



Evaluating the socioeconomic impacts of Marine Stewardship Council certification at the fishery level





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Executive summary

The Marine Stewardship Council (MSC) commissioned a study to understand the potential socioeconomic impacts that occur as a result of MSC certification of fisheries. The scope of benefits in this study includes price premiums, price stability, increased sales, and improved market access, as well as job creation/security. Capturing the extent to which certification contributes to these socioeconomic benefits can prove challenging beyond anecdotal observation. Indeed, research exploring the socioeconomic impact of MSC certification at a fishery level remains relatively sparse. This study was commissioned to explore how to capture these potential socioeconomic benefits, and if these have been realised within the two case studies of MSC-certified fisheries selected for this study: Cornish hake and Cornish sardines. Two methods were selected to gather data.

We used the Marine Management Organisation's (MMO) annual sea fisheries data on landings weight and value to calculate quayside price per kilogram and then compared both hake and sardine fisheries with a control group (ie similar fisheries) without MSC certification. We visually examined price trends to observe any differences between the groups and applied the difference-in-difference (DiD) statistical technique. This statistical analysis tool offered insights as to whether the intervention of MSC certification impacts any socioeconomic trends.

We also developed several questions around socioeconomic impact and incorporated these into a survey that the MSC had already developed for similar research into the effect of certification on fisheries' participants. The survey questions also covered various socioeconomic impacts including fish prices, market access, reputation, job creation, and catches. This additional primary data collection enabled us to gain insight into the changes that stakeholders, such as fishers and wholesalers, experience and their perceptions of the benefits of MSC certification. The survey was undertaken by the Cornwall Rural Community Charity, contracted by the MSC and was made available for analysis.

Key findings for the landings data analysis

- Landing volumes increased considerably for both hake and sardines (both MSC and non-MSC) over the period considered in this research.
- Analysis of MMO data indicates a possible price premium for the hake fishery certified as MSC in Cornwall (2015), compared to the control group of Scottish hake fisheries (that certified in July 2018).
- The landings data analysis did not indicate that quayside sardine prices had increased because of MSC certification in Cornwall (2010).

Key findings for the survey interviews

- **Hake:** All respondents noted an increase in hake price, an increase in market access, and an increase in reputation. When asked if the benefits of certification outweigh the costs of becoming certified, 100% of respondents stated that the benefits of certification are much greater than the costs of becoming certified. Fishers also stated that certification and re-certification were expensive, but came with the benefits of good promotion.



- Sardines: Fishers stated that they had not noted any real change regarding price increase (some described price decrease relative to 2006 price levels), but processors appeared to have realised benefits resulting from marketing as MSC-certified. Fishers noted other benefits, for example through implementing required scientific research or possibly price maintenance, as well as through maintaining market access. Of those interviewed, 73% said their reputation had improved or improved greatly. This was the dominant perceived benefit of MSC certification. The fishers interviewed hope to maintain certification going forward. The benefits of MSC are not always tangible. Some interviews suggested that the Cornish Sardine Management Association (CSMA), who manage the fishery and own the MSC certificate, has had a bigger impact on their success than the MSC certification. The MSC process has facilitated new research and the organisation has promoted the fishery via MSC social media channels.

The findings from both these research strands point to various socioeconomic benefits arising from MSC certification and a potential price premium for the Cornish hake fishery. The exploratory nature of this research entails certain limitations; findings are considered indicative and preliminary. Key limitations centre on the challenges of designating an effective control group and accounting for other external factors, as well as the limited sample size for survey responses. Nevertheless, this work provides useful insights on this subject and helps lay the groundwork for further research, one that can contribute to MSC's understanding of how certification can affect socioeconomic outcomes for different participants in fisheries. Future studies should include more in-depth research into developing control groups to compare MSC-certified fisheries with similar non-certified fisheries. Insights from qualitative survey responses can also be further investigated. Getting access to individual fishery-level stakeholder's audited accounts to understand and verify economic impacts should be explored.



1. Introduction

Through its certification standard for environmental sustainability of fisheries, the Marine Stewardship Council (MSC) seeks to improve fishing practices and reduce the negative environmental consequences of over-fishing. MSC also seeks to evaluate any positive socioeconomic impact on the various stakeholders associated with a fishery becoming certified, including fishers, wholesalers, and processors. Socioeconomic benefits that might occur because of certification include a price premium, price stability, increased sales, and improved market access, as well as job creation and security. The extent to which certification contributes to these socioeconomic benefits can prove challenging to capture beyond anecdotal observation. Indeed, though several studies on price premium and economic revenues exist, research exploring the socioeconomic impact of MSC certification at the fishery level remains relatively sparse.

It is in this context that the MSC commissioned the NEF Consulting to undertake this study to explore how to capture the socioeconomic benefits that might be accruing at a fishery level. Of particular importance was understanding if a price premium exists, ie has certification led to an increase in quayside prices? This is a very important benefit to those at the fishery level, and one which the MSC is keen to demonstrate, as a powerful incentive to encourage more fisheries to seek certification and ultimately contribute to its aims of improving fishing standards and sustainability.

Key to understanding the extent to which MSC certification impacts prices is developing a 'counterfactual', for example what we expect would happen to prices if MSC certification had not taken place. In a social research context, this can prove difficult to achieve. One way to estimate the counterfactual is to create a control group and compare price trends between this group and the one that has achieved certification.

Using two case studies, Cornish hake and Cornish sardines, this research explores the extent a price premium may exist regarding certification. It does so by using the Marine Management Organisation's (MMO) annual sea fisheries data on landings weight and value to calculate quayside price per kilogram and then comparing both hake and sardine fisheries with what we deemed, in discussion with the MSC, to be the best available control group. We presented the price trends visually to observe any differences between the groups and also applied the difference-in-difference (DiD) statistical technique, which allowed us to isolate the treatment effect to provide insights on whether the intervention of certification is having an impact on trends.

Alongside this analysis, NEF Consulting also developed several questions around socioeconomic impact that were incorporated into a previously developed and tested MSC survey. This was then used to research the effect of certification at two fisheries in Cornwall. The primary data collection enabled us to gain insight into the changes that stakeholders, such as fishers and wholesalers, had experienced. Here, the counterfactual was defined as what the stakeholder perceived would have happened to prices, sales, and market access without MSC certification. Survey questions covered various socioeconomic impacts including fish prices, market access, reputation, job creation, and catches.



The findings from both these research strands point to various socioeconomic benefits arising from MSC certification and a potential price premium for the Cornish hake fishery. The exploratory nature of this research entails certain limitations, so findings are considered indicative and preliminary. Key limitations centre on the challenges of designating an effective control group and accounting for other external factors, as well as the limited sample size for survey responses. Nevertheless, this work provides both useful insight into this relatively sparsely researched subject and the groundwork for further research, one that can contribute to the MSC's understanding of how certification can affect socioeconomic outcomes at a fishery level.

The report adopts the following structure: Section 2 provides relevant background context for both case-study fisheries. Section 3 details the methodology used. Sections 4 and 5 present the findings from each research strand. The final section discusses the potential for further research and concludes.

2. Background context

Sustainable fisheries management relies on a good understanding of the health of fish populations (stocks). To ensure that the harvest of these stocks does not deplete the population to an extent it cannot recover, scientists, managers, fishers, and politicians need to understand what proportion of each stock can be removed without compromising the future harvest. This is referred to as the maximum sustainable yield (MSY), which has become a limit in EU fisheries management. Specifically, MSY is the largest average yield (catch) that can be removed at the stock level forever, under constant environmental conditions. An overfished stock has a biomass below MSY and is therefore unable to produce MSY as the fishing rate is above MSY. Stock biomass declines as a result.¹

To set fishing limits, differentiating between stock biomass, fishing yield, and fishing rates is also necessary, as some of these (those that relate to fishing activity) can be controlled through policy and management. The key terms (all referred to as abbreviations in fisheries science² and policy) to consider in relation to the health of fish stocks are as follows:

TAC – Total Allowable Catch (set at EU level per stock and ICES area, in tonnes).

FQA – Fixed Quota Allocation (principal means of allocating fishing quotas within the over 10m UK fishing industry since 1999).³

MCRS - minimum conservation reference size (set at EU level, measured in cm).⁴

B: Biomass (the body-weight of all the fish in a stock: measured in tonnes).

Y: Yield (the catch, measured in tonnes).

MSY: Maximum sustainable yield (the largest yield possible over an indefinite period, under constant environmental conditions, measured in tonnes).

F: Fishing mortality (the catch relative to the size of the stock).

FMSY: Maximum rate of F over time at a population size of BMSY that is consistent with achieving MSY.



BMSY: Stock biomass that enables MSY. Results from fishing at FMSY for a long time.

SSB: Spawning stock biomass (the amount of fish in a stock which can reproduce and contribute to the next generation, measured in tonnes).

Btrigger: Value of SSB that triggers management action.

Bpa: Precautionary reference point for SSB.

