INFORMATION NOTE, SEPTEMBER 2017

Shared Stocks and Fisheries Subsidies Disciplines: Definitions, Catches, and Revenues

U. RASHID SUMAILA

ICTSD.ORG

This information note sets out how the distinction between shared and non-shared fish stocks has been drawn in the academic literature and what the potential implications are of such distinctions within the context of subsidy disciplines and multilateral fisheries subsidies negotiations at the World Trade Organization.

1. Introduction

The concept of shared versus exclusively "national" fish stocks has been a central question of fisheries governance for several decades and has recently appeared in negotiations at the World Trade Organization (WTO) over subsidies to the fishing industry. During these negotiations, Members have raised the question of identifying shared fish stocks several ways. In the context of discussions regarding the establishment of prohibitions on subsidies; for example, New Zealand, Iceland, and Pakistan offered a proposal prohibiting subsidies to all fishing in areas beyond the subsidising government's national jurisdiction. Alternatively, in the context of establishing a prohibition of subsidies on overfished stocks, a group of Latin American countries proposed that the determination of the status of overfished stocks should be made with the cooperation of the states involved in the fishery. Several proposals (including those by the ACP and LDC groups, and a group of Latin American countries) suggest that some prohibitions should not apply to subsidies provided to fishing within developing country Members' Exclusive Economic Zones (EEZs)--which could cover shared or non-shared stocks--and for fishing of quota established under Regional Fisheries Management Organizations (RFMOs)--which, by definition, govern stocks that spend at least some time on the high seas and are therefore "shared."

This note aims to contribute to this ongoing debate by setting out how the distinction between shared and non-shared stocks has been drawn in the academic literature and what the potential implications are of such distinctions within the context of subsidy disciplines. The specific objectives of this information note are as follows: i) to explain succinctly how shared fish stocks are identified in technical literature, international instruments (including UNCLOS), and the author's own recent work; ii) using the author's own method of identifying shared stocks, to explain the share of fisheries catch that is caught in shared fisheries and the landed value of this catch; and iii) to discuss briefly the likely implications of using the distinction of shared and non-shared to apply subsidy disciplines to shared fish stocks.

ICTSD

International Centre for Trade and Sustainable Development

2. What Are Shared Fish Stocks?

Since the United Nations Convention on the Law of the Sea (UNCLOS) was agreed, it has been clear to fisheries scientists (both natural and social), policy makers, and managers that it is important to define and distinguish between fish stocks that spend their entire lives in a country's EEZ from those that do not and are therefore shared with other countries. Determining which species are shared or not is necessary not only because of scientific curiosity, but also because this information is crucial for developing management institutions and regimes that are likely to succeed. For fish stocks that are not shared, successful management depends solely on the effectiveness of domestic institutions and policies. In contrast, if a stock is shared with two or more countries, the fate of the fish stock, and the fisheries that depend on it, are determined by all the countries that share the fish (Munro 1979; Sumaila 2013).

