Sustainable Fisheries
PARTNERSHIP

A Method for Measuring Social and Economic Performance of Fisheries:

Stakeholder Consultation Document

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Contributors

Lead authors: Braddock Spear, Tania Woodcock | **Science and technical lead**: Pedro Sousa | **Research team**: Braddock Spear, Tania Woodcock, Sèbastien Metz, Jack Whalen, Pedro Sousa, Tracy Van Holt, Jeffrey C. Johnson, Wendy Weisman, Sofia Käll, Beatrice Crona | **Stakeholder engagement**: Braddock Spear, Iain Pollard

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1 INTRODUCTION

There is a growing demand for sustainable seafood in global markets. Yet, complex interrelationships among the environmental, economic, and social sustainability of a fishery pose a challenge to producers. Environmental improvements in a fishery can be achieved using strategies that focus solely on traditional fisheries management through effort reduction, gear changes, closures, etc. But, these strategies can impact the socioeconomic wellbeing of a fishery. Some fisheries and communities can adequately deal with the economic and social implications (positive or negative) that come with most (if not all) fishery management decisions. Those fisheries and communities have sufficient infrastructure, processes, and knowledge to deal with these impacts and allow for environmentally sustainable fisheries in the region to continue.

In many fisheries, the governance and infrastructure are not yet established for environmental, social, and economic stability (let alone sustainability) as a base for long-term engagement with supply chains. As a result, uncertain or negative socioeconomic impacts may prompt fishers to disregard environmental strategies and undermine improvement efforts. Thus, a more holistic approach is needed to achieve sustainable fish stocks, fisheries, and fishing communities.

Up to now, much of the work evaluating fisheries' sustainability, including voluntary certification schemes and consumer ratings systems among others, has focused on environmental issues. This approach does not address sustainability as a whole in seafood supply chains. Nor is it reflective of the evolution of the corporate responsibility movement wherein more businesses are now considering their impact on workers and the community in addition to the environment.

Sustainable Fisheries Partnership's (SFP's) end goal is to achieve environmental sustainability in global seafood supply chains. But in many cases, that goal is difficult or impossible to reach unless social and economic considerations are factored into the strategy and solutions put in place. To assist fisheries, communities, supply chain companies, governments, and other NGOs, SFP is exploring the expansion of our online fisheries database, FishSource, to capture and publicly share useful economic and social information that may contribute to strategies for achieving environmental sustainability.

1.1 Scope of the social and economic performance measurement tool

SFP is proposing to expand the remit of FishSource by incorporating a new tool, which focuses on social and economic outcomes of fisheries that are key for wellbeing, fairness, profitability, and efficiency. The tool will comprise a series of socioeconomic indicators, and will not include risk analysis or reporting of human rights abuses such as slavery, child labor, and human trafficking. A significant level of media attention has been given to human rights risks in seafood supply chains and several tools already exist or are in development to address that portion of acute risk issues in fisheries.

The availability, quantity, and quality of social and economic information for fisheries vary greatly among fisheries and countries. Similar to the environmental information FishSource provides, we anticipate the social and economic information will contain high-level indicators that can be used to monitor improvements and trigger areas for further investigation or improvement work.

We are not aiming for FishSource to be a comprehensive tool for understanding the overall social and economic health of a fishery. The information captured and displayed will be that which can be linked to environmental aspects of a fishery and to important social and economic issues. As part of the tool developed for inclusion in FishSource, SFP will include a scoring system that allows comparison of performance across fisheries (similar to the existing environmental scores that cover management quality and stock status of a fishery).

Our goal is to make the information provided by the proposed tool as clear and actionable as possible. Additional analysis by users of the information may be required when determining strategies and actions for improvement. As SFP becomes more familiar with the new information and how it relates to environmental issues, we will factor social and economic considerations into the improvement recommendations we already make public.

1.2 Vision for implementation

Given the high cost of primary data collation, SFP will rely on desk-based research for data compilation. The paucity of social and economic data for fisheries is likely to represent a significant challenge for users of this tool. As SFP develops it, we will seek opportunities for long-term systematic partnerships with entities that have global reach and expertise in social and economic information gathering in fisheries. Because SFP and the FishSource team will not build significant staffing capacity in this area, we and the users of the tool will need to rely on a network of experts to compile the vast majority of the information. SFP will maintain a list of approved analysts to carry out the methodology and submit scores and information for uploading to FishSource. The social and economic content on FishSource will grow gradually over time as the fishing industry, NGOs, local governments, processors, and other stakeholders request and fund approved analysts to compile data and carry out the evaluations.

As social and economic information is compiled and submitted to FishSource, we will need expertise on staff to conduct quality control, provide responses as queries are received from analysts and stakeholders, and defend/improve the methodology. If the method that is presented below (or a later version of it) is rolled into FishSource, SFP will seek a social/economic information coordinator for the FishSource team.

In summary, the FishSource program will simply provide the methodology, a platform for showing high-level social and economic information, guidance for compiling it, and standards to ensure quality and consistency. Work still needs to be done to better understand our audiences for social and economic information and what their motivations are. Possible incentives for other groups to contribute include having a standardized and globally recognized outlet for this information, which currently is disaggregated and difficult to access. In addition, SFP can offer market leverage through its seafood supply chain relationships to drive improvements in these fisheries, as well as strategies and custom recommendations for how improvements can be made. If the information and platform is useful for only a select group of fisheries that partners and other stakeholders are interested in, then that is all that will need to be maintained. The database and resources needed to support it would grow commensurate with information availability and demand from key stakeholders to have the information aggregated on FishSource.

2 PROTOTYPE METHODOLOGIES

Our team of socioeconomic experts conducted a review of the literature to identify existing and potential indicators of social and economic performance in seafood supply chains.

With respect to the findings from the literature review, we directed our focus towards three fundamental aspects of social wellbeing for analysis in capture fisheries and seafood processing. These were:

- Security – the dependability of a continued livelihood
- Flexibility – the degree of options/mobility within the fishery system in response to changes, problems, opportunities
- Viability – the likelihood of a fishery and associated supply chain persisting from a social perspective, as long as the fishery is well-managed ecologically.

Three main economic dimensions were explored:

- Wealth generation – whether the fishing sector (vessel owners, workers) is generating wealth
- Resource efficiency – the degree of resource use by the fishing vessel
- Profitability – whether the cost of fishing is covered by the fishing income

We then compiled a suite of more than 60 variables associated with social performance and close to 80 variables associated with economic performance and investigated them for their suitability for inclusion in the prototype methodology. We focused the investigation using several constraints and guidelines, designed to ensure we identified meaningful indicators and allowed for the methodology to have the widest possible application, regardless of the resources available to fisheries. The constraints and guidelines used are outlined below:

- Indicators must be easily understood by actors throughout seafood supply chains.
- Indicators must be appropriate for any fishery, even small-scale and those with little data.
- Data used to assess fisheries must be publicly available through desk-based research such as reports or trustworthy data sources online. However, it is acceptable/expected to find “no available evidence” for indicators and fisheries.
- Data must be accessible with fairly minimal effort. SFP and its partners do not currently have funds to collect data in the field.
- Indicators should not compete with or replace the use of comprehensive instruments such as the Fair Trade Standard for labor protections or instruments related to human trafficking in seafood supply chains; SFP is working with other partners on a risk assessment approach to human rights abuses in fisheries.
- Focus on indicators that the supply chain can likely influence.
- Indicators should use the fishery as the unit of performance measurement, in parallel with the way SFP currently measures sustainability in ecological terms.

Using an iterative process, we identified a sub-set of suitable variables and indices before deciding on a short-list of 10 socioeconomic indicators that best met key criteria, including the likelihood that supply chain actors have the ability to change or influence associated factors to achieve a positive outcome. These indicators are outlined in Sections 2.1 and 2.2. For each indicator, we identified the focus, rationale, and operationalization. We then compared our approach with other existing assessment methods and indicators (see Appendix A for details).

Finally, we applied the prototype methodology to real-life fishery profiles, using cases where we anticipated that analysis would reveal a wide range of scores. We tested the methodology against three fisheries – one in a developed country, where the fishery status was considered above average

and social performance would likely score high, and one in a developing country, where human wellbeing and the environmental condition of the fishery was generally considered poor. The third fishery, although based in a developing country, has recently been certified as Fair Trade, indicating that social performance should be scored highly. In addition, the test fisheries also differed in scale from artisanal to industrial, allowing us to test if the methodology worked for both types of fishery.

Following the stakeholder consultation, we will continue to refine the methodology, before testing it against a larger number of fishery profiles.

2.1 Proposed economic performance indicators

2.1.1 Core indicators

Three indicators of economic performance at the harvesting stage (i.e., fishers) of seafood supply chains have been proposed for use in the socioeconomic tool. Readers should note that these may be subject to changes arising from the consultation process.

The economic indicators are outlined in Table 1 and detailed below:

1. There is some economic value retained by the fishery

   This indicator assesses the value generated by fishing vessels and fishers. The term “total economic value” was proposed during discussions, but pertains to a precise economic definition, which is not suitable for application in this context. Use of the term “economic value” encompasses value generated by businesses (fishing vessels) and also workers (fishers). The gross value added (GVA) represents how much income (turnover) is retained by the people exploiting the resource (vessels owners and fishermen).

   The indicator proposed is the ratio between gross value added and turnover.

   This ratio does not take into account what could be considered as a distribution issue, when vessel owners concentrate most of the value generated by the fishery (high profits, low wages). A separate social indicator considers this dimension (1. Earnings are fair and stable).