Blim: Limit reference point for SSB.^{5'6}

Cornish hake (*Merluccius merluccius*)



Hake (*Merluccius merluccius*). Source: European Commission⁷

Biology

European hake (*Merluccius merluccius*) is one of 12 species of hake, which are all gadiforms (an order of ray-finned, cod-like fish) in the family of Merlucciidae.⁸ Hake are predatory fish, growing to a maximum size of around 1.8m (and up to 15kg weight). They are found in European waters mainly between 100 and 300m but also to a depth of 1km over the continental shelf from Norway to Mauritania.⁹ Their main prey includes squid and other fish (including smaller hake, herring, whiting, and horse mackerel).¹⁰ In terms of behaviour, diurnally, they remain close to the seabed, whereas nocturnally they move into mid-water to feed. Hake are slow-growing, with females maturing at between 5 and 6 years, and at around 50cm in length. Hake can produce a large number of eggs during the spawning season, which in UK waters is generally in February and March. Hake are relatively long-lived (living up to 20 years), but have a slow growth rate and a late maturity, which makes this species vulnerable to overfishing. When fishing effort is reduced, as examples around the EU have shown, stocks recover.^{11,12} Climate change impacts may be favouring hake recruitment because of warming sea temperatures,^{13,14} while recent recruitment is uncertain.¹⁵

Information on the biology and ecology of hake suggests that European hake grows faster than previously understood, which affects the maturity-at-age pattern and therefore stock assessments informing fisheries management and the setting of catch quotas.¹⁶

Stock information

ICES (the International Council for the Exploration of the Sea) recognises two hake stocks – northern and southern – both of which have been historically overfished and were considered outside of safe biological limits.¹⁷ The northern stock is currently considered to be fished within



safe biological limits, as a result of management and restrictions put in place at EU level. It is within this stock that the Cornish hake fishery takes place.¹⁸

The SSB for the northern stock was estimated in 2000. It increased rapidly between 2000 and 2017 and is now stable. This was due to fishing mortality being drastically cut from 2004 to 2012 and is now below the MSY target with quotas increasing over recent years as a consequence.¹⁹ ICES advice in 2019 assessed that fishing pressure on the northern hake stock is below FMSY; spawning-stock size is above MSY Btrigger, Bpa, and Blim. European hake is listed as being of 'least concern' by the International Union for Conservation of Nature (IUCN) red list.²⁰

Management

Hake is a highly significant demersal fishery in European waters, commonly caught in mixed fisheries with cod, haddock, and whiting across the North East Atlantic.²¹ Hake has historically been managed by a TAC (Total Allowable Catch) through the European Common Fisheries Policy (CFP)²² system which allocates TAC shares to EU Member States, who then distribute their share of the TAC through their domestic industry via quotas (FQAs – Fixed Quota Allocations – in the case of the UK).²³ EU vessels have equal access to all EU waters under the CFP; however, in waters up to 12 nautical miles from a coast (territorial waters), access can be limited by the EU country to vessels and fisheries that traditionally fish in those waters.²⁴

Due to the overfishing of stock at EU level in the late 1990s, action was taken to reduce fishing effort.²⁵ In 2004, a hake recovery plan for the northern stock²⁶ was implemented which had a positive impact on the stock (a 2006 recovery plan was also put in place for the southern stock).²⁷

Northern hake has a minimum conservation reference size (MCRS) of 27cm set at EU level and is caught within UK waters (ie within the Exclusive Economic Zone – EEZ – defined under the United Nations Convention for the Law of the Sea (UNCLOS) as 200 nautical miles) by both English and Scottish fleets.²⁸

English hake fishery

Hake is caught throughout the UK but mainly focussed in the south west of England in a variety of fishing gears: demersal trawls, beam trawls, and mainly gill nets. Gill-net fishing for hake mainly occurs beyond UK inshore waters (within the 6-mile limit), in particular in the Celtic Seas ecoregion (ICES divisions VIIe, VIIIf, VIIg, VIIh, VIIj, VIIk; FAO statistical area 27).²⁹

The majority of hake landed in England is landed in Cornwall and is caught mainly using gill nets, which is the unit of certification for the MSC certificate.³⁰ These MSC set nets have a mesh size of 124mm (above the legal minimum)³¹ and are typically 125 yards long, set in tiers (up to 32 nets joined together). Some vessels use up to six tiers of nets at a time (~21 Km of net).³²

Environmental factors – bycatches and discarding

In terms of the UK and regional management in England, Cornish fishing vessels >12m operating beyond the territorial waters (12-mile limit) are required (by EU legislation) to fit their nets with acoustic devices (pingers) to deter cetaceans and limit accidental catches, dramatically reducing bycatch levels of harbour porpoises.³³ In addition, the two <12m vessels in the MSC certificate use acoustic pingers at all times. This form of fishing also results in bycatches of non-target species which include sharks, rays, and seals although the level of bycatch varies (both seasonally and spatially) and is not well understood.³⁴ The Centre for



Environment, Fisheries and Aquaculture Science (Cefas) is running a scheme on spurdog (piked dogfish/*Squalus acanthias*) bycatch reduction and data improvement, which also includes vessels involved in the MSC Cornish hake gill-net fishery, where spurdog bycatch was repeatedly reported.³⁵

Discarding of juvenile hake (considered undersized and above MCRS of 27cm) can be substantial in some fishing grounds fleets. Discarding of large individuals had increased due to quota restrictions in certain fleets. Since 2015, however, observed discards have decreased.³⁶ As a result of these efforts, the Cornish hake fishery closed all five conditions of certification set at initial assessment in 2015.³⁷

MSC history and certification³⁸

The Cornish hake fishery was awarded MSC status for sustainability by independent auditors in June 2015,³⁹ certifying a fleet of 15 Cornish vessels from 12m to 23m in length catching hake from the Celtic Sea and the south of Ireland. The MSC Unit of Certification (UoC) fleet all operate from Newlyn (Cornwall), and all landings are made into the Cornish port of Newlyn. Between them, the 15 MSC-certified vessels landed 1,912t (green weight) into Newlyn Harbour (*see the section on landings for more detail*), according to catch data for 2019, reported in the February 2020 independent auditor's MSC annual surveillance report.⁴⁰ The scope of the MSC certification ends at the first point of sale at the fish markets in Brixham, Plymouth, and Newlyn.⁴¹ Initial drivers for MSC certification within the fishery were indicated to be improved marketability of the catch, greater market access and improved pricing, according to responses in this study.

The fishery uses mesh gillnets that are bigger than the legal minimum, thereby enabling the fishery to target larger hake while allowing smaller fish to escape.⁴²

The Cornish Fish Producers Organisation (CFPO) Ltd holds the MSC certificate. The CFPO was established as a non-profit-making co-operative in 1976 and includes 210 fishing-vessel-owning members from all over Cornwall. It represents the views of Cornish fishermen locally, nationally, and internationally.⁴³

MSC summary⁴⁴

Species	European hake; Hake (<i>Merluccius merluccius</i>)
Geographical area	Western English Channel, Bristol Channel, Celtic Sea and Western Approaches ICES divisions VIIe, VIIf, VIIg, VIIh, VIIj, VIIk FAO statistical area 27 (North East Atlantic)
Method of capture	Bottom-set gill nets with a mesh size of at least 120mm.
Stock	Northern Hake Stock Division IIIa, sub-areas IV, VI and VII, and divisions VIIIA, b, d



Management system	Currently a combination of EU regulations and national UK legislation
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Cornish sardines (*Sardina pilchardus*)



Sardine (*Sardina pilchardus*). Source: European Commission.⁴⁵

Biology

Sardines (*Sardina pilchardus*, also referred to historically in the UK as pilchards) are small silvery pelagic fish related to herring (from the family *Clupeidae*), which grow to a maximum of 25 cm. Sardines mature at a length of around 15 cm and the maximum reported age for the species is 15 years.⁴⁶ Sardines are found at depths ranging between 10 and 100 m along the continental shelf of the eastern North Atlantic, from the UK and Ireland to West Africa and the Mediterranean. Cornwall is the northern end of their natural range.^{47,48}

Diurnally, sardines spend their time in the 25–55 m depth of the water column, rising nocturnally to the 10–35 m depth range. This distinction in day-time/night-time behaviour is common in various fish species. Schools of juvenile fish and adult fish are usually separate.⁴⁹ Sardines are batch spawners, spawning in spring and summer in either the open sea or coastally, where females can produce between 50,000 and 60,000 eggs. Post-spawning sardines migrate northwards to feeding grounds and are subsequently found in shore in coastal waters around western Europe. In winter they migrate southwards as far as Senegal.^{50,51} Sardines feed on planktonic crustaceans (eg copepods).⁵²

Stock information

Previously considered as one single stock, following survey and modelling conducted in 2015 the stock was split into a northern and southern stock. There is a paucity of information on sardine stocks in general but the evidence available suggests sardines caught in Cornwall are a migratory subset of a larger Breton/Bay of Biscay stock. The PELTIC (Pelagic ecosystem survey in the Western Channel and Celtic Sea) programme, originally funded by the Department for Environment, Food and Rural Affairs (Defra) project POSEIDON (Pelagic Ocean Science: Ecology and Interconnectivity of Diverse Ocean Networks), was developed specifically to address the gaps in knowledge around small pelagic fish and the ecosystem in which they play such a key role. The surveys are designed and implemented by Cefas. The PELTIC survey covers ICES Division 7.f and the UK waters of ICES Division 7.e, which is equivalent to approximately 25% of the total potential sardine habitat in ICES Division 7.e. The PELTIC survey recently increased to



include all of Division 7.e and 7.d (2018), but this survey index, however, cannot yet be used as a stock indicator.⁵³ A self-sampling programme developed for the MSC-certified Cornish sardine ring-netting fishery in 2017 provides catch-at-length data. Currently, the collected data satisfies Cefas and ICES to use for stock estimates.⁵⁴ Sardines are categorised 'least concern' by the IUCN red list.⁵⁵

Landings have increased over the last decade (*see the section on landings below*) as increased numbers of vessels joined the fishery with over 5,000 tonnes landed in Cornwall in 2016.⁵⁶ ICES had previously advised for 2018 and 2019 to reduce catches by >20% compared to the 2014–2016 average.

