Investigations of countries exporting seafood to the US which may be subject to regulation under the MMPA bycatch rule with respect to cetaceans

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Contents

Background

On 15 August 2016, the US enacted provisions under the Marine Mammal Protection Act (MMPA) which will require countries exporting seafood to the US (either directly or through an intermediary nation) to show that their fisheries are not associated with any intentional killing of marine mammals, and/or that their marine mammal bycatch is at comparable levels with that of US fisheries (NOAA 2016, Williams et al. 2016). The regulation became effective on 1 January 2017, with a five-year exemption during which time exporting nations are expected to assess their bycatch issues, then enact regulatory programmes and mitigation strategies to address marine mammal bycatch, which are analogous in efficacy to those of US fisheries.

About 90% of seafood consumed within the US is imported[1], and about a third of US catch is exported (including some US catch which is exported for processing then reimported). In general, the US catch sent abroad is wild-caught, whilst much of the imported seafood, such as shrimp, is farmed (Greenberg 2014). A list of the top six seafoods consumed in the US highlights the importance of fish imports into the US:

1. Shrimp (90% imported, mostly farmed in Asia);
2. Canned tuna (mostly from distant water/offshore fisheries and imported)
3. Salmon (two-thirds farmed, almost all imported)
4. Alaska pollock (US, wild-caught)
5. Tilapia (farmed and imported, usually from China)
6. Pangasius catfish (farmed and imported from China) (Greenberg 2014).

As a first step, NOAA has compiled a list of seafood products for each nation exporting to the US, and asked those nations for details on their fisheries, such as how products are caught, gear type, fleet size, area of operation, fishing season and bycatch. Nations are also being asked to give information on their current regimes for bycatch mitigation in those fisheries, and for prohibiting the intentional killing or injury of marine mammals. These data will be used to classify those fisheries based on their frequency of marine mammal interactions as either 'exempt' (a seafood operation with very low bycatch (defined as (1) ten percent or less of any marine mammal stock's bycatch limit, or (2) more than 10 percent of any marine mammal stock's bycatch limit, yet that fishery by itself removes 1 percent or less of that stock's bycatch limit annually)), or 'export' (a seafood operation which exports commercial fish and fish products to the United States and has more than a remote likelihood of incidental mortality and serious injury of marine mammals in the course of its commercial fishing operations) (NOAA 2016).

In the likely event that fisheries will not have, or be able to provide, the necessary information, NOAA will attempt to do this themselves by drawing analogies with similar US fisheries and gear types interacting with similar marine mammal stocks. If this is not possible, the fishery will be classified as 'export' until such time as more information becomes available. Subsequent to these investigations, if a fishing operation is found to be consistent with the US in the level of injurious or fatal interactions with marine mammals (whether through analogous and similarly effective mitigation in the form of a regulatory programme for an export fishery, or through demonstrating the requisite low levels of interaction for an exempt fishery), then it will be issued with a Comparability Finding, which is required for a nation to export seafood products to the United States. By the end of the five-year exemption period and every four years thereafter, countries exporting to the US must have applied for and received a Comparability Finding for their fisheries to export seafood products to the United States.

[1] https://www.fishwatch.gov/

The US legislation provides an opportunity to give new impetus to work seeking to tackle problems of cetacean bycatch. Bycatch causes serious welfare and conservation issues and has continued to be a resolutely intractable issue to solve in the majority of fisheries. The magnitude and complexity of the data gathering, regulatory and enforcement tasks which lie ahead in order to get the most out of the legislation are clear. This report comprises the start of the process of compiling fisheries and bycatch information by country to contribute to the identification of likely exempt and export fisheries: those that are probably already eligible for Comparability Findings, and those that currently have bycatch issues which make the issuing of a Comparability Finding unlikely unless a regulatory structure involving sufficient mitigation is put in place. Given the nature of global fisheries, the report cannot be exhaustive or definitive. The US contacted states that export seafood products requesting information similar to what is being gathered for this report with a deadline of 31/03/2017. It is hoped that this independent information gathering will assist the US process. This report solely addresses cetacean bycatch and not any issues related to pinnipeds.

Initial screening of US import statistics to guide further investigations

Firstly, the US trade statistics for 2015 (the most recent complete calendar year available when analysis commenced) were analysed. The NOAA database of imports to the US provides a comprehensive list of monthly imports of seafood products by country[2].

A number of seafood products were removed from the analysis at the start. These chiefly comprised aquaculture and/or freshwater-derived products (see Table 1 for key words in product lists that were included/excluded). About half of the seafood eaten in the US is the product of aquaculture; most of this is shrimp and salmon[3]. US trade data state whether shrimp are from warm-water or cold-water, but not whether they are wild-caught or farmed. Although global shrimp fishing yields about 3.4 million tonnes per year, chiefly from Asia, less than 10% of the shrimp eaten in the US is wild-caught, and the US is a key global market from Asian farmed shrimp (Gillett 2008, Greenberg 2014). Farmed shrimp is primarily from Asian and South American countries[4], and is from warm-water. Warm-water shrimp were excluded from analysis, although it should be noted that will inevitably result in some wild-caught shrimp and any associated bycatch not being considered in analysis. Cold-water shrimp are often wild-caught, and have been retained in the analysis. The US trade figures do state whether salmon is wild-caught or farmed, and farmed salmon has been excluded. 79% of Alaska salmon is exported, increasingly to Asia, whilst two thirds of salmon consumed in the US is farmed and comes from abroad (Greenberg 2014). Much of the world's salmon farming industry, such as in the UK and Norway, shoots seals as predator control. This will also be prohibited under the MMPA regulations, but is beyond the scope of this study, which is only investigating issues of cetacean bycatch. There have also been some reports of cetacean interactions with salmon farm cages in, for example Chile (see below) and the UK, although this is thought to be rather infrequent[5]. The global aquaculture industry as a whole is not without significant environmental impacts (see for example Greenberg (2014)), including the often-damaging fishing required to provide feed for farmed shrimp, salmon etc.. However, this too is beyond the scope of this study.

[2] http://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/

[3] http://www.fishwatch.gov/aquaculture

[4] http://www.worldwildlife.org/industries/farmed-shrimp

[5] https://www.sruc.ac.uk/news/article/898/humpback_whale_post_mortem_suggests_entanglement_in_salmon_farm

Table 1. Seafood product to be included and excluded for analysis.

Key words of products which were included	**Key words of products which were excluded**
GROUNDFISH	FARMED
TOOTHFISH	SEAWEED
CRAB	ALGAE
LOBSTER	MOLLUSCS
TUNA	CONCH
SWORDFISH	CAVIAR
CRUSTACEAN	TILAPIA
HERRING	WAXES
MACKEREL	CORAL
MARINE FISH	SHELLFISH
SARDINE	FRESHWATER
WHITEFISH	OYSTER
FISH NSPF	PERCH
ORANGE ROUGHY	SCALLOPS
SALMON	SEA URCHIN
SHARK	SEA CUCUMBER
DOLPHINFISH	SNAIL
BASS	SQUID
GROUPER	OCTOPUS
ANCHOVY	TROUT
STICKS	CLAM
BONITO	AGAR
SNAPPER	ABALONE
FLATFISH	CARP
COLD-WATER SHRIMP	CATFISH
	CUTTLEFISH
	MUSSELS
	THICKENERS
	SPONGE
	WARM-WATER SHRIMP

Preliminary investigations were aimed at examining the countries with the largest export by weight. Total recorded imports for 2015 were 2.7 million tonnes valued at US$ 19.2 billion. When aquaculture products etc. were excluded, this was reduced to 0.96 million tonnes valued at US$ 7.5 billion. By weight, the top three countries (China, Canada, Thailand) account for 51% of the total excluding aquaculture etc..

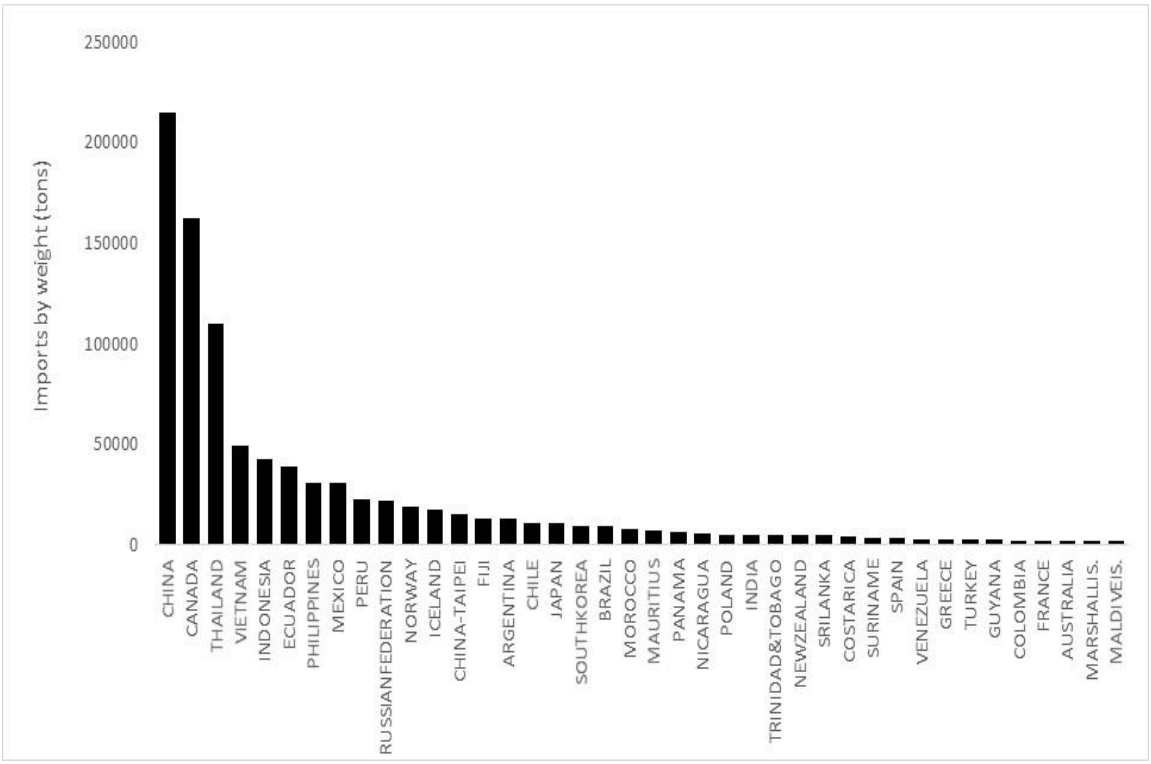

Figure 1. Imports by weight from top 40 countries after aquaculture etc. products excluded.

Given the particularly high bycatch impact of gillnets, especially on small cetaceans (Reeves et al. 2013), data from a CMS report on gillnet bycatch (Waugh et al. 2011) were used, which provide estimates of the total proportion of catches for each country caught using gillnets. As a crude first approximation of the exports to the US likely attributable to such fisheries, we multiplied the total exports by the gillnet proportion. Figure 2 shows that there are some differences in the estimated top 40 exporting countries when based on the gillnet proportion but many of the same countries still appear.

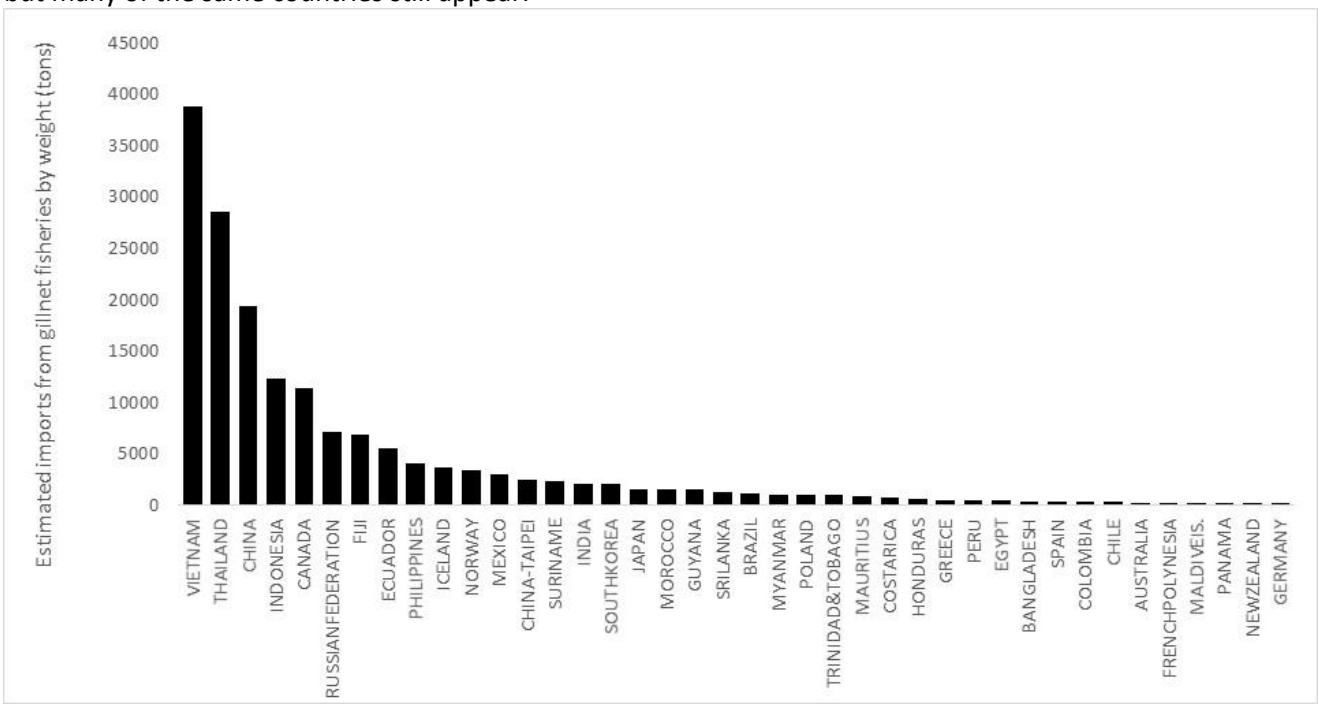

Figure 2. Estimated imports by weight from gillnet fisheries for top 40 countries aquaculture products excluded.

The majority of gillnet fisheries have cetacean bycatch (Young and Iudicello 2007, Reeves et al. 2013). In many cases gillnet fisheries are artisanal and less likely to export, so these estimates probably over-estimate the exports to the US from gillnet fisheries, particularly for developing countries. However, although the exports attributed to gillnet fisheries are likely to be over-estimated for developing world countries, this is less likely to be the case for higher per-capita GDP nations. Thus Figure 2 would immediately flag Canada, Russian Federation, Iceland, Norway, South Korea and Japan as potentially having relatively large exports from gillnet fisheries and also potentially a large bycatch problem. In fact all these countries are known to have substantial cetacean bycatch (Young and Iudicello 2007, Reeves et al. 2013).

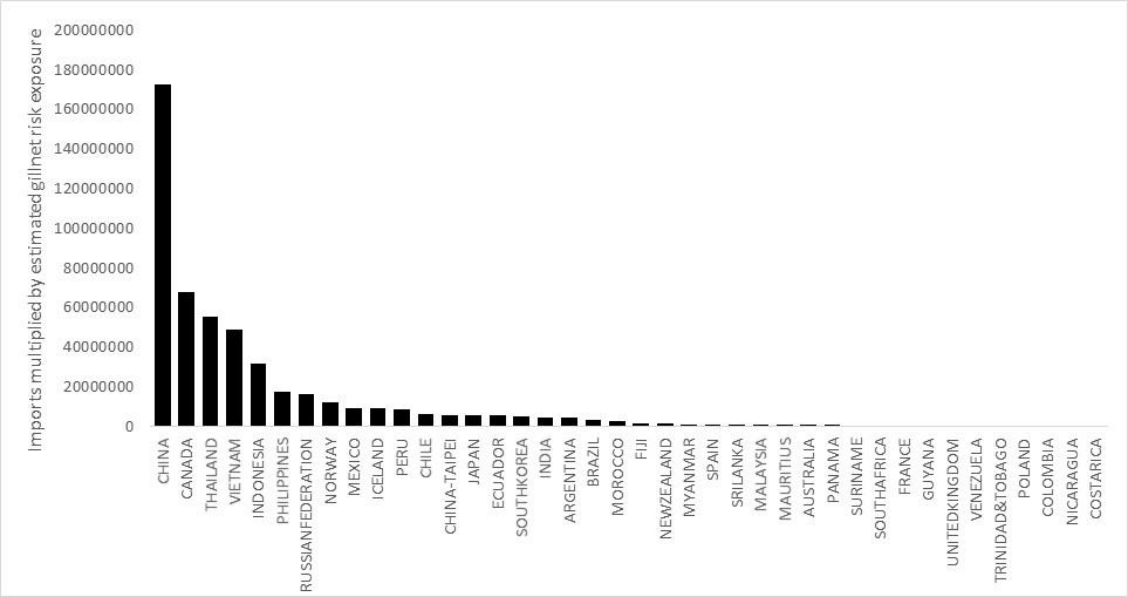

Figure 3. Exports to the US multiplied by gillnet risk exposure.

The CMS report (Waugh et al. 2011) calculated a weighted exposure to gillnets for cetaceans by each national EEZ. This attempted to reflect the likely population level impact of the risk posed by gillnets with an IUCN weighted exposure summed across all cetacean species. These weighted exposures were multiplied by weight imported to the US as a crude indicator of the relative level of risks (Figure 3). When countries are ranked by weight of imports and by exposure risk, the overall ranking is similar (Figure 4).

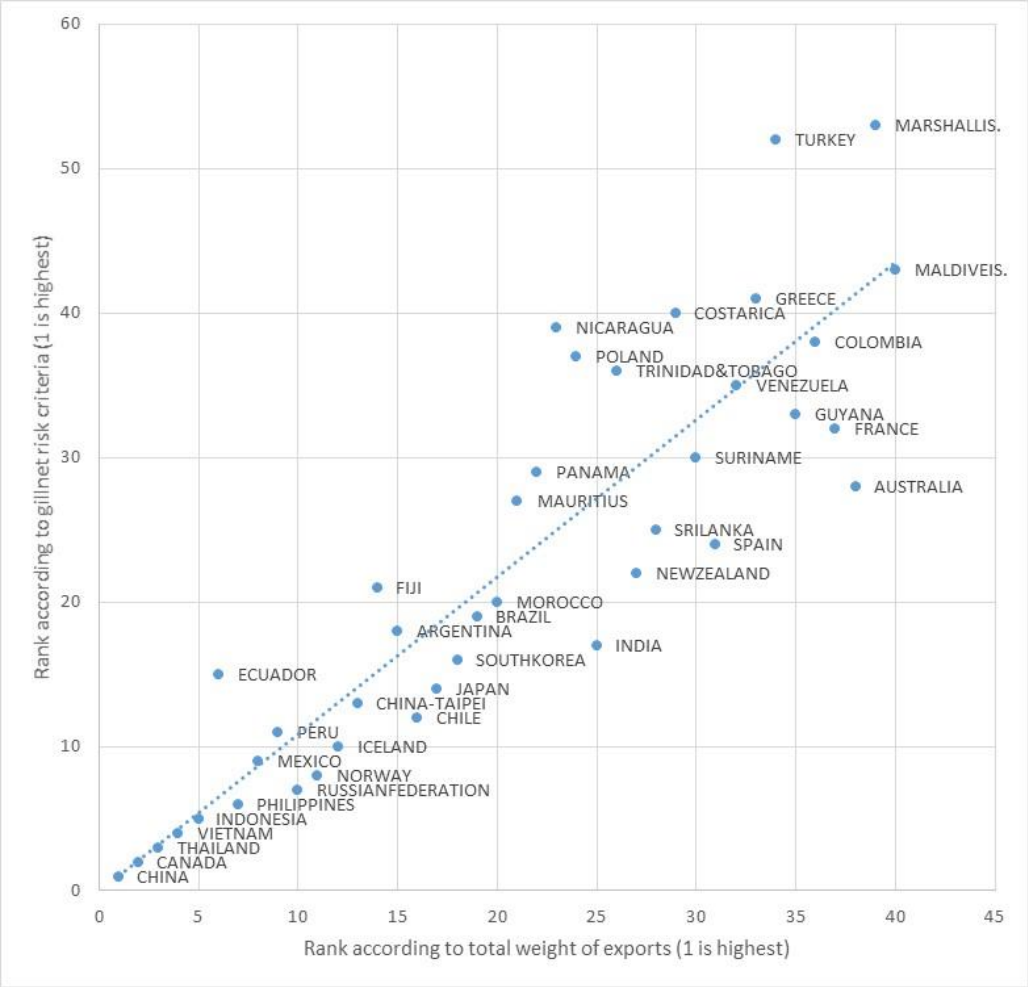

Figure 4. Rank according to total weight imported against rank according to gillnet risk index. Countries below the dotted line have a potentially higher risk in proportion to their export tonnage, whereas countries above the line have a relatively lower risk.

While the analysis in Figures 1-4 highlights some countries where further investigation is clearly required and where the largest problems might well be occurring, it is no substitute for detailed country-by-country analysis.

Analysis by individual country and fishery

An additional approach is to examine each country by fishery based on their exports to the US. The lists of exports contain a large number of rather small value products. In order to reduce the lists to manageable numbers we excluded those valued at less than US$ 100,000 a year (in addition to the product exclusions already made for aquaculture etc. (see above)). This was an arbitrary figure but we assessed that this would be approximately the value that states might consider it to be worthwhile providing information in order to maintain their export markets in the US. As a next step, several countries (~30) were excluded from further analysis as their exports were considered to be of very low value, low-bycatch risk and/or the countries were obviously only acting as intermediary processors. All products that were initially identified as farmed were excluded from the totals for each country. However, in some of the country investigations it became apparent that some species were farmed in addition to wild caught. This was the case for sea bass (*Dicentrarchus spp.*) which is farmed in Greece, Cyprus and Turkey but was still included in those country totals.

This generated a much-reduced list of products from around 70 countries (Table 2). It should be noted that these are just countries that export seafood to the US; countries with cetacean

bycatch problems that do not export are not included in this list. Experts in those countries (primarily scientists and NGOs) were asked for information on any bycatch problems associated with products on the list of which they were aware, and sent the list of products for their country to assess. Available literature was also reviewed (both primary/peer-reviewed and grey), and online information such as the Fisheries and Aquaculture Department of the Food and Agriculture Organization of the United Nations (FAO)[6] website was researched. Given the data gaps and difficulty in obtaining details on global fisheries bycatch (see also for example Young and Iudicello (2007), Reeves et al. (2013)), and the exploratory aims of this investigation, a broader consideration was given to online, grey and personal communication information than would normally be the case for a standard report or peer-reviewed publication. Investigating the country to look for bycatch problems was the primary approach. A parallel approach was also followed of going directly to known bycatch problems which have already been documented. Investigations do suggest that the countries identified in the more objective but rather crude evaluations such as Figure 4 do correspond well with those highlighted by working through the country lists.