2. The fishery is profitable

   The focus of this indicator is on businesses at the fishing vessel level. The operating profit is estimated by the difference between the turnover and all operating costs.

   The indicator proposed is the ratio between operating profit and turnover, the operating profit margin.

   This ratio indicates if the income generated by the fishing activity covers the running costs (operating profit margin positive or null), which is essential for fishermen to stay in business in the short run, but does not account for the need to invest (long run). This indicator is one of the most widely used when evaluating the financial health of a fishery. Notably, there is usually weak compliance of fisheries regulations when vessels are not profitable. From an operational perspective, data on net profit (taking into account depreciation, financial costs, and opportunity costs) are usually less accessible/robust than operating profit.

3. The vessels are resource efficient

   This indicator addresses the efficiency of fishing businesses. A fishing business relies on two main resource types: fish resources and energy. As FishSource already focuses on the fish resource exploitation level, we focus here on the energy efficiency of fishing vessels. Most methods approach this by integrating the technical fuel efficiency, comparing the quantity of fuel used with the quantity of fish caught.

From an economic perspective, it makes more sense to compare values. For instance, for this indicator, we propose to evaluate the ratio between fuel costs and turnover: the economic fuel efficiency.

This ratio is sensitive to the evolution of fuel price: if the technical efficiency and the fish prices were stable, an increase in crude oil price would mechanically lower the economic fuel efficiency of a fishing fleet.

Table 1. Proposed criteria for determining economic performance

Economic dimension	Suggested measures	Score ranges		
		<6	≥ 6	≥ 8
1. There is some economic value retained by the fishery	GVA/Income	Ratio below 47%	Ratio between 47% and 57%	Ratio above 57%
2. The fishery is profitable	Operating profit margin	Profit margin below 11%	Profit margin between 11% and 18%	Profit margin above 18%
3. The vessels are resource efficient	Economic fuel efficiency	Ratio above 18%	Ratio between 13% and 18%	Ratio below 13%

In order to generate scores for the economic indicators, data for several variables are to be collected:

- The turnover: all the income generated by the fishing vessels
- The fuel costs: how much the vessels spent on fuel to go fishing. Usually, this is the most important cost for a fishing vessel.
- The crew costs: how much the vessels spent on wages and if any social costs. Most of the time, this is the second most important cost for fishing vessels.
- Total operating costs: all the costs borne by vessels, except depreciation and financial costs (interests).

To allow us to assess whether or not the outcomes of the economic indicators are good in comparison to other fisheries we propose to use data collated by EU Member States as an economic reference point (see Section 2.3, Scoring fisheries).

Additional variables

In addition to the proposed economic indicators, there are some descriptive variables that would help to understand the overall context of a fishery: number of vessels, number of fishermen, days at sea, total power (kW), total tonnage (GT), average age of the vessels, and average age of fishermen. These different variables are not proposed to be included in scores, but displaying trends for each profile would help with understanding the dynamic of the fishery. There is potential for an index to be generated, highlighting the relative size of the fishery in FishSource. The index would help understand the relative importance of each profile in the database.

2.2 Proposed social performance indicators

Seven social indicators have been proposed. Each indicator consists of two or three sub-indicators of social wellbeing, with one total score calculated for the indicator (see Section 2.3, Scoring fisheries). Some of the indicators here focus solely on the social performance of the harvesting stage while others also address the primary processing stage of the seafood supply chain. For the purposes of this tool, we define primary processing as the first stage of processing (e.g., de-heading, gutting,

filleting, chilling or freezing) done in the country where the fishery is based: where primary processing occurs in the fishery region it represents an important stage of the value chain that may benefit from social improvements.

During development, we identified and evaluated potential data sources for use in scoring the social indicators and rated the data for the readiness of their availability (see Appendix C). Five fisheries were used as examples and the data were rated on a falling scale from A (readily available) to D (difficult to obtain). While these evidence sources are suggested, we shall not be limited to their use only and all relevant evidence will be considered during the scoring of a fishery. We will develop a living database of evidence sources that may be used by analysts when applying the tool.

As per the economic indicators, the social indicators outlined in Table 2 and detailed below may be subject to changes arising from the consultation process:

1. Earnings are fair and stable

   This indicator assesses the state of earnings in both the harvesting and primary processing stage of the seafood supply chain. In some fisheries (particularly large-scale and industrial fisheries), fishers may be paid in wages and therefore it is possible to compare fishers' wages to a standard wage. In this case, the standard wage is usually the national minimum wage where available for the country. If there is no legal national minimum wage, as in countries where wage standards are set by collective bargaining (i.e., Scandinavian countries), estimations of minimum wage can be made using respected, publicly available sources (see Appendix C). Alternatively, the national living wage, defined as the minimum income required by a worker to meet their basic needs, may be used as the standard where available. If the average income of workers in both sectors (harvesters and processors) is not equal to or greater than the identified standard, than the fishery isn't providing sufficient compensation to make an acceptable living and will be given a low score. If one of the two sectors makes less than the standard, this indicates that social inequality is being perpetuated in the fishery; in some cases, the inequality may have cultural components, such as women working in processing jobs earning less than a living wage.

   In some, typically small-scale, fisheries, fishers may own their boats and gear, operating on a self-employed basis where they do not receive wages. The earnings of fishery workers may be based on a percentage of the harvest earnings or share of the catch. In these cases, additional information would be needed to estimate the fairness of compensation. Standards are being sought for assessment of such fisheries. If for example, SFP can identify a percentage typically considered to be a fair division of the catch/earnings among the captain and crew of fishing vessels, it would be possible to compare this standard to the fishers' earnings.

2. Jobs benefit the communities

   This indicator addresses the re-investment of wealth by seafood supply chain workers in the community. Comparing the percentage of local vs. outsourced or migrant labor in the supply chain may be used as a proxy for the re-distribution of wealth from a fishery – that is, whether wealth created from the fishery stays within the region and is reinvested in the communities or is distributed elsewhere. There is no one definition for migrant workers. Here we choose to use the definition set out by the United Nations (UN) Convention on the Rights of Migrants, which states that any person engaged in work in a State in which he or she is not a national is a migrant worker.[1] We chose to measure numbers within the workforce (rather than, for example, seafood processing capacity in the country – see

[1] http://www.unesco.org/new/en/social-and-human-sciences/themes/international-migration/glossary/migrant/

Anderson *et al*. [1]), because data on the workforce will likely be easier for most seafood companies to obtain and make available. Furthermore, supply chain actors have more control over who does the processing of their own products vs. changing processing capacity in the country overall.

Fisheries contribute to resilience in communities by providing employment opportunities and revenue to a region. We have made the assumption that high levels of outsourcing and/or use of migrant workers would result in wealth from the fishery being exported, eventually resulting in attrition, and diminishing the fishery and associated communities. Aside from directly reducing employment locally, exporting unprocessed seafood products reduces its value potential to local supply chains and may have negative repercussions for local wellbeing in terms of reduction of a healthy tax base, political leverage for getting decent social services, etc. Furthermore, while not addressed by this tool, outsourcing labor to countries with a cheaper workforce where working conditions may be unfavorable is indicative of human rights risks in the seafood supply chain.

If more than half of the harvesting and primary processing workforce consists of migrant workers or is outsourced to other countries, the fishery will receive a low score. Even in cases where seafood companies have high standards for seeking cheaper labor overseas, and protect workers' rights, they will be penalized if less than 50% of the workforce is local. It could be argued that a certain degree of foreign labor is necessary for staying in business in the globalized economy of seafood, especially for highly commoditized and relatively lower-value products such as "whitefish" that are sold in fast food and high-volume retail outlets. In such cases, evidence showing that the local fishing community benefits from overall fishery efforts even when migrant labor is needed, or when jobs such as processing are sent overseas, may be submitted to improve the fishery's score (for example where seafood companies reinvest some of the profits gained by obtaining cheaper labor overseas, into the arenas of health or education in the fishery communities AND foreign laborers are protected). Additionally, companies may submit evidence showing that even in highly seasonal fisheries that require migrant labor (for example, Bristol Bay salmon), the local labor force is not displaced, or that communities receive a net benefit from migrant labor influx (for example, when local businesses and services are being used to house, feed, and entertain the migrant workforce).

3. Workers are protected

This indicator asks if protections are afforded to workers at the national level and in the fishery. First, we assess whether there are national laws in place, which protect workers' right to associate freely, to bargain collectively, and to strike. We then assess if these rights form part of the constitution, or if more than one type of national level protection exists (i.e., labor code or trade union law/industrial disputes act and the freedom of association and collective bargaining are both present). If protection of worker rights is written into the labor code and trade union law/collective bargaining law, then this is considered a strong protection. These data are available on the wageindicator.org online database for many countries [2]. Evidence regarding national-level workers' protections may also be sourced from the US Department of State's Country Reports on Human Rights Practices, which are published on an annual basis.

Ideally, we would assess how well workers' rights are upheld by fisheries, but evidence of this is unlikely to be available within the evidence constraints that we are working with. Where such information is available it is likely to be in the form of audit outcomes or business KPIs. Instead, we have chosen to focus on whether there is a structure in place for workers to express and resolve grievances at the fishery level. This structure may be implemented through a fishers' organization or outlined in a company Code of Conduct or publicly available workers' agreements. In small-scale fisheries, where vessels are

independently owned and operated, the structure is more likely to be provided by a fishers' organization, for example, a union, cooperative, or federation. Workers in small-scale fisheries are less likely to have formal work agreements in place, and crews often work on other terms; for example, workers may receive an agreed share of the catch. For larger industrial boats/fisheries, a formal process may be in place for workers and employers to address grievances, or a process may be spelled out in federal or state regulations. Workers' contracts are more likely to be used in the processing sector and some industrial fisheries. In cases where contracts are used, they should be public and include clauses about redressing abuses that may occur.

