshore Processing
South Arran MPA	Troon Carradale Campbeltown Tarbet Tarbet Campbeltown Carradale Arran Arran Arran Arran	Mobile Fishing Mobile Fishing Mobile Fishing Static Fishing Static Fishing Static Fishing Static Fishing Static Fishing Tourism Community Aquaculture

Annex 5: Case Study Interview Questions

Tourism Development

1. Why do tourists come to [site]? What are the main attractions?
2. How does tourism vary over the year/seasons? What are the main drivers for this change?
3. What are the range of facilities on offer to tourists in [site]?
4. What are your key concerns about the sustainability of [site] and its communities?
5. What does the [... MPA/SAC] contribute to tourism in [site]?
6. Have there been any changes to tourist activities or businesses since the [... MPA/SAC] was established?
7. Can you show me areas where tourism has expanded in or around the [... MPA/SAC]? Are there any areas of concern? If so what are the concerns? (MAPS)
8. Are there any plans to develop [site] tourism sector because of the [... MPA/SAC]?
9. How do you see local communities benefiting from tourism development on [site]? Do you see any adverse impacts from this development?

Community Involvement

1. Can you tell me about this community group/the community groups you work with and how it/they were formed?
2. How did they join or how were members recruited?
3. What was the main motivation for establishing this/these group(s)?
4. What elements of MPAs are of most interest to your/this local group?
5. How does the group function? How do you meet/coordinating activities and how often would this be?
6. What activities have the group already undertaken that are associated with MPAs?
7. What plans agreed by the group do you have in place that are associated with the MPAs?
8. Do you have other marine based issues/areas of interest/activities that this/these group(s) work on?
9. Have you got or are you applying for any funding to support your/the community group(s) activities because of MPAs? If so, who are you applying to?
10. Can you show me areas where the community/ies work and areas where you/they see potential opportunities or issues in the [... MPA/SAC?] (MAPS)

Aquaculture

1. Please can you give me some background to this aquaculture site? How long has it been established? How many people work here?
2. Do you have any concerns with regards to the viability of this site in this area?
3. Do you have any concern regarding the [... MPA/SAC] and its interactions with aquaculture?
4. Are there any planning applications submitted to extend or expand the capacity of this site?