Table 2. Countries with imports into the US identified for further investigation

ARGENTINA	GREECE	PHILIPPINES
AUSTRALIA	GREENLAND	PORTUGAL
BAHAMAS	GRENADA	RUSSIAN FEDERATION
BANGLADESH	GUATEMALA	SINGAPORE
BELIZE	GUYANA	SOLOMON IS.
BRAZIL	HONDURAS	SOUTH AFRICA
BURMA	ICELAND	SOUTH KOREA
CANADA	INDIA	SPAIN
CAPE VERDE	INDONESIA	SRI LANKA
CHILE	ITALY	SURINAME
CHINA	JAMAICA	THAILAND
CHINA - HONG KONG	JAPAN	TONGA
CHINA - TAIPEI	KIRIBATI	TRINIDAD & TOBAGO
COLOMBIA	MALAYSIA	TUNISIA
COSTA RICA	MALDIVE IS.	TURKEY
CYPRUS	MARSHALL IS.	UNITED ARAB EMIRATES
DENMARK	MAURITIUS	UNITED KINGDOM
DOMINICAN REP.	MEXICO	VANUATU
ECUADOR	MOROCCO	VENEZUELA
EL SALVADOR	NETHERLANDS	VIETNAM
FAROE IS.	NEW ZEALAND	
FIJI	NICARAGUA	
FRANCE	NORWAY	
FRENCH POLYNESIA	PANAMA	
GERMANY	PERU	

We would like to stress that, due to the complexity and dynamic nature of the subject matter, this report comprises only the outcomes of preliminary investigations, and research must be considered to be ongoing. There are few nations where fisheries and bycatch data are sufficiently complete to enable a full assessment of countries' ability to comply with the MMPA bycatch rule. In most cases, these data do not exist. In some cases, there may be information which exists, but which we may not have been able to access. Thus this report is

[6] http://www.fao.org/fishery/countryprofiles/search/en

also a request for input from experts in those countries which we have investigated who may be able to substantially enhance (or correct) the information which we present here.

Toothfish (assumed to be *Dissostichus spp.*) form a substantial component of exports to the US for a number of countries (Argentina, Australia, Chile, France, Korea, Mauritius, New Zealand, South Africa). Toothfish fisheries are managed by Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) and legal operations have a high level of observer coverage. There are however considerable concerns over IUU toothfish fisheries. In the legal toothfish fisheries managed by CCAMLR and countries with toothfish fisheries in their EEZ the most common fishing method is longlines but there is also some trawling. CCAMLR observers have reported very low cetacean bycatch in the last ten years. Between 2006 and 2016 there were no reports of cetacean bycatch in CCAMLR areas 58.5.2, 58.5.1, 58.6, 58.7[7]. Hence in the context of this review, toothfish fisheries are assumed not to have any substantial cetacean bycatch and so are not mentioned individually in each country summary.

Summary information by country (alphabetical order)

ARGENTINA

Overview

In 2015, Argentina exported over US$ 103 million dollars-worth of seafood to the US.

Main exports to US by weight

Exports were dominated by whiting, hake or unspecified groundfish (39%), king crab (17%), toothfish (12%), flounder (12%) and anchovy (9%).

Proportion of exports to US from gillnet fishery

Hake and whiting are largely caught from large freezer vessels using mid-water and bottom trawls, mostly on the Patagonian/Fuegan shelf. Flounder are caught using bottom trawls. The king crab fishery uses pots/traps. Anchovy are caught using mid-water trawls and purse-seines.

Likely problem fisheries/products

In Argentina, the franciscana (*Pontoporia blainvillei*) and Commerson's dolphin (*Cephalorhynchus commersonii*) are the most vulnerable cetaceans regularly bycaught in artisanal fisheries (Bordino and Albareda 2004). These coastal fisheries involve bottom set gillnets and shrimper (funnel shaped nets with walls that are set between tides) gear (Negri et al. 2012). Mid-water trawls have been associated with bycatch of dusky dolphins (*Lagenorhynchus obscurus*) in Argentina (Crespo et al. 1997). In 1994, mid-water trawls were forbidden in the red shrimp fishery and dolphin bycatch was assumed to have decreased (Crespo et al. 2000). However, the expanding mid-water trawl fishery for anchovy (*Engraulis anchoita*) has been associated with bycatch of common (*Delphinus delphis*) and dusky dolphins (Crespo et al. 2000). Pots and traps may entangle large whales, and a number of entanglements of southern right whales (*Eubalaena australis*) have been reported from Argentina (Bellazzi et al. 2012). These have not all been in fishing gear.

Data gaps and how to address them

There are concerns over the dolphin bycatch associated with the anchovy fishery and it seems likely that anchovy exported to the US may be associated with bycatch of dusky and common dolphins. The majority of other export species are not associated with known cetacean bycatch but there has been little monitoring of either the trawl fisheries or pots/traps. It is possible that some unspecified fish species or cold-water shrimp that are exported could originate from fisheries with a bycatch problem.

Next steps

Anchovy are caught by purse-seine and mid-water trawl. Both these fishery types are associated with dolphin bycatch and would be a priority for bycatch monitoring. There has particular concern for Commerson's dolphins in the mid-water trawl operations south of 41^{O}S

[7] https://www.ccamlr.org/en/publications/fishery-reports

(Reeves et al. 2004). The Government of Argentina has been developing a National Action Plan to Reduce the Interaction of Marine Mammals with fisheries in Argentina (Franciscana-Consortium 2016). At the time of writing it was not clear what the Action Plan will involve.

AUSTRALIA

Overview

In 2015, Australia exported around US$ 39 million dollars-worth of seafood to the US.

Main exports to US by weight

Exports were dominated by tuna (including yellowfin, bigeye, albacore and bluefin) and swordfish (54%), toothfish (33%), and rock lobster (5%).

Proportion of exports to US from gillnet fishery

Gillnets in Australia are mainly used to catch sharks which are not exported to the US.

Likely problem fisheries/products

Tuna and billfish fisheries around Australia operate in the Indian Ocean (Western Tuna and Billfish Fishery, WTBF) and Pacific (Eastern Tuna and Billfish Fishery, ETBF) using predominantly pelagic longlines. Between 2003 and 2010 there were no marine mammal interactions reported by observers in the WTBF. In 2006 and 2007, ten interactions with whales (beaked whales and pilot whales (*Globicephala spp*.)) were reported to the ETBF, the majority of which involved cetaceans being hooked or entangled in the gear. This rate was considered 'very low' but further monitoring was put in place as part of the Australian Tuna and Billfish Longline Fisheries Bycatch and Discarding Workplan[8]. The western rock lobster fishery is known to pose a high risk of entanglement to humpback whales (*Megaptera novaeangliae*). Changes in fishing practices resulted in a large increase in entanglement rates from 2012 but gear modification measures implemented 2014 appear to have reduced entanglements by around 60% (How et al. 2016).

Data gaps and how to address them

IWC Scientific Committee has recommended ongoing assessment of the effectiveness of the measures in the western rock lobster fishery (IWC 2016).

Next steps

Further information about the entanglement rates of humpback whales in the western rock lobster fishery will confirm whether the mitigation measures implemented have been effective.

BAHAMAS

Overview

In 2015, the Bahamas exported over US$ 43 million dollars-worth of seafood to the US.

Main exports to US by weight

Exports are dominated by rock (spiny) lobster (>US$ 40 million dollars-worth; >1450 tonnes), some crab, and a small amount of grouper and snapper.

Proportion of exports to US from gillnet fishery

Neither the crustacea nor finfish exported are caught in gillnets.

Likely problem fisheries/products

According to FAO information, in 2007 spiny lobster (*Panulirus argus*), represented 84% of total fisheries landings (live weight) in the Bahamas. Virtually all lobster is landed as tails. Lobsters are fished with spears, hooks, compressors, traps and casitas (also known as condominiums)[9]. The Bahamas have fisheries regulations which regulate fishing gear used, lobster size, closed seasons etc.[10]. Marine mammal researchers working in the Bahamas have not heard of or witnessed any bycatch as a result of commercial fisheries in 25 years, although

[8] http://www.afma.gov.au/wp-content/uploads/2010/06/ATBLF_bycatchdiscard_08-10.pdf

[9] Casitas comprise a sheet of metal placed on top of wood or concrete blocks under which lobsters aggregate; they are then caught with a hook when the sheet of metal is lifted by a diver.

[10] http://www.fao.org/fishery/facp/BHS/en

they report that the number of surface-buoyed fish pots targeting grouper and snapper is increasing rapidly (Diane Claridge, pers.comm.). These are also being used in deeper water as the shallower areas become fished-out. It is expected that this increase and geographical expansion of effort may result in future bycatch. There have been two incidents of Atlantic spotted dolphins (*Stenella frontalis*) bycaught in non-commercial line-trolling for pelagics. There are no large-scale net fisheries in the Bahamas apart from those which fish illegally within the EEZ, which are undocumented (Diane Claridge, pers.comm.).

Data gaps and how to address them

The Bahamas lobster fishery does not appear to present problems, either in available data, or bycatch issues.

Next steps

It is not expected that the Bahamas would need to be investigated further, although the expansion of the fish-pot fishery for snapper and grouper has potential cause problems in the future.

BANGLADESH

Overview

The total US export fishery was worth around US$ 2 million in 2015.

Main exports to US by weight

Exports were dominated by unspecified fish (96%) and unspecified crab (4%).

Proportion of exports to US from gillnet fishery

Bangladesh has a large artisanal gillnet fishery but without any information on the fish species exported it is difficult to know if any products from gillnet fisheries are entering the US market.

Likely problem fisheries/products

Smith et al. (2008) identified potentially unsustainable bycatch of Irrawaddy dolphins (*Orcaella brevirostris*) in gillnet fisheries targeting elasmobranchs, and scarring on bottlenose dolphins (*Tursiops aduncus*) consistent with interactions with trawl fisheries.

Data gaps and how to address them

There is evidence of bycatch problems in Bangladesh but limited data on the fisheries responsible. This makes it almost-impossible to ascertain whether the unspecified fish products exported to the US may be associated with cetacean bycatch.

Next step

The low level of exports and lack of identified species together with the extensive artisanal fisheries suggest that it would be difficult to use trade with the US to facilitate bycatch monitoring and mitigation.

BELIZE

Overview

In 2015, Belize exported over US$ 6 million dollars-worth of seafood to the US.

Main exports to US by weight

Belize exports rock (spiny) lobster to the US.

Proportion of exports to US from gillnet fishery

Rock lobster is not caught in gillnets in Belize.

Likely problem fisheries/products

In Belize, spiny lobsters are fished by free diving with a hook or with lobster traps (with small openings) that are set out at the start of the lobster fishing season and retrieved when the season legally closes. They are usually fished in shallow waters from seagrass beds or from under crevices on the reef. These fishing methods do not generally result in cetacean bycatch (Nadia Bood, pers. comm.; Maria Amalia Porta, pers. comm.).

Data gaps and how to address them

The Belize lobster fishery does not appear to present problems, either in available data, or bycatch issues.

Next steps
It is not expected that Belize would need to be investigated further.

BRAZIL

Overview
The total US export fishery was worth around US$ 95 million in 2015.
Main exports to US by weight
Exports are mainly snapper (*Lutjanidae spp*.) making up 39%, followed by tuna (bigeye, yellowfin) and swordfish (19%), and rock lobster (15%).
Proportion of exports to US from gillnet fishery
Brazil has a large coastal gillnet fishery and snapper is a major target species for these coastal fisheries.
Likely problem fisheries/products
Snapper are caught by handlines, longlines, traps and gillnets. Gillnet fisheries, including those that target snapper, are of particular concern for franciscana (Danilewicz et al. 2012). Pelagic fleets operating surface driftnets have been implicated in bycatch of a number of cetacean species including large whales (Zerbini and Kotas 1998), but these mainly target sharks (Marigo and Barros Giffoni 2010).
Data gaps and how to address them
Some action is being taken to assess franciscana bycatch but bycatch of other species in the extensive coastal artisanal fisheries is poorly understood.
Next steps
An Action Plan for the Conservation of the Franciscana was established by the Government of Brazil in 2010. A number of measures have been taken but it is not clear whether compliance by fishermen or enforcement by government authorities have taken place (Franciscana-Consortium 2016).

BURMA (MYANMAR)

Overview
The total US export fishery from Myanmar (Burma) was worth around US$ 18 million in 2015.
Main exports to US by weight
Exports are not well specified and are predominantly non-specific crab (61%) and non-specific fish (35%).
Proportion of exports to US from gillnet fishery
Myanmar has a large number of coastal artisanal gillnet fishers but whether any of these catches are exported to the US is unclear.
Likely problem fisheries/products
Cetacean bycatch in purse-seine nets, beach-seine nets, gillnets and longlines has been reported. Indo-Pacific bottlenose and spinner dolphins (*Stenella longirostris*) were the most common species observed being sold at a large fish market (Tun et al. 2006). Smith and Mya (2008) describe intensive gillnetting around the Mergui Archipelago in an area where small numbers of finless porpoises (*Neophocaena phocaenoides*) and Irrawaddy dolphins were observed during surveys in 2005. Densities of both species observed during these surveys were much lower in Myanmar than in neighbouring Bangladesh. They also noted concerns over the number of stern trawlers around the Mergui Archipelago. The freshwater population of Irrawaddy Dolphins in the Ayeyarwady river of Myanmar is classified as Critically Endangered, with gillnet entanglement identified as the dominant threat (Reeves et al. 2004).
Data gaps and how to address them
There are few population estimates for cetaceans in the Bay of Bengal. There is evidence of bycatch along the coast of Myanmar, but no estimates of total numbers for any species. There is also little specific information on which fish species are exported to the US. Assessment of bycatch is complicated by directed takes which also result in cetaceans being on sale in fish markets.

Next steps

Myanmar has extensive gillnet fisheries and critically endangered cetacean populations for which gillnets are believed to be the dominant threat. More data on the species and origin of catches exported to the US is needed.

CANADA

Overview

The total Canadian US export fishery was worth around US$ 2000 million in 2015.

Main exports to US by weight

Crustaceans make up a large proportion of the exports with lobster, predominantly *Homarus spp.* (35%) and crab, predominantly snow but also other non-specific (28%). Of fish species, groundfish including, cod, pollock, haddock, (9%), herring (8%), halibut and turbot (3.5%), sardine (3%).

Proportion of exports to US from gillnet fishery

Atlantic cod, herring and Greenland halibut are all caught in nearshore gillnets.

Likely problem fisheries/products

The lobster fishery in the NW Atlantic is Canada's most valuable seafood export and 78% goes to the US[11]. Lobsters are caught in pots, generally set close to shore, within 15km. Lobster fishing is most active in the Gulf of Maine, Bay of Fundy, Southern Gulf of St. Lawrence and coastal Nova Scotia and involves around 10,000 fishers. Landings have increased substantially since 1980. The main risk is large whale entanglement. There were substantial changes in Canadian east coast fisheries in the early 1990s with the collapse of several groundfish stocks resulting in substantial effort reduction. These changes affected bycatch of harbour porpoise (*Phocoena phocoena*)(Lesage et al. 2006, Benjamins et al. 2007) and entanglement of large whales (Benjamins et al. 2012). In the Gulf of St. Lawrence, Lesage et al. (2006) found that more recent harbour porpoise bycatch was associated exclusively with gillnets and the Atlantic cod and Greenland halibut fisheries. Estimates for 2000-02 were in the range 1000-2400 bycaught harbour porpoise per year. Benjamins et al. (2007) estimated between 800-2200 bycaught cetaceans in Newfoundland gillnet fisheries between 2001 and 2003, almost all harbour porpoise. These were mainly in the nearshore cod fishery but also in fisheries for lumpfish, herring and Greenland halibut. The Gulf of Maine/Bay of Fundy stock of harbour porpoise is subject to bycatch in the Canadian gillnet fishery which occurs mostly in the western portion of the Bay of Fundy. Although there are no recent bycatch estimates for this fishery, recent US stock assessments[12] use an estimate of 43 individuals per year from Canadian fisheries compared to 521 from US fisheries. Snow crab fisheries on the Grand Banks pose an entanglement risk to humpback whales from the Gulf of Maine stock which is likely under reported[13]. The lobster fishery in the Bay of Fundy also presents an entanglement risk to North Atlantic right whales (*Eubalaena glacialis*)[14], but is considered lower risk than the equivalent fishery in the US (Myers et al. 2007). The habitat of all these cetacean populations includes both US and Canadian waters and the US stock assessment reports assess bycatch in Canada as well as US.

Data gaps and how to address them

There has been no observer program in the Bay of Fundy region since 2002 but the fishery is still active. Bycatch of harbour porpoise in this region for these years is therefore unknown. It is frequently not possible to identify the source of the gear involved in large whale entanglements. Gear marking could help establish the relative risks from Canadian and US fisheries.

Next steps

[11] http://www.dfo-mpo.gc.ca/fm-gp/sustainable-durable/fisheries-peches/lobster-homard-eng.htm
[12] http://www.nmfs.noaa.gov/pr/sars/pdf/stocks/atlantic/2015/f2015_harborporpoise.pdf
[13] http://www.nmfs.noaa.gov/pr/sars/pdf/stocks/atlantic/2015/f2015_humpback.pdf
[14] http://www.nmfs.noaa.gov/pr/sars/pdf/stocks/atlantic/2015/f2015_rightwhale.pdf

Observer programmes to estimate small cetacean bycatch in gillnet fisheires and gear marking schemes for pot fisheries are needed. Currently the mitigation measures are release programmes for harbour porpoise in herring weirs and some disentanglement for large whales. Other measures such as reductions in vertical line in pot fisheries could be implemented.

CAPE VERDE

Overview

The Cape Verde US export fishery was worth approximately US$ 65 million in 2015.

Main exports to US by weight

Exports almost-exclusively comprise tuna products.

Proportion of exports to US from gillnet fishery

Gillnet fisheries are not significant in Cape Verdean fisheries exports.

Likely problem fisheries/products

Tuna was traditionally caught by pole and line, which is still the case in artisinal fisheries. Now tuna is caught both by the artisanal fleet, and by the industrial and semi-industrial fleet, with larger boats mainly using purse-seines. According to the Cape Verde fisheries department (INDP), the Cape Verde fleet in 2011 comprised 892 boats with outboard engines and 337 boats without engines, with an average of three fishermen per boat. Additionally there were approximately 91 large boats with inboard engines and an average of 12 fishermen per boat, whilst semi-industrial, generally between 6 and 25 m, had 5-14 fishermen onboard. 4,800 fishermen were registered in 2011 (Conor Ryan, pers. comm). INDP does not think there is an issue with bycatch from Cape Verdean vessels. Whilst researchers working in Cape Verde suggest that this is what they would be expected to say, they also largely concur that cetacean bycatch is likely a minor issue, although data are lacking. There is concern, however about foreign longliners and purse-seiners (primarily Portuguese and Spanish, with whom Cape Verde has a fishing agreement through the EU, and also Japan, China and Russia), which are thought to make incomplete declarations of their catch and bycatch. IUU fishing is also common, as the Cape Verde Government does not have means and resources to protect its territorial waters. In 2016 there were 71 foreign vessels registered with the Cape Verde government, but it is assumed that many more fish their waters in practice (Conor Ryan, pers.comm.).

Data gaps and how to address them

Whilst INDP do not think there is a bycatch problem, it would be useful if this could be further quantified.

Next steps

The available information is largely sufficient to determine that direct exports from Cape Verde to the US are not likely to be subject to import regulations due to bycatch, but further data would be useful.

CHILE

Overview

Chile's exports of seafood to the US in 2015 were worth nearly US$ 110 million.

Main exports to US by weight

By weight, the largest category in the US import lists for Chile was non-specified seafood products of various types (38%), followed by toothfish (25%), crustaceans, including crab and lobster (16%) and groundfish, mostly hake (14%). There were also small amounts (1-2% each) of dolphinfish, mackerel, swordfish and anchovy.

Proportion of exports to US from gillnet fishery

Gillnets are used in Chile, mostly in small-scale coastal fisheries, but there are no specified products in the US import list that are obviously caught with gillnets.

Likely problem fisheries/products

Chile is 4300 km from north to south, and there are significant regional differences in fisheries and bycatch. Reports of cetacean bycatch in Chile are numerous and varied, but no one fishery, target species or area stands out, and there are no bycatch estimates. Examples include:
Sperm whales (*Physeter macrocephalus*) becoming entangled in swordfish driftnets, and also interacting with toothfish longlines; Peale's dolphins (*Lagenorhynchus australis*), Chilean dolphins (*Cephalorhynchus eutropia*), Burmeister's porpoises (*Phocoena spinipinnis*) and southern right whale dolphins (*Lissodelphis peronii*) becoming entangled in nets, particularly gillnets in coastal fisheries; dolphin meat (from bycatch and directed takes) being used in the past to bait crab pots (whilst this is now not so common, it probably still takes place); Chile's salmon aquaculture industry causing concern over dolphins being displaced by infrastructure or entangled in cages[15] (Sonja Heinrich, pers.comm.; Young and Iudicello (2007).

Data gaps and how to address them

There is a large proportion of non-specified seafood in the US import lists. Until more detail is provided on these products, it will not be possible to assess how these relate to cetacean bycatch. The extent to which dolphin meat is still used to bait crab pots should be investigated.

Next steps

It may be that there is cetacean bycatch at some level throughout Chile's fisheries, but none particularly stands out. More detailed export/import declarations would be a good next step.

CHINA

Overview

China's export to the US was over US $1000 million in 2015. It has been the world's main fish producer and exporter of fish and fishery products since 2002. Because it outsources processing from other countries, it has also been the third largest importer since 2011, although its fisheries trade experienced a slowdown in 2015 after years of growth with a reduction in its processing sector (FAO 2016).

Main exports to US by weight

China's export of seafood to the US in 2015 was 215 417 tonnes, however much of this was seafood which had been imported from other countries to be processed and re-exported. This is demonstrated in the data which show that 50% of China's export was groundfish (cod, haddock, whiting, pollock, hake and other non-specified groundfish), and nearly 10% was flatfish (sole, halibut, turbot and flounder). These will likely have been imported from US and Northern European countries, such as Russia, Norway, Greenland[16] processed, then re-exported. 24062 tonnes (approximately 10%) of China's exports was large pelagics, mostly tuna, 5% crab products (mostly swimming crab). 15% is non-specified fish/seafood. It is not known if these products are originally from other countries or not, although China does also import tuna for processing/canning[17].

Proportion of exports to US from gillnet fishery

It is probable that some of the products exported to the US from China were caught using gillnets (either in China or elsewhere, if China was just the processor) but it is not possible to calculate the proportion.

Likely problem fisheries/products

China's fishing industry comprises domestic fishing, processing, and Distant Water Fishing (DWF). It is unknown how much of China's seafood export to the US is caught by Chinese fleets and whether it was caught within or outside China's EEZ. China developed a DWF at the start of the 21st Century with specialized 'catcher' vessels such as bottom trawlers, gillnetters,

[15] http://www.bycatch.org/focus-species/chilean-dolphin
[16] https://www.undercurrentnews.com/2015/07/09/china-cod-re-processing-industry-upping-us-imports-over-norway-russia/
[17] http://www.worldfishing.net/news101/regional-focus/taiwan-lifts-fisheries-output

purse-seiners (tuna and non-tuna), squid jiggers, longliners (tuna and non-tuna) working with mother ships to deliver catch to freezing and processing facilities (Pauly et al. 2014). Pauly et al. (2014) estimated the total mean number of Chinese fishing vessels of these various kinds operating in the EEZ (and/or adjacent High Seas areas) of the countries and territories in seven regions of the world ocean, from 2000 to 2011 to be 3432, which they think is likely an underestimate.

According to Pauly et al. (2014), whilst China over-reports its domestic catch, it substantially under-reports the catch of its DWF. They estimated the Chinese DWF catch to be 4.6 million tonnes per year from 2000 to 2011, compared with an average of 368 000 tonnes per year reported by China to FAO. The Chinese DWF extracts the largest catch from African waters (3.1 million tonnes per year), followed by Asia, Oceania, Central and South America and Antarctica, although Pauly et al. (2014) point out the uncertainty of these estimates and also the difficulty of distinguishing between legal and illegal catch. Indeed, because the access agreements between China and Chinese companies and the nations in whose EEZs China is operating are not publicly available, at least some aspects of 'IUU' could be said to be applicable to all Chinese DWF, as even if the fishing is legal, it is almost entirely undocumented and unreported.