Environmental factors – bycatches and discarding

According to the Seafish Risk Assessment for Sourcing Seafood (RASS),⁵⁷ there is a risk of accidental bycatch of marine mammals and seabirds in the sardine fishery, but this is not specifically applied to ring-netting or drift netting.⁵⁸ The landings statistics at EU level that are available to ICES are highly uncertain. There is considerable variability in landings reporting from throughout the range as well as the consideration that bycatches of sardine are unlikely to be reported. To address this, the MSC-certified component of the fishery has implemented significant improvements in data recording in the fishery, in relation to endangered, threatened and protected (ETP) species and bycatch information, in 2018/19. Conditions related to these components are on-target.⁵⁹

Management

At EU level there is no TAC for sardine and therefore no quotas at member-state level. There are effort and catch restrictions (days at sea – DAS) in the Bay of Biscay fishery (now managed with a limit on vessel numbers and catch quotas) and a small pocket of the Adriatic (subareas 17 and 18) in the southern stock but other than that, it is an unrestricted fishery EU-wide.⁶⁰ For the northern stock, which is considered in this report, the Cornish Sardine fishery has adopted specific management measures to improve data collection and ensure sustainability of the fishery and stock.

Cornish sardine fishery

Historically known as pilchards, Cornish sardines were a significant seasonal fishery for communities along the Cornish coasts and the main fishing opportunity for the Cornish fleet for centuries. The fishing mainly takes place nocturnally using a large (200m-long and 50m-deep), small-mesh net to encircle the shoals (called a *ring net*). This is then drawn in. Fish are scooped out and transferred into on-board iced holds. The fishery relies on echo sounders to find shoals. While sardines are the target fishery, other small pelagic species (eg herring, sprat, or anchovy) are also caught in this manner. The Cornish sardine fishery is inshore and undertaken within the 6-mile limit and Cornwall IFCA district⁶¹ from July through to April (mainly from August to January).^{62,63}

The fleet of Cornish ring netters has increased in size, with 15 vessels < 15m in length fishing for sardines, with the capacity to catch up to 36 tonnes per night per fishing vessel.⁶⁴ 'Slipping', whereby fish that are unwanted (too large a landing or non-target species) enables skippers to release the fish (with high survivability documented) before they are scooped up and brought on board.⁶⁵



Ring nets are limited by Cornwall IFCA by-laws (maximum net length of 18.23m). The CSMA records the catches of their member vessels but no legal quota or effort limit is put in place. The 15 members of the CSMA meet annually and set vessel-specific catch limits. For example, in 2018 these were set at 8,303t per vessel (the cumulative limit was not reached in that same year). The management group aims to prevent oversupply (leading to 'gluts' on the market, which result in lower prices) so the cumulative limit is important to adhere to for the market as well as sustainability. MSC conditions require an established decision-making process, which results in measures and strategies to achieve the fishery-specific objectives. These voluntary measures include a CSMA Code of Conduct, signed by all members. CSMA is measured and assessed against the MSC standard and certification process and originally set a levy to fund the MSC certification.^{66,67} If the voluntary measures are not followed, members would be unable to fish in the area and as such would not be MSC certified.

MSC history and certification

The Cornish sardine fishery was first certified to the MSC standard in June 2010 and re-certified in 2017.⁶⁸ The level of certification extends to members of the CSMA, which includes 15 vessels registered in Plymouth, Mevagissey, and Newlyn. In terms of the vessel sizes, there is a range including three <10m and 11 >10m in length. Sardines in this fishery are caught by ring nets and are eligible to enter further chains of custody when landed with completed logbooks at Newlyn and Mevagissey in Cornwall or Plymouth in Devon, at the processors. Chain of Custody certification is a requirement from the first change of ownership.⁶⁹

MSC summary⁷⁰

Species and stock	Sardine (<i>Sardina pilchardus</i>)
Range	ICES Divisions VIIe and VIIf (western Channel), within six miles of the coast of Cornwall.
Method of capture	Ring nets
Management systems	Cornish Sardine Management Association operating under laws of the UK and under the umbrella of the EU.



3. Methodology

This research was split into two parts: a desk-based analysis exploring landings and price changes pre- and post-MSC certification; and survey-interviews with fishers, wholesalers, vessel owners, producer organisations, skippers, and management bodies involved in both the MSC Cornish hake and MSC Cornish sardine fisheries. Triangulating secondary datasets with primary data from those at ground level helps provide insight on the socioeconomic impacts of MSC certification. This section describes the methodology used for each part.

Landings and price changes pre- and post-MSC certification

Numerous studies have explored the economic benefit associated with MSC certification. Examples include an exploration of consumer behaviour associated with MSC labelling using the discrete choice method, which found consumers willing to pay more for MSC products.⁷¹ Another study undertook hedonic analysis using scanner data to explore whether consumers were paying a price premium for MSC-certified fish and found this to be the case.⁷² Away from consumers, one study estimated the economic impact of MSC on South African hake by developing scenarios based on anecdotal evidence, industry news, and personal communication on what they estimated would happen in the years following the loss of MSC certification, finding that MSC was important for the hake fisheries market position.⁷³ When it comes to the effect of MSC on quayside prices, research remains relatively sparse. A study in 2016 using the DiD method suggested some price premium exists at a quayside level.⁷⁴

To explore how prices and landings volume changed for Cornish hake and Cornish sardines after achieving MSC certification, we used the MMO sea fisheries annual statistics.⁷⁵ This dataset provides a range of information related to the UK fishing industry, including landing port, vessel nationality, length group, landing volume, and value as far back as 2008. From this data, we observed monthly and annual variables such as prices and landing volumes over a certain period (eg before and after certification). We analysed both MSC hake and sardine fisheries. Furthermore, for each MSC fishery, there is a 'comparison fishery' that acts as a control group, for example a fishery (or fisheries) of the same species, but one that is non-certified throughout the same period. By comparing with this control group across the period before and after certification, it is possible to gain indicative insights into the effect MSC certification might have on ex-vessel (quayside) prices and landings volume.

For the Cornish hake fishery, the control group selected was the average of the four largest hake landings to ports in Scotland: Lochinver, Ullapool, Peterhead, and Scrabster. These four Scottish ports alongside Newlyn represent the five largest ports for hake landings in the UK. While there are differences between these fisheries and the Cornish context (eg different vessel nationalities, potentially different markets), it felt appropriate to compare Newlyn with these other main ports. It should be noted that in July 2018, Scottish hake became MSC certified through the SFSAG (Scottish Fisheries Sustainable Accreditation Group) Scottish Demersal MSC



certificate.¹ For this study, we assumed the impacts on prices and landings were not immediately felt after this certification.

For the Cornish sardine fishery, finding a suitable control group was difficult, as very few sardines are landed elsewhere in the UK. The best available control group within the MMO dataset was to look at sardines landed in Dutch ports by UK-registered vessels. While there are different factors influencing prices between these two groups (eg different markets), a comparison between each group was deemed appropriate for an indicative exploration of price differences. However, the relatively little data available for comparison is a limitation to consider when interpreting findings.

Given the time and data availability, it was decided that the DiD method represented the most effective way of exploring the relationship with MSC and quayside prices using the MMO data. This statistical technique controls time-varying factors and common trends in both the treatment and control groups. This allows the isolation of treatment effect (as long as certain assumptions are made).⁷⁶ In this instance, the treatment effect is MSC certification. As such, given the availability of data before and after certification and the ability to ascertain control groups from similar fisheries, DiD represented the most appropriate method available to understand the effect of MSC certification on quayside prices. As already mentioned, the DiD technique has been used in previous studies to assess the impact of MSC certification on pricing. The DiD method requires several assumptions, most notably that both treatment and control groups have similar parallel trends before intervention and that no new factors influence trends after the intervention period.⁷⁷ To ensure that such assumptions were met as closely as possible, control groups were chosen that had as much in common as possible with the MSC fisheries. It is important to note the limitations in the DiD method, namely that it does not allow any changes in price to be *directly attributable* to MSC. Nevertheless, if assumptions are met, the method provides a *good indicator of the effect MSC certification has had*.⁷⁶

This study uses a DiD model adapted from Stemle et al.'s⁷⁶ study of quayside prices in US and Japanese MSC fisheries. Two variables were added to the standard DiD model to account for different factors. This included a control variable using a logarithm of landed weight to account for the differing quantities of landings between the control and the treatment group. A dummy variable was used to acknowledge the difference in prices between months, in the case of hake, this was the winter months December and January; for sardines, this was April and May. In this model, X_3 is the DiD estimator.

¹ See <https://fisheries.msc.org/en/fisheries/sfsag-northern-demersal-stocks/@@assessments>



Hake

$$\text{Price (€/kg)} = X_0 + X_1 G_{if} + X_2 T_{tf} + X_3 \text{MSC}_{if} + X_4 \ln(\text{landings})_{if} + X_5 (\text{Winter})_{if} + u_{if}$$

Dependent variable = dockside price

f = fishery

i = group

t = time period

G = binary indicator variable for group

T = binary indicator variable for time period

MSC = interaction group and time dummy variable to isolate treatment fishery after certification

In(landings) = logarithm of landed weight (ln)

(Winter) = dummy variable for landings in December and January

u = error term

Sardines

$$\text{Price (€/kg)} = X_0 + X_1 G_{if} + X_2 T_{tf} + X_3 \text{MSC}_{if} + X_4 \ln(\text{landings})_{if} + X_5 (\text{April_May})_{if} + u_{if}$$

Dependent variable = dockside price

f = fishery

i = group

t = time period

G = binary indicator variable for group

T = binary indicator variable for time period

MSC = interaction group and time dummy variable to isolate treatment fishery after certification

In(landings) = logarithm of landed weight (ln)

(April_May) = dummy variable for landings in April and May

u = error term

Socioeconomic survey interviews

The MSC first developed a survey instrument in 2017 for semi-structured interviews, aimed at monitoring socio-economic impacts of certification on harvesters and first buyers in the supply chain. In addition to MSC staff, this survey was co-authored with external researchers and reviewed by a working group of economists, social scientists and political scientists. This provided a starting point to produce a survey tailored to the specific questions of this Cornish study (e.g. focusing in greater detail on questions around price premium) by building on a piloted and peer-reviewed example designed for this type of research⁷⁸. This was the best way within the project resources to include the necessary qualitative and quantitative information to ground-truth and compare to the official landings and price data available from the MMO. NEF Consulting reviewed and subsequently modified the existing instrument, contributing a series of additional questions (Appendix 1) to create a survey for the specific purposes of this study. These questions included both multiple-choice questions and open-ended questions which focussed on perceptions of fishers and other stakeholders of the attribution for any of the changes noted following MSC certification. Socioeconomic outcomes covered in the survey included fish prices, market access, reputation, job creation, and catches. To enable comparison between the two, the questions were the same for both the Cornish hake and Cornish sardine survey.

