

DEFRA LOW IMPACT FISHING CO-DESIGN PROJECT

PHASE 2: FINAL PROJECT REPORT

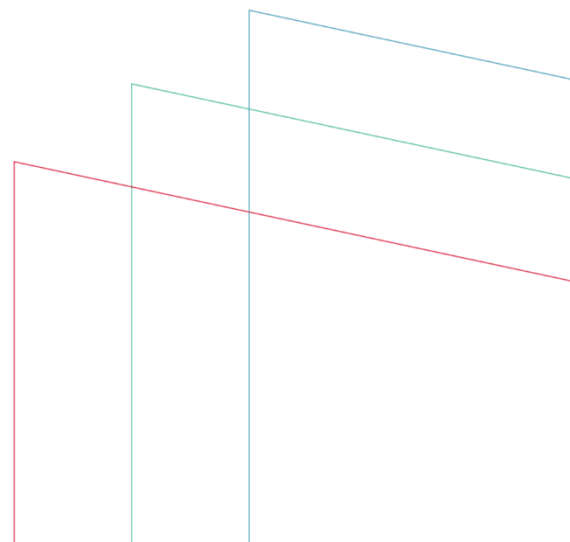
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1. INTRODUCTION: SHORT SUMMARY OF CONCLUSIONS FROM PHASE 1

1.1 LOWERING THE ENVIRONMENTAL IMPACT OF FISHING IN ENGLAND

There is a growing understanding in England that the allocation of resource access through a fleet division at under 10 metres is outdated, reducing the efficacy of management measures and obstructing efforts to ensure sustainable, economically productive fisheries. A wide variety of fishing gear types are used to catch finfish and shellfish in England.¹ These gears are constantly evolving, with a focus on trying to reduce fuel use/costs, catches of non-target species and any negative impacts on marine habitats through interactions with fishing gear.² The UK seafood fishing industry, despite its importance to both our economy and culture, is recognised as a significant threat to the sustainability of our marine environments.³

In light of this, stakeholders with a broad array of involvement in commercial fishing have been calling for a coherent approach to fisheries management to *“ensure that our fisheries, our marine environment and our coastal communities are sustainable and thriving”*.⁴ The National Federation of Fishermen's Organisations (NFFO) are calling for the *“artificial division of the fleet at 10 metres”* to be replaced with a new classification based on impact.⁵

Within the wider policy context, the implementation of new fisheries legislation is recommended to provide a framework for how to minimise the impact of fisheries on the marine environment and enable ocean recovery. A key consideration within this framework will be how to approach the allocation of fishing opportunities (whether quota, days and sea or spatial management) to ensure these principles of reducing negative externalities from fishing are reduced.

1.1.1 Overview of the fisheries sector in England

Fishing around English shores is a diverse activity and sector, ranging in scale and gear used, practice and business model. The main distinction is between active and passive gears. Active gears include trawls and dredges, which are towed, whereas passive gears are those that are fixed or drift with the tides. (Passive gears include fixed nets, drift nets, pots and traps as well as hook and lines.) The selectivity/survivability of non-target

catches, fuel use and impacts on the seabed are considered in available literature⁶ (see *Literature review* submitted to Defra) as the main distinctions between active and passive gears, with active gears having a higher environmental impact overall due mainly to higher fuel use, seabed impacts⁷ and lower selectivity when compared to passive gears.

In general terms, pots and traps are used in shellfish fisheries (e.g. crab, lobster, whelk) as are dredges (scallops), whereas nets, hook and line and trawls are used in finfish fisheries, whether demersal (seabed, e.g. cod or sole) or pelagic (species fished in the water column – e.g. mackerel or herring).

In the UK, many species can be caught by either active or passive gears. For example, Nephrops (langoustine) are caught by trawls as well as creels (pots). The rates of bycatches, and seabed impacts are notably different for these two fisheries.⁸ The same is true of cod, where trawls and fixed nets⁹ both catch cod in the North Sea, and these gears also have different environmental impacts, from fuel use to bycatch.¹⁰

Beyond overarching distinctions between active/mobile and passive/static gear, the configuration of gears – their footprint and the mesh sizes and panels used – also mean there are distinctions between similar gear types, which also determine their impact. Other factors, which need to be considered, include characteristics of the fishery (whether it is mixed or for single species) and the location (fishing grounds/marine habitat) where the fishing takes place, as well as other factors, including how the gear is towed, the weight of the gear and the skipper's technique and approach to using the gear.

The literature review supporting this project provides more detail on the specifics of fishing gears used and their impacts, especially citing the impacts of how different gears have been estimated alongside the respective footprints for the North Sea and North Western waters.^{11,12} For example, some trawlers are 'twin rig', i.e. doubling the footprint, while some scallop dredgers can tow up to 18 dredges a side, which multiplies the footprint of the gear compared to single or double dredges.

1.2 WHY CONSIDER THE DEFINITION OF LOW IMPACT FISHING?

To date, the European Union (EU) Common Fisheries Policy (CFP) Article 4 provides a definition of low impact fishing as "*utilising selective fishing techniques which have a low detrimental impact on marine ecosystems or which may result in low fuel emissions, or both*". When the UK leaves the CFP, a suitable definition for the England (and the UK) will be needed.

The **Fisheries White Paper (2018)** states that Defra will “*consider new criteria to define low impact inshore fishing vessels to replace the current ‘under 10 metres category’*” and makes extensive mention of the need to favour “*low impact fisheries*”. Yet these are not currently defined and therefore the vision for an efficient and sustainable fishing industry, based in part on the principle of low impact fishing, cannot be met without having objective, transparent and measurable criteria.

The **25 Year Environment Plan (25 YEP)** commits to sustainable fisheries and an approach that prioritises the health of the marine environment and ocean recovery:

“Beyond our coastlines, we must do more to protect the seas around us and marine wildlife. . . . We will develop a fishing policy that ensures seas return to health and fish stocks are replenished. We will also extend the marine protected areas around our coasts so that these stretches of environmentally precious maritime heritage have the best possible protection.

This 25 Year Environment Plan. . . calls for an approach to agriculture, forestry, land use and fishing that puts the environment first.”¹³

The high level objectives and principles apply specifically to fisheries and form the basis of Defra’s approach to fisheries legislation following EU Exit, namely the Fisheries Bill (and subsequently the Fisheries Act). Similarly, commitments in the 25 YEP to management that “*accounts for, and seeks to minimise, impacts on non-commercial species and the marine environment generally*” requires that any given definition addresses these wider aspects.

Without a definition of low impact fishing, commitments in the Fisheries White Paper and 25 YEP – e.g., the days at sea trial (“*effort-based*” management to replace the current under 10 metres ‘*quota*’ pool) for some low impact inshore fisheries – cannot be implemented. Therefore, how fishing opportunities are allocated and whether criteria, which can aid the reduction of negative environmental impacts on the marine environment, are applied are key considerations for UK fisheries management.

As the White Paper states:

“Defra and MMO can use this opportunity to review how the English inshore fleet, many parts of which could be viewed as relatively low impact (such as artisan fishers with close ties to their coastal communities), is managed and regulated. Instead of the current ‘under 10 metres’ category we will consider a variety of potential options including limits to engine power and restrictions on where such vessels can fish. This approach supported by vessel monitoring and electronic catch reporting could allow us to provide increased fishing opportunities, or lighter regulation, for those involved in low impact fishing

activity. At the same time, it would be necessary to monitor the potential cumulative impact of medium impact vessels.”¹⁴

Furthermore, the White Paper seeks to integrate recreational sea angling (RSA) within the new fisheries framework. Again, there is no distinction between or within RSA in terms of which impact currently exists for England. These issues highlight the need for definitions and approaches to low impact fishing to be adaptable and resilient to changes as innovation and spatial management of fisheries in England evolves.

1.3 WHY CO-DESIGN?

For a definition to be fit for purpose in developing a low impact fishing framework it needs to be accepted across the commercial and recreational UK fleet, among regulators and the wider public, hence a wide range of actors with heterogeneous preferences should be involved. As technology and environmental and policy conditions change, a definition of low impact fishing will need to be resilient to change and can therefore not be developed in isolation.

A collaborative, co-designed approach is needed to give the necessary range of stakeholders an opportunity to shape the definition, as well as conferring other benefits such as building cohesion, trust, respect, honesty and tolerance amongst stakeholders to last beyond the immediate scope of the project. This provides the opportunity to test the salience of using definitions such as low impact at an early stage of policy design, so policy ambitions and trajectories can be adjusted if needed.

Co-design is a process that goes beyond consultation by involving stakeholders in the early phases of policy development through participatory and consensus-building approaches. Arnstein’s ‘Ladder of Participation’¹⁵ is often used to illustrate different levels of involvement of people and communities and more recently, NEF have adapted this into a ‘ladder of co-production’¹⁶ (Fig. 1). The ladder shows a continuum of participation moving from ‘doing to’ on the lower rungs, through to ‘doing for’ and ultimately ‘doing with’ on the upper rungs. ‘Doing with’ consists of processes of co-design and co-production, with co-design involving listening to (and valuing) stakeholder views, deliberating in a forum of trust and then acting upon the outcomes of deliberations. This shift in focus of engagement requires valuing people as knowledge providers and legitimators, promoting reciprocity and building social networks based on trust.^{17,18,19}

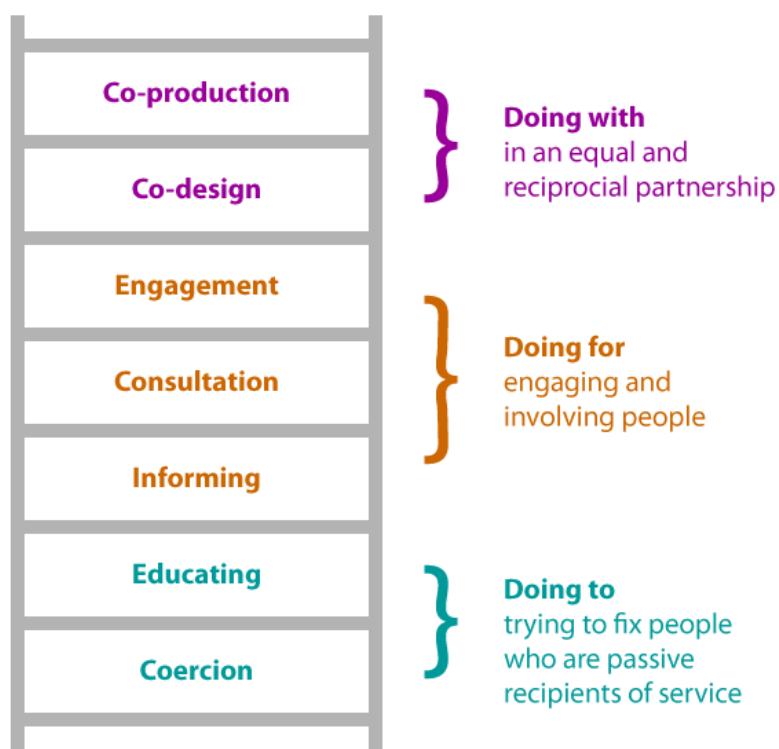


Figure 1: The ladder of co-production (adapted from Arnstein 1969 in NEF, 2014)

A successful project from Canada between regulators, eNGOs and the fishing industry resulted in management measures to reduce and manage seabed impacts of bottom trawling in Canada’s Pacific waters on corals, sponges and other sensitive benthic habitats. The success of these measures suggest that co-created solutions for habitat protection can be effective in achieving conservation outcomes.²⁰

1.4 PHASE 1: LITERATURE REVIEW AND CURRENT DATA COLLECTION SUMMARY

The literature review²¹ examined similarities and differences between definitions commonly used and the impacts associated with these definitions. The processes of defining these terms were also assessed. Low impact is a term that is widely used without a shared definition, e.g. Article 4 of the CFP defines low impact fishing as “utilising selective fishing techniques which have a low detrimental impact on marine ecosystems or which may result in low fuel emissions, or both”. The Future of Inshore Fisheries workshop in 2019 acknowledged that using the ‘under 10 metres’ length category was a simple way of defining ‘inshore fishing’ in the UK, the use of a single criterion may no longer be appropriate due to increases in fishing capacity in the latest years.²² The fishing industry body Seafish concluded that there is no consistent or overarching definition of inshore fisheries in the UK, but rather “regional definitions”

including the target species, gear used and distance from shore/port, which mirrors conclusions of the 2015 to 2016 evidence review that defining 'inshore' is problematic.