The only identifiable seafood products on the US import list that could have been caught by Chinese vessels are large pelagics (mostly tuna) and crab products. Tuna is mostly caught by longline and purse-seine vessels; the purse seining may well result in small ceteacean bycatch, although no data are available. Any of the swimming crab on the US import list that was caught in China is likely to be problematic. In 2013 Taylor (2013) ranked the Chinese swimming crab fisheries management, including of bycatch as of 'Very High Concern', and advised avoiding purchasing *Portunidae* swimming crabs from China.

Some information is available on bycatch from domestic fisheries, for example Liu et al. (2017) interviewed fishers in the South China Sea and documented bycatch of (mostly) Indo-Pacific humpback dolphins *(Sousa chinensis)* and Indo-Pacific finless porpoises *(Neophocaena phocaenoides*) (mostly) in gillnets, but these fisheries are unlikely to be affected by the MMPA rule.

Data gaps and how to address them

There is little about China's fisheries that does not feature data gaps. Pauly et al. (2014) give some recommendations regarding how to address the data deficiencies concerning China's fishing activities. These particularly relate to potential EU actions vis-à-vis DWF, but could have wider applicability when considering data gaps and include: the FAO insisting on proper reporting of catches from China, both domestic and distant water, by region and taxa; the European Parliament creating and funding a group tasked with researching Chinese fisheries as part of broader work on all countries with DWFs; the European Parliament encouraging developing countries to make fishing agreements with China public, as it is in their interest to do so; the European Parliament encouraging more transparency about fisheries ownership, flagging etc; illegal fishing activities being treated as criminal matters not fisheries matters.

With the current basic level of uncertainty about China's fishing activities, both within and outside its EEZ, assessment of bycatch in its fisheries is not possible. It would be reasonable to assume however, that given the level of fishing effort, geographical extent, variety of gear types used, range of species targeted and lack of any known monitoring or mitigation programmes, that cetacean bycatch will be present and likely considerable in China's fisheries.

Data gaps relating to China's role as a intermediary/processing nation also need to be addressed; China will have to confirm to the US that seafood which it has processed and then

exported to the US, but which was caught by other nations was not from a bycatch-related fishery.

Next steps

If the US is to meaningfully enforce the MMPA cetacean bycatch rule with regards to China, considerable progress will have to be made in availability of fisheries data as a first step.

CHINA - HONG KONG

Overview

Hong Kong exported almost US$6 million dollars worth of seafood to the US in 2015.

Main exports to US by weight

All of the export was non-specific (either fish, crustaceans or shark) apart from some sea bass which was likely farmed and imported/exported for processing. It is possible that other exported products were also just processed in Hong Kong.

Proportion of exports to US from gillnet fishery

There is no specific information on any products that allows any assessment of gillnet use.

Likely problem fisheries/products

According to the Hong Kong Agriculture, Fisheries and Conservation Department, the fishing industry in Hong Kong comprises about 5,000 fishing vessels with about 10,500 local fishermen working aboard. Fishing takes place mostly on the adjacent continental shelf of the South China Sea, and much of the catch is landed in China (Lindsay Porter, pers.comm.). Main fishing methods include trawling, long-lining, gill-netting and purse-seining[18]. Fishing is considered a sunset industry in Hong Kong, with no large industrial fisheries; in 2013 commercial trawling was banned in reponse to significant depletion of fish stocks[19]. Some fishers changed to small-scale purse-seine and gillnet fishing as a result of the trawling ban (Lindsay Porter, pers.comm.). There are problems with finless porpoise being bycaught in gillnets, however the target species are small fish which are processed into feed for fishfarming, and not for export (Lindsay Porter, pers.comm.).

Data gaps and how to address them

There are very few specific data in the US import lists that allow any assessment of Hong Kong's bycatch. A more detailed export declaration needs to be made for this to happen. However, fisheries with known associated bycatch, such as gillnetting for small fish, tend not to be export fisheries, so the MMPA rule will not apply.

Next steps

More detailed export data should be requested, but Hong Kong is unlikely to be a priority for further investigation

CHINA – TAIPAI (TAIWAN)

Overview

China Taipai's seafood exports to the US in 2015 were US$ 82 million.

Main exports to US by weight

58% of exports were non-specific fish or seafood products. 30% was dolphinfish. Of the remainder, 5% was likely imported, processed, then exported seafood (e.g. cod, orange roughy), and 4% was tuna products.

Proportion of exports to US from gillnet fishery

Reeves et al. (2004) report that the Taiwanese offshore and distant-water driftnet fisheries have been problematic for cetacean bycatch. Some Taiwanese tuna may be caught using this method, although longline and purse-seine are more usual methods.

Likely problem fisheries/products

Officially, Taiwan had 326,000 fishermen working in DWF, offshore and coastal fisheries, with

[18] http://www.afcd.gov.hk/english/fisheries/fish_cap/fish_cap_latest/fish_cap_latest.html

[19] http://www.scmp.com/news/hong-kong/article/1116809/trawling-ban-means-end-era-hong-kongs-fishermen

over 23,000 registered boats in 2012. Fish stocks are reported as being depleted in both coastal and offshore Taiwanese waters[20]. Only a few species account for about 75% of Taiwan's total fisheries production. Skipjack is the largest single species, saury is the second largest, followed by squid. Other important species are mackerel, bigeye tuna, yellowfin tuna, longfin tuna[21]. Taiwan is one of the world's largest tuna longline fishing boat operators, although a government longline boat buy back scheme has reduced the fleet size in recent years. Nevertheless the reported fleet still numbers over 300 large longliners, as well as more than 1,000 small tuna longline boats. Taiwan's total reported tuna longline catch in 2012 was 223,000 tonnes, most of which is landed either at Shimizu Port in Japan or transshipped on the high seas or in the EEZ of the nation and then carried to Shimizu, from whence it was distributed to fish markets around Japan[22]. Taiwan also operates purse seining and squid jiggling fleets. In 2012, the reported tuna purse-seine catch was 201,000 tonnes. Whilst tuna caught by longliners is mostly landed in Japan, purse-seine-caught tuna gets sent to Thailand, the Philippines and China for processing/canning[23]. Taiwan's DWF fleet accounted for 58% of total fisheries production by volume in 2012 and 47% by value, with total reported catch from the fleet reaching 727,000 tonnes in 2012. Taiwan has bilateral fishing agreements with six Pacific nations: Papua New Guinea, Micronesia, Kiribati, Tuvalu, Nauru and the Solomon Islands[24]. However, Taiwan is also associated with significant IUU fishing, especially in its tuna longline fleet, and was given a 'yellow card' by the EU in 2015 for not taking sufficient measures to control these activities. The EU cited serious shortcomings in Taiwan's legal framework, monitoring and surveillance of its long distance fleet[25]. The largest of Taiwan's identified exports to the US in 2015 was dolphinfish. This is mostly caught by longline. In Hsin-Kang, eastern Taiwan, where dolphinfish is the main target species, the fisheries are engaged in an Fisheries Improvement Project (FIP) to improve the sustainability of the fishery[26], but it is not known whether this fishery exports to the US.

There is some information available on bycatch of the Critically Endangered Indo-Pacific humpback dolphins in the eastern Taiwan Strait by gillnets and trammel nets (Dungan et al. 2011, Araújo et al. 2014), but the fisheries involved are unlikely to be affected by the MMPA rule.

Data gaps and how to address them

For a nation with such a large fishing fleet, Taiwan exports relatively little directly to the US. Much of its tuna catch is not landed in Taiwan itself, but in Japan and other nations (see above). The 58% of seafood exported which is non-specific constitutes a significant data gap. The key specified export to the US is dolphinfish which is largely caught by longline. It is reasonable to suspect small cetacean bycatch to be associated with Taiwan's IUU fishing activities. Taiwan has put in place a vessel monitoring and observer programme, but it is unclear how effective this has been in improving the legality and governance systems of some of their fishing operations; it does not appear to cover bycatch[27].

Next steps

As a nation with governance systems which have been assessed as being poor, especially with regard to IUU distant fleet fishing, Taiwan is unlikely to be able to provide adequate cetacean bycatch data to the US, and the required investigations will be complex.

[20] http://www.worldfishing.net/news101/regional-focus/taiwan-lifts-fisheries-output
[21] http://www.worldfishing.net/news101/regional-focus/taiwan-lifts-fisheries-output
[22] http://www.worldfishing.net/news101/regional-focus/taiwan-lifts-fisheries-output
[23] http://www.worldfishing.net/news101/regional-focus/taiwan-lifts-fisheries-output
[24] http://www.worldfishing.net/news101/regional-focus/taiwan-lifts-fisheries-output
[25] europa.eu/rapid/press-release_IP-15-5736_en.htm
[26] https://fisheryimprovementprojects.org/fip/hsin-kang-mahi-mahi/
[27] http://www.worldfishing.net/news101/regional-focus/taiwan-lifts-fisheries-output

COLOMBIA

Overview

The total Colombian US export fishery was worth around US$ 9.9 million in 2015.

Main exports to US by weight

Exports are dominated by unspecified tuna (88%) and crustacea (10%).

Proportion of exports to US from gillnet fishery

Colombia has a coastal artisanal fleet using a variety of gear including gillnets. In some areas, dolphins are killed for bait on longlines (Avila et al. 2008). Tuna are caught mainly within the limits of the Exclusive Economic Zone (EEZ) in the Eastern Pacific using purse-seines.

Likely problem fisheries/products

Colombia is a member of the Inter-American Tropical Tuna Commission (IATTC). Columbia is a member of the Agreement on the International Dolphin Conservation Program (AIDCP) whose aim is to reduce incidental dolphin mortalities in the purse-seine fishery in the eastern Pacific Ocean to levels approaching zero.

Data gaps and how to address them

As a signatory to the AIDCP, Colombian tuna fisheries should meet equivalent standards to the US. There is little information about the crustacea fisheries and related cetacean bycatch.

Next steps

Information on tuna fisheries which make up the bulk of exports will be available to the US through joint membership of IATTC. This should allow bycatch problems in tuna fisheries to be identified and responded to.

COSTA RICA

Overview

In 2015, Costa Rica exported over US$ 37 million dollars-worth of seafood to the US.

Main exports to US by weight

Costa Rica exports mostly large pelagics such as tuna, swordfish and dolphinfish, as well as snapper and grouper.

Proportion of exports to US from gillnet fishery

The large pelagics which comprise the majority of Costa Rica's export are likely caught by longlines in the country's advanced artisanal fleet; products such as grouper and snapper are caught by the mid- or small-scale artisanal fleet and fished with gillnets and bottom longlines (see below) (Herrera-Ulloa et al. 2011).

Likely problem fisheries/products

There are 30 species of cetacean found in Costa Rica waters, many of which have year round presence; studies have mainly focused on bottlenose dolphins (*Tursiops truncatus*), coastal spotted dolphins (*Stenella attenuata graffmani*), humpback whales and Guyana dolphins (*Sotalia guianensis*) (May-Collado 2009). Although Costa Rica does have a small area of Caribbean coastline, its fisheries are overwhelmingly in the Pacific . Between 75% and 80% of fisheries landings come from the artisanal fleet. From those, about 95% of the fleet operates in the Pacific Ocean (Herrera-Ulloa et al. 2011). Costa Rica's FAO profile[28] lists Costa Rican fisheries (in order of catch volume) as the tuna purse-seine fishery, with foreign vessels fishing under licences; the large pelagic longline fishery, with a range of vessel sizes fishing both within and outside the 12-nautical mile limit for species such as yellow fin, big-eyed and skipjack tuna, swordfish, marlin, dolphinfish and shark; the shrimp trawl fishery; the coastal sardine fishery using purse-seines. There is also a signficant coastal demersal and pelagic species fishery with small-scale vessels using mainly lines, gillnets, and handlines and targetting species such as snapper, corvina , macarela , barracuda, horse mackerel, grouper. It was reported in 2013 that 90% of Costa Rica's Pacific tuna is caught by foreign purse-seine boats, mostly from Panama and Venezuela, with only 15% of fishing trips landing their catch in

[28] http://www.fao.org/fi/oldsite/FCP/en/cri/profile.htm

Costa Rica[29]. However tuna is also caught by Costa Rica's longline fishery. The bycatch problem in the Costa Rican longline fishery is primarily sharks and turtles (Dappa et al. 2013), however there have also been some cetacean interactions reported (Werner et al. 2015).

Although bycatch attention in the ETP is usually focused on the tuna purse-seine fishery, the problems in Costa Rica may be more with coastal and artisanal gillnet fisheries, although data are lacking (Young and Iudicello 2007, May-Collado 2009). This fishery uses gillnet amongst other methods. Young and Iudicello (2007) and May-Collado (2009) both cite a study carried out by Palacios and Gerrodette (1996) looking at artisanal gillnet fishery cetacean bycatch levels in relation to estimates of small cetacean abundance in the ETP, which estimated an annual incidental mortality in artisanal gillnets of 16,596 in Costa Rica.

Data gaps and how to address them

According to May-Collado (2009), 'Costa Rica conservation and management efforts for the protection of marine mammals are few and isolated'. There is likely a large gap concerning coastal cetacean bycatch in the small scale fisheries. It is possible that some exports to the US come from this fishery, such as snapper and grouper. There is a need to identify if this is the case, and if so, how they are caught, given that the coastal fishery uses a variety of fishing methods. If it is established that there are exports to the US caught in coastal gillnets, then the MMPA rule would be relevant. Whilst the majority of exports from Costa Rica comprise large pelagics, which are caught by longline, and does involves some cetacean bycatch, issues with gillnets are more serious.

Next steps

There is a need to identify if any exports to the US are caught in coastal gillnets – snapper and grouper are the mostly likely possibilities, although in neighbouring Nicaragua, lines and hooks are more often used to catch these species (see Nicaragua section).

CYPRUS

Overview

The total Cypriot US export fishery was worth around US$ 1.5 million in 2015.

Main exports to US by weight

Exports to the US were exclusively sea bass (*Dicentrarchus Spp*.). Although Cyprus reported a small catch of 18.1 tonnes[30] of wild sea bass in 2015 the great majority of Cypriot sea bass comes from aquaculture (1726 tonnes in 2015[31]).

Proportion of exports to US from gillnet fishery

None

Likely problem fisheries/products

The Cypriot aquaculture facilities seem unlikely to be associated with any direct small cetacean bycatch. The only regularly occurring large whale species in the Eastern Mediterranean is the sperm whale which is unlikely to interact with aquaculture.

Data gaps and how to address them

Cyprus does have known interactions between fisheries and bottlenose dolphins but these do not appear to be associated with any exports to the US. Cyprus does not have any fishing vessels covered by EU Regulation 812/2004.

Next steps

The available information would appear to be sufficient to determine that direct exports from Cyprus to the US are not likely to be subject to import regulations due to bycatch. Hence Cyprus will not be investigated further for this study.

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[29] http://news.co.cr/foreign-fishing-fleets-catch-90-percent-of-costa-ricas-pacific-tuna/22530/

[30] http://ec.europa.eu/eurostat/web/fisheries/data/database

[31] http://ec.europa.eu/eurostat/web/fisheries/data/database?p_p_id=NavTreeportletprod_WAR_NavTreeportletprod_INSTANCE_m1uYMjNmt0Yf&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-2&p_p_col_count=1

DENMARK

Overview

The total Danish US export fishery was worth around US$ 1.1 million in 2015.

Main exports to US by weight

Exports were dominated by herring and pilchard which accounted for 77% by weight, followed by Nephrops (6%).

Proportion of exports to US from gillnet fishery

Herring are largely caught by a pelagic fishery with purse-seines and pelagic trawls[32].

The Danish set net fisheries, including gillnets and trammel nets, mainly target cod, plaice, sole, turbot and hake. Exports to the US do not appear to originate from these fisheries where harbour porpoise bycatch is known to occur.

Likely problem fisheries/products

It was estimated that the annual bycatch of harbour porpoise bycatch in Danish North Sea bottom set gillnet fisheries from 1987-2001 was 3,887-7,366 (Vinther and Larsen 2002). In line with the measures required in the EU Bycatch Regulation 812/2004, Denmark has required the use of pingers for nets set by a proportion of the fleet. However, use of pingers is only required for 3% in ICES areas 3d24/3c22 and 38% in areas 3a/4. Estimates for the Kattegat and Belt Seas suggest that it is most likely that < 1% of the harbour porpoise population is being taken in this region. However there are a number of caveats to this since effort and bycatch from smaller vessels is not fully represented (ICES 2016).

Next steps

Denmark reports annually to the European Commission including bycatch monitoring and mitigation under EU Regulation 812/2004. At the present time, known cetacean bycatch in Danish fisheries does not appear to be associated with products exported to the US.

DOMINICAN REPUBLIC

Overview

The Dominican Republic's US seafood exports were worth nearly $US 6 million in 2015.

Main exports to US by weight

Exports comprised rock (Caribbean spiny) lobster.

Proportion of exports to US from gillnet fishery

Lobster are not caught in gillnets.

Likely problem fisheries/products

Spiny lobster (predominantly *Panulirus argus*) is caught using traps by the small scale artisanal fishery in waters up to 30 m deep (Herrera et al. 2011).

Data gaps and how to address them

Although there are many data deficiencies in the Dominican Republic's fisheries, enough information is available to assess that the spiny lobster fishery is unlikely to pose bycatch problems for cetaceans.

Next steps

There should be no need for further investigation of fisheries exports.

ECUADOR

Overview

The total Ecuadorian US export fishery was worth around US$ 240 million in 2015.

Main exports to US by weight

[32] http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/513972/IPOL-PECH_ET(2013)513972_EN.pdf

55% of exports were some form of tuna product (yellowfin, albacore, bigeye), 21% dolphinfish and 9% swordfish.

Proportion of exports to US from gillnet fishery

Ecuador has the largest artisanal fleet of all the Southeast Pacific countries with a fleet of around 45,000 boats in 2013 (Martínez-Ortiz et al. 2015). Many of these vessels use multifilament gillnets of 10-15cm mesh although there is also a large artisanal fleet using longlines. The coastal gillnet fisheries target a wide range of epipelagic, mid-water and demersal fishes, as well as shellfish and molluscs. The large oceanic-artisanal fishery is unique to Ecuador and operates far offshore using a mothership and fleet of small vessels. This fishery uses longlines to target large pelagic species (dolphinfish, yellowfin tuna, bigeye tuna, and swordfish). A substantial proportion of this catch is exported to the US.

Likely problem fisheries/products

Reeves et al. (2013) note reason for concern from large ongoing bycatches of common and striped dolphins (*Stenella coeruleoalba*) in Peru and Ecuador. In the early 1990s the estimated bycatch of small cetaceans was several thousand a year (Félix and Samaniego 1994). Gillnet entanglement of humpback whales is also considered a serious problem in the coastal artisanal fleet but less so in the offshore or industrial fleet (Félix et al. 2011). The oceanic-artisanal longline fishery for dolphinfish uses different (smaller) hook types to the one for tuna, billfish and sharks. The smaller hooks used for dolphinfish mean this fishery is highly selective with little fish bycatch compared to the tuna fishery (Martínez-Ortiz et al. 2015). There are no records of cetacean bycatch for these offshore fisheries which have expanded rapidly in the 1990s and 2000s.

Data gaps and how to address them

The gillnet fisheries that are thought to have a high cetacean bycatch do catch some of the main pelagic species that are exported to the US but are a relatively small proportion compared to the offshore fishery which accounts for over 80% of the total catch.

Next steps

The offshore longline fleet which accounts for most exports to the US has not yet been associated with a cetacean bycatch problem (Martínez-Ortiz et al. 2015). The fisheries that are known to have high cetacean bycatch are coastal artisanal and it is necessary to determine whether products from these are part of the exports to the US.

EL SALVADOR

Overview

In 2015, El Salvador's export to the US was worth approximately US$3.5 million.

Main exports to US by weight

Half of El Salvador's export to the US comprised snapper species. The remainder was either non-specified or dolphinfish.

Proportion of exports to US from gillnet fishery

Small scale fisheries do fish with gillnets in El Salvador, and they likely catch snapper, but details are not available.

Likely problem fisheries/products

El Salvador is the smallest and most densely populated of the Central American countries and only has a Pacific Ocean seaboard. Donadi et al. (2015) report that fisheries in El Salvdor are both industrial/commercial and small scale/artisanal. Historically, industrial fisheries focused on shrimp trawling, but decreasing catches led to the developmenet of new fisheries. According to Donadi et al. (2015) as of 2008, there were 59 bottom trawl vessels (12 - 24 m), five purse-seiners (45 – 75 m), and four pelagic longliners (12 - 24 m). Pelagic longliners and purse-seiners did not start operating in El Salvador until 1999 and 2002, respectively, and mainly fish outside the EEZ. Donadi et al. (2015) report that since the early 1990s artisanal fisheries have accounted for over 50% of total fisheries production in El Salvador. They use a variety of methods such as gillnets, hand lines, longlines, cast nets, and traps. Most seafood

caught by artisanal vessels is is consumed locally. Snapper could be caught with nets, hand-lines, longlines or trawls in El Salvador. It is not known. Dolphinfish are probably caught with longlines; Young and Iudicello (2007) note that there is likely bycatch associated with coastal and artisinal gillnet fisheries of Eastern Tropical Pacific nations, of which El Salvador is one, although data are lacking.

Data gaps and how to address them

There is a significant lack of data about fishing methods or associated bycatch in El Salvador export fisheries. Snapper species are the seafood export most likely to be problematic owing to possibly being caught by gillnetting.

Next steps

El Salvador possibly does have exports associated with bycatch which should be investigated, although no data are available.

FAROE IS.

Overview

The total Faroese US export fishery was worth around US$ 2 million in 2015.

Main exports to US by weight

Exports were dominated by haddock and cod (84%) with some Nephrops.

Proportion of exports to US from gillnet fishery

The Faroese commercial fishing fleet comprises longliners, gillnetters, single and pair trawlers, purse-seiners and a number of ocean-going factory vessels.

Likely problem fisheries/products

NAMMCO (2016) lists fisheries in the Faroes that are known to have a marine mammal bycatch. These include pelagic pair trawling for mackerel, blue whiting and herring using trawls with very high vertical opening, (VHVO); purse-seines; and gillnets set for herring in shallow waters. The cod and haddock fisheries are not known to be associated with cetacean bycatch.

Data gaps and how to address them

The reliability of the reported bycatch data has never been assessed and reliable bycatch data are missing for all fisheries (NAMMCO 2016). Further data are needed on bycatch in some sectors believed to be higher risk, but these do not appear to be involved in export to the US**.**

Next steps

No further investigation at this stage but imports of new species, particularly from expanding VHVO trawls, should be assessed.

FIJI

Overview

Fiji's seafood exports to the US in 2015 were worth over US$ 76 million.

Main exports to US by weight

97% of Fiji's total export was tuna, although the large majority was not specified in terms of species. Fiji also has tuna longline cannery and processing companies, and a proportion of catch leaves Fji already processed[33].

Proportion of exports to US from gillnet fishery

Tuna is not caught in gillnets in Fiji.

Likely problem fisheries/products

Tuna is mostly caught by longliners in Fiji[34]. There is also a signficant foreign fishing vessel presence in and around its waters, both IUU and licenced; poor management has led to overfishing and near-collapse of domestic Fijian fisheries[35]. In 2012, 265 million tonnes of tuna

[33] http://www.worldfishing.net/news101/regional-focus/fiji-battling-to-save-it-waters

[34] https://www.wcpfc.int/system/files/SC3-AR-WP-8.pdf

[35] http://www.worldfishing.net/news101/regional-focus/fiji-battling-to-save-it-waters

was reported taken from the Pacific Ocean, which represents 60% of the total global catch[36]. Fleets from Taiwan, Japan, South Korea, China, the USA and Europe fished the majority of the catch[37]. In 2012, Fiji was given a 'yellow card' by the EU for its failure to tackle IUU fishing in its waters. Fiji was judged to have successfully addressed IUU fishing through legal reforms and new rules for inspection, control and monitoring of vessels, and its formal warning was withdrawn in 2014[38]. Observer coverage on vessels is too low to make an adequate assessment of cetacean bycatch; there are reports that domestic fleets have less bycatch than foreign vessels, but there are insufficient data to support this. There are also some limited data on interactions between odontocetes and longlines, but not enough observer effort to draw any conclusions on bycatch rates[39] (Miller 2007).