4. Fishery will be viable for future generations

   This indicator comprises three sub-indices. First, it assesses whether new fishers from the region are being recruited into the fishery, when the fishery is well managed (to replace those who age out in the case of closed fisheries). Second, the range of age classes represented among fishers is assessed. If employment in the fishery is seen as a viable occupation, that is reflected in the value people place on fishing as a livelihood. Fisheries can and do die from attrition when such value is seen as low. Third, this indicator assesses the role of women in the fishery as a measure of fishery viability. While female fishers are uncommon in most fisheries, female workers often account for the majority of workers in seafood processing [3]. Such work is often poorly paid and low status. Therefore, to determine fishery viability performance, and progress in terms of gender equity, we look for proof that women are increasingly taking leadership roles in the fishery. More specifically, we chose to look for documentation of women in "C-suite" leadership roles in fisher organizations or worker organizations in primary processing that represent seafood worker interests. We note that at the time of writing, this indicator scored a C/D in difficulty of obtaining data through desk-based research (see Appendix C).

5. Harvesters have economic flexibility

   Where there is poor access to markets or fishers only have access to certain buyers for their products, their economic opportunities and bargaining leverage with that buyer are limited. This indicator assesses the extent of economic opportunities for fishers and the flexibility which they provide. The first sub-indicator assesses whether or not fishers have the freedom to sell their seafood products to whomever they choose.

   The second component of this indicator asks if fishers have access to multiple sources of financial assistance. It is not unusual for a middleman to serve as both buyer and lender to harvesters who are at or near the poverty level, particularly in small-scale fisheries. Fishers who have access to only one source of finance for loans, whether to deal with personal issues or to build their capacity to earn and diversify their incomes, are vulnerable to unfair lending practices and exploitation by moneylenders. In contrast, individuals and organizations with access to more than one type of lending source have more flexibility.

   We also consider investments in human capacity in fisheries to be evidence of improved flexibility. For example, formalized training such as programs in how to add value to landings can help fishers to earn more without increasing fishing effort or expenditures.

   As with Social Indicator 4 (Fishery will be viable for future generations), data for this indicator was relatively difficult to obtain through desk-based research, but nevertheless it remains important (see Appendix C).

6. Communities have improving healthcare

   This indicator considers the state of healthcare within the community where the fishery is based. Healthcare can be considered from two points of view when measuring wellbeing in

fisheries: 1) that it affects and 2) that it is affected by the socioeconomic performance of the fishery. Access to healthcare, food security, and nutrition could be considered good indicators of health with regards to fishing communities; however, they are difficult to measure and evidence obtained through desk-based research is likely to be limited.

We propose the use of the under-five mortality rate as a proxy for healthcare. This measure is framed by Goal #4 of the UN Millennium Development Goals (MDGs), which called to reduce the mortality rate of children under the age of five years by two thirds, between 1990 and 2015 [4]. In order to score this indicator, we look to the Demographic and Health Surveys (DHS) Program's Spatial Data Repository funded by USAID, which provides spatially explicit health and demographic data. The DHS Program collects regional data on under-five mortality rates. Since the rate may vary across areas of large fisheries that encompass multiple geographic regions, the assessor must take the highest under-five mortality rate of all regions associated with the fishery. Where the regional rate does not meet the global standard for under-five mortality (set at 10 deaths per 1,000 live births), which is in line with many developed countries, we ask for evidence of improvement [5]. Significant improvement levels have been defined using a combination of the original UN MDG of two-thirds (66%) improvement and statistical assessment of global country-level data (see Appendix D). Where data at the regional level is insufficient, estimates of the national under-five mortality rate, developed by the UN Inter-Agency Group for Child Mortality Estimation, may be used as an alternative for scoring fisheries.[2]

7. Communities have improving education

This indicator considers the state of education within the community where the fishery is based. Like healthcare, access to education can both affect and be affected by the socioeconomic performance of a fishery. Where access to education is good, it can be anticipated that there is greater access to more diverse options for livelihoods as well as a greater knowledge base to advance sustainability in the fishing community. Not only that, education may also be linked to health and human rights among other things. However, it cannot be presumed that access to education means access to quality education. Thus, an additional measure of quality of education is useful.

The indicator builds on UN Millennium Development Goal #2, which called for the world's countries to achieve universal completion of primary education by 2015 [4]. As a sub-indicator, we propose the use of the primary enrollment rate as a measure of access to education. In order to assess this, we used UNESCO's global trend on out-of-school children that calculates the number of children (of both sexes) that are not enrolled in primary school [6]. These educational metrics are typically available at the country level and finer resolution data should be prioritized if available. Where the primary enrollment rate does not meet or exceed the standard set at 90%, we ask for evidence of improvement.

Additionally, we propose the use of the youth (aged 15-24) literacy rate as a measure of quality of education. Again, we look to UNESCO data to score this sub-indicator. Similar to under-five mortality rate, where available, data of a resolution close to the fishery unit of analysis should be prioritized over regional or national data. Where the youth literacy rate does not meet or exceed the standard of 90%, we ask for evidence of improvement. We have defined 'significant improvement' as an improvement of 8% or more for both sub-indicators, basing this measure on the actual improvement rates observed for enrolment in primary education between 2000 and 2015 and the youth literacy rate from 1990 to 2015.[3]

[2] Available at http://www.childmortality.org/index.php?r=site/index&language=

[3] As outlined at http://www.un.org/millenniumgoals/education.shtml

Table 2. Proposed Criteria for determining social wellbeing

Wellbeing dimension	Suggested Measures & Score Ranges		
	For each indicator, determine which factor(s) apply and note the appropriate score.		
Score	<6	≥6	≥8
	Less than half of factors are present	At least half of factors are present	All factors are present
1. Earnings are fair and stable	• Harvesting wages are higher than the standard (national minimum wage). • Primary processing sector wages are higher than the standard.[4]		
2. Jobs benefit the communities	• The majority of the harvesting workforce comprises local people.[5] • The majority of the primary processing workforce comprises local people.		
3. Workers are protected	• There is more than one national-level protection of "right to strike" in place or it is in the nation's constitution. • There is more than one national-level protection of freedom of collective bargaining, or it is in the constitution. • Structure is in place to address worker grievances at local level or the supply chain uses labor contracts and the terms are transparent/public.		
4. Fishery will be viable for future generations	• Harvesters from a range of age classes are represented. • New fishers are being recruited into the fishery. • Women are increasingly taking leadership roles in the supply chain and fishing communities.		
5. Harvesters have economic flexibility	• Harvesters are free to sell to whomever they wish without retribution. • Harvesters can access loans from at least two types of lenders at interest rates not exceeding the government rate. • Formalized training is provided to harvesters in how to add value to their landings.		
6. Communities have improving healthcare	• Made significant improvement in under-five mortality rate (reduced by 66% between 1990 and 2015) or meets global standard.[6] • Made improvements in under-five mortality rate (reduced by 65% between 1990 and 2015). • Made improvements in under-five mortality rate (reduced by 49% between 1990 and 2015).		
7. Communities have improving education	• Less than 10% of primary school-age children are out of school or there has been significant improvement (by 8% or more between 2000 and 2015) in the enrollment rate. • The literacy rate among youth aged 15-24 is 90% or more, or there has been significant improvement (by 8% or more between 1990 and 2015) in the literacy rate.		

[4] Typically, the minimum wage for the country (see text for more explanation).

[5] See the text for detailed explanation of local and how this indicates community benefits.

[6] WHO European Region (10 per 1000 live births).

2.3 Scoring fisheries

Defining an appropriate unit of analysis for scoring fisheries is challenging. In the existing FishSource database, a fishery is defined by its target species and its location. For example, blue swimming crab in Indonesia. Each fishery is then associated with one or more gears that catch target species. This method denotes a biological approach in which the resource is the focus point and the fishing vessels are described by the gear they use.

However, economists typically describe a fishery by aggregating vessels into homogeneous groups (fishing fleets) in terms of fishing and economic pattern. Several fleets may therefore catch the same target species. Usually fleets are described by their dominant gear, determined by the time spent using the gear or its importance in terms of income generated. Fishing fleets may catch several species at the same time and the target species, that is, the species listed in the FishSource profile, may contribute to a limited share of the total income. Moreover, a vessel might catch the target species with a minor gear.

In order to define economic scores at the fishery level, we propose to:

1. Evaluate variables and indicators at the fleet-segment level;
2. Aggregate the indicators and scores based on the share of value landed by each segment.

In addition to defining the unit of analysis, the economic indicators require a quantitative basis for scoring. The European Commission requests Member States to collect data describing the economic performance of fishing vessels on an annual basis (the DCF – Data Collection Framework). Data collated by Member States will be used to evaluate the distribution for each indicator and will help define the first version of the scale for each score. This scale is to be tested and adjusted for data-poor fisheries. It is also to be tested on long time series (more than 10 years) to evaluate how pertinent the questions and scores are to track the evolution of fisheries' economic health.

For the sake of consistency for current users of FishSource, we maintain the simple three-level scoring system used for the ecological sustainability indicators. The score for each economic indicator is based on a value range relevant to that indicator (see Table 1 for details). Each social indicator has two or three factors (see Table 2), which are used to score the indicator. Ranking scores are <6 if less than half of the factors were present, ≥6 if at least half of the factors are present, and ≥8 if all of the factors are present.