The strength of undertaking a survey is the ability to quantify some aspects of social outcomes. The addition of open-ended response questions allowed for more qualitative, contextual information from respondents. Limitations in the survey interview approach include the presence of an interviewer, which might influence the respondents' answers (eg they may feel unable to say something considered socially undesirable). Nevertheless, the benefits of having an interviewer present ensure that there is less likelihood of respondents misunderstanding survey questions and more opportunity to obtain qualitative data.



The semi-structured interviews, using the co-developed survey, were completed during February 2020 and conducted by a consultant commissioned and briefed by the MSC specifically for this process. The consultant, from Cornwall Rural Community Charity (CRCC), was selected due to their proximity to the fisheries and their experience in direct research with fishermen. Sampling was determined through direct promotion of the study via the CRCC consultant, and through Producer Organisation (POs) heads at the fishery. The opportunity to participate was open to any participants within the two fisheries selected and was voluntary. This key informant approach aimed to gather insights and points of view from a cross-section of actors within the fishery, including skippers, vessel owners, processors and producer organisations, to determine different perspectives and their prevalence regarding the different socioeconomic topics covered by the survey.

The consultant from CRCC subsequently compiled the responses to the relevant questions (Appendix 1) in MS Excel and these were sent by MSC to NEF Consulting for independent analysis and inclusion in the results.



4. Landings and price changes pre- and post-MSC certification

Cornish hake

Landings

Over the last decade, there has been a considerable increase in hake landings in Newlyn (Figure 4.1). The total value of these landings has risen broadly in parallel with this increase in landings. In the 4.5 years since MSC certification in June 2015, 6,297 tonnes of hake were landed with a value of £16,689,288. Comparatively, in the 4.5 years before MSC certification, 2,575 tonnes were landed at a value £5,772,191. This represents approximately a three-fold increase. Annual increases can vary between years, for example a 64.45% increase in landed weight from 2011 to 2012 and only a 5.42% increase in landed weight from 2018 to 2019 (Figure 4.2). This indicates a correlation but not causation.

Figure 4.1. Landed weight and landings value for hake landed in Newlyn 2008–2019

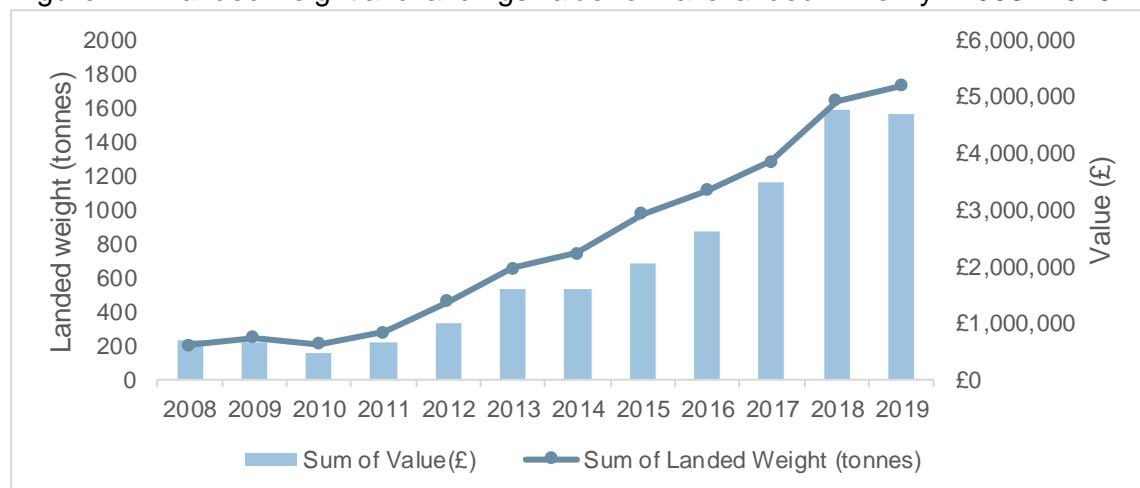
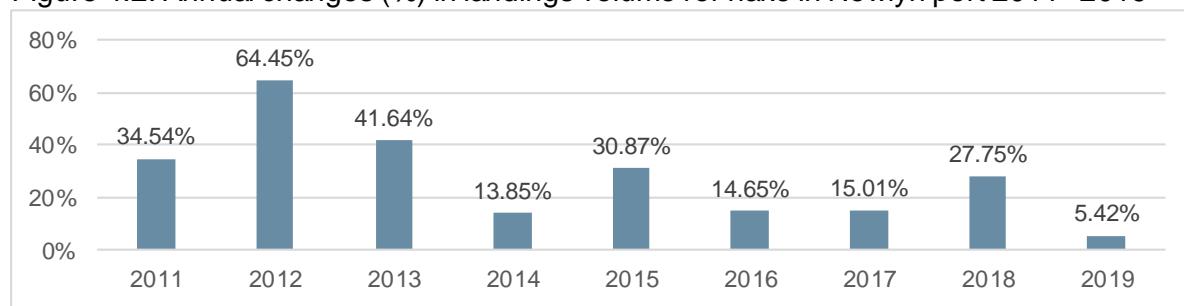


Figure 4.2. Annual changes (%) in landings volume for hake in Newlyn port 2011–2019



Prices

Using MMO data, the MSC hake fishery was defined as all the landings of hake in Newlyn, with the vast majority of landing volume categorised in the MMO data as 'drift and fixed nets' (in practice, the MSC hake fishery is all fixed gill net). The period was set as 2008–2019, with certification taking place in June 2015. As outlined in the methodology section, the control



group was selected as the average of the four largest hake landings to ports in Scotland: Lochinver, Ullapool, Peterhead, and Scrabster.

Prices were calculated by dividing the landed weight by value, to provide a price per kilogram of hake landed and adjusted for inflation (presented as 2018 prices). Figures 4.3 and 4.4 visually plot the longitudinal changes in the annual average price for both treatment (Cornish) and control group (Scottish) over the 11-year period.

Figure 4.3: Monthly weighted average hake quayside price 2008–2019 – Cornish hake fishery compared to Scottish hake fisheries