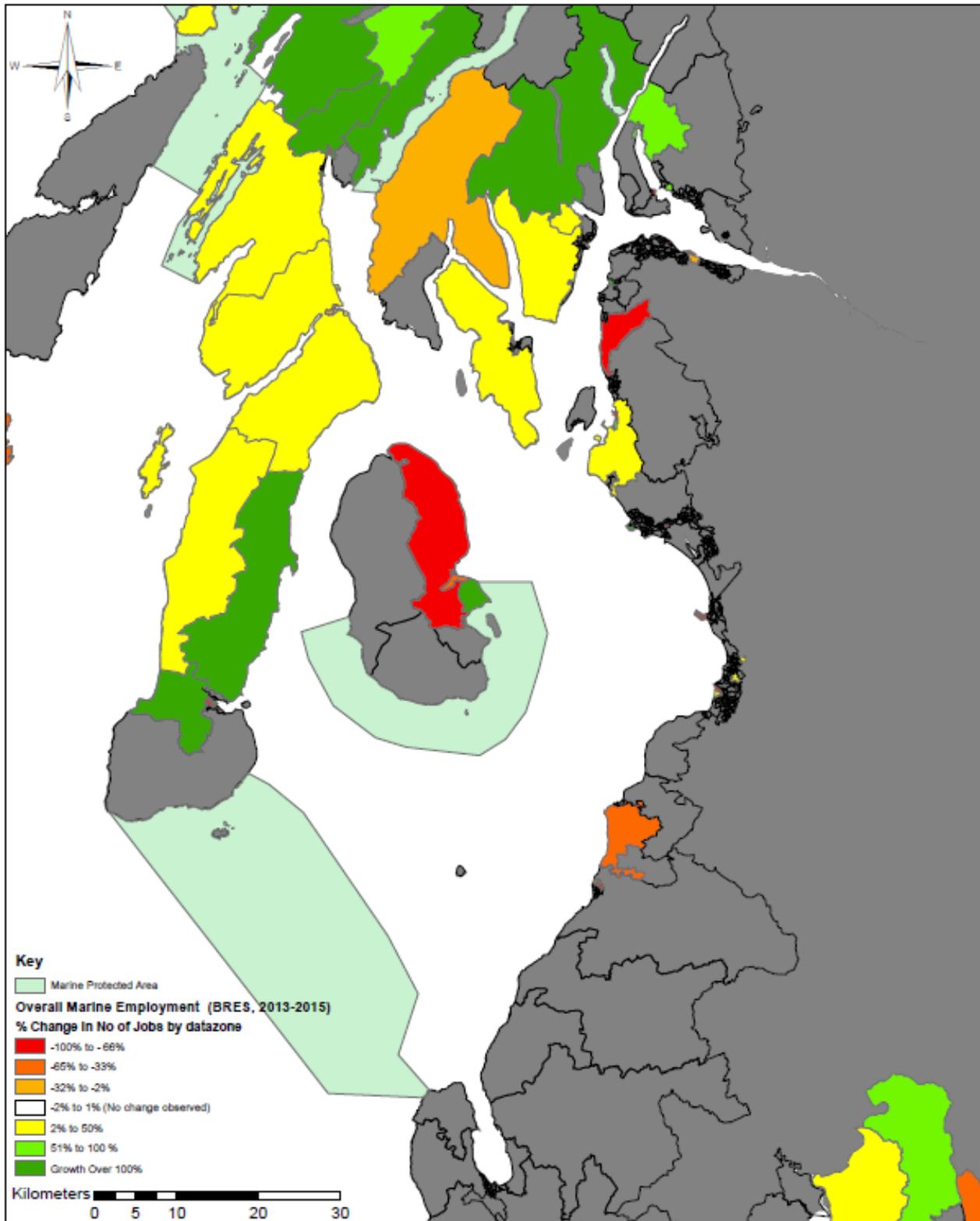
5. Are there any development plans in progress that have yet to be submitted?
6. Do you have any concerns with this or any proposed applications because of the MPA/SAC?
7. Have you experience any benefit because of the MPA/SAC?
8. Have you experience any negative impacts because of the MPA/SAC?
9. Have you made any changes to your business operation or practises because of MPA/SAC? If no, will you need to in the future?