2.3.1 Scoring data-deficient fisheries

During the development of the prototype methodology, we identified data availability as a key obstacle to the successful application of the tool. In some fisheries, all the data needed to score the fisheries may be available; in others, none; and in many, there is likely to be partial-data availability. As noted in Appendix C, data for several proposed social indicators were rated as 'difficult to obtain' or 'not obtainable by desk-based research.' Even in situations where obtaining evidence to assess a particular indicator is usually easy, this may not be the case for all fisheries assessed.

Currently, fisheries lacking evidence in FishSource receive an 'N/A' rating against the relevant indicator, informing the user that the indicator could not be scored. The use of 'N/A' in assessing data-deficient fisheries corresponds with the approach typically taken by economists but is less appropriate when scoring social performance. We have chosen to take a similar but alternative approach, instead rating the indicator as 'DD' (data-deficient). For consistency with the ecological indicators, this approach does not penalize scores for missing data. Although it should be noted that penalizing scores would certainly put pressure on those responsible for these fisheries to seek out information on social and economic wellbeing.

Unlike the economic indicators, the social indicators are each formed of two or three sub-indices. Therefore, situations can arise where there is partial data availability within the indicator. A scoring approach for partial-data availability within indicators is outlined below:

Two sub-indicators

- No data + No data = DD
- No data + Yes = >6
- No data + No = <6

Three sub-indicators

- No data + No data + Yes/No = DD
- No data + Yes + Yes = >6
- No data + No + Yes/No = <6

Furthermore, where data is not available to the level of the fishery, some indicators may be assessed using higher-level information such as regional or national data. In this case, a measure of uncertainty may be applied to the evidence used to highlight the reduced certainty of the indicator score (see Appendix F for a proposed measure of uncertainty for use in FishSource).

3 TEST FISHERIES

We tested the prototype methodology, outlined in Section 2, against three fisheries with existing profiles in FishSource:

1. Blue swimming crab in Indonesia (small-scale fishery, developing country);
2. West Baltic cod in Sweden (industrial fishery, developed country);
3. Shrimp in the Sinaloa District, Mexico (industrial and artisanal fishery, developing country).

The evidence obtained and scoring outcomes from applying the prototype methodology are detailed in Appendix E and briefly discussed below.

3.1 Economic scores

The good economic performance of a fishery is not linked to any geographical or size criteria, but to the appropriate use of scarce resources (fuel, labor mainly) to extract fish resources: there are many examples of large industrial fleets with poor economic status in developed countries and as many examples of small-scale artisanal fisheries with a good economic status in developing countries. The evaluation of the three test fisheries demonstrates that the fisheries' status as a small-/large-scale fishery situated in developing/developed countries has little to no influence on the resulting economic scores. The three fisheries selected for the case study all present low scores, with the West Baltic cod fishery receiving the lowest score for two of three indicators and scoring at a low level for the third indicator (fuel efficiency).

Profit level estimated for the three fisheries led to the definition of low to medium scores: the West Baltic cod fishery received the lowest rank (<6) with 9%, while the two other fisheries were given an intermediate score (≥6) for better profit margins. With a ratio GVA/fishing income below 47%, the West Baltic cod fishery and the Sinaloa shrimp fishery received a lower score (<6) than the blue swimming crab fishery. The three test fisheries presented low levels of fuel efficiency. Only the West Baltic cod fishery was evaluated to be at the score 6 threshold, with the two other test fisheries presenting high level of fuel costs, equivalent to low scores associated to the fuel efficiency indicator.

Further tests are currently underway to evaluate if these low scores are due to a sample bias or a definition issue. One of the main issues arising from these tests relates to the age of the data. When there is an ongoing mandatory data collection process, such as the EU DCF, the best available economic data is already 12 to 18 months old when the data is published. In some cases, the available data might be older, with potential discrepancies between indicators: the economic data available for the Sinaloa shrimp fishery show a low level of wages while the social indicator related to wages (Earnings are fair and stable) is scored at a high level (due to the Fair Trade certification).

3.2 Social scores

Unlike the economic indicators, the resulting social scores largely exemplified the differences that would be anticipated from the fisheries' status as small-/large-scale fisheries in developing/developed countries. As expected of a fishery from a developing country, where there are likely to be more challenges related to the social wellbeing of workers in fisheries, the blue swimming crab fishery received a lower score than the West Baltic cod fishery in several dimensions. In fact, the crab fishery received only two >8 scores and the data were notably more difficult to find. In contrast, the Sinaloa shrimp fishery, which obtained Fair Trade certification against Fair Trade USA's capture fisheries standard in early 2016, scored >8 in response to six of the seven indicators.

Unexpectedly however, the small-scale crab fishery did score higher than the industrial cod fishery for some indicators (Earnings are fair and stable, Communities have improving education). The score received by the cod fishery is lower than might be expected given the developed country context in which it operates. Although workers in the cod fishery receive greater protection from labor

contracts, unions and social security for workers (e.g., pension and unemployment funds), when compared to national standards the wages in the fishery, were lower than those in the crab fishery. Furthermore, although Sweden's primary enrolment rate is very high, data showing the youth literacy rate was not readily available.

Our application of the prototype methodology to the test fisheries highlighted the strengths and challenges in measuring performance in this way, and emphasized the need for careful interpretation of scores. We note that it is possible for a fishery to meet certain scoring criteria, but be unable to demonstrate that through publicly available data at the time of assessment. Certain things may be taken for granted in developed countries where there is no legally set minimum wage but pay rates are agreed through collective bargaining agreements between the industry and the union. However, in our example, 85% of workers in the country were automatically protected through labor union agreements. The fishers had their own association and contract, so they were covered by a labor union. It is also possible that evidence used to justify scores may be outdated by the time it becomes public – it is not real time. Political regimes change, fisheries collapse. But such things will also be public, and so this relatively "open source" evidence format should correct itself.

4 DISCUSSION

This consultation document outlines SFP's reasoning for the development of a social and economic tool, to be used in assessing performance in the harvesting and primary processing stages of the seafood supply chain. We also detail the approach taken in determining suitable indicators.

It is clear from our research that interest in assessing the socioeconomic wellbeing of fishers and associated seafood supply chain workers is growing. Our literature review revealed a range of performance metrics that have been proposed or are already in use, each with differing foci and their own strengths and weaknesses.

The purpose of our proposed tool is to provide an easy-to-use snapshot of the socioeconomic aspects of a fishery. SFP's methodology is not intended to replace in-depth research, nor to replace more comprehensive sets of indicators relating to social and economic dimensions of fisheries. Furthermore, we do not explore the complexities of interrelationships between social, economic, and ecological factors. Ultimately, the aim is for the proposed tool, or some variation on it, to be used for analysis of fisheries in the FishSource database – essentially expanding FishSource to provide a publicly available, rapid first assessment of environmental, social, and economic sustainability for fisheries worldwide.

The tool is designed to encourage ownership of social and economic wellbeing in seafood supply chains by promoting decent and productive work for seafood harvesters and processors. We believe that scoring fisheries in a public forum may compel industry to investigate and address the reason for low or intermediate scores in their supply chain. Meanwhile, businesses sourcing seafood from high-scoring fisheries may see opportunities for communication and marketing about successful efforts to improve socioeconomic aspects of fisheries. As such, our goal is to make the information provided on FishSource as clear and actionable as possible. Notably, a key criterion we used to select the final list of proposed indicators, from a much longer list, is that seafood supply chain actors are likely to have the power to change or influence those indicators, whether directly (e.g., by creating cooperation among suppliers) or indirectly (e.g., by inciting change at a national level).

Thus far at SFP, we have been successful in engaging industry to make changes on the environmental aspects of their supply chain and it is hoped that similar successes would be achieved with regard to the social and economic wellbeing of fisheries. It is anticipated that both harvesters and processors, as well as downstream supply chain actors, would ask how performance can be improved and participate in the improvement process. For example, in order to improve sustainability scores, industry actors could foster the development of programs aimed at providing microfinance options and training for fishers on creating value-added products.

As SFP's familiarity with socioeconomic information and how it relates to environmental issues grows, we will factor social and economic considerations into the improvement recommendations we already make public. There is also potential for fishery improvement projects (FIPs) to incorporate efforts to address social and economic sustainability in the future (FIP+). More generally, we hope that the proposed framework for assessment will provide a context for the seafood industry to think beyond the acute issues affecting human rights such as slavery and child labor, and allow industry actors to address the broader social and economic wellbeing of seafood supply chain actors.

It is clear from our trial application of the prototype methodology to the three test fisheries that the first and foremost challenge in delivering reliable profiles of the socioeconomic performance of fisheries and seafood processors will be the availability of data. While most fisheries benefit from some form of environmental data collection, it is still unusual for socioeconomic data to be collected. Even if good practices are in place, many fisheries, particularly small-scale fisheries in developing countries, are likely to be assessed as 'DD' (data-deficient) or receive low scores due to a lack of publicly available evidence. For example, in the case of the Fair Trade-certified Sinaloa shrimp

fishery, we were unable to score Social Indicator 4 (Fishery will be viable for future generations) and were forced to rate the indicator as 'DD' due to a lack of evidence for two of the three sub-indicators.

The paucity of socioeconomic data for individual fisheries and fishing communities also means that compiling evidence for assessment of the social and economic indicators may require more intensive work than that needed for the ecological assessment. Where data does exist, its quality and availability in the public realm is often variable. Thus, it is likely that information for a small number of fisheries would be made available through FishSource at first, with the database growing over time. However, providing an aggregated, easy-to-access and globally recognized database of socioeconomic data for fisheries may incentivize groups to contribute data that is currently only accessible in a scattered format.

