Marine Management Organisation

Socio-economic value of fisheries

(MMO1387)

...ambitious for our seas and coasts

MMO1387: Socio-economic value of fisheries
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Executive summary

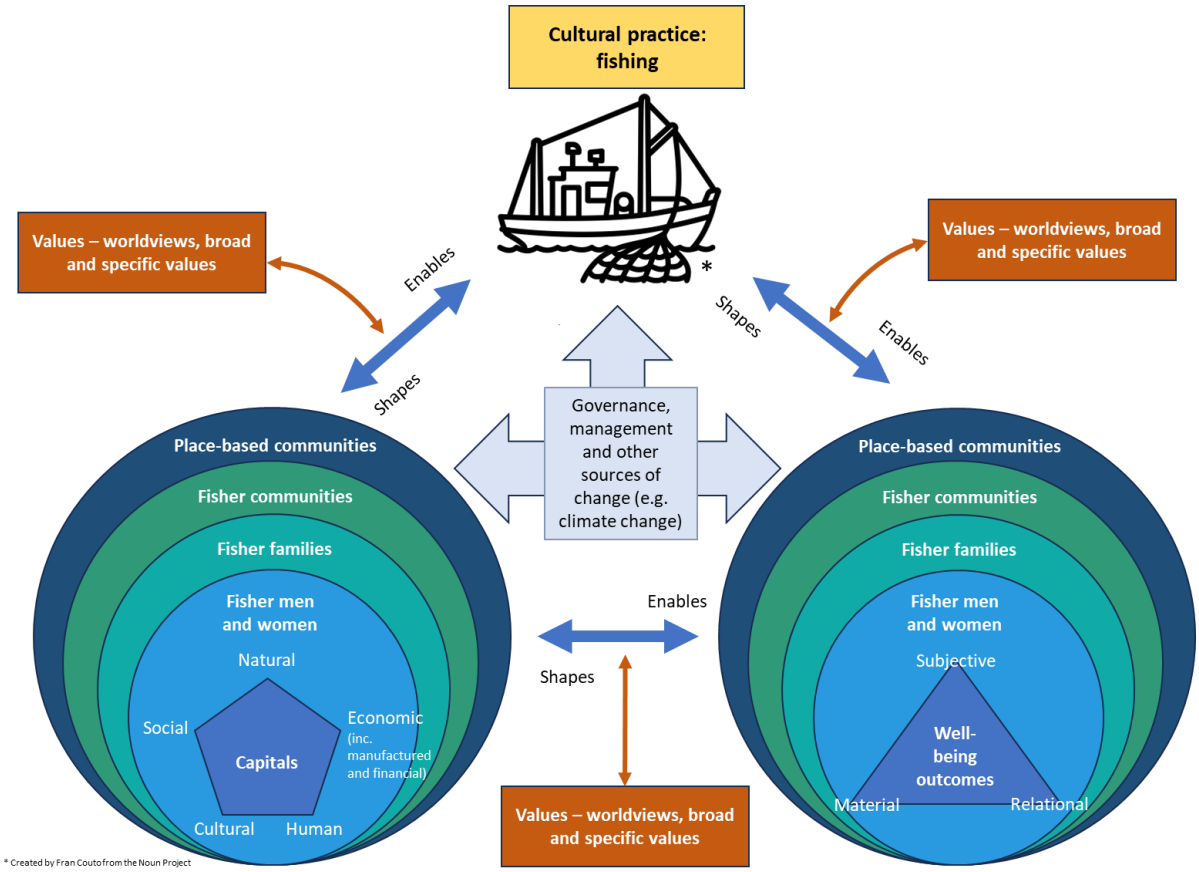
The UK government has committed to build "*a vibrant and sustainable UK fishing industry*" (Defra, 2018) that is managed to achieve social, economic and employment benefits across the UK (Fisheries Act 2020). Drafting of the first tranche of Fisheries Management Plans (FMPs) has identified an evidence gap relating to data on social impacts that can inform FMP development, as well as other fisheries and marine management processes. To address this, the Marine Management Organisation (MMO) commissioned ICF and the Countryside and Community Research Institute (CCRI) to explore the existing evidence base relating to the social, economic and cultural outcomes from fishing and to whom they accrue.

The project aimed to:

- Develop a wellbeing focused conceptual framework to support subsequent stages of this work.
- Identify the social, cultural and economic wellbeing outcomes that fishing brings to fishers, their families, and the occupational and place-based communities, organised according to the conceptual framework.
- Explore the barriers and enablers to the realisation of these wellbeing outcomes.
- Identify a list of testable social wellbeing indicators based on the evidence review which, following further development, have potential for evaluating changes in wellbeing resulting from fisheries management change among fishers, their families and associated occupational and place-based communities.

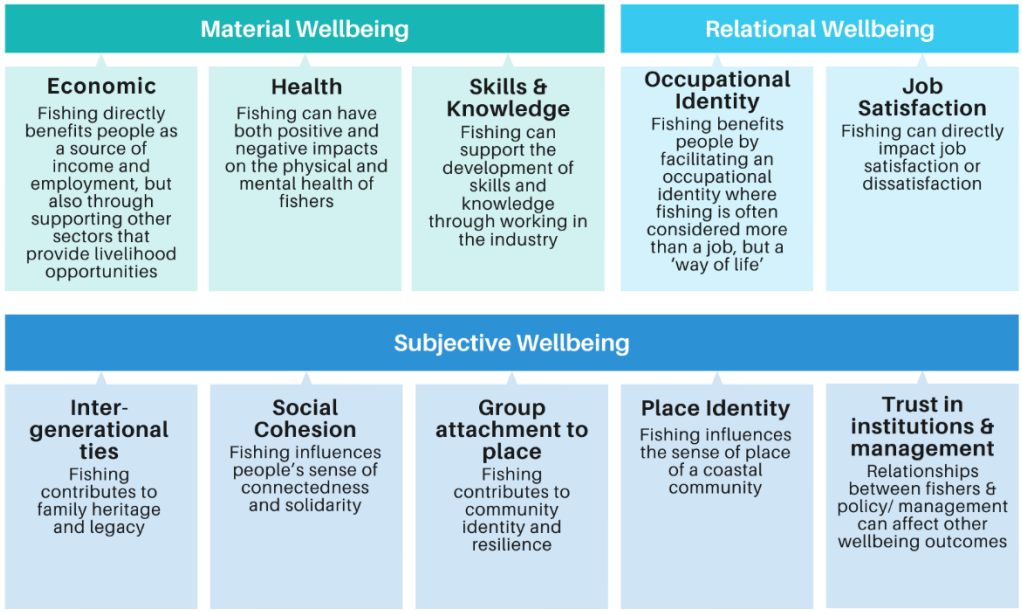
The conceptual framework developed draws upon commonly used sustainability and wellbeing approaches and frameworks, including the five capitals approach, natural capital, cultural ecosystem services, place-based approaches, diverse values and three-dimensional wellbeing (Figure ES1). The conceptual framework highlights how the capital assets a fisher, their family and their occupational and place-based communities can access, use and transform, will shape the fishing practices undertaken and enable the realisation of different wellbeing outcomes (material, subjective and relational). Wellbeing outcomes will differ by fishing practice due to the different ways fishers will access, use and transform capital assets. The wellbeing outcomes will themselves shape fishing practices and the access, use and transformation of capitals. The diverse values that individuals hold will also affect how individuals access, use and transform capital assets, the fishing practices they engage with and the wellbeing outcomes that result. Governance, management and other sources of change (e.g., climate change) are included as influencing factors at the centre of the framework to illustrate that they affect all other components of the conceptual framework (capital assets, fishing practices and wellbeing outcomes). How sources of change impact wellbeing outcomes will vary according to the recipient (i.e., the fisher, their family or their occupational and place-based community).

Figure ES1: Conceptual framework for understanding wellbeing outcomes.



A quick scoping review (QSR) was undertaken to specifically examine the evidence available for the wellbeing outcomes realised from fishing. The majority of the 55 studies reviewed did not use a wellbeing framework to support evidence gathering, but focused more generally on the social, cultural and economic impacts of fishing. Guided by the conceptual framework, this evidence was reinterpreted and assigned to a wellbeing dimension (**Figure**). This analysis was used to develop wellbeing indicators across each of the wellbeing elements identified in the QSR. The indicator development aimed to draft a set of indicators that could support the MMO to better identify and assess the extent to which commercial fishing and its management, contributes to material, subjective and relational wellbeing outcomes.

Figure ES2: Social, cultural and economic impacts of fishing identified in the QSR across material, relational and subjective wellbeing dimensions.



To take the outcomes of this research further and to operationalise the conceptual framework and indicators, the following next steps are recommended:

- Testing the assumptions within the framework with both decision-makers and a range of fisheries stakeholders.
- Testing fisher perceptions of wellbeing outcomes that may result from planned or anticipated management measures at different intervention scales and speeds of change, in different fishery contexts and communities, to identify gaps in wellbeing outcomes.
- Refine and prioritise the indicators to a manageable set for inclusion in existing collection instruments (e.g., Department for Environment, Food and Rural Affairs (Defra) new social survey of fishers) and/or use to guide bespoke data collection specific to target management measures or policies.
- Undertake a large-scale, cross-UK, exercise to collect consistent data to assess material, subjective and relational outcomes.
- Assess the sensitivity of wellbeing outcomes to change (e.g., through the indicators and regular data collection).

1 Introduction

The UK government has committed to build "*a vibrant and sustainable UK fishing industry*" (Defra 2018) that is managed to achieve social, economic and employment benefits across the UK (Fisheries Act 2020). As part of this, the Marine Management Organisation (MMO) is leading the delivery of several new Fisheries Management Plans (FMPs) for England, alongside other fisheries management initiatives. FMPs aim "*to deliver sustainable fisheries for current and future generations*" (Defra and MMO 2023). While FMPs focus primarily on stock management, they may also consider wider social and economic fisheries management issues, recognising the important role that fishing plays in England's coastal communities. Other management measures, such as determining quota allocations, supporting nature recovery actions and Marine Protected Area management may also benefit from consideration of these social issues.

Drafting of the first tranche of FMPs has identified an evidence gap relating to data on social impacts that can inform FMP development, as well as other fisheries and marine management processes. Evidence is needed that sets out the complex and interlinked social, cultural and economic outcomes fisheries provide, acknowledging that these accrue not only to those involved in the fishing sector, but also to their families, the occupational communities they form and the place-based communities to which they belong. Such evidence will also help to understand how to build resilience to the multiple challenges the fishing sector faces (from changing management regimes to climate change). It may also support the MMO in its wider work on marine conservation, marine planning and licensing, and how changes in these could impact social, economic and cultural outcomes in fishing communities.

To address this knowledge gap the MMO has commissioned ICF and the Countryside and Community Research Institute (CCRI) to explore the existing evidence base relating to the social, economic and cultural outcomes from fishing and to whom they accrue.

1.1 Aims and objectives

This project had the following aims:

- To develop a wellbeing focused conceptual framework to support subsequent stages of this work.
- To identify the social, cultural and economic wellbeing outcomes that fishing brings to fishers, their families, and their associated occupational and place-based communities, organised according to the conceptual framework.
- Explore the barriers and enablers to the realisation of these wellbeing outcomes.
- Identify a recommended list of testable social wellbeing indicators based on the evidence review which, following further development, have potential for evaluating changes in wellbeing resulting from fisheries management change among fishers, their families and the occupational and place-based communities. The focus is on indicators that:

- are applicable at the individual fisher, fishing family, occupational community or wider place-based community level;
- have potential for evaluating the wellbeing outcomes of fisheries management measures;
- can be measured, either quantitatively or qualitatively;
- are repeatable.

1.2 Structure of the report

This report is structured as follows:

- **Section 2** presents a brief overview of the methods used to develop the conceptual framework, review existing evidence and identify indicators.
- **Section 3** summarises the conceptual framework.
- **Section 4** provides a high-level overview of the evidence for the wellbeing outcomes resulting from fishing.
- **Section 5** presents the draft indicators.
- **Section 6** discusses the challenges and limitations of this project and provides recommendations for next steps.
- **Section 7** contains references.

This report has two annexes:

- **Annex A** contains the review undertaken to support the development of the conceptual framework.
- **Annex B** presents the detailed method and findings from the quick scoping review (QSR) of the evidence for the wellbeing outcomes from fisheries.

2 Method

This section summarises the methods used for the development of the conceptual framework, the evidence review using a quick scoping review (QSR) approach and indicators.

2.1 Conceptual framework development

The conceptual framework was prepared following a brief review of theoretical and conceptual frameworks that could be used to explain the social, cultural and economic outcomes from fishing. The review was not designed to be comprehensive, but to explore concepts commonly used in marine policy and management. The frameworks reviewed were the five capitals approach, cultural capital and natural capital; cultural ecosystem services, place-based and values-based approaches; and social wellbeing (see Annex A **Conceptual framework**). The findings from this review were summarised and elements of these different frameworks were pulled together into a conceptual framework for this project.

2.2 Quick scoping review

QSRs provide a rapid overview of the evidence identified through a systematic approach to literature collection. A review protocol was developed outlining the review questions, the approach to the evidence search including the search scope (time period, geographic range, languages and type of literature), the search strategy (the search string, inclusion and exclusion criteria), strategy for extracting information and approach to analysis. See **Annex B Quick scoping review** for full details of the review protocol.

Literature searches were undertaken using Google Scholar and Scopus. This was augmented by CCRI and MMO-recommended sources for unpublished or difficult to access materials. Targeted searches were also completed in Google where obvious evidence gaps emerged. Cross-referencing of highly cited papers was undertaken to identify additional relevant papers, as well as targeted author searches.

The Preferred Reporting Items for Systematic review and Meta-Analysis (PRISMA) approach was followed when screening the literature (Page et al., 2021). In total, 55 peer-reviewed and grey literature reports were reviewed in full for the extraction of data into a Microsoft Excel spreadsheet. Data extracted included background details of the study, evidence for wellbeing outcomes and the barriers and enablers hindering or facilitating their emergence, and information relevant to the sensitivity of wellbeing outcomes to change. The evidence was then grouped thematically according to the wellbeing categories identified in the conceptual framework.

2.3 Indicators

In developing indicators, the aim was to draft a set of indicators, based on the outcomes of the QSR, that could support the MMO to better identify and measure

the extent to which commercial fishing (and its management) contributes to material, subjective and wellbeing outcomes. This approach differs from other fisheries social indicator development (e.g., developed by National Oceanic and Atmospheric Administration (NOAA, undated) and International Council for the Exploration of the Sea (ICES, undated), and the Social Wellbeing in Fisheries Tool (SWIFT) (Van Holt et al., 2016)) in that the indicators in this report specifically focus on the causational link between fishing activity and social wellbeing (rather than as basic measures of wellbeing) and are presented as a set of 'idealised' indicators.

Indicators were developed for each of the wellbeing domains identified in the QSR and, where appropriate, include measures that could capture data at the individual fisher, fishing household, occupational fishing community and/or wider place-based community level. In addition, contextual indicators measuring wellbeing dimensions recognised by the Office for National Statistics (ONS) are included, where appropriate, and are aligned to the wellbeing framework. These indicators are included as they can provide a benchmark against which the bespoke wellbeing indicators developed through this project can be compared. This will also help with the interpretation of the bespoke indicators.

The indicators have been drafted with reference to good practice in the development and use of social indicators in marine contexts (Hattam et al. 2015), which recommends that indicator quality is assessed in five areas: measurability; sensitivity; specificity; scalability; and transferability.

3 Conceptual framework

This section describes the conceptual framework used to guide this project (Figure 1). Annex A provides an overview of the theoretical and conceptual frameworks that were drawn upon to develop this framework. The framework emphasises the wellbeing outcomes arising from fishing. A wellbeing approach was taken as it enables an exploration of the multiple and diverse ways that fisheries matter for a diversity of people. Table 1 provides definitions of the terms included within the conceptual framework.

Fishing is a cultural practice that facilitates and enables the realisation of wellbeing outcomes that are underpinned by natural capital (in the form of fish and shellfish stocks). The performance of fishing practices draws upon different forms of capital (cultural, social, human and economic) accessible by individuals, their families and the communities (occupational and place-based) in which they operate. Different fishing practices may draw upon slightly different forms of capital. Fishing practices also help to shape the form of these capitals as they are used and transformed to enable fishing.

To undertake fishing practices (e.g., trawling or potting), fishers use and transform the capitals they have access to (e.g., human capital such as skills, natural capital such as fish stocks). In so doing, this generates wellbeing outcomes for individual fishers, their families and their communities. These wellbeing outcomes may be material (e.g., income, health and knowledge), subjective (e.g., job satisfaction, self-reported assessments of health) and relational (e.g., identity and social connections). They may also be positive (e.g., the creation of income) or negative (e.g., potential negative impacts on physical and mental health). These outcomes feedback into the system to shape the form of the capitals and the fishing practices used (e.g., cohesive fishing communities support each other, building social, cultural and human capital, further enabling fishing practices).

The process for generating wellbeing outcomes from fishing, including the use and transformation of capitals and how fishing practices are undertaken, will be influenced by individuals' worldviews and values. These values will shape how individuals respond to management measures and other sources of change. Depending upon the level of understanding of these values, responses may be predictable as well as unexpected. For example, fishers' worldviews about the environment may encourage or discourage their adoption of fishing techniques or technology depending on their understanding of how that technique or technology impacts the environment. Similarly, fishers' values relating to social relationships could influence their engagement with management actions depending on how others engage or the impacts of that management on social relationships.

Governance and management actions may influence fishing practices and hence the amount, use and transformation of capitals held by individuals and communities. For example, closure of a popular fishing ground may result in fishers needing to draw on additional economic capital to reach new fishing grounds, and additional human capital (e.g., skills) to understand where and how best to fish in the conditions of the new location. By affecting fishing practices, governance and management will also influence the wellbeing outcomes derived from fishing. For example, the need to

travel to more distant fishing grounds may affect job satisfaction (subjective wellbeing), strain family ties if more time is spent at sea (relational wellbeing) and result in increased costs reducing income (material wellbeing).