Onshore Processing

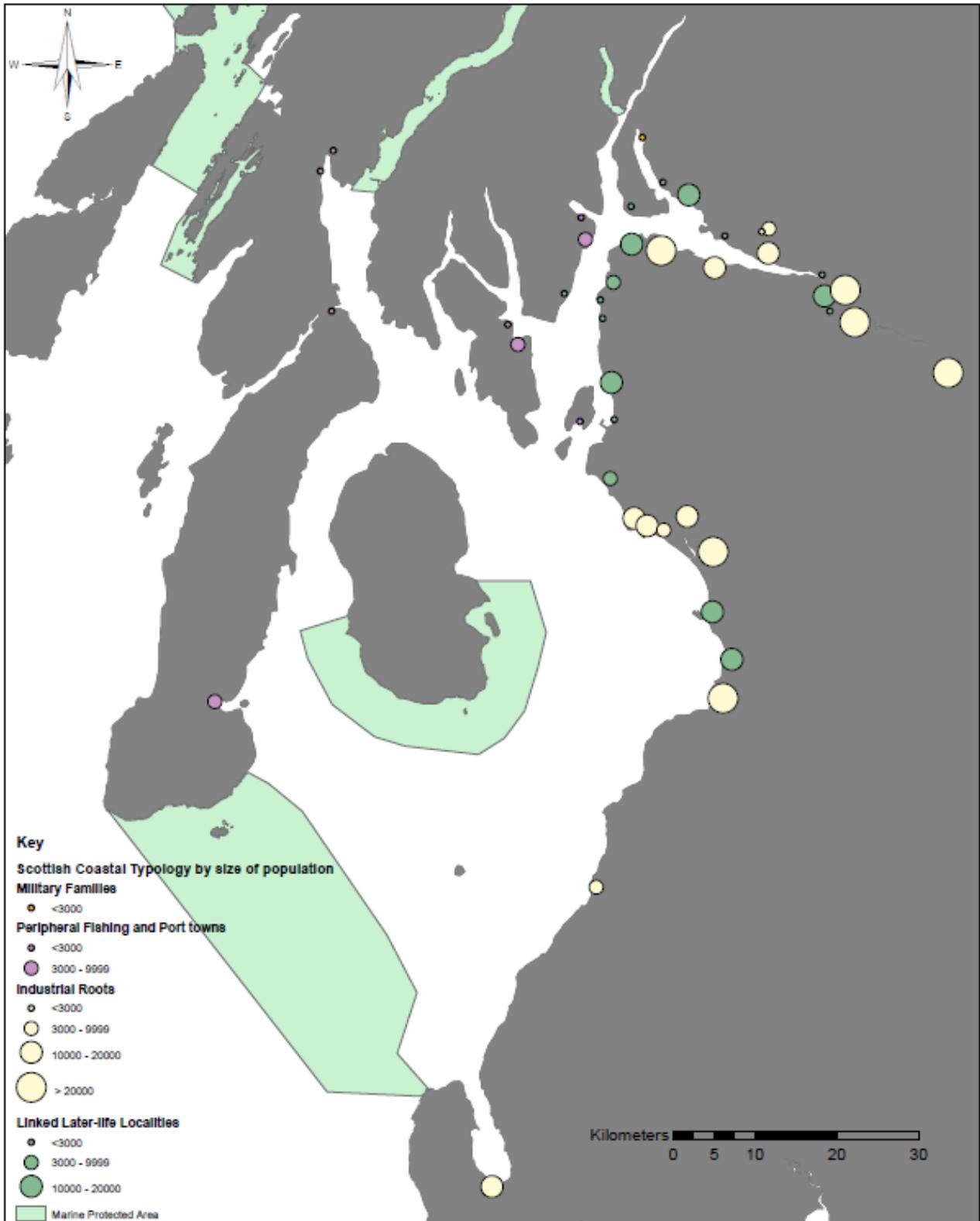
1. Can you please give me some background to this company? How long have you been at this site? How many people work here?
2. What is the annual turnover of this company? What markets do you supply? Can you give a breakdown of species you process and how much they contribute to your annual turnover?
3. Do you have any general/broad concerns with regards to the viability of this site/company?
4. Since the introduction of the management measure in South Arran/Wester Ross/East Mingulay MPA(s) have you seen a change in the through put of your business?
5. Have you made any changes to your business operation or practises because of the management measures? If no, will you need to in the future?
6. Where else could you source raw product for your processing facilitate should local supply decrease or change?
7. How many vessels do you purchase finfish/shellfish from? Does the company own or have shares in any of these vessels?
8. Were you involved in the consultation process for MPAs in Scotland? If so, how?
9. Have the introductions of the MPAs changed your businesses future plans? If so what are the driver of these changes?

Annex 6: Baseline Assessment of Other Marine Users

Clyde Region
3 Year Change (%) in Overall Marine Employment
by Scottish Dataszones (2001) in coastal region
(Buisness Register and Employment Survey 2013 - 2015)



