

Temporal and Spatial Use of the Skerries Bank Angling Zone by Different Fisheries User Groups: A Baseline Report



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Executive Summary

Devon and Severn Inshore Fisheries and Conservation Authority (D&S IFCA) is committed to the development of the Recreational Sea Angling (RSA) sector. The D&S IFCA Angling Strategy (2014-2016) identified spatial management to protect important areas for sea angling from conflicts with other gears as a potential way forward. Three sites were chosen to pilot this approach after informal discussions with local anglers; the Skerries Bank, the Emsstrom wreck and Burnham, Berrow and Brean beaches.

During the creation of the Skerries Bank Angling Zone, a public consultation was held, followed by a series of targeted meetings with the three primary user groups of the site (recreational anglers (shore and boat), commercial charter boat operators and the commercial catch sector). These meetings addressed each sector's fishing activities, their perceptions of other user groups use of the site, conflicts with other fishing activities, and any concerns about wider management of the site. The initial meetings highlighted several shared concerns amongst the different user groups, the most prevalent of which was the occurrence of illegal trawling. All three user groups also felt that, whilst current levels of commercial fishing activity inside the Angling Zone were compatible with angling interests, any increase in activity targeting plaice and rays would be detrimental to recreational and charter angling, as well as to existing commercial fishermen's catches. A voluntary Code of Conduct was developed which aimed to balance the different sector's needs. This included a ban on commercial targeting of plaice, a size limit of 10m on vessels netting or longlining in the Angling Zone, a requirement to clearly mark nets and a bag limit for anglers of 10 plaice and 3 ray per day.

A monitoring plan was developed to collect data on the use of the site by different user groups, to ground-truth the observational information obtained during the meetings. Transect surveys recording vessels distribution over the site took place from April 2015 until April 2016. Interviews of recreational anglers on the shore took place during the same time period. Fishing diaries were also submitted by commercial fishermen. The baseline data collection highlights the importance of the site to all three user groups, and there is much overlap, both spatially, and temporally in their use of the site. Whilst the data from the monitoring provides an improved understanding of the use of the site, the limitations of the data (including few commercial vessels participation in the fishing diaries and the daylight-only nature of the transect surveys) do mean that a complete picture of the user group's use of the site was not possible.

From data-collection to publication, this baseline report has taken five years to complete not only due to other pressures on officer time, but also relating to matters important to the angling sector. This included the development of the netting permit byelaw, the introduction of iVMS on mobile gear vessels, the commencement of bass research, and the introduction of research and management of the wrasse fishery that emerged in 2015. Therefore, the next stage of the work should involve going out to the three user groups again to compare perceptions about spatial and temporal use, conflict and management concerns in 2019 compared to 2014. Recent anecdotal information suggests an increase in commercial activity targeting rays on the site having a negative impact on the available opportunities for anglers. Future work should therefore also include review of the wider context of trends in the ray stocks as well as interrogating local ray landings to detects whether there has been a more regional increase in ray landings, or whether it may be a localized trend. Initial research has highlighted the importance of co-management of sites for multiple benefits for multiple user groups. This work would benefit for a more in-depth review, including reviewing existing management case studies where spatial management has been implemented for the development of individual or multiple user groups. Finally, the further work on the development the Skerries Bank Angling Zone should act as a springboard for a review of the Authority's RSA Strategy.

1. Introduction

Recreational Sea Angling (RSA) is a popular sport, with approximately 8.7 million sea fishers taking part in recreational fishing in Europe (Roberts et al. 2017). It is increasingly being recognised as an essential part of the economic structure within the leisure industry in the UK (Hood-Cree 2010). A report by Defra estimated that in 2012 there were 884,000 sea anglers in England, with the sport worth approximately £1.23 billion per year to the UK economy. The angling trade includes manufacturers, wholesalers and companies trading in angling tackle and equipment (Armstrong et al. 2013) as well as having economic benefits to coastal tourism through boat charters and accommodation. Sea Angling 2012 also identified the social benefits of sea angling, which provides a sense of place and community, allows people to experience nature and improves individual's well-being (Armstrong et al. 2013). The South West of England offers some of the most diverse sea angling opportunities for individuals, clubs and businesses (Lawrence 2005). Charter boats are generally included as sub-sector of recreational sea angling. However, as commercial operations they have similarities with both the RSA sector and the commercial catching sector. For the purposes of this report, three 'user groups' are considered: recreational sea anglers (including shore anglers and operators of privately owned and operated angling boats), charter boat operators and the commercial catching sector.