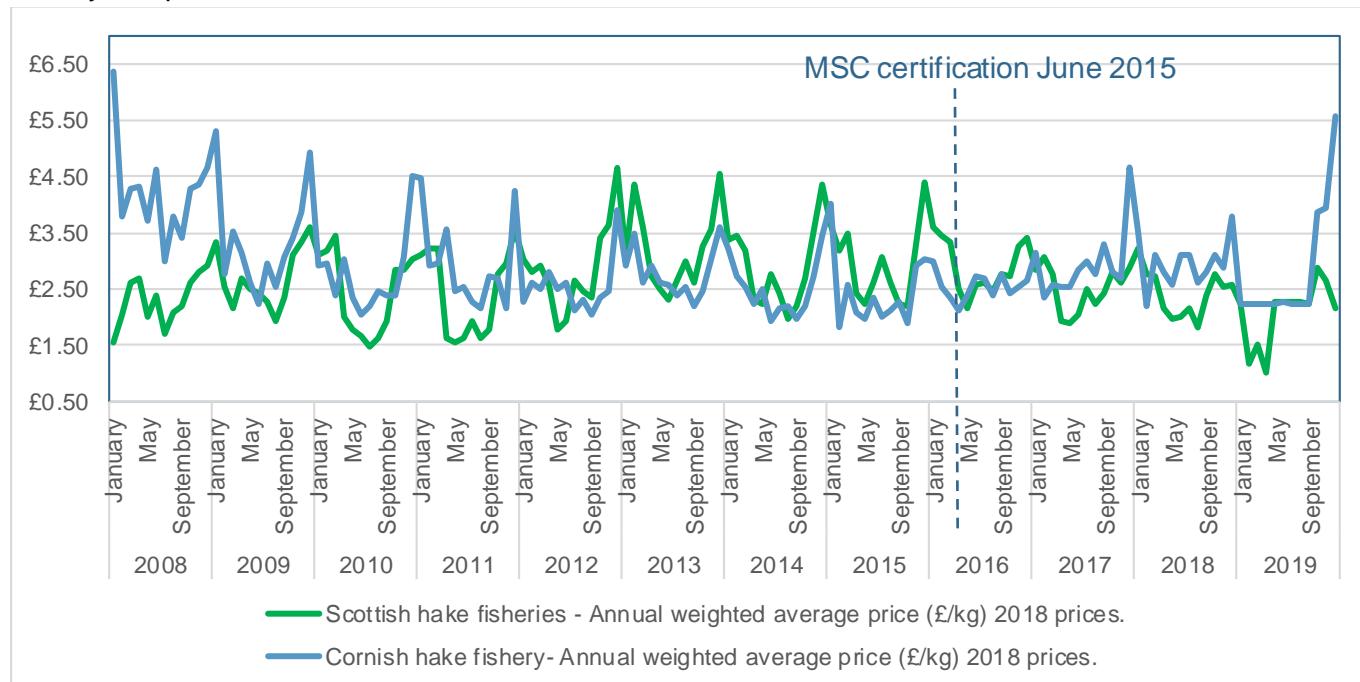
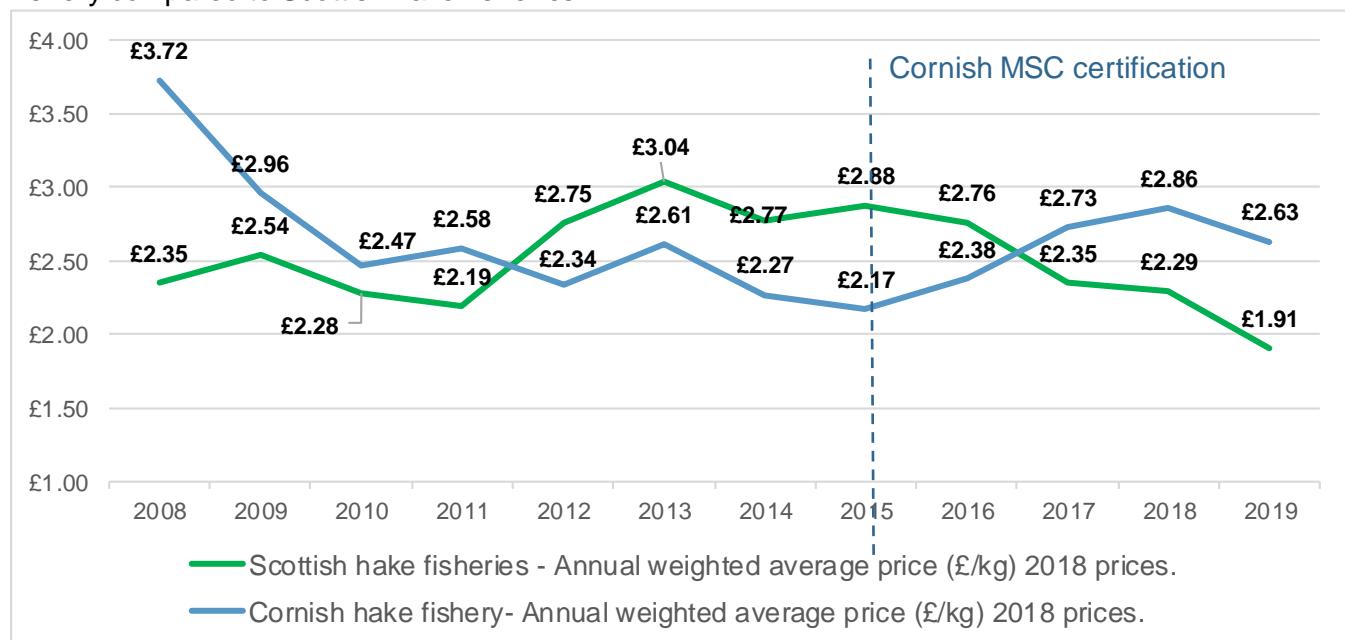


Figure 4.4. Annual weighted average hake ex-vessel price 2008–2019 – Cornish hake fishery compared to Scottish hake fisheries





Observing Figures 4.3 and 4.4, there are several notable patterns. First, there are significant fluctuations in hake prices throughout the year for both fisheries, with the winter months of November, December, and January recording considerably higher prices than other months. Secondly, the trend in prices across years is not parallel between the treatment group and the control group from 2008 to the year of MSC certification, 2015. However, there is a parallel trend from the period of 2012–2015. Thirdly, when the Cornish hake fishery received MSC certification, its price was 75% of the non-certified Scottish fisheries average (£2.17 compared to £2.88). By 2018 (at around the time the Scottish hake fisheries became MSC certified) it was 138% that of the non-certified fisheries (£2.63 compared to £1.91). This shows a marked increase in quayside prices for Cornish hake fishers and indicates that MSC certification was potentially a factor in this increase. However, the Cornish fishery price was higher than Scottish fisheries in the years 2008–2011, considerably so in 2008, where the Cornish price was 158% of the Scottish price (£3.72 compared to £2.35). The exact factors behind this trend are not known, especially the disparity between prices in 2008. It is important to note that the factors influencing the prices in 2008–2011 may have resulted in price trends following 2015. Therefore, it is necessary to rule out these factors before attributing increases to quayside prices to MSC certification. In this respect, further research is required.

The DiD model was run for all trips taken between 2008 and 2019 (3,027 in total). Table 4.1 presents the results for DiD simulation from the period 2008–2019. The DiD estimator (MSC) was both negligible in size ($X_3 = -0.053$) and far from statistically significant (p-value = 0.585). In simple terms, this suggests that MSC certification did not affect price differences between the two fisheries. Given the fluctuations in prices between both groups in the pre-treatment period (Table 3.1), especially in the first three years, this is unsurprising.

Table 4.1. DiD results for Cornish and Scottish hake fisheries: 2008–2019

Regression Statistics								
Multiple R	0.335							
R Square	0.112							
Adjusted R Square	0.111							
Standard Error	1.051							
Observations	3027							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	5.000	422.186	84.437	76.411	0.000			
Residual	3021.000	3338.345	1.105					
Total	3026.000	3760.532						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.263	0.078	16.165	0.000	1.110	1.416	1.110	1.416
G	0.345	0.063	5.504	0.000	0.222	0.467	0.222	0.467
T	-0.004	0.046	-0.081	0.935	-0.094	0.086	-0.094	0.086
MSC	-0.053	0.096	-0.546	0.585	-0.241	0.136	-0.241	0.136
Ln(landings)	0.114	0.008	14.940	0.000	0.099	0.129	0.099	0.129
Winter	0.637	0.052	12.364	0.000	0.536	0.738	0.536	0.738



As already mentioned, there is a period before MSC certification where both groups follow a parallel trend, from 2012 to 2015. If we assume that the fluctuation in trends in the years prior to this is due to external factors that do not influence prices beyond 2012, a DiD model produces a statistically significant DiD estimator (MSC) (p -value = 0.048, significant to a 95% confidence), one that is positive ($X_3 = 0.23$). Table 3.2 presents the DiD results for the 2012–2019 period. This suggests MSC certification does influence increasing quayside prices for the certified fisheries in this analysis.

Table 4.2 DiD results for Cornish and Scottish hake fisheries: 2012–2019

Regression Statistics		ANOVA					
			df	SS	MS	F	Significance F
Multiple R	0.322						
R Square	0.104	Regression	5.000	279.764	55.953	46.846	0.000
Adjusted R Square	0.101	Residual	2027.000	2421.052	1.194		
Standard Error	1.093	Total	2032.000	2700.816			
Observations	2033.00						
	0						

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.554	0.102	15.300	0.000	1.354	1.753	1.354	1.753
G	0.128	0.092	1.395	0.163	-0.052	0.309	-0.052	0.309
T	-0.296	0.056	-5.317	0.000	-0.405	-0.187	-0.405	-0.187
MSC	0.230	0.116	1.977	0.048	0.002	0.459	0.002	0.459
Ln(landings)	0.104	0.010	10.903	0.000	0.086	0.123	0.086	0.123
Winter	0.599	0.065	9.201	0.000	0.472	0.727	0.472	0.727

Cornish sardine

Landings

Since 2008, there has been a considerable increase in sardines landed in Cornish ports (Falmouth, Newlyn, Mevagissey, Plymouth, and Fowey) (Figure 4.5). MSC certification was attained for the Cornish sardine fishery in June 2010. The increase in landings has taken place over three different phases, experiencing a sharp rise in tonnes landed between the years 2010 and 2011 and 2015 and 2016. Figure 4.6 shows the increases in volume landed between 2010 and 2011, which stood at 60%, and subsequently 87% between 2015 and 2016. In the first phase (2008–2010), the average annual landed weight was 2,345 tonnes. During the second phase (2012–2015), this average was 3,546 tonnes. In recent years (2016–2019), landed weight per annum averages at 7,238 tonnes. This represents an increase of just over 300% when compared to the first phase. As with landings volume, the value of sardines landed has increased, with the annual value during the first phase averaging £738,078 compared with £2,470,344 in the third phase (an increase of 335%).



