Determining the degree of 'small-scaleness' using fisheries in British Columbia as an example

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ABSTRACT

Small-scale fisheries have been estimated to contribute up to 30% of the global landed value, which is caught by approximately 22 million fishers, some of which can be attributed to developed countries. Socio-economic analysis of small-scale fisheries often focuses on developing countries and fails to recognize the presence and contribution of small-scale fisheries in the developed world. Fisheries in British Columbia are diverse and often regarded as being industrialized and large-scale when analyzed in a global context. This study aims to demonstrate that features of small-scale fisheries are present within British Columbia's fleets. A list of re-occurring features of small-scale fisheries is curated from the literature to capture physical, economic and social features of small-scale fisheries. These commonly identified features of small-scale fisheries are applied to Aboriginal Food, Social and Ceremonial fisheries and all commercial fisheries in British Columbia are analyzed to determine the presence or absence of each small-scale fishery feature. The results of this research create a gradient of fisheries from smallest to largest scale. This approach determines that Aboriginal Food, Social and Ceremonial fisheries are the most small-scale, while the sablefish fishery is the largest scale. The qualitative nature of this framework creates an opportunity for any group of fisheries in the world to be compared.

1. Introduction

In the 1980s, small-scale fisheries (SSF) began appearing in the academic literature. A table presented in Thomson [59] was one of the first examples of comparing small- and large-scale fisheries side by side to demonstrate the contribution of SSF relative to LSF. This first effort to compare large-scale fisheries (LSF) versus SSF was followed with updated and slightly different comparisons by Sumaila et al. [52], Berkes et al. [8], and Jacquet and Pauly [33]. On a global scale, these fisheries employ between 44% fishers in the primary sector, 90% of both fishers and fish workers, and generate 30% of the landed value [23,51,56,58]. SSF make an important contribution to fisheries worldwide, but what and whom they are comprised of is very different from nation to nation. Typically 'small' invokes images of raft or canoe style boats with no motor. In many cases SSF are defined as vessels without a motor [39]. To date, most of the SSF research has taken place where 'smallness' is obvious and you can know a SSF just by looking at it [13,2,21,5].

SSF fisheries represent important employment opportunities for many around the world. However, in many cases, they are not clearly defined. There is currently no universally accepted definition of SSF, however, many features are associated with SSF and existing approaches from the literature that can be used to define SSF. While some attributes are explicitly mentioned in the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries [23], there is no strict definition of SSF, highlighting a gap in small-scale fisheries research. It is extremely difficult to participate in productive discussion about a group without explicitly explaining characters or parameters of the group. There has also been a great deal of research by Too Big To Ignore, which is a global partnership of researchers who focus on issues related to SSF.[1] Again, there is no broadly applied definition of SSF used throughout their organization.

Some argue that attempts to define SSF may delay work to assist in management of SSF and stress the need to use an imprecise definition for SSF [1,26]. Much of the work carried out by those in support of an imprecise definition focus on fisheries in developing nations where imprecise definitions may be useful in improving management [2,47,6]. Others argue that in order to improve fisheries governance, boundaries of SSF should be more conclusively described by values of social justice and ecological sustainability [35].

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[1] Too Big To Ignore 'http://toobigtoignore.net' (Accessed January 2015).

A common feature is that small-scale fishers often lack capacity to lobby their interests to government members [26]. However, the stock of SSF is rising as demonstrated by the recent launching of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries [23]. The FAO is taking the initiative to recognize SSF as a stand-alone entity and stress the ability of SSF to contribute to food security through the Code of Conduct for Responsible Fisheries [22] and the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries [23]. The guidelines specify fisheries, for which the fishers are self-employed, keep a portion of the catch for personal/community consumption and are also important in that they are rooted in culture and local traditions [23].

In British Columbia (BC), fish presently support commercial, Food Social and Ceremonial (FSC) needs and recreational fisheries along the coast. The Department of Fisheries and Oceans (DFO) is responsible for the management of Canada's Oceans and does so through a series of acts and policy initiatives. When considered on a global scale, BC's commercial fishery is relatively new and the industry experienced periods of both massive growth and reduction throughout the twentieth century. There has been a large decrease in the number of smaller active vessels in the last thirty years.[2] The less than 35 ft. (10.6 m) and 35–45 ft. (10.6–13.7 m) vessel length categories were reduced by 68% and 60%, respectively, between 1985 and 2013[3]. Targeted capacity reduction schemes like the Davis and Mifflin Plans of 1968 and 1996, respectively, had larger overarching impacts on the entire structure of the BC fleet [14,27,31,9].