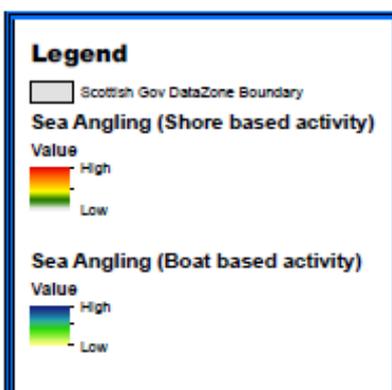
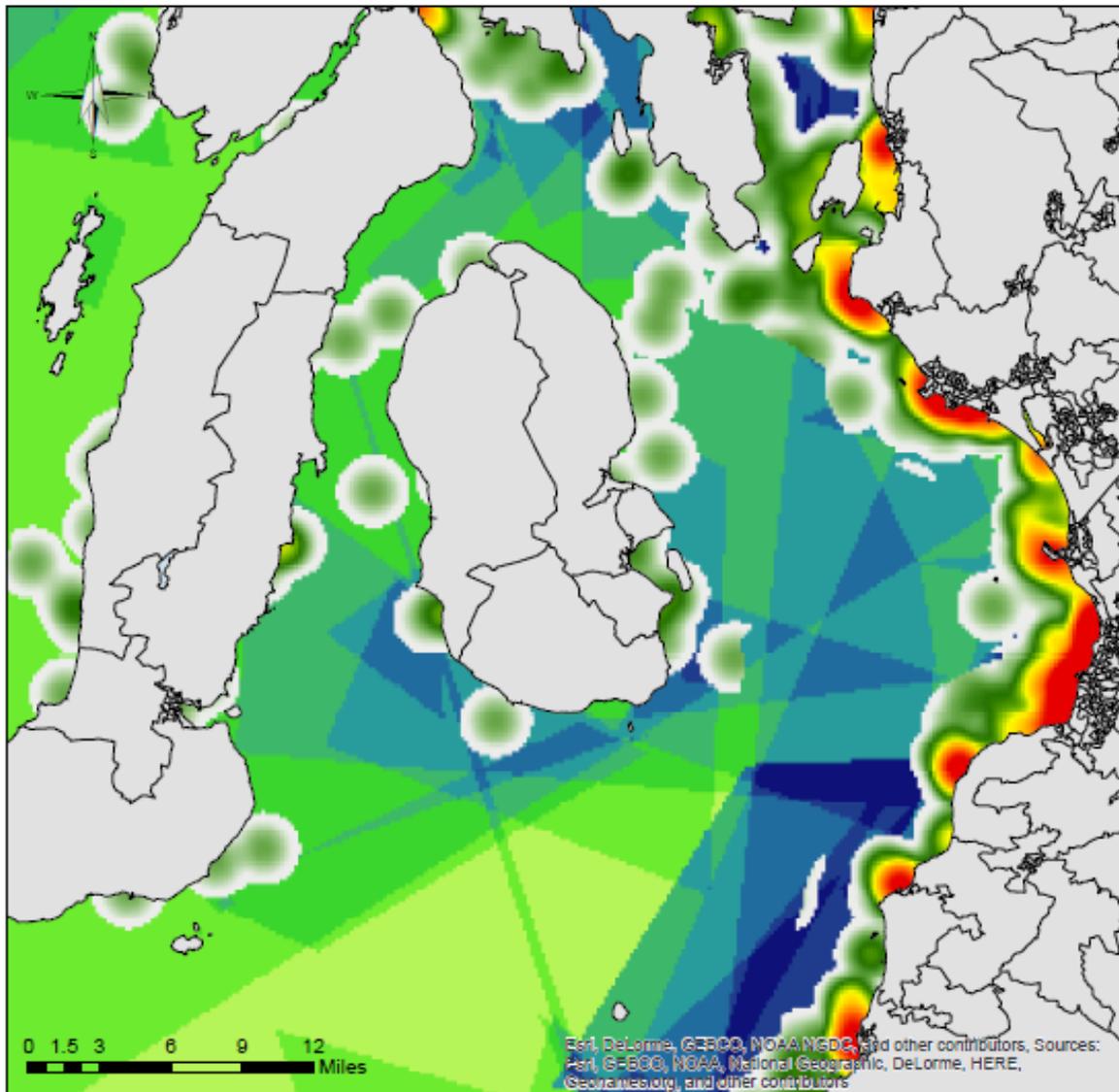
Typology of Scottish Coastal Towns
 (Scottish census 2001, 2011)
 Clyde Region
 Source: Duffy (2017), University of St Andrews