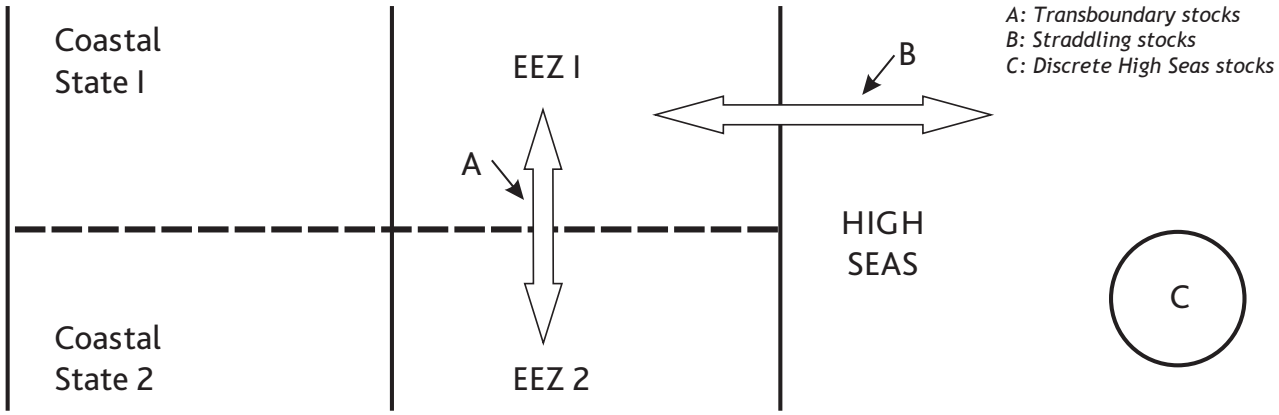
The work involved in disciplining harmful subsidies gives rise to a new dimension in the need to define and distinguish shared from non-shared fish stocks. Policy-makers could consider splitting the world's fisheries into domestic and international (or shared fisheries) in order to align the incentives to remove subsidies with national interests (Sumaila 2012). The argument is that, with this distinction, the battle for eliminating harmful subsidies on domestic non-shared fish stocks would shift to home countries, while the incentive to negotiate limits on subsidies that affect shared stocks would still rest with the countries sharing the stock and the international community as a whole (Sumaila 2012).

At the Fisheries Economics Research Unit (FERU), we consider a targeted fish species to be shared if it has a spatial range which potentially spans beyond the boundaries of a country's EEZ, or occurs in the high seas (Teh and Sumaila 2015). In this sense, our definition is consistent with the definition of shared fish stocks according to the Food and Agriculture Organization of the United Nations (FAO), which includes the following:

- Transboundary stocks: fish that cross from the boundary of one EEZ into the EEZs of one or more coastal countries;
- Highly migratory fish stocks: fish that are, by nature, highly migratory, and are found both within a country's EEZ and the adjacent high seas. This follows the list of 17 highly migratory species under UNCLOS;
- Straddling stocks: fish stocks that are found both within the coastal country and the adjacent high seas; and
- Discrete high seas stocks: fish stocks that are only found in the high seas (Munro, van Houtte, and Willmann 2004).

These different parts of the definition are illustrated in Figure 1

Figure 1: Different types of shared fish stocks



Source: Munro, van Houtte, and Willmann (2004)

3. Share of Fisheries Catch and Landed Value Generated in Shared Fisheries[1]

To determine the share of fisheries catch and landed value generated in shared fisheries, we obtained the taxon names (family/genus/species) corresponding to these potentially shared fish species from the *Sea Around Us* (SAU) database (www.seaaroundus.org). This resulted in a list of 354 fish taxon names[2] that, based on current knowledge of the species' behaviour and ranges, we considered to be "shared" fish species because they fit one of the parts of the definition above (e.g. are straddling, transboundary, highly migratory, or discrete high seas stocks) (Teh and Sumaila 2015). It is important to note that, while these are fish species or families which may potentially be shared, depending on where they occur, they may not actually be caught by more than one country. To account for the spatial aspect, we compiled a list of shared fish species caught within each FAO major fishing area and used the list to filter the 354 potential shared fish species, resulting in 206 shared fish species-FAO area pairs (Teh and Sumaila 2015).

To obtain country specific shared fish catch, countries within each FAO area were allocated to the shared fish species associated with the respective FAO area. We obtained shared fish species for 14 FAO regions (Teh and Sumaila 2015). The Northeast Atlantic (Area 27) had the highest number of shared fish species (71), while the Southern Oceans (Areas 48, 58, and 88) had the lowest (8). We then extracted annual catch data by EEZ for these spatially matched shared fish species from the SAU catch database. In cases where a country's EEZ extended across multiple FAO fishing areas, a species was considered to be shared if it occurred as a shared species in at least one FAO area.