Although there are still significant gaps in the evidence base of the impact categories listed, there is a significant quantity of scientific literature available. Evidence suggests that each mode of impact on the environment, depending on a number of factors (e.g. species, habitats, gear type; see section on impact categories above), can be significant. A distinction could therefore be made between the use of definitions in relation to managing fishing mortality or managing fishing opportunity, e.g. between recreational and commercial fisheries. Aiming to reduce environmental impact is a common feature of many definitions, e.g. 'marine stewardship' is now formalised as a set of criteria and development of an ecolabel to certify fisheries. For all environmental impacts reviewed, there was sufficient evidence to suggest that action is necessary to reduce impacts. For the patterns of exploitation and fish welfare, there was some uncertainty as to how to achieve this. For seabed impacts, the evidence suggests that context and/or frequency are the main determinants of the impacts. Areas for further research include determining approaches to fish welfare by gear type as well as identifying effective indicators for ghost fishing.²³

Centre for Environment, Fisheries and Aquaculture Science (Cefas) provided an overview of current data collection and its purpose/limitations, based on the aspects of low impact fishing as derived from the literature review. The primary data used in stock assessments are estimates of the total catch, broken down by size and/or age. Data collection falls into two categories: fishery-dependent and fishery-independent. Fishery-dependent data involves data obtained directly from fishing vessels (catches, effort, data on size and age composition of the catches) collected by scientific observers. The main focus of this data collection is the estimation of the quantities of discards at sea. Fishery-independent data relates to the fish stocks and fisheries obtained from dedicated surveys using fishery research vessels, planned and coordinated to provide annual estimates of fish stocks abundance.

Criteria from the literature review, which are included in some from within the Cefas remit, and ongoing monitoring and data collection include:

- seabed impact (e.g. gear dragged along the seabed, seabed impact in MCZ surveys etc.);
- target stock population (mortality of target species);
- by-catch (mortality non target species);
- by-catch (other marine life- birds, marine mammals, etc.);
- fish welfare (R&D trials on gear impacts);
- plastic/pollution (seafloor litter).

In relation to defining low impact fisheries, a re-assessment of the data collection programme may be needed and some specific criteria (e.g. ghost gear) are not reflected in ongoing Cefas data collection.

2. PHASE 2: METHOD AND CASE STUDIES

In order to incorporate learning from Phase 1 the project team determined that designing and running regional, iterative workshops in different fishing ports in diverse regions of England would provide an opportunity to engage quay-side with fisheries and angling representatives at a very early stage of policy design. Fishers using different methods to target a range of stocks across different fisheries environments were targeted. These workshops were proposed to be attended and supported by Defra staff to hear directly from stakeholders and provide answers from policy makers.

To ensure that within the possible scope, budget and project timeline the project team were able to engage with some representatives of a dispersed and diverse industry, the selection of ports was based on a number of criteria. These ranged from the size of the port in terms of vessels and fishers through to the variety of gears used and range of species caught, as well as their current level of engagement with policy makers and representative organisations and spokespeople.

The workshops were planned in two rounds in each location: the first to identify the types of environmental impact that fishing (recreational and commercial) could have; the second to identify ways that impacts might be lowered across the fisheries and the opportunities and constraints to doing so. The workshops were to be followed by a symposium that brought stakeholders together to discuss the findings from the series of workshops and to agree the principles of low impact.

Within this process, the literature review from Phase 1 was used to inform the workshops by providing background and examples of the types of impacts that might result from fishing to be discussed in the workshop. This included some of the impact types (e.g. fish welfare) emerging within the literature that may be less of a concern elsewhere. This use of the literature review was intended to ensure that it was not a substitute for discussions and results from the workshop but informed the process.

The process created the opportunity to highlight where there might be consensus about impacts and also where there may be differences between the perceptions of fishers and the literature relating to low impact fishing.

2.1 CASE STUDY LOCATION SELECTION AND JUSTIFICATION

Three case study sites were selected to cover a spread geographically to reflect the diversity of English ports. In terms of the number of English fishers and vessels as well as the main fisheries and gear types used, the project team and Defra agreed on Eastbourne, Brixham and North Shields. The reasons for each are outlined below:

(1) Brixham – covering the ports of Brixham, Newlyn, Plymouth, the North Devon Marine Pioneer (NDMP) area (Ilfracombe, Appledore, Bideford, Clovelly) and Beer

- The South West and ports covered by this case study encompass the majority of the English (inshore) fleet.²⁴
- The case study catchment covers ~1,143 total vessels.²⁵
- A variety of mobile fishing gears (beam trawls and dredges), alongside a wide variety of gears (rod and line, pots, nets) and species (over 35 regularly caught in the South West), make Brixham a key area and case study for accessing a wide range of fisheries stakeholders.
- The Fishing into the Future project was available as a boundary organisation based in Brixham and had both local support and access to venues and stakeholders.
- Brixham lab was an ideal setting for the workshop with parking available.
- Wider fisheries organisations and contacts are based in/near Brixham, e.g. MMO, Devon and Severn IFCA, South West PO.
- Accessible for Interfish and Plymouth Trawler Agents (PTA) from Plymouth, as well as Weymouth fishers who attended the workshop.

(2) Eastbourne – covering the ports of Eastbourne, Newhaven, Hastings, Rye, Portsmouth, Emsworth, Shoreham, Worthing, Littlehampton, Selsey

- A mix of gears (trawls, nets, pots, traps, rod and line) are used throughout the area and much of the fleet and workshop participants are polyvalent, defined by the FAO as ‘all vessels using more than one gear, with a combination of passive and active gears (none of which exceed 50 percent of time at sea annually).
- 483 vessels were based within the catchment area for this workshop/case study.²⁶
- A range of vessel sizes and split between PO/quota pool fishers was also an opportunity to look at different perspectives regarding both quota and licensing.
- Eastbourne Sovereign Harbour (Seasons) venue and catering was ideal as NEF had previously run fisheries events there, with both capacity and parking familiar to fishers.
- NEF contacts in Eastbourne, Hastings; MRAG contacts in Newhaven, Shoreham; SWPO and CCRI contacts in Selsey: provided a good opportunity for engagement.

(3) North Shields – covering the ports of Hartlepool, North Shields, Whitby, Amble, Blythe, Bridlington, Scarborough, Filey, Grimsby/Hull

- The North East has a mix of fleets (over and under 10 metres), distinct fisheries from the other case study areas and a limited number of species (both quota and non-quota) that are available as seasonal fishing opportunities.
- A significant number of vessels (relative to the North East fleet overall) were accessible for the port catchment area (a total of 457).²⁷
- The fisheries are distinct compared to the rest of England:
 - They are mainly Nephrops based overall (which is a gear, nephrops trawl, otherwise not represented in England in the case studies);
 - Scarborough is now mainly based on shrimp fisheries (which is a gear, shrimp beam trawl, also otherwise not represented in England in the case studies).
- Defra noted this region had not felt fully engaged historically and this was an opportunity to draw fishers from these ports into national policy development conversations.
- Regional Cefas offices (Scarborough and Hartlepool) also provided a major opportunity regarding Cefas contacts, as well as a local Defra staff member, links to the NFFO and the Fishermen’s Mission, a familiar venue and meeting point.
- Local contacts through CCRI were also contacted to connect with other local fishers.

2.2 WORKSHOPS WITH POLICY MAKERS

To better engage and understand the issues concerning fishing and the environmental impact of fishing, alongside the emerging policy context and priorities, the project team convened two 90-minute focused workshops with Defra policy staff. These workshops were used to present findings of the review of low impact fishing and describe the approach to co-design of definitions and plans and how these relate to the future Fisheries Bill and 25 YEP.

The workshops were held at the Defra offices and Defra staff were recruited via the Defra project manager. The Defra policy teams and policy leads represented were fisheries, social science, shellfish fisheries, arm’s-length bodies, sustainability, recreational sea fishing and marine evidence, as well as quota management.

2.3 CO-DESIGN WORKSHOPS WITH FISHERIES STAKEHOLDERS

The project team brought together stakeholders in four regional workshops using participatory, co-designed methods to explore and document the social, economic, environmental and technological factors that contribute to environmentally low impact fishing. Defra staff attended and contributed to all these workshops, presenting policy makers' perspectives and challenges. These workshops began with an overview of low impact fishing in the context of the Fisheries White Paper and ongoing journey of the Fisheries Bill through parliament. This was seen as crucial in improving the understanding and generating consensus (where possible) and buy-in to policy proposals, as well as a first step in a trust-building exercise. The approach adapted aspects of the co-production framework developed by the CCRI for Defra (in the context of a co-designed social survey of fishers)²⁸, following four distinct stages to deliver a series of consensus building workshops, although the full series was cut short as a result of the coronavirus pandemic.

Invitations were sent directly to 170 stakeholders and fishers' organisations including: Plymouth Trawler Agents (PTA), Brixham Trawler Agents, NFFO, Eastbourne u10 CIC, NUTFA, Coastal PO, South West PO, Cornish PO, South Coast Fishermen's Council, Poole and District Fishermen's Association, South Devon and Channel Shellfishermen, Weymouth and Portland Fishermen's and Licensed Boatman's Association, Portland Licensed Skippers Association, Mevagissey Fishermen's Association, South West Handline Fishermen's Association, Hastings Fishermen's Protection Society, Hastings FLAG, Dorset and East Devon FLAG and locally based wholesalers and fishmongers. As there may be a degree of overlap between membership and distribution lists, it is not possible to state exactly how many individual fishers were reached by the project team by email, phone call and WhatsApp, but as an example, PTA sent the invitation on to 140 fishers. A low estimate of the reach of the workshop invitations is around 400, and a high estimate would be around 1,000.