Figure 4.5. Landed weight and landings value for Cornish sardine 2008–2019

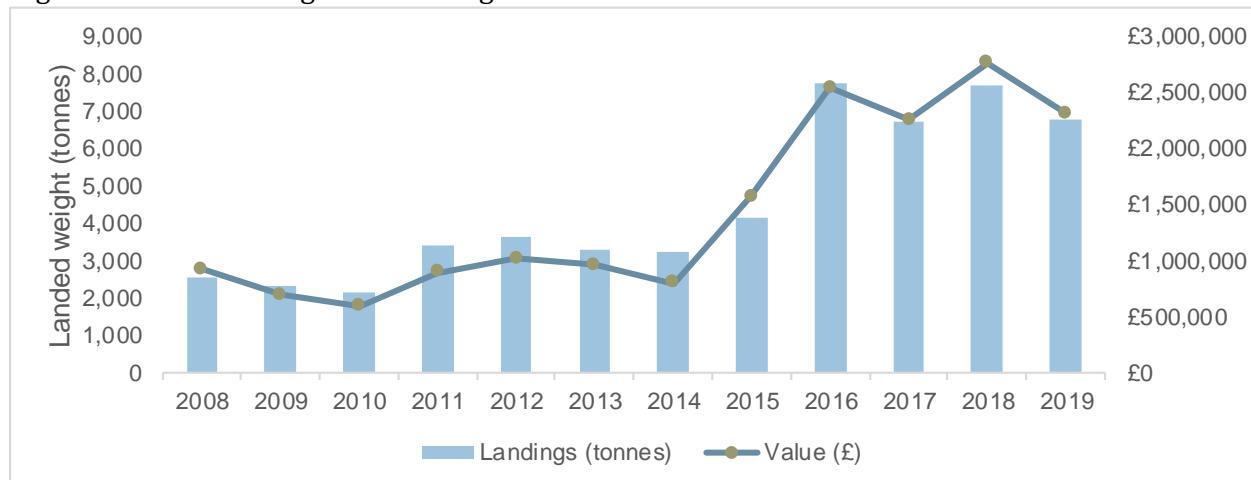
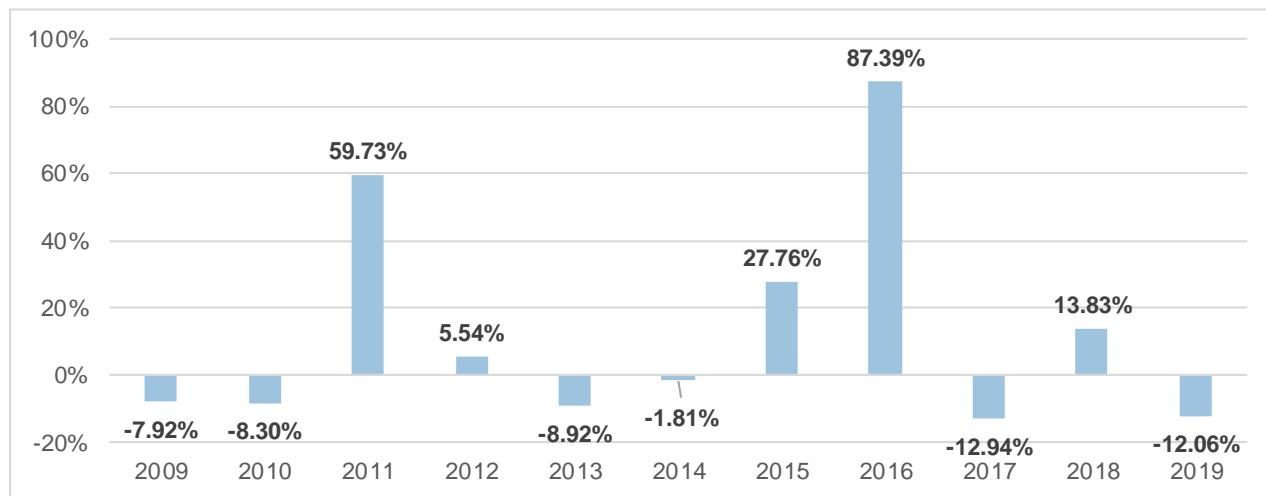


Figure 4.6. Annual changes (%) in landed weight for Cornish sardine 2011–2019



Prices

Using the MMO data, the MSC Cornish sardine fishery was defined as all the landings of sardines in the following ports: Falmouth, Newlyn, Mevagissey, Plymouth, and Fowey. Another criterion used to define the MSC fishery in this context was gear type. Using the MMO data, we considered all sardines caught using the following: demersal trawl/seine, drift and fixed nets, pelagic seine. While the MSC unit of certification for sardines is ring nets and surrounding nets with seine, as data is collected in a different way by the MMO, we have included the following categories as they include overlapping components, for example demersal trawl/seine or pelagic seine. The period was set as between 2008 and 2017 for two reasons. First, MMO data for 2018 and 2019 did not contain gear type information and secondly, we wanted to reduce the length of time considered following MSC certification in 2010; the more time that has passed, the less likely any changes in price are attributable to certification.

Prices were calculated by dividing the landed weight by value to provide a price per kilogram of sardines landed and adjusted for inflation (presented as 2018 prices). Figures 4.7 and 4.8 visually plot the longitudinal changes in price for both treatment (MSC) and control group (non-MSC) over the nine-year period.

Figure 4.7: Monthly weighted average Cornish sardine ex-vessel price 2008–2017 – MSC fishery compared to non-certified Dutch landings by UK vessels

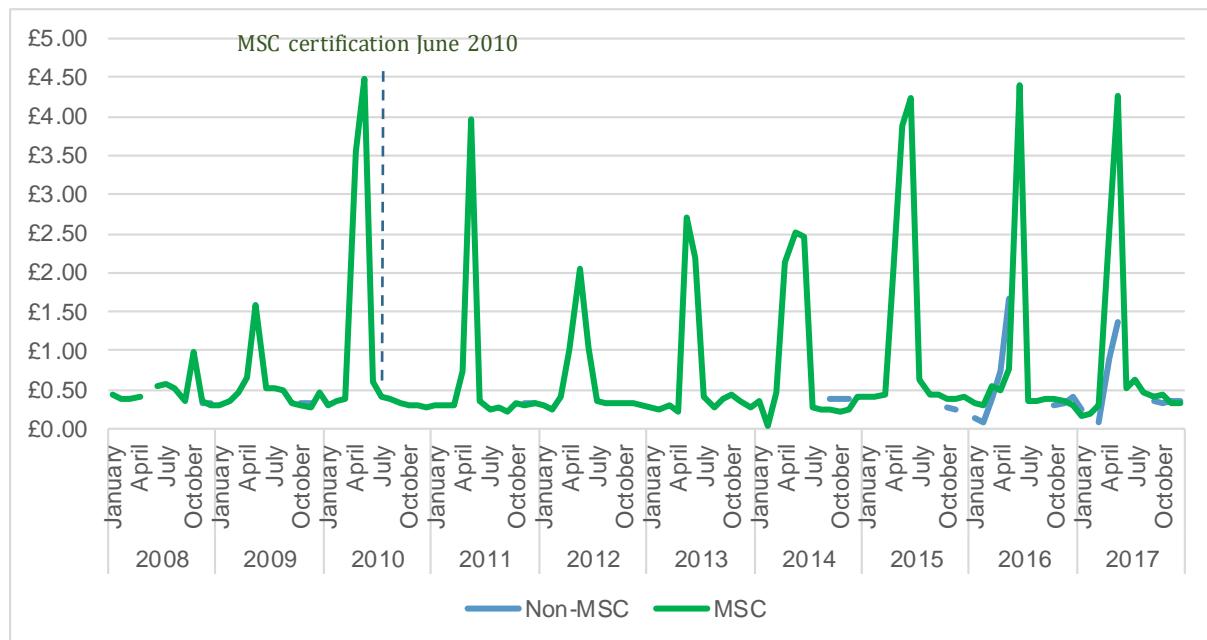
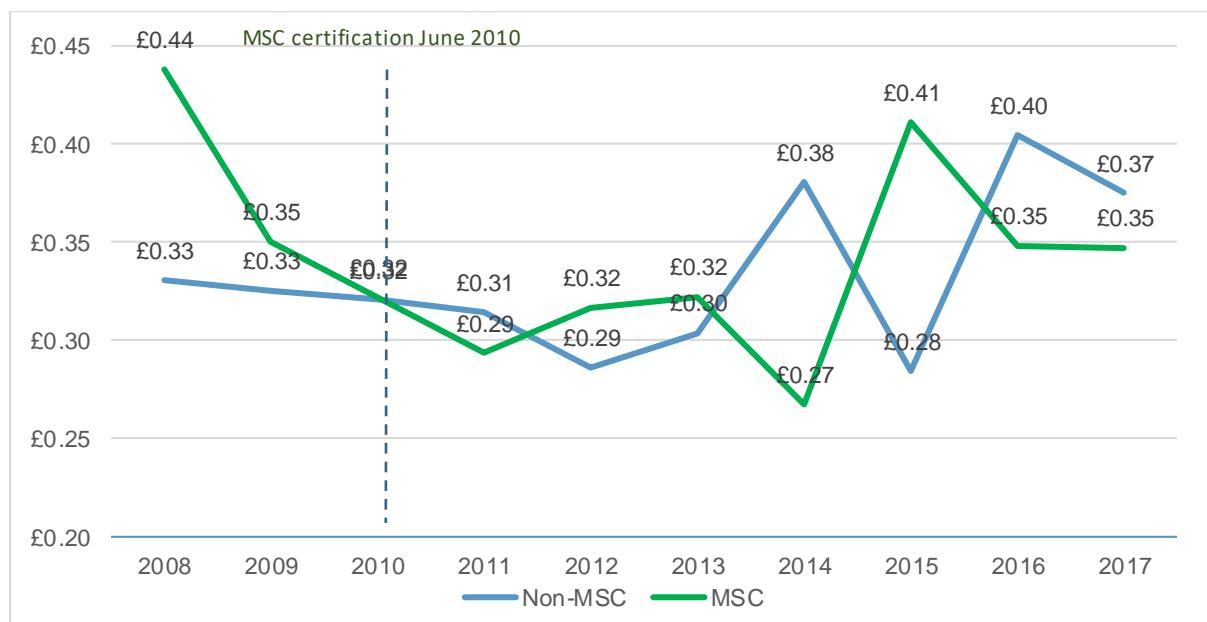


Figure 4.8: Monthly weighted average sardine ex-vessel price 2008–2017 – MSC fishery compared to non-certified Dutch landings by UK vessels



In Figure 4.7, there is a clear spike in the month-by-month prices, with the highest prices per kilogram found in the late spring/early-summer months (April–June). This is likely to do with scarcity increasing the price during these months. For Cornish ports, the average monthly



landed weight for the April–June period across 2008–2017 is 12 tonnes compared to 611 tonnes for the October–December period. Between 2008 and 2017, the price of sardine fluctuates for both groups, ranging between £0.27 and £0.44. There is no parallel trend between both groups: some years the annual weighted average price is greater than the other group, others it is less. Like the MSC hake fishery, there is a notable decrease in price from 2008 to 2010 starting from a high position. MSC certification in June 2010 does not seem to have influenced prices in the years that followed.