The catch data from the SAU database is spatialized based on the known spatial distribution and habitat preferences of fish taxa, global fishing access agreements, and statistical reporting areas. This information is used to allocate reported catches to a global system of 30-minute latitude by 30-minute longitude cells. The time series of global marine fisheries landed values is calculated by combining the spatially allocated catch data with a database on global ex-vessel prices, created by FERU in collaboration with the SAU.

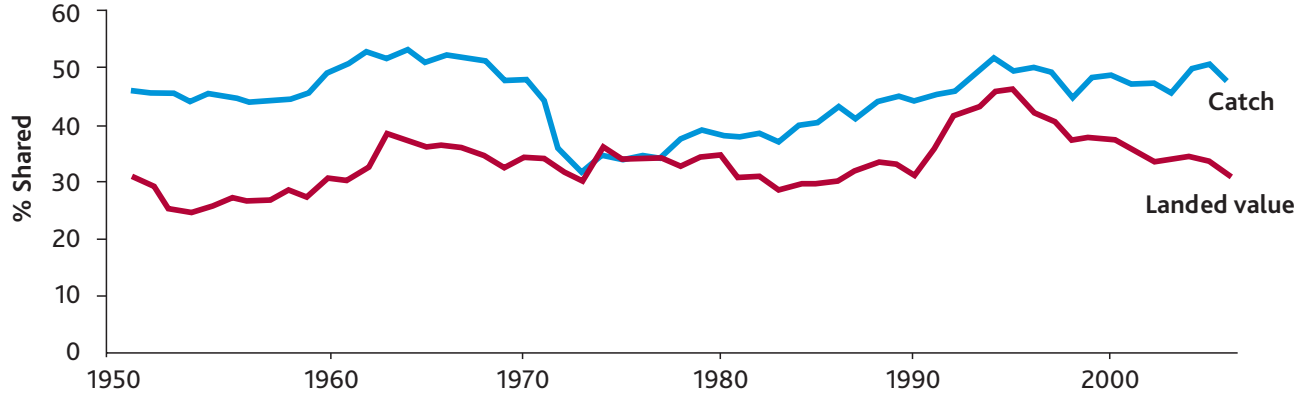
It should also be noted that the SAU database assigns catches to each country's EEZ inclusive of both domestic and foreign caught fish--i.e. catch data for species x in country y reflects the amount of species x caught in country y's EEZ as well as the catch of species x by country y in other EEZ(s). Per the FERU definition of shared fish species, we are interested in the overall catch and value of fish species which make up shared fishery resources. As such, we did not distinguish between domestic and foreign portions of each country's catch or landed value.

We found that, globally, shared fisheries accounted for around 35-50% of total global catches, reaching around 50% in the mid-1960s, followed by a decrease to a low of 34% in the early 1970s. A second peak occurred in the mid-1990s to approximately 52%, then remained relatively stable in the mid-40% range to 2006 (Figure 2) (Teh and Sumaila 2015).

We estimated that the global landed value of shared fish species totalled US$6.3 billion in 1950, and increased to US$30.7 billion by 2006. Shared fisheries' landed value made up a smaller proportion of total global landed value compared to catch, averaging about 33% for the entire 1950-2006 period. The temporal trend was similar to the catch until the early 1970s. While the percentage of shared catch rose from the mid-1970s to mid-1990s, the percentage of shared landed value showed a decreasing trend from the mid-1970s to mid-1980s, then reached a peak of around 45% in the mid-1990s, and decreased steadily thereafter (Teh and Sumaila 2015).

1 This section draws heavily on Teh and Sumaila (2015).
2 For simplicity, we use "species" to encompass fish taxa identified to family, genus, or species level.