The workshops discussions focused on creating a shared understanding of the drivers of fishing behaviour alongside levers, which influence or nudge behaviour, identifying who has the ability to use those levers for both commercial fishing and recreational angling. Possible pitfalls and unintended policy outcomes for low impact fishing were discussed in relation to the inception and progression of reaching consensus on a workable definition moving forwards.

The workshops were designed collaboratively between the project partners and local partners involved in commercial and recreational fishing locally. A series of two workshops were planned for each of the three case studies with the same group of

participants (where possible) in order to enable an iterative approach with a focus on consensus building.

The workshops were split into three parts, an introduction and overview, then two structured discussion sessions.

Discussion 1: identifying the environmental impacts of fishing

- What are the environmental impacts of fishing/angling independent of fishing type?
- How do environmental impacts vary across different scales (e.g. local inshore waters, regional, global)?

Discussion 2: defining low impact fishing

- What impacts could be reduced?
- What criteria should be used to define low impact fishing (referring to identified impacts from discussion 1)?
- How could these criteria be measured/assessed?

The first workshops were exploratory, recognising that fisheries are diverse and that the pattern of impacts across variables will be different for different fisheries. The second workshops aimed for consensus building around the principles and framework that defines low impact fishing identified in the first workshop.

Ten telephone interviews were undertaken to set the scene for the workshops and to talk to stakeholders who had said they may be unable to participate in the workshops (or the final symposium) but were keen to contribute. These interviews included discussion on behaviour change and how fishers/anglers would adapt to policy and management changes, and were included in the analysis in the scoping report to Defra.

2.3.1 Workshop participation

Two workshops were conducted two weeks apart in Eastbourne (Monday 3 February 2020 and Wednesday 19 February 2020) at the Waterfront in Eastbourne, next to the fishing quay. In terms of attendance both fishers and anglers attended the first workshop and were invited to return for the second workshop: of those who attended the first workshop, 12 were under 10 metres skippers, 6 were over 10 metres skippers, 2 were vessel owners and representatives of the SWPO, one was a wholesaler, 5 were anglers and one was a charter boat skipper. Participants came from Weymouth in the west through to Southend-on-Sea in Essex, representing the ports of Weymouth, Selsey, Shoreham, Newhaven, Eastbourne, Hastings and Southend-on-sea.

Due to the coronavirus outbreak only one workshop was conducted in Brixham on Wednesday 26 February 2020 at Brixham Lab, a few minutes' walk from the harbour. The meeting was well attended with a diverse group of over 30 fishers from around the south-west, stretching from Mevagissey to Weymouth and including a wide range of vessel sizes and gear types.

Due to the coronavirus outbreak only one workshop was conducted in North Shields on Wednesday 11 March 2020 at the Fishermen's Mission, right next to the Fish Quay. The meeting was well attended with 21 fishers and representatives from around the north-east, covering ports from Northumberland through Durham and Yorkshire.

In total 116 fisheries stakeholders attended the series of workshops delivered before the coronavirus epidemic led to the cancellation of future events. A full breakdown is presented in Table 1 below.

Table 1: fisheries stakeholders who attended each regional low impact workshop

Stakeholder	Eastbourne 1st workshop	Brixham 1st workshop	North Shields 1st workshop	Eastbourne 2nd workshop
Under 10m fisher	12	16	15	8
Over 10m fisher	6	14	10	4
Recreational Angler / AT rep	6	1	0	4
Charter boat skipper	1	2	0	1
Other (e.g. PO rep, fishing rep, NFFO, wholesaler, fishmonger, Seafish, IFCA, eNGO, Councillor)	4	5	3	4
Defra marine / fisheries / social science	4	4	4	4
Total	33	42	32	25

To replace the cancelled second workshops for North Shields and Brixham (due to Covid-19), a series of focused questions based on the outcomes from the first workshops were emailed to stakeholders in Brixham and North Shields. The aim was to give stakeholders an opportunity for further engagement with the project after a period of reflection following the initial workshop. Participants were asked to email their written responses to four questions:

1. What are the key impacts/criteria that need to be addressed in your fishery to improve environmental performance?
2. What steps would need to be taken to reduce the impact? What could policy provide to enable this reduction?

3. What opportunities and incentives are already in place or should be implemented? Are there any regulatory or funding opportunities or practical support you would need access to in order to realise these opportunities?
4. What barriers hinder you to take up techniques that have a lower environmental impact?

2.3.2 Data analysis

Detailed notes from all the workshop discussions, interviews and follow-up emails were collated into a spreadsheet, organised by the key themes addressed in the workshops. These were scrutinised to identify recurring themes across the three cases studies, as well as identifying any differences.

3. RESULTS FROM PHASE 2

This chapter presents the results from the workshop discussions. These are organised around the three broad themes that the research addressed: (i) the environmental impacts of fishing; (ii) opportunities and barriers to reducing environmental impact; and (iii) the challenges of co-designing a definition of low impact fishing.

3.1 WHAT ARE THE ENVIRONMENTAL IMPACTS OF FISHING?

Participants across the three workshops identified a range of environmental impacts resulting from fishing activity (see Table 2). The most significant of these were impacts on the seabed, particularly from dredges and trawls, carbon emissions due to fuel use, plastic pollution and other waste, including ghost gear, and impacts on target stock populations.

Table 2: Stakeholder-identified environmental impacts of fishing

Impact	Examples cited
Seabed impact	<p>Scallop dredging: perceived as highly destructive of seabed (although some in North Shields suggested that low impact scallop dredging is possible on the right grounds if dredge is small, i.e. 5 dredges per side of the vessel)</p> <p>Trawls</p> <p>Static gear minimal impact</p> <p>Weights and anchors (angling), e.g. anchoring boats in eel-grass areas</p>
Target stock population	<p>Excessive pelagic species removal by super-trawlers has impacts on food chain</p> <p>Damage to breeding grounds and spawning stocks (e.g. herring spawning impacted by scallop dredging which reduces seaweed)</p> <p>Breeding season disturbance</p> <p>Displacement of fishing activity due to closed grounds (e.g. MCZ ban on towed gear, wind farms, silt etc.)</p> <p>Impact on localised stocks (e.g. too many angling boats on wrecks can impact fish populations)</p> <p>Unintended mortality as a result of catch and release (angling)</p> <p>Charter boats for angling</p> <p>Discards</p>
Bycatch	<p>Dealing with unwanted/unintended catches on land rather than discarding may have negative impacts on the marine ecosystem</p> <p>Sea birds</p> <p>Super-trawlers causing whale deaths</p>
Plastic/pollution	<p>Plastic waste: both a local and global problem, including ghost gear</p> <p>Single use plastic for bait containers</p> <p>Bilge water</p> <p>Noise (e.g. sonar)</p> <p>Litter</p>
Fuel use	<p>Carbon emissions of fishing vessels, but also emissions from vehicles used to transport catch on land, vessel construction, new engines etc.</p>

Fish welfare	Belief that some poor treatment of fish is unavoidable (e.g. container size)
Other impacts	Bait digging (angling) Food chain disruption Impacts on endangered species

There was a clear consensus that impacts need to be considered for both the inshore and offshore sectors. However, smaller, inshore boats, particularly owner-operated day boats, were noted as limited in their capacity and effort by the weather, tides and the limited distances they can travel from and to their home port in a day, thus could be considered as sustainable, low impact fishing. That being said, the cumulative impacts of any fishing activity have the potential to have a negative environmental impact. This relates both to the number of vessels fishing in a particular area, including the activities of foreign vessels, and to the intensity of fishing activity (e.g. twin rigging = double impact, quad rigging = quadruple impact). It also relates to applying the most appropriate gear type to the fishing area, taking note of the seabed characteristics, potential for bycatch and target species.

The behaviour and knowledge of the skipper was seen as having a big influence on the potential for environmental impact. Some participants (Brixham, North Shield) felt that it is not the size of gear or vessel that matters, but the quality of the skipper that determines the catch and the impact. If all net sizes were the same then fishing would only be determined by the skipper/fisher's individual skill and expertise.

Furthermore, there was a view that how low impact is perceived is likely to be subjective and will differ between different fishery groups and between fishers and environmental groups. There were concerns that the power and influence of the "Green agenda" will lead to a definition which will disadvantage fishers and push them to be more low impact, regardless of if they are already fishing in a sustainable/environmentally friendly way.

Other impacts, aside from fishing activity, were noted as having an environmental impact. This included the weather (where it was noted that a severe storm can have a devastating impact on inshore seabed), climate change and ocean acidification. Other species, such as the increasing seal population, were also noted by participants in North Shields, as impacting on stock levels and ecosystem functions. Alongside this, further activities were cited as having an impact, including coastal defence works (e.g. the silt and sand from Teignmouth impacting on fishing grounds), wind farms, drilling on seabed, aggregate dredging, recreational activities (e.g. jet skis and littering from tourists), landfill and run-off (from factories, agriculture) entering the marine