Resource conflict is a common feature of coastal management (Voyer et al. 2017) and conflicts between RSA and commercial fishing have been well documented (Kearney 2001, Boucquet et al. 2017, Voyer et al. 2017). These conflicts exist at a variety of scales and have a number of potential causes. An unintended consequence of strengthening commercial fisheries management through rights-based management (via individual quotas and catch shares in the UK) is the increased long-term rights and responsibilities of commercial fishers (Kearney 2001). When combined with a lack of agreed principles for the allocation of resources between competing groups, this has had the effect of increasing conflict between recreational and commercial fishers (Kearney 2001). Whilst at a local level frustrations often manifest themselves as conflicts over spatial management, they are often underpinned by fundamental disagreements about how to value fishing: Whilst commercial and recreational fishermen often agree that fish are public resources and should not be wasted, their interpretation of value, public and waste can be highly divergent (Boucquey 2017). This conflict is often managed by using spatial planning tools to segregate uses, with access decisions made through a comparison of the economic costs and benefits of the competing user groups. These comparisons rarely include an in-depth analysis of the extent or nature of the conflict (Voyer et al. 2017).

Devon and Severn Inshore Fisheries and Conservation Authority (D&S IFCA) has a duty to seek to balance the different needs of persons engaged in the exploitation of sea fisheries resources in the District. Recreational Sea Angling (RSA) was one of three core work areas in the Devon and Severn IFCA Annual Plan between 2012 and 2015. Following the publication of its first Recreational Sea Angling Strategy, the Authority was looking to introduce fisheries management that would proactively develop the sector. Initial scoping of potential sites was carried out with the assistance of the RSA representatives on the Authority. Three potential pilot study areas were identified; the Emsstrom wreck site close to

Torbay, the Skerries Bank in Start Bay and Burnham, Berrow and Brean beaches in Somerset, to assess the impact of introducing management measures to improve sea angling.

The Skerries Bank is a 6.5km sand and shell bank running underwater in a north east direction from Start Point in South Devon. Skerries Bank lies within an area which was designated as the Skerries Bank and Surrounds MCZ in 2013, for various intertidal and sublittoral rock and sediment habitats as well as spiny lobster and the pink sea fan. The Skerries Bank also sits adjacent to the South Devon Inshore Potting Agreement area, which introduced voluntary closures to trawling from 1978 (Blyth et al. 2002) (Figure 1), and management through legislation was introduced in the late 1990s. The Skerries Bank itself lies within an area which was closed to trawling under Devon Sea Fisheries Committee Byelaw, which existed for much of the 20th Century. The Skerries Bank / Start Bay closure to mobile demersal gear is still in place today as a permit condition issued under the D&S IFCA Mobile Fishing Permit Byelaw.

Charter and private RSA boats primarily target plaice and blonde ray which utilise the sand bank features of this area. The site is located close to shore (Figure 1) and benefits from being sheltered from the prevailing winds. Angling surveys conducted by the Authority, as part of its participation in the Sea Angling 2012 project, found the Skerries Bank area to have the highest density of private RSA angling boats in the D&S IFCA District. Commercial fishing activities include fyke netting, potting, longlining and monofilament netting, primarily from small vessels operating from Beesands, Hallsands and Dartmouth. Anecdotal reports suggested increasing pressure from static net fisheries, particularly for rays.

At the quarterly meeting in June 2014, after an initial period of public consultation on a proposal to remove netting and longlining from the Skerries Bank Angling Zone area, the Authority requested officers to extend this process and to directly liaise with all interested sectors. In July 2014 D&S IFCA held three meetings (one per user group) with stakeholders in order to understand fishing activities at the site better. Recreational sea anglers, charter boat operators and commercial fishermen who fished from ports close to the site were invited to attend sector specific workshops. The first round of workshops focused on each user groups knowledge of the site, their fishing activities (including spatial and temporal use of the Skerries) and their concerns and ambitions relating to the proposed Angling Zone. From this first round of in-depth consultation, revised proposals were compiled and sent to interested parties. A second round of meetings was held in late August 2014 to give the sectors an opportunity to respond to the revised proposals before officers formulated a final proposal and recommendations for the Authority.