The extent to which management actions affect different wellbeing outcomes and capitals is likely to vary with the type and scale of the intervention (e.g., closure of a fishing ground vs. changes to bycatch regulations), but also the speed of change and by the outcome or capital type. Similarly, the wellbeing outcomes these forms of capital can generate (and the value given to these outcomes), will also vary across individuals and communities and through time.

Figure 1: A conceptual framework for understanding the social and cultural outcomes from fishing.

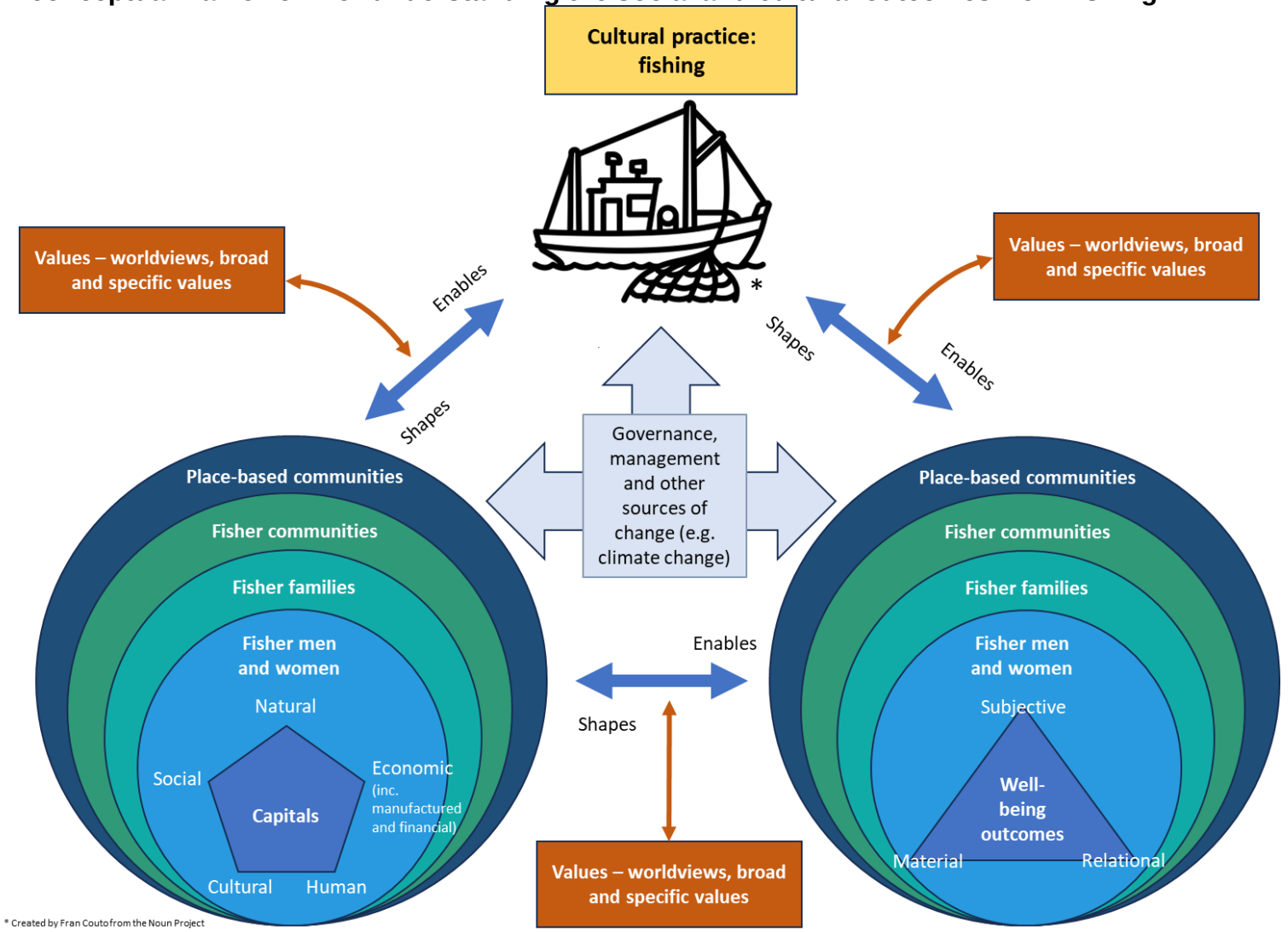


Table 1: Definitions for elements of the conceptual framework.

Concept	Definition
Natural capital	The part of nature which directly or indirectly underpins value to people, including ecosystems, species, freshwater, soils, minerals, the air and oceans, as well as natural processes and functions. In combination with other types of capital, natural capital forms part of our wealth; that is, our ability to produce actual or potential goods and services into the future to support our wellbeing (Natural Capital Committee, 2014).
Social capital	*"The institutions that help us maintain and develop human capital in partnership with others (e.g., families, communities, businesses, trade unions, schools, and voluntary organisations)"* (Porrit, 2005).
Human capital	*"People's health, knowledge, skills and motivation"* (Porrit, 2005).
Cultural capital	Cultural capital takes three forms (Bourdieu, 1986) **Embodied**: in the form of long-lasting dispositions of mind and body that are consciously acquired or passively inherited (e.g., demonstrations of skill, the incorporation of cultural norms of the fishing community, identity). **Objectified**: in the form of cultural goods (e.g., fishing boats and equipment). It can be converted to economic capital through sale, but the cultural capital is not transferred unless the significance of the item is explained. **Institutional**: a form of objectification that guarantees properties of cultural capital (e.g., certification of competence). It is essentially a way of describing one's cultural capital and differs from human capital which refers to the actual skills that one has.
Economic capital	Economic capital comprises manufactured and financial capital. **Manufactured capital:** "*material goods or fixed assets which contribute to the production process rather than being the output itself (e.g., tools, machines and buildings)"* (Porrit, 2005). **Financial capital:** *"plays an important role in our economy, enabling the other types of capital to be owned and traded. Unlike the other types, it has no real value itself but is representative of natural, human, social or manufactured capital (e.g., shares, bonds or banknotes)"* (Porrit, 2005).
Cultural practices	Expressive, symbolic and interpretive interactions between people and the natural environment (Fish et al., 2016).
Wellbeing outcomes	Wellbeing outcomes are the resulting wellbeing status of an individual, group or population that can be attributed to an activity, process or change (e.g., a new fisheries management intervention, climate change, a change in access to capitals).

Concept	Definition
Material wellbeing	*"What a person has, i.e., the objective material resources that a person can draw upon to meet their needs, such as food, assets, employment, services and the natural environment"* (White, 2010).
Subjective wellbeing	Subjective wellbeing (or personal wellbeing) focuses on people's own experiences and perception of their lives. It includes aspects such as life satisfaction, positive and negative emotions, and whether their life is meaningful (Deiner et al., 1999).
Relational wellbeing	"*What a person does through social relationships that enables/or disables the pursuit of wellbeing (including relationships of care and love, relations with the state, social institutions, kinship, cultural rules and norms, forms of collective action, among others)*" (Coulthard, 2012).
Worldviews	*"Are the ways through which people perceive, conceptualise and modify the world, rooted in cultures and languages (Olsen, 2019). Worldviews shape individual and collective ways of perceiving, interpreting and interacting with nature, and are expressed through culture, knowledge systems and languages*" (IPBES, 2022).
Broad values	Are general moral guiding principles and life goals (e.g., freedom, justice, responsibility, harmony with nature, harmony with Mother Earth, health, prosperity) informed by people's worldviews and beliefs (Dietz et al., 2005). They are often embedded in a society's institutions (i.e., informal social conventions and norms, and formal legal rules) and can underpin people's specific values of nature (IPBES, 2022).
Specific values	Are opinions on or judgements regarding the importance of nature in particular situations. Specific values comprise instrumental, intrinsic and relational values (IPBES, 2022).
Instrumental values	The importance of nature as a means to achieve a particular end (e.g., to satisfy human needs, interests or preferences) (IPBES 2022).
Intrinsic values	That something has value as an end-in-itself or has inherent or moral value that is not tied to human purposes (Devos et al., 2019).
Relational values	Preferences, principles, virtues associated with relationships, both interpersonal and as articulated by policies and social norms. They include "eudaimonic" values associated with a good life and are not present in things, but derived from relationships and responsibilities to them (Chan et al., 2016).

4 Quick Scoping Review results

This section presents the findings from the QSR, with a focus on wellbeing outcomes in relation to the conceptual framework and the development of indicators (**Section 0**). See Annex B **Quick scoping review** for full details of the QSR including review questions, method and complete results.

Of the 55 pieces of literature included in this review, the majority of studies were conducted in England (n=31), but locations in Scotland (n=12), Wales (n=8) and Northern Ireland (n=2) were also captured, and two studies were UK wide. The reviewed studiesexplored diverse aspects of fisheries. Common themes included the concept of identity in fishing communities; institutional arrangements and social dynamics in UK inshore fisheries; the significance of social capital; community resilience; and the role of women in fishing communities. Most studies dealt solely with inshore fisheries, but some considered boats both under and over 10 metres, likely capturing fishers who operate further out to sea. In most papers, the type of fishery (demersal, pelagic, shellfish etc.) was not specified. The evidence gathered therefore likely encompasses a broad range of fishery types and target species. Where the type of fishery was specified, studies collectively dealt with a wide range of fishing methods and finfish and shellfish species.

Table 2 summarises the evidence identified through the QSR for material, subjective and relational wellbeing outcomes from fishing and to whom these outcomes accrue (i.e., fishers, their families, the occupational community and the place-based community). As QSRs are designed to be rapid, the evidence identified may not be exhaustive but will give a useful overview of the type of evidence available. An absence of evidence, however, should not be considered an absence of effect. In some cases, there may be genuine evidence gaps, although a more comprehensive review may be able to identify evidence for additional wellbeing outcomes. Evidence was primarily gathered to explore the impact of fishing on wellbeing outcomes, however, where available, information was also captured on the impact of leaving or diversifying from or within the fishing sector on wellbeing outcomes.

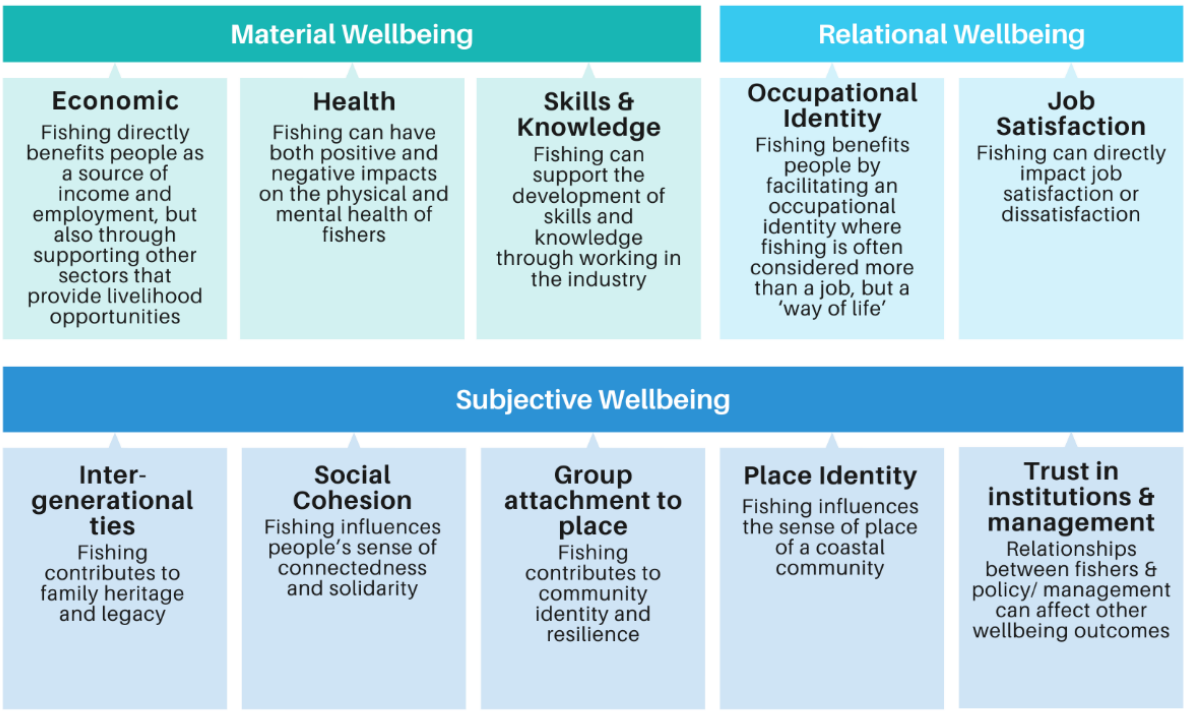
The majority of the evidence identified through the review does not focus on wellbeing per se, but more generally on the social, cultural and economic impacts of fishing. Guided by the conceptual framework (**Section 3**), this evidence has been reinterpreted and assigned to a wellbeing dimension (Figure 2). Often wellbeing dimensions and their associated domains are not clearly defined, and many are overlapping and interlinked. The allocation of outcomes to wellbeing dimensions and domains has therefore been undertaken according to the judgement of the report authors.

Table 2: Summary of QSR evidence for material, subjective and relational wellbeing outcomes from fishing and to whom these outcomes accrue.

Wellbeing domain	To whom impacts accrue	Wellbeing outcomes
Material wellbeing (What a person has, i.e., the objective material resources that a person can draw upon to meet their needs)		
Economic	Fishers	• Income and employment security in the catch sector.
	Fisher families	• Income and employment in the fishing supply chain.
	Wider community	• Income and employment in the fishing supply chain. • Income and employment through tourism and creative industries associated with fishing.
Health	Fishers	• Food for consumption. • Detrimental physical and mental health. • Drink and drug related health problems. • Exiting the sector can improve physical and mental health outcomes.
	Fisher families and wider community	• Food for consumption, contributing to food security in remote communities.
Skills and knowledge	Fishers	• Fishing skills. • Boat maintenance skills. • The ability to be a “jack of all trades”. • Knowledge accumulation feeding into the concept of the “good fisher”.
Subjective wellbeing (People’s own experiences and perceptions of their lives)		
Occupational identity	Fishers	• Autonomy, independence and freedom. • Perceptions of being “Frontiersmen” and “hunter gatherers”. • Being skilled problem solvers (linked to technical competences, skills and knowledge). • Self-worth, pride, determination, bravery and survival against the odds. • Diversification from fishing impacts, notions of independence and fishing heritage. • Diversification within the sector fortifies entrepreneurialism and the expression of risk-taking.

Wellbeing domain	To whom impacts accrue	Wellbeing outcomes
Job satisfaction	Fishers	• Being able to express one's identity as a fisher supports job satisfaction. • Perceptions of safety, poor health, lack of economic security and inefficiencies in fisheries management reduce job satisfaction and influence fisher decisions to exit the sector.
Relational wellbeing (What a person does through social relationships that enables/or disables the pursuit of wellbeing)		
Inter-generational ties	Fishers	• Families as a source of knowledge.
	Fisher families	• Family heritage and legacy. • Supports identity, sense of belonging and pride. • Facilitates entry into the fishing sector.
	Wider community	• Contributes to community identity.
Social cohesion	Fishers and the occupational community	• Provision of support while at sea in times of need. • Success is reliant on networks and knowledge sharing. • Solidarity and camaraderie. • Shared norms and values.
	Wider community	• Barrier to entry of "outsiders" into fishing. • Fishing as part of community social fabric. • Community glue and place-based community bonds
Group attachment to place	Occupational community	• Rootedness to place and sense of belonging. • Supports resilience and fosters adaptive capabilities. • Can lead to rivalry between port communities.
Place identity	Fishers, fisher families and the wider community	• Fishing contributes to placemaking, shaping identity and providing aesthetic, authentic, emblematic and inspirational wellbeing outcomes. • Linked to symbols such as the fisherwoman and fishwife. • Reinforces cultural heritage and memory, protecting history and tradition.
Trust in institutions and management	Fishers and the occupational community	• Low levels of trust towards institutions. • Feelings of being unappreciated and ecological knowledge undervalued. • Failure to have sector needs addressed. • Impacts other wellbeing dimensions (e.g., subjective wellbeing).

Figure 2: Impacts of fishing identified in the QSR across material, relational and subjective wellbeing dimensions.



5 Indicators

Table 3 presents the suggested indicators against each of the wellbeing domains identified in the QSR (see Table 2), together with to whom the impact from fishing is experienced (i.e., fisher, fishing household, fishing community, wider place-based community). These indicators could be used to measure the extent to which commercial fishing contributes to material, subjective and relational wellbeing outcomes, but in many cases the data underpinning the indicators are not yet collected or used.

Table 4 presents contextual indicators measuring wellbeing dimensions recognised by the Office for National Statistics (ONS, 2024). The associated data, collected through the Annual Population and Lifestyle Survey, are publicly available at a national level. These indicators do not offer measures of direct causation between fishing and wellbeing but, through bespoke data requests to the ONS, they can provide/present wellbeing characteristics of specified geographies and sectors. The ONS indicators have been aligned with the wellbeing framework developed in the QSR, although the ONS use a different framework to conceptualise and categorise indicators.

To be operationalised, the indicators will need further refinement, testing, prioritisation and reduction into a composite set of indicators that can be used in a real-world context. Recommendations for this further work are presented in the Discussion (**Section 6**) of this report.

Table 3: Indicators of the impact of fishing on the social wellbeing of fishers, fishing households, fishing communities and wider place-based communities.

Wellbeing domain	To whom impacts accrue	Wellbeing outcomes	How might we measure that?
Material wellbeing (What a person has, i.e., the objective material resources that a person can draw upon to meet their needs)			
Economic - Fishing directly benefits people as a source of income and employment, but also through supporting other sectors that provide livelihood opportunities.	Fishers	• Income and employment security in the catch sector.	• Fishers' weekly net pay from fishing minus mortgage/rent/lodgings (£). • Fishers' weekly net income from additional sources outside of commercial fishing minus mortgage/rent/ lodgings (£). • Annual profit (£) for owners of registered commercial fishing vessels. • Percentage of individual gross weekly income derived from sources outside of fishing related activities. • Fisher satisfaction with current income from fishing activity. • Fisher confidence that fishing will provide a source of income for the next three years.
	Fisher families	• Income and employment in the fishing supply chain.	• Gross household income derived from fishing. • Percentage of gross household income derived from fishing (where other sources of income exist in the household). • Number/percentage of fishing households in which family members are involved in the family's fishing business. • Number/percentage of fishing households in which family members are employed in the wider fishing sector (e.g., processing, marketing etc.).