The team hopes that much of the data for the proposed tool may be easily made publicly available by those closely involved with the fisheries. Those fisheries that are already engaged in FIPs may find the process of obtaining and releasing relevant socioeconomic information less demanding than those outside of the FIP system. Therefore, it is probable that FIP-participating fisheries will be the first to be profiled in FishSource in a way that is useful to industry. If data availability continues to pose a challenge to scoring many fisheries in the long term, or if demand for socioeconomic scoring of fisheries proves to be low, it may ultimately be that the proposed methodology is only applied to a small number of fisheries.

5 CONCLUSION

Although there are limitations to our methodology, which relies on desk-based research, we believe that providing basic tools for broad assessments of wellbeing is an important step in understanding the situations of people working in the seafood supply chain. Our proposed tool is meant to encourage current and future leaders in the seafood supply chain, marine resource managers, and socially responsible investors to become more interested in the basic question of how social and economic performance relate to environmental sustainability.

The performance indicators provide a snapshot assessment of social and economic wellbeing. Therefore, the question of why a certain score for an indicator is high or low may require more detailed explanation or in-depth research by the interested party. These "why" questions matter greatly for understanding fishery dynamics at the human-ecological system level.

Businesses may be compelled to look more closely at low-scoring aspects of fisheries in their supply chain, or to seek out and make public legitimate evidence to improve a low score. Indeed, the next step of this research would be to further identify ways for business to concretely improve indicators. SFP will encourage and embrace long-term partnerships or collaboration among organizations that address data availability and fisheries improvements, and also seek to make use of social and economic wellbeing tools that are already in existence.

In the shorter term, use of our proposed tool can help generate questions about causality and relationships among indicators for further research. More generally, SFP's effort may help the seafood industry begin to frame "social performance" in terms of "wellbeing," which is much broader than the current focus on human trafficking and other examples of the most extreme abuses in seafood supply chains.

6 REFERENCES

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APPENDICES

Appendix A. Social performance indicators in context, and comparison with other indicator initiatives

Since the 1990s, there has been growing interest in performance metrics to assess social aspects of fisheries systems and bring more attention to these issues. Initiatives we selected for comparison (see Table A.1) include those specifically created to emphasize worker fairness and avoidance of resource-use conflict (Association of Southeast Asian Nations (ASEAN) initiative funded by USAID and other partners [A1]); economic and community performance (Anderson et al. [A2], henceforth referred to as the "Anderson group"); worker organization and structures for empowerment, human rights protection, wages, working conditions and services (Fair Trade certification standards [A3]); state-level guidelines for governments on social and ethical dimensions of small-scale fisheries, including gender equality (FAO/UN [A4]); and tools to predict how management alternatives may affect community vulnerability, or disrupt wellbeing (Jepson et al. [A5], henceforth referred to as the "Jepson group").

Table A.1. Comparison of six social indicator initiatives for fisheries in terms of the evidence, units of analysis, and context.

Approach	Purpose	Main Focus	Audience	Evidence/source	Unit of analysis/scale
Sustainable Fisheries Partnership (NGO)	Measure social well-being performance	Flexibility, security, and viability	Industry, investors, philanthropists	Traceable, synthesize publicly available reports & websites collected by third parties	Small and large fisheries (Global – FishSource)
ASEAN [A1] *(Industry)*	Measure social performance	Worker fairness and avoiding resource–use conflict	Industry investors, philanthropists	Self-reporting of compliance certificates; map community resources in field.	Small and large fisheries (Asian Region)
FAO/United Nations [A4]	Provide small-scale fisheries guidelines	Secure tenure, decent work, power relationships, gender equality	Governments, industry, fishers	Recognition of the issues in small-scale fisheries, rather than evidence.	Small-scale fisheries communities (Locally)
Anderson group [A2]	Measure performance of fishery management systems	Ecology, Economy, Community in harvest, post-harvest sectors, & community	Governments, industry, academics	68 metrics scored by experts using key informants	Fishery management rather than fish stock (Global)

Fair Trade USA [A3]	Fair trade certification standards	Governance, structure, empowerment, human rights, wages, working conditions, and services	Consumers, fishers, industry	Third-party verifies throughout the supply chain through fieldwork	Certificate holder/fishery organization (Global-local data)
Jepson et al. [A5]*; derived from Pollnac* [A6]	Social impact assessment	Assess management alternatives' effect on vulnerability, community wellbeing, social disruption	State agencies, fishers	Spatially explicit census and other datasets	Fishing community (section of a county) (US – States)

Following is a discussion about key issues that arise in this comparison including A) research/evidence needs; B) unresolvable issues with units of analysis, and C) the significance of measuring performance vs. other approaches that call for social science constructs and methods.

A. Evidence/research needs: While having detailed social wellbeing data collected by competent trained people in the field is an ideal, attaining that ideal is costly for a single fishery (let alone 1,800+ fisheries) and can take years to fund, implement research, and finally share data; meanwhile business as usual continues for fisheries in need of help, and investors and lenders are seeking some basis upon which to assess and compare prospects. Using public data encourages seafood industry actors to do something rather than nothing, and levels the playing field for fisheries that do not (yet) have the luxury of access to interested, well-funded researchers to study them. In addition, the transparency of using public data allows fishery and seafood supply chain actors, and others, to challenge the scores as long as they can produce valid evidence. The relatively "open source" approach of SFP contrasts with the other initiatives (Table A.1), and each one has certain strengths and/or capitalizes on relevant opportunities. For example, ASEAN indicators require compliance certificates from industry partners, or local research surveys; this is a high standard for evidence, but feasible to the extent that ASEAN counts on industry-led consortium members in a single region who likely have capacity to track compliance. The downside is that resource mapping in the field will be challenging in terms of time and funding [A1]. The Jepson group's approach [A5] has the potential to be very accurate in its ability to predict social outcomes related to policy changes, but it is best suited for the US context because it relies heavily on spatially explicit census data, boating ramp databases, and other types of data not applicable to many international fisheries. Similarly, the strength of Fair Trade [A3] standards is their comprehensiveness in terms of types of evidence required and commitment to ensuring updated information, using third-party field visits annually to verify the supply chain; but data from these opportunities will likely not be available across 1,800 fisheries in the short term, leaving deficiencies. On the other hand, the Anderson group [A2] have created 68 metrics that can be scored using key informants (rather than on-site field research), and thus potentially reduce the burden in uncovering suitable evidence. Scores are typically verified through further research if the evaluators find some scores to be anomalous. Yet, the Anderson group's extremely comprehensive and well-thought-out metrics are complex for non-academic/novice audiences such as seafood company managers and executives, who would likely find it difficult to locate evidence to back up those metrics.

B. We find that the issue of units of analysis (see last column, Table A.1) – whether a species, fish stock, fishing community, area defined by a regulatory system, or gear types – is problematic for

all the approaches including the one proposed. Resolving that is beyond the scope of this paper, but the diversity of units used in the frameworks listed helps to highlight the problem. (In later sections we also discuss how these unit issues affected the scores in two example fisheries). The unit of analysis problem affects how to operationalize the indicators. For example the census-level data that the Jepson group relies on may be much broader than the scale appropriate to the fishery [A5]. In some fisheries, information is so scarce that a single site's information may be applied to a fishery that spans a whole country and many thousands of fishers and processing workers. Personal biases of key informants can also come into play in the Anderson group's approach [A2], because it is unclear whether site-, region-, or country-level data has been used to arrive at a score. At this point, the efforts listed in Table A.1 are seeking to create, uncover, re-purpose, and productively use whatever data sources they can afford. As work in this field progresses we can expect to revisit and redefine the boundaries of evidence.[1]

C. Measuring social performance vs. other social science-based approaches to fisheries. Studying the social wellbeing of a fishery or a community in general, or studying a fishery for specific social and environmental policy reasons, is different from assessing performance. We are getting a "snapshot" of a fishery in basic terms of human wellbeing, so that seafood supply chains can start to ask how to do better and find ways to achieve specific goals toward that end. We emphasize this basic point because there is growing interest in the social dimensions of healthy fisheries, and many ways to approach it – each serves a different purpose and speaks to specific audiences and needs. They are not mutually exclusive and can be seen as complementary. In Table A.1, for instance, we see that FAO fills a need for general, holistic discussion of human rights and ethical guidelines in fisheries [A4], and Jepson's group came up with a way for US decision makers to consider Social Impact Assessments that incorporate social values in modeling impact of fishery policy alternatives [A5].

These approaches also vary in how they treat the question of wider context and exogenous factors that affect social wellbeing in fisheries. In the Pollnac [A6] and Jepson group [A5] approaches, the underlying model appears to be such that many key drivers of changes in wellbeing, as well as fishery sustainability more generally, are contextual or external factors that affect fishery management, which in turn affect fishing and social wellbeing. Recent work by the Anderson group provides additional insight into "enabling conditions" and how management regimes interact with exogenous resource and community factors to affect whether and specifically to whom benefits accrue [A2]. Our proposed performance indicators ask retailers, processors, fishing organizations, and others in the supply chain, "What can you do to improve performance?" and leave many complexities of context to one side, until deeper research can be done to adequately answer questions about the causal mechanisms behind social performance in a fishery. We include certain measures, such as education and healthcare, that can be viewed either as external factors affecting socioeconomic aspects of a fishery, or as social attributes perpetuated within the fishery and the supply chain, or both – these are empirical questions. Some might argue that certain fundamentals in human wellbeing, such as education and healthcare in fishery communities, are beyond the scope of what the seafood supply chain can or should endeavor to fix; i.e., the supply chain might not have control over the percentage of primary and secondary school age children that are out of school. Yet, it matters greatly whether fisheries are operating in places where children are not attending school, as it signals that other inequalities may be present. Indeed, it can be argued that pressure by the seafood industry to improve education and healthcare in fishery communities underserved by their governments and/or with inadequate political representation may be excellent leverage to create change.