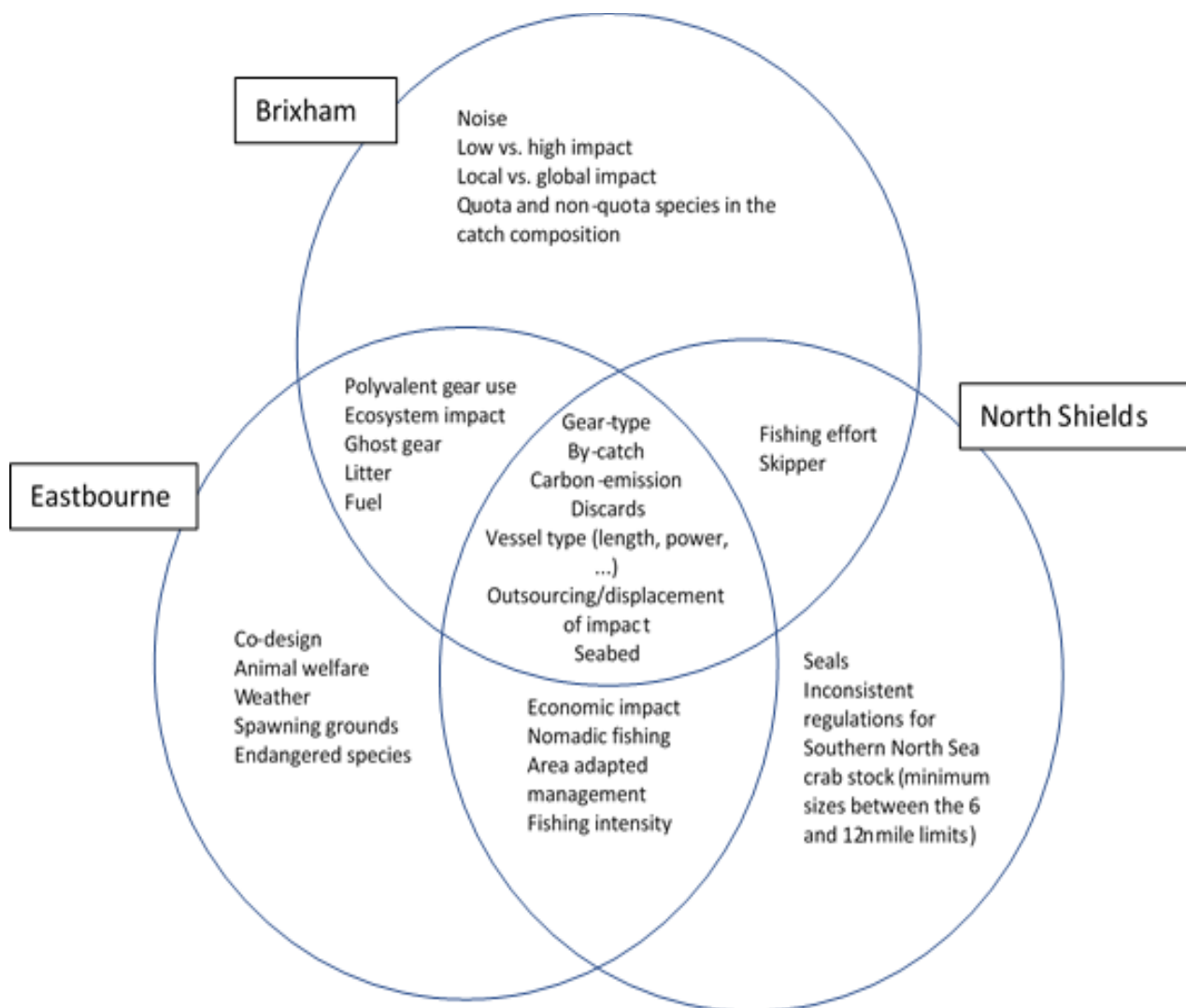


Figure 3: Venn diagram of issues/criteria put forward in the first round of regional workshops

3.2 BARRIERS AND OPPORTUNITIES TO REDUCING ENVIRONMENTAL IMPACT

A number of options for lowering environmental impact were proposed, together with identifying how feasible it would be to implement the options (see Table 3).

Table 3: Impact reduction options and feasibility assessment

Impact	Impact reduction option	Feasibility (Easy, Moderate, Difficult)

Seabed impact	Ban or tightly restrict scallop dredging (encourage more sustainable forms of scalloping, such as diving)	M
	Maintain ban on pulse beamers	E
	Provide a price incentive on catch that is caught using low impact methods	M
	Restrict nomadic fishing	M
	Ban or restrict twin/quad rigging	E
	Introduce a code of conduct for anglers	E
	Focus on environmentally friendly methods through IFCA byelaws and management	M
	Provision of grant support for trialing new technologies for reduced impact trawls (e.g. the Sunwing trawl which reduces gear weight, seabed disturbance and fuel consumption)	M

Target stock population	Access rights:	
	Ecosystem approach to management rather than single species management (e.g. sea bass feed on pelagics – sea bass are regulated, but pelagics are not)	E
	Spatial, temporal and gear restrictions in nursery grounds (e.g. no dredges)	M
	Restriction of nomadic fishing	M
	Licensing access to the Farne Deeps to protect local boats	E
	Subsidies provided for closed seasons to recognise fisheries as a public good	D
	Quota management:	
	Stock impacts could be reduced through changes to quota management (annual or quarterly not monthly to account for seasonality)	M
	Flexibility in quota system (quarterly or annual) regional and seasonal component	M
	Technical measures:	
	Gear design (e.g. lobster escape hatches, whelk holes, mesh sizes)	E
	Technical measures need to be enforced	M
	Pre-authorized list of gears for U10m	M
	Pot limits	E
	Bag and size limits for anglers (mentioned slot limits – i.e. min and max size)	E
	Better use of appropriate tackle (barbless hooks, circle hooks, thicker line, stone weights etc.)	M
Improving science:		
Fisher-science partnerships to understand mortality and seabed/ecosystem impacts	M	
Improve speed at which data on fish stocks is incorporated into management decisions	M	
Voluntary measures:		
Codes of conduct (angling)	E	

	Annual fisheries reports at métier level to provide information on fishing effort	M
	Supply chain:	
	Higher market value for fish caught in an environmentally-friendly or low-impact way (not just MSC-certified fish)	M
	Improve public awareness of low impact fishing	E
	Produce marketed under one standard similar to the Red Tractor	M
	Improve links between fish merchants and fishers - with fish merchants demand quality, traceability & sustainable products	M
	Using fishers to peer police	D D
	Control seal population	D
	Days at sea to control effort	M
	VMS fitted to all vessels to monitor effort	

Bycatch	Allow very small vessels (5-6m) to land bycatch (as only a few Kgs per trip)	M
	Use of selective gears	M
	Finding other uses for discards	M
	Code of conduct and fast adaptive closures when high numbers of birds are about	M
Plastic/pollution	Provide onshore facilities (easy to access in harbours) to dispose of single use plastic and encourage fishing for litter	M
	Provision of recycling facilities and incentivising of fishing gear (example given of project in Brixham to recycle used fishing gear)	M
	Provision of facilities for disposal of used oil	E
	Reduce use of single use plastics in angling by having reusable bait containers.	D
	Single use plastic reduction (e.g. line recycling, clearing litter, etc.); angling	M
	Gear parking and gear conflict need to be tackled as the root cause of ghost gear – e.g. gear marking; reporting and penalties for gear loss	M
	Forum to flag gear positions to alleviate gear conflict	M
	Ban pumping out bilge water	E
	Improved boat design to reduce pollutant leakage	M
	Incentives for improved boat design	E
Reduce the use of plastic in trawl materials (e.g. replace plastic dollies with braided rope)	M	
Fuel use	Improve fuel efficiency of engines	M
	Grants to enable vessel owners to switch to low-carbon technologies for engines (e.g. hydrogen cell, diesel-electric hybrids)	M

Fish welfare	Education on fish welfare (handling to reduce post release mortality)	M
	Education to use correct tackle, hooks and follow best practice e.g. circle hooks requires outreach work	M
	Limit the time out of water (angling)	M
Other impacts	Reduction in bait digging – habitat damage	M

Fishing will always have an impact on the marine environment because, by its very nature, it involves removing fish from their habitat and population. There was agreement that any form of fishing could have a high impact if there are too many vessels fishing in a fishery, or if effort is too high. Conversely, anything could be low impact if managed well in the appropriate location.

There was reluctance from participants to say one type of gear is lower impact than another, as there are many variables, and even what might be considered the most high impact gear (e.g. pulse trawling) could be low impact if only used selectively, e.g. for two weeks just before Christmas when sole prices are high and the fish are thick. This reluctance was both technical and also social (fishers were reluctant to publicly single out particular fishing gears as having higher impact out of both a sense of solidarity as fishers and also because of local power relations and possible reprisals). The point was made that determining low impact on the basis of gear is not likely to be effective. Given this, participants felt that a focus on *lower* impact, or lowering impact, was preferred, rather than *low* impact (which was deemed too absolute and inflexible).

With that in mind, a number of measures were suggested that could help to facilitate lower impact fishing, as presented in Table 3. Some of these were seen as being easier to implement than others (ranked according to feasibility in Table 3), and it was noted that any criteria must be both realistic and enforceable.

A number of broad approaches to fisheries management were proposed, alongside a set of specific measures. Firstly, a points-based system was suggested, where fishers get points for activities that are deemed to be lower impact – such as collecting litter, reducing or increasing the survivability of bycatches or upgrading to an efficient engine – measured against a set of pre-agreed criteria. Lower impact behaviour could be incentivised by providing rewards for higher points. The appropriate elements for achieving points could be set out in a Code of Conduct for different fisheries, recognising the different opportunities and constraints in terms of lowering impact. For instance, points could be scored for tonnage/capacity/horsepower, proof that

waste/litter/old gear is being recycled, days at sea, survivability of discards etc. One potential 'reward' for obtaining low-impact status could be better protection via spatial management or compensation for potting damages.

Secondly, the Seafood Innovation Fund²⁹ and Marine and Fisheries Fund³⁰ provide opportunities to fund joined-up working involving science, industry, policy makers and others with an interest in developing practical solutions to impact reduction, e.g. the Defra-led Cetacean Bycatch Focus Group. The NFFO have requested the creation of a similar group to direct strategic work on benthic impact reduction, pool research findings on gear innovations and technology transfer to move towards wider-scale adoption.³¹

Thirdly, reducing nomadic fishing was seen as a key approach to reducing the environmental impact. Participants indicated that local fishers are more inclined to take care of local fishing grounds, in order that they will be able to fish them into the future. Being local also has a positive impact on social sustainability (locally sourced fish, tourism, health and wellbeing benefits). They perceived nomadic fishing vessels, particularly large trawlers and dredgers, as having a significant impact on local fish populations and marine habitats.

It was recognised that addressing fuel use and pollution was an area where the most improvement could be relatively easily achieved. Fishers and anglers indicated that they were keen on recycling plastic and would be willing to fish for litter, if appropriate waste disposal and recycling facilities were provided in harbours. Alongside this, improving engine efficiency could be achieved by subsidising engine upgrading (either diesel-electric hybrids or hydrogen cells), which would reduce carbon emissions.

While it was recognised that technical measures such as net sizes, pot limits and trawl regulations are needed, unless this is enforced, it is unlikely to have the anticipated impact. Alongside this, the appropriate gear will depend on the area being fished, so a principle of the 'right gear in the right area' is needed. This linked strongly to the demand and proposal for more tailored and localised management, with IFCA co-management³² approaches being suggested as viable in some regions (and their remit being extended to the 12nM limit as they have the ability to manage at the appropriate scale, although did not have the powers to make some changes that were considered necessary, e.g. in relation to nomadic fishing).

The extent of MPAs in inshore waters may stimulate the use of alternative gears that are in line with site conservation objectives. Building on existing work to better understand the effects of different gears on the seabed (including documenting the metrics of gear components) could form preparatory work to measure fisheries specific impacts and stimulate impact reduction.³³

3.2.1 Quota

A strong perspective voiced throughout the workshops was that quotas should be given to fishers, not sold on the open market. Some under 10 metres fishers would rather not have monthly quotas and would prefer effort management criteria to allow flexibility as they are unable to fish for long periods due to weather.

Quota management was raised in each of the regional workshops as a major barrier for lowering the impact of fishing and also a barrier to running fishing businesses effectively for the under 10 metres sector. Being able to access quota for key stocks of interest that are available as fishing opportunities for the inshore fleet on an annual or quarterly basis, rather than monthly through the MMO quota pool, or the ability to 'roll over' allowances or carry over a certain amount to a subsequent quarter, was proposed as a solution. This was preferable as an approach to quota management, as periods of bad weather meant available quota was not utilised and then lost as an opportunity.