Wellbeing domain	To whom impacts accrue	Wellbeing outcomes	How might we measure that?
			• Number/percentage of fishing households in which family members are employed in other fishing-related sectors (e.g., tourism, fishing suppliers).
	Wider community	• Income and employment in the fishing supply chain. • Income and employment through hospitality, tourism and creative industries associated with fishing.	• Number of jobs associated with non-catch fishing supply chain (e.g., chandlery, boat repair, fishing suppliers, fish processing, fish markets, sales, catering/restaurants). • Daily visitor spend (£) in a specified geography on items such as food/drink and souvenirs where a reason for visiting was the local fishing heritage or visual artifacts/architecture associated with fishing. • Number of visitors to a specified geographic area whose primary reason for visiting was the local fishing heritage or visual artifacts/architecture associated with fishing. • Number of commercial fishing vessels in a specified geography also being used for tourism services (e.g., fishing trips/ferry).
Health – Fishing can have both positive and negative impacts on the physical and mental health of fishers.	Fishers	• Physical and mental health benefits or disbenefits. • Drink and drug related health problems. • Exiting the sector can improve physical and mental health outcomes.	• Proportion of fishers reporting positive or negative physical health benefits from fishing. • Proportion of fishers reporting positive or negative mental health benefits from fishing. • Proportion of fishers reporting work-related stressors (which could be due to a range of reasons including. physical danger, severe weather, financial concerns, changes to regulations, administrative duties due to regulation, isolation, lack of crew, spatial squeeze caused by other marine users).

Wellbeing domain	To whom impacts accrue	Wellbeing outcomes	How might we measure that?
	Fisher families and wider community	• Food for consumption, contributing to food security in remote communities. • Mental health impacts on fishing families.	• Importance of locally caught fish as a staple of weekly food consumed by fishing households. • Number of wives/partners/family members experiencing feelings of loneliness when the fisher is at sea. • Number of wives/partners/families indicating they are worried about the safety of the fisher at sea.
Skills and knowledge – Fishing can support the development of skills and knowledge through working in the industry.	Fishers	• Fishing skills. • Boat maintenance skills. • The ability to be a "Jack of all trades". • Knowledge accumulation feeding into the concept of the "good fisher".	• Number of fishers undertaking formal training provided by an external organisation for their job in fishing. • Number of fishers reporting that their fishing related skills were taught to them by peers.
Subjective wellbeing (People's own experiences and perceptions of their lives)			
Occupational identity – Fishing benefits people by facilitating an occupational identity where fishing is often considered more than a job, but a 'way of life'.	Fishers	• Autonomy, independence and freedom. • Perceptions of being "Frontiersmen" and "hunter gatherers". • Being skilled problem solvers (linked to technical competences, skills and knowledge). • Self-worth, pride, determination, bravery and survival against the odds.	• Number of people in coastal communities reporting that they identify primarily as a fisher. • Number of people in coastal communities reporting that being employed in fishing plays a crucial part in forming their personal identity (i.e., the way they want others to see them). • Number of people in coastal communities reporting that being employed in fishing provides a sense of autonomy in their actions and decision-making. • Number of people in coastal communities reporting that being employed in fishing provides a sense of self-worth and pride.

Wellbeing domain	To whom impacts accrue	Wellbeing outcomes	How might we measure that?
		• Diversification from fishing impacts notions of independence and fishing heritage. • Diversification within the sector fortifies entrepreneurialism and the expression of risk-taking.	• Number of people in coastal communities reporting low to high life satisfaction as a direct result of being employed in fishing.
	Fishing families	• The wider impact of fisher occupational identity on the fishing household.	• Number of wives/partners/family members expressing a sense of pride in being part of the local fishing industry. • Number of wives/partners/family members indicating that fishing is an important part of their own identity.
Job satisfaction – Fishing can directly impact job satisfaction or dissatisfaction.	Fishers	• Expression of factors contributing to identity supporting job satisfaction. • Perceptions of safety, poor health, lack of economic security and inefficiencies in fisheries management reduces job satisfaction and influences fisher decisions to exit the sector.	• Number of fishers reporting satisfaction with aspects of their job, including: rules, government funding, economic viability, longevity, career progression, safety, length of working week, access to quotas, crew relationships, work-life balance, general satisfaction, support and guidance from other fishers, onboard conditions, security in retirement, and access to internet at sea.
Relational wellbeing (What a person does through social relationships that enables/or disables the pursuit of wellbeing)			
Intergenerational ties – Fishing contributes to	Fishers	• Families as a source of knowledge.	• Number of fishers reporting that their fishing related skills and knowledge were taught to them by previous generations of fishers.

Wellbeing domain	To whom impacts accrue	Wellbeing outcomes	How might we measure that?
family heritage and legacy.			• Number of fishers reporting to have at least one other family member over previous generations employed on a commercial vessel.
	Fishing families	• Family heritage and legacy. • Supports identity, sense of belonging and pride. • Facilitates entry into the fishing sector.	• Number of wives/partners/family members reporting first fishing related job supported by family member or part of family business.
Social cohesion – Fishing influences people's sense of connectedness and solidarity.	Fishers, fishing families and the occupational community	• Provision of support while at sea in times of need. • Success is reliant on networks and knowledge sharing. • Solidarity and camaraderie. • Shared norms and values.	• Number of fishers indicating trusted sources of information to support their decision-making (e.g., family members, business partners, other fishers, local fishery managers, financial advisor, national government, fishing industry representatives etc.). • Fishers' perception of 'togetherness' with other fishers. • Number of fishers, fishers wives/partners/family members and people in coastal communities reporting that their social networks/friendship circles are in some way connected to fishing. • Number of individuals not from a fishing family entering the (catch) fishing sector.
Group attachment to place – Fishing contributes to community identity and resilience.	Occupational community	• Rootedness to place and sense of belonging. • Supports resilience and encourages adaptive capabilities. • Can lead to rivalry between port communities.	• Number of individuals feeling like they belong to the fishing community in the area they live or work.

Wellbeing domain	To whom impacts accrue	Wellbeing outcomes	How might we measure that?
Place identity – Fishing influences the sense of place of a coastal community.	Fishers, fisher families and the wider community	• Fishing contributes to placemaking, shaping identity and providing aesthetic, authentic, emblematic and inspirational wellbeing outcomes. • Linked to symbols such as the fisherwoman and fishwife. • Reinforces cultural heritage and memory, protecting history and tradition.	• Number/percentage of people in specified geography reporting that the historic presence of fishing in the area over generations contributes to its sense of place. • Number/percentage of people in specified geography reporting that the presence of fishing in the area significantly contributes to a sense of community among those in the area. • Number/percentage of people in specified geography reporting that the sense of community resulting from fishing activity in the area increases resilience to tackle new challenges ahead (social, political and/or economic).
Trust in institutions and management – Relationships between fishers and policy/management can affect other wellbeing outcomes.	Fishers and the occupational community	• Low levels of trust towards institutions. • Feelings of being unappreciated and ecological knowledge undervalued. • Failure to have sector needs addressed. • Impacts other wellbeing dimensions (e.g., subjective wellbeing).	• Number of fishers reporting trust in policy makers and fisheries managers to address their needs and the needs of the sector. • Number of fishers reporting that current fisheries management ensures the sustainability of fisheries. • Fishers reporting regulatory impacts on the ability to diversify fishing activity such as gear restrictions, costs of licences for different gear types, access to quota, closed areas. • Number of people employed in fishing engaging in fisheries co-management events or scientific data collection. • Number of people employed in fishing feeling they are involved in decision-making regarding fisheries.

Table 4: Contextual indicators drawn from the ONS wellbeing dashboard.

Level	Outcome	Description	Potential indicators
Material wellbeing (What a person has, i.e., the objective material resources that a person can draw upon to meet their needs)			
Fisher families	Economic	Measures income generated from being employed in fishing or registered as a self-employed/owner of active commercial fishing vessel.	Median household wealth in fishing sector (£).
Fisher (individual)	Mental health	Measures mental health of those employed in fishing or registered as a self-employed/owner of active commercial fishing vessel.	Number of those in the fishing sector at a specified geography reporting evidence of depression or anxiety.
	Physical health	Measures physical health of those employed in fishing or registered as a self-employed/owner of active commercial fishing vessel.	Life expectancy (years) at birth of those in the fishing sector at a specified geography.
	Combined health	Measures combined (general) health of those employed in fishing or registered as a self-employed/owner of active commercial fishing vessel.	Number of fishers reporting that they are fairly or very satisfied with their own health (specified geography/sector).
	Skills and knowledge	Measures satisfaction of those employed in fishing or registered as a self-employed/owner of active commercial fishing vessel.	Proportion of fishing sector at a specified geography fairly or very satisfied with their education and skills.
Subjective wellbeing (People's own experiences and perceptions of their lives)			
Fisher (individual)	Life and Happiness	Measures the level of happiness and satisfaction of those employed	Number of fishers reporting low-high life satisfaction (specified geography/sector).

Level	Outcome	Description	Potential indicators
		in fishing or registered as a self-employed/owner of active commercial fishing vessel.	Number of fishers reporting low-high levels of happiness in life (specified geography/sector).
Relational wellbeing (What a person does through social relationships that enables/or disables the pursuit of wellbeing)			
Fisher	Loneliness	Measures feelings of loneliness (isolation from others) among those employed in fishing or registered as a self-employed/owner of active commercial fishing vessel.	Proportion of fishing sector at a specified geography reporting feeling lonely often, always, sometimes or never.
Fishing community	Attachment to place	This measures the degree connectedness to the place felt by those employed in fishing or registered as a self-employed/owner of active commercial fishing vessel	Proportion of fishing sector at a specified geography agreeing or strongly agreeing that they belong to their neighbourhood.
	Social cohesion	Measures satisfaction with social factors of those employed in fishing or registered as a self-employed/owner of active commercial fishing vessel.	Proportion of fishing sector at a specified geography fairly or very satisfied with their social relationships.
			Proportion of fishing sector specified at a geographic area reporting that people from different backgrounds get on well together in the local area.
	Governance	Measures degree of trust towards government across fishing industry at a specified geography.	Proportion of fishing sector at a specified geography reporting that they tend to trust the government.
			Proportion of fishing sector at a specified geography reporting that they do not have a say in what the government does.

6 Discussion and recommendations for next steps

Understanding the wellbeing outcomes from fishing is important to the development of FMPs and other fisheries and marine management processes. The conceptual framework developed, together with the evidence base reviewed and indicators constructed, provide an important step towards this understanding. They also provide the basis for understanding how to further develop the evidence base.

The conceptual framework draws upon commonly used sustainability and wellbeing frameworks. It therefore aligns to, and extends, ongoing discussions among decision-makers about the wellbeing outcomes from fishing. It also provides a useful guide for understanding how wellbeing outcomes may change as a result of fisheries and marine management, and why.

The QSR provides a detailed overview of the state of the evidence available for understanding the wellbeing outcomes from fishing. Although the evidence is not extensive, it covers a wide range of material, subjective and relational wellbeing outcomes. It illustrates the diversity of ways that fishing contributes to individual fishers, their families, their occupational and place-based communities.

The indicators developed are an early attempt at distilling the information gathered from the QSR, guided by the conceptual framework. They offer a potential set of measures that can be used to monitor how wellbeing outcomes may change across groups as a consequence of change in fisheries and marine management processes. If measured over time they may also provide insight into the sensitivity of wellbeing outcomes to change in fisheries and marine management processes.

The remainder of this section sets out the challenges and limitations associated with the conceptual framework, the evidence identified through the QSR and the indicator development stage. It closes by providing advice on next steps that the MMO could consider when taking this work forward.

6.1 Challenges and limitations

Each stage of this project presented its own challenges and limitations. These are summarised below.

6.1.1 Conceptual framework

Preparation of the conceptual framework was undertaken following a rapid review of a limited number of theoretical and conceptual frameworks that have been or are commonly used to support discussions on environmental management. Alternative frameworks exist, however, such as those based on system thinking, resilience and adaptation. These are closely linked to the sustainability and wellbeing approaches, emphasising the role of distinctive human capacities in shaping who we are and how we interact with our social and natural environment (Joseph and McGregor, 2020). Bringing in a system approach may be beneficial as it could help to identify trade-offs between wellbeing, resilience and sustainability as well as potential unexpected consequences that may result from fisheries management interventions.

Although the frameworks drawn upon to develop the conceptual framework have all been applied in fisheries contexts, they are not fisheries specific. Nuances particular to the fisheries sector, or elements of it, may therefore be missing. Further development of the conceptual framework should therefore be undertaken with members of the fishing sector and those involved in fisheries management.

6.1.2 Quick scoping review

While the QSR identified evidence from across the UK, the body of evidence is insufficient to explore geographical trends, the contribution of different sub-sectors of the fishing sector to wellbeing outcomes or the sensitivity of wellbeing outcomes to different management interventions. Evidence gaps for potential wellbeing outcomes were also identified. For example, no evidence was found for positive mental health outcomes associated with fishing, although many of the outcomes associated with, for example, identity could provide benefits for mental health. The absence of evidence for wellbeing outcomes should not be interpreted as evidence of absence. The existence of evidence gaps could indicate a limitation of the QSR method, which, as its name suggests, is designed to be quick. A more in-depth approach (e.g., a full systematic review) could surface additional evidence. However, social, cultural and economic data (including wellbeing data) are recognised as an evidence gap for the MMO. This suggests that more targeted and more comprehensive data collection will be required to fill identified evidence gaps.

Many wellbeing outcomes (if not all) interact. For example, trust is an important element of relational wellbeing. Where trust between fishers and management institutions is low, this may influence, e.g., fisher job satisfaction, fisher identity and health. It has not been the purpose of this project to explore the interactions between wellbeing outcomes and little evidence was identified to support this, however, understanding these interactions (especially for wellbeing outcomes that are particularly influential to the realisation of others) will be important for understanding the success of fisheries management actions.

6.1.3 Indicators

A limitation of indicators that aim to attribute causation (i.e., the influence of fishing on different wellbeing outcomes) is that wellbeing outcomes are complex and inter-related, making it challenging to attribute an outcome to a single cause. It may be more appropriate to monitor wellbeing outcomes over time (i.e., the status of wellbeing), and to undertake further qualitative research to better understand how wellbeing outcomes from fisheries management decisions can be improved and negative impacts mitigated.

There are further challenges in developing a set of generic indicators, where the specific context is not known (e.g., a specific management measure or policy). This has implications for applying the indicator quality criteria of measurability, sensitivity, specificity, scalability and transferability (Hattam et al. 2015):

- *Measurability (are there data available for the measurement and quantification of the indicator?):* In most cases, new data collection is likely to be required to measure progress against the indicators in Table 3 although there may be

data collected as part of Defra's new social survey of fishers that could be used.

- *Sensitivity (is the indicator able to detect change over time?):* The sensitivity of most indicators is dependent on the nature of what is being measured but it is also highly dependent on associated data, including the frequency of collection and scale. If appropriate data collection is designed, the ability of the causational indicators to detect change is very high. They are formed to directly link the appropriate outcome to fishing activity, although they will need to be tailored for specific sub-sectors within the industry. It must be noted that most contextual wellbeing indicators in Table 3 (e.g., life expectancy or physical health) are slow moving and have low variability, and this is reflected in the national monitoring of associated datasets (where no change over time is often reported with modelled data and rolling samples on a quarterly basis). Where the causational indicators reflect contextual indicators, one could expect low variability and slow change over time.
- *Specificity (can the indicator respond over time to changes in management as opposed to natural variability?):* How well the indicators reflect change in marine management measures is dependent on them being applied in a specific context and wording refined accordingly. Even where this is undertaken it will require tailored research to gather data on the causality between intervention and outcome, including identifying fishers' behavioural responses. It can be difficult to predict the exact outcomes of policy/strategies to monitor impact over time.
- *Scalability (can the indicator be aggregated or disaggregated to a different spatial scale and still retain its ability to indicate the change of interest?):* The indicators would require refining based on the policy, strategy or workplan that they are being used to assess. For example, fisher income as an indicator of economic wellbeing can be seen at the individual level, or when measured through bespoke ONS datasets, can be aggregated to sector level data. All indicators at an individual scale can be aggregated to provide data at whatever level is required (community, sector or even national scales). However, different indicators may be required for different target groups, for example, aggregating individual fisher data for a particular wellbeing outcome may not be relevant when trying to understand the wellbeing outcomes associated with fishing and fisheries management measures for the wider place-based community.
- *Transferability (is the indicator useful for other locations and hence studies?):* The indicators will require tailoring to meet the needs of varying geographies, as required.

6.2 Next steps

6.2.1 Stakeholder engagement

Future work beyond the lifetime of this project should focus on sharing this framework with the decision-makers it has been designed to support, testing the assumptions embedded within the framework with members of different fishing communities, and modifying and elaborating on any inconsistencies arising.

The framework and indicators could be tested in diverse fishing communities (e.g., in terms of geography, target fishery, community size) to identify if there are gaps in the wellbeing outcomes presented. It would also be helpful to test fisher perceptions of potential wellbeing outcomes that may result from planned or anticipated management measures (e.g., FMPs, area closures, quota change etc.). However, it will be important to note that commonly used heuristics mean that, in the face of uncertainty, there is an increased likelihood that risks associated with future change are overestimated.

6.2.2 Indicator development

As indicated by the conceptual framework developed in this project, when trying to assess and understand the wellbeing outcomes from fishing activities (and the impacts of fisheries management activities on these wellbeing outcomes), it will be necessary to explore changes in the assets that fishers access, use and transform to generate the wellbeing outcomes (i.e., forms of capital), as well as their diverse values. Not all fishers and fishing communities (occupational or place-based) are the same. They will have different levels of access to capital assets and individuals will hold different values. These will influence both the extent to which wellbeing outcomes can be achieved and whether the processes for achieving wellbeing outcomes can be activated. This suggests that outwardly similar fishers and fishing communities may respond in different ways to the same intervention.