Data gaps and how to address them

Low observer coverage means there are no clear environmental impact data on the Fijian tuna longline fisheries, and such data are necessary to make a bycatch assessment.

Next steps

As fisheries are mostly longline in Fiji, although cetacean interactions do occur, at this point no further investigations are warranted.

FRANCE

Overview

The total French US export fishery was worth around US$ 7.8 million in 2015.

Main exports to US by weight

Exports were dominated by herring/pilchard meal (83%) and toothfish (10%).

Proportion of exports to US from gillnet fishery

Gillnets are not a significant fishery type for the dominant export species.

Likely problem fisheries/products

There are conservation concerns over the high level of common dolphin bycatch from combined trawl and gillnets in western European waters. Mannocci et al. (2012) found that conservation measures that reduced bycatch to less than 50% of the current level in the Bay of Biscay neritic stock would be required to reach PBR. Pelagic trawls are known to have a bycatch of common dolphin but substantially different estimates have come from analyses of observer and strandings data (Peltier et al. 2012). In 2017, the Scientific Committee of IWC noted that the large number of stranded common dolphins reported at the beginning of the year raised serious concerns, and established an expert group to evaluate methods to estimate total bycatches in the Bay of Biscay (IWC 2017). Observer programmes on different trawl fisheries did not detect cetacean bycatch in pilchard trawls, but note that the nature of the fishery made bycatch difficult to detect (Morizur et al. 1999).

Data gaps and how to address them

France has observer programmes covering the trawl fleets and gillnets. In 2014, 808 days at sea were observed in towed and static gears. Bycatch of harbour porpoise and common dolphin was observed but total bycatch estimates were not provided (ICES 2016).

Next steps

France reports annually to the European Commission including bycatch monitoring and mitigation under EU Regulation 812/2004. It is not clear whether cetacean bycatch in French fisheries is associated with products exported to the US.

FRENCH POLYNESIA

Overview

[36] http://www.worldfishing.net/news101/regional-focus/fiji-battling-to-save-it-waters

[37] http://www.worldfishing.net/news101/regional-focus/fiji-battling-to-save-it-waters

[38] http://eeas.europa.eu/archives/delegations/new_zealand/documents/press_corner/news/20141028_fiji_fisheries.pdf

[39] http://www.tuna-org.org/Documents/Aus/ngo/WDCS%20Views%20Paper-ENG.pdf

French Polynesia seafood exports to the US in 2015 were worth over US$ 8.6 million.

Main exports to US by weight

French Polynesia's exports to the US were nearly all tuna: 38% of exports were albacore tuna, 30% bigeye, 24% yellowfin.

Proportion of exports to US from gillnet fishery

Tuna is not caught in gillnets in French Polynesia.

Likely problem fisheries/products

Tuna is mostly caught by longliners in French Polynesia[40]. There is also extensive foreign fishing vessel presence in the region, both IUU and licenced. Observer coverage on vessels is too low to make an adequate assessment of cetacean bycatch. There are some limited data on interactions between odontocetes and longlines, and with other non-specified fishing gear, but not enough observer effort to draw any conclusions on bycatch rates[41] (Miller 2007).

Data gaps and how to address them

Low observer coverage means there are no clear environmental impact data on the French Polynesia tuna longline fisheries, and such data are necessary to make a bycatch assessment. French Polynesia is a Participating Territories to the WCPFC.

Next steps

Fisheries are mostly longline in French Polynesia, and cetacean interactions are known to occur. Monitoring is required to establish whether the levels of bycatch associated with these longline fisheries are a concern..

GERMANY

Overview

The total German US export fishery was worth around US$ 9.4 million in 2015.

Main exports to US by weight

Exports from Germany are 87% herring with the rest non-specified.

Proportion of exports to US from gillnet fishery

There are over 1000 German vessels fishing with gillnets and fish traps along the Baltic coast[42].

Likely problem fisheries/products

The German Baltic herring fishing fleet consists of a coastal fleet of boats < 12 m and some larger vessels ≥ 12 m. There are also two large pelagic trawlers targeting Atlanto-Scandian herring and North Sea herring in European and international waters of the North Atlantic. Coastal fishing for herring is carried out with gillnets particularly in the state of Mecklenburg – Vorpommern. Many of these are part-time fishers with small vessels but the bycatch along German coasts from these operations was estimated a total of 57 harbour porpoise in the western Baltic and 25 in the central Baltic (Rubsch and Kock 2004). Scheidat et al. (2008) concluded that bycatch in gillnets is a 'major threat' to porpoises throughout the western Baltic. EU Regulation 812/2004 does not specify any mitigation measures for vessels < 12m.

Data gaps and how to address them

There are serious conservation concerns for the Baltic harbour porpoise population. It is not clear what proportion of German herring exports come from gillnet fisheries that are associated with harbour porpoise bycatch including vessels below the 12m size limit considered in EU Regulation 812/2004.

Next steps

Establishing whether herring from small part-time fishers enters the export market to the US is needed to know whether this could provide an incentive for mitigation measures in these fisheries.

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[40] http://www.soest.hawaii.edu/PFRP/sctb15/papers/FrenchPolynesia.pdf

[41] http://www.tuna-org.org/Documents/Aus/ngo/WDCS%20Views%20Paper-ENG.pdf

[42] http://www.europarl.europa.eu/RegData/etudes/note/join/2014/514010/IPOL-PECH_NT%282014%29514010_EN.pdf

GREECE

Overview

The total US export fishery was worth around US$ 17.6 million in 2015.

Main exports to US by weight

Exports to the US were dominated (92%) by sea bass (*Dicentrarchus Spp*.). Although Greece reported a small catch of 204 tons of wild sea bass in 2015 the great majority of Greek sea bass comes from aquaculture (110,000 tons in 2015[43]). Other species specified was jack horse mackerel (2%).

Proportion of exports to US from gillnet fishery

Greece has a large fleet of small coastal vessels using gillnets and longlines. In 2017, the Greek fishing fleet comprised approximately 15000 vessels (with over 90% less than 12 meters)[44].

Likely problem fisheries/products

The high number of vessels using gillnets does create a risk of bycatch but substantial bycatch around Greece has not been documented (Bearzi 2002). The most common cetacean species known to interact with coastal fisheries in Greece is the bottlenose dolphin *Tursiops truncatus* (Giorgos Paximadis, pers. comm).

Data gaps and how to address them

Greece does not have any fishing vessels covered by EU Regulation 812/2004.

Next steps

It is likely that cetacean bycatch in Greece does occur but only a very small amount of mackerel and unspecified fish are exported to the US. Greece will not be investigated further in this study.

GREENLAND

Overview

The total US export fishery from Greenland was worth around US$ 2.5 million in 2015.

Main exports to US by weight

Exports are snow crab (91%) and Atlantic cod (9%).

Proportion of exports to US from gillnet fishery

Snow crab are caught in pots. Coastal fisheries of cod are mainly (90%) caught using Danish traps or 'pound nets' with the remaining 10% mainly caught by handline and gillnets[45].

Likely problem fisheries/products

Greenland has direct takes for marine mammals and bycatch is treated in the same way as direct catches in terms of reporting. It is however not clear whether all bycatches are reliably included in catch statistics (NAMMCO 2016). The pot fishery for snow crab may pose an entanglement risk to large whales but is small scale in terms of vessels (26 active licences in 2012). The use of gillnets is much less than in many other areas.

Data gaps and how to address them

IWC assesses bycatch of large whale populations that are subject to direct takes in Greenland (fin (*Balaenoptera physalus*), minke (*Balaenoptera acutorostrata*), humpback and bowhead (*Balaena mysticetus*)) within the context of the Aboriginal Whaling Management Procedure, although very few data on bycatch are available.

Next steps

It is not expected that Greenland would need to be investigated further.

GRENADA

Overview

In 2015, Grenada exported almost US$ 4.5 million dollars-worth of seafood to the US.

Main exports to US by weight

[43] http://www.fao.org/fishery/countrysector/naso_greece/en

[44] http://ec.europa.eu/fisheries/fleet/index.cfm?method=Download.Menu&country=GRC

[45] http://www.coastalfisheries.net/wp-content/uploads/2013/06/Coastal-fishing-in-Greenland.pdf

The Grenada export to the US comprised yellowfin tuna.

Proportion of exports to US from gillnet fishery

Tuna is not caught by gillnets in Grenada.

Likely problem fisheries/products

Grenada is unusual in the Caribbean for having a significant small-scale tuna longlining fishery (Gillet 2011). There are four categories of fishing vessels targeting large pelagic species in Grenada: small scale open longliners, medium scale longliners, large longliners and open pirogues (trolling). None of these is larger than approximately 20 m/4 crew, and most only make day trips (apart from the large longliners). There are also two active FADs[46]. There is thought to be little bycatch associated with this fishery, apart from turtles by longliners (Gillet 2011).

Data gaps and how to address them

No direct bycatch data were available, and these would be useful, but it is likely that the fishery does not result in notable levels of bycatch.

Next steps

It is not expected that Grenada would need to be investigated further.

GUATEMALA

Overview

Guatemala exported just over US$ 4 million of seafood to the US in 2015.

Main exports to US by weight

Main exports were dolphinfish and snapper.

Proportion of exports to US from gillnet fishery

Gillnets are used in the artisanal fisheries in Guatemala, but exports are more likely to be from the industrial fleet.

Likely problem fisheries/products

Lindop et al. (2015) report that although Guatemala has both Pacific and Atlantic/Caribbean coast, fishing effort is focused mainly on the Pacific, with mostly artisanal fishing occurring in the Atlantic. According to Lindop et al. (2015), Guatemalan fishing vessels are categorised into large (15-45 m fishing with bottom and mid-water trawls, longlines and purse-seines), medium (9 - 17 m fishing with bottom and mid water trawls) and small (3.5 – 10m, fishing with handlines, trawls, gillnets, beach nets and traps, depending on the target species). Large and medium sized boats are classified as industrial and small as artisanal. The snapper and dolphinfish exported to the US are most likely caught by the industrial fleet using longlines or trawls. Young and Iudicello (2007) note that there is likely bycatch associated with coastal and artisinal gillnet fisheries of Eastern Tropical Pacific nations, of which Guatemala is one, although data are lacking. However, seafood from this fishery is less likely to be exported and covered by MMPA rules.

Data gaps and how to address them

Lindop et al. (2015) report that Guatemala's fisheries are over-exploited, with under-reporting from all vessel types. Fisheries have not been well-governed, and there is no strong infrastructure. Although the fisheries authorities in Guatemala stated that no products on the US import list have cetacean bycatch (Maria Amalia Porta, pers.comm.), it is likely that that Guatemalan fisheries do result in cetacean bycatch, but no data are available.

Next steps

There is a clear need for fisheries and bycatch data from Guatemala, which is the first step to establishing whether the MMPA rule is relevant.

GUYANA

Overview

In 2015, Guyana's seafood exports to the US were worth just over US$ 10 million.

[46] http://www.fao.org/docrep/005/Y4260E/y4260e08.htm

Main exports to US by weight
64% of Guyana's exports by weight was non-specific marine fish. 34% was snapper.
Proportion of exports to US from gillnet fishery
The small-scale/artisanal fishery, which does export some of its seafood, primarily uses gillnets[47]. As such a large proportion of Guyana's fish export is non-specific (64%), there may be gillnet-caught produce imported into the US.
Likely problem fisheries/products
According to the FAO, in addition to industrial shrimp trawling fishery (which also lands some finfish), Guyana has a deep slope (semi-industrial red snapper) fishery, and a small-scale artisanal fishery. The deep slope semi-industrial red snapper fishery uses traps or longlines and fishes the edge of the continental shelf for snapper and grouper. The growing small-scale fishery uses gear such as Chinese seine (fyke net), pin seine (beach seine), cadell lines, handlines, drift seines, gillnets and circle seines. Gillnets are the most widely used gear. Commercial fish are captured by both artisanal vessels and trawlers [48]. The key identifiable export product is snapper, which is mostly likely largely caught by the deep slope fishery, but also possibly by the small-scale fishery. Bycatch is possible from both these fisheries, but no data are available.
Data gaps and how to address them
No evidence has been found of monitoring or mitigation for cetacean bycatch in Guyana's fisheries. Whilst this will be required, in the first instance, more detail in the import/export data is needed to resolve what seafood the non-specified 64% is, and how it is fished. Clarification on how the snapper imported into the US is caught is also needed.
Next steps
Data from Guyana are sparse, so information gathering needs to commence at quite a basic level prior to any assesment of bycatch being made.

HONDURAS
Overview
Honduras exported almost US $ 50 million of seafood to the US in 2015
Main exports to US by weight
Almost all Honduras' export was rock (spiny) lobster (1650 tonnes of a total export of 1900 tonnes).
Proportion of exports to US from gillnet fishery
Spiny lobsters are not caught using gillnets
Likely problem fisheries/products
Spiny lobsters (*Panulirus argus*) are a key export to the US for Honduras. Rodriguez-Mejia (year unknown) reports that spiny lobsters are caught both by the industrial and artisanal fleet using traps, and by diving with the use of casitas[49] and/or SCUBA. Most of the US export is from the industrial fleet. Whilst sustainable management of the lobster fishery is an issue in Honduras, from a cetacean bycatch perspective, it is not problematic.
Data gaps and how to address them
There are no cetacean bycatch issues associated with the Honduras lobster fishery. The fisheries authorities in Honduras have stated that no products on the US import list have cetacean bycatch (Maria Amalia Porta, pers.comm.)
Next steps
There should be no need to further investigate Honduras

[47] http://www.fao.org/fi/oldsite/FCP/en/GUY/profile.htm
[48] http://www.fao.org/fi/oldsite/FCP/en/GUY/profile.htm
[49] Casitas comprise a sheet of metal placed on top of wood or concrete blocks under which lobsters aggregate; they are then caught with a hook when the sheet of metal is lifted by a diver.

ICELAND

Overview

The total Icelandic US export fishery was worth around US$ 147 million in 2015.

Main exports to US by weight

Around 46% of the export weight was identified as some form of cod product with haddock accounting for 20%. Other products included general 'Groundfish', pollock, mackerel and flatfish.

Proportion of exports to US from gillnet fishery

There are large inshore gillnet fisheries in Iceland for cod and lumpsucker.

Likely problem fisheries/products

Some reporting of marine mammal bycatch in the bottom set gillnet fishery started in early 2002 covering about 5% of the cod gillnet fleet and continued up to 2009 when a new electronic log-book system was implemented. No records have been received from the new system. The main sources of information are the annual cod gillnet survey that is about 2% of the fleet effort in April and is distributed in line with the fleet effort by area. Recent reports have been received from the lumpsucker net fishery and the inspectors from the Directorate of Fisheries and scientists that reported bycatches and these data were compared to log-book records from the fleet to estimate the proportion of bycatch reported. The harbour porpoise is the most commonly bycaught marine mammal and according to the calculations the bycatch in gillnets has decreased since 2003, from 7,300 animals per year to about 1,600 animals per year in 2009–2013, in line with decreased cod net effort. With 400 in lumpsucker nets, the total has likely been about 2,000 per year animals from 2009 or 1.2–6.5% of the abundance estimate range calculated from an aerial survey (NAMMCO 2014). There are currently no mitigation measures in place to address marine mammal bycatch in Iceland.

Data gaps and how to address them

The information that is available from Iceland suggests a bycatch of harbour porpoise that is likely well in excess of PBR. Much of this comes from the cod gillnet fishery and cod accounts for nearly 50% of the exports to the US. Cod is also caught by trawling which is likely to have a much lower bycatch rate. Therefore, when considering the US regulations it will be necessary to examine the supply chain within Iceland to determine whether products from the gillnet fisheries are likely to be included in exports to the US. Iceland provides readily available data on total catch but expert advice from within Iceland may be needed on the marketing pathways from different fisheries.

Next steps

The available data show a bycatch in Iceland that is likely in excess of PBR with no mitigation or apparent plans to address the problem within the next few years. Whether imports from Iceland will be subject to the new regulation will depend on the market pathways for cod caught in the gillnet fishery and whether these can be distinguished from the trawl fisheries.

INDIA

Overview

India's seafood export to the US was worth just over US$ 40 million in 2015.

Main exports to US by weight

India exports a variety of non-specified crustacean and fish products. Of those specified, the key products are swimming crab (*Portunidae* and *Callinectes* (20 % by weight)); also fish such as grouper, mackerel and tuna. India is also one of the world's major fish processing nations. Seafood primarily from European and North American markets is sent to countries such as India to be processed and packaged, and then re-exported, which complicates traceability issues (FAO 2016).

Proportion of exports to US from gillnet fishery

Kumarran (2012) notes that gillnets comprise 18.4% of fishing gear in India, and that they are the fishing method with the highest proportion of bycatch. It is unclear what proportion of

gillnet-caught seafood is actually exported to the US. However, India uses bottom trawls and bottom gillnets to catch *Portunidae* swimming crabs (Taylor 2013), so it is likely that at least some crab exports are caught in gillnets. Kumarran (2012) notes that any kind of regulation or restriction on the use of gillnets would be difficult to implement or monitor.

Likely problem fisheries/products

Kumarran (2012) lists 26 species of cetacean found in India, but reports that cetacean research is limited in the country. Bhathal and Pauly (2008) note that India's fisheries are 'fishing down marine food webs'. Whilst catch has increased over time, there is a decline in the Marine Trophic Index (MTI)[50], which had previously been maintained by a geographical expansion of the fisheries from coastal areas only in the 1970s, to the continental shelf and beyond. However, Bhathal and Pauly (2008) note that this expansion has 'apparently met its natural limits, and catches can be expected to stagnate and ultimately decline, with serious consequences for the marine fisheries sector and consumers in India.'

In addition to gillnets, other fishing gears in India are trawl (44% of fishing gear), seines (19.2% of fishing gear), bag nets (11% of fishing gear). Kumarran (2012) states that 98% of the trawls are benthic, and therefore probably not a major bycatch risk. The swimming crab fisheries industry in India was working on developing a Fishery Improvement Project (FIP) in 2013; however Taylor (2013) (Montery Bay Seafood Watch initiative) ranked the Indian swimming crab fisheries management as of 'Critical Concern', and advised avoiding purchasing *Portunidae* swimming crabs from India, partly because of marine mammal bycatch, for which the bottom gillnet fishery in India is given a ranking of 'High Concern'.

Spinner dolphins are affected by bycatch in many areas of the Indian Ocean, in particular by the drift gillnet tuna fisheries; it is possible therefore that there is spinner dolphin bycatch associated with at least some tuna exported from India to the US (Smith et al. 2014). India is a member of IOTC. IOTC banned the use of large-scale (longer than 2.5km) drift-nets on the high seas areas of the Indian Ocean in 2012, but this did not apply to EEZs. In May 2017 IOTC passed Resolution 17/07 which called on parties to take all measures necessary to prohibit their fishing vessels from using large-scale driftnets in the entire IOTC area of competence by 1 January 2022. Following an objection by Pakistan, the status of this Resolution will not be confirmed until 02/11/2017.

Data gaps and how to address them

There is little or no monitoring of cetacean bycatch, or action on mitigation in India. The US trade data are particularly non-specific for India in terms of product species, and more detail is required to attempt to assess provenance. However, swimming crabs caught in bottom gillnets are of concern, as is tuna caught in drift gillnets.

Next steps

Data gaps in relation to India's fisheries are numerous, but investigations could start with the swimming crab fisheries, in particular bottom gillnets, and with the tuna driftnet fisheries.

INDONESIA

Overview

In 2015**,** the US imported US$ 480 million dollars of seafood from Indonesia.

Main exports to US by weight

The total weight of seafood products exported from Indonesia was approximately 42630 tonnes, of which almost 10000 tonnes was tuna products, over 6000 tonnes was swimming crab (*Portunidae* and *Callinectes*, primarily), and much of the remainder non-specified.

[50] Marine trophic index is the mean trophic level of fisheries landings [and an indicator of marine biodiversity]

Indonesia is also one of the world's major fish processing nations. Seafood primarily from European and North American markets is sent to countries such as Indonesia to be processed and packaged, and then re-exported, which further complicates traceability issues (FAO 2016).

Proportion of exports to US from gillnet fishery

Indonesia's fishing fleet is 95% artisanal (280,600 gillnet units and over 73,400 seine units in 2011 (MMAF 2011)); other vessels are small commercial and industrial. The larger vessels use a range of fishing methods, which include drift gillnets to catch large pelagics such as tuna (Proctor et al. 2003). Some swimming crab is caught in bottom gillnets (Taylor 2013).

Likely problem fisheries/products

Indonesia is geographically extensive, with a large variety of marine ecosystems. As for many south east Asia nations, Indonesia's fisheries are vast and sparsely documented. In 2011 there were 581,845 fishing vessels, including 398,700 longline units, over 280,600 gillnet units and over 73,400 seine units (MMAF 2011).

In general the majority of these multi-stakeholder, multi-gear and multi/mixed species fisheries have not been adequately assessed for cetacean bycatch, and it is therefore poorly documented (Benjamin Kahn, pers.comm.; Jos Pet, pers.comm.). Mustika et al. (2014) report that two cetacean bycatch datasets are available for Indonesia to date (comprising a strandings database for East Kalimantan 1995-2012 and data from fisher interviews and onboard WWF observers on longline vessels around the Archipelago 2005-8). These show gillnet entanglement was responsible for 66% of known mortality causes of stranded cetaceans in East Kalimantan. The WWF data show low numbers of cetacean bycatch by longlines.

There are reports of targeted catch of oceanic dolphins for bait in the shark fin fishery in some areas of Indonesia such as east Lombok (Benjamin Kahn, pers.comm.). Ceteaceans are targetted with harpoons in the Sawu Sea area by hunters from Lamalera and other villages in East Nusa Tenggara/Nusa Tenggara Timur (NTT), partly for food, and partly to sell. Deliberate hunting of dolphins with harpoons by shark fishermen mainly from West Nusa Tenggara/Nusa Tenggara Barat (NTB) has also been observed; this started as using dolphin meat as bait for shark fishing with longlines and other hook and line techniques, but has progressed to being sold as food, and dolphin has now attained market value (Jos Pet, pers.comm.). In NTT, tuna bombing is also reported to take place, where explosives are used to herd and separate dolphins from tuna schools, and which can result in dolphin mortality [51] (Benjamin Kahn, pers.comm.).

Fisheries in coastal and freshwater areas are reported to have high impact on cetacean populations, such as Irrawaddy dolphins in the Mahakam River where there are only 31-42 (total, all ages: 59-79) mature animals in the subpopulation, which is listed as Critically Endangered by the IUCN. Recent live-captures and ongoing bycatch in fishing gear are the factors likely most responsible for the subpopulation's decline; gillnet entanglement accounted for approximately 66% of the 46 deaths documented between 1995 and 2005 (Benjamin Kahn, pers.comm.; Young and Iudicello (2007), Jefferson et al. (2008)). Mustika et al. (2014) studied artisanal fishery bycatch of cetaceans at two locations in Indonesia: Paloh (West Kalimantan) and Adonara (East Nusa Tenggara). Finless porpoises and Indo-Pacific humpback dolphins are often bycaught in Paloh in gillnets; spinner dolphins and bottlenose dolphins were bycaught in Adonara, mostly by purse-seines. Over the 12-18 months before the study, 48 bycatch events were recorded for the two locations combined.