South Arran MPA

Marine Scotland's Recreation and Tourism Survey 2015

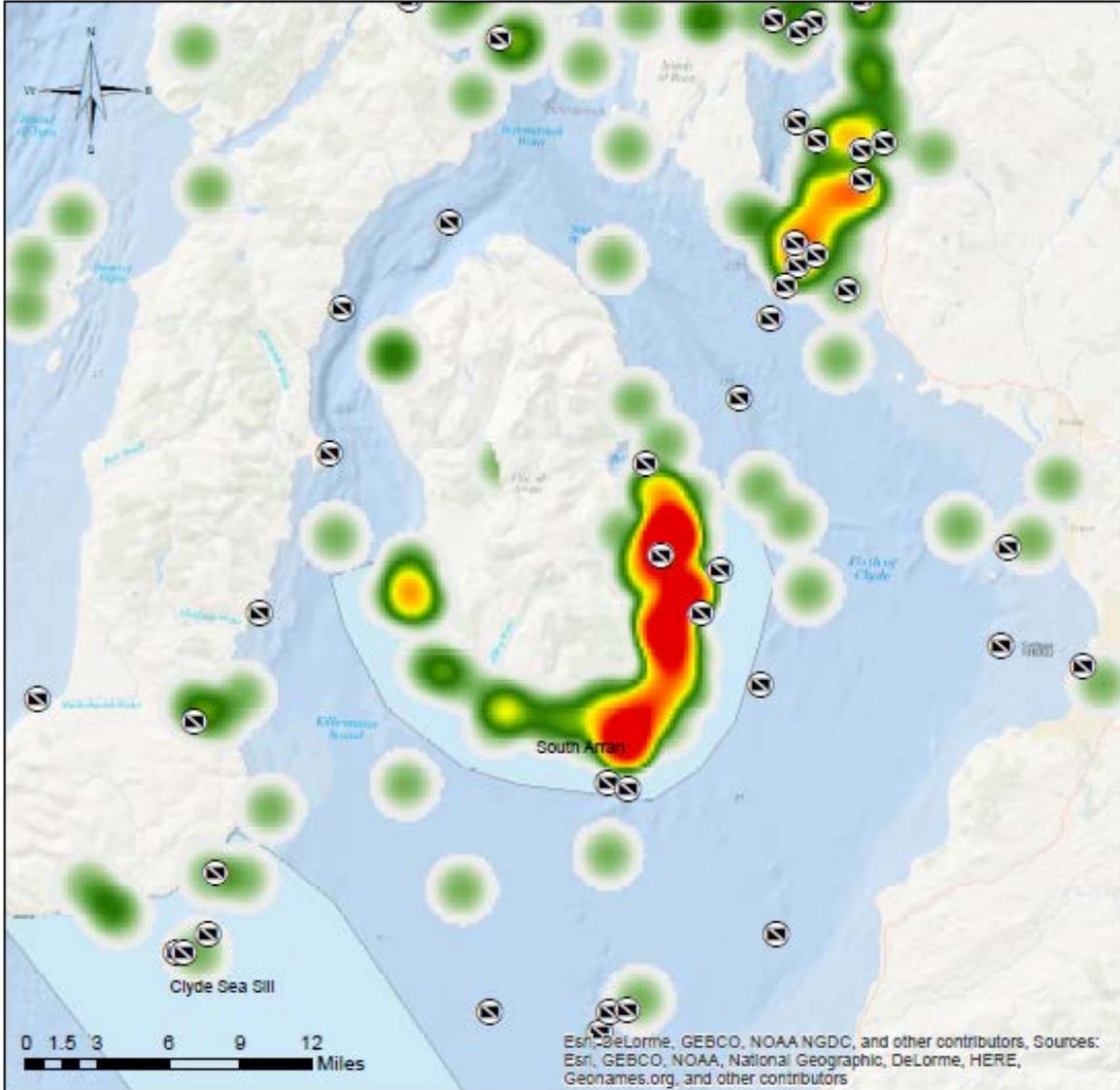
Sea Angling Activity



South Arran MPA

Marine Scotland's Recreation and Tourism Survey 2015

Scuba Diving Activity and Sites



Annex 7: Analysis of Fishing Activity Data: Detailed Methodology

Data used in fisheries analysis was obtained from IFISH, the UK fisheries data warehouse. IFISH provides information on sea fishing activity, landings and sales.