The extent to which management actions affect wellbeing outcomes and capital assets is likely to vary with the nature and scale of the intervention (e.g., closure of a fishing ground vs. the introduction of iVMS (inshore Vessel Monitoring System) or changes to bycatch regulations). It is also likely to vary with the speed of change and by the outcome or capital type (see, for example Daw et al., 2016). For example, some wellbeing outcomes may be highly sensitive to change (e.g., trust) with others changing more slowly over extended periods (e.g., social cohesion, tangible cultural heritage). Similarly, the wellbeing outcomes these forms of capital can generate (and the value given to these outcomes), will also vary across individuals and communities, and through time.

A useful next step would be to develop a set of indicators for commonly used capital assets (economic, social, human, cultural and natural). These can be used to track and understand how capital assets are accessed, used and transformed through fishing and the implications of management change on this. It may also be useful to measure values. As these are less likely to change over time, measurement may need to be part of bespoke data collection activities, rather than being monitored over time.

The set of indicators presented in Table 3 is extensive, with much of the required data currently unavailable. A similar problem is likely to present itself for capital asset indicators. Any set of indicators will therefore need to be prioritised and reduced to a manageable set. This will facilitate incorporation into existing data collection instruments (e.g., Defra's new social survey of fishers) and / or use to guide bespoke data collection specific to target management measures or policies. If data are available, methods such as factor analysis can be applied to identify representative indicators across the wellbeing domains.

6.2.3 Development of the evidence base

It has not been possible to assess the levels of certainty in the evidence nor the extent to which the wellbeing outcomes are likely to emerge or be present across the whole of the UK's inshore fishing fleet or just parts. While the literature review has captured evidence from across the UK, there is insufficient detail to understand how wellbeing outcomes may vary geographically or by fishing practice. Data collection methods reported in studies have largely involved in-depth interviews, but studies have had different objectives and employed distinct theoretical or conceptual frameworks. While this provides evidence of a range of potential wellbeing outcomes data are insufficient to disaggregate further. A large-scale, cross-UK, exercise is needed to consistently collect relevant evidence for material, subjective and relational wellbeing outcomes. This could be achieved through, for example, the Defra fisher social survey, but will require the addition of questions relevant to the conceptual framework developed through this project. An alternative could be a large-scale qualitative study focusing on case study locations drawn from a typology of fishing communities. However, engagement demands on fishers are currently high due to the preparation of FMPs and the timing for such a study would need careful consideration.

There is lack of evidence regarding the sensitivity of wellbeing outcomes to change. The evidence presented largely focuses on what the wellbeing outcomes are and identifies some barriers and enablers to their realisation. The studies essentially provide a stock take, but do not capture how these wellbeing outcomes change over time, nor how they respond to different sources of change (e.g., management measures that affect fishing practices or ecosystem change that affects stock availability). In addition to gathering consistent and regular data on wellbeing outcomes, a useful next step would be to map out the logic chains that identify the links between ecosystem change, change in other forms of capital (e.g., human, social, cultural and economic), the barriers and enablers and the wellbeing outcomes using a system thinking approach. As this may not be possible for all wellbeing outcomes, a short list of priority outcomes would need to be identified.

Given the level of consultation underway with the fishing sector regarding FMP development and the challenges associated with stakeholder fatigue, priority for new quantitative data collection should be given to the Defra fisher social survey, which in addition to a set of core questions asked annually, could include questions asked less frequently. Such large-scale data collection would facilitate the use of advanced statistical methods that can explore issues of causality (assuming the inclusion of suitable wellbeing related questions). Some indicators, however, may be better addressed though qualitative methods. This would require a common approach to be used across the country that does not overburden respondents. It will be important to explore how such an approach could be implemented alongside existing data collection efforts.

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Annex A Conceptual framework

A1 Introduction

This Annex summarises the theoretical and conceptual frameworks reviewed as part of the development of the conceptual framework for this project. The conceptual framework is then used to guide the evidence review and the development of wellbeing outcome indicators.

Understanding the wellbeing outcomes from fishing and how to measure them is challenging. Outcomes from fishing have been conceptualised in many ways, drawing upon different disciplinary perspectives. Dominant schools of thought in current political and governance usage include wellbeing and sustainability. These are, however, interconnected approaches with common threads.

To make these approaches useable, the MMO requires an operational framework that can identify the wellbeing outcomes associated with fishing and the impacts of management measures or other drivers on those outcomes. Development of the framework needs to consider theoretical approaches that frame and help explain what the wellbeing outcomes of fishing are and how they may emerge. It also needs to include an understanding of what data should be collected over time to track the impact of interventions on wellbeing outcomes.

Drawing on the wellbeing and sustainability literature (including capitals and ecosystem service approaches), this report briefly presents frameworks that can be used to explain the wellbeing outcomes of fishing. It then draws them together into a conceptual framework. It aims to connect the different theories, assumptions and beliefs about the wellbeing outcomes of fishing, unveiling important relationships that can be used to drive further study and inform decision-making. We pay particular attention to how this conceptual framework can be embedded within existing decision-making approaches.

A2 Understanding the wellbeing outcomes from fishing

This section provides a brief overview of theoretical and conceptual frameworks that can be used to explain the wellbeing outcomes from fishing. It is not designed to be comprehensive, but to introduce key concepts including (1) the five capitals approach, cultural capital and natural capital; (2) cultural ecosystem services, place-based and values-based approaches; and (3) social wellbeing.

A2.1 Capitals approaches

A2.1.1 The five capitals framework

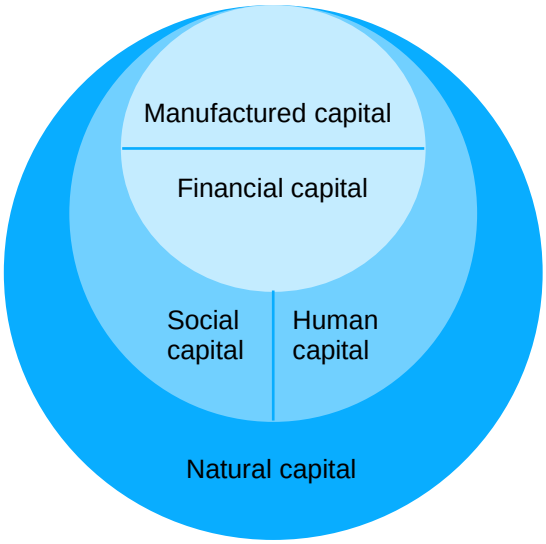
The five capitals framework (Porritt, 2005; Ekins, 1992) emerged from debates around sustainable development and focuses on the maintenance of five stocks of capital (**Figure A1**), rather than the flows of goods and services from them (e.g., Gross Domestic Product - GDP). The five capitals are[1]:

[1] All definitions have been taken from The Forum for the Future (2020) The five capitals – a framework for sustainability, which draws on Porritt (2005).

- **Natural capital:** any stock or flow of energy and materials that produces goods and services (e.g., renewable and non-renewable resources; sinks that absorb, neutralise or recycle waste; processes such as climate regulation).
- **Human capital:** people's health, knowledge, skills and motivation.
- **Social capital:** the institutions that help us maintain and develop human capital in partnership with others (e.g., families, communities, businesses, trade unions, schools, and voluntary organisations).
- **Manufactured capital:** material goods or fixed assets which contribute to the production process rather than being the output itself (e.g., tools, machines and buildings).
- **Financial capital:** plays an important role in our economy, enabling the other types of capital to be owned and traded. Unlike the other types, it has no real value itself but is representative of natural, human, social or manufactured capital (e.g., shares, bonds or banknotes).

In some representations of the model, manufactured and financial capital are combined as economic capital, allowing exploration of other capital forms, such as cultural capital (see **A2.1.2 Cultural capital** below). Definitions for each capital have subsequently been refined. These are discussed in MMO (2023) and are not repeated here.

Figure A1: The five capitals framework for sustainability (from Porritt, 2005).



The capitals framework conceptualises sustainability in economic terms (i.e., that capitals contribute to wealth creation) with an emphasis on organisations. Sustainable organisations maintain and enhance these capitals, rather than degrade them. It has been used to explore livelihood strategies (Rakodi, 1999; Scoones 1998) and it forms the basis for the OECD's wellbeing framework (OECD, 2020). Capital assets are assumed to lead to flows of goods and services that generate wellbeing. The model presupposes that capitals can be stored, transformed, exchanged or used to create those flows (Porritt, 2005). Application of the approach requires an assessment of all capitals rather than each in isolation.

Marine applications of the capitals approach are limited. The MMO (2023) explored its use to support marine planning and understanding of carrying capacity and trade-offs, but there are no readily available examples of its application to fisheries beyond its use in a sustainable livelihoods context. The sustainable livelihoods framework (e.g., Scoones, 1998) assumes that the ability of individuals and communities to pursue different livelihood strategies (e.g., fishing or farming) is dependent on the tangible and intangible assets or capitals that the individual and or community has access to (as per the five capitals framework). Access, use and transformation of capitals is considered alongside people's desired livelihood outcome, their livelihood strategies, the institutions, policies and organisations that determine access to assets and the individual's vulnerability context (Ashley and Carney, 1999).

Allison and Ellis (2001) take a sustainable livelihoods approach (that builds on the sustainable livelihoods framework) to small-scale fisheries in low-income countries to gain insights into conventional fisheries management policies (including community and territorial use-rights approaches). They found that incomplete understanding of livelihoods can result in the application of management approaches that are incompatible with resource conservation and the social and economic goals of fisheries management (i.e., desired wellbeing outcomes).

A2.1.2 Cultural capital

Cultural capital is one of the least theorised forms of capital. It is not explicitly considered in either the five capitals approach or the sustainable livelihoods framework, and there is no consensus in the literature about how it should be understood or deployed (Hale et al., 2023). Cultural capital is recognised as being distinct from other forms of capital. Like other forms of capital, it can be material (e.g., pictures, books, machines), but it can also be embodied (e.g., dispositions of mind and body), and institutionalised (e.g., in the form of qualifications) (Bourdieu, 1986). Bourdieu conceptualised cultural capital as a way of explaining social phenomena and as a contributor to "habitus", the way that individuals or groups perceive and respond to the social world around them (Bourdieu, 1977). The possession of cultural capital affects how social and cultural relations are made and remade, by whom and for whom. Alongside other capitals, cultural capital, is considered a resource and gives an individual the capability to be and act (Bebbington, 1999). Cultural capital enables cultural practices that are valued for their meaningfulness, and they can be highly associated with place. These practices are enabling and empowering in ways that the other forms of capital alone would not make possible.

Gustavsson et al. (2017) explores how cultural capital is accumulated, used and shared in a fishing context. Ownership of boats, machinery and equipment are interpreted as objectified cultural capital; the ability to demonstrate skills related to the use of fishing boats and machinery, and general working at sea represents embodied cultural capital; and certifications of competency provide an illustration of institutionalised cultural capital.

There are many challenges to the application of the concept of cultural capital, not least potential overlaps with other forms of capital. For example, objectified cultural capital (e.g., fishing boats) can be interpreted as manufactured or economic capital with an economic value, but this economic value does not represent the full range of

values that these tangible objects represent. These wider values can be considered cultural value resulting from cultural capital (Throsby, 1999). Cultural capital may also overlap with social and human capital, although the extent to which they overlap depends on the definitions used. When embodied cultural capital is interpreted as skills and abilities, it may be considered human capital. When cultural capital is interpreted as social norms, values and beliefs it overlaps with definitions of social capital (when social capital is defined as a network of relationships *and* the properties of those relationships). All capitals, however, are interrelated and interlinked. The ability to use the concept of capitals therefore requires careful definitions as well as pragmatism.

A2.1.3 The natural capital approach

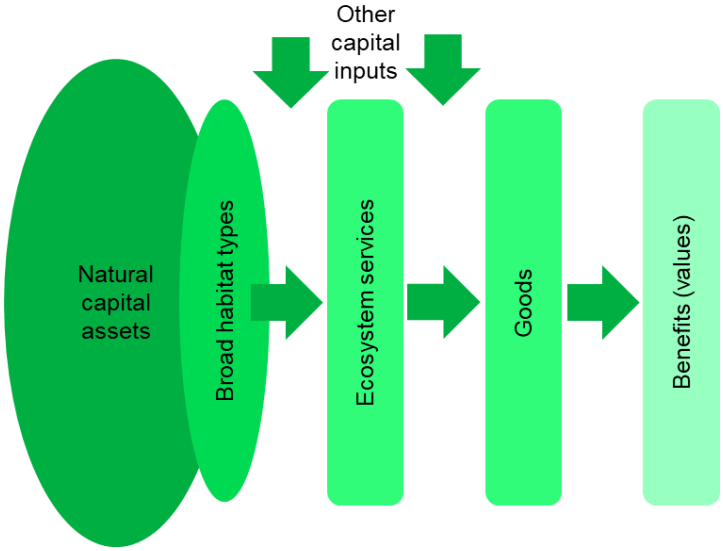
The natural capital approach has emerged from earlier work on ecosystem services. The Millenium Ecosystem Assessment (Millennium Ecosystem Assessment, 2005) developed a conceptual framework that explicitly focused on the contribution of biodiversity and ecosystems to human wellbeing via ecosystem services. Ecosystem services were defined as the benefits people obtain from ecosystems and were categorised into supporting, provisioning, regulating and cultural services. Ecosystem services were conceptualised as flowing from natural capital which, together with manufactured, human and social capital, forms society's productive base. A number of initiatives have emerged from the Millennium Ecosystem Assessment, including national and international assessments (e.g., the UK National Ecosystem Assessment and its Follow-On phase, and The Economics of Environment and Biodiversity).

Since the Millennium Ecosystem Assessment, the emphasis has shifted from ecosystem services to the positioning of ecosystem services in a natural capital logic chain. This natural capital approach (

Figure A) focuses on the implications of change in natural capital for human wellbeing (Natural Capital Committee, 2014). It considers the value of the natural environment and ecosystems for people and the economy and is increasingly embedded in the UK's approach to public policy and decision-making.

The natural capital approach assumes that the quantity and quality of natural capital assets (e.g., fish stocks) affects their ability to deliver ecosystem services (Guerry et al., 2015). Ecosystem services are the conditions and processes of ecosystems that generate (or help to generate) benefits for people (such as the provision of seafood). People, often through the use of other forms of capitals, can access, use and / or enjoy ecosystem services, which in turn delivers valued benefits that contribute to human wellbeing. Institutions (e.g., property rights and access rights) will influence who can use different natural capital assets and ecosystem services and when, as will the nature of the ecosystem service. For example, use of an ecosystem service by one individual may exclude another from using or accessing that same service (i.e., they are private goods), while other forms of service may be equally accessible by all and use by one does not affect or preclude use by another (i.e., they are public goods).

Figure A2: Conceptual framework for the natural capital approach (Natural Capital Committee, 2014).



The natural capital approach has been used to illustrate how investment in the natural capital of fisheries can be both economically and ecologically viable (e.g., Döring and Egelkraut, 2008). The approach has also been used to support the development of fisheries management byelaws (e.g., Hooper, 2021). While informative, it is acknowledged that natural capital assessments are often limited in their ability to understand the social and cultural impacts of environmental change and the wider social and cultural benefits and values arising from interactions with the environment.

A2.2 Cultural ecosystem services, place-based and values-based approaches

A2.2.1 Cultural ecosystem services

Cultural ecosystem services (CES) are one of the three main groupings of ecosystem services (alongside provisioning and regulating services[2]). Compared to provisioning and regulating services, there is less understanding of what constitutes a cultural ecosystem service, how they can be measured (especially quantitatively) and how they are valued (Fish et al. 2016). There is also a lack of evidence for how management interventions may affect CES as the link between the extent and condition of natural capital assets and CES is poorly understood.

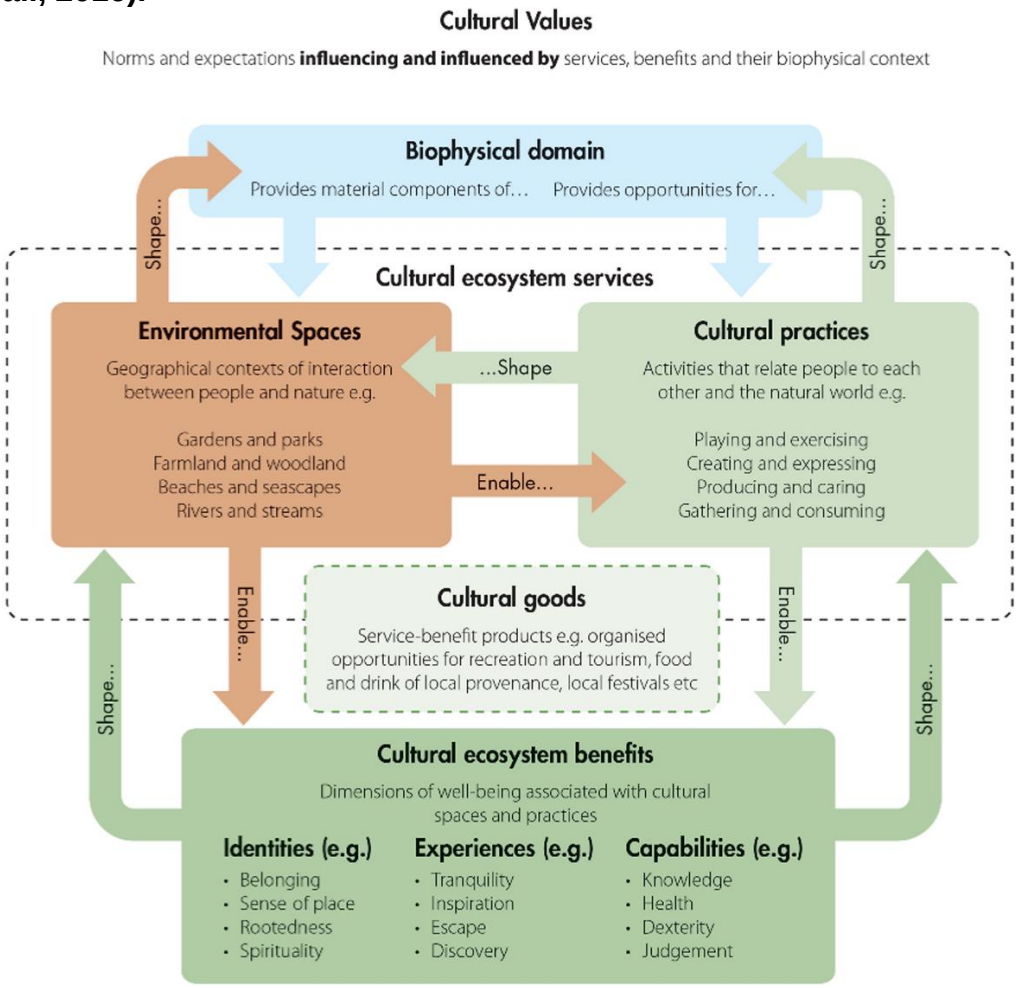
Definitions of cultural services remain disputed and there is a lack of agreement over what constitutes a CES. There is growing recognition, however, of the relational nature of CES, and that they are co-produced and co-created through peoples' interactions with ecosystems (e.g., Chan et al., 2012). This moves away from the instrumental view of human-ecosystem relationships (Acott and Urquhart, 2018), i.e.,

[2] The Common International Classification for Ecosystem Services (CICES) defines provisioning services as "*all material and biotic energetic outputs from ecosystems; they are tangible things that can be exchanged or traded, as well as consumed or used directly by people in manufacture*" and regulating services as "*all the ways in which ecosystems control or modify biotic or abiotic parameters that define the environment of people, i.e., all aspects of the 'ambient' environment; these are ecosystem outputs that are not consumed but affect the performance of individuals, communities and populations and their activities*".

that nature is valued as a means to an end. Fish et al. (2016, p. 212) therefore defines CES as the "*contributions ecosystems make to wellbeing through the identities they help frame, the experiences they help enable and the capabilities they help equip*".