The issue with quota relates more to the timing and the ability to catch the species when they are inshore. It was cited that 40% of the 2019 quota available to the pool was not utilised. There was a consensus that an improved method for distributing quota in under 10 metres was needed. It was agreed that one way to achieve benefits across the inshore fleet would be to decentralise the management of the under 10 metres pool (e.g. through the Coastal PO or other regional or community quota management bodies) and create a network of local quota management units and national association (similar to POs which have a national association, UKAFPO) that would report to the MMO (enforcement) and Defra (policy). This was viewed as more locally embedded and would allow fishers to be more flexible, ensuring that they can adjust when they fish to catch better, earn better, fish better. Quota would then be available at the right time, so fishers could be safer and reduce their emissions and effort, bringing benefits across several of the impact categories identified.

Fishers want flexibility year on year, but also certainty to help them plan their businesses and build a business model that supports long-term fishing practices based on yearly allocations. Participants stated that POs should be retained for the over 10m sector.

In addition, having both full-time (FT) and part-time (PT) fishers accessing the quota pool was not seen as justifiable as some were wholly reliant on the fishery whereas others had other income streams and employment opportunities, but were given the same fishing opportunities.

Participants thought that providing additional quota to under 10 metres, as an incentive to lower their impact was unlikely to work.

Fishers stated that quotas need to be given to them, not sold on the open market, and that quotas should be free (to active fishers who have fishing vessels) and should only be traded by active fishers (if at all).

3.2.2 Licensing

Fishers voiced the opinion that some of the licensing issues and conditions were forcing fishers to engage in activities, which led to negative environmental outcomes. This was presented as a major barrier to lowering the impact of fishing on the marine environment and stemmed from both entitlements e.g. for the European sea bass (*Dicentrarchus labrax*), where anyone who caught sea bass now gets a 5-tonne fishing opportunity. It was seen that this was pushing part-time fishers into fishing more than they had previously done by setting a target for them to try to reach, thus increasing sea bass mortality beyond what was necessary.

Furthermore, licensing is also driving behaviour that is having negative environmental impacts. For example, if entitlements for whitefish, shellfish or sea bass are lost, this limits the ability of fishers to diversify and increases their reliance on single fisheries and, therefore, their vulnerability to changes (whether environmental or economic). There is a genuine fear of losing entitlements. Thus, to keep them active, there have to be catches of certain species at times where fishers do not actually want to be targeting those species. Entitlements (e.g. sea bass) can be taken away if not used and fishers end up targeting species – e.g. pollock for a whitefish entitlement, or crabs to keep a shellfish entitlement – that they do not want to be targeting in order to ensure they keep these entitlements. Catching species for this reason drives negative impacts of fish stocks and increases conflict in inshore fisheries with fishers moving onto others' grounds and into neighbouring fisheries. It was stated that losing the entitlement affects smaller boats more than larger ones, mainly in trawling as the catches are mixed so it is less of an issue compared to, for example, the specialised rod-and-line sea bass fishery.

Local licensing for access to certain grounds were also raised as options, which could embed low impact criteria.

Fishers expressed the view that there were significant economic issues at play that influence the decisions they make about which species they are going to target. If they do not have enough quota they will not invest in the gear needed to target them. The current system however means that they do not have the option of deciding each year as their license to fish specific species is taken away if it is not used.

3.3.3 Regulation and management

Workshop participants identified barriers around regulation and management. They focussed on the current structure being too rigid, lacking flexibility and not being about

the right gear in the right place. The local and regional management aspects were seen as poorly coordinated, needing to be tied together more coherently.

Fishers believed existing rules needed simplifying to make them more manageable. There was consensus that a definition of under 10 metres and 10+ metres is linked to quota, not to environmental impact, so the wording in the Fisheries White Paper appeared confused. Fishers asked if what is right/wrong with the status quo could be investigated first so industry and Defra could collectively scrutinise what is working and what needs to change. Fishers made it clear they felt Defra should consider the real impact of the application of any definition of 'low impact fishing' before it is implemented or publicly shared.

The highest impact fisheries should get Defra's attention. For example, super trawlers have an impact on stock, food web and other marine life but are perceived to be unregulated. The success of a campaign to ban pulse trawling in the EU, although many years too late in fishers' views emphasized the continued need for pulse trawl ban in UK waters after leaving the CFP.

Fishers felt that good management would mean good practice and that the issue stemmed from a top-down failure, rather than their fishing practices. The impacts of nomadic UK fleet are an issue in many ports around the coast of England, requiring spatial management. This includes the issue of gear parking and gear conflict, displacement by MCZs and other marine industries.

A possible re-entry point for Defra into the lowering impacts discussion could be a focus on the highest impact fleets, which were seen as the high capacity, mainly offshore pelagic trawlers and nomadic trawlers and dredgers fishing far from their home ports, in all weather and were perceived to be unmanaged.

Often bycatches were only considered non-target because of prohibitions, which sometimes were not understood to make sense in local contexts (examples of undulate rays and spurdogs were given). If certain species are perceived to be more common in certain areas, often accounting for over 50% of fish caught, then fishers felt this should make a fishery for them acceptable. A finer scale, improved and more reactive local management system – such as smaller management areas with more fishers involved on IFCAAs – could allow fishers to land species in this situation. A definition based on vessel size was not perceived as optimal, as any size limit will lead to drift (e.g. super under 10 metres), with vessel size and horsepower not the best proxy for impact as these depend on the gear used (mainly relevant to towed gear).

Capping and reference periods have caused problems and fishers thought a review was necessary. Very small-scale fishers, selling directly to tourists and not merchants, look as though they do not have track records, although IFCA (SFC) documentation showed

they were landing fish. These artisanal (low impact) day boats, selling to the public, are at a disadvantage.

Discussions in some regions focussed on the lack of regulation of spatial management for the nomadic fleet, which was seen as having a disproportionately high impact on stocks and grounds as well as using more fuel and generating higher emissions. Typically, local fishers knew the times and locations of the spawning grounds and events and would avoid these in order to allow the fish to reproduce. In contrast, it is assumed that the nomadic fleet uses this as an opportunity for higher catches. Fishers suggested that if the 12 mile limit was restricted to UK fishers (English vessels only in some instances) this might prevent this problem in some areas because no nomadic fishing vessels have attachments to these local/home ports and therefore disregard the negative impacts of overfishing, fishing spawning aggregations or habitat damage.

Having to discard sea bass caught in trawl fisheries (above the 1% bycatch allowance) was seen as policy driving negative environmental outcomes for no benefit to the stock, fishers, the public (who could have eaten the sea bass) or the marine environment (discards on the grounds).

Displacement of fishing activity due to closed grounds, either through MCZs (e.g. with ban on towed gear), aggregate dredging or windfarms, puts pressure on other grounds and can cause more intensive fishing in those areas. This can also result in changes in gears used, e.g. potting to trawling, again putting increased pressure on certain fisheries.

Concern around the displacement of high-impact boats were also raised. If new regulations cause them to move further out (e.g. to the high seas) then fish stocks will still be depleted there.

Many participants recognised that enforcement was an issue and suggested a system of peer policing.

3.3.4 Changing fishing practice

Bycatches of other marine life in netting could be overcome by shooting gear in the evening and haul in the morning, to avoid damage through entanglement to birds for example. Codes of conduct and fast, adaptive closures when high volumes of birds are about was seen as a viable route to reduce bird bycatch.

Fishers suggested that if all pots and nets were tagged and recorded at the beginning of the year then ticked off at year end in a port-level census, then penalties could be applied for those who have lost gear (if this was not a result of gear conflict). Closed areas for spawning seasons were seen as hard to achieve because, for example, some slower vessels will not have the range to travel outside the required area closures during certain spawning seasons.

Another issue was identified with regards to finding a definition for the 'polyvalent' fishery. It was pointed out that if fishers are using multiple gears during the day, in principle, they could be classified as high impact in the morning and low impact in the afternoon.

A closed season for scallop diving was seen as a barrier to the development of that (low impact) fishery.

In general, impacts were linked by fishers to the intensity of the fishing method, e.g. twin-rig boats being higher impact than single-rig boats. Fishers stated that if all net sizes were the same then fishing would only be determined by the skipper's/fisher's individual skill and expertise in the grounds and stocks they fish. Fishers felt a Government ban on high impact dredging and twin-rig trawling was necessary in some regions and had been successful in the Farne Deeps. They suggested that locality/non-nomadic status could be used as access criteria inshore and the local nature of a fishery was seen to have a positive impact on social sustainability (e.g. locally sourced fish, tourism, health and wellbeing benefits).

3.3.5 Feedback

A lack of feedback from data collection has reduced fishers' confidence in how research is used in management. Adaptive management requires feedback loops as well as information so fishers understand how the provided information shapes management. Fishers felt that they had put a lot of time into educating and building trust/rapport with Defra Marine and Fisheries policy teams over previous years, but that the rapid turnover of staff in the civil service compared to fishing means that this institutional memory is lost as people with whom they have built a working relationship move on and lose contact. Knowledge is lost, which can be demoralising and dissuade fishers from continuing to work with Defra.

Plenty of feedback is provided in these sort of projects, yet fishers feel that they are ignored as soon as the project ends. A safeguard will need to ensure that this project is clear in its results, so that this is avoided as fishers feel new staff can misinterpret the results of consultations when they are eventually revisited, often assuming endorsement from fishers.

3.3.6 Funding

Fishers felt a considerable budget would be needed to include fishers in the development of fisheries management plans to determine how to lower the impact of fishing. Funding is a barrier in the transition to more fuel-efficient vessels or use of electric boats (for this reason determining low impact by engine type was considered

problematic). Fishers expressed a view that they should be paid for their time to attend IFCA meetings.

Funding was also a barrier to the necessary quay-side infrastructure and facilities at all ports for old gear disposal. To ensure uptake was high this should be free or even incentivised through the points system. Funding for capital investment in materials handling and recycling facilities is needed. Fishers who would otherwise choose to bring in free-floating marine litter are prevented from doing so because of lack of these facilities. Larger harbours may or may not charge for disposal of marine litter that is landed. There are examples where fishers have been charged to dispose of derelict fishing gear that they have caught but did not own. Ports within the Fishing For Litter scheme (e.g. Brixham) funded by the harbour authority are finding it difficult to fund the disposal of the volumes of marine litter brought ashore to the tune of 5 tonne per week at £24,000 a year. How good waste management is incentivised is dependent on funding. It was further pointed out that taking part in seabed impact trials for beam trawlers means simultaneously a loss of income during trials, and fishers would need to be compensated.

A similar issue was raised with regards to the reduction of the use of plastic in trawl materials. Taking part in these trials is causing a loss of income for the fishers. Fishers felt they should be involved in the science used to determine management measures. They proposed that they could work with scientists to design monitoring/recording equipment that could easily be used on vessels. Cameras on board and VMS could be used to monitor and record catch and fishing effort.

Concerns were raised around the following indicators being used as criteria: (i) *“Days at sea”* may lead to a restriction of fishing access; (ii) *“Fishing within local grounds”* would need an appropriate definition of what is ‘local’ and may restrict access incorrectly; (iii) *“reduced discards”* may lead to an oversimplification of the real issue for low impact fisheries and would need to be enforced appropriately.