The DiD model was run for all trips taken during the period 2008 to 2017 (863). Table 4.3 presents the results for DiD simulation from the period 2008–2017. Given the lack of parallel trends between the two groups present in Figure 4.8, it is unsurprising the DiD model does not produce significant results (eg p-value for $X_3 = 0.42$ (Table 4.3)). As such, this model does not show MSC certification influencing increasing quayside prices for certified Cornish sardine fisheries.

Table 4.3. DiD results for Cornish sardines and sardines landed in Dutch ports by UK vessels: 2008–2017

Regression Statistics		ANOVA				
Multiple R	0.681					
R Square	0.463	df	SS	MS	F	Significance F
Adjusted R Square	0.460	Regression	5	162.729	32.546	127.197
Standard Error	0.506	Residual	737	188.576	0.256	4.58115E-97
Observations	743	Total	742	351.306		

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.71	0.18	3.96	0.00	0.36	1.07	0.36	1.07
G	0.15	0.19	0.80	0.42	-0.22	0.51	-0.22	0.51
T	-0.14	0.20	-0.70	0.48	-0.53	0.25	-0.53	0.25
MSC	0.17	0.21	0.81	0.42	-0.24	0.57	-0.24	0.57
Ln(landings)	-0.13	0.01	-20.12	0.00	-0.14	-0.12	-0.14	-0.12
April_May	0.73	0.08	8.99	0.00	0.57	0.90	0.57	0.90



5. Socioeconomic survey responses

A total of 15 fishers (vessel owners, skippers) and other stakeholders (members of producer organisations, processors, and management associations) were interviewed by a consultant from the Cornwall Rural Community Charity in early 2020, funded and organised by the MSC. Of these, five participated in the hake fishery (representing 33% of the 15 vessels certified) and 11 participated in the sardine fishery (78% of the 14 vessels) with one fisher participating in both fisheries. MSC had hoped to undertake a greater number of interviews to develop a richer qualitative data set, but unforeseen circumstances impacting the fishing industry meant this was not possible; fewer participants were interviewed than anticipated. A summary of the key points, which relate to the impacts of MSC, is presented for each fishery.

Cornish hake

When asked, 4 of 5 participants were satisfied with the benefits they were receiving through the fishery; 1 participant was neither satisfied nor dissatisfied. When asked to explain their reasons, fishers stated that the benefits resulted from prices having risen and volume being maintained, while a good marketing campaign by MSC had resulted in a 60p rise in price per kg. This meant a price increase from £2.00 kg average (2010) to £2.59 (2019), with an increase in volume. Care-of-the-catch adaptations (product quality care) were made alongside staggered landings of fish for the market. These were also factors considered to be in part responsible for the price increase. MSC publicity, consumer demand, and TV chef endorsement are thought to also have contributed.

Initially, 60% of fishers had anticipated higher prices and a notable proportion (40%) also stated they had benefitted from greater market access because of certification. Their reflections on what had materialised after certification covered impacts on prices, market access, reputation, job creation, and catches.

- i. Fish prices: All respondents noted an increase in price (100%). There was agreement that MSC certification played a role, but full attribution was not clear, as fishers outside the MSC certificate had also noted higher prices, according to a vessel owner participating in both fisheries. Other factors such as care of catch (product quality), consumer demand, and marketing also were thought to have played a role.
- ii. Market access: All respondents noted an increase in market access (100%). Attribution to MSC was perceived but could not be quantified. Other factors included increases in catches, improved quality and popularity in the UK as well as increases in hake quota. Promotion by the CFPPO was also perceived to have supported greater market access.
- iii. Reputation: All respondents noted an increase in reputation (100%). Attribution to MSC was perceived but could not be quantified. Other factors included increased awareness and perceptions around eco-labels.
- iv. Job creation: One participant noted increases in terms of job creation. The other four (80%) stated employment had stayed the same. The counterfactual of what would have happened without MSC was not available. This was noted by one respondent. Some attribution of this to MSC was shared but this was not quantifiable.



v. Catches: Sixty percent of respondents noted a greater increase in catches. Again some of this was attributed to MSC certification but this was not quantifiable. Quota increases in recent years, improved science, and stock assessments were seen as factors leading to the increases in catches alongside price increases driving fishing effort.

Regarding the top perceived benefits that encouraged participation in the certification process, 60% of respondents stated price was the top benefit, which supported their participation in the certification. Furthermore, 40% of those surveyed stated access to supermarkets/markets were the primary benefit they were expecting as a benefit of certification. MSC-labelled Cornish hake products sold in UK retail settings amounted to 74 metric tonnes in the 2018/2019 financial year. Perception of the product (considered a benefit by 40% of respondents) and market access (considered a benefit by 20% of respondents) were ranked as second-tier benefits, with quality assurance and demand from processors also given as responses. Processors had informed respondents that MSC certification was having a positive impact on their prices. The third benefit listed included stating it was participation in a sustainable fishery (40%), as well as price (20%), and quality/volume (20%).

When asked if the benefits of certification outweigh the costs of becoming certified, 100% of respondents stated that the benefits of certification were much greater than the costs of becoming certified.

When asked about developments post-certification, the following options were selected:

- Improved catch per unit effort
- Reduced operating costs
- Improvements in quality control (2)**
- Extended fishing seasons
- Less time spent at sea (2)**
- Higher profits (3)**
- More fish to the market place (1)**
- More product types produced
- A greater number of export markets

It was noted that quality was improving overall and that the reputation for hake had extended beyond MSC in Cornwall with a good reputation nationally and internationally. Time at sea had remained static, with profits higher in the fishery, which was effectively restricted to 30–35 weeks per year (with tides). Exports had decreased and it was thought that 90% of the hake was consumed in the UK, compared to previous years where the majority was exported. It was made clear that the market was complex so quantifying the benefits of MSC certification was difficult. According to one respondent, those fishers not certified were also experiencing an increase in hake prices, although this represented a small portion of total landings.

Fishers also stated that certification and re-certification were expensive, but it came with the benefits of good promotion. It was noted that it is very difficult to say what difference MSC has made and that fishing is a consumer-lead market where buyers increasingly require MSC and therefore processors encouraged fishers to participate.



Cornish sardine

When asked, 4 of 11 participants stated they were satisfied with the benefits they were receiving through the fishery as a result of MSC certification. Seven participants were neither satisfied nor dissatisfied. When asked to explain their reasons, fishers stated that they had not noted any real change regarding price increase (some even stated there had been a price decrease relative to 2006), but processors appeared to have realised benefits resulting from marketing product as MSC. Fishers noted other benefits, for example through required scientific research or possibly price maintenance, as well as through maintaining market access. Volumes of sardine landings had increased and this increase in supply had kept the prices down, but the increase in volume meant fishers had maintained their gross income.

Initially, fishers had anticipated higher prices (36%) and greater market access (45%) as well as improved reputation (9%) as a result of certification. Their reflections on what had materialised after certification covered impacts on prices, market access, reputation, job creation, and catches.

- i. Fish prices: Nine (82%) respondents stated that sardine prices had stayed the same after MSC certification, while one (9%) stated prices had increased and one (9%) stated prices had decreased. There was a lack of clarity as to whether MSC certification played a role in the price. Attribution was unclear and some of those interviewed thought MSC had played a role while others thought MSC had played no role at all. One respondent thought prices would have decreased more without MSC certification. Other factors such as landings in other areas, a highly competitive market (including Spanish and French vessels), and possibly oversupply as a result of overfishing the southern stock (which currently has its MSC certification suspended) may have played a role.
- ii. Market access: Ten (91%) respondents stated that market access had improved or improved greatly, with one (9%) stating it had stayed the same. 54% of the respondents thought this was due to the MSC, whereas others were unsure.
- iii. Reputation: Eight (73%) of those interviewed said the reputation of landing MSC sardine had improved or improved greatly, while the remaining 3 thought the reputation had stayed the same. The majority (73%) of those interviewed attributed this to MSC certification, supported by increased awareness about the MSC sardine fishery and TV programmes.
- iv. Job creation: 81% of those interviewed thought there had been no change, but some respondents indicated there had been job increases in the supply chain (mainly in processing and also in transport). These jobs were attributable to higher catches and landings but not to the MSC in their views. One respondent felt there had been a decrease in employment opportunities as a result of MSC as sardine is non-quota species where the MSC standard requires fishers to follow ICES advice (data poor; 20% cut in TAC), which led to a capping of vessel catches and vessel numbers.
- v. Catches: 55% of those interviewed had observed an increase in catches, whereas 18% had experienced a decline (as a result of the TAC reduction) and 18% noted no change. The decline was attributed to MSC and ICES advice, whereas the increases were not attributable to the MSC.

Regarding the top perceived benefits that encouraged participation in the certification process, there were several perceived benefits (listed alongside the number of times they were stated),

but the dominant perceived benefit was the reputational gain as a result of MSC certification, followed by a larger market and improved market access.

②	Opening other markets	(1)
②	Market access	(3)
②	Larger volume market	(4)
②	Reputation	(6)
②	Point of difference from other catch areas	(1)
②	Increased catches	(1)
	customer demand	(1)
	Market price	(2)

When asked if the benefits of certification outweigh the costs of becoming certified, 100% of respondents agreed with the statement, with a split between those who stated that the benefits of certification *are much greater* than the costs of becoming certified (55%) or that *the benefits of certification are even* with the costs of becoming certified (45%).