The meetings highlighted a great deal of consensus between the groups in the way management of an Angling Zone would improve their activities. The charter boat user group felt that current static gear levels are not detrimental to their fishing activities. Although concern was voiced by the RSA user group regarding current levels of netting, all three groups saw an increase in current levels of static gear as undesirable and potentially damaging. The meetings also highlighted the importance of the area primarily for plaice for the charter boats, although rays were reported to add value to the area as a whole for this sector. Rays and plaice were equally important to the RSA sector. The commercial catching sector felt that they could agree to a complete ban on commercial targeting of

plaice in the Skerries Bank Angling Zone area in order to acknowledge the importance of this species to recreational sea angling and charter boats. The commercial sector was concerned about the removal of opportunities for ray fishing and longlining, as this would prove a significant risk to their businesses. The commercial user group also felt that their 'stewardship' of the area, with families fishing the area from small boats for generations should be recognised, this view was supported by the charter boat sector. The commercial catching sector felt that in order to acknowledge their compromise in giving up the potential for plaice fishing, they would like to see balance in management by the placing of sensible bag limit on recreational anglers (including charter boats), in order to remove the risk to their business of fish being caught by unlicensed vessels in the area being sold on the 'grey market'. The RSA sector saw the introduction of a bag limit as acceptable, providing the numbers were not overly restrictive. A consensus on an area free from all forms of netting could not be reached. The RSA sector felt that this was an important part of the original proposal and therefore suggested the placement of smaller, more localised no-netting zones to benefit the shore angler. In the second round of consultations, an area off Beesands beach was therefore proposed as no-netting. The commercial sector strongly rejected this area and questioned the perception held by anglers that the current levels of commercial netting activity in the vicinity of Beesands is sufficient to be detrimental to shore-based angling activities. In the absence of evidence to guide decisions, the IFCA therefore suggested a reporting scheme for licensed boats to record commercial fishing activity within the Angling Zone to guide future decisions. After the initial, and subsequent workshops a voluntary Code of Conduct (Appendix 4) was developed and the Skerries Bank Angling Zone was created, including the following provisions:

- 1. No commercial targeted fishing for plaice by any method may take place within the entire area of the Skerries Angling Zone.
- 2. Vessels which exceed 10m in overall length are prohibited from engaging in any commercial or recreational netting or longlining activity within the entire area of the Skerries Angling Zone.
- 3. All nets used within the pilot Angling Zone should be clearly marked using buoys with flags to aid efficient differentiation between pots and nets.
- 4. There is a bag limit for recreational sea anglers fishing within the Angling Zone of 10 plaice and 3 rays per angler, per day.

The Code aimed to balance the needs of all three user groups by restricting commercial netting and longlining effort to preserve the importance of the area to recreational anglers and charter boats, whilst maintaining access for small commercial fishing vessels that rely on access to the area.

In order to supplement anecdotal information gained through the stakeholder engagement phase and to provide a baseline for monitoring the impacts of implementing small-scale spatial management to benefit the RSA and charter boat sectors, D&S IFCA determined that detailed information regarding the use and compliance of the site was required. This would allow D&S IFCA to understand how different user groups use the site throughout the year and monitor compliance with the voluntary Code of Conduct.





2. Methodology

2.1. Surveys

All surveys were conducted using a stratified sampling strategy which was developed in order to obtain an even coverage over days of the week and times of day. Boat based surveys around four transects running across the inner, middle and outer Skerries Bank Angling Zone (Figure 2) were conducted by D&S IFCA's fisheries patrol vessel twice a week from April 2015 to April 2016. Each survey lasted for 4 hours. Vessel name, GPS location, type of vessel, fishing activity and the number of anglers and rods were all recorded. Private RSA and charter vessels were interviewed where possible to establish the awareness of and determine the compliance with the voluntary Code of Conduct. In addition, information on the target species was obtained. Commercial fishers were sent fishing activity logs to complete and return on a monthly basis from April 2015 to April 2016. However, see limitations section 2.3 below. The logs asked for information on the number of trips made within that month, how many of those trips were within the angling zone, the location of fishing activities, the type of fishing activity, and the species targeted.

Shore based surveys were conducted at Hallsands and Beesands beaches. The number of shore anglers and rods were recorded as well as any other fishing activity or sightings of commercial, charter and private RSA boats observed from the shore. Interviews with anglers were conducted where possible in order to obtain data on fishing effort, species targeted, compliance and awareness of the Angling Zone and Code of Conduct. It should be noted that data from these surveys are not included in this report. These data will be used to produce a stand-alone report.