Figure 2: Trends in shared fisheries catch and landed value worldwide



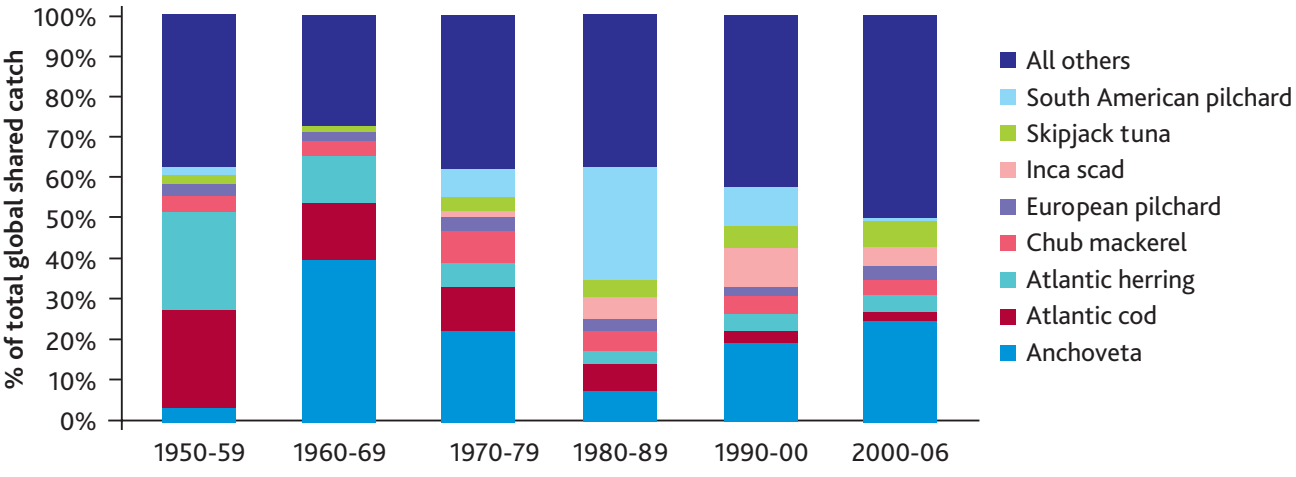
Source: Teh and Sumaila (2015)

The number of countries catching shared fish species almost doubled between 1950 and 2005, from 76 in 1950 to 151 in 2005. African and Caribbean countries and territories were responsible for over 50% of the increased participation (28% and 26%, respectively), followed by Asia and Oceania (both 17%), and finally, South America (5%). But since the annual catch data presented here is inclusive of foreign caught fish landed in each home country, the increase in the number of countries partially reflects the spatial expansion of the global fishing effort, rather than the fishing effort of an individual country. This occurred as the major distant water fishing nations took to fishing in the territorial waters of other less developed countries in the south, following the depletion of fisheries in the northern hemisphere (Swartz, Sala, Tracey, Watson, and Pauly 2010). South America and Europe experienced the largest changes in their contributions to global shared fishery catch between 1950 and 2005. While the contribution of South America grew dramatically, from less than 1% in 1950 to 38% in 2005, Europe's contribution decreased from 56% to 19% in the same period (Teh and Sumaila 2015).

Similar patterns observed in regional catches by shared fisheries are also observed in the landed values they generate. The only clear exception is that there was a bigger difference in temporal change in Asia and North America's contribution to shared landed value compared to their shared catch. Our results are generally consistent with the "changing face of global fisheries" found by Watson and Pauly, in which global fisheries landings were dominated by Europe and Asia in the 1950s, but were overtaken by South America by the 2000s (Watson and Pauly 2013).

Atlantic cod and herring were the two fish species that together made up around 48% of global shared fish catches. However, their contribution to total global shared fish catch decreased from 1960 onwards, while the proportional catch of achoveta, South American pilchards, and Inca scads increased. Skipjack tuna started to make up a larger part of global shared fish catch starting in the 1980s (Figure 3) (Teh and Sumaila 2015).