Fish et al. (2016) conceptualise CES as being enabled by the environmental spaces (i.e., places, localities, landscapes and seascapes) and species with which people interact (**Figure A3: The conceptual framework for cultural ecosystem services Figure A**). The environmental spaces and species shape, and are shaped by, cultural practices (e.g., playing and exercising, creating and expressing, producing and caring and gathering and consuming). Cultural practices enable the creation of cultural goods (e.g., tangible outcomes such as recreation and tourism, local festivals, heritage assets such as fishing boats and equipment) and cultural ecosystem benefits. Cultural practices (such as fishing) are the mechanisms that link cultural benefits to the biosphere and their cultural contexts.

Figure A3: The conceptual framework for cultural ecosystem services (Fish et al., 2016).



A2.2.2 Sense of place

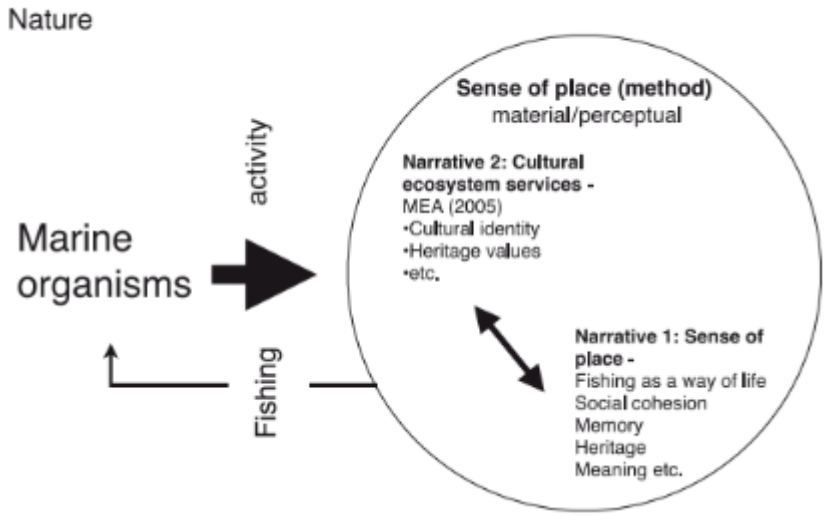
The human geographical concept of place is an important element in the conceptualisation of CES in Fish et al. (2016). Place is a combination of location (a point in space), locale (the material setting for social relations) and sense of place

(the feelings and emotions a place evokes, both individual and shared) (Cresswell, 2009). Places are also practised, with people doing and taking part in activities (e.g., fishing) in place, which contributes strongly to sense of place (Cresswell, 2009).

There is a growing interest in sense of place in the marine context. For example, the MMO has gathered baseline sense of place data to support marine planning (MMO 2019). Acott and Urquhart (2018) and Urquhart and Acott (2014) draw on the concept of sense of place (as a CES) to understand the complex, reciprocal relationship between fishers and the environment.

Figure A illustrates how Acott and Urquhart conceptualise sense of place in the context of fishing. The physicality of a place is acknowledged and with this the link to natural capital and the co-construction of CES. Alongside which the material and intangible nature of sense of place are recognised as giving rise to a range of values associated with fisheries (e.g., heritage, spiritual, identity etc.). This narrative is located within the natural capital logic chain, recognising that the practice of fishing enables a range of social and cultural effects. A feedback loop between these outcomes, fishing activity and marine organisms indicates how social and cultural change can influence fishing activities and hence marine organisms.

Figure A4: The sense of place conceptual framework (Acott and Urquhart, 2018).



A2.2.3 Values-based approaches

To fully understand the relationship between people and nature, it has been recognised that the diverse values held by individuals need to be considered (Diaz et al., 2015). The natural capital logic chain (

Figure **A**) acknowledges the importance of understanding values but interprets value in an instrumental way. Changes in natural capital result in changes in ecosystem services, these lead to valued changes in the benefits people obtain from nature. This interpretation of value is narrow and does not capture the wider ways in which people may have and express values for nature.

To address this shortcoming, the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES 2022) has created a value typology based on:

Worldviews: the ways through which people perceive, conceptualise and modify the world, rooted in cultures and languages (IPBES 2022 from Olsen et al., 2019). They have a critical role in shaping how values are constructed, expressed and assessed.

Broad values: people's life goals and general guiding principles towards the world that are informed by their worldviews (Dietz et al., 2005). Examples of broad values include moral principles, such as justice, belonging and freedom, but also life goals, such as enjoyment, health, and prosperity.

Specific values: the opinions on or judgements of the importance of specific things (e.g., nature) in particular situations and contexts (IPBES, 2022). There are three main types:

- **Instrumental values**, the importance of nature as a means to achieve a particular end (e.g., to satisfy human needs, interests or preferences) (IPBES 2022).
- **Relational values**, preferences, principles, virtues associated with relationships, both interpersonal and as articulated by policies and social norms. They include "eudaimonic" values associated with a good life and are not present in things but derived from relationships and responsibilities to them (Chan et al., 2016).
- **Intrinsic values**, that something has value as an end-in-itself or has inherent or moral value that is not tied to human purposes (Rea and Munns, 2019).

All of these value types, combined with worldviews and knowledge types, will shape the behaviour of individuals, societies and organisations as well as their attitudes to nature. Understanding these diverse values will therefore be important for understanding how, for example, fishers and fishing communities may respond to fisheries management and how fisheries management may influence the social, cultural and economic outcomes obtained from fishing activities.

A2.3 Three-dimensional wellbeing model

Changes in wellbeing result from interactions with the environment. Wellbeing is a complex, multi-dimensional concept for which there is no agreed or unified definition (Dodge et al., 2012). It is assumed to comprise of both material (the assets an individual has that can be objectively measured) and subjective (how a person thinks and feels about their quality of life) dimensions. A more social interpretation also recognises that resources and the outcomes from their use are characterised by their use within a social and cultural context. This has led to the development of the concept of social wellbeing (Gough and McGregor, 2007; White, 2010).

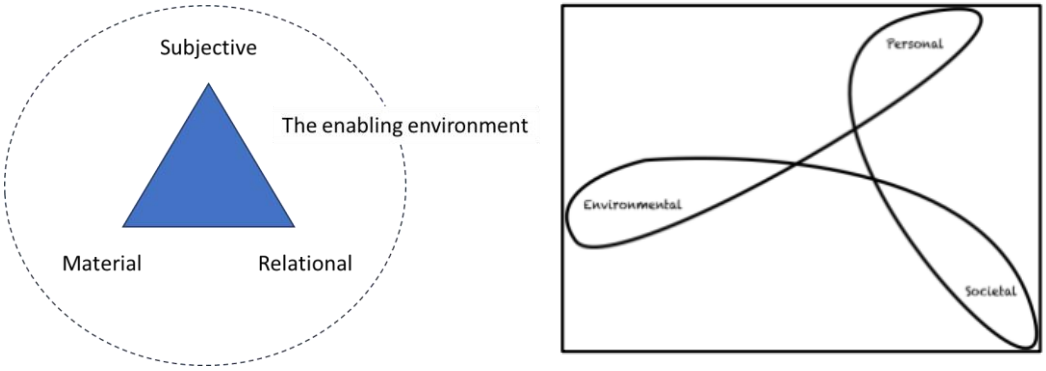
In addition to material and subjective wellbeing, social wellbeing recognises the relational dimension of wellbeing – what an individual does through social relationships to enable or disable processes contributing to wellbeing (Johnson et al., 2018; White, 2015). The bringing together of these three concepts resulted in the emergence of the three-dimensional wellbeing model.

In the three-dimensional wellbeing model, wellbeing is not simply an outcome (a state that individuals do or do not possess or experience) but a process that should be situated in the context (social, political, economic, environmental) in which an individual operates (Coulthard, 2012; White, 2015). An individual's wellbeing is interlinked with societal wellbeing, which in turn is linked to environmental wellbeing (**Error! Reference source not found.**). The relationship between these three elements may vary over an individual's life course.

Each of these elements of wellbeing can be considered in relation to different forms of capital or resources (White, 2010; White, 2015). Relational wellbeing draws on social and human capital, both of which will be dependent upon cultural and social norms and context. Individuals therefore become who and what they are as a result of the things that they have as well and through their relatedness to others and their environment.

In the context of fishing, it has been argued that the social wellbeing approach can help to provide a deeper understanding of the social impacts of fisheries decline (on fishers, their families and communities) and provide insights into fisher behaviour (e.g., Britton and Coulthard, 2013; Coulthard 2012).

Figure A5: The three-dimensional wellbeing triangle (left;White 2010) and the concept of wellbeing as a process (right), where each element is interdependent and mutually supportive (White, 2015). The size of the relationship between the three elements will vary over time.



A2.4 Summary of findings from the review of frameworks

Each of the frameworks described above contributes understanding of how social, cultural and economic outcomes from fishing can be conceptualised, but each has its limitations. The following section presents a brief overview of their strengths and weaknesses.

A2.4.1 Capitals approaches

The capitals approaches (including the natural capital approach) emphasise the role of sustainable resource utilisation and how this creates benefits for people. Changes in assets are assumed to influence the achievement of desired outcomes (e.g., changes in natural, social, human, cultural, material and financial capital will influence the outcomes of fishing activities). The approaches can therefore be used to explore trade-offs between the different capitals and the implications of these trade-offs. Furthermore, the UK government is increasingly using the natural capital

approach to support decision-making and so provides a useful starting point on which to build a more complete conceptual framework.

The location of culture in these approaches varies. The five capitals approach does not explicitly include cultural capital, assuming it is captured in social and human capital. The sustainable livelihoods approach considers culture as a transforming process, similar to laws, policies and institutions, which influence an individual's ability to access to assets. In contrast, the natural capital approach assumes that cultural benefits arise from the use or enjoyment of natural capital, but cultural practices (such as fishing) are considered external drivers of change (i.e., pressures on natural capital), rather than central elements of a wider system.

The explicit inclusion of cultural capital in a capitals approach could provide insights into the role of culture in the creation of benefits and other outcomes. Cultural capital, however, is not well theorised and the distinction between it and other forms of capital (especially human and social capital) is unclear. If cultural capital is to be included within a conceptual framework and be made operational, it will need to be carefully defined by users of that framework.

Capital based frameworks, however, do not support the categorisation of social, cultural and economic benefits and outcomes resulting from change. Capitals frameworks alone therefore do not support an understanding of how changes in fisheries management impact the benefits individuals, their families and communities derive from fishing. Nevertheless, it will be important to consider the sustainability of capital assets and how this may change as a result of management decisions. Access to capitals and the ability of users to use and transform capitals will influence the ability of individuals to engage with fishing and the outcomes that fishing can produce.

A2.4.2 Cultural ecosystem services (CES), sense of place and values

Conceptualisations of CES (including sense of place) recognise the contribution that capital inputs (other than natural capital) make to the production of ecosystem services (cultural or otherwise). Feedback loops are captured indicating how all services (cultural or otherwise) are co-produced through relationships between nature (e.g., fish stocks) and people (e.g., fishers). Unlike the natural capital approach, CES frameworks recognise fishing as a cultural practice and part of the system, rather than an external pressure. Like the natural capital approach, CES and sense of place frameworks capture culture in a positive sense; culture is seen as bringing benefits and as life enriching. The contested nature or "disbenefits" of people-nature relationships (e.g., the potential negative role of fishing on fisher health) are rarely captured explicitly in these frameworks.

Values-based approaches move away from a focus on benefits. The emphasis is on how values shape behaviour and therefore influence the outcomes of management approaches. Although this does not support identification or classification of outcomes, it highlights the need to understand the process through which outcomes are generated and how outcomes matter in different ways to different people.

A2.4.3 Three-dimensional wellbeing model

The CES approach, sense of place and the diverse values approach have considerable overlaps with the three-dimensional wellbeing model and the concept of social wellbeing. They all aim to capture both individual preferences and shared understanding of the world. Context is considered important, including an individual's or society's capital assets. The relational element of wellbeing, especially when considered a process, encourages an emphasis on the outcomes of change and the processes that support them, rather than the state and condition of the asset base that individuals and societies draw upon to generate wellbeing. These wellbeing outcomes can be categorised as material, subjective and relational.

A3 A conceptual framework for understanding the social, economic and cultural outcomes from fisheries

This section presents a framework for understanding the social, economic and cultural outcomes of fishing, categorised as material, subjective and relational wellbeing outcomes. It draws together elements from across the frameworks reviewed.

Fishing can be thought of as a cultural practice that facilitates and enables the realisation of wellbeing outcomes that are underpinned by natural capital (in the form of fish and shellfish stocks). The performance of fishing practices draws upon different forms of capital (cultural, social, human and economic) accessible by individuals, their families and the communities (occupational and place-based) in which they operate. Different fishing practices may draw upon slightly different forms of capital. Fishing practices also help to shape the form of these capitals as they are used and transformed to enable fishing. As recognised in the capitals approaches, there is a need to understand not only the impacts of management interventions and other changes in the outcomes arising from the practice of fishing, but also the assets that are used to generate them (i.e., forms of capital).

The fishing practices and the capitals fishers use and transform enable a process that supports the generation of wellbeing outcomes for individuals and their communities. These outcomes may be material (e.g., income, health and knowledge), subjective (e.g., job satisfaction, self-reported assessments of health) and relational (e.g., identity and social connections). They may also be positive (e.g., the creation of income) or negative (e.g., potential negative impacts on physical and mental health). These outcomes feedback into the system to shape the form of the capitals and the fishing practices used (e.g., cohesive fishing communities support each other, building social, cultural and human capital).

The process for generating wellbeing outcomes from fishing, including the use and transformation of capitals and how fishing practices are undertaken will all be influenced by the worldviews held by the individual, as well as the broad and specific values given to elements of the fishing resource system. These values will shape how individuals respond to management measures and other sources of change. Depending upon the level of understanding of these values, responses may be predictable or unexpected.

Governance and management actions may influence the performance of fishing practices and hence the amount, use and transformation of capitals held by individuals and communities. For example, closure of a nearby fishing ground may

result in fishers needing to draw on additional economic capital to reach new fishing grounds, and additional human capital (e.g., skills) to understand where and how best to fish in the conditions of the new location. Governance and management will also influence the wellbeing outcomes derived from fishing. For example, the need to travel to more distant fishing grounds may affect job satisfaction (subjective wellbeing), strain family ties as more time is spent at sea (relational wellbeing) and result in increased costs reducing income (material wellbeing).

The extent to which management actions affect wellbeing outcomes and capitals is likely to vary with the scale of the intervention (e.g., closure of a fishing ground vs. the introduction of iVMS (inshore Vessel Monitoring System) or changes to bycatch regulations), but also the speed of change and by the outcome or capital type (for example Daw et al., 2016). For example, some wellbeing outcomes may be highly sensitive to change (e.g., trust) with others changing more slowly over extended periods (e.g., social cohesion, tangible cultural heritage).

Similarly, the outcomes these forms of capital can generate (and the value given to these outcomes), will also vary across individuals and communities and through time. When trying to assess and understand the wellbeing outcomes from fishing activities, it will also be necessary to explore changes in the capital assets that fishers can access as well as the outcomes they facilitate.

Figure A presents the conceptual framework and **Table** includes definitions for the concepts within the conceptual framework.

Figure A6: A conceptual framework for understanding the social and cultural outcomes from fishing and how these are enabled by fishing practices and capital assets.