Figure 2. Map showing the location of the four transects used to conduct the boat-based surveys.

2.2. Mapping of fishing activity

The geospatial distribution of fishing activity, target species per sector and gear type was ascertained from the boat-based line transect surveys and commercial fishing logs. The data obtained from the surveys mentioned in section 2.1 above were used to establish the seasonality of fishing effort, type of fishing activity occurring, and individual species targeted. Fishing effort and gear type per grid square was mapped in QGIS v2.14.19.

2.3 Limitations of the data

Although the data collected during the survey can be used to gain some insight into the spatial and temporal use of the Angling Zone, it should be noted that there are several limitations to the data.

2.3.1. Commercial activity logs

Ten vessels returned activity logs for some of the sampling period. Despite, being requested for all vessels for the full year that the monitoring plan was active, the commercial logs were received patchily, covering a period of six months from May to October 2015. Even within this six month period coverage of individual vessels was sporadic.

Additionally, as the returns only covered a six-month period, quantitative analysis, such as fishing effort could not be conducted with any certainty. The location of commercial fishing was mapped using the grid squares recorded on the activity logs. This was based on a presence (coloured square) or absence (non-coloured square). In order to establish whether there are any seasonal fishing trends in the commercial sector, within the Angling Zone, activity logs should have been collected for the whole year. However, these logs can be

used to determine the location of commercial fishing activities within the Angling Zone, the type of gear used and the species being targeted during this period.

In terms of coverage, there are currently four vessels with commercial netting and six vessels with commercial potting permits fishing from the ports of Beesands and Hallsands, so the 10 vessels which returned some information provides a useful snapshot. However, vessels from Brixham, Dartmouth and Salcombe may also visit the Angling Zone. For these ports there are 67 vessels with commercial potting permits and 25 with commercial netting permits. The introduction of the netting and potting permit byelaws creates an opportunity for wider engagement in the future.

2.3.2. Boat-based surveys and interviews

Fishing effort for the various user groups was calculated using counts of the type of boats seen during the boat-based survey. Although the survey period was from April 2015 to April 2016 surveys were not carried out every month during this period due to weather constraints and angling activity declining over the winter period. A six-month period was covered during 2015 and in 2016 surveys were only conducted in April.

However, the information obtained in relation to the species targeted by the recreational sector is limited and is therefore not directly comparable to the species targeted by the commercial sector. This is due to several boats refusing to partake in additional interviews.

3. Results

An illustration of how the Angling Zone is used across all three user groups during the year of surveys is presented in Figure 3. Commercial fishing appears to be taking place throughout the entire Angling Zone. The RSA sector was observed fishing across the majority the Angling Zone with the exception of the South-East corner and some locations within the west outer section of the Angling Zone. Close inshore and across the middle of the Skerries Bank appear to be hotspots for both the commercial and private RSA sectors, whereas charter boats concentrate their efforts to the south and north east of the bank. It should be noted that the data are not quantitative, and the pie charts purely represent whether a particular sector is fishing in that location.

3.1. Spatial and temporal use of Angling Zone by charter and private RSA sector During the boat-based surveys, the majority of charter boats were observed in the southern middle section of the Skerries Bank itself, indicating that this may be a hotspot for this sector. In contrast, although the private RSA sector appear to utilise the majority of the Angling Zone, preferred areas are across the Bank itself and to the west of the Bank (B7, B8, D6 and E5, Figure 5). Although there are limited data on the individual species targeted by this sector, rays and plaice appear to be important species for this sector as these are the primary species targeted as shown in Figure 8.

The total number of boats observed during the survey period varied between the individual months, ranging from three in October 2015 to 34 in April 2016 (Table 1). This variation is likely affected by survey effort as less surveys were conducted during the winter months. Figure 6 and 7 illustrates the number of vessels observed per sector per month per survey hour. Charter boats were observed the most during July 2015 (0.625 per hour) and April 2016 (0.75 per hour) (Figure 6 & 7).



Figure 3. Breakdown showing the use of the Skerries Bank Angling Zone across all three user groups (commercial, private and charter boats). The pie charts only represent whether a sector is fishing in that location; it is not an indication of effort.

Private RSA boats appear to be more prevalent during spring and summer with 3.25 being observed per hour during September 2016 and 2.25 boats being observed per hour in April 2016 (Figure 6 and 7).