[51] https://www.newscientist.com/article/mg12617121-100-tuna-fleets-banned-from-bombing-dolphins/

The Indonesian Yellowfin tuna fisheries (using purse-seine, longline, pole & line and handline) are engaged in a Fisheries Improvement Program (FIP) with the goal of reaching Marine Stewardship Council certification. The FIP involves improving sustainability by promoting traceability, improving catch data, and improving the management and policy towards sustainable fisheries.

The swimming crab fisheries in Indonesia are also engaged in a FIP. However in 2013 Taylor (2013) (Montery Bay Seafood Watch initiative) ranked the Indonesian swimming crab fisheries management as of 'Very High Concern', and advised avoiding purchasing *Portunidae* swimming crabs from Indonesia, partly because of marine mammal bycatch for which the bottom gillnet fishery in Indonesia is given a ranking of 'High Concern'. Indonesia uses primarily bottom gillnets and pots, but have also been known to use shallow, small trawls. In 2010, Indonesia was the largest supplier to the US of swimming crab, accounting for almost 50% of its imports. The US purchased more than 50% of Indonesia's swimming crab exports (Taylor 2013).

Data gaps and how to address them

Most of the data and projects referred to involve artisanal fisheries and bycatch and will not be affected by the MMPA rule. There is little information on bycatch, and certainly more on the export fisheries is required. Data gaps for both incidental and deliberate capture of cetaceans could be addressed through a voluntary national-scale reporting network, possibly involving members of the existing marine mammal stranding network. Tuna and swimming crabs are probably the best place to start with assessing bycatch as they are substantial exports, some fisheries have FIPs in place, and gillnets are involved in at least some of their production.

Next steps

Information on Indonesia's extensive fisheries and any potential bycatch is sparse, but investigation of tuna and swimming crabs would be a good first step.

ITALY

Overview

The total Italian US export fishery was worth around US$ 7.4 million in 2015.

Main exports to US by weight

Exports were dominated by anchovy (76%) and tuna (13%).

Proportion of exports to US from gillnet fishery

Small pelagic fish are caught by seines and pelagic pair trawls, with anchovies making up 26% of the total Italian catch. Tuna are caught by longlines[52]. Pelagic drift nets associated with a high bycatch risk were banned in the Mediterranean in 2002 but illegal drift netting continued, including by Italian vessels (Notarbartolo-Di-Sciara 2014).

Likely problem fisheries/products

In 2017, the Italian fleet comprised around 12,000 vessels[53]. Around two thirds of the fleet is used for small-scale fishing with the average length around 10m. The small longline vessels fishing for tuna are not known to have a cetacean bycatch. Observer programmes have been conducted on pair trawlers targeting anchovy in the Adriatic Sea as part of the requirements of EU Regulation 812/2004. The only observed cetacean species as bycatch was bottlenose dolphin and there were too few to obtain reliable estimates (Fortuna et al. 2010). The authors note the need to determine whether the scale of observed mortality is sufficient to threaten bottlenose dolphins at the population level.

Data gaps and how to address them

[52] http://www.europarl.europa.eu/RegData/etudes/note/join/2008/397238/IPOL-PECH_NT(2008)397238_EN.pdf

[53] http://ec.europa.eu/fisheries/fleet/index.cfm?method=Search.SearchSimple&country=ITA

The pair trawling observer programme described in Fortuna et al. (2010) covered around 2% of the total hauls. In 2014 there was much less observer effort and no cetacean bycatch was observed (ICES 2016). The only observed species as bycatch was bottlenose dolphin and numbers were small but nevertheless the conservation implications could not be assessed.

Next steps

Further assessment of the conservation implications of the bottlenose dolphin bycatch in the pair trawl fishery for anchovy could establish whether this meets comparable standards to the US.

JAMAICA

Overview

In 2015, Jamaica exported just over US$ 5 million dollars-worth of seafood to the US.

Main exports to US by weight

Jamaica's exports to the US comprise rock (spiny) lobster and *Homarus sp*. lobster.

Proportion of exports to US from gillnet fishery

A very small number of artisanal fishers use gillnets to catch spiny lobsters, but it is unlikely to be significant in the export market[54].

Likely problem fisheries/products

Fishing for lobster is done mainly on the island shelf and the banks. The fishery has two components, artisanal and industrial. The artisanal fishery is mainly carried out using Z traps (small coarse-mesh traps set on the seabed) and diving (both free diving and scuba). The industrial fishery only uses Florida (wooden) traps; its lobsters are exported (Kong year unknown)[55].

Data gaps and how to address them

Although the Jamaica lobster fishery appears to need better management, it does not seem to present problems in terms of cetacean bycatch.

Next steps

It is not expected that Jamaica would need to be investigated further.

JAPAN

Overview

The total Japanese US export fishery was worth around US$ 136 million in 2015. Japan is a major importer of fish, with imports an order of magnitude greater than exports.

Main exports to US by weight

Imports into the US from Japan are relatively poorly documented with 84% by weight being classified as some form of non-specific fish or 'sticks'. Of products that are specified, tuna (bluefin, albacore, skipjack) is the largest at 6%, followed by mackerel (5%).

Proportion of exports to US from gillnet fishery

In 2006 Japan had just over 200,000 fishers involved in coastal fisheries with a total of 232,534 powered fishing vessels registered[56]. Japan has a number of fishery types that are known to be associated with high levels of cetacean bycatch. There are three types of set net in Japan, large, small and salmon. These are defined by different regulations and water depth rather than actual physical extent or mesh size. The species caught in set nets are salmon and trout in general, Japanese sardine, Japanese anchovy, Japanese horse mackerel, Mackerel in general, amberjack in general, flounders in general, Okhotsk atka mackerel, squid in general, frigate tuna and bullet tuna, round herring, *Decapterus* in general, Pacific saury, Alaska pollock, seabream in general, *Scomberomorus* in general.

Bycatch of small cetaceans in gillnets around Japan is less well documented than for large whales. Shirakihara and Shirakihara (2012) assess localised bycatch of Indo-Pacific bottlenose

[54] http://www.fao.org/docrep/006/Y4931B/y4931b0e.htm

[55] http://www.fao.org/docrep/006/Y4931B/y4931b0e.htm

[56] http://www.fao.org/fishery/facp/JPN/en

dolphin off Amakusa-Shimoshima Island and estimate that the minimum annual bycatch was 5.2-6.5% of the population. Bycatch is also implicated as a major factor in an observed decline in finless porpoise in the Sea of Japan (Kasuya et al. 2002).

Likely problem fisheries/products

Set (trap) nets are associated with large whale bycatch, mainly minke whales. These are also reported catching bluefin tuna which is one of the species identified in exports to the US. Marketing rules were introduced in 2001 that prohibited killing of some cetacean species found entrapped in set nets and required bycatch of other cetacean species to be reported if sold. This resulted in a much higher reported bycatch, particularly of minke whales. The IWC Scientific Committee has repeatedly expressed concerns over the status of coastal minke whales populations around Japan (often referred to as J stock) in view of the high levels of bycatch and directed takes (IWC 2013). Entanglements of western Pacific gray whales in set nets are also a serious conservation concern (Brownell et al. 2007).

Data gaps and how to address them

Japan has directed takes for species that are also subject to bycatch. Although the reporting requirements for selling whale products appear to have resulted in more comprehensive reporting, market surveys suggest a combination of unreported bycatch or unreported directed takes (Lukoschek et al. 2009). Further details on fish species exported would reveal the likely fisheries for these.

Next steps

Japan has several cetacean populations where there are concerns for conservation status due to a combination of bycatch and directed takes. Bluefin tuna are caught in set nets that are also responsible for minke whale bycatch and fish from these fisheries may be included in exports to the US. The majority of Japan's exports are unspecified but could originate from fisheries with significant cetacean bycatch requiring further investigation.

KIRIBATI

Overview

Kiribati's seafood exports to the US in 2015 were worth just over US$ 2 million.

Main exports to US by weight

Nearly 60% of Kiribati's export was non-specific tuna. The remainder was non-specified marine fish. Kiribati is also expanding its domestic processing capacity[57].

Proportion of exports to US from gillnet fishery

Tuna is not caught in gillnets in Kiribati.

Likely problem fisheries/products

Purse seining is the primary tuna fishing method in Kiribati, providing over 60% of government revenue. Kiribati also sells fishing rights to other nations, licencing a significant number of foreign longline fleets (Fisheries-Kiribati 2013). In 2016, the EU issued a 'yellow card' to Kiribati, based on concerns about the country's capacity to control fishing activities by foreign fleets. Concerns were raised by the EU of illegally caught fish being laundered through the ports of Kiribati, which do not have robust traceability systems. They also cited Kiribati's unwillingness to share information on foreign vessels operating in their waters[58]. Observer coverage on vessels in the region is too low to make an adequate assessment of cetacean bycatch, although there are some observer records from the purse-seine fisheries in the area recording fatal small cetacean interactions.[59]

Data gaps and how to address them

Low observer coverage means there are few data on Kiribati's purse-seine fishery. Kiribati is a member of the Western and Central Pacific Fisheries Commission (WCPFC). Conservation and Management Measure 2011-03 of the WCPFC prohibits setting a purse seine net on a school of

[57] http://www.bbc.co.uk/news/av/business-34906549/kiribati-fishes-for-tuna-wealth
[58] http://europa.eu/rapid/press-release_IP-16-1457_en.htm
[59] http://www.tuna-org.org/Documents/Aus/ngo/WDCS%20Views%20Paper-ENG.pdf

tuna associated with a cetacean and requires any accidentally encircled cetaceans to be released and reported. **Next steps**
The WCPFC launched a Bycatch Management Information System (BMIS) in July 2017. The BMIS could provide information on compliance with the ban on purse seine sets associated with cetaceans.

MALAYSIA

Overview
In 2015, Malaysia exported over US$ 12 million dollars-worth of seafood to the US.
Main exports to US by weight
Product import information for Malaysia is not very specific, with crab (no species given) the main export. Pelagics such as tuna and dolphinfish are also exported, but there are several products given as non-specific.
Proportion of exports to US from gillnet fishery
Given the lack of detail in the data, the use of gillnets to catch seafood imported into the US is not easy to specify, but according to FAO information, in 1997, the gillnet fishery (drift and set) contributed 126 278 tonnes to total marine fish landings (11% of coastal marine fish production). Finfish drift gillnets are mainly used to target the higher-valued commercial pelagic fish species. Set gillnets are used by coastal fishermen mainly catch demersal fish species[60]. It is therefore possible that exported tuna, for example, may have been caught in drift gillnets.
Likely problem fisheries/products
According to the FAO, fish constitutes 60-70% of the national animal protein intake in Malaysia, with the rate of demand increasing. The nation is the largest per capita consumer of seafood in the region. Malaysia does not make substantial seafood exports to the US, and the data available for the products which are exported are sparse, making it difficult to know what is being exported, or how or where it was caught. Malaysia has two type of marine fisheries - coastal and deep-sea. In 1997, the inshore and coastal fisheries, comprising both traditional and commercial vessels, contributed more than 88.8% of total marine fish landings of the country and there is a general consensus that these fisheries are at maximum exploitation. Deep-sea fisheries operate beyond 30 nautical miles with larger vessels. The diversity of marine species in Malaysian waters is reflected in the large range of fishing gear used: commercial fishing gear such as trawl, fish purse-seine, driftnet, gillnet, and and traditional fishing gear, including hook-and-line, bag net, trammel net, lift net and traps. The fishing gear that contributes most of landings are trawls (50% of landings in 1997, catching demersal finish and prawns), purse-seines (catching pelagics and coastal anchovies), driftnets and gillnets (catching finfish and prawns).

Whilst there is fisheries management and regulation in place in Malaysia, the Department of Fisheries in Malaysia does not collect bycatch data, and there are no at-sea observer progammes or monitoring at landing sites. Researchers working locally in Peninsular Malaysia report that interviews with fishermen over the years have suggested that cetacean bycatch is low, but that it is unclear if that this is actually the situation (Louisa Ponnampalam, pers. comm.). Teh et al. (2015) report that dolphins are killed in Sabah (northeast Borneo) both through incidental capture and targeted hunting. They report that Irrawaddy and Asian bottlenose dolphins are caught in gillnets, and there is also bycatch from trawlers. Whilst bottlenose dolphins and finless porpoise are eaten, sold or used for bait Indo-Pacific humpback and Irrawaddy dolphins are usually released or discarded. Spinner dolphins are the most commonly hunted dolphin species, followed by bottlenose and spotted dolphins. Irrawaddy dolphins, Indo-Pacific humpback dolphins and whales are not hunted.

[60] http://www.fao.org/fi/oldsite/FCP/en/mys/body.htm

Commercial fleets are Malaysian owned, but crewed by non-Malaysians which makes interviews difficult. It is thought that any bycatch is likely discarded at sea (Louisa Ponnampalam, pers. comm.).

Data gaps and how to address them

Data on Malaysian fisheries, from species caught, through fishing methods, areas fished and bycatch are sparse. Better data on fisheries in general would need to be collected before any bycatch issues can be quantified and addressed. Whilst it is difficult make an assessment on products from the US import list, tuna should be investigated as a possible source of bycatch from drift gillnets.

Next steps

Researchers in the area are trying to persuade fishers to bring in bycatch rather than discard it at sea, but this is proving difficult. However, it would be an important step in quantifying cetacean bycatch.

MALDIVE ISLANDS

Overview

The Maldivian US export fishery was worth > US$ 20 million in 2015.

Main exports to US by weight

Exports almost exclusively comprise tuna products, predominantly yellowfin. Tuna is caught by pole and line/handlines (Charles Anderson, pers. comm.).

Proportion of exports to US from gillnet fishery

Gillnet fisheries are not significant in the Maldives.

Likely problem fisheries/products

The fisheries from the Maldives themselves have a low risk of bycatch, as they are almost-all pole and line/handline-caught tuna. These methods of fishing do require live bait, however, which is increasingly caught at night using lights, and might attract dolphins.

Data gaps and how to address them

The Indian Ocean tuna fishery (predominantly gillnetting, purse seining and longlining) by local (e.g Sri Lanka, India) and distant-water fleets from Europe and Asia is associated with significant small cetacean bycatch. The scale of the fishing, number of countries involved, and IUU status of many vessels means documentation, monitoring and management are lacking. However, the Maldivian fisheries themselves are considered low risk.

Next steps

The available information would appear to be sufficient to determine that direct exports from the Maldives to the US are not likely to be subject to import regulations due to bycatch. Hence the Maldives will not be investigated further for this study.

MARSHALL IS.

Overview

The Marshall Islands exported nearly US$ 9 million-worth of seafood to the US in 2015.

Main exports to US by weight

70% of exports were of tuna. 36% of exports were specified as bigeye tuna, but the remainder was non-specific tuna. Non-tuna exports were listed as non-specific marine fish.

Proportion of exports to US from gillnet fishery

Tuna is not caught with gillnets in the Marshall Islands.

Likely problem fisheries/products

About three-quarters of the catch by locally-based offshore vessels is from purse seining, with the remainder from longlining. Foreign longline, purse-seine, and pole-and-line vessels are also licensed to operate in the Marshall Islands zone[61].

Data gaps and how to address them

[61] http://www.fao.org/fishery/facp/MHL/en

The Marshall Islands longline bigeye and yellowfin tuna fisheries are engaged in a Fisheries Improvement Project (FIP)[62]. The Marshall Islands government has also implemented several tuna fishery data collection programmes including observer, port sampling and logsheet data collection programmes, representing the fishing activities of vessels flagged to China, the Federated States of Micronesia, Japan, the Marshall Islands and Taiwan (Bromhead et al. 2012). This is potentially useful for availability of data, but there are no indications that cetacean bycatch is included in these programmes. The majority of Marshall Islands vessels use purse-seines to catch tuna. Marshall Islands is a member of the Western and Central Pacific Fisheries Commission (WCPFC). Conservation and Management Measure 2011-03 of the WCPFC prohibits setting a purse seine net on a school of tuna associated with a cetacean and requires any accidentally encircled cetaceans to be released and reported.

Next steps

The WCPFC launched a Bycatch Management Information System (BMIS) in July 2017. The BMIS could provide information on compliance with the ban on purse seine sets associated with cetaceans. Given that there some observer programmes have been established in the Marshall Islands, data collection may be quite feasible.

MAURITIUS

Overview

The total US export fishery from Mauritius was worth around US$ 42.7 million in 2015.

Main exports to US by weight

Exports were dominated by unspecified tuna (97%) with small amounts of toothfish (1%).

Proportion of exports to US from gillnet fishery

Mauritius had a coastal artisanal fleet of around 2000 vessels in 2008. The gear used includes basket traps, hook-and-line, harpoons, large nets and gillnets[63]. Artisinal fisheries land small amounts of tuna from catches around FADs. In 2010 there was a single Mauritian vessel long-lining for tuna and Mauritius issued 225 licenses to foreign vessels to operate in its waters. Mauritius is also a major trans-shipment hub for tuna caught in the Indian Ocean[64]. Most of the foreign vessels fishing for tuna use longlines but there are some European vessels (French and Spanish) using purse-seines mainly for yellowfin, bigeye and skipjack tuna.

Likely problem fisheries/products

Tuna exported from Mauritius may come from a large area of the Indian Ocean by a fleet flagged from several different countries. Mauritius is a member of the Indian Ocean Tuna Commission (IOTC) which has a working group on bycatch. Tuna landed in Mauritius does not appear to be caught in driftnets which are mainly used further north in the Indian Ocean. IOTC measures have mainly focused on seabirds and turtles but there is consideration of a driftnet ban in EEZs of member states in response to cetacean bycatch.

The longline tuna fleet reports depredation of bait from hooks by cetaceans and there is some entanglement of cetaceans in longlines but this has not been quantified (Anderson 2014).

The purse-seine fleet fishing for tuna in the western Indian Ocean did used to set in association with cetaceans (mainly baleen whales) although dolphin associations with tuna are not often reported in the offshore Indian Ocean. Setting on cetaceans by the purse-seine fleet has been banned by EU regulation (2007) and IOTC resolution in 2013 (Anderson 2014).

Data gaps and how to address them

The varied fleet and number of Asian and European flagged vessels involved means any at sea observer programmes need to be coordinated through IOTC. There are large cetacean bycatch problems associated with tuna fisheries in the Indian Ocean (Anderson 2014) but currently it appears that landings in Mauritius are from longline and purse-seine fleets that pose lower risk

[62] https://fisheryimprovementprojects.org/fip/fisheries-improvement-project-for-the-marshall-islands-longline-bigeye-and-yellowfin-tuna-fishery/

[63] http://www.fao.org/fi/oldsite/FCP/en/MUS/profile.htm

[64] *iotc.org/sites/default/files/documents/proceedings/.../sc/IOTC-2011-SC14-NR18.pdf*

than the gillnet fisheries of Iran, India, Sri Lanka, Pakistan, Oman and Yemen. Port inspections are carried out by Mauritius and compliance with IOTC measures to reduce seabird and turtle bycatch are a stated requirement for fishing in Mauritian waters.

Next steps

Monitoring the source of tuna landed in Mauritius through IOTC will be needed as well as ensuring the IOTC ban on setting on cetaceans is respected by vessels landing tuna. Increasing use of FADs also needs to be monitored. IOTC banned the use of large-scale (longer than 2.5km) drift-nets on the high seas areas of the Indian Ocean in 2012, but this did not apply to EEZs. In May 2017 IOTC passed Resolution 17/07 which called on parties to take all measures necessary to prohibit their fishing vessels from using large-scale driftnets in the entire IOTC area of competence by 1 January 2022. Following an objection by Pakistan, the status of this Resolution will not be confirmed until 02/11/2017.

MEXICO

Overview

Mexico's seafood export to the US was worth around US$ 215 million in 2015.

Main exports to US by weight

Mexico's main exports are finfish such as grouper and snapper, tuna and shrimp.

Proportion of exports to US from gillnet fishery

Mexico fishes on both its coasts, and the nation is highly dependent on coastal fishing (Salas et al. 2011). Small-scale fisheries in Mexico account for about 97% of the marine fleet (Fernández et al. 2011). The Upper Gulf of California is one of the nation's key fishing areas. Much of this fishing is by gillnets from panga vessels, for both shrimp and finfish (López-Sagástegui et al. 2015).

Likely problem fisheries/products

The impact of gillnet fishing both legal and illegal in the Upper Gulf of California on the vaquita (*Phocoena sinus*) has been well-documented (e.g. Rojas-Bracho and Reeves (2013); Taylor et al. (2016)). Wider data on bycatch in other areas of Mexico are generally lacking, as there are few or no observer or monitoring programs (Lorenzo Rojas-Bracho, pers. comm.) However, vaquita bycatch in gillnets, severely exacerbated by illegal totoaba fishing, has resulted in the near-extinction of the species, and currently overshadows all other potential Mexican bycatch issues. Other whale and dolphin species are also found in the Gulf of California (such as *Delphinus* spp, bottlenose dolphins, humpback whales, fin whales and Bryde's whales *(Balaenoptera brydei)*), and the intensive gillnetting in the area is also a threat to these animals.

Data gaps and how to address them

Observers and monitoring would clearly be useful in Mexico's fisheries generally. In the Upper Gulf of California, data gaps are not the main issue.

Next steps

In the US's engagement with Mexico over cetacean bycatch, the vaquita issue should remain the priority, and vigorous action to this end is ongoing (e.g. Rojas-Bracho and Reeves (2013); Taylor et al. (2016)). However, the urgency of the vaquita situation does not remove the need to monitor other fisheries for bycatch and particularly those using gillnets.

MOROCCO

Overview

The total Moroccan US export fishery was worth around US$ 50 million in 2015.

Main exports to US by weight

Exports were almost exclusively sardine (85%) and anchovy (14%).

Proportion of exports to US from gillnet fishery

Gillnet fleets from EU countries used to operate in Moroccan waters targeting hake. The Spanish fleet stopped operations in 1999. Tudela et al. (2005) note that illegal, large-scale driftnets are still used in several Mediterranean areas with the bulk of this fleet operating from

Morocco targeting swordfish. They found that these fisheries were associated with a high bycatch of common and striped dolphin, with annual take rates exceeding 10% of their population sizes in the Alboran Sea. The Moroccan fishery for small pelagics operates off the Atlantic coast with a coastal seine fleet of around 700 vessels and a pelagic trawl fleet of around 20 vessels[65]. There is also an artisanal fleet of small vessels using small seines.

Likely problem fisheries/products

A key concern for cetacean bycatch are illegal driftnet fisheries but these do not seem associated with any products exported to the US. There has been some observer monitoring of the sardine fishery since 2015 to investigate discards and bycatch of cetacean species. No cetacean bycatch has been reported[66].

Data gaps and how to address them

Measures to ensure illegal drift net fisheries in the Mediterranean do not continue are needed. ACCOBAMS and General Fisheries Commission for the Mediterranean (GFCM) have a joint project on mitigating interactions between endangered marine species (including cetaceans) and fishing activities. One of the pilot projects involves the purse-seine fishery for small pelagic species in the Moroccan Mediterranean (ACCOBAMS, 2015).

Next steps

The exports to the US of sardine and anchovy do not appear to be associated with cetacean bycatch. The export situation is therefore unlikely to help with addressing the fisheries where bycatch is occurring.

NETHERLANDS

Overview

The total Netherlands' US export fishery was worth around US$ 11 million in 2015.

Main exports to US by weight

Exports are dominated by flatfish (82%, mainly sole which accounted for over 50% of total), and herring (7%).