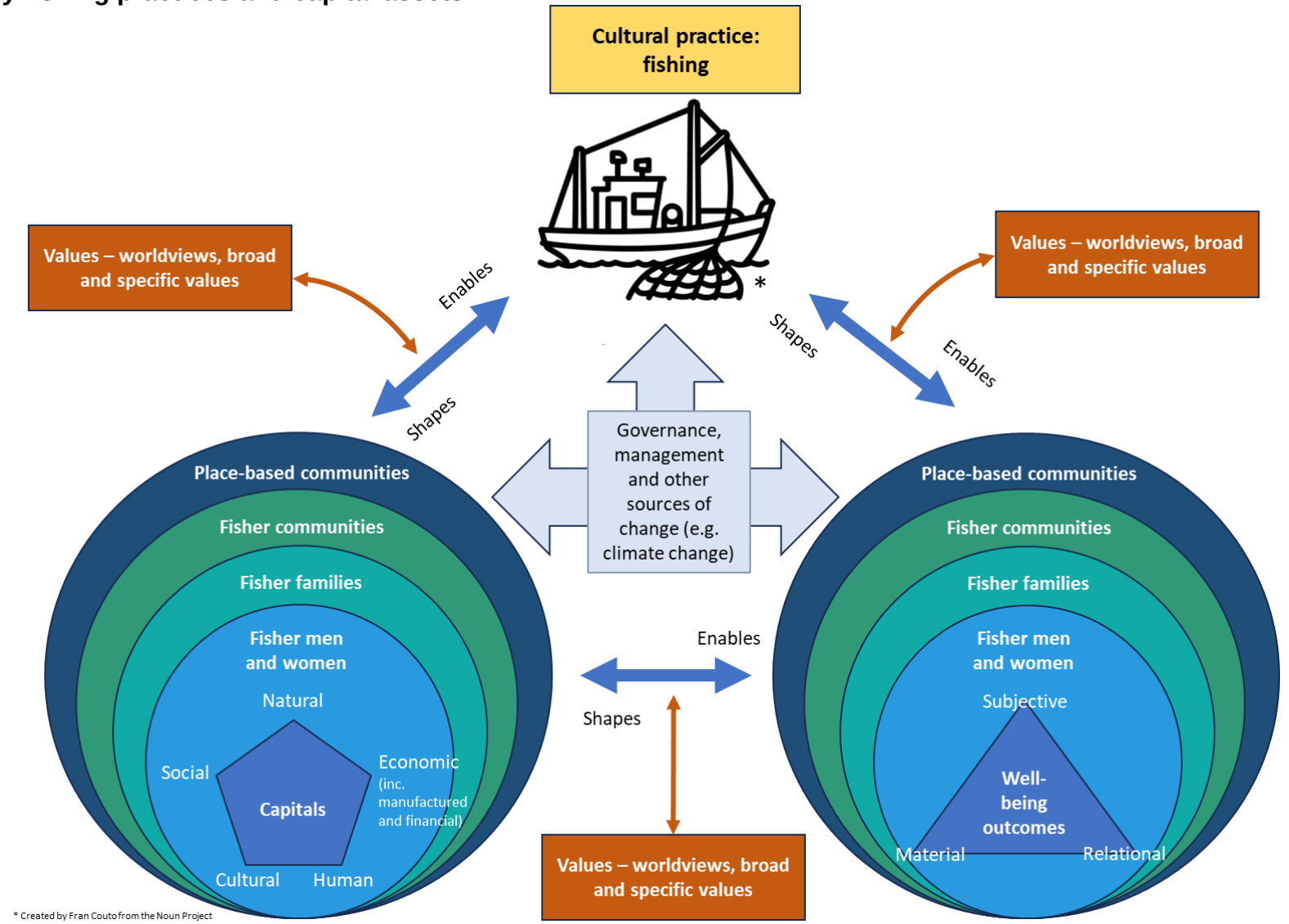


Table A1: Definitions for elements of the conceptual framework.

Concept	Definition
Natural capital	The part of nature which directly or indirectly underpins value to people, including ecosystems, species, freshwater, soils, minerals, the air and oceans, as well as natural processes and functions. In combination with other types of capital, natural capital forms part of our wealth; that is, our ability to produce actual or potential goods and services into the future to support our wellbeing (Natural Capital Committee, 2014).
Social capital	*"The institutions that help us maintain and develop human capital in partnership with others (e.g., families, communities, businesses, trade unions, schools, and voluntary organisations)"* (Porrit, 2005).
Human capital	*"People's health, knowledge, skills and motivation"* (Porrit, 2005).
Cultural capital	Cultural capital takes three forms (Bourdieu, 1986) **Embodied**: in the form of long-lasting dispositions of mind and body that are consciously acquired or passively inherited (e.g., demonstrations of skill, the incorporation of cultural norms of the fishing community, identity). **Objectified**: in the form of cultural goods (e.g., fishing boats and equipment). It can be converted to economic capital through sale, but the cultural capital is not transferred unless the significance of the item is explained. **Institutional**: a form of objectification that guarantees properties of cultural capital (e.g., certification of competence). It is essentially a way of describing ones cultural capital and differs from human capital which refers to the actual skills that one has.
Economic capital	Economic capital comprises manufactured and financial capital. **Manufactured capital:** "*material goods or fixed assets which contribute to the production process rather than being the output itself (e.g., tools, machines and buildings)"* (Porrit, 2005). **Financial capital:** *"plays an important role in our economy, enabling the other types of capital to be owned and traded. Unlike the other types, it has no real value itself but is representative of natural, human, social or manufactured capital (e.g., shares, bonds or banknotes)"* (Porrit, 2005).
Cultural practices	Expressive, symbolic and interpretive interactions between people and the natural environment (Fish et al., 2016).
Wellbeing outcomes	Wellbeing outcomes are the resulting wellbeing status of an individual, group or population that can be attributed to an activity, process or change (e.g., a new fisheries management intervention, climate change, a change in access to capitals).
Material wellbeing	*"What a person has, i.e., the objective material resources that a person can draw upon to meet their needs, such as food, assets, employment, services and the natural environment"* (White, 2010).

Concept	Definition
Subjective wellbeing	Subjective wellbeing (or personal wellbeing) focuses on people's own experiences and perception of their lives. It includes aspects such as life satisfaction, positive and negative emotions, and whether their life is meaningful (Deiner et al., 1999).
Relational wellbeing	"*What a person does through social relationships that enables/or disables the pursuit of wellbeing (including relationships of care and love, relations with the state, social institutions, kinship, cultural rules and norms, forms of collective action, among others)*" (Coulthard 2012).
Worldviews	*"Are the ways through which people perceive, conceptualise and modify the world, rooted in cultures and languages (Olsen, 2019). Worldviews shape individual and collective ways of perceiving, interpreting and interacting with nature, and are expressed through culture, knowledge systems and languages*" (IPBES, 2022).
Broad values	General moral guiding principles and life goals (e.g., freedom, justice, responsibility, harmony with nature, harmony with Mother Earth, health, prosperity) informed by people's worldviews and beliefs (Dietz et al., 2005). They are often embedded in a society's institutions (i.e., informal social conventions and norms, and formal legal rules) and can underpin people's specific values of nature (IPBES, 2022).
Specific values	Opinions on or judgements regarding the importance of nature in particular situations. Specific values comprise instrumental, intrinsic and relational values(IPBES, 2022).
Instrumental values	The importance of nature as a means to achieve a particular end (e.g., to satisfy human needs, interests or preferences) (IPBES 2022).
Intrinsic values	That something has value as an end-in-itself or has inherent or moral value that is not tied to human purposes (Devos et al., 2019).
Relational values	Preferences, principles, virtues associated with relationships, both interpersonal and as articulated by policies and social norms. They include "eudaimonic" values associated with a good life and are not present in things but derived from relationships and responsibilities to them (Chan et al., 2016).

A4 Conclusions and next steps

The conceptual model presented in **Section 3** draws on a very brief review of common frameworks currently used to support resource (including fisheries) management. Other relevant frameworks (e.g., social and ecological systems approaches and resilience thinking) have not been presented nor have many of the nuances of the frameworks that have. To ensure that the framework can become operational and support decision-making, the next steps for this project include:

Assessing the applicability of the framework to the existing evidence base: The existing literature on the social, economic and cultural outcomes of fishing will be explored to assess the extent to which this evidence can be captured under the

conceptual framework presented here, in particular the three dimensions of wellbeing described. This should enable refinements to the conceptual framework, especially where outcomes emerge that do not fit within the elements of the framework. A particular challenge will be interpreting what is a capital versus a wellbeing outcome, especially for more intangible and relational elements as they may not be mutually exclusive. For example, trust is often considered a form of social capital, but trust may also be considered a wellbeing outcome that results from working with others.

Developing indicators: To operationalise the conceptual framework, a series of indicators will be developed. Many indicators have already been defined during the development of Defra's fisher social survey (Urquhart et al., 2019) however this survey does not explicitly include cultural capital and wellbeing outcomes. It also focuses primarily on the individual fishers and their occupational communities and less so on fisher families and the wider place-based community.
Indicators should focus on wellbeing outcomes at the individual, family and community level, but also the process of how they are achieved (i.e., capturing the level, use and transformation of different forms of capital), and potentially how an individual's values may influence them. A crucial challenge will be to understand how sensitive the indicators are to change and the speed at which they may change following an intervention.

Future work beyond the lifetime of this project should focus on sharing this framework with the decision-makers it has been designed to support, testing the assumptions embedded within the framework with members of different fishing communities, and modifying and elaborating on any inconsistencies arising.

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Annex B Quick scoping review

B1 Introduction

This Annex sets out the findings from a Quick Scoping Review (QSR) of the literature on social, cultural and economic outcomes arising from fishing, organised into the three dimensions of wellbeing described in the conceptual framework in Annex A. The evidence extracted from the literature is categorised into material, subjective and relational wellbeing outcomes and highlights to whom these outcomes accrue (to fishers, their families, the occupational and place-based community). The review also examines the barriers and enablers that may hinder or facilitate the realisation of wellbeing outcomes. It should be noted that the majority of the evidence captured in this review does not focus on wellbeing per se but has been reinterpreted through this review and assigned to a wellbeing dimension. As such it provides a new framing of the evidence.

The review focuses primarily on the inshore fishing fleet and vessels tied to a home port. These vessels are typically under 10m and tend to fish closer to shore. Fishing activities by this group are heterogeneous with fishers targeting different species, using different gear types and vessel configurations, and applying different business models. The study focuses on the inshore fishing fleet because the direct benefits it brings are likely to be locally received by their families, the occupational fishing communities they create and the place-based communities they operate within.

Wellbeing is only one component of the conceptual framework presented in Annex A. The framework also refers to capital assets and diverse values. The review does not focus on capital assets as they were not the main focus of this study, but where evidence supports, insights are provided into diverse values relevant to understanding the wellbeing outcomes related to these fisheries.

The findings from the review inform the next stage of this project: the development of indicators for material, subjective and relational wellbeing outcomes. The review also identifies the strengths of the evidence base as well as its limitations, highlighting areas where the MMO may seek to gather further evidence.

For definitions of the terminology used in this Annex, see Table A4 in Annex A.

B2 Method – Quick Scoping Review (QSR)

QSRs aim to provide a rapid overview of the evidence identified through a systematic approach to literature collection. While the aim is to be as comprehensive as possible within the given resources, it is recognised that gaps will likely remain as literature searches are restricted.

B2.1 Search protocol

The PEO (Population, Exposure, Outcome (PEO)) model underpinned the development of the research questions, in which:

- Population = fishers, their families, the occupational fishing community and the local place-based community.
- Exposure = fishery activities.
- Outcome = social, cultural and economic wellbeing outcomes of fishing.

The review aimed to answer the following research questions:

- What are the social, cultural and economic wellbeing outcomes resulting from local commercial fishing on fishers, their occupational fishing communities, their families, and the wider place-based community in the United Kingdom?
- What barriers hinder people from realising the social, cultural and economic wellbeing outcomes from local commercial fishing, and how do these vary among fishers, their families, their occupational fishing communities, and the wider non-fishing community?
- What enablers facilitate the realisation of social, cultural and economic wellbeing outcomes from fishing at both the individual fisher, their families, their occupational fishing community, and the wider place-based community level?
- How sensitive are the social, cultural and economic wellbeing outcomes of local commercial fishing to changes in environmental, economic, or regulatory conditions?

B2.2 Search scope

The scope of the search was limited temporally, geographically, and based on the language and literature type (**Table**).

Table B1: Scope of the search.

Characteristics of the literature	Inclusion criteria
Time period	Post 2000
Geographic range	National (UK: England, Scotland, Wales, Northern Ireland)
Language	English
Type of literature	Peer-reviewed evidence and grey

B2.3 Search strategy

The search string was developed based on key words relevant to the research questions and the conceptual framework. To create an efficient search string different versions of the string were tested to identify a version that captured the most pertinent papers and reports, and excluded those that were irrelevant. The final search string used was:

- ("local commercial fish*" OR "small-scale fish*" OR "artisanal fish*" OR "inshore fish*") AND
- ("social" OR "economic*" OR "cultural*" OR "income" OR "health" OR "wellbeing" OR "well-being" OR "value*" OR "heritage" OR "ecosystem service*") AND
- ("barriers" OR "enablers" OR "obstacles" OR "hindrances" OR "challenges" OR "facilitators") AND
- ("impacts" OR "consequences" OR "effects" OR "influence") AND

- ("fisher*") AND
- ("United Kingdom" OR "UK" OR "England" OR "Scotland" OR "Wales" OR "Northern Ireland")

The search was undertaken in Google Scholar for broad coverage and Scopus for accessing peer-reviewed literature[3]. This was augmented by Countryside and Community Research Institute (CCRI) and Marine Management Organisation (MMO)-recommended sources for unpublished or difficult to access material. Targeted searches were also completed in Google where obvious evidence gaps emerged. Cross-referencing of highly cited papers was also used as a method to identify additional relevant papers, as well as a targeted author search.

Inclusion criteria: Primary focus was on studies that detail the social, cultural and economic wellbeing outcomes from inshore fishing in the UK context.

Exclusion criteria: Studies not pertaining to the UK, those primarily based on modelling, and those containing detail of social aspects of fishing without discussing wellbeing outcomes (e.g., papers focusing on management and responses to it).

B2.4 Strategy for extracting information

The PRISMA approach was followed when screening the literature (Figure B1).

1. All titles, abstracts and links identified in the search from Google Scholar and Scopus were downloaded and captured in Excel. Only the first one hundred search results from Google Scholar were considered with the relevant papers being extracted to the Excel spreadsheet manually. Recommended articles from CCRI and the MMO, as well as targeted author searches were added to these lists.
2. Search result titles were screened to exclude duplicates and publications clearly out-of-scope.
3. Of those remaining, abstracts / executive summaries were screened to exclude out-of-scope publications.
4. The remaining papers / reports were read in full and irrelevant studies removed.
5. Data were extracted from the remaining papers.

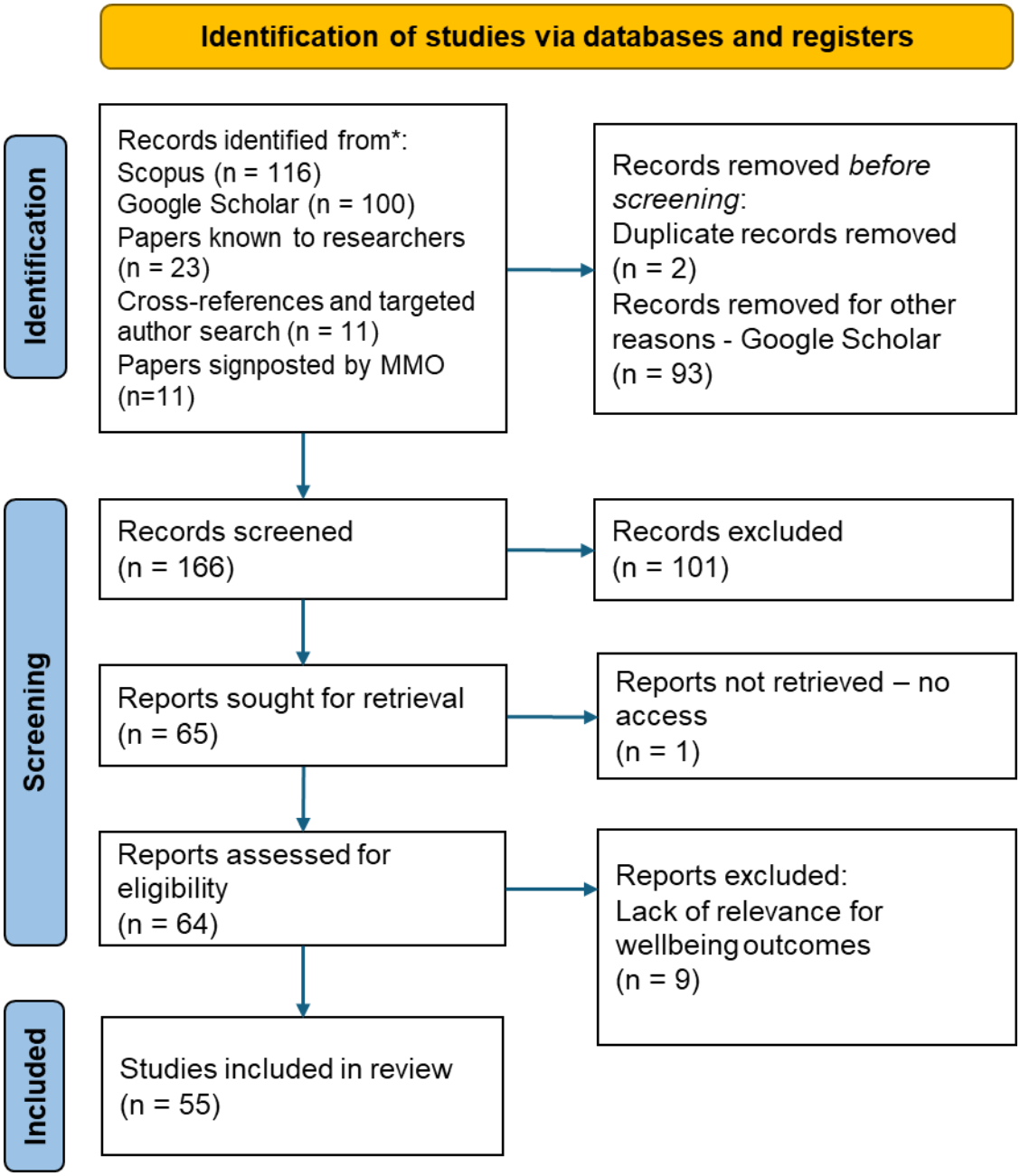
Overall, the quick scoping review included 55 studies, comprised of peer-reviewed literature and grey literature.

B2.5 Approach to analysis

Data from each paper/ report reviewed were captured in an Excel spreadsheet. Data extracted included background details of the study, evidence for wellbeing outcomes and the barriers and enablers hindering or facilitating their emergence, and information relevant to the sensitivity of wellbeing outcomes to change. The evidence was then grouped thematically according to the wellbeing categories identified in the conceptual framework.