A breakdown of the spatial use of the Angling Zone by the private RSA sector per month can be seen in Appendix 3. The seasonal use of the Skerries by the commercial charter sector and commercial catching sector will be largely determined by the presence and abundance of plaice and rays. Anecdotal reports suggest this can vary greatly between years.

Table 1. Monthly breakdown of vessels observed, and the total hours spent on surveys in order to calculate the number of boats observed per hour.

Year	Month	Total number of vessels observed	Total hours spent surveying	Number of surveys conducted
2015	May	24	32	8
2015	July	18	24	6
2015	August	5	12	3
2015	September	23	24	6
2015	October	3	8	2
2015	November	6	12	3
2016	April	34	24	6



Figure 4. Location and number of charter boats observed during the boat-based surveys. This represents sightings of charter boats during the whole year of the survey.



Figure 5. Location and number of private boats observed during the boat-based surveys. This represents sightings of private boats during the whole year of the survey.



Figure 6. The number of charter, commercial and private boats observed in the Skerries Bank Angling Zone, taking into account survey effort per month in 2015. This is based on the data collected during the boat-based surveys conducted by D&S IFCA.



Figure 7. The number of charter, commercial and private boats observed in the Skerries Bank Angling Zone, taking into account survey effort per month in 2016. This is based on the data collected during the boat-based surveys conducted by D&S IFCA.



Figure 8. Individual species targeted by private anglers. Information taken from the boat-based interviews conducted by D&S IFCA officers.

3.2. Spatial and temporal use of Angling Zone by the commercial sector

Information taken from the commercial activity logs indicate that the commercial sector moves across the entire Angling Zone (Figure 9) during the period May to October 2015. This coincides with where the commercial vessels were observed during the boat-based surveys (Figure 10). During the period May to October, a total of nine commercial vessels were observed on 74 separate occasions (Figure 11). In the summer months of June to August vessels fish across the majority of the Angling Zone, moving closer inshore in September (Appendix 1). Figure 12 illustrates the type of commercial fishing activity taking place within the Angling Zone for the entire period of the survey. Fixed netting, potting and rod & line fishing is the primary form of activity taking place within the Angling Zone for the whole period. Rod & Line fishing for bass close to the shore and across the lower half of the bank and fixed netting for rays in the north east corner of the Angling Zone is the primary form of fishing activity taking place in May (Appendix 1 and Figure 12). During the summer months fixed netting, rod & line fishing and potting spreads across the Angling zone primarily targeting, bass, sole, brown and spider crab and lobster (Figure 13 and Appendix 1). A wide variety of species are targeted across the middle of the bank, whereas the south-eastern part of the zone is an important area for crustaceans and the outer middle section to the west being a hotspot for bass, sole and brill (Figure 13). D&S IFCA is also aware that potting for whelk also takes place in this area, although this was not reported by the vessels that recorded their fishing activity over the time period covered (May to October 2015).



Figure 9. Grid cells fished by the commercial sector. Taken from the commercial activity logs. This does not show the effort but just where the commercial vessels fished during the year of the survey.



Figure 10. Number of commercial boat sightings per grid square as seen during the boat-based surveys.





Figure 11. The number of commercial boats observed using the Angling Zone (A) and the number of trips (B) made by those boats into the Angling Zone per month. Taken from the commercial activity logs.



Figure 12. Type of commercial fishing activity taking place in each grid square, taken from the commercial logs. Gear used has been equally split, so the pie charts do not represent the percentage of activity accruing but provide a visual representation of the location of different fishing activities.



Figure 13. Individual species being targeted by the commercial angling sector. Information taken from the completed commercial activity logs.

4. Discussion

Recreational fisheries play an important role in the aquatic environment by generating significant social and economic benefits. This social ecological system is diverse and starting to evolve due to individual priorities and behaviours (Brownscombe et al., 2019). However, commercial fisheries play an equally important socio-economic role Kearney et al. 2002). Conflict between recreational and commercial users of fisheries resources appears endemic to all developed countries and most have struggled with its resolution (Kearney 2002). Conflict between these user groups can arise due to competition for common resources (fish stock) and spatial access (Bower et al., 2014), as well as the use of different management measures (Sutinen & Johnson, 2003). The commercial use of nets (usually gill nets) is often one of the primary sources of conflict between people on the water (Boucquey 2017). For example, catch and release rates by recreational sea anglers for some species (cod and European bass) in the UK are high (Ferter et al., 2013), meaning reduced direct conflict over access to resources. However, inherently different ways of valuing fish and fishing underly all these issues, and even where similarities in attitudes (e.g. stewardship) emerge, there is often a large difference in how the user groups understand these concepts (Boucquey 2017). Policy makers are often required to address apparent categorical conflict decisions based on ill-assessed economic valuations which can have perverse outcomes in terms of worsening the conflict and have high negative social impacts, even on the apparent beneficiary group (Voyer et al. 2017). Careful consideration of the most appropriate tool to address the conflict and temporal shared use is thought to be preferential to complete spatial segregation, which can create power imbalances and discourages resolution (Voyer et al. 2017).