Proportion of exports to US from gillnet fishery

In 2015 there were around 300 active vessels in the Dutch fleet. Trawlers targeting flatfish use pulse, SumWing or beam-trawl gear[67]. Gillnets are used for beach cast fisheries but these are largely recreational.

Likely problem fisheries/products

Harbour porpoise is the main species of concern subject to bycatch in Dutch waters. Currently an estimate of anthropogenic mortality of porpoises in Dutch waters does not exist but there are indications that the number of porpoises that died in the past few years may be close to or higher than limits based on PBR (Scheidat et al. 2013). Small cetacean bycatch is not believed to be a major concern for demersal trawls for flatfish (ICES 2016). In 2015 there was no dolphin bycatch observed by observers placed on pelagic trawlers (ICES 2017)The Dutch herring fishery is mainly conducted in the Atlantic.

Vessels from the Netherlands are involved in fisheries in the Bay of Biscay using mid water otter trawls (ICES 2017). There is evidence of a large common dolphin bycatch in the Bay of Biscay (Peltier et al. 2012) but there is still some uncertainty regarding the fisheries involved.

Data gaps and how to address them

Netherlands reports annually under EU Regulation 812/2004. The level of harbour porpoise bycatch in the southern North Sea is a concern and further assessment is needed.

Next steps

Further assessment of harbour porpoise bycatch in North Sea and common dolphin bycatch in

[65] https://fisheryimprovementprojects.org/wp-content/uploads/Sustainability-evaluation-Fev2016.pdf

[66] https://fisheryimprovementprojects.org/wp-content/uploads/Sustainability-evaluation-Fev2016.pdf

[67] https://prod.pulsefishing.eu/sites/default/files/pf_research/paper/Pulse%20fisheries%20in%20the%20Netherlands_final.pdf

Biscay.

NEW ZEALAND

Overview

The total US export fishery from New Zealand was worth around US$ 18.6 million in 2015.

Main exports to US by weight

Exports include toothfish (29%), orange roughy (21%), swordfish (9%) and snapper (8%), and some crustacea including rock lobster, but 30% was non-specified fish.

Proportion of exports to US from gillnet fishery

Gillnets are used around the coast of New Zealand and have been particularly problematic for Hector's (*Cephalorhynchus hectori*) and Māui (*Cephalorhynchus hectori maui*) dolphin, but dusky dolphin bycatch has also been reported. Gillnets may be used by un-licenced recreational fishers and the majority of gillnet vessels are less than 15m. In 1995, gillnets contributed less than 1% of the value of all New Zealand fisheries combined (Dawson and Slooten 2005).

Likely problem fisheries/products

It is not thought that the gillnet fleet targets any species that are specified in the US exports, but there is some uncertainty over how exported snapper is caught. Some closed areas where gillnetting is prohibited have been implemented, but management measures in relation to bycatch mitigation fall short of what has been recommended by IWC Scientific Committee which has continued grave concerns over the status of the small, severely depleted Māui dolphin (IWC 2016). The orange roughy fishery involves large pelagic trawlers which are not known to be associated with bycatch. Swordfish are predominantly caught on longlines. Longlines in New Zealand have been associated with bycatch of a number of cetacean species but reported numbers are low (Rowe 2007) and there are no total estimates (Werner et al. 2015). There are no estimates of cetacean bycatch for fisheries for snapper which involve bottom longline, bottom trawl, beach seines and gillnets[68].

Data gaps and how to address them

The proportion of non-specified fish in exports may potentially originate from gillnet fisheries associated with bycatch causing conservation concerns for Hector's dolphin. For the species that are specified there are likely to be fewer cetacean bycatch issues.

Next steps

More detailed information on the species composition of exports would identify whether gillnets are involved in catches of these species.

NICARAGUA

Overview

The Nicaragua US export fishery was worth approximately US$ 0.5 million in 2015.

Main exports to US by weight

Exports are dominated by rock lobster and snapper (*Lutjanidae*), plus other crustacea and finfish (see below).

Proportion of exports to US from gillnet fishery

Gillnets are used to catch mackerel on the Pacific coast, a minor Nicaraguan export to the US.

Likely problem fisheries/products

On Nicaragua's Pacific coast, the fishery is 90% artisanal, using small boats < 15 m. Snapper is caught with lines and hooks by hand and longline of < 1 km, dolphinfish is caught by longline, spiny lobster (*Panulirus gracilis*) with multifilament yarn in rocky areas very close to the coast, flounder is fished with bottom trawls, at depths < 100 m for about 120 days/year.

On Nicaragua's Caribbean coast, snapper is caught with lines and hooks by hand and with longliners within the continental shelf, dorado with longliners in areas of depths < 200 m, spiny

[68] http://www.seachoice.org/wp-content/uploads/2011/12/MBA_SeafoodWatch_NZTaiSnapperReport.pdf

lobster (*Panulirus argus*) with pots, crabs (*Callinectes*) with traps and pots, grouper are are caught with hooks. There is also some shrimp trawling in the Caribbean. Local researchers report that there is little cetacean bycatch problem of note in Nicaraguan waters (Alejandro Cotto, pers. comm.). Young and Iudicello (2007) however note that there is likely bycatch associated with coastal and artisinal gillnet fisheries of Eastern Tropical Pacific nations, of which Nicaragua is one, although data are lacking.

Data gaps and how to address them

Whilst we have not received reports of significant bycatch in relation to Nicaragua's fisheries there may be undocumented problems which it would be helpful to clarify.

Next steps

It has been reported that fisheries in Nicaragua which export to the US do not have significant bycatch issues with marine mammals, largely because fisheries and cetaceans mostly do not overlap (Alejandro Cotto, pers. comm.). The fisheries authorities in Nicaragua have also stated that no products on the US import list have cetacean bycatch (Maria Amalia Porta, pers.comm.). However, given that there have also been concerns about the situation in Eastern Tropical Pacific nations' coastal fisheries, there is still a requirement for quantitative bycatch assessments.

NORWAY

Overview

The total Norwegian US export fishery was worth around US$ 109 million in 2015.

Main exports to US by weight

Around 29% of the export weight was identified as some form of haddock product with mackerel accounting for 25%. Cod accounted for around 14%. Other products include snow crab, mackerel, unspecified 'Groundfish'.

Proportion of exports to US from gillnet fishery

There are large inshore gillnet fisheries in Norway from around 6000 vessels. Much of this effort is targeting cod and monkfish.

Likely problem fisheries/products

Previous estimates of around 7000 harbour porpoise bycaught annually in Norwegian gillnet fisheries (Bjørge et al. 2013) were subsequently revised downwards to around 3000 due to using incorrect fishery effort in the original analysis (Bjørge et al., 2016). Norwegian waters were surveyed as part of the SCANS-III survey in 2016 but complex fjords where much of the bycatch occurs are difficult to survey. Total estimates for western coastal waters between Stavanger and Lofoten were around 24,000 with around 52,000 for areas south of Stavanger in the North Sea between Norway and Denmark[69]. Even if all Norwegian waters are considered to be one population, the bycatch in relation to abundance estimates is of conservation concern. Bjørge et al. (2016) note that the population structure of harbour porpoises in Norwegian waters is not well documented and there is evidence that the Norwegian harbour porpoise population is distinct from populations in the rest of Scandinavian and European waters (Andersen 2003). There are currently no mitigation measures in place to address marine mammal bycatch in Norway. Pingers are being considered but trials in some gillnet fisheries were not successful because the pingers did not survive the depth of deployment.

Data gaps and how to address them

The two main species caught in the gillnet fishery are cod and monkfish. Monkfish do not appear in the US import data but cod accounts for around 14%. There are other fisheries for cod including hand jigs, longline, purse-seine, Danish seine and demersal trawl. These are not believed to have a substantial bycatch and account for around 50% of cod landings. Thus the main uncertainty is whether cod from the gillnet fleet is exported to the US.

Next steps

[69] https://synergy.st-andrews.ac.uk/scans3/files/2017/05/SCANS-III-design-based-estimates-2017-05-12-final-revised.pdf

The available data show a bycatch in Norway that is high in relation to the population estimate on the west coast with no mitigation and rather unspecific plans to address the problem within the next few years. Whether imports from Norway will be subject to the new regulation will depend on the market pathways for cod.

PANAMA

Overview

Panama exported almost US $ 50 million of seafood to the US in 2015

Main exports to US by weight

Half of Panama's export by weight comprised large pelagics (dolphinfish, tuna species, swordfish), and a further quarter was snapper species.

Proportion of exports to US from gillnet fishery

Gillnet use does occur in Panamanian small-scale fisheries, but the proportion of fish exported to the US which is caught using gillnets appears to be quite low. **Likely problem fisheries/products**

Historically, underreporting has been a feature of Panamanian fisheries, with possibly 40% of catch unreported[70]. Panama fishes for yellowfin tuna in the ETP using purse-seines, but is under a US primary nation embargo covering yellowfin tuna products from this fishery[71]. Therefore the large pelagics exported from Panama to the US (dolphinfish, tuna and swordfish) are likely caught by longline. The dolphinfish and yellowfin tuna catches from this longline fishery are primarily for the US export market, and were, until December 2010, caught by both artisanal and industrial vessels. However legislation in 2010 and 2011 limiting the size of longlining vessels, the number of hooks, and only allowing lines to be hauled with handrollers have effectively changed the fishery to being artisanal only[72]. These measures were part of a Fishery Improvement Project (FIP), the aim of which is to increase the fishery's sustainability, at least in part to maintain favourable export status to the US. This does not in itself benefit cetaceans directly, but is a positive sign for the status of the fishery.

Panama's other main export to the US is snapper species. Anderson (2005) studied the snapper fisheries of the Las Perlas archipelago in Panama and noted that although they could be classed as 'artisanal' or 'subsistence' from their scale and the traditional practices used to catch the fish, (primarily by hook and hand-line in small wooden boats), the catch had considerable value and was transported out of the area for resale, including to the US. *Decreto Ejecutivo* No. 49 from in 1992 banned the fishing of any snapper using gillnets. Raab et al. (2005) also studied fisheries in the La Perla Archipelgo, indentifying nine different fishing techniques of which gillnetting was the most popular. This finding ran counter to their expectations about net use, which had been thought to be low. It is probable therefore that, whilst snapper are not targetted using gillnets specifically, the species is probably still caught in gillnets as this fishing method is common in small-scale fisheries in Panama. Young and Iudicello (2007) cite a study carried out by Palacios and Gerrodette (1996) looking at artisanal gillnet fishery cetacean bycatch levels in relation to estimates of small cetacean abundance in the ETP, which estimated an annual incidental mortality in artisanal gillnets of 3581 in Panama, however it is unclear if those estimates still apply.

Data gaps and how to address them

There is no cetacean bycatch information available for Panama, and although there seem to be some efforts to improve fisheries practices, more quantified data are required.

Next steps

[70] http://insider.si.edu/2014/07/scientists-say-panama-fish-catch-vastly-reported/

[71] http://www.nmfs.noaa.gov/pr/dolphinsafe/embargo2.htm

[72] http://cedepesca.net/promes/tuna-and-large-pelagics/panama-pacific-mahi-mahi-and-yellowfin-tuna/

Investigations thus far do not suggest any obvious export fisheries in Panama with serious bycatch issues, but given previous estimates, more data are needed.

PERU

Overview

In 2015, Peru exported nearly US$ 155 million dollars-worth of seafood to the US.

Main exports to US by weight

By weight, the main products (from a total of 22500 tonnes) specifically mentioned in the US import list are pelagic species: dolphinfish (>8,000 tonnes) and anchovy (>750 tonnes). However, much of Peru's export is classed as various types of non-specific seafood (>12,000 tonnes – 54%), and it is not known what these species are, or how they are caught.

Proportion of exports to US from gillnet fishery

Some products on the list are classed as groundfish, such as hake, but these are generally caught by trawl, not gillnets[73]. Small-scale driftnets in Peru are a serious problem for cetacean bycatch (see below), but it is unclear if any catch from this fishery is exported to the US.

Likely problem fisheries/products

Peru has a serious bycatch problem with its small-scale gillnet fleet. Operating over Peru's continental shelf and targeting shark and ray species, Young and Iudicello (2007) and Mangel et al. (2013) report the annual cetacean bycatch of the driftnet fleet to be 10,000 and 20,000 cetaceans (dusky dolphins, common dolphins, bottlenose dolphins, pilot whales and Burmeister's porpoises). Ministerial decrees in 1990 and 1994 and a national law in 1996 banning the capture of and trade in small cetaceans has likely limited the reporting of bycatch but not resolved the problem, with bycatch rates probably remaining at the same level as before the ban (see Young and Iudicello (2007) for more detailed information and bycatch data); harpooning dolphins for bait is also a serious and escalating issue (Young and Iudicello 2007, Mangel et al. 2013). The non-specificity in the US trade figures makes it difficult to tell if any of the products of this high-bycatch fishery make it to the US market. Peru is the world's leading producer of dolphinfish with over 50% of the total catch, and the United States is the top importer of dolphinfish from Peru[74]. Dolphinfish is primarly caught by longline, and no serious cetacean bycatch issues have been reported. Peru's other major specified export is anchovy, caught in purse-seines[75], where bycatch occurs, but is unquantified (Young and Iudicello 2007).

Data gaps and how to address them

There is clearly a problem in Peru with cetacean bycatch from small-scale gillnetting operations. Lack of detail in the US import data for Peru mean it is not possible to tell whether catch from this fishery is exported to the US. Data on this needs to be provided. Cetacean bycatch in the anchovy purse-seine fishery needs to be quantified.

Next steps

Focus should primarily be on whether the US is importing any seafood from the small-scale driftnet fishery, which has very high bycatch. For this, more detail in the import lists is required. Information is also lacking on a number of fisheries and there is a need for much better data regarding bycatch.

PHILIPPINES

Overview

The Philippines exported $US 212 million dollars of seafood to the US in 2015.

Main exports to US by weight

The main exports comprise tuna products (65% by weight), crab products (11% by weight) and

[73] http://www.fao.org/fishery/facp/PER/en

[74] http://perureports.com/2015/05/04/perus-first-mahi-mahi-fishing-prohibition-begins/

[75] http://www.seafish.org/rass/index.php/profiles/anchovy-in-north-central-peru-purse-seine/?ps=bycatch

non-specified seafood products (12% by weight).

Proportion of exports to US from gillnet fishery

Bottom-set nylon gillnets are used to catch crabs and there may also be some gillnetting for tuna.

Likely problem fisheries/products

Marine fisheries in the Phillippines comprise municipal (small-scale) and commercial fisheries, detemined on the basis of vessel gross tonnage. Coastal waters within 15 km from the shoreline are municipal waters and commercial fishing is not allowed within this area. The commercial sector commonly uses bagnets, purse-seines and ringnets for catching small pelagics while municipal fishers dominantly use gillnets, beach seines and round haul seines. Philippines fisheries land several species of tuna including yellowfin, bigeye and skipjack. The most common gears used by the commercial sector for catching them are purse-seines and ringnets, whilst municipal fishers use hook-and-line or handline. These methods are operated in conjunction with fish aggregating devices (FADs) locally known as payao (WPEA-OFMP 2012). The use of purse-seines, ringnets and handlines accounts for over 75% of annual tuna catch. In 2011 fishing methods comprised purse-seine, 48%; ringnet, 26%; handline, 10%; hook-and-line, 14% and other gears, 2%.

Tuna is caught throughout the Philippines, the most productive fishing grounds being the Sulu Sea, Moro Gulf and waters extending to the north Celebes Sea. Over 55% of the total skipjack and yellowfin catch is from waters around Mindanao. When the catch rates of tuna in Philippine waters started to decline in the late 1980s, Filipino fishing companies started to fish in international waters or high seas with a distant-water fleet. From 2002 to 2005, there was a bilateral tuna fishing agreement with Indonesia; more recently agreements have been negotiated with Papua New Guinea and other Pacific Island nations. No other fishing by foreign flag vessels is permitted in the Philippines EEZ, but IUU fishing does occur in Philippine waters, much of it involving tuna vessels. The Philippines was issued with an EU 'yellow card' in 2014 for failing to tackle IUU fishing, but by 2015 had carried out satisfactory reforms in its legal and governance systems[76].

Reeves et al. (2004) and Young and Iudicello (2007) describe significant bycatch issues in the Philippines tuna fisheries from large-mesh driftnets, purse-seines and round haul nets setting on FADs. These estimates were prior to the WCPFC ban on setting a purse seine net on a school of tuna associated with a cetacean. Bycatch problems have been reported to particularly affect small cetaceans such as spinner dolphins, pan-tropical spotted dolphins and Fraser's dolphins (*Lagenodelphis hosei*), with annual estimates of bycatch by single fisheries numbering hundreds or thousands of animals. Although data on all aspects of the fisheries and their bycatch are lacking, and monitoring is required, preliminary analyses suggested levels of bycatch were not sustainable (Young and Iudicello 2007). Tuna exports from the Philippines to the US comprise 65% of the total; its provenance and therefore any related bycatch issues, is unknown. The Philippines also imports tuna for processing/canning from other nations such as Taiwan: some of this may also be exported onwards to the US[77]

The crab net/trap (*matang quatro*) fishery in Malampaya Sound results in bycatch of the Philippines' only population of Irrawaddy dolphins (Reeves et al. 2004, Smith and Beasley 2004, Young and Iudicello 2007) The population is listed as Critically Endangered on the IUCN red list, with a population estimate of 77 animals (although this is probably lower). Mortality from entanglement in crab gillnets was likely to be above PBR and causing a decline in the population (Reeves et al. 2004, Smith and Beasley 2004, Young and Iudicello 2007). Crab

[76] http://europa.eu/rapid/press-release_IP-15-4806_en.htm

[77] http://www.worldfishing.net/news101/regional-focus/taiwan-lifts-fisheries-output

products comprise 11% of the Philippines seafood export to the US, although it is not known what proportion of this is from Malampaya Sound.

Data gaps and how to address them

Bycatch problems are known to have existed with both tuna and crab fisheries in the Philippines. Whilst monitoring is required to assess the current extent of the problems, it is already believed that bycatch was unsustainable and mitigation required. More data are required but unless there is evidence of a reduction in bycatch then mitigation is a priority.

Next steps

Crab and tuna imports from the Philippines into the US should both be investigated for potentially high levels of small cetacean bycatch.

PORTUGAL

Overview

The total Portuguese US export fishery was worth around US$ 9.9 million in 2015.

Main exports to US by weight

Sardines make up around 54% of Portuguese exports to the US by weight. This is followed by tuna which makes up around 15%.

Proportion of exports to US from gillnet fishery

The polyvalent fleet includes 372 vessels >12 m using gillnets/trammel nets. Portugal has gillnet fisheries, particularly along the south coast, and these have been associated with bycatch of bottlenose dolphin (ICES 2016) but do not appear to be involved in products exported to the US. Around 40% of stranded cetaceans in mainland Portugal showed confirmed evidence of mortality due to bycatch (ICES 2017). The three species with higher percentage of mortality due to incidental capture are common dolphin, harbour porpoise and bottlenose dolphin. Most stranded animals with evidence of bycatch showed signs of interaction with fixed gears, either gillnets or trammel nets (ICES 2015).

Likely problem fisheries/products

Sardines are mainly caught in purse-seine fisheries. This métier accounts for around 40% of the total landings in mainland Portugal. The cetacean species reported as bycatch in purse-seine fisheries in Portugal from observer programmes in 2014-16 was the common dolphin. Marçalo et al. (2015) estimate an annual mortality rate due to purse seining of 113 (95% CI 3–264) common dolphins, which is 0.63% of the most optimistic estimate of population size for the Portuguese fishing area (from SCANS II). Pinger trials have been conducted on purse-seine vessels fishing out of Portimão but the rate of interactions and mortality was higher with boats using pingers on their nets (ICES 2016). It is likely that sardine exports to the US are associated with common dolphin bycatch although the numbers involved and conservation implications have not been assessed.

Data gaps and how to address them

Details of mitigation measures and observer programmes including electronic monitoring are given in ICES (2016). The conservation implications of bycatch have not yet been fully assessed but a new population estimate for common dolphins is expected from the SCANSIII conducted in 2016. There is so far little evidence that the mitigation measures that have been investigated have been effective at reducing common dolphin bycatch.

Next steps

Portugal reports on bycatch monitoring and mitigation annually to the European Commission. These reports could be used to assess whether Portugal was meeting equivalent standards to the US with respect to cetacean bycatch in the purse-seine fishery for sardines.

RUSSIAN FEDERATION

Overview

The total fishery exports to the US from the Russian Federation was worth around US$ 303 million in 2015.

Main exports to US by weight

Crab (king and snow) account for 69% of products by weight. Cod, haddock and pollock combined account for a further 28%.

Proportion of exports to US from gillnet fishery

Crab are caught in pot fisheries whereas cod, haddock and pollock are caught in bottom and mid-water trawls. Salmon nets in the Sea of Okhotsk have been known to entangle bowhead whales (Shpak et al. 2014) and large numbers of Dall's porpoise (*Phocoenoides dalli*)(Perrin et al. 2001).

Likely problem fisheries/products

Pot fisheries can pose an entanglement risk to large whales and the crab fisheries overlap with potential North Pacific right whale (*Eubalaena japonica*) habitat. There have been cases of known and suspected entanglements (Burdin et al. 2004) in the Okhotsk Sea and Kuril Islands, involving at least four whales, but reporting rates are likely to be very low. There is no known cetacean bycatch associated with the Russian Barents Sea cod and haddock trawl fisheries.

Data gaps and how to address them

There are limited data on cetacean distribution in the areas of crab fisheries and even less information on bycatch and entanglement. As with other entanglements of large whales in pot gear, it is often difficult to identify the origin of the gear. Gray whales (*Eschrichtius robustus*) off Sakhalin island show high rates of scarring from encounters with fishing gear (Bradford et al. 2009), but the source fishery is not known.

Next steps

Gear marking is needed to identify the source of gear associated with large whale entanglements in the crab fishery.

SINGAPORE

Overview

Singapore's seafood export to the US was worth around US$ 9 million in 2015.

Main exports to US by weight

Singapore's exports to the US comprise swordfish and tuna.

Proportion of exports to US from gillnet fishery

Gillnet fishing is not a key element in Singapore's US exports.

Likely problem fisheries/products

Singapore has only two fishing ports, both of which are small – Jurong (an international port for foreign vessels to land their catch) and Senoko, the home base for the Singaporean fishing fleet which comprises four offshore and 35 inshore vessels [78]. There are very few data on Singaporean fisheries (e.g. no FAO fisheries profile), and it is assumed that the majority of fish landed and then exported from Singapore is from foreign vessels.

Data gaps and how to address them

Singaporean fisheries are small in international terms, and not well documented. The nation is unlikely to be aware or, or able to exercise much control over, any bycatch related to fish landed in its ports, but caught by foreign vessels.

Next steps

Singapore is data deficient, but probably does not merit any further action in regard to its cetacean bycatch.

SOLOMON IS.

Overview

The Solomon Islands exported $US 2.5 million dollars-worth of seafood to the US in 2015.

Main exports to US by weight

The whole export was non-specific tuna.

Proportion of exports to US from gillnet fishery

Tuna is not caught in gillnets in the Solomon Islands.

[78] http://www.ava.gov.sg/explore-by-sections/fisheries/fishery-ports/fishery-port-services

Likely problem fisheries/products

Both domestic and foreign distant water fleets operate in and around the Solomon Islands' waters, primarily fishing tuna; domestic vessels use purse-seine, pole-and-line and longlining[79]. The Solomon Islands was given a 'yellow card' by the EU in 2014, for taking insufficient action against IUU fishing in its waters. It undertook reforms in its legal and administrative framework, and the warning was lifted in 2017[80]. In 2016 some of the Solomon Islands' skipjack and yellowfin purse-seine and pole-and-line fisheries achieved Marine Stewardship Council (MSC) certification (SPC 2016), and the tuna longline fishery is engaged in a Fisheries Improvement Project (FIP)[81]. These measures do not necessarily mean very much for cetacean bycatch, but should improve monitoring and management generally, which would be useful in an area when observer coverage has generally been slight, and bycatch data lacking[82] (Miller 2007).