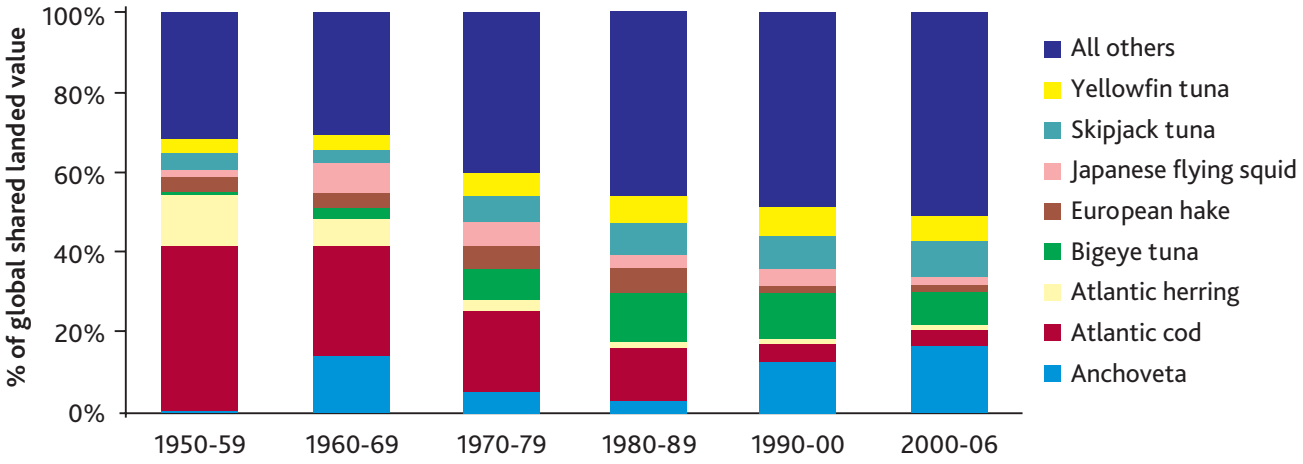
Figure 3: Major fish groups contributing to total global shared fish catch



Source: Teh and Sumaila (2015)

Atlantic cod was also the largest single contributor to global shared fish landed value from 1950 to 1959. Similar to the global shared fish catch trend, the proportional contribution of Atlantic cod to global shared fish landed value decreased after the 1960s, while that of tunas started to increase from the 1970s. Japanese flying squid and European hake were among the top contributors to global shared fish landed value for the entire analysis period, even though these two groups were not among the top contributors to global shared fish catch, an indication of the high price per unit weight that they command (Figure 4) (Teh and Sumaila 2015).

Figure 4: Major fish groups contributing to total global shared fish landed value



Source: Teh and Sumaila (2015)

The temporal trend of targeted shared species reflects the transition from European to South American dominance of fisheries. As stated above, starting in the 1950s, Atlantic cod, as a species, made up the single largest contribution to global shared catch, but was replaced by anchoveta in later periods, which accounted for 25% of global shared catches. The trend of targeted shared species was slightly different for landed value. While Atlantic cod was also the single largest contributor to landed value in the 1950s, both anchoveta and tunas became increasingly important in later periods. From 2000 to 2006, tunas (skipjack, yellowfin, and bigeye) together contributed slightly more than half of global shared landed value, surpassing anchoveta, which contributed 38% (Teh and Sumaila 2015). The WTO Members which accounted for the largest proportion of the world's tuna landed value from 2000 onwards were Japan, Korea, Chinese Taipei, Philippines, and Indonesia. It is significant that Japan, Korea, and Chinese Taipei maintain large distant water fleets that operate throughout the Pacific in order to catch tunas. The heavy presence of foreign fishing fleets adds pressure to tuna fish stocks that are, in many cases, under weak national governance.