Finally, Pollnac defined wellbeing as "the degree to which an individual family, or larger social grouping (e.g., community) can be characterized as being healthy (sound and functional), happy, and

[1] SFP has been working on their FishSource database to be able to accept different units of analysis.

prosperous" [A6]. We use a more general approach to wellbeing, as having three main aspects (security, flexibility, and viability).

Appendix A References

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A4. Food and Agriculture Organization of the United Nations (FAO). 2015. Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication.

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A6. Pollnac, R.B., S. Abbott- Jamieson, C. Smith, L.M. Miller, and P.O. Clay. 2006. Toward a Model for Fisheries Social Impact Assessment. *Marine Fisheries Review*, 68(1–4).

Appendix B. Economic performance indicators, a quick overview

As for the social dimension, there has been an increasing interest in developing indicators for economic performance. Following are some relevant initiatives that were considered during development of SFP's proposed economic performance indicators:

A. FAO SDRS

At the end of the 1990s, the FAO Fishery Resources Division developed some guidelines[1] for the definition of "Indicators for sustainable development of marine capture fisheries." The approach developed by the FAO led to the definition of a limited set of indicators, with only 9 economic indicators. The method was meant to be applied to all kinds of fisheries: developed/developing countries, artisanal/industrial fisheries. This work was the FAO contribution to the first international discussion on sustainable indicators. Other important contributions were published notably by the Australian administration (the Australian ESD framework[2]) or the OECD.[3]

B. INDECO project

INDECO was an EU funded research project, with the aim of developing a set of indicators which would support the environmental integration within the Common Fisheries Policy but also contribute to the international work on indicators developed at the beginning of the 2000s.[4] The INDECO project aimed to lead to the identification of 'robust and operational indicators describing the links between fisheries and environment, applicable across a large range of ecosystems and fishing zones'. This project integrated other methods developed during the same period, notably the Australian ESD framework (ESD for Ecologically Sustainable Development). While developed with a European perspective, this method was designed to suit all kind of fisheries systems.

INDECO target was to identify quantitative indicators for the impact of fishing on the ecosystem state, functioning and dynamics, as well as indicators for socioeconomic factors and for the effectiveness of different management measures. The economic dimension of the INDECO method is composed by 19 quantitative indicators.

C. ECOFISHMAN project

ECOFISHMAN is another EU-funded research project focusing on the "Ecosystem-based Responsive Fisheries Management in Europe."[5] Developed several years after the INDECO project, the ECOFISHMAN approach led to the development of indicators aiming at assessing the success of fisheries policies, notably the implementation of results-based management systems (RBM).

The selection process developed by the ECOFISHMAN team relied on the screening of a large pool of indicators found in the literature. This screening consisted in scoring each potential indicator against 9 attributes (Measurement, Public awareness, Historical data, Concreteness, Theoretical Basis, Specificity, Sensitivity, Responsiveness, Cost) following the approach developed by Lutchman and

[1] FAO Technical Guidelines for Responsible Fisheries. No. 8. Rome, FAO. 1999. 68pp.

[2] Chesson, J., and H. Clayton (1998), A Framework for Assessing Fisheries with Respect to Ecologically Sustainable Development," Bureau of Rural Sciences, Canberra.

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[4] Lutchman, I., M.J. Rochet, M. Tasker, and J. Brown (2006), "Final Analysis and Evaluation of the INDECO Indicators." INDECO Project Deliverable Numbers 23 and 24.

[5] See, notably, EcoFishMan Deliverable D2.1 "Guidelines for indicator use, importance criteria and weighing" (2012) and D2.2 "Recommendations for new potential indicators" (2013).

Rochet.[6] The resulting economic dimension of the ECOFISHMAN method is described by 24 quantitative indicators.

D. Fishery Performance Indicators

The Fishery Performance Indicators (FPI) method developed by James Anderson et al. is based on 68 metrics that can be scored using key informants and do not rely on first-hand data collection or existing publications. The economic dimension of the FPI method is composed of 29 indicators. This method may however be quite complex when applied at a global scale: the need to rely on local experts may be too time-consuming and costly for SFP needs.

E. EU Data Collection Framework

The EU Data Collection Framework (DCF) is a systematic data collection program developed at the EU level, aiming at gathering data to inform policy makers. It is the second iteration of data collection after the DCR (Data Collection Regulation, from 2000 to 2008). The third iteration, DCMAP, is due to be implemented soon.

Each year, all EU Member States have to provide updates to several databases to the Joint Research Center (JRC), notably about the economic performance of fleets, but also about transversal data (effort and gear use) and catch levels. A specific Scientific, Technical and Economic Committee for Fisheries (STECF) expert group produces the annual economic report (AER) based on this data, presenting the latest available information on economic performance. The AER has incorporated several synthetic indicators, which were also combined with the pool of indicators that were explored during the preliminary phase of this work.

[6] Rice, J.C., and M.J. Rochet (2005), "A framework for selecting a suite of indicators for fisheries management." ICES Journal of Marine Science 62:516–527.

Appendix C. Potential data sources and ease of obtaining data for social indicators

We investigated the availability of evidence for the social indicators in five fisheries (blue swimming crab in Indonesia; Baltic cod; Brazilian lobster; Chilean southern hake; Mexican grouper) to evaluate the ease of obtaining data using desk-based research alone (see Table C.1).

All indicators were categorized on a scale of A) easy to obtain; B) average effort required to obtain; C) difficult to obtain; D) not obtainable by desk-based research.

Table C.1. Potential data sources for scoring social indicators and ease of obtaining data

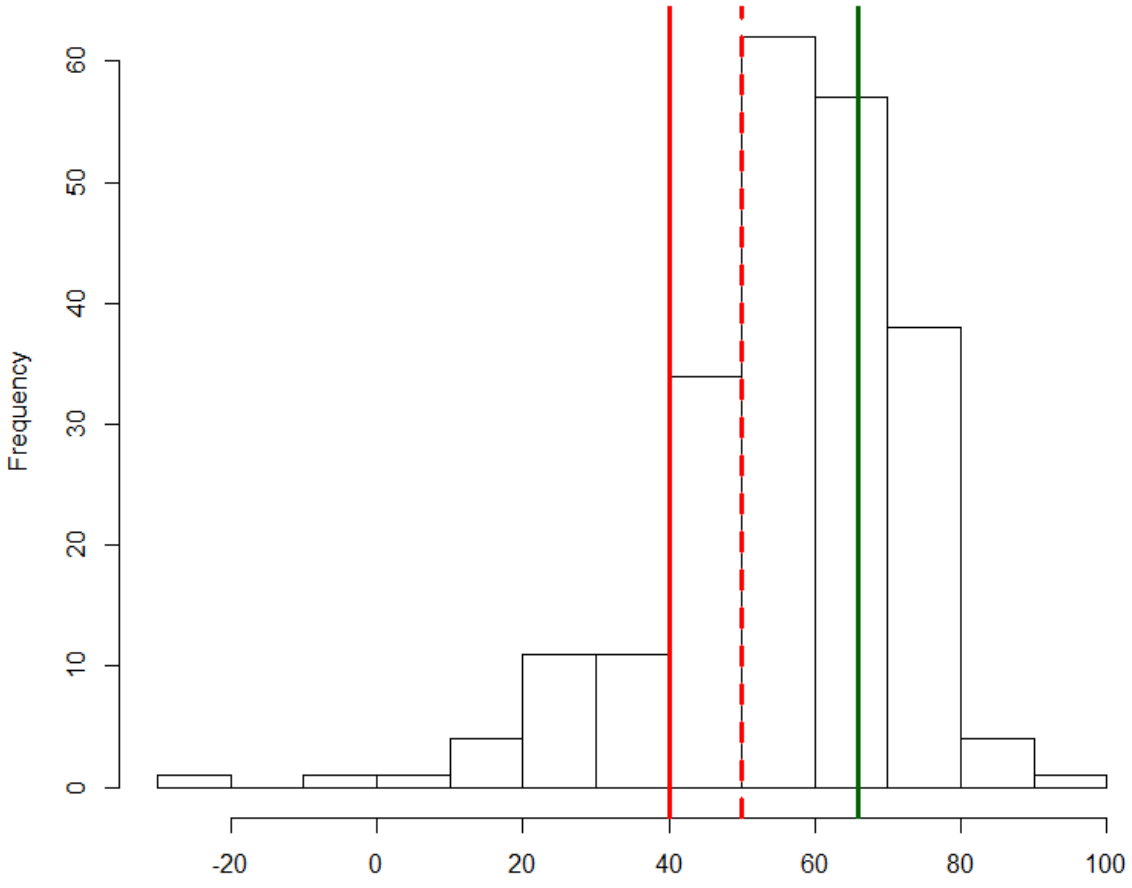
Dimension		Score	Data sources
1.	Earnings are fair and stable	A	Wageindicator.org contains minimum wages for countries. Salaries for the fishing sector are available (http://www.wageindicator.org /main/salary/minimum-wage). The website does not capture local variation for primary producers within a country or variation between fisheries. For countries within the European Union, the Eurostat website (http://ec.europa.eu/eurostat) is also a good source.
2.	Jobs stay local	C	No common data source for the fisheries. Generally, the data was difficult to obtain with exceptions in fisheries that had in-depth reports on trade dynamics. If no reports of non-local employment are available, assumptions may need to be made (people don't typically report if they have a local fleet, only if they have a non-local fleet).
3.	Workers are protected	B/C	Wageindicator.org provides the types of legal provisions available for the right to strike and freedom of collective bargaining (http://www.wageindicator.org/main/labour-laws). In some cases, insufficient data is available and other sources could be provided as supplementary information. For fisheries-level information on worker protection, no common data source for the fisheries. Most organized fisheries associations have their own websites that are easy to obtain. If there is an associated fishery improvement project, these data likely can be obtained from the FIP Directory (http://fisheryimprovementprojects.org/).
4.	Fishery will be socially viable for future generations	C/D	No common data source for the fisheries; local reports are needed. Data on European and US fisheries are easier to obtain. Useful sources are, for example, national statistics over employment; FAO country profiles (http://www.fao.org/countryprofiles/en/). Also see industries', governments', and fishermen's associations' websites for information on training.
5.	Fishers have economic flexibility	C/D	No common data source for the fisheries; however, collecting demographic data is usually the first step taken in any social assessment of fisheries.
6.	Communities have improving healthcare	A	Data can be found by the Demographic Health and Survey (DHS) Program's Spatial Data Repository, which provides spatially explicit health and demographic data (http://dhsprogram.com/data/).
7.	Communities have improving education	A	Millennium Development Goal Data: http://mdgs.un.org/unsd/mdg/Data.aspx Also, UNESCO eAtlas of Out-of-School Children (http://tellmaps.com/uis/oosc/) data is currently available at the country level. Use regional data if available.