Voyage and landing information is supplied by skippers. Vessels over 10 metres are required to maintain logbooks or e-logbooks and provide landings declarations under European Union (EU) legislation. Vessels of 10 metres and under are not required to provide this information under EU legislation but in Scotland, these vessels provide the information on FISH1 forms whereas in the rest of the UK, the data is submitted voluntarily by the skippers and is supplemented with sales data from the Register of Buyers and Sellers.

Data on *Nephrops*, king and queen scallop, landings into Scottish ports by UK vessels apportioned equally to where the fishing activity was declared within ICES area VI.a and rectangles 38E4, 38E5 and 38E6 in ICES area VIIa (see figure 2) were analysed for this report. This area of fishing grounds was analysed as it is associated with the majority of MPAs on the West Coast and *Nephrops*, king and queen scallops, were thought to be the landings most likely to be affected by management measures. It is, important to note that the queen scallop fishery can fluctuate naturally so changes observed in the data may be due to natural variations in that fishery.

The number of effort days and the number of voyages were analysed to see if there was any difference in fishing patterns since management measures were implemented. The number of effort days for UK vessels are calculated using voyage data from logbooks to determine the time spent fishing with each gear type and in each ICES rectangle. Landings are apportioned to each rectangle based on the number of fishing days declared in each, and as such, landings by ICES rectangle may not be a true reflection of what was actually caught in each rectangle. Furthermore, ICES rectangles are self-declared and hence subject to errors.

ICES rectangles are 30 square nautical miles and much larger than the area of an MPA. The rectangles that are estimated to be affected by MPA management measures were determined from information in two Marine Scotland reports:

1. [Simple guide to fisheries management measure in Marine Protected Areas](#)
2. [Inshore MPA / SAC management Socio-economic and non-monetary assessment - 2015 Report](#)

The analysis of fishing data covered years 2015 and 2016. The data on effort days, number of voyages and live weight of landings was analysed by month of landing, the ICES rectangle fishing activity was declared in gear type. Fishing gears were grouped into five main categories for analyses; mobile trawls, mobile dredges, mobile other, static traps and static other. When making comparisons between the years, only the data from January to September for each year was analysed as 2016 is not a complete year.

It is important to note that 2016 data is not officially published at the time of this report and has not been finalised. Data for 2016 has not been through the full quality check process to ensure its accuracy and therefore is subject to change. The main issue for the quality of the statistics is the completeness of information in the administrative system. The entry of information into the relevant administrative data base for catches of fish species not subject to quota can often take months and for this reason 2016 data is not complete. A further issues is that information was supplied by the fishermen on their activity and catch and has not been subject to quality checks. In conclusion, information on fisheries data analysed in connection with this report should be considered indicative at best and defining conclusions or policy decisions should not presently be based on this analysis.



Scottish Government
Riaghaltas na h-Alba
gov.scot

© Crown copyright 2017

OGL

This publication is licensed under the terms of the Open Government Licence v3.0 except where otherwise stated. To view this licence, visit nationalarchives.gov.uk/doc/open-government-licence/version/3 or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email: psi@nationalarchives.gsi.gov.uk.

Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

This publication is available at www.gov.scot

Any enquiries regarding this publication should be sent to us at
The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

ISBN: 978-1-78652-822-3 (web only)

Published by The Scottish Government, February 2017

Produced for The Scottish Government by APS Group Scotland, 21 Tennant Street, Edinburgh EH6 5NA
PPDAS262818 (02/17)

w w w . g o v . s c o t / m a r i n e s c o t l a n d