The apparent fleet reduction in the last thirty years can further be attributed to the onset of Individual Transferable Quota (ITQ) management schemes in many fisheries beginning with Geoduck in 1989 [19]. This was soon followed by ITQs being introduced to the sablefish (1990), halibut (1991), sea urchin (1994), sea cucumber (1995), groundfish trawl (1997), some salmon troll (2003) and groundfish longline (2006) fisheries in the last 30 years [19]. It is generally accepted that ITQs are introduced to enhance economic performance of a fishery and this often results in the reduction of participants/vessels [11,12,50,54]. The heavy reduction of vessel numbers, especially of the smaller vessels demonstrates the need to understand SSF in BC. The prevention of further reductions in numbers of small relative to large vessels may allow some of the benefits of SSF identified in this study to be realised. This is important because our study is suggesting that some of the most commonly identified features of SSF in developing nations are present within every target fishery of the British Columbian fleet.

2. Method

There are a large number of definitions or features of SSF found in the literature (Table 1). These features can be grouped into three broad categories, i.e., physical vessel, economic and social features (Table 1). Physical features include descriptors of vessels, which are the most commonly used features to distinguish between SSF and LSF [39,40,54]. This is because it is quite easy to acquire vessel data and it's easier for people to work with features that they can see. For example, it's relatively easy to know how many vessels are in a fleet and how many have a motor and how many do not by looking at the vessels. The physical features of vessels have important implications on the environment. A larger vessel often requires a larger engine and more fuel, contributing to the carbon footprint of fishing. Some gears such as trawlers are associated with habitat degradation and relatively high amounts of by-catch [4,30,36,46,48,60]. The damage of a trawl fleet was evident in BC's groundfish trawl fleet, which caught 322 t of cold-water coral and sponge by-catch from 1996 to 2004 [3].

Economic features are a slightly less tangible way of distinguishing between SSF and LSF; however, these features can describe fisheries in

Table 1
List of common SSF features.

Number	Feature	Source
Vessel features		
1	Vessel under 12 m (39.3 ft.)	[39,40,54]
2	Non-motorized vessel	[54]
3	Passive gear	[29]
4	Multi-gear	[57,29]
5	Multi-species	[57,29]
6	Dated or low levels of technology, labour intensive[a]	[25,49]
7	Inshore, limited range to fish, fishing pressure adjacent to community	[20,43,35,29]
Economic features		
8	Low fuel consumption (under $10,000)	[29]
9	Relatively little capital and energy input (Under $250,000)	[7,35,29]
10	Relatively low yield and income	[7,35,29]
11	Part-time, seasonal, multi-occupational	[35]
12	Sold in local markets	[10]
13	Sustain local or regional economies	[55]
14	Individual or community ownership	[35]
Social features		
15	Fish for food and community use	[25,35]
16	Support social and cultural values	[49,55]
17	Regulated through customary rules with some government involvement	[35]

[a] Labour Intensity is used in qualitative terms and is not a quantitative measure of labour in proportion to capital required for fishing.

monetary terms, which people find relatable. For example, all else being equal, if a fishery can employ more people than another, people will likely want to participate and the government may have an incentive to invest in it. Other features may include costs, revenues, markets and ownership (Table 1). Including economic features in the analysis of SSF and LSF could provide a powerful bargaining tool for policy decisions, as it is stated in DFO's Mission, Vision and Values[3] to support economically prosperous marine sectors, which would include commercial fisheries.

Social features of a fishery are the least tangible features for determining SSF and LSF, and therefore are not often analyzed or used in practice for management. These features include how fish is consumed in non-traditional markets as well as how cultural values attached to fish can be used in management processes (Table 1). All of these features are commonly used in the literature to describe SSF in developing countries. These features should not be limited to being applied only in these countries [13,2,5,6].

2.1. Application to British Columbian fisheries

Fisheries in BC are explored using the features of SSF commonly found in the literature (Table 1). This framework is used to establish where SSF attributes are present within the BC fleet. A feature is considered present even if it does not exist within the entire fleet. For example, many boats in the fleet may be less than 12 m (39 ft.) but there may also be vessels that are greater in length. Once these features have been identified, the fisheries can be compared on a relative spectrum of most small-scale to most large-scale based on the number of identified SSF attributes. It should be noted that the importance of these individual features is being equally weighted in this analysis. However, some of these features hold greater importance to SSF than others. Using this framework, the fisheries in BC can be considered on a relative qualitative scale of most likely to be SSF and most likely to be LSF. One can use a scale of 0–17, where 0 is a fishery with not a single SSF feature and 17 is a fishery with the maximum number of features of

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