When asked about developments post-certification, the following were selected

②	Improved catch per unit effort	(2)
②	Reduced operating costs	(1)
②	Improvements in quality control	(4)
②	Extended fishing seasons	(1)
②	Less time spent at sea	(1)
②	Higher profits	(1)
②	More fish to the marketplace	(6)
	More product types produced	(1)
	A greater number of export markets	(3)

Some fishers commented that there was a much better outlook towards stock science coming from ICES, in part through fishers self-sampling catches. The market had also expanded to include butterfly fillets instead of whole fish, which increased the possible market as well as the shelflife by 48 hours.

Having active vessels and processors in the CSMA was perceived to strengthen resilience to external shocks, whether economic (e.g. exchange rate changes) or environmental (e.g. weather). In addition, the membership payments enabled funds to be raised for MSC audits, which everyone contributed towards. The fishers interviewed hoped to maintain certification going forward which demonstrates an overall perception of benefits of certification. Preference was recorded for a local company to conduct the auditing. Those interviewed suggested there was a role for the MSC to encourage this change to a local company for auditing.

Fishers felt they had benefitted from MSC certification. With sardine fisheries in other countries losing their certification, it is even more important to remain certified. The benefits of the MSC are not always tangible and some interviews suggested that the CSMA has had a bigger impact on success than the MSC. Those interviewed felt that the MSC process had encouraged or facilitated useful research due to the auditing process and conditions, as well as promoting the fishery on social media. The perception that processors have benefitted more than fishers was expressed.



6. Conclusion

This report is the result of an exploratory study into the socioeconomic impact of MSC certification at a fishery level across two fisheries: Cornish hake and Cornish sardine. The qualitative and quantitative analysis of changes attributable to MSC certification delivered mixed results. For the Cornish hake fishery, the analysis of MMO data alongside the survey results indicated a positive impact in price premiums, market access, and other socioeconomic benefits. The DiD model suggested a potential price premium resulting from MSC certification (when compared with the control group from 2012 onwards). Furthermore, visually interpreting price changes on an annual basis suggests an increase related to certification. When hake fishers were asked whether they had experienced a price difference due to certification, they described a price premium, alongside other socioeconomic benefits, such as access to markets. This supports the MMO data analysis.

In contrast, according to the DiD model, there does not appear to be an association with MSC certification and a price premium for Cornish sardine. In general, the MMO data presents no trends and in survey interviews with sardine fishers, they did not describe improved quayside prices attributable to MSC certification. However, other socioeconomic impacts at the Cornish sardine fishery level were observed, such as possible price maintenance, as well as maintaining market access. This is not to say there is no quayside price premium or another socioeconomic benefit, just that this study has not unearthed them. This is especially the case for the MMO data analysis on Cornish sardine, where the options for a suitable control group were very limited.

The findings in this study are considered preliminary and indicative. Analysis of MMO sea fisheries data can indicate trends but it is difficult to ascertain causation beyond correlation. DiD modelling offers one approach, but this method comes with limitations, notably the challenge of finding a suitable control group and assuring no other external factors are influencing changes after an intervention. Survey response rates were relatively low and therefore limited in their representativeness. Nevertheless, even with these limitations in mind, this study has provided useful insights on the impact MSC certification has at a fishery level.

In terms of exploring how the MSC can better understand its socioeconomic impact at a fishery level, this study unearthed several lessons that can help inform future research.

First, when using landings data to observe price trends between the MSC treatment group and non-treatment groups, the designation of a control group is hugely significant. This can prove a challenging process and is greatly shaped by the data available. In the case of Cornish sardine, there were limited options for a control group, making the comparison to a hypothetical counterfactual difficult. Access to a dataset that provided similar information to the MMO's annual sea fisheries data beyond the UK would prove beneficial (eg Irish or Dutch sardine fisheries); however, these were not available for this study (and are collected and recorded in different ways, which may impact the analysis).

Secondly, achieving a high survey response rate for surveying presents a practical challenge: stakeholder engagement can prove difficult, especially during periods of uncertainty (eg around leaving the CFP and the impact on EU markets). To counter this, innovative means of getting higher numbers to respond might help, for example reaching out at a location where many relevant stakeholders are in one place, such as a prearranged workshop or event.



There are numerous ways to build on this research going forward. In terms of comparing landings data and price premium, more in-depth research on what constitutes a viable control group to compare certified and non-certified fisheries would greatly enhance the potential for the MSC to understand whether certification is having an impact on prices. Additionally, with the study's available resources, we were unable to gain access to datasets with the information beyond the MMO dataset.

Future research could include more in-depth analyses of external factors that might impact quayside prices in a particular port, which will help bolster the robustness of any claims of price changes being influenced by certification. In terms of building on the primary data collection from socioeconomic survey research, future research could also investigate insights emerging from the surveys, such as some respondents suggesting that the CSMA, which manages the fishery and holds the MSC certificate, has had a bigger impact on the success of this fishery than the MSC. To gain a more in-depth understanding of the economic impacts on individual fishers or wholesalers, the use of open-book audited accounts could provide a dataset that is arguably more reliable and verifiable than the self-reported responses found in a limited number of fisher surveys.⁷⁹ These above are some of the possible routes to build on this report's contribution to understanding how MSC certification can influence socioeconomic outcomes at a fishery level.



Appendix 1.

1. How many years have you participated in or worked with this fishery?
2. In what other fisheries do you participate?
3. Did you participate in the pre-assessment phase that led to certification? (please tick one)
 - No, I did not participate in the pre-assessment phase.
 - I directly participated in the pre-assessment phase.
 - I participated in the formal assessment.
 - I provided comment on the formal assessment.
 - Other (please specify)
4. Why did the fishery seek certification?
5. Who led the process to get certification?
6. Who paid for the process to get certification?
7. Was there (dis)agreement among fishers whether the fishery should go through the assessment process? (please tick one)
 - Everyone agreed
 - Most people agreed
 - About half the people agreed
 - Most people disagreed
 - Everyone disagreed
8. What were the principal points of agreement?
9. What were the principal points of disagreement?
10. Now that this fishery is certified, how satisfied are fishers with the benefits that this fishery has received? (please tick one)
 - Very satisfied
 - Satisfied
 - Neither satisfied nor dissatisfied
 - Dissatisfied
 - Very dissatisfied
11. Please explain the reason for the level of satisfaction you indicated in the previous question.



12a. Thinking back to when this fishery entered the assessment process, please indicate which **social and economic** effects of MSC certification you anticipated.

- A higher price for the fish
- Greater market access
- Easier access to credit (with the banks)
- Greater credibility of the industry (reputation)
- Job creation
- Increased catches

12b. Comparing now to before MSC, which of the following **social and economic** effects were realised?

(i) Fish prices

Greatly decreased *Decreased* *No change* *Increased* *Greatly increased*

- a. How much was this attributable to MSC?
[0%-100%]
- b. Are there any other factors you feel may be responsible for changes in this outcome? (Note for surveyor: if possible, see if you can get rough % estimates for other factors)

(ii) Market access

Greatly decreased *Decreased* *No change* *Increased* *Greatly increased*

- a. How much was this attributable to MSC?
[0%-100%]
- b. Are there any other factors you feel may be responsible for changes in this outcome? (Note for surveyor: if possible, see if you can get rough % estimates for other factors)

(iii) Greater credibility of the industry (reputation)

Greatly decreased *Decreased* *No change* *Increased* *Greatly increased*

- a. How much was this attributable to MSC?
[0%-100%]
- b. Are there any other factors you feel may be responsible for changes in this outcome? (Note for surveyor: if possible, see if you can get rough % estimates for other factors)

(iv) Job creation

<i>Greatly decreased</i>	<i>Decreased</i>	<i>No change</i>	<i>Increased</i>	<i>Greatly increased</i>
<input type="checkbox"/>				

- a. How much was this attributable to MSC?
[0%-100%]
- b. Are there any other factors you feel may be responsible for changes in this outcome? (Note for surveyor: if possible, see if you can get rough % estimates for other factors)

(v) Catches

<i>Greatly decreased</i>	<i>Decreased</i>	<i>No change</i>	<i>Increased</i>	<i>Greatly increased</i>
<input type="checkbox"/>				

- a. How much was this attributable to MSC?
[0%-100%]
- b. Are there any other factors you feel may be responsible for changes in this outcome? (Note for surveyor: if possible, see if you can get rough % estimates for other factors)

13. Which were the top benefits that supported participation in the assessment process?

#1 _____

#2 _____

#3 _____

14. Do you believe that, for your fishery, the benefits of certification outweigh the costs of becoming certified? (please tick one)

- Yes, the benefits of certification are much greater than the costs of becoming certified.
- Yes, the benefits of certification are slightly greater than the costs of becoming certified.
- The benefits of certification are even with the costs of becoming certified.
- No, the costs of becoming certified are slightly greater than the benefits.
- No, the costs of becoming certified are much greater than the benefits.

15. Have any of the following developments happened to your industry after certification (these may be unrelated to certification)? (tick any that apply)

- Improved catch per unit effort

Estimate/quantify developments, if possible _____



- Reduced operating costs
Estimate/quantify developments, if possible _____
- Improvements in quality control
Estimate/quantify developments, if possible _____
- Extended fishing seasons
Estimate/quantify developments, if possible _____
- Less time spent at sea
Estimate/quantify developments, if possible _____
- Higher profits
Estimate/quantify developments, if possible _____
- More fish to the marketplace
Estimate/quantify developments, if possible _____
- More product types produced
Estimate/quantify developments, if possible _____
- A greater number of export markets
Estimate/quantify developments, if possible _____

16. Do you wish to make any final comment? _____



Endnotes

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