The results from the boat-based surveys highlight that there are similarities in the temporal and spatial use of the Angling Zone between the three user groups. Vessels from the commercial catching sector fish across the entire Angling Zone using a variety of static gears seasonally depending upon weather conditions and catch rates of different species. The recreational sea angling sector and charter boat sectors, however, concentrate their efforts over the Skerries Bank itself, with less fishing activity occurring in the surrounding areas of the Angling Zone. Commercial netting appears to be more prevalent during the summer months between June and August which coincides with the peak use by charter boats. At the current time, there appear to be few obvious opportunities for further spatial and temporal separation of the activities in the Skerries Banks Angling Zone, without some form of trade off with other user groups.

During the initial consultations, the recreational sea angling sector raised concerns over the level of netting taking place within the Angling Zone and that increases in the level of static gear used would be undesirable and potentially damaging to their fishing opportunities. The commercial fishing industry had concerns in regard to removal of fishing opportunities and reduced fish stocks caused by the amount of angler fishing effort and potential illegal sale of fish from unlicensed vessels. Interestingly, there were many similarities in both the concerns of the user groups and the language they used. The main concern of all three user groups was the continued activity of trawlers illegally fishing in the closed area of the Skerries Bank. Since the Angling Zone was implemented, D&S IFCA has brought in permit conditions under the mobile gear permit byelaw which require all vessels to be fitted with iVMS or VMS with a

remotely accessed electronic reporting device (such as VMS or iVMS). Spatial management of mobile fishing activity is achieved via the Mobile Fishing Permit Conditions and associated annexes (1 to 8). At the time of writing, the Skerries Bank area is within Annex 5 and within this area the vessels must report their location at least every three minutes. New technology acts as a greater deterrent to illegal activity within the site. It can be used in conjunction with other evidence to investigate illegal fishing in a prohibited area. Increased monitoring has strengthened D&S IFCA's enforcement capabilities and it is thought that the outcome will be fewer infringements. All user groups acknowledged the importance of the site, both to their own sector and to other forms of fishing. Commercial fishermen discussed their activities in terms of stewardship, and recreational and charter boat anglers also discussed improving conservation strategies within the RSA community.

Although all the three user groups activities overlap over the Skerries Bank, competition and in turn conflict over fish stocks is likely to be limited to a relatively small number of species due to fisheries targeting different individuals. Both rays and plaice are important species for recreational anglers, with rays being equally important for the commercial sector and one of the primary fish stocks targeted all user groups (Figures 8 & 13) The localised distribution of the rays over the Skerries Bank could render them vulnerable to localised depletion. At the current time, the Code of Conduct is thought to be the most appropriate method of management. This discourages commercial fishers targeting plaice within the angling zone and introduces a voluntary bag limits for recreational anglers on plaice and rays. Plaice were not targeted by the commercial sector, confirming adherence to the Code of Conduct. However, any future increase in commercial fishing of rays could have a negative impact on local charter and recreation fishing activities. Conflict between user groups would likely to be particularly marked if this included larger vessels moving in to fish the Skerries for the first time, or if there was a large increase in targeted fishing of rays and plaice.

Co-management has been endorsed for inshore management generally (Rodwell et al. 2014, Pieracinni and Cardwell 2015) and more specifically for managing conflict between RSA and commercial fisheries (Kearney 2002). The success of such co-management is dependent upon: a) identifying the sources of conflict; (b) gathering sufficient data to assess principal perceptions; (c) having independent assessment of resource use and public debate of these assessments and their likely implications; and (d) having broader interests than just the primary antagonists involved in the assessment process and advisory processes (Kearney 2002). The consultation process in the development of the Skerries Bank Code of Conduct helped to better elucidate the causes of conflict, and the monitoring reported here has established a baseline in order to assess the principal perceptions. Furthermore, the structure and functioning of D&S IFCA, with representation across stakeholder groups, allows for the maintaining broader interests within the advisory process. The first step of an independent assessment of resource use was attempted in the Skerries Bank monitoring. Although it shows the site is of importance to all user groups, it was beyond the scope of this report to undertake any socio-economic or environmental assessment of the benefits and impacts of the different activities. In fact, such an assessment on such a localised geographic scale may not be possible.