3.3.7 Market incentives

Incentives may be defined as *“formal or informal mechanisms that may induce members of a common property resource to undertake collectively beneficial but individually costly actions”*.³⁴ These may also be framed as direct incentives (which are targeted as specific objectives to encourage changes in practice), indirect incentives (which set in place enabling mechanisms that encourage changes in practices), or disincentives (which penalise in order to discourage certain practices from occurring).³⁵

The lack of market premium for low impact seafood was viewed as a considerable disincentive to adopt low impact fisheries practices. Creating a market for ‘low impact

fishing' products would need to include educating and raising awareness among consumers with regards to the higher sustainability (low impact, less food miles, etc.) of fresh, locally caught products of high quality. Fishers viewed the MSC as a 'bit of a club', with many small fishers not being able to afford the cost of accreditation. Hence, they identified the need for another mechanism of recognising sustainable local fishing practice, accessible to all fishers.

Further, a role for buyers/merchants was seen not only in marketing low impact fisheries but also as a means of enforcement through traceability of products. Improved relations between merchants and fishers was suggested as a way to overcome this barrier.

3.3.8 Other incentives

Frustration was expressed at the lack of regulation for protecting gear, for example, dredgers/trawlers destroy pots, as well as a need to recognise the wider consequences of gear conflict between mobile and static gear. One potential 'reward' or incentive for obtaining low impact status could be better protection or compensation for potting damages. Gear conflicts is a major issue in some regions and should be classified as a vandalism offence that also leads to ghost fishing and pollution through lost/damaged gear.

The potential of a points-based system, in which fishers get points for activities that are deemed to be of lower impact, e.g. collecting litter, could incentivise lower impact behaviours. This could be determined by a Code of Conduct for different fisheries. Collection of plastic at sea for recycling and appropriately recycling gear and reporting lost gear could contribute to the award of low impact points.

3.4 SUMMARY

Fishers need to understand what institutional arrangements will be in place for this low impact project and wider work around the Fisheries Bill. The scientific and legal language needs to be accessible and should not be left open to interpretation. Any changes could be followed up with port level demonstrations, discussions and trials.

It was generally accepted that the principles of low impact fishing (e.g. less fuel usage, fewer discards, less bycatch etc.) actually often align with the ideas that fishers have about running an efficient business, although external barriers limit them in doing this. For example, there are in-built incentives to minimise bycatch in order to avoid costs and the undesirable occurrence of bycatch but the understanding and application of technical or practical solutions and the associated costs remain key barriers. General regulatory prohibitions on bycatch in isolation are likely to achieve little but will have the unintended consequence of disincentivising the reporting of bycatch incidents,

which in turn will diminish knowledge on the extent and understanding of the problem³⁶.

3.4.1 Similarities between case studies

- Flexible quota management (quarterly or annual) in the pool;
- Licensing needs to be reviewed;
- Reluctance and concern around creating new divisions;
- Socio-economics needs to be considered alongside environmental impacts;
- Gear conflict and marking requirements;
- Restrictions on nomadic fishing (raised in both North Shields and Eastbourne);
- Impacts of super trawlers.

3.4.2 Differences between case studies

- Main gear type;
- Fleet segmentation at port level;
- Importance of quota fisheries;
- Diversity of species.

3.5 BARRIERS TO CO-DEFINING LOW IMPACT FISHING

In the series of workshops, it was generally accepted that the principles of low impact fishing (e.g. less fuel usage, fewer discards, less bycatch etc.) often align with fishers' perspectives on running an efficient business. Participants commented that external barriers limit the extent to which they are able to focus on them. It was made clear in all of the regional workshops that a definition of 'low impact fishing' with only a focus on the environment would not work: there are socio-economic impacts which need to be considered in conjunction because a low impact fishery, which does not support jobs or provide enough food, will not work.

There was consensus shaping up around defining low impact fishing at a fishery level, considering multiple factors, all important for that specific fishery. The issue of cumulative impacts was also raised, which is why the fishery level was considered more appropriate than at the vessel or gear level: one low impact vessel may have minimal impacts on stock but if 100 of these vessels entered the fishery this would not be the case. Similarly, a single super trawler operating a very clean fishery with minimal bycatch and high fuel efficiency resulting in low CO² emissions could also be described as being low impact, assuming it was fishing within sustainable limits.

A fishery defined as 'low impact' could change as the indicator under consideration changes. For instance, more vessels entering the fishery could increase the overall impact leading to the fishery becoming high impact. There was agreement that any form

of fishing could be high impact if there are too many vessels fishing a fishery, or if effort is too high. Conversely, anything could be low impact if managed well. There was reluctance to say one type of gear is lower impact than another, as there are many variables, and even what might be considered the most high impact gear (e.g. pulse trawling) could be low impact if only used in limited areas.

The following barriers to a co-designed definition of low impact fishing were raised at the workshops:

- A disconnect between the commissioning of research and a process to deliver reform for inshore fisheries. For instance, the current low impact project was perceived as lacking a clear foundation in the wider science-policy narrative or a clear road map for policy delivery that involves industry.
- Responses are likely to be based predominantly on individual perceptions and preferences in the context of experiential knowledge of the fisheries they work in.
- Co-designing policy with stakeholders must be coupled with coherent evidence-based policy formulation and implementation of measures that are practical. A co-design process can help to bring forward knowledge and information; it can inform preferences or make policy choices. But deliberation with stakeholders ideally needs to communicate with the science-policy narrative so that it can best add value. For example, if environmental impact is defined in relation to weight of fish landed, then the large-scale pelagic fishing fleet is likely to score well, which may contrast with the notion of the small-scale fleet having the lowest impact, but this would be separate from the social objective of inshore fisheries.³⁷

3.5.1 Division (policy creating winners and losers) is a fundamental barrier to a successful co-design process

Many contentious topics could not be discussed in the workshops because of the diversity of fishers in the room as well as existing power relations. Fishers do not want to blame each other or identify specific types of gear as being the cause of problems in public meetings. This was a fundamental barrier to defining low impact fishing as by default it would mean others are 'high' or 'higher' impact and there were concerns and uncertainties about the consequences of that distinction.

Investments have been made based on fishers' 5-year plans. While the specific issues keep changing the inshore fleet, fishers need to be able to have a business plan that relies on fishing opportunities and the ability to diversify. This project to define low impact needs to be mindful not to precipitate a 'win-lose' situation of low versus high impact whereby participants will consciously choose to provide information that benefits them in the policy outcome of the workshops.

Defra and the MMO need to simplify the rules and make them manageable; this was seen as high priority by fishers. Gear categories can control segmentation but fishers suggested the removal of artificial barriers such as the under or over 10 metres classifications. A suggestion of licence categories being used for management purposes (through gear categories and segmentation) was made. The under or over 10 metres division was seen as an oversimplification that resulted from an attempt by Defra and regulators to make fisheries easier to manage, which came at the expense of effectiveness and practicality. Fishers stated that the low impact project aims to split the under 10 metres and expressed concern that the outcome will have licensing implications.

Fishers stated that a low impact definition may provide an opportunity for some parts of the fleet because it could result in extra access, quota or less regulation. This, however, would likely result in division, separation and distinct rules for different parts of the fleet, rather than common rules for everyone. The risk of a low impact definition being divisive was presented as a major concern. It was pointed out that individuals are often motivated by self-interest and therefore the starting point for a conversation about future management should not start with incentives as this would not be a good first step on a new path.

In addition, know-how, capital cost, negative effects on catching ability or opportunity costs on fishing operations, absence of incentives and regulatory barriers are likely to be case specific to the type of innovation envisaged.³⁸

3.5.2 Lack of trust in the fisheries sector

A dominant barrier for all the regional workshops was the perception that Defra/MMO do not have the best track record, rooted in the original division of under and over 10 metres vessels for quota management purposes and the resulting inequity. (Under 10 metres were only allocated 3% of the national quota so they have paid money for licences that used to be free.) The fishing industry are notably suspicious of the agenda and power throughout industry for all tiers of Government (Defra, MMO, IFCAs) and is also suspicious of conservation NGOs.

Fishers feel that they have put a lot of time into educating and building trust/rapport with Defra Marine and Fisheries policy teams. However, the rapid turnover of staff in the civil service means that this time is often lost as people with whom they have built a working relationship with, move on and lose contact. Knowledge is lost, which can be demoralising and dissuade fishers to continue to work with Defra.

Trust between fishers and scientists was also seen in some regions as currently lacking and thus a barrier. Fishers suggested further participation in scientific methods, and contributing to surveys was seen as necessary to overcome this barrier. Fishing into the

Future was presented as a good approach to involvement. Fishers could be trained in basic fisheries science and then used as scientific data collectors, which could be further linked to accruing 'low impact points'. It was felt that fishers should be involved in the science that is used to determine management measures of their sector. They could work with scientists to design monitoring/recording equipment that could easily be used on vessels. Cameras on board and VMS could be used to monitor and record catch and fishing effort.

Fishers suggested that Defra should repeat the engagement with a framework of options on impact management that they can respond to. This could be done through policy options or scenarios.

3.5.3 Engagement

As low impact was considered a subjective term, concern was raised that environmental non-government organisations may drive a definition focussed on conservation targets rather than practicality for fisheries. It was preferred for future discussion to focus on the term "*lowering impact*" rather than a definition of 'low' which was seen as subjective, divisive and a barrier to full engagement.

Closer engagement and more frequent dialogue was pointed out as necessary. It is recommended that Defra responds and follows up in a way that builds social capital because trust-building takes time and needs to be continuous. There are cost implications to this type of engagement and fishers proposed that Defra would need to provide funding to support the continuation of the co-design process to develop a definition of low (or lower) impact fishing.

3.6 ANGLING OPPORTUNITIES AND NEEDS FOR IMPACT REDUCTION

Anglers were represented in several of the workshops and highlighted a range of impacts from their activities similar to commercial fishing. Some issues, for example, bycatch and bait digging, were angling specific. Many of the impacts raised in association with angling were considered low by those presenting them. However, in most cases where impacts were identified, possible steps to mitigate their severity were also put forward.

The environmental impacts identified by anglers during the workshops included impacts to target stocks, bycatch, welfare, habitat, pollution and fuel use. Key mechanisms for mitigating these ranged from effective management and education to research. In some cases, however, it was not considered possible to achieve further impact reduction. Bycatch, for example, is a complex issue within angling because many anglers are happy as long as they catch fish regardless of species. Therefore many anglers argue that this

impact does not exist. Even where bycatch is accepted to occur, the issue is tricky due to the fact that it is unpredictable and often trying to mitigate the damage is too late by the time the fish is hooked. The emissions of greenhouse gasses through travel, both on land and at sea, is another impact that is hard to reduce. In this case, technological innovation was put forward as a potential solution in the future. Finally, the impact of weights and anchors on the seabed, which were deemed negligible, are also considered impossible to tackle with current technology, but research into release weights, for example, may help change that.