In contrast, a different group of WTO Members are among those most dependent on shared fish stocks. The countries with the highest average percentage catch from shared stocks for the period studied were Finland (95%), followed by Greenland (90%), Peru (88%), Barbados (87%), and Sweden (86%) (Table 1). Throughout the period, Greenland, Finland, and Peru were consistently among the top five countries most dependent on shared stocks. Since 2000, Barbados, Marshall Islands, and Micronesia have joined Peru and Finland among the top five. The pattern was similar for landed value. The top five countries with the highest average percentage of landed value from shared stocks to total national landed value across the 1950–2006 period were Greenland (92%), Finland (86%), Barbados (80%), Martinique (79%), and Peru (75%). Finland and Greenland were consistently among the top five countries until 2000. From 2000–2006, the top five countries consisted of Vanuatu and Marshall Islands (both 94%), Peru (91%), Micronesia (87%), and Slovenia (86%) (Teh and Sumaila 2015).

Table 1. Countries in which shared species made up 75% and above of total catch and landed value in 2006

CATCH			LANDED VALUE		
Country	% shared fish	Top fish group/species	Country	% shared fish	Top fish group/species
Faeroe Is	75	Blue whiting	Barbados	76	Common dolphinfish
Chile	76	Inca scad	Nauru	76	Yellowfin tuna
Algeria	77	European pilchard	Slovenia	76	European anchovy
Ireland	78	Blue whiting	Martinique	76	Atlantic cod
Croatia	79	European pilchard	St Vincent and the Grenadines	76	Yellowfin tuna
Maldives	79	Skipjack tuna	Cook Islands	79	Albacore
Slovenia	79	European anchovy	Netherlands Antilles	79	Yellowfin tuna
Papua New Guinea	81	Skipjack tuna	Poland	80	Atlantic cod
St Vincent and the Grenadines	81	Yellowfin tuna	American Samoa	81	Albacore
Ecuador	82	Skipjack tuna	Ecuador	81	Skipjack tuna
Norway	82	Atlantic herring	Guatemala	82	Yellowfin tuna
American Samoa	84	Albacore	Peru	87	Anchoveta
Cook Islands	84	Albacore	Georgia	92	European anchovy
Poland	84	Atlantic cod	Marshall Islands	93	Skipjack tuna
Sweden	84	Atlantic herring	Greenland	94	Northern prawn
Nauru	85	Skipjack tuna	Vanuatu	95	Skipjack tuna
Barbados	86	Flying fishes			
Tuvalu	86	Skipjack tuna			
Micronesia	87	Skipjack tuna			
Estonia	88	European sprat			
Georgia	88	European anchovy			
Guatemala	89	Yellowfin tuna			
Netherlands Antilles	89	Skipjack tuna			
Greenland	92	Northern prawn			
Finland	97	Atlantic herring			
Peru	97	Anchoveta			
Marshall Islands	98	Skipjack tuna			
Vanuatu	98	Skipjack tuna			

Source: Teh and Sumaila (2015)

In contrast, the top five countries that contributed most to global shared fish catches and landed value were not highly dependent on shared fish stocks nationally, except for Peru. From 1950–2006, shared species accounted for around half of the total national landed value for "Top LV" countries: Chile (45%), Japan (47%), Spain (50%), Norway (65%). Likewise, with the exception of Peru, the top five countries that contributed the most to global shared fish catches were not highly dependent on shared fish stocks. Shared fish species made up between 20% (USA) to 88% (Peru) of national catches for these countries (Table 2).

Table 2. Top shared fisheries countries and their rankings in global fisheries catch and landed value

Top shared catch country	Rank in global catch	Top shared LV country	Rank in global LV
Peru	2	Japan	6
Chile	5	Peru	2
Japan	6	Chile	5
China	1	China	1
Norway	10	Korea	13

Source: Teh and Sumaila (2015)

These figures show that in most cases, countries which account for the highest proportion of global shared catch and landed value are different from those where shared species constitute the majority of their national catch and landed value. This implies a disparity in the interests that each group may have in the sustainability of shared fisheries resources. It also brings up the issue of equity; most RFMO allocation schemes are based on historical catch, thus favouring the "top catch" countries, which tend to be the major fishing powers (Bailey, Ishimura, Paisley, and Sumaila 2013). However, many of the "large catch" share and particularly "large landed

value" share countries tend to be smaller developing countries that have a disproportionate dependence on the same shared fisheries resources to support food security and economies (Teh and Sumaila 2015).