[3] Google was explored as a source of grey literature, but the search string turned up excessive numbers of irrelevant studies.

Figure B1: PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only.



B3 Literature review findings

B3.1 Overview of the literature

This section provides a brief overview of the literature in terms of geographical coverage, study focus, type and scale of fishery examined by each study and whether each study applied a conceptual framework.

B3.1.1 Geography

While the majority of studies were conducted in England, locations in Scotland and Wales were also represented (**Table**). The evidence for Northern Ireland was more limited. The literature also incorporated nationwide surveys, studies and reviews covering the entire UK, providing a diverse geographical coverage of fisheries across different regions.

While this literature review spans the UK, it has limitations and there are gaps in coverage. For example, all Welsh papers (other than one drawing on secondary data) refer to the same case study location. The scale of each study also varies, with some studies focusing on specific fishing ports and others taking a more regional view. It is therefore not possible to use the data to identify geographical trends.

Table B2: Geographical focus of studies identified.

Country	Number of papers	Specific locations
UK	2	
England	31	**South-east:** South-east England, Hastings, Rye, Whitstable, Isle of Wight. **South-west**: Plymouth National Marine Park, Sidmouth, Brixham, Cornwall, Padstow, Newlyn, Looe, Poole, Dorset, Beer, Lyme Bay. **North-east:** Northumberland, North Shields, Amble, Whitby, Grimsby. **North-west:** Whitehaven, Blackpool, Morecambe Bay. **East:** North Norfolk, Norfolk, Cromer, Wells-next-to-the sea, Sheringham, Lowestoft.
Scotland	12	East coast Scotland, west coast Scotland, Orkney Islands, Fraserburgh, Shetland, Peterhead, Hebrides, Mull, Jura, Islay, Skye
Wales	8	Llyn peninsula
Northern Ireland	2	Portavogie, Ardglass, Kilkeel, Mourne, Lecale coast, Ards Peninsula, the north coast, and the cross-border area of Lough Foyle

B3.1.2 Focus

The studies reviewed diverse aspects of fisheries, often considering cultural ecosystem services, sense of place, and the sustainability of aquatic food systems. Common themes included:

- the concept of identity in fishing communities,

- the relationship between institutional arrangements and social dynamics in UK inshore fisheries,
- the significance of social capital in various contexts such as Marine Spatial Planning,
- community resilience, and
- the role of women in fishing communities.

The studies also delve into cultural sustainability, community wellbeing, and market conditions impacting inshore fishers. Additionally, some studies address health outcomes in the fishing industry, social change in fishing communities, and collaborative knowledge mobilisation.

B3.1.3 Type and scale of fisheries

The inshore fishery was an inclusion criterion for this review but was not the sole focus of this study. While most studies dealt primarily with inshore fisheries, some considered boats both under and over 10 metres, likely capturing fishers who fish further out to sea. In most papers, the type of fishery (demersal, pelagic, shellfish etc.) was not specified. The evidence gathered therefore, likely encompassed a broad range of target species. Where the type of fishery was specified, studies collectively dealt with a wide of range of finfish and shellfish species.

B3.1.4 Conceptual framework

Not all papers drew on a conceptual framework. Those that did applied a wide range of conceptual approaches, among which were sense of place, wellbeing, resilience, cultural ecosystem services and cultural/social capital. Other conceptual frameworks or focal themes examined, which were used in a small number of studies, included a lifecourse approach, dependency, belongingness, and gender.

B3.2 Social, cultural and economic wellbeing outcomes from fisheries

The first review question asked 'what are the social, cultural and economic wellbeing outcomes arising from fishing for fishers, their families, the occupational and place-based community?'. This section presents the findings from the review responding to this question, and categorises the evidence into material, subjective and relational wellbeing outcomes. It also captures data relating to how leaving the fishing sector impacts wellbeing outcomes.

B3.2.1 Material wellbeing outcomes

Material wellbeing refers to "w*hat a person has (the objective material resources that a person can draw upon to meet their needs, such as food, assets, employment, services and the natural environment)"* (Coulthard, 2012 p. 360, drawing upon Gough and McGregor 2007). Material wellbeing outcomes cover multiple wellbeing domains and can be objectively measured. These domains include the examples in the definition but can also be considered to capture capabilities such as health, skills, knowledge and education (i.e., "facts about people's lives and the spaces they live in" ONS, 2024). The review identified evidence for individual and family related economic outcomes such as income and employment, as well as outcomes for health, skills and knowledge. More broadly for the fishing and place-based community, the review found evidence for economic outcomes associated with fishing, such as tourism and creative arts.

Economic wellbeing outcomes: Fishing delivers economic wellbeing outcomes to fishers and their families in the form of income and security of employment, and provision of a livelihood in both fish catching and processing sectors (Jacob et al., 2023; Jennings et al., 2016; NEF Consulting, 2018; Ross, 2013; Thomson, 2001; Zhao et al 2013). In some communities, small-scale fisheries are found to provide more employment than large-scale fisheries (New Economics Foundation, 2011). Fishing also provides fish for consumption, contributing to food security in remote communities (Brooker et al., 2018; Thomson, 2001).

While fishing provides income and material security to families, its role has been decreasing over time. Fishers and their partners are diversifying family income, taking on various roles within and outside the fishing industry to provide stability and economic resilience (Britton and Coulthard, 2013; Gustavsson and Riley, 2018b; Szaboova et al., 2022; Winchenbach et al., 2022). In some cases, fishers are becoming secondary breadwinners under the pressures of changing market conditions and regulations, while partners (often women) are supporting the household financially (Morgan, 2016; Zhao et al., 2013). Female-led enterprises are frequently connected to their partners' activity at sea and change in response to motherhood-induced family challenges (Gustavsson, 2021).

The fishing industry also provides economic gains to the place-based community. This can be directly through fish supplies and the fishing supply chain (e.g., upstream through chandlery, boat repair, electricians etc. and downstream in fish processing and sales) and indirectly through imagery and the symbolic nature of fisheries, stimulating tourism and the creative industries (Acott and Urquhart, 2011; CFPO et al., 2023; Gustavsson and Riley, 2020; NEF Consulting, 2018; Reed et al., 2013; Urquhart and Acott, 2013a; White, 2018). These indirect sectors provide both income and employment (Brookfield et al., 2005; Kirwan et al., 2018; Urquhart and Acott, 2013a). In some locations, 'virtual fisheries' with no link to active fishing have replaced authentic fisheries, creating an economic dependency on the symbolic image of fishing (Brookfield et al., 2005).

Health: While fishing can provide positive health outcomes through access to nutrition[4], fishing can also have detrimental health outcomes, both physical and mental (Coulthard and Britton, 2015; Szaboova et al., 2022). Drawing on census data, Turner et al. (2019) found that the fishing and aquaculture sector have the 5th highest rate of poor health (out of 87 sector categories). They also have amongst the poorest health outcomes of all workers in England and Wales, after accounting for geographic location, age and local socio-economic profiles. For some fishing types, (e.g., Nephrops trawlers), drink and drug problems were also reported as frequent (NEF Consulting, 2016).

Both mental and physical health outcomes can improve for those who leave the fishing sector. Fishers who have started to diversify their income away from fishing have reported a sense of relief and improved physical and mental health (Winchenbach et al., 2022).

[4] No evidence was located for positive mental health outcomes from commercial fishing, but an absence of evidence should not be interpreted as evidence for an absence of positive mental health outcomes. There is a growing body of evidence for the mental health benefits of engaging with blue spaces (e.g., Defra 2019).

Skills and knowledge: Fishing also contributes to material wellbeing outcomes through the development of skills and knowledge. Fishers see themselves as a "Jack of all trades". They require skills as a fisher, but also in boat and gear maintenance (Gustavsson and Riley, 2020). These skills are passed between generations (Urquhart and Acott, 2013a) and fishers recognise that these skills, and ecological knowledge, can only be built through experience and cannot be learnt from books (Acott and Urquhart, 2014). This knowledge accumulation feeds into the concept of the "good fisher" (Gustavsson, 2018), one that is skilful, knowledgeable and respectful of resources (Gustavsson et al., 2017).

B3.2.2 Subjective wellbeing

Subjective wellbeing (or personal wellbeing) focuses on people's own experiences and perception of their lives. It includes aspects such as life satisfaction, positive and negative emotions, and whether their life is meaningful (Deiner et al., 1999). It can be measured through an individual's self-report or evaluation of their lives.

Evidence in the literature for subjective wellbeing outcomes focuses primarily on identity and the contribution of fishing to this, as well as job satisfaction. Identity is considered a subjective wellbeing outcome as it represents a projection of the self-evaluation of an individual or community.

Occupational identity: Occupational identity was the most well studied subjective wellbeing outcome identified in the literature. For many fishers, fishing activity goes beyond a notion of job and is perceived as 'a way of life' or sometimes even as 'a limb' or 'the soul' (Acott and Urquhart, 2011; Britton and Coulthard, 2013; CR, 2009; Gustavsson and Riley, 2018a; Kirwan et al., 2018; Morgan, 2016; Ross, 2013; Urquhart and Acott, 2013a, 2014; Urquhart et al., 2011).

Autonomy and independence are essential elements of a fisher's identity (Christy et al., 2021; CR, 2009; Gustavsson et al., 2017; Morgan, 2016; Ross, 2013). Fishers see themselves as 'frontiersmen' and the last 'hunter gatherers' of the developed world (CR, 2009). Fishers also perceive themselves as being highly skilled problem solvers, enabling them to read environmental signals and understand how to catch available resources (CR, 2009; Symes and Phillipson, 2009). They value highly the independence and freedom fishing offers them over decision-making (Coulthard and Britton, 2015). Their identity is interlinked with notions of self-worth, pride, determination, bravery associated with the dangers that the activity poses and survival against the odds in an industry in decline (Bakker et al., 2019; Britton and Coulthard, 2013; Reed et al., 2013; Winchenbach et al., 2022).

Identity also stems from technical competences, knowledge of the area and the physical strength that fishers need to undertake the job (Christy et al., 2021; Gustavsson and Riley, 2020; Reed et al., 2011). Knowledge and skills as an asset are highly valued in the fishing sector (Reed et al., 2020) and the holding of these assets help to preserve identity into retirement (Gustavsson and Riley, 2018a).

Job satisfaction: All of the factors that contribute to identity described above also contribute to job satisfaction, which is an important component of fisher wellbeing (Britton and Coulthard, 2013; Coulthard and Britton, 2015). Job satisfaction is also affected by perceptions of safety, poor health, lack of economic security and

inefficiencies in fisheries management, which can influence fishers' decisions to leave the sector (Coulthard and Britton, 2015).

Diversification and identity: Diversification from fishing has mixed impacts on a fisher's identity, challenging notions of independence and fishing heritage (Brooker et al., 2018; Morgan, 2016). Where diversification is within the fishing sector (e.g. entering new markets), for some fishers it fortifies the entrepreneurial element of their identity (Kirwan et al., 2018; Prosperi et al., 2022). It also enables an expression of risk-taking, another characteristic of fisher identity (Morgan, 2016).

Where diversification is out of the fishing sector, the effects reported by fishers are varied. For some it induces a sense of loss and regret, and a feeling of being 'crippled' (i.e., a loss of identity), but for others this loss may be compensated by subjective wellbeing gains through a provision of relief and a feeling of being valued in the community through wider recognition and support (Winchenbach et al., 2022).

B3.2.3 Relational wellbeing outcomes

Relational wellbeing is defined as what a person does through social relationships that enables/or disables the pursuit of wellbeing (including relationships of care and love, relations with the state, social institutions, kinship, cultural rules and norms, forms of collective action, among others) (Coutlhard, 2012, drawing upon Gough and McGregor 2007). This review has found evidence for wellbeing outcomes resulting from fisher-family relationships (e.g. intergenerational ties), fisher-occupational community relationships (e.g. social cohesion and group identity), fisher place-based community relationships (e.g. place identity) and fisher-institutional relationship (e.g. trust).

Intergenerational ties: Families are seen as sources of knowledge that is passed from father to son creating intergenerational ties to fishing (Gustavsson, 2018; Gustavsson et al., 2017; Urquhart and Acott, 2013a). Fishing is perceived as family heritage and legacy and reinforces the sense of individual and community identity, belongingness, and pride (Ainsworth et al., 2019; Gustavsson, 2022; Jamieson et al., 2009). Family ties to fishing also act as an important enabler to other wellbeing outcomes, facilitating access to the fishing industry, with "insiders" trusted more and outsiders from non-fishing families struggling to enter the sector and earn respect among hereditary fishers (White, 2015).

Social cohesion: The literature indicates that social cohesion is an important wellbeing outcome. In the occupational community, fishers' interactions are built upon notions of competition and cooperation, inherent in the nature of the fishing profession (Gustavsson et al., 2017; Reed et al., 2013). Fishing is a dangerous activity where survival can depend on community ties and understanding that fishers will come to each other's aid in times of need. Success is therefore contingent upon networks and knowledge sharing among fishers (Acott and Urquhart, 2017; Gustavsson et al., 2017; Ross, 2013; Turner et al., 2014). Fishers are also tied to each other through risk, common experiences of isolation and loneliness (Ross, 2013). The solidarity or camaraderie that results is an important aspect of social cohesion (CR, 2009; Reed et al., 2011; Reed et al., 2013). This cohesion is strengthened by the employment of local crews (Thomson, 2001).

The boundaries of the fisher community also reinforce cohesion: only those who hold the same norms and values and are able to cope with harsh conditions are considered insiders and perceived as 'good fishers'. Others are seen as outsiders and not of the community, which makes access to the fishing industry highly restricted (Bakker et al., 2019; Gustavsson, 2018; Nightingale, 2013).

At a wider community level, fishing is seen as 'interwoven into the community and part of the social fabric' (Acott and Urquhart, 2011). The fishing industry acts as a community glue, creating place-based community bonds and further stimulating community cohesion (Urquhart and Acott, 2013b).

Relationships with place and group identity: Occupational community wellbeing is likely linked to the collective identity of fishers. This is interlinked with group attachment to place, reflecting rootedness in the community, sense of belonging and the notion of locality (Acott and Urquhart, 2017; Urquhart and Acott, 2014). In turn, collective identity expressed through sense of place can result in rivalry between port communities (Reed et al., 2011; Reed et al., 2013). Strong place-based community identity is, however, beneficial for resilience, encouraging the adaptive capabilities of fishers and place to changing environments and market conditions (Urquhart and Acott, 2013a).

Place identity: Place identity may contribute to wellbeing at different scales from individual to the wider community. The fishing industry is actively involved in placemaking, shaping place identity, and providing aesthetic, authentic, emblematic and inspirational wellbeing outcomes to visitors and locals (Acott and Urquhart, 2011, 2014, 2017; Ainsworth et al., 2019; CFPO et al., 2023; Reed et al., 2011; Urquhart and Acott, 2013a; White, 2018). Place identity is not only linked to fishers and the act of fishing. The image of a fisherwoman or fisherwife is a frequently used symbol in Scottish towns to attract tourists and emphasise the fishing heritage of places (Nadel-Klein, 2000).

Apart from attracting visitors to a fishing town, the fishing industry also reinforces cultural heritage and memory, and protects history and tradition of fishing towns with a deep connection to the sea (Acott and Urquhart, 2011, 2014, 2015, 2017; Reed et al., 2013; Urquhart and Acott, 2013a, 2014; White, 2018). Some fishers acknowledge that the co-existence of fishing and tourism in a place may be 'a future way of life' for communities deeply rooted in their fishing heritage (CFPO et al., 2023).

Relationship with policy and management: Relationships between fishers and policy and management institutions also contributes to relational wellbeing. Relationships between fishers and policy and management institutions can be strained which can affect other wellbeing domains (e.g. subjective wellbeing). Fishers tend to have low levels of trust towards institutions and decision-makers coupled with a community feeling of being underappreciated by the government (Bakker et al., 2019; Ford and Stewart, 2021; Reed et al., 2020). Low levels of trust stem from a long-standing perception that decision-makers' fail to appropriately consider and address the needs of the sector or value their ecological knowledge (Anbleyth-Evans and Lacy, 2019; Reed et al., 2020).

B3.3 Diverse values

As highlighted in the conceptual framework (Annex A), the diverse values that individuals and communities hold will shape individual, societal and organisational behaviour and therefore influence the wellbeing outcomes that may result from fishing activities. Wellbeing outcomes do not map directly on to values, and while capturing evidence around values was not the main purpose of this review, some insights can be identified. Relevant definitions for this section are presented in **Table** . As no studies focused specifically on worldviews or intrinsic values, they are not discussed further.

Table B3: Definitions of diverse values.

Diverse values	Definitions
Worldviews	*"The ways through which people perceive, conceptualise and modify the world, rooted in cultures and languages (Olsen, 2019). Worldviews shape individual and collective ways of perceiving, interpreting and interacting with nature, and are expressed through culture, knowledge systems and languages*" (IPBES, 2022).
Broad values	General moral guiding principles and life goals (e.g., freedom, justice, responsibility, harmony with nature, harmony with Mother Earth, health, prosperity) informed by people's worldviews and beliefs (Dietz et al., 2005). They are often embedded in a society's institutions (i.e., informal social conventions and norms, and formal legal rules) and can underpin people's specific values of nature (IPBES, 2022).
Specific values	Opinions on, or judgements regarding, the importance of nature in particular situations. Specific values comprise instrumental, intrinsic and relational values. (IPBES, 2022).
Instrumental values	A type of specific value, this refers to the importance of nature as a means to achieve a particular end (e.g. to satisfy human needs, interests or preferences) (IPBES 2022).
Intrinsic values	A type of specific value, this refers to the notion that something has value as an end-in-itself or has inherent or moral value that is not tied to human purposes (Devos et al., 2019).
Relational values	A type of specific value, referring to the preferences, principles, virtues associated with relationships, both interpersonal and as articulated by policies and social norms. They include "eudaimonic" values associated with a good life and are not present in things, but derived from relationships and responsibilities to them (Chan et al., 2016).