Fishing, including angling, causes mortality, which is a clear impact to the 'target stock'. Many of the anglers suggested that more effective management measures, including bag limits and 'slot sizes' (i.e., minimum and maximum landing sizes to protect both juvenile and the most fecund fish) could be effective here, especially if combined with education on fish handling to reduce post-release mortality. Education regarding correct handling technique, tackle setup (i.e., use of circle hooks) and general best practice was also put forward as a possible means to reduce the impact on fish welfare.

Unlike commercial fishing, some of the impacts raised by anglers concerned peripheral impacts of the activity. Bait digging, for example, was seen as a significant impact to coastal habitats, with a reduction in this activity considered both possible and key to reducing the impact it causes. Similarly, the impact of plastic and single-use plastic pollution in association with angling activities was identified. In this case, education and community activities, such as beach cleans, end-of-life gear and line recycling schemes or the 'take-5 approach'³⁹, were suggested as potential ways to reduce these impacts.

Overall, anglers identified several environmental impacts associated with their fishing activities and gave methods to reduce these impacts in most cases. These included both top-down and bottom-up measures, but it was stressed that without focused support at all levels these measures would be hard to implement and enforce.

3.7 OPPORTUNITIES IDENTIFIED IN WORKSHOP FOLLOW-UP EMAILS

With regards to seabed impact for beam trawlers, trials of fishing gears that reduce the impacts of fishing activity on the seabed have not been conducted. For example, an adaptation of the beam trawl called a 'Sumwing' has been developed in the Netherlands. To the knowledge of Waterdance, this has not been trialled by the UK beam trawl fishing in ICES area VII. The 'Sumwing' reduces the weight of the gear and seabed disturbance, resulting in lower fuel consumption.⁴⁰ Policy support for a trial would best be presented as cash funding with conditions to report on the effectiveness for general publication. The cash funding would mitigate the lost income from reduced fishing time with conventional gear while the gear was trialled.

Recycling options (if offered by ports) are generally very limited due to the different materials used in gear construction, the labour involved in deconstruction and the lack of interest in the material generally (e.g. recycled ropes). A national scheme linking materials recyclers with transporters is needed.

4. CONCLUSIONS AND RECOMMENDATIONS FOR SUBSEQUENT WORK

There were significant disruptions over the timespan of the project, including a general election period of purdah (November 2019 to January 2020), significant flooding and disruption to national travel networks (February and March 2020), and the COVID19 outbreak and social distancing measures (from March 2020). This impacted on the research by firstly compressing the timetable so that workshops originally scheduled for December to February were re-scheduled for February to March, and secondly, as a result of COVID19. Two out of six workshops had to be cancelled, along with the stakeholder symposium scheduled for April. Alternative methods were employed, such as posing questions to participants in follow-up emails, but the current pandemic situation limits opportunities for additional data collection and is likely to impact on the ability of stakeholders to engage.

However, a number of conclusions can be drawn from both the engagement activities and the literature review.

Firstly, the literature and data review highlighted that there are areas where impacts are quite well established and that there are other emergent issues that could be important (e.g. fish welfare or GHG emissions) where there is less evidence (e.g. benthic infaunal impacts of pulse trawls or morality caused by ghost fishing).

Secondly, fishing stakeholders identified a number of opportunities to reduce impact. Although it was recognised that some impacts are harder to reduce than others, they had suggestions for requirements to achieve this. Key areas identified for impact reduction included:

- Reducing seabed impacts by controlling dredging activity;
- Gear and effort restrictions for maintaining target stock populations and minimising bycatch;

- Reduction in pollution and plastic use through the provision of recycling facilities and innovations in product development to reduce plastic waste;
- Improvements in vessel efficiency through design and transitioning to electric/hydrogen powered engines;
- Education and training in fish welfare for anglers and product quality for commercial fishers.

A key perception was that local, non-nomadic, inshore vessels are likely to have the least impact as their effort is restricted due to weather, engine power and tides and there is a sense of stewardship for local resources (which is less likely for nomadic vessels who have the capacity to move to more productive fishing areas if needed).

However, alongside identifying potential areas for impact reduction, stakeholders also identified a number of challenges to achieving consensus on identifying criteria for lowering the impact of fishing, as set out in the following sections

4.1 TRUST

A lack of trust as a result of historic issues around quota allocation and fisheries management, mean that this project was associated with considerable ‘baggage’ (a barrier in fisheries management recognised in other literature⁴¹) and the project was not seen as a ‘blank slate’ or a new approach to working collaboratively with industry, but rather a continuation of previous undelivered aspirations. A lack of trust was perceived as an issue that is problematic at all levels, from international (European Commission, ICES science), to national (Defra, MMO) and local (IFCAs). For example, participants expressed scepticism as to the purpose of the project, with concerns that information elicited through the workshops could later be used to restrict fishing activity or penalise the industry.

Defra should ensure that they respond/follow-up in a way that builds social capital as trust-building takes time and needs to be continuous to gain fishers’ confidence for a successful process outcome. Funding for bigger, longer-term support is needed. For example, the MCZ process received around £8 million to deliver the regional stakeholder engagement and this trust and bridge to industry locally has now been lost.

Collaborative or co-designed definitions need investment to support the maximum number in the industry and this means a closer engagement and more frequent dialogue with industry is necessary covering multiple marine and fisheries policy areas. The reactivity of data and management does not match fishers’ daily experiences and this also undermines their trust in science.

Projects such as Fishing into the Future are seen as helping to build that trust and dialogue, but had a limited reach. Fishers did not feel they could discuss many contentious topics in that workshop because of the diversity of fishers in the room. They do not want to blame each other and identify specific types of gear as being the cause of problems, because they did not know how Defra or the MMO would use this information and therefore what consequences it would have for their colleagues. Fishers feel that they have put a lot of time into educating and building trust/rapport with Defra Marine and Fisheries policy teams. However, the rapid turnover of staff in the civil service means that this time and institutional memory is often lost, as people with whom they have built a working relationship with, move on and lose contact. Knowledge is lost, which can be demoralising and dissuade fishers to continue to work with Defra.

Thus, considerable time and effort is needed to build trust before meaningful conversations can be had between stakeholders and policy makers in terms of designing new policy options. That being said, feedback following the workshops suggests that they have been effective in breaking down initial barriers and providing an opportunity to influence workable policy development. This opportunity may be better suited to overarching policy work, rather than specifically used to define low impact fisheries through co-design.

It is worth highlighting the importance of the attendance, openness and commitment of the Defra staff represented in the workshops. This was fundamental in overcoming initial suspicion of the motivation for the project. The leadership of senior Defra staff in preparing for and presenting at these workshops, alongside the amount of time spent answering questions and defending policy positions, contributed a great deal to the success of the workshops and must be acknowledged. Feedback from fishers after workshops indicated this was essential in showing who Defra policy makers actually are, and allaying fears or confusion surrounding new projects that aim to involve stakeholders directly.

4.2 REPRESENTATION

This history of quota allocation has left a legacy of division and significant gaps in representation of interests, e.g. Producer Organisations (POs) for quota owners, which have also skewed representation to follow quota interests over other needs. This is a particular problem for the inshore fleet. The dispersed and fragmented nature of the inshore fleet, and the local/regional nature of their engagement means they are often not represented fully in the national context and did not feel they had been able to shape the Fisheries White Paper (FWP). The Coastal PO was seen as the best option for

inshore fishers in the north-east, while it had a very mixed view in Eastbourne and Brixham, with some stating it was not fit for purpose. The NFFO has a clear role and constituency, but the role of flagships and funding for the organisation meant that some fishers who attended workshops did not feel represented and were concerned how lobbying and input into the FWP did not reflect their needs.

The fishing industry body Seafish focuses on levy payers (supermarkets etc.) and were therefore also not perceived as delivering representation for the inshore fleet. Lobbying and advocacy at the national level was perceived to match a minority of interests, so fishers do not feel represented by the stakeholders who are engaged in policy development currently. This is a clear obstacle to effective co-design as even thorough industry engagement will not please all stakeholders. Shared objectives and outcomes will be hard to achieve if the interests being represented are not those of the majority of English fishers or are not perceived to align with their needs.

In addition, power structures (e.g. quota leasing) means that fishers do not always feel they can be open in meetings as they fear reprisals if they disagree publicly with those who lease them quota (or buy their landed catch). Feedback making this point explicitly was emailed or relayed in phone calls to the project team after workshops.

4.3 QUOTA

The historic approach to quota management was perceived by all stakeholders to have been a problem and had created inequity within the fleet. This has had impacts on socio-economics (inequality in access to fishing opportunities, regulatory discarding and impacts on quota leasing market) and also the environment (discarding and food chain impacts, shifts in fishing effort to non-quota species driving overfishing of shellfish and sea bass) and was well supported in available literature.^{42,43,44,45,46,47}

4.4 LICENSING

Increasing mortality on whitefish and shellfish to maintain license entitlements⁴⁸ was presented as a major negative environmental outcome also leading to conflict locally as fishers encroach on fisheries they are not regularly active in to ensure they have the ability to diversify. Allocation of entitlements based on track records (in the case of sea bass) have also driven a sense of unfairness between full-time and part-time fishers.

4.5 RECOMMENDATIONS

4.5.1 Build on trust gained during the project

While the coronavirus pandemic will continue to impact global healthcare and the global economy, it will also continue to impact how the UK fishing industry works for the foreseeable future. There is a key opportunity for Defra to build on trust and working relationships, which have been developed through the low impact fishing co-design project. The timing of when to continue the conversation is currently unclear, but connections to local gatekeepers and boundary spanners means a clearer and more diverse entry route into the industry has now been established.

4.5.2 Facilitate participation and representation

Ensure that a diverse range of active fishers are able to participate in future policy development, rather than relying on industry spokespeople is an important consideration in widening participation and representation. However, this means more than simply widening the invitation list. Power structures and unfamiliarity with engaging in processes such as this one mean that efforts to increase the ability of stakeholders to meaningfully participate are important. This can include increasing awareness around processes and how to share information in meetings. The South Coast Fishermen's Council provides a template for similar regional engagement and decision-making for a move towards co-management. It can also mean including participants who know the local sector and who are able to facilitate discussions and enable fishers' contributions rather than representing them.

4.5.3 Implement quarterly quota allocations

With regard to quota management, a quarterly quota allocation would appear popular as a measure that would help reduce environmental impacts (even if the level of quota available overall in the pool would need to be lower as a result).

4.5.4 Licensing review

Review the licensing system as changes in 2015⁴⁹ meant that licensed fishing vessels had to have caught 350Kg of a species over the course of the year to maintain their entitlement (for either whitefish or shellfish). Those below that threshold had their licences capped. For those who were on the margin, they were monitored to see whether they should also be capped. This has led to those fishers ensuring they are catching above that threshold in order not to lose their entitlement (as it has a value when it comes to selling the fishing vessel). To maintain the value of their license, fishers are fishing in other fisheries, increasing fishing effort and also conflict.