Our analysis shows that there are two groups of countries with particularly strong interests in shared stocks (Teh and Sumaila 2015). First are distant water fishing entities--such as Japan, Korea, and Chinese Taipei--that are responsible for most of the catch of shared species, particularly on the high seas (White and Costello 2014; Sumaila, Lam, Miller, Teh, Watson, et. al. 2015). Second are countries like Greenland, as well as Caribbean and Small Island Developing countries, which are highly dependent on shared stocks but do not catch a significant portion of them, in global terms.

Using the recent peak shares of 52% and 45% in the mid-1990s for catch and landed value, respectively and the total global catch and landed value of 112 million tonnes and US$154 billion per year, respectively (Teh and Sumaila 2015), we estimate that ~58 million tonnes of catch are of shared stocks per year, generating ~US$69 billion from shared fish stocks annually, on average from 2015 to 2014.

4. Implications of Using the FERU Approach to Subsidy Disciplines to Shared Fish Stocks

In theory, the suggestion to organize efforts in disciplining subsidies based on whether a fish stock is shared or not makes economic sense. This is because this approach attempts to align the costs and benefits of a country providing harmful subsidies to its fishery. If the subsidies provided by a government help to drive the country's domestic fish stocks to depletion, the resulting economic and social cost would bear on the country in question. The argument for shared fish stocks is a bit different because the cost of depletion resulting from a country providing harmful subsidies to its fleet would be borne by all the countries that share the stock.

The challenge is in the practical implementation of the suggestion. One major difficulty is in distinguishing shared from non-shared fish stocks. Efforts to do this are in their infancy, with very few papers directly addressing the issue. Our above approach attempts to draw the distinction based on our current knowledge of how and where different species of fish live. However, our current knowledge is limited; it does not extend to every stock of every species, and global catch figures are not comprehensive. This means only high-level applications of our suggestion are possible. We can, however, draw several broad conclusions from the current available data.

First, we know that some FAO areas contain more shared fish stocks than others. For instance, we know that FAO areas 61 (Northwest Pacific), 87 (Southeast Pacific), 21 (Northwest Atlantic), and 71 (West Central Pacific) contain more than forty shared fish stocks/groups each (Teh and Sumaila 2015). The implication here is that there is a particularly strong rationale for collective action, particularly among countries whose fishing vessels are active in these FAO areas, to eliminate or re-direct subsidies that may be harmful to those shared stocks.

Second, the data provides a good indication of the WTO Members that account for the highest percentage of global total shared catch and landed value (Teh and Sumaila 2015). From a global perspective, these Members arguably have a moral duty to ensure that they are not providing subsidies that contribute to overfishing of these stocks because the social and economic costs of overfishing due to any such subsidies may negatively affect countries other than their own.

Finally, within this line of thinking, we also identified the top shared species and the number of countries that target them. Governments of these countries could, therefore, consider giving particular attention to subsidies provided to fishing of species whose exploitation appears to be most in need of international cooperation.