Appendix D. Determining 'significant improvement' for under-five mortality

In order to define 'significant improvement' for Social Indicator 6 (Communities have improving healthcare), we analyzed global changes in the under-five mortality rate using data developed by the UN Inter-Agency Group for Child Mortality Estimation. National-level estimates from 1990 and 2015 were compared and the percentage change in the under-five mortality rate was calculated.

A histogram showing the distribution of the percentage change in under-five mortality was then used to inform our definition of 'significant improvement' for the healthcare indicator (See Figure D.1). Subsequently, a cut-off of a 50% reduction in the under-five mortality rate was determined to be a suitable sub-indicator of significant improvement in healthcare.

Figure D.1 Histogram showing the distribution of percentage-change data for the under-five mortality rate from 1990 to 2015



Appendix E. Application of the prototype methodology to three test fisheries

Table E.1. Assessment of economic performance in the test fisheries, with scoring and rationale

Economic dimension	Suggested Measures	Blue Swimming Crab Fishery[1]	Score	West Baltic Cod Fishery[2]	Score	Sinaloa Shrimp Fishery[3]	Score
1. There is some economic value retained by the fishery	GVA/Income	Gross value added/ turnover = 51%	≥6	Gross value added/ turnover = 36%	<6	Gross value added/ turnover = 31%	<6
2. The fishery is profitable	Operating profit margin	Operating profit margin = 13%	≥6	Operating profit margin = 9%	<6	Operating profit margin = 19%	≥6
3. The vessels are resource efficient	Economic fuel efficiency	Economic fuel efficiency = 29%	<6	Economic fuel efficiency = 18%	=6	Economic fuel efficiency = 37%	<6

[1] Scored using evidence from Sustainable Fisheries Partnership, unpublished dataset

[2] Scored using evidence from https://stecf.jrc.ec.europa.eu/documents/43805/1034590/2015_STECF+15-07+-+EU+Fleet+Economic+data+tables.zip

[3] Scored using evidence from http://www.fira.gob.mx/InfEspDtoXML/abrirArchivo.jsp?abreArc=3673

Table E.2. Assessment of social performance in the test fisheries, with scoring and rationale

Wellbeing dimension	Suggested Measures & Score Ranges	Blue Swimming Crab Fishery	Score	West Baltic Cod Fishery	Score	Sinaloa Shrimp Fishery	Score
1. Earnings are fair and stable	Harvesting wages are higher than the standard (national minimum wage).	Yes: >10% national average.[4]	≥ 6	No: Harvesters earn 34% below national average.[5]	<6	Yes: Certified under the Fair Trade seafood, indicating that wages are fair.[6]	≥8
	Primary processing sector wages are higher than the standard.	No: They are less than average daily wage in region.[7]		No: Outsourced to cheaper labor markets abroad.[8]		Yes: Certified under the Fair Trade seafood, indicating that wages are fair.[9]	

[4] Chu J, Anderson JL, Anderson CM. Evaluation of new fishery performance indicators (FPs): A Case Study of the Blue Swimming Crab Fisheries in Indonesia and Philippines. Agriculture and rural development discussion paper 52; 2012. http://siteresources.worldbank.org/INTARD/825826-1111129171182/23192329/ARD_DP12_BlueCrab_web_final.pdf

[5] Anderson J, Carvalho N. The 2013 Annual Economic Report on the EU Fishing Fleet (STECF 13-15). 2013. http://stecf.jrc.ec.europa.eu/documents/43805/581354/2013-09_STECF+13-15+-+AER+EU+Fleet+2013_JRC84745.pdf; Wageindicator.org http://www.wageindicator.org/main/salary/minimum-wage/denmark

[6] Sustainable Fisheries Partnership, 2016, 'SFP helps Mexican shrimp fishery achieve Fair Trade certification': https://www.sustainablefish.org/news/articles/2016/02/24/sfp-helps-mexican-shrimp-fishery-achieve-fair-trade-certification

[7] Chu J, Anderson JL, Anderson CM., 2012.

[8] Espersen: http://www.espersen.com/jobs-career/company-culture-diversity & Pers.Comms.

[9] Del Pacifico SeaFoods, 2015, Gulf of California Sinaloa Artisanal Shrimp Fishery Improvement Project: http://www.delpacificoseafoods.com/suripera-shrimp-fip.php

2. Jobs benefit the communities	Harvesting workforce comprises >75% local people.	No: 36–70% local harvesting crew.[10]	≥ 6	Yes: National fishing companies own fishing quotas. Strong labor organizations/difficult to have unregulated workers.[11]	≥ 6	Yes: There is no evidence to suggest that migrant workers form a significant portion of the harvesting workforce.	≥8
	Primary processing workforce comprises >75% local people.	Yes: 96–100% local processing workers.[12]		No: Processing sent to other countries.[13]		Yes: There is no evidence to suggest that migrant workers form a significant portion of the processing workforce.	
3. Workers are protected	National level protection: multiple national-level protections for right to strike.	No: Only provisions in the labor code, not in trade union/collective action.[14]	<6	Yes: Insufficient data on wage.indicator.org but public strikes suggest strikes allowed.[15]	≥8	Yes: Mexican law provides for the right of workers to form and join unions, to bargain collectively, and to strike in both the public and private sectors.[16]	≥8
						Yes:	

[10] Chu J, Anderson JL, Anderson CM., 2012.

[11] TAC: http://ec.europa.eu/fisheries/cfp/fishing_rules/tacs/index_en.htm Labor organization: The Danish Fisherman's Association: http://fiskeriforening.dk/english/
Labor law: http://wageindicator-labour-law.silk.co/page/Denmark

[12] Chu J, Anderson JL, Anderson CM., 2012.

[13] Espersen: http://www.espersen.com/jobs-career/company-culture-diversity and pers.comms.

[14] Wageindicator Labour Law: http://wageindicator-labour-law.silk.co/page/Indonesia

[15] Wageindicator.org: http://www.wageindicator.org/main/salary/minimum-wage/denmark, Wageindicator Labour Law: http://wageindicator-labour-law.silk.co/page/Denmark

[16] US Department of State, 2016, Country Reports on Human Rights Practices for 2015: http://www.state.gov/j/drl/rls/hrrpt/humanrightsreport/index.htm#section7afreedom

	National Level Protection.	No: Only in the labor code.[18]		Yes: Insufficient data on wageindicator.org but salaries are collectively bargained for 80% of workforce.[19]		Mexican law provides for the right of workers to form and join unions, to bargain collectively, and to strike in both the public and private sectors.[17]	
	Structure is in place to address worker grievances at local level or Supply chain uses labor contracts and the terms are transparent/public.	No: No evidence of fisheries associations to address grievances & mainly informal contracts.[20]		Yes: National fisherman's association to address grievances, as well as strong labor protections.[21]		Yes: Del Pacifico established a direct relationship with workers in 2015 to ensure all workers involved in processing benefit from labor laws and freedom of association. Furthermore, an official statement on freedom of association was presented in 2015.[22]	
4. Fishery will be viable for future generations	Harvesters from a range of age classes are represented.	Yes: Harvesters from a wide range of ages in the fishery. All working ages are well represented.[23]	<6	Yes: Ages 15[24]–75 are represented. Average age for fishers is 47. 3.[25]	≥6	No: Evidence regarding the age classes of harvesters is not readily available.	DD

[18] Wageindicator Labour Law.

[19] Wageindicator.org: http://www.wageindicator.org/main/salary/minimum-wage/denmark, Wageindicator Labour Law: http://wageindicator-labour-law.silk.co/page/Denmark

[17] US Department of State, 2016.