A review of the licence conditions and entitlements would be beneficial to determine if there are other ways to enable fishers to maintain a portfolio of options without

increasing fishing effort. From a wider perspective of reducing impact, license conditions and latency should be the primary focus.

The review could also seek to determine the impacts of the allocation of sea bass entitlements to both full-time and part-time fishers during the reference period. This was cited in Brixham and Eastbourne as being a major problem for the sea bass fishery in terms of increasing effort because even part-time fishers with low sea bass catches were effectively given a 5 tonne limit.

Participants in all the regional workshops raised major issues with marine licensing overall. Questions were asked about how mobile fishing gear can be banned from an area when aggregate extraction is not. Therefore conditions for the licensing of all marine activities could also usefully be reviewed from the perspective of reducing environmental impact as well as conflict between marine users.

4.6 POSSIBLE WIDER IMPLICATIONS FOR DEFRA

- The project generated valuable opportunities to discuss and develop trust and collaboration between Stakeholders and Defra participants over the short duration of the project which can be used to inform a wider co-design process .
- The conclusion of the project provides a useful opportunity to reflect on process and provide some more detailed recommendations on co-design that could inform future/other co-design initiatives going forwards. Efforts should be made within Defra to synthesise the information emerging from the co-design dialogues to identify the key messages for Defra policy streams and draw lessons for future co-design initiatives.
- There is a clear recognition of the need for longer-term, adequately resourced projects to undertake co-design activities with the fishing industry.

4.7 IMPLEMENTING A DEFRA-WIDE CO-DESIGN FRAMEWORK

The project highlighted some challenges for a co-design framework. The co-design process takes time and involves a series of iterative stages in order to build trust, collectively define the scope of what is to be co-designed, share knowledge and deliberate, reflect, identify areas of consensus and disagreement and establish feedback loops to monitor and evaluate the process and outcomes.

In order to facilitate this, a co-design framework to be utilised as a best practice approach across Defra programmes and projects is needed. Our recommendation, set

out below, is adapted and developed from the co-production framework outlined in earlier work for Defra by Urquhart et al. (2019)⁵⁰ in the context of developing a new social survey of fishers. The framework proposed here consists of six distinct phases of activity, with feedback at a number of stages to monitor both the outcomes and the process itself. The time required for each phase will depend on the topic to be addressed and the degree of existing social capital within the specific stakeholder groups involved.

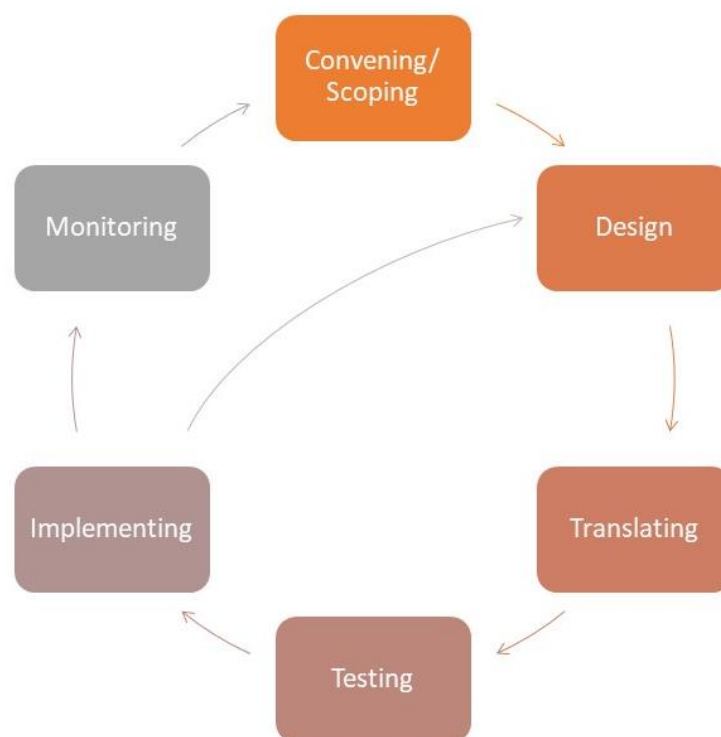


Figure 4: Co-design framework

Phase 1: Convening/Scoping

This initial phase consists of laying down the foundations for the co-design process and involves the following:

- *Consider who should be involved in the co-design project.* Think about including those who experience the issue/problem at hand or will be affected by any decisions resulting from the co-design process; those who hold relevant information or expertise relating to the issue; users of the outcomes such as policy makers or managers. It is important to value all stakeholders as holders of different forms of knowledge.
- *Utilise local gatekeepers to bring local stakeholders together.* Local gatekeepers are important as ‘boundary spanners’⁵¹ between policy makers and researchers, and fisheries stakeholders. They can act as intermediaries both in terms of locating participants for engagement activities, but they can also play a facilitation role.

- *Utilise a neutral intermediary* to act as a boundary-spanner in facilitating dialogue at the fisher-policy interface (e.g. workshops or other participatory events).⁵²
- *Agree the objectives of the co-design between all stakeholders.* Initial engagements should focus on identifying areas of mutual benefit and improvement, what is to be co-designed, agreeing the objectives and recognising that there needs to be a commitment to shared responsibility.⁵³ It is crucial that the issue to be addressed through the co-design is itself agreed on collaboratively between stakeholders, so they understand and agree with the importance and relevance of the work, and are more likely to engage fully as a consequence.
- *Defining 'rules' of engagement and having a memorandum of understanding.* This should clearly set out the objectives and roles, responsibilities of those participating, ways of working, boundaries of activities and anticipated outcomes.
- *Building trust takes time.* It needs frequent dialogue at the local level and evidence based on action from that dialogue. This could be in the form of initial regional 'sandpit' meetings.
- *Building human and social capital.* Integrate activities to enable different stakeholders (different fishing groups, policy makers, scientists) to build cohesion through a better understanding of each other's perspectives. This is important to manage and dissipate fisher-policy maker conflicts, but also conflict between different groups of fishers. It could involve activities that encourage participants to listen openly and respectfully of others who think differently to them. Consideration also needs to be given to those stakeholders with less capacity to engage and those who do have representatives or spokespeople.
- *Review existing data and evidence,* to feed into the policy design phase.

Phase 2: Design

- *Utilise different forms of engagement* to ensure inclusion of a broad range of stakeholders including fisheries stakeholders, supply chain stakeholders, NGOs, scientists etc. Be aware that even where there is willingness there can be cultural differences between stakeholders. Language, meeting formats etc. create obstacles and can marginalise some people. Engagement formats should be designed that 'level up' and ensure stakeholders are equipped to engage and present their knowledge. Recognise that these stakeholders will have different forms of knowledge from scientific expertise to tacit knowledge through everyday experience. Engagement could take the form of 'policy co-design labs', where a broad set of stakeholders come together on successive occasions to test ideas through deliberation, knowledge sharing and creative methods to reveal non-

verbal knowledge (e.g. visualisation tools, mapping, role playing, story telling). One-to-one engagement can further help to elicit individual values, avoiding responses that are influenced by peer pressure in group settings. Any engagement activities should be mindful of stakeholder schedules (e.g. work patterns dictated by tides and weather) in terms of scheduling. Designing policy 'prototypes' in this phase can allow for rapid feedback.

- *For fisher engagement, ensure a bottom-up approach to fisher representation.* Fishers should nominate who they want to represent them, formally and in a transparent manner so there is no room for interpretation (the South Coast Fishermen's Council is a good model of this in practice). Involve these 'stakeholder-approved' representatives in discussions and get them to report back to local groups⁵⁴. They could also facilitate local workshops on behalf of the research team.
- Engagement should include *open, honest and transparent participation from policy makers*, facilitated by a neutral intermediary.
- *Identify areas of consensus and disagreement*, including workable solutions.

Phase 3: Translating

- Researchers to work with policy makers to translate co-design outcomes into *draft policy options*, to be presented back to stakeholders for further deliberation.

Phase 4: Validation and testing of policy options

- *Test/validate with 'end user' stakeholders* any outcomes from co-design before implementation. It is important to get individual input, as well as group consensus. This phase involves a smaller set of stakeholders, focused on those who will be 'end users' of the policy.
- *Develop appropriate criteria* to enable different stakeholders to self-assess the utility of the policy options.
- Where needed, revisit Phase 2 for further deliberation to refine or re-design policy options.

Phase 5: Implementation

- Implementation of the policy or policies.

Phase 6: Monitoring

- *Evaluate and reflect* on the co-design process and the success of the resulting policies, feeding back learnings into future iterations of the process.

5. CONCLUSION

The above process is intended to help overcome some of the challenges inherent in co-design initiatives. In the complex, messy and politicised context of English fisheries at the current time, it is important to also accept that there are contested spaces and power struggles within and between stakeholder groups. It is equally important to recognise that these may not always be overcome simply through facilitation, negotiation and communication.⁵⁵

The approach above recognises that there may be a need during the process to re-evaluate and return to earlier stages. An important part of the process is not simply the policy outcomes but the potential of the process to create the conditions under which developing a shared commitment to policy outcomes is possible.

While it is clear that co-design has benefits for policy formulation, such as providing legitimacy for policy change and improved compliance, there are a number of notable challenges that need to be acknowledged and addressed.

Firstly, where the stakeholder landscape is varied and complex, such as in fisheries, different stakeholders may have conflicting interests and values. This can make achieving consensus over policy design difficult, if not impossible. Here it is important to identify where consensus can be achieved and where a suite of policy options might be necessary to cater for differing interests.

Secondly, engaging **all** fisheries stakeholder groups, particularly the hard-to-reach, is challenging, thus incorporating a field testing stage is important to seek input from all end users. Alongside this, not all stakeholders have experience of or the capacity to engage in policy fora, thus consideration needs to be given to capacity building and support to ensure equity in access to participation.

Thirdly, the institutional structure within Defra is not well-suited to co-design. For instance, the 6-month format that is the mainstay of Defra research activities is not fit for purpose for delivering meaningful co-design projects. Co-design needs a longer

period of engagement in order to allow for trust-building, multiple interactions, reflection and evaluation, calling for 18 to 24 month projects, together with embedding projects into a wider process of ongoing partnership working with fisheries stakeholders.

Fourthly, trust is built between individuals, not institutions. As this project identifies, fisheries stakeholders become frustrated when they build reciprocal relationships with Defra or MMO staff and within a year or two those individuals have been reallocated to another department within the civil service. Thus, there is a need not to just build social capital, but to maintain it over the long-term.

Fifthly, while there are clear resource implications for funding extended project timeframes, an investment in developing strong partnerships at the outset is likely to be cost effective in the long run.⁵⁶

Finally, co-design involves a significant cultural shift within Defra, recognising multiple forms of legitimate knowledge and the adoption of more experimental approaches to policy formulation.

6. ANNEXES - ATTACHED

- Literature review [Low Impact Final Literature Review (March 2020)]
- Data review [Co-designing the principles for defining low impact fishing - Cefas' data collection. CP017-04-F5]

ENDNOTES

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