B3.3.1 Broad values

The evidence on fisher identity provides an indication of broad values held by fishers. Freedom, independence, autonomy, masculinity and belonging to the sector are core components of that identity (Christy et al., 2021; CR, 2009; Gustavsson et al., 2017; Morgan, 2016; Ross, 2013, Zhao et al., 2013). These broad values are embedded in the social norms around fishing, making entry into the sector challenging for those considered outside (see Section 3.4.1 and CR, 2009; Gustavsson and Riley, 2018a; Zhao et al., 2014).

B3.3.2 Instrumental values

The material wellbeing outcomes reported reflect the role that fishing plays in providing a means to an end. Fisheries are valued for their contribution to income (of individuals, families and occupational and place-based communities), employment and the health benefits associated with fish consumption. These values are however diminished when fishing poses a risk to occupational health, safety and security (see Section 3.2.1).

The role of fishing in a location is also valued for its contribution to other income generating activities. Heritage symbols and infrastructure (e.g. nets, huts, warehouses, ships' wheels) provide cultural value to a location that is capitalised upon by tourism and creative sectors (Acott and Urquhart, 2014; 2017).

B3.3.3 Relational values

The fisher-nature relationship makes an important contribution to the construction of fisher identity (Acott and Urquhart, 2011). Fishers express a deep connection to the sea and attachment to place, including islands, coasts and estuaries (Ainsworth et al, 2019; Nightingale, 2013; Urquhart and Acott, 2014). Nature and the sea provide inspiration, a sense of belonging and reinforce experiences of independency, autonomy, and freedom (Acott and Urquhart, 2011; Ross, 2013).

Shared experiences from fishing and social relationships between fishers and their families and other community members are also highly valued for their role in community life (Acott and Urquhart, 2011). There are tight bonds between fishers that contribute to solidarity and safety at sea (Reed et al., 2011), and reciprocal relationships that facilitate the sharing of knowledge (although these may be more common among fishers with perceived similar skill levels; Turner et al 2014). Social connections within the fishing industry are especially valued by fishers' wives and partners. Those staying onshore for long periods without their partner often experience a sense of loneliness, worry and deteriorating wellbeing (Britton and Coulthard, 2013; Reed et al., 2011; Ross, 2013; Szaboova et al., 2022) that can be ameliorated through social connections.

Sense of place and place identity discussed in Section 3.2.3 are also likely to influence how people behave towards and respond to changes in the fishing sector.

B3.4 Barriers and enablers to realising social, economic and cultural wellbeing outcomes

The second and third literature review questions focus on the barriers and enablers that hinder and facilitate the realisation of wellbeing outcomes from fisheries. Barriers and enablers will vary between and across individuals and locations, and will be experienced differently by different people. How barriers and enablers influence wellbeing outcomes will be dependent upon the diverse values held by fishers, their families and communities and the range of capitals that they have access to (which may itself act as a barrier and/ or enabler). What constitutes a barrier to one may therefore be an enabler to another. The following section presents a combined summary of the range of barriers and enablers identified.

Barriers and enablers to entry into the sector are also discussed as these determine the ability of individuals and communities to realise fishery related wellbeing outcomes.

B3.4.1 Barriers and enablers

Barriers and enablers to wellbeing outcomes operate at different scales. Within the literature, evidence was found for global barriers (sometimes with local enabling responses), barriers and enablers relating to fishing practices and patterns, barriers and enablers that result from governance institutions and practices, and barriers and enablers at the family and community level. The role of diversification from the fishing sector into tourism and its role in achieving wellbeing outcomes is also noted.

Global barriers and local enabling responses: Some barriers to the realisation of fishing related wellbeing outcomes are global in nature and largely out of the control of individual fishers, their families and communities. These include, for example, market pressures and climate change. Fishers are subject to global and local market fluctuations, and changing dietary patterns, all of which significantly impact their livelihoods (Jennings et al., 2016) and are likley to affect both material and subjective wellbeing. Access and certification issues further complicate matters. Inequitable quota distribution and the high cost of certifications (such as Marine Stewardship Council) limit market access and reduce income potential (CR, 2009; Hadjimichael et al., 2013; Reed et al., 2013). In addition, changing weather patterns and sea temperatures are impacting the location of fish stocks. This has implications for fishers and their ability to catch target species with the gear they have access to. This may result in lost income and employment opportunities (Jennings et al., 2016).

In response to such changes, some fishers and their families have developed marketing and branding initiatives. Place marketing, local food branding, and integration with tourism activities have been demonstrated to add economic value and strengthen community identity (Reed et al., 2011; Urquhart and Acott, 2013b), likely contributing to all three wellbeing dimensions.

Fishing practices and patterns: The changing nature of fishing activities with growing competition, increased migrant labour and changing fishing patterns (resulting from, e.g., regulation, overfishing, climate change) can act as a barrier to relational wellbeing, but also has implications for material and subjective wellbeing. For example, community cohesion is easily strained by competition between small and large-scale commercial fishing and between recreational and commercial fishing due to the use of different gear types, technologies and fishing practices (traditional vs more modern) (Hadjimichael et al., 2013; Turner et al., 2014). An increase in migrant labour in the sector has been shown to reduce opportunities for local labour but also raises concerns about safety when communication is challenged by language skills (CR, 2009). Furthermore, perceived over regulation, overfishing, and extended time away from home due to changing fishing patterns (e.g., in response to an MPA designation), can strain family relationships in addition to economic wellbeing outcomes (Hattam et al., 2014). It also likely strains relationships with governance institutions (see approaches to governance below).

Where competition can be reduced through, for example, effective separation of large and small-scale fisheries, small-scale fisheries have been able to gain

autonomy and socio-ecological resilience allowing them to emphasise catch quality over quantity (Korda et al., 2023; Prosperi et al., 2022) with the potential to benefit all wellbeing dimensions.

Approaches to governance and trust in governance institutions: Perceived mismanagement by government can result in fishers viewing government policies as hostile, impacting all dimensions of wellbeing. This furthers a loss of trust, reduces the perceived credibility in management institutions and presents a barrier to participation in management activities (Bakker et al., 2019; CR, 2009; Ford and Stewart, 2021; Gustavsson et al., 2017), which could help to build relational wellbeing.

Where collaborative management has been achieved, it plays a vital role in enhancing trust (and thereby relational wellbeing) and management effectiveness by involving fishers in management and decision-making processes, especially for issues such as those faced in the management of fishing in marine protected areas (Hattam et al., 2014; Reed et al., 2020). Similarly, skill and knowledge development through partnerships with research institutes and collaborative learning significantly improves the economic viability of fishers (Bakker et al., 2019) enabling improved material and subjsective wellbeing outcomes.

Family ties and support: The catch sector has traditionally been a male dominated sector, with wives and partners providing a supporting role. Within fishing families, wives and partners are important facilitators of wellbeing outcomes across all wellbeing dimensions. They actively contribute to different aspects of the fishing business (albeit their contribution is not always recognised and acknowledged) (Gustavsson, 2021; Gustavsson and Riley, 2018b; Morgan, 2016; Szaboova et al., 2022). Wives and partners also build social relationships, support their partners' health, help to strengthen father-child relations, complement family income (sometimes acting as the primary bread winner), and connect their husbands with the wider society (Reed et al., 2011; Szaboova et al., 2022; Zhao et al., 2013; Zhao et al., 2014). Women's role has also been changing in relation to advocacy with more women engaging in decision-making processes and communicating with politicians, driven by concerns for family and community (Zhao et al., 2014).

Family ties also support a fisher's resilience to industry decline, with fisher dedication to fishing rooted in generational fishing practices (Acott and Urquhart, 2011; Kirwan et al., 2018). Smaller, kinship-based fishing communities with similar fishing practices often hold stronger social bonds and information sharing (Turner et al., 2014). This helps individual fishers overcome economic shocks with stoicism (Gustavsson and Riley, 2020). Conversely, this may also lock individuals into a sector with a limited future and implications for all dimensions of wellbeing.

Community wellbeing: For family members remaining onshore while fishers are away at sea it can be lonely and isolating, with particular implications for subjective wellbeing. Networking and organisational support (i.e., building relational wellbeing) are essential for overcoming isolation and building confidence among community members (Gustavsson, 2022; Zhao et al., 2014). Examples of this include the building community-based networks and female-led organisations (Zhao et al., 2014).

Diversification from fishing: Tourism is perceived by some fishing communities as a factor degrading sense of place and community cohesion (i.e., an element of relational wellbeing) because of the loss of authenticity and the entry of (non-fishing) newcomers. However, not all view tourism as a barrier, others see it as an enabler and an essential economic revenue stream (Acott and Urquhart, 2011, 2014) and hence material and subjective wellbeing.

B3.4.2 Barriers to participation in the fishing sector

Economic challenges, gender norms and the mechanisms through which knowledge and information are shared within the sector are important barriers to participation in fishing activities and hence the achievement of fishing related wellbeing outcomes:

Economic challenges: Increased property prices, the loss of basic services, and limited employment opportunities have led to the depopulation of coastal communities, particularly among young people resulting in fewer entrants into the fishing sector (Urquhart et al., 2011).

Regulatory hurdles: Economic challenges are exacerbated by regulatory hurdles where stricter regulations and higher set-up costs deter new entrants, especially the younger generation, from pursuing careers in fishing (Gustavsson and Riley, 2018a; White, 2015).

Gender norms: Commercial fishing is a predominantly male occupation and the identity of fishers is frequently associated with masculinity (Gustavsson and Riley, 2020; Szaboova et al., 2022). This masculine identity can make it challenging for women to enter the sector. Women must work ‘twice as hard’ to gain respect and recognition, while overcoming negative attitudes and cultural taboos (Zhao et al., 2013; Zhao et al., 2014).

Knowledge and communication: The fishing industry typically employs a patrilineal transfer of knowledge. This reinforces traditional gender roles making it difficult for women to enter the catching sector (Gustavsson and Riley, 2018b). Policy and management communications within the sector are also typically aimed at male fishers creating further barriers to participation and understanding, particularly for women and newcomers (CR, 2009; Gustavsson, 2022; Zhao et al., 2014).

Family ties: Strong family ties and inherited cultural and social capital aid entry into the industry and skill development, promoting a sense of community and belonging (Gustavsson and Riley, 2018a), but can result in the exclusion of individuals from non-fishing families (White, 2015).

B3.4 Sensitivity of wellbeing outcomes to change

The final review objective was to explore how sensitive wellbeing outcomes from fishing activities are to changes in environmental, economic, or regulatory conditions (i.e., the degree to which the wellbeing outcomes may be adversely or beneficially affected by environmental, economic or regulatory change). Understanding this is important as it will influence the selection of appropriate indicators that can be used to track wellbeing outcomes over time; an important characteristic of an indicator is that it is sensitive and can detect a response to the change of interest.

The literature reviewed typically does not assess the sensitivity of wellbeing outcomes in detail. While it identifies how changes in some wellbeing outcomes may result in changes across others, it provides little evidence of the scale of change or how wellbeing outcomes respond over time (e.g., speed or magnitude of change). Little can therefore be concluded about the extent to which wellbeing outcomes may respond in similar or different ways to the same pressure or how wellbeing outcomes respond to cumulative pressures. Consequently, the vulnerability of the sector remains unpredictable. The text below summarises factors identified in the literature that may have a particular influence on the ability of fishers, their families and communities to derive wellbeing outcomes from fishing activities and how wellbeing outcomes may respond to change (i.e., they may influence the sensitivity of wellbeing outcomes to change).

Labour changes and crew dynamics: As labour and capital become more mobile, traditional links between fishing fleets, home ports, and local fishing grounds are weakening. This shift is resulting in a move away from kinship-based networks towards more formal contractual relationships (Symes, 2000). Such changes not only dilute the sense of 'local dependence' but also challenge social cohesion and cultural identity within fisheries-dependent communities (Symes and Philippson, 2009).

Changes in labour availability are also affecting crew dynamics causing a shift from traditional family-based crews to reliance on migrant workers. This is resulting in a growing sense of dissatisfaction among fishers (Coulthard and Britton, 2015; Ross, 2013). These evolving dynamics affect adaptation strategies and the wellbeing of fishers and their families, causing feelings of isolation (Coulthard and Britton, 2015; Ross, 2013).

Changes in gender roles: Gender roles within occupational fishing communities have been changing (Urquhart et al., 2011), albeit slowly (Zhao et al., 2013). This restructuring of the fishing industry and the growing role of tourism are reshaping perceptions of masculinity (Gustavsson and Riley, 2020). This change is empowering women, who are seen as icons of fishing communities (Nadel-Klein, 2000, Urquhart et al., 2011) and facilitating their participation in mutliple aspects of the fishing sector (from catch to processing and administration) (Gustavsson and Riley, 2018b). This shift is complicated by the changing nature of employment and livelihoods in response to climate change and varying weather patterns (Jennings et al., 2016). No evidence was found for the implications of these changing gender roles for fishers, but it can be anticipated that changing gender roles may have implications for family and community wellbeing.

Engagement in management: Where increased participation of fishers in management discussions has occurred (for example, industry-science partnerships such as the GAP2 project and Seafish common language groups) higher levels of trust in governing institutions have been reported enabling the initiation of a move towards more collaborative management (Ford and Stewart, 2021). Increased fisher organisation is also reported to enhance their influence on governance decisions, indicating a shift in power dynamics (Jacob et al., 2023). Both factors are likely to facilitate the generation of more positive wellbeing outcomes from fishing across all wellbeing dimensions.

Integration of small-scale with large-scale fisheries: The identity of fishing communities is sensitive to their level of integration within the English fishing sector. Greater integration with large-scale fisheries potentially diminishes certain economic and cultural outcomes associated with small-scale fisheries (Korda et al., 2023) with implications for the wellbeing outcomes achieved.

Diversification: Identity and sense of place are challenged by the 'touristification' of the fishing industry and globalisation forces that affect the unique image of a fishing town (Brookfield et al., 2005; Urquhart and Acott, 2013a). As highlighted above this move towards tourism is viewed both positively and negatively with the impacts on wellbeing differing according to scale (i.e., fisher, fisher family or occupational or place-based community).

B4 Discussion and conclusions

The findings presented in this Annex provide an overview of the literature on the social, cultural and economic wellbeing outcomes from fishing in the UK, structured around the wellbeing outcomes element of the conceptual framework presented in Annex A.

B4.1 Overview of findings

Material wellbeing outcomes include economic factors, such as income and employment from fishing and the fishing supply chain as well as income and employment from fishing related tourism. The literature highlights their changing relative importance over time. Material wellbeing outcomes also include health outcomes that can be both positive and negative, and a diverse range of skills and knowledge.

The diversity of potential subjective wellbeing outcomes was not well captured in the literature. Evidence primarily related to occupation identity (which was well studied) with some evidence also for job satisfaction and the impact of diversification on this. Further research is needed to understand subjective wellbeing outcomes more fully.

Evidence for relational wellbeing outcomes relate to the importance of intergenerational ties; social cohesion; relationships with place, place identity and group identity; and relationships with policy and management. A reasonable body of evidence was found, but as with the other elements of wellbeing, it was not possible to explore how these outcomes vary by location, fisher or community type.

The review also provided insights into potential barriers and enablers that hinder and facilitate the realisation of wellbeing outcomes, although the evidence for this is limited within the literature reviewed. Barriers and enablers are interlinked with some factors described being both barriers and enablers depending on whether they are present or not and increasing or decreasing. For example, social cohesion can be a wellbeing outcome in itself, but can also enable other wellbeing outcomes or hinder their realisation if cohesion is lost.

Furthermore, the literature provides little detail of how diverse values may influence the emergence of welling outcomes, indicating a gap in the evidence base.

B4.2 Limitations

The wellbeing component of the conceptual framework provides a useful structure around which to organise the evidence on wellbeing outcomes. However, if the effect of management interventions on wellbeing outcomes is to be better understood, **it will be important to understand the evidence relating to capital assets and diverse values**. Not all fishers and fishing communities (occupational or place-based) are the same. They will have different levels of access to assets and hold different values. These will influence both the extent to which wellbeing outcomes can be achieved and whether the processes for achieving wellbeing outcomes can be activated. This suggests that outwardly similar fishers and fishing communities may respond in different ways to the same intervention.

It has not been possible to assess the levels of certainty in the evidence nor the extent to which the wellbeing outcomes are likely to emerge or be present across the whole of the UK's inshore fishing fleet or just parts. While the literature review has captured evidence from across the UK, **there is insufficient detail to understand how wellbeing outcomes may vary geographically or by fishing practice**. Data collection methods reported in studies have largely involved in-depth interviews, but studies have had different objectives and employed distinct theoretical or conceptual frameworks. While this provides evidence of a range of potential wellbeing outcomes data are insufficient to disaggregate further. A large-scale, cross-UK exercise is needed to consistently collect relevant evidence for material, subjective and relational wellbeing outcomes. This could be achieved through, for example, the Defra fisher social survey, but will require the addition of questions relevant to the conceptual framework developed through this project. An alternative could be a large-scale qualitative study focused on case study locations drawn from a typology of fishing communities. However, engagement demands on fishers are currently high due to the preparation of Fisheries Management Plans (FMPs) and the timing for such a study would need careful consideration.

There is a lack of evidence regarding the sensitivity of wellbeing outcomes to change. The evidence presented largely focuses on what the wellbeing outcomes are and identifies some barriers and enablers to their realisation. The studies essentially provide a stock take, but do not capture how these wellbeing outcomes change over time, nor how they respond to different sources of change (e.g., management measures that affect fishing practices or ecosystem change that affects stock availability). In addition to gathering consistent and regular data on wellbeing outcomes, a useful next step would be to map out the logic chains that identify the links between ecosystem change, change in other forms of capital (e.g., human, social, cultural and economic), the barriers and enablers and the wellbeing outcomes using a systems thinking approach. As this may not be possible for all wellbeing outcomes, a short list of priority outcomes would need to be identified.

B4.3 Next steps

This review has identified potential steps that the MMO could take to strengthen the evidence base relating to the wellbeing outcomes from fishing for fishers, their families, and their occupational and place-based communities. The next step for this project will be to explore potential indicators for some of the wellbeing outcomes identified. The creation of a short-list of priority indicators will help the MMO identify where it might be most useful to focus its efforts in building the evidence base.

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