5. Conclusion

Several proposals in the WTO fisheries subsidies negotiations attempt to draw, for different purposes, a distinction between domestic fishing of resources under a coastal state's jurisdiction, and fishing of shared resources, particularly in areas beyond national jurisdiction. This author and his colleagues have suggested drawing a similar distinction in order to align incentives for international cooperation with international resources. The definition of which stocks are shared is clear. Our research builds on this definition and uses current knowledge about the behaviour of fish species to estimate which species are in fact "shared" and,

thence, what proportion of fish catch and landed value comes from these shared species. The limitations of current knowledge, however, mean that this approach would be difficult to implement directly in the context of subsidy negotiations. However, our research does have several implications that negotiators could consider. Overall, it is clear that a substantial portion of global catch comes from shared stocks, which means that there is a strong argument for international cooperation to limit subsidies that could lead to the overfishing of shared stocks, particularly those that are not under the responsibility of any national jurisdiction. Further, there are regions of the world where many fish stocks are shared; as such, the rationale for collective action to limit subsidies that could lead to overfishing of those stocks is particularly high. It also appears that some countries are more heavily involved in fishing of shared stocks, so they arguably have a duty to ensure they are not contributing, via subsidies, to the depletion of those stocks. Finally, there are certain species that are "shared" far more heavily than other species, in the sense that a large number of countries exploit them; it is suggested that governments make a particular effort to ensure that subsidies provided to their fisheries are not directed to the exploitation of these species.

References

Bailey M., G. Ishimura, R. Paisley, and U.R. Sumaila. 2013. "Moving Beyond Catch in Allocation Approaches for Internationally Shared Fish Stocks." *Marine Policy* 40 (July): 124–36.

Munro, G. R. 1979. "The Optimal Management of Transboundary Renewable Resources." *The Canadian Journal of Economics* 12, no. 3 (August): 355-76.

Munro G., A. van Houtte, R. Willmann. 2004. "The Conservation Management of Shared Fish Stocks: Legal and Economic Aspects." FAO Fisheries Technical Paper 465. FAO, Rome.

Sumaila, U. R. 2013. *Game Theory and Fisheries: Essays on the Tragedy of Free for All Fishing*. New York: Routledge.

Sumaila, U. R. 2012. "How to Make Progress in Disciplining Overfishing Subsidies." *ICES Journal of Marine Science: Journal du Conseil* 70, no. 2: 251-58.

Sumaila, U.R, et al. 2015. "Winners and Losers in a World Where the High Seas is Closed to Fishing." *Scientific Reports* 5: 8481. https://doi:10.1038/srep08481

Swartz, W., E. Sala, S. Tracey, R. Watson, and D. Pauly. 2010. "The Spatial Expansion and Ecological Footprint of Fisheries (1950 to Present)." *PLoS One* 5: e15143. https://doi.org/10.1371/journal.pone.0015143

Teh, L.S.L., and U.R. Sumaila. 2015. "Global Analysis of Temporal Trends in Shared Fisheries." *Marine Ecology Progress Series* 530: 243–54. https://doi.org/10.3354/meps11049

Watson R.A., and D. Pauly. 2013. "The Changing Face of Global Fisheries." *Marine Policy* 42: 1-4.

White, C., and C. Costello. 2014. "Close the High Seas to Fishing?" *PLoS Biology* 12: e1001826. https://doi.org/10.1371/journal.pbio.1001826

Citation: Sumaila, U. Rashid. 2017. *Shared Stocks and Fisheries Subsidies Disciplines: Definitions, Catches, and Revenues*. Information Note. Geneva: International Centre for Trade and Sustainable Development (ICTSD).

About ICTSD

The International Centre for Trade and Sustainable Development (ICTSD) is an independent think-and-do-tank, engaged in the provision of information, research and analysis, and policy and multistakeholder dialogue, as a not-for-profit organisation based in Geneva, Switzerland. Established in 1996, ICTSD's mission is to ensure that trade and investment policy and frameworks advance sustainable development in the global economy.

ICTSD is grateful for the support from its core donors including the UK Department for International Development (DFID); the Swedish International Development Cooperation Agency (SIDA); the Ministry of Foreign Affairs of Denmark (Danida); the Netherlands Directorate-General of Development Cooperation (DGIS); and the Ministry of Foreign Affairs of Norway.

ICTSD welcomes comments and feedback on this information note. These can be sent to atipping@ictsd.ch.

ISSN 1816 6970