A more in depth understanding of fishing effort (especially targeting rays) over time would help to further elucidate the nature of the conflict. There may also be opportunities to address shared concerns over larger vessels moving in and exploiting the area, having negative effects on all current users of the site. Finally, because of the introduction of permits for mobile, potting and netting gears, a more inclusive consultation (of all permit holders) is possible, due to the extensive data base of contact details acquired from potential fishers during the application process to be issued with a permit.

5. Conclusions and Recommendations for Future Work

The Skerries Bank Angling Zone is used by all three user groups included in this study. In the absence of detailed socio-economic analyses, the continued development of a comanagement approach appears to be the most appropriate way forward. Recent advances in D&S IFCA management, namely the installation of remotely accessed electronic reporting devices on all mobile gear vessels (between 6.99m and 15.25 metres), including higher reporting levels in the Skerries area, will potentially reduce the risk of illegal mobile gear activity, and help evidence where fishing is taking place legally. This addresses one of the major concerns of all the user groups. Crucially, the initial meetings also highlighted that an increase in commercial fishing effort could have a negative effect on all three user groups. This warrants further work to elucidate whether there have been changes in use of the site since the original data collection. The suggested next steps in the development of the Skerries Bank Angling Zone are therefore as follows:

- Due to the length of time since the data collection occurred, it would be pertinent to repeat the engagement work which took place in 2014 to compare each user group's perception about the current activity levels of different sectors against the baseline recorded in this report.
- Consideration of further monitoring work to overcome some of the limitations of the data e.g. a more in-depth consideration of temporal differentiation in sectoral use of the site. It is the Government's intention to introduce IVMS on all commercial fishing vessels by 2021, so any monitoring work should be conscious of this commitment.
- An additional short report on the use of Hallsands and Beesands and adjacent waters by each sector should be completed.
- A review of the status of the key stocks (only possible over broad geographic scales) and local landings of the same species to understand the conflict on a broader spatial scale.
- A more in-depth review of the success of spatial/ temporal management for the development of one or multiple user groups elsewhere will aid decisions on the future management of the site.
- The additional work on the Skerries Angling Zone should feed into a renewed Angling Strategy, work towards which should be included in the D&S IFCA Annual Plan for 2020-2021.

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Appendix 1. Monthly breakdown of commercial fishing activity

Figure 14. Location and type of fishing activity observed in May 2015. The pie charts only indicate the type pf gear used and do not represent effort.



Figure 15. Location and type of fishing activity observed in June 2015. The pie charts only indicate the type pf gear used and do not represent effort.



Figure 16. Location and type of fishing activity observed in July 2015. The pie charts only indicate the type pf gear used and do not represent effort.



Figure 17. Location and type of fishing activity observed in August 2015. The pie charts only indicate the type pf gear used and do not represent effort.



Figure 18. Location and type of fishing activity observed in September 2015. The pie charts only indicate the type pf gear used and do not represent effort.



Figure 19. Location and type of fishing activity observed in October 2015. The pie charts only indicate the type pf gear used and do not represent effort.



Appendix 2. Monthly breakdown of Charter boat fishing activity

Figure 20. Location and number of charter boats observed during May 2015 surveys.



Figure 21. Location and number of charter boats observed during July 2015 surveys.



Figure 22. Location and number of charter boats observed during September 2015 surveys.



Figure 23. Location and number of charter boats observed during November 2015 surveys.



Figure 24. Location and number of charter boats observed during April 2016 surveys.



Figure 25. Location and number of charter boats observed during May 2016 surveys.



Appendix 3. Monthly breakdown of Private boat fishing activity

Figure 26. Location and number of private RSA boats observed during May 2015 surveys.



Figure 27. Location and number of private RSA boats observed during July 2015



Figure 28. Location and number of private RSA boats observed during August 2015



Figure 29. Location and number of private RSA boats observed during September 2015



Figure 30. Location and number of private RSA boats observed during November 2015



Figure 31. Location and number of private RSA boats observed during April 2016



Appendix 4. The Skerries Bank Angling Zone Code of Conduct