[20] De Alessi M, Warmbrunn A. A white paper rapid assessment: markets, moneylenders, pathways to reform in blue swimming crab fishing communities of the Tiworo Strait, SE Sulawesi. 2014. (PDF) FIP website: http://www.apri.or.id/fip/

[21] National fisherman's association: http://fiskeriforening.dk/om-danmarks-fiskeriforening/organisation/politisk-organisation/, Wageindicator Labour Law: http://wageindicator-labour-law.silk.co/page/Denmark

[22] SCS Global Services, 2014, Reporte de Inconformidades y Formulario para el Plan de Acción Correctiva (NCR-CAP): http://www.delpacificoseafoods.com/gulfofcalifornia/reporte-fair-trade.pdf

[23] Chu J, Anderson JL, Anderson CM., 2012.

[24] In this country, fifteen years of age is the legal minimum for full time employment.

	New fishers are being recruited into the fishery.	No: No evidence of new fishery recruits.[26]		Yes: Active recruitment of new members.[27]		No: No evidence of new fishery recruits.	
	Women are increasingly taking leadership roles in the supply chain and fishing communities.	No: No evidence of women in leadership.[28]		No: No women on management team of large processor or in the board of fishermen's union.[29]		Yes: Evidence that women are taking a more important role in fishing communities.[30]	
5. Harvesters have economic flexibility	Harvesters are free to sell to whomever they wish without retribution.	No: Evidence that fishers are not free to sell to whomever they choose.[31]	<6	Yes: No evidence to suggest that fishers are not free to sell to whomever they choose.[32]	≥8	Yes: Del Pacifico no longer oblige fishers to exclusively deliver to the buyer the total catch. Once the supplier has fulfilled its agreement, exclusivity disappears and cooperatives and registered producers are free to sell their product to anyone they consider more convenient.[33]	≥8

[25] The Danish AgriFish Agency: http://webfd.fd.dk/stat/Faste%20tabeller/Beskaeftigelse/alderp_eng3.html

[26] FIP website: http://www.apri.or.id/fip/

[27] The Fisheries Circle: http://www.fishermannow.com/become+a+fisherman/fisherman

[28] Processor association: http://www.apri.or.id/apri-board/

[29] Espersen: http://www.espersen.com/espersen/management; National fisherman's association: http://fiskeriforening.dk/om-danmarks-fiskeriforening/organisation/hovedbestyrelse/; The Danish AgriFish Agency: http://webfd.fd.dk/stat/Faste%20tabeller/Beskaeftigelse/koenp_eng3.html

[30] Phys Org, 2014, 'ASU scientist finds women shaping Mexico's shrimp industry': http://phys.org/news/2014-03-asu-scientist-women-mexico-shrimp.html

[31] Chu J, Anderson JL, Anderson CM., 2012.

[32] Fishsource.com: https://www.sustainablefish.org/fisheries-improvement/whitefish/baltic-sea-cod/eastern-baltic-cod; FIP info from SFP website: https://www.sustainablefish.org/fisheries-improvement/whitefish/baltic-sea-cod/eastern-baltic-cod

[33] SCS Global Services, 2014; Center on Globalization, Governance & Competitiveness Duke University, 2010, A Value Chain Analysis of the Sinaloa, Mexico Shrimp Fishery: http://www.cggc.duke.edu/environment/CGGC_SinaloaShrimp_Report.pdf

	Harvesters can access loans from at least two types of lenders at interest rates not exceeding the government rate.	No: They have loans from middlemen.[34]		Yes: Loans from government and banks.[35]		Yes: Evidence of financial assistance from multiple sources: FIRA-FOPESCA, a second-tier development bank, provides credit to the fishing sector. In addition, some fisher federations (formed of multiple fisher cooperatives) provide financial assistance to cooperative members.[36]	
	Formalized training is provided to harvesters in how to add value to their landings.	No: There is no evidence of value-added programs.[37]		Yes: There is formalized training. Two years' basic education to become a fisherman as well as further education in fishing techniques, radio communications and economy. All crew members are required to take a security course.[38]		Yes: The support program PROPESCA provides training to improve the sector's productivity. The government-run program, FIRA-FOPESCA, also provides training to the fishing sector.[39]	

[34] Chu J, Anderson JL, Anderson CM., 2012.

[35] Comments on the Green Paper for EU's common Fisheries Policy: http://ec.europa.eu/fisheries/reform/docs/thorupstrand_en.pdf

[36] Governance & Competitiveness Duke University, 2010.

[37] FIP website: http://www.apri.or.id/fip/

[38] The Fisheries Circle: http://www.fishermannow.com/become+a+fisherman/fisherman

[39] SCS Global Services, 2014; Governance & Competitiveness Duke University, 2010.

6. Communities have improving healthcare	Made significant improvement in under-five mortality rate (reduced by 66% between 1990 and 2015) or meets global standard (set at 10 deaths per 1000 births).	Yes: The national under-five mortality rate does not meet the global standard of ten deaths per 1,000 births. However, it declined significantly by 67.9% from 84.7 deaths per 1,000 live births in 1990 to 27.2 deaths per 1,000 live births in 2015.[40]	>8	Yes: The national under-five mortality rate meets the global standard. According to data provided by the World Bank for Sweden, the national under-five mortality rate decreased by 56.5% from 6.9 deaths per 1,000 live births in 1990 to 3 deaths per 1,000 live births in 2015.[41]	>8	Yes: DHS Survey (1987) indicates 61% chance of dying before five per 1,000 live births in Mexico. Mexico does not meet the global standard for the under-five mortality rate of 10 deaths per 1,000 live births. World Bank data indicates 1.3% chance of mortality in under-5s (per 1000) for 2015. But, the national under-five mortality rate improved by nearly 72% from 46.6 per 1,000 live births in 1990 to 13.2 per 1,000 live births in 2015.[42]	>8
	Made improvements in under-five mortality rate (reduced by 65% between 1990 and 2015).						
	Made improvements in under-five mortality rate (reduced by 49% between 1990 and 2015).						

[40] World Bank, 2016: http://data.worldbank.org/indicator/SH.DYN.MORT

[41] World Bank, 2016: http://data.worldbank.org/indicator/SH.DYN.MORT

[42] Demographic and Health Surveys. Spatial Data Repository for the Demographic and Health Surveys (DHS) Program http://spatialdata.dhsprogram.com/home/ , http://beta.statcompiler.com/; World Bank, 2016: http://data.worldbank.org/indicator/SH.DYN.MORT

7. Communities have improving education	Less than 10% of primary and secondary school age children are out of school.	Yes.[43]	>8	Yes.[44]	>6	Yes.[45]	>8
	The literacy rate among youth aged 15-24 is 90% or more, or there has been significant improvement (8% or more between 1990 and 2015).	Yes: The national youth literacy rate is 98.98% for 2015.[46]		DD: Literacy rate data is not available for Sweden.		Yes: The national youth literacy rate is 98.74% for 2015.[47]	

[43] UN Millennium Development Goals: http://mdgs.un.org/unsd/mdg/Data.aspx

[44] UN Millennium Development Goals: http://mdgs.un.org/unsd/mdg/Data.aspx

[45] UNESCO Institute for Statistics, 2016, UNESCO eAtlas of Out-of-School Children: http://www.uis.unesco.org/data/atlas-out-of-school-children/en

[46] UNESCO Institute for Statistics, 2016, Education: *Literacy rate*: http://data.uis.unesco.org/Index.aspx?queryid=166#

[47] UNESCO Institute for Statistics, 2016, Education: *Literacy rate*: http://data.uis.unesco.org/Index.aspx?queryid=166#

Appendix F. Applying a measure of uncertainty to the evidence used in FishSource

When assessing fisheries indicators (environmental, social, and economic), the availability of evidence, or lack thereof, can affect how the fishery is scored. For some fisheries, the analyst may be forced to use data that is: not to the fishery level, out of date, or not from a credible source. Where this is the case, the score assigned to the fishery may not accurately reflect the circumstance of the fishery.

As such, we propose to introduce a complementary measure of data uncertainty to FishSource. The measure is not a comprehensive system for assessing data uncertainty, but rather a simple framework that may be applied under the analyst's expert judgment, as defined by a combination of the following three criteria:

1. Credibility

The credibility of data comprises the trustworthiness of the data and the expertise of the data provider. Although both factors will vary on a case-by-case basis, some general assumptions about data sources can be applied. For example, official government statistics can be deemed more credible than (>) NGO reporting, which can be deemed more credible than (>) media sources.

2. Scale of data

In order to accurately assess the performance of a fishery, data at the exact scale of the unit (fishery) under assessment is preferred by SFP. However, in some fisheries there are unlikely to be publicly available data to this level. Fishery-level data can be deemed more certain than (>) regional data, which can be deemed more certain than (>) national, aggregated, or wider-scale information.

3. Age of data

We recognize that data showing the current situation of a fishery provides for the most accurate assessment, however for some fisheries the most recently available data may be several years old. Therefore, we recognize that the newest evidence is better/more certain than (>) data that is several years old.

We have developed some simple guideposts for the analyst to use when assessing a fishery:

Reliability	Scale	Age of data
High (government report): >=8	Optimal (fishery level): >=8	Good (<= 2 years): >=8
Medium (NGO report): >=6	Medium (regional level): >=6	Medium (5 to 2 years old): >=6
Low (media piece): <6	Low (national level or broader): <6	Low (more than 5 years old): <6

By combining the three criteria, an uncertainty status may be applied to the indicator score:

- LOW uncertainty
  - Status of the criteria of uncertainty are ALL >=8.
- MEDIUM uncertainty
  - Status of the criteria of uncertainty are a mix of >=6 and >=8 [e.g., scale is optimal, data is new, but the evidence is provided by an NGO report].
- HIGH uncertainty
  - At least one criteria of uncertainty are <6.