Data gaps and how to address them

Low observer coverage means there are few data on the Solomon Islands' fisheries. Generally, pole-and-line fishing is not a concern in terms of cetacean bycatch, but there is potential for bycatch associated with longlining, purse-seines nets and FADs. Solomon Islands is a member of the Western and Central Pacific Fisheries Commission (WCPFC). Conservation and Management Measure 2011-03 of the WCPFC prohibits setting a purse seine net on a school of tuna associated with a cetacean and requires any accidentally encircled cetaceans to be released and reported. **Next steps**

More details are required on the purse-seine fishery to assess compliance with the WCPFC measures. The WCPFC launched a Bycatch Management Information System (BMIS) in July 2017. The BMIS could provide information on compliance with the ban on purse seine sets associated with cetaceans.

SOUTH AFRICA

Overview

The total South African US export fishery was worth around US$ 31 million in 2015.

Main exports to US by weight

By both weight and monetary value, South Africa's main export product is rock lobster (the species and provenance are not clear in all the data), although tuna, toothfish and some groundfish are also exported.

Proportion of exports to US from gillnet fishery

Seafood products fished using gillnets are not key exports from South Africa to the US.

Likely problem fisheries/products

In South Africa, large whale entanglements are primarily caused by static fishing gear, chiefly from the West Coast rock lobster *Jasus lalandii* industry (WCRL); large-mesh gillnets set off KwaZulu-Natal (KZN) to reduce the risk of shark attacks are also a source of entanglement (Simon Elwen, pers. comm., Samantha Peterson, pers. comm., Meÿer et al. (2011)). Meÿer et al. (2011) report 96 records of large whale entanglement in fishing gear between 1975 and 2009, 60% of which were Southern right whales, 17% humpback whales and 23% unidentified; when gear could be idenitifed, 74% was static bottom-deployed fisheries gear. There have been changes in spatial and temporal overlap between the lobster fisheries and whales in recent years, and an increase in entanglements from the late 1990s, at least partially due to whale population recoveries in the area (Meÿer et al. 2011). In 2016, there was a large increase in the number of whales entangled to 24 in that year. These were mainly humpback and Bryde's whales, although not all entanglements were associated with the WCRL (McCue et

[79] http://www.fao.org/fi/oldsite/FCP/en/slb/profile.htm

[80] https://ec.europa.eu/fisheries/fighting-illegal-fishing-commission-lifts-yellow-cards-cura%C3%A7ao-and-solomon-islands_en

[81] http://www.trimarinegroup.com/resources/papers/SI-FIP-Promotional.pdf

[82] http://www.tuna-org.org/Documents/Aus/ngo/WDCS%20Views%20Paper-ENG.pdf

al. 2017). Southern right whale entanglements have declined recently, but Meÿer et al. (2016) note that this may largely be due to the almost complete disappearance of single right whales along the South African coastline in recent years. Irrespective of whale entanglement issues, the WCRL fishery itself is considered to be unsustainable, due to both legal and illegal fishing; in late 2016, the South African Sustainable Seafood Initiative (SASSI) red listed WCRL as being an unsustainably fished resource[83]. Management of the fishery is currently thought to be inadequate, but suggested reduction in fisheries effort would be beneficial for both the lobsters and the whales.

There are also anecdotal reports of negative interactions between killer whales and pelagic longline vessels targeting swordfish and tuna. It is reported that fishers have shot at killer whales, however the extent of these associations are unknown due the absence of observers on local vessels (Monica Betts, pers. comm.).

Data gaps and how to address them

The US fisheries data do not state what proportion of lobster imported is WCRL, so more detail on that would be helpful. More recent whale bycatch data from the fishery would also be useful, however it would be expected that unless management and mitigation is enacted, bycatch will be increasing, if only due to an increase in whale numbers in the area.

Next steps

There are several mitigation methods available for addressing large whale entanglement in static fishing gear including gear modifications and effort reduction. These should be considered in conjunction with the wider management of the WCRL fishery.

SOUTH KOREA (REPUBLIC OF)

Overview

The total US export fishery from Republic of Korea was worth around US$ 87 million in 2015.

Main exports to US by weight

Exports include a large variety of fish and crustacea with a high proportion (39%) of non-specified, mackerel (15%), toothfish (13%), crab (mainly snow) (10%), tuna (10%) and pollock (4%).

Proportion of exports to US from gillnet fishery

Korea has a varied fishery including set nets, pots and gillnets but also substantial offshore trawl fisheries.

Likely problem fisheries/products

Pelagic species such as anchovies, mackerel, and squid still dominate the catches from the coastal and offshore waters. The major species caught by the distant water fisheries are the Alaska Pollock and tuna[84]. In 2011-12, 12 cetacean species were reported as bycatch in Korea. The finless porpoise was the dominant species, followed by the common dolphin, harbour porpoise, and Pacific white-sided dolphin (*Lagenorhynchus obliquidens*). Bycaught baleen whales were mainly minke but also Bryde's and humpback (Kim et al. 2013). Set nets, pots and gillnet fisheries have all been responsible for minke whale bycatch in Korea. Cetacean bycatch can be legally sold if reported to the appropriate authorities and thus levels of reporting may be higher than elsewhere (Song et al. 2010). In addition, market surveys have been conducted to also provide bycatch estimates (Baker et al. 2006). Song (2014) evaluated bycatch in Korea relative to PBR for minke whale, finless porpoise, Indo-Pacific bottlenose dolphin and Western gray whale. For all these populations bycatch was in excess of PBR.

Data gaps and how to address them

Korea has well documented bycatch problems with estimates that are in excess of PBR for species where it has been possible to make an assessment. Other species such as common

[83] http://wwfsassi.co.za/west-coast-rock-lobster-is-now-red-listed/

[84] http://www.fao.org/fi/oldsite/FCP/en/KOR/profile.htm

dolphin and harbour porpoise are reported as bycaught but have not been assessed due to lack of data (Song, 2014). Bycatch data are lacking for offshore trawling.

Next steps

There are several cetacean populations in Korea for which bycatch is a conservation concern. Some of the fisheries involved may contribute to the unspecified exports to the US. This needs further investigation.

SPAIN

Overview

The total Spanish US export fishery was worth around US$ 35.7 million in 2015. Of this bluefin tuna accounted for over US$ 10 million.

Main exports to US by weight

Exports were dominated by tuna, swordfish and bonito (44%), non-specified crustacea (14%) anchovy (8%), sardine (6%), horse mackerel (3%). Other products include toothfish, flatfish and groundfish.

Proportion of exports to US from gillnet fishery

Spain has a gillnet fleet with a documented catch of common dolphins in ICES Division 8a and harbour porpoises in ICES Divisions 8ab (ICES 2016). Galicia (NW Spain) is the main fishing region of Spain with over 6000 vessels in 1997. This includes coastal gillnets and offshore pair trawlers.

Likely problem fisheries/products

Pair trawlers off Galicia target mainly blue whiting (*Micromesistius poutassou*), along with mackerel (*Scomber scombrus*), hake (*Merluccius merluccius*), and horse mackerel (*Trachurus spp.*) as secondary targets. Common dolphin bycatch is frequently reported from pair trawlers and Fernández-Contreras et al. (2010) concluded that the total rate of bycatch by all fleets operating in the area is almost certainly unsustainable. Lopez et al. (2003) also suggested that bycatches of common dolphin and bottlenose dolphin may be unsustainably high in Galician fisheries. ICES (2016) summarises bycatch data for Spain up until 2016. Much of this information comes from strandings and so is difficult to attribute to specific fisheries.
Bluefin tuna are caught by purse-seine fisheries with quotas set by ICCAT shared between Spain, France, Italy, Croatia, Greece, Portugal, Malta, and Cyprus. In recent years the Spanish bluefin fleet has caught its annual quota in just a few days of fishing.

Data gaps and how to address them

Despite the monitoring requirements under EU Regulation 812/2004, there has been no bycatch monitoring since 2010 (ICES 2016). Current Spanish purse-seine tuna fisheries have a very limited season and do not appear to be associated with cetacean bycatch, but limited information is available.

Next steps

Spain has some identified bycatch problems associated with gillnets and pair-trawls in Galicia. The primary target species of these fisheries does not appear to be exported to the US but horse mackerel, which is caught, makes up 3% of exports. There is a need for further bycatch monitoring and reporting under EU Regulation 812/2004.

SRI LANKA

Overview

Sri Lanka's US seafood exports in 2015 totalled approximately US$ 54 million.

Main exports to US by weight

Exports are dominated by tuna, in particular yellowfin tuna.

Proportion of exports to US from gillnet fishery

The primary method used by Sri Lankan fishermen for catching both tuna and swordfish, which is also exported, is drift gillnets (Anouk Illangakoon, pers. comm.). Gillnets have long been the primary source of cetacean bycatch in Sri Lanka, a nation which has been reported to have considerable bycatch issues (many thousands of animals per year), although there are

significant data deficiencies (Anouk Illangakoon, pers. comm.; Young and Iudicello (2007); Gillet (2011), Ilangakoon (2012); Reeves et al. (2013)). An unfortunate side effect of the legal protection afforded to cetaceans in Sri Lanka, is that bycatch is often not reported (Anouk Illangakoon, pers. comm.).

Likely problem fisheries/products

Sri Lanka has high cetacean species richness, with spinner dolphins, distributed around the island both coastally and offshore, being the most common species. The primary threat to cetaceans in Sri Lanka is fishing, and some research indicates over 50% of cetaceans caught are spinner dolphins (Ilangakoon 2012). Tuna and swordfish products, which comprise the majority of Sri Lanka's exports, are a particular problem, as they are largely caught by drift gillnetting, and spinner dolphins are known to associate with tuna schools. Direct hunting of cetaceans in Sri Lanka is also a problem, and probably increasing (Anouk Illangakoon, pers. comm., Ilangakoon (2012)). Sri Lanka is a member of IOTC. IOTC banned the use of large-scale (longer than 2.5km) drift-nets on the high seas areas of the Indian Ocean in 2012, but this did not apply to EEZs. In May 2017 IOTC passed Resolution 17/07 which called on parties to take all measures necessary to prohibit their fishing vessels from using large-scale driftnets in the entire IOTC area of competence by 1 January 2022. Following an objection by Pakistan, the status of this Resolution will not be confirmed until 02/11/2017.

Data gaps and how to address them

Cetacean research in Sri Lanka has been conducted since the 1980s (with bycatch also documented since that time) but has been sporadic and patchy (Ilangakoon 2012). In general more long-term, structured cetacean research would be beneficial in Sri Lanka, and indeed in the wider Northern Indian Ocean, which has high levels of data deficiency. With particular reference to byctach, all cetaceans have national legal protection under Sri Lankan law, although enforcement is rare. Fishermen are aware of the law, and so bycatch is usually hidden, disposed of it at sea or used as bait (Anouk Illangakoon, pers. comm.). At-sea observer and monitoring programs, as well as better law enforcement would be required to address this.

Next steps

The difficulties with fisheries management and bycatch reporting in Sri Lanka are likely to cause problems in assessing the nation's exports to the US. Given that serious bycatch problems have been known about, albeit poorly documented, in Sri Lanka for many years, it would be appropriate for bycatch mitigation strategies to be implemented, particularly in tuna drift gillnet fisheries, regardless of data if export to the US is to continue

SURINAME

Overview

Suriname exported over US$ 26 million dollars of seafood to the US in 2015.

Main exports to US by weight

42% of Suriname's exports in 2015 comprised non-specific marine fish. A further 26% was tuna (mostly yellowfin), 23% snapper, and a small amount of grouper and mackerel.

Proportion of exports to US from gillnet fishery

Unknown: the snapper is likely caught by hook and line, but the other products cannot be detemined**.**

Likely problem fisheries/products

According to Hornby et al (2015), in 2005 977 artisanal and 169 industrial vessels were operating in the waters of Suriname. The FAO reports the total number of vessels reported in 2010 to be around 950[85]. These comprise artisanal (small-scale, commercial), industrial (large-scale, commercial) and a subsistence fishery. The artisanal fishery usually operates in near-

[85] http://www.fao.org/fishery/facp/SUR/en

shore coastal waters, river mouths and brackish waters catching finfish and shrimp, and using using Chinese seines, longlines, pin seines, dragnets beach seines and gillnets. The industrial fishery operates from around 20 m of depth, to the edge of the continental shelf. Suriname's fisheries are multi- species, multi-gear, including trawlers, snapper boats, open or closed wooden vessels and canoes. According to the FAO, 75 % of the fish catch is caught by the artisanal fleet although other fisheries are developing[86]. Hornby et al (2015), report that it is thought that some boats from Guyana are fishing illegally in Suriname's EEZ and landing their catch in Guyana. The fishery for snapper species is dominated by Venezuelan distant water fleets which are required to land part of their catch in Suriname, which considers the catch to be domestic, but there are no data on how well this system works. In 2005, there were 43 Venezuelan hook and line vessels fishing red snapper and 15 targeting mackerel species. There are also reports that Guyanan and Venezuelan boats are illegally targetting tuna in Suriname's waters[87]. According to the FAO, tuna catches began to be reported in 2012 in Suriname and reached 4700 tonnes in 2015[88], but it is not known how this tuna is caught is caught.

Data gaps and how to address them

Tuna seems to be quite new to fishing in Suriname and comprises 26% of its seafood export to the US; however it is not known how it is caught, and this information is requried in order to assess the bycatch risk. It is likely that snapper exported from Suriname is in fact being caught by Venezuelan vessels by hook and line. This method should not result in a high bycatch risk, but no data are available. More information is needed on what products comprise the 42% of exports which are not specified.

Next steps

It is not possible to determine from the amount of data available whether Suriname's tuna, snapper and non-specific seafood exports present a bycatch risk, so further investigation is warranted.

THAILAND

Overview

In 2015 the US imported just over $US 500 million dollars-worth of seafood from Thailand.

Main exports to US by weight

85% of Thailand's exports to the US were tuna products (mostly non-specific). The remainder was crab products, a variety of finfish and also some groundfish and flat fish which were likely imported into Thailand from their countries of origin for processing then re-export**,** as Thailand is also one of the world's major fish processing nations (FAO 2016). A significant but unknown proportion of Thailand's tuna export is also the product of reprocessing, rather than of Thai origin[89].

Proportion of exports to US from gillnet fishery

As much of Thailand's tuna export is actually post-processing re-export, it is not possible to determine the proportion that might have been caught in drift gillnets. However, given that Thailand imports tuna from Taiwan, China, Japan, and South Korea, as well as from the US [90], it is likely that some of this was caught in drift gillnets.

Likely problem fisheries/products

[86] http://www.fao.org/fishery/facp/SUR/en

[87] http://www.kaieteurnewsonline.com/2012/09/23/guyanese-stealing-surinames-fish-grounds-de-ware-tijd/

[88] http://www.fao.org/fishery/facp/SUR/en

[89] http://www.fao.org/fishery/facp/THA/en

[90] http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/agriculture-and-food-market-information-by-region/asia/market-intelligence/inside-thailand-the-fish-and-seafood-trade/?id=1433861767469

According to the FAO[91], Thailand has both small-scale and commercial fisheries. The commercial fisheries have vessels with inboard engines, which can fish offshore for several days in a row, using gear such as trawls, purse-seines, encircling gillnets and large drift nets. Small-scale fisheries vessels have small or no engines, operate close to shore and use traditional fishing gear such as small trawls, gillnets, push nets, lift nets, set bag nets, traps, hook-and-line and other stationary gears that operate in estuaries, bays and inshore waters. In 2000, the total number of fishing boats in Thailand was 58 119 of which 80% were small-scale. However, commercial fisheries account of 90% of Thailand's total marine catch; only 60% of Thailand's total marine catch is caught in Thai waters (41 % in the Gulf of Thailand and 19 % Andaman Sea). The rest is from waters outside the Thai EEZ [92]. Recently the number of fishing boats has significantly reduced in reponse to EU intervention (see below), and subsequent regulation.

Thailand's fisheries are known to be problematic in several ways. In 2015, the EU issued Thailand with a 'yellow card' because of, according to the EU, 'its inadequate fisheries legal framework and poor monitoring, control and traceability systems.' This warning is still in force and 'the dialogue is proving difficult and there remain serious concerns about the steps taken by Thailand to fight IUU fishing activities. This means that further action by the Commission cannot be ruled out'[93]. There also reports of human rights abuses onboard Thai vessels fishing illegally in remote areas [9495]. Although improvements are reported to be taking place, such as increased procedures, regulations and reporting (Saisunee Chaksuin pers.comm.), current circumstances do not provide an environment conducive to cetacean bycatch monitoring and mitigation.

Any bycatch information available is largely from small-scale fisheries in Thailand. According to Young and Iudicello (2007) the Irrawaddy dolphin, finless porpoise, and Indo-Pacific humpback dolphin are the species most impacted by bycatch in gillnets. Teh et al. (2015) report that Irrawaddy dolphin populations in the Songkhla area of Thailand are at high risk of entanglement in gillnets, and that interviews conducted along the eastern Gulf of Thailand between 2003 and 2014 indicated an unsustainable level of bycatch. In Trat province, dolphins are bycaught in commercial trawl boats, commercial floating seine boats, gillnets (crab, shrimp, and fish), ropes connecting fishing gears to buoys, and ropes of octopus traps. Teh et al. (2015) also report that Indo-Pacific humpback dolphins in Thailand have been caught in gillnets and stake traps, although the latter are now illegal.

An FIP is being implemented for blue swimming crab, including some research on bycatch. An FIP for Thai Tonggol (Northern bluefin/longtail tuna) is also being developed (Pakawan Talawat, pers.comm.).

Data gaps and how to address them

Assessing Thailand's exports to the US under the MMPA rule is difficult, partly because of their levels of IUU fishing resulting in poor documentation, and partly because so much of what they export is processed seafood originally from other countries.

Next steps

It may be easier to tackle any bycatch issues from the nations importing seafood into Thailand for processing under the MMPA Intermediary Nations provision, rather than in Thailand's own

[91] http://www.fao.org/fishery/facp/THA/en

[92] http://www.fao.org/fishery/facp/THA/en

[93] http://europa.eu/rapid/press-release_IP-16-1457_en.htm

[94] https://www.theguardian.com/global-development/2016/dec/15/thai-fishing-industry-human-rights-abuses-continue-in-unpoliced-waters-greenpeace-claims

[95] https://www.theguardian.com/global-development/2017/mar/30/thailand-failing-to-stamp-out-murder-slavery-fishing-industry-starvation-forced-labour-trafficking

fisheries. As it is thought that much of the tuna imported into Thailand for processing is from the US, indentifying and eliminating this from further investigations would be a good start.

TONGA

Overview

Tonga's seafood exports to the US in 2015 were worth $US 1.4 million.

Main exports to US by weight

Tonga's main exports comprised 34% snapper (*Lutjanidae* spp.), 30% dolphinfish, 21% yellowfin tuna, 11% non-specific marine fish.

Proportion of exports to US from gillnet fishery

None of the listed exports is caught using gillnets.

Likely problem fisheries/products

Most Tongan boats are either dedicated tuna longliners or snapper dropliners[96].

Other offshore pelagics (such as dolphinfish) are also caught with longlines[97]. The dropline deepwater fishery (using weighted lines with baited hooks attached) targets *Lutjanidae* (snappers), *Lethrinidae* (emperors) and *Serranidae* (groupers). Dropline bottom fishing occurs at depths from 50 to 450 m over banks and seamounts[98]. There is a management plan in place for the dropline fishery with an aim of ensuring its sustainabilty. Although it is thought that the environmental impact of the fishery is low, monitoring for bycatch is said to occur, although no data were found[99]. On a wider regional scale, there is generally scant observer coverage of Pacific Island fisheries, and consequently few bycatch data[100] (Miller 2007).

Data gaps and how to address them

Whilst there do not seem to be any monitoring or observer data for Tonga to assess cetacean bycatch, given the fishing methods used, it is unlikely to be a significant problem.

Next steps

Tonga is unlikely to require further investigation.

TRINIDAD & TOBAGO

Overview

In 2015, Trinidad & Tobago exported over US$ 41 million dollars-worth of seafood to the US.

Main exports to US by weight

About half of Trinidad & Tobago's export was yellowfin tuna, and a further quarter was snapper. The remaining export comprised other finfish such as dolphinfish and grouper.

Proportion of exports to US from gillnet fishery

According to FAO information, both the artisanal and semi-industrial fishing fleets of Trinidad and Tobago use gillnets (amongst other methods) to catch finfish. It is therefore likely (but unquantified) that at least some of Trinidad & Tobago's finfish export is caught using gillnets.

Likely problem fisheries/products

Trinidad and Tobago has a multi-species, multi-gear, multi-fleet fleet fishery which comprises artisanal, semi-industrial and industrial vessels (Mohammed et al. 2011, Mohammed and Lindop 2015). 2005 FAO data state that inshore artisanal fishing contributes between 75-80% of marine fish landings. The artisanal fleet uses gillnets, fish traps, trolling, a-la-vive (hand line fishing with live bait), and manually operated demersal and pelagic longlines. The semi-industrial fleet fishes for demersal and pelagic species and operates in the offshore areas

[96] http://www.tongafish.gov.to/images/documents/Management%20Plans/Deepwater%20Management%20Plan%20for%20Tonga%202014%20-%202016%202.pdf

[97] http://www.fao.org/fi/oldsite/FCP/en/ton/profile.htm

[98] http://www.tongafish.gov.to/images/documents/Management%20Plans/Deepwater%20Management%20Plan%20for%20Tonga%202014%20-%202016%202.pdf

[99] http://www.tongafish.gov.to/images/documents/Management%20Plans/Deepwater%20Management%20Plan%20for%20Tonga%202014%20-%202016%202.pdf

[100] http://www.tuna-org.org/Documents/Aus/ngo/WDCS%20Views%20Paper-ENG.pdf

primarily using pelagic and demersal longlining, gillnetting and fish trapping, with catches including tuna species, swordfish and other billfish species, king fish, dolphinfish, tile fish, snapper species, groupers and sharks. The industrial fleet comprises double-rigged shrimp trawlers. Of these fishing methods, it is primarily gillnets which are likely to be a problem. Bottlenose dolphins, pantropical spotted dolphins and spinner dolphins have all been observed around Trinidad and Tobago (Boisseau et al. 2006). There are few reports of cetacean bycatch, but Young and Iudicello (2007) report that a killer whale drowned in a driftnet in Trinidad waters of the Gulf of Paria and that bottlenose dolphins have been entangled in both gillnet and trawl fisheries in Trinidad. Trinidad and Tobago was given a 'yellow card' by the EU in April 2016 for lack of cooperation in the fight against IUU fisheries. According to the EU 'Trinidad and Tobago…has a large fleet operating internationally where authorities do not control or inspect foreign vessels, nor cooperate with relevant flag States. The poor traceability system also causes the risk of laundering of fisheries products.'[101]

Data gaps and how to address them

Of the range of fish species exported to the US from Trinidad & Tobago it would be useful to identify what was caught using gillnets, as this is the fishery most likely to cause problems, although few bycatch data are available (and these would be useful).

Next steps

Trinidad & Tobago should supply data on the fishing methods use for their exported fish, to enable bycatch assessments to be made.

TUNISIA

Overview

The total Tunisian US export fishery was worth around US$ 1.3 million in 2015.

Main exports to US by weight

Exports were dominated by sardine (46%) and mackerel (28%).

Proportion of exports to US from gillnet fishery

Tunisia has gillnet and purse-seine fisheries. The artisanal fleet contained around 10,000 vessels in 2008.

Likely problem fisheries/products

Bycatch of minke and fin whales has been reported, but the most impacted species appears to be bottlenose dolphins (Karaa et al. 2011). Purse-seine fisheries for small pelagics are associated with dolphin bycatch.

Data gaps and how to address them

ACCOBAMS/GFCM have two pilot projects in Tunisia within the project aiming to mitigate interactions between endangered marine species (including cetaceans) and fishing activities. The objective of the project off Kelibia includes mitigating cetacean bycatch and depredation in purse-seine small pelagic fisheries. Another project in the Gulf of Gabès aims to address these issues in surface and bottom longline fisheries.

Next steps

Sardine fisheries in Tunisia are associated with bycatch of bottlenose dolphin and occasionally other cetaceans, but limited data are available. A localized project (Kelibia), expected to be completed in 2017, may help assess the overall bycatch in Tunisian purse-seines for small pelagics.

TURKEY

Overview

Turkey's seafood exports to the US in 2015 totalled nearly $ US 19 million.

Main exports to US by weight

Out of an export by weight of about 2500 tonnes of seafood, about 2000 tonnes was sea bass. The remainder was mostly non-specified.

[101] http://europa.eu/rapid/press-release_IP-16-1457_en.htm

Proportion of exports to US from gillnet fishery
Sea bass from Turkey is farmed.
Likely problem fisheries/products
Turkey is one of Europe's top sea bass farming nations. The intensive farming of sea bass as carried out in Turkey does cause some environmental concerns but cetacean bycatch is not one of them[102]. The turbot fishery in the western Black Sea coast is considered a possible cause of harbour porpoise bycatch observed through strandings (ACCOBAMS 2015).
Data gaps and how to address them
Turkey does export some seafood that is not farmed sea bass, albeit in small quantities. Turkey has in the past been associated with illegal driftnetting, and whilst this has officially ceased, these activities may still be continuing; it is not possible from the US import data to ascertain what the non-specified fish products are, or their provenance (Baulch et al. 2014).
Next steps
The majority of Turkey's exports are from aquaculture, and the remainder is not traceable.

UNITED ARAB EMIRATES

Overview
The total US export fishery from United Arab Emirates (UAE) was worth around US$ 1.3 million in 2015.
Main exports to US by weight
Exports were dominated by rock lobster (38%) and shrimp (28%).
Proportion of exports to US from gillnet fishery
The fisheries of the UAE are entirely artisanal in nature. Trawls and driftnets are banned[103]. The dominant lobster in the market is *P. homarus* which is imported in significant quantities from the Sultanate of Oman.
Likely problem fisheries/products
Although Oman does not export much to the US, it appears that rock lobster caught in Oman may be exported to the US through UAE. There is a National Strandings Committee in Oman which holds records of bycatch. From direct data as well as from indirect evidence (e.g. entanglement scars on large whales), there is evidence that bycatch is an issue for many species. Rock lobster are caught in tangle nets which are gillnets modified for that purpose. Shrimp are also caught in Oman, sometimes using gillnets and these may also be exported to UAE.
Data gaps and how to address them
There is limited data from the region on cetaceans generally but it seems most likely that a substantial proportion of the exports from UAE are caught in Oman. There is particular concern over the status of the Arabian Sea humpback whale population which may be at risk from gillnet fisheries.
Next steps
Some of the export from Oman to UAE is likely to be undocumented. Using the MMPA regulations to apply pressure to address bycatch in Oman through imports via UAE may be challenging.

UNITED KINGDOM

Overview
The total US export fishery from the UK was worth around US$ 10.4 million in 2015.
Main exports to US by weight
Exports are dominated by sardine and herring (44%), toothfish (16%), mackerel (11%), halibut (2%) and sea bass (2%). 15% was non-specified fish.
Proportion of exports to US from gillnet fishery

[102] http://www.fao.org/fishery/countrysector/naso_turkey/en
[103] http://www.fao.org/fi/oldsite/FCP/en/are/profile.htm

UK fisheries use gillnets in the southern North Sea, Channel and Celtic Shelf. There were 32 UK registered vessels of over 12m using gillnets in areas where pinger use is required under EU Regulation 812/2004 in 2014. There is also a substantial fleet of smaller (<12m) vessels using gillnets which are not monitored or required to use pingers (Northridge et al. 2015).

Likely problem fisheries/products

The cetacean species most subject to incidental takes are common dolphin and harbour porpoise. In 2014 it was estimated that between 1400 and 1700 porpoises and just under 300 common dolphins were bycaught in UK fishing nets. In 2014, all reported bycatches from observer monitoring programmes were in set gillnets and there were none in pelagic trawls. Sampling of the main pelagic trawl fisheries for mackerel and herring over a number of years has shown low bycatch rates (Northridge et al. 2015). The winter fishery for sea bass in the English Channel using pair trawls had an observed incidental take of 428 common dolphins between 2000/01 and 2005/06 (Northridge 2006) but there was very little effort in 2014 and this fishery was closed in 2015 due to concerns over the sea bass stock.

Data gaps and how to address them

Pelagic trawls for sardine, herring and mackerel have been found from observer programmes to have a low bycatch rate. There remain sectors of the UK fleet using gillnets that are not subject to monitoring or mitigation under EU Regulation 812/2004. This means estimates of total bycatch are subject to a number of caveats. There are concerns over the total impact of bycatch on common dolphin populations in the NE Atlantic (Mannocci et al. 2012).

Next steps

UK reports annually on monitoring and mitigation under EU Regulation 812/2004. Currently there do not appear to be exports to the US that are associated with high levels of bycatch. If the winter fishery for sea bass in the English Channel were to re-open then this would need to be monitored closely. The source of the 15% of exports which are unspecified fish should also be clarified.

VANUATU

Overview

Vanuatu exported $US 1.2 million dollars-worth of seafood to the US in 2015.

Main exports to US by weight

85% of exports comprised swordfish; the remainder was bigeye tuna.

Proportion of exports to US from gillnet fishery

Tuna and swordfish are not caught using gillnets in Vanuatu.

Likely problem fisheries/products

Vanuatu fishes for tuna and tuna-like pelgaics predominantly using longlines, but also purse-seines. There is also substantial foreign fishing vessel presence in its waters. Purse-seiners set on both unassociated and associated schools, and also use FADs. Vanuatu established the National Observer and Port Sampling Program in 2008. Since 2010, Vanuatu has had 100% observer coverage on locally-based foreign fishing vessels and 100% port sampling on all unloading of fresh fish including trans-shipment in port. However, there is still very limited observer coverage for the Fiji and Solomon Island based fleets operating in the Vanuatu EEZ[104].

In 2013 Vanuatu was issued with 'yellow card' by the EU for poor control of fishing activities by its flagged vessels, operating both locally and foreign-based. Vanuatu improved its monitoring programmes and legal framework to combat IUU fishing, and the yellow card was withdrawn in 2014[105]. Vanuatu was awarded a certificate of recognition by the FAO for its commitment to

[104] https://www.wcpfc.int/system/files/AR-CCM-28%20VANUATU%20PART%201%20Rev%203%20(23%20September%202016).pdf

[105] http://europa.eu/rapid/press-release_IP-16-1457_en.htm

fighting illegal fishing worldwide in 2016[106].There are records since 2012 of marine mammal bycatch by the Vanuatu national fleet in the Western and Central Pacific Fisheries area. The gear is not specified, but is assumed to be longlines and purse-seines. Bycatch ranges from one animal in 2015 to 11 animals in 2013, and species include false killer whales, spinner dolphins, bottlenose dolphins and Risso's dolphins[107].

Data gaps and how to address them

Adequate data appear to be available on Vanuatu's fisheries, including cetacean bycatch numbers.

Next steps

Although bycatch has been recorded in Vanuatu's fisheries, there is probably no need for further investigation.

VENEZUELA

Overview

Venezuela's seafood exports to the US in 2015 totalled approximately $ US 34.5 million.

Main exports to US by weight

About 60 % of exports by weight were swimming crab (*Portunidae* and *Callinectes*), and a further 20% was tuna (yellowfin and bigeye). The remainder was grouper, snapper and shrimp.

Proportion of exports to US from gillnet fishery

The majority of exports (crab and tuna) are not caught with gillnets. There is a possibility that the snapper and grouper are, but they form a small percentage of the export.

Likely problem fisheries/products

From strandings, Bolaños-Jiménez et al. (2014) reported 23 cetacean species to be present in Venezuela. Swimming crab in Venezuela is primarily caught using small mesh cages, and also with long baited lines (Oesterling and Petrocci 1995), which are not a cetacean bycatch risk. Venezuela fishes for yellowfin tuna in the ETP using purse-seines, but is under a US primary nation embargo covering yellowfin tuna products that from this fishery[108]. It is therefore expected that the tuna catch will be from longlines. The Venezuelan Pelagic Longline Observer Program (VPLOP) , sponsored by the Enhanced Research Program for Billfish of the International Commission for the Conservation of Atlantic Tunas (ICCAT) started in 1991 to monitor billfish (including swordfish) catches from the Venezuelan pelagic longline (industrial) vessels targeting tuna species and swordfish in the Caribbean Sea and adjacent waters of the Atlantic Ocean (Arocha et al. 2013). Although the program did not require encounters with marine mammals to be recorded, it was noted that these encounters were rare (Arocha et al. 2013).

Bolaños-Jiménez et al. (2014) identified interaction with fisheries, direct takes and ship strikes as the probable cause of stranding/death for 59% of the cases included in their review of cetacean strandings and mortality in Venezuela between 1988-2014. The Guiana dolphin (*Sotalia guianensis),* both in the Orinoco river basin and all along the mainland, the pink river dolphin (*Inia geoffrensis)*, in the Orinoco river, both from bycatch and intentional captures related to the fisheries of the mapurite catfish (*Calophysus macropterus*), and the long-beaked common dolphin (*Delphinus sp*.) in northeastern Venezuela are thought to be the most vulnerable species to bycatch in Venezuela, but this is all from artisanal rather than commercial fisheries (Jaime Bolaños-Jiménez, pers. comm.).

Data gaps and how to address them

[106] http://dailypost.vu/news/vanuatu-receives-fao-award-for-fighting-iuu-fishing/article_eb6e4e99-2d07-56a3-a292-ec273a7288da.html

[107] https://www.wcpfc.int/system/files/AR-CCM-28%20VANUATU%20PART%201%20Rev%203%20(23%20September%202016).pdf

[108] http://www.nmfs.noaa.gov/pr/dolphinsafe/embargo2.htm

From the available information, the main exports of swimming crab and tuna species would to be of low bycatch risk, although more information on the snapper and grouper exports would be useful.

Next steps

For the majority of its exports, Venezuela should not require further investigation, although problems exist in the artisanal fisheries.

VIETNAM

Overview

The US import from Vietnam in 2015 was over US$ 325 million dollars.

Main exports to US by weight

By weight, the main exports were large pelagics (chiefly tuna species (yellowfin, albacore, bigeye or unspecified)), which comprised 55% of exports. Other exported products included crab species (mostly swimming crabs – 6% by weight), groundfish, flatfish, sardine, anchovy, shrimp, but these were in low proportions. About 20% of the products on the list were non-specific seafood/fish, and therefore impossible to investigate further. Vietnam is also one of the world's major fish processing nations. Seafood primarily from European and North American markets (see for example in the Vietnam data, groundfish and flatfish) is sent to countries such as Vietnam to be processed and packaged, and then re-exported, which further complicates traceability issues (FAO 2016).

Proportion of exports to US from gillnet fishery

There is not a sufficient level of detail in the Vietnamese US import data to ascertain the proportion of seafood exported to the US which is from gillnets. However gillnets are one of the ways that oceanic/offshore tuna is caught in Vietnam (the others being purse-seine and longline/handline)[109], so it is likely that some of the tuna exported to the US is from gillnets. The *Portunidae* swimming crab fisheries in Vietnam use bottom gillnets and pots (Taylor 2013).

Likely problem fisheries/products

There is little information on cetacean species, distribution or abundance in Vietnam. Hanh (2009) reports that 17 species of cetaceans including one baleen whale, pygmy and dwarf sperm whales (*Kogia* spp), 13 dolphins and one porpoise occur in Vietnam. Surveys by Smith et al. (2003) in 1999 and 2000 showed low cetacean densities in their survey area (Gulf of Tonkin) which covered both coastal and offshore areas. They recorded sightings of Indo-Pacific humpback dolphins, finless porpoises, pantropical spotted dolphins, spinner dolphins and bottlenose dolphins at low (but un-quantified) densities. In terms of fisheries, Teh et al. (2014) estimated that between 1950 and 2010, catches in Vietnam were 75% higher than those reported to the FAO; this does not take into account the considerable level of foreign fishing in Vietnamese waters. Further, Teh et al. (2014) note that small-scale multi-species/multi-gear fishing, which is predominant in inshore areas and provides 82% of Vietnam's catch, has grown considerably, with poor monitoring and enforcement [110]. Teh et al. (2014) report that the number of motorised boats increased by 87% from 1990-2002 from over 41,000 to 77,000 boats, and offshore fishing vessels increased by 170% between 2000 and 2010; catch per unit effort has been decreasing since before 1990. In 2005, the FAO stated that the inshore fleet mostly uses gillnets, longlines, lift-nets, push nets and traps [111]. FAO reports that in the shallow-water offshore fisheries, the fishing composition is trawling 30%, purse-seine 26%, gillnet 18%, lift net 5%, longline 6% and others (fixed net, push net etc.) 15 %. The offshore fisheries supply about 90% of the commercial landings, but less than 60% total catch. The fleet consists of approximately 20 000 vessels. Interpreting Vietnamese fishing activity is complex; Foreign vessels have long fished in Vietnamese waters [112]. It is further reported that Vietamese

[109] http://fishing-living.org/the-fishery/#sthash.3GnhH4CW.dpbs
[110] http://www.fao.org/fi/oldsite/FCP/en/vnm/profile.htm
[111] http://www.fao.org/fi/oldsite/FCP/en/vnm/profile.htm
[112] http://www.fao.org/fi/oldsite/FCP/en/vnm/profile.htm

boats also fish far out of their own EEZ, largely illegally, in areas of the Pacific around the Solomon Islands, Vanuatu, Papua New Guinea, Australia, and Micronesia [113]. 60% of Vietnam's yellowfin tuna export is caught by foreign vessels, processed in Vietnam and re-exported as 'product of Vietnam'[114]. In 1997, the Government of Vietnam began more active support for the development of offshore/oceanic tuna fisheries; Vietnam is currently the second largest exporter of yellowfin tuna to the US [115]. The nation has more than 3,600 tuna boats, 2,000 of which target yellowfin tuna [116]. There is currently a scheme in Vietnam comprising a partnership between WWF and industry organisations to improve the yellowfin tuna longline and handline fishery with the goal of achieving Marine Stewardship Council (MSC) certification [117]. The Vietnam yellowfin tuna Fishery Improvement Project (FIP) includes using onboard observers, obtaining data on stock status to improve sustainabilty, fisheries management, ecosytem management (including bycatch) and governance systems to improve traceability (Poseidon-ARM-Ltd 2013). Young and Iudicello (2007) note that 'Incidental catch in Vietnamese…fisheries would…be expected but little information is available.' Hanh (2009) reports no evidence of direct targeting of cetaceans in Vietnam, but there are reports from fishers of cetaceans being caught in gillnets. Hahn reports that a Vietnamese fisher, while working as a translator for a large Chinese gillnetter, witnessed 14-15 dolphins come up dead in the net during a two-week trip off the coast of Thanh Hoa province. From the photographs, he identified the dolphins as pygmy killer whales (*Feresa attenuata*) or melon headed whales (*Peponocephala electra*), and Risso's dolphins (*Grampus griseus*). The Chinese fishers sold the meat at the market. Hanh (2009) also quotes a study of marine resources in Vietnam in 1995 and 1996 by the Ministry of Fisheries of Vietnam and the Japan International Cooperation Agency which involved the deployment of various surface gillnets resulting in fifteen cetaceans from probably six different species being caught. Smith et al. (2003) state that the low densities of cetaceans observed in their surveys of the Gulf of Tonkin might in part at least be due to entanglement in gillnets, reduced prey availability from overfishing, and mortality caused by fishing with explosives.

Data gaps and how to address them

Although little is known about Vietnam's cetacean bycatch, it is probably substantial, both in coastal and offshore fleets, as both use gillnets and purse-seines. Amongst the low-levels of traceability in seafood products, given the FIP initiative, tuna products are the most likely to yield some data, and the FIP is a positive sign.

Next steps

Vietnam's fisheries will require further investigation and better data provision. A good place to start would be with tuna, given the FIP.

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[113] https://www.pacificnote.com/single-post/2016/12/07/Tuna-Commission-Urged-To-Address-Influx-of-Vietnamese-%E2%80%9CBlue-Boats%E2%80%9D

[114] https://d2ouvy59p0dg6k.cloudfront.net/downloads/background_and_guidance_on_vn_yellowfin_tuna_fip_v2.pdf

[115] http://fishing-living.org/the-fishery/#sthash.3GnhH4CW.dpbs

[116] http://wwf.panda.org/what_we_do/where_we_work/coraltriangle/solutions/fisheries/vietnam_yellowfin_tuna_fip/

[117] http://wwf.panda.org/what_we_do/where_we_work/coraltriangle/solutions/fisheries/vietnam_yellowfin_tuna_fip/

Summary of by-country investigations

Table 3.

Countries where available data suggest no substantial bycatch issues associated with products exported to the US. No further investigation re: MMPA rule suggested at current time	**Data deficient countries: more information needed to make an assessment, but MMPA rule not expected to apply**	**Data deficient countries: more information needed to make an assessment, but MMPA rule might apply**	**Countries with known bycatch problems, but more information needed to assess whether MMPA rule likely to apply**	**Countries with known bycatch problems where MMPA rule expected to apply** **(includes countries that may already be addressing the problem standards similar to the US)**
BAHAMAS	CAPE VERDE	BURMA(MYANMAR)	BANGLADESH	ARGENTINA
BELIZE	CHINA-HONG KONG	CHINA	BRAZIL	AUSTRALIA
CYPRUS	FIJI	CHINA-TAIPAI	CHILE	CANADA
DENMARK	FRENCH POLYNESIA	COSTA RICA	COLOMBIA	ICELAND
DOMINICAN REPUBLIC	GRENADA	EL SALVADOR	ECUADOR	ITALY
FAROE IS.	MOROCCO	GUATEMALA	FRANCE	JAPAN
GREECE	NICARAGUA	GUYANA	GERMANY	MEXICO
GREENLAND	PANAMA	INDIA	INDONESIA	NORWAY
HONDURAS	SINGAPORE	KIRIBATI	NETHERLANDS	PHILIPPINES
JAMAICA	TURKEY	MALAYSIA	NEW ZEALAND	PORTUGAL
MALDIVE IS.	VENEZUELA	MARSHALL IS.	PERU	SOUTH AFRICA
TONGA		MAURITIUS	TUNISIA	SOUTH KOREA
VANUATU		RUSSIAN FEDERATION	UK	SPAIN
		SOLOMON IS.		SRI LANKA
		SURINAME		
		THAILAND		
		TRINIDAD&TOBAGO		
		UAE		
		VIETNAM		

General issues identified from preliminary investigations

As emphasised above, the investigations which comprise this report cannot be considered to be complete. Firstly, there are inherent difficulties with acquiring information about global fisheries, which are generally poorly documented, and often characterised by poor management and illegal actvities; secondly, fisheries are dynamic with both fisheries activities and the information available on them changing on a continuous basis; thirdly, even when information does exist, it may be complex to access, due to the procedures of the countries involved and/or language barriers. As such, we greatly welcome input from those with expertise in the countries investigated who may be able to enhance or correct this report and, more importantly, increase the likelihood that the MMPA bycatch rule can be a really effective tool for making progress on cetacean bycatch problems, which have thus far proved to be largely stubbornly intractable. There are several issues which will impact on how effective the MMPA regulation can be in reducing global fisheries bycatch. Some of these are briefly addressed here:

The clearest is the lack of data and documentation, both in general management and bycatch in particular (Reeves et al. 2004, Young and Iudicello 2007, Reeves et al. 2013). Even countries acting in good faith may currently be unable to provide the level of detail requested by NOAA;

reliable observer and monitoring programmes are expensive and not easily established. Such programmes rarely exist outside North America, western Europe, Australia, and New Zealand, with bycatch data tending to be anecdotal and/or opportunistic, based on interviews or strandings, covering only small geographical areas, and often focusing on artisanal, non-export fisheries (Reeves et al. 2004). Reliance on interviews with fishers and official reports are likely to lead to underestimates of bycatch, as '…bycatch is a rare event in the experience of a given fisherman, leading him to conclude (rightly or wrongly) that the fishery-wide scale of the problem is small or negligible…; as cetacean populations become increasingly depleted (regardless of the causes), the incidence of bycatch declines regardless of the trend in fishing effort…; reporting of a significant cetacean bycatch may be a low priority, or politically unacceptable, in countries where fishery development is considered vital for food security or maintaining the balance of trade.' (Reeves et al. 2004). Indeed, in some areas, legislation prohibiting cetacean bycatch has likely exacerbated the problems associated with lack of monitoring and data, as bycaught animals tend to be disposed of at sea, or used as bait.

IUU (illegal, unreported, unregulated) fishing is a further complication. This includes fishing without a licence, under-reporting catch or catching prohibited species, operating with illegal fishing gear, fishing in marine protected areas, or in areas reserved for artisanal fishers. Agnew et al. (2009) reviewed the situation in 54 countries and on the high seas, and estimated IUU-based fishing losses to be between US$ 10 billion and US$ 23.5 billion annually, representing between 11 and 26 million tonnes. They also found that developing countries with poor governance were most often the subject of IUU fishing, with total estimated catches in West Africa being 40% higher than reported catches. The Overseas Development Institute reports that the EU, which is the world's largest importer of fish products, imports €1.1 billion in illegal fish products every year, whilst in 2011, the US may have imported between US$ 1.7 billion and US$ 2.1 billion of illegal wild-caught seafood – or up to 32% of total seafood imports (Daniels et al. 2016). Whilst both the US[118] and EU are attempting to address IUU fishing (Council-of-the-European-Union 2008) and this is discussed in the Comments on the MMPA Final Rule (NOAA 2016), IUU-derived imports pose a problem in the pursuit of bycatch data and regulation.

The lack of traceability of many seafood products, whether legally or illegally caught, is also is a characteristic of global fisheries supply; again many nations will need to impose stricter regulatory structures on their fisheries than is currently the case in order to guarantee the provenance of the products, and that they are not associated with marine mammal bycatch. The US trade statistics do not have this level of detail, further complicated by many large fish producing nations, especially in Europe and Asia, fishing globally outside their EEZs. The development of dedicated distant water fleets and fisheries (DWF) first by the UK, Europe and the USA, then the former Soviet Union, followed by Asian nations such as Japan and South Korea, came in response to the stagnation and decline of world fisheries catch, despite an increase in effort, especially in Asia (Pauly et al. 2014). DWF, which can go hand-in-hand with IUU fishing is a further complication in investigating issues of seafood provenance. Data gathering for this report was illustrative of how fisheries information can slip through the cracks, as country-experts tend have expertise primarily on fishing carried out in their own EEZs, so for countries fishing outside their EEZs there is a clear but unquantified knowledge gap. In the investigations carried out for this report, the US import lists were the key information source. However, in many of the lists, high percentages (e.g. Chile (38%), Suriname (42%), Peru (54%,) Taiwan (58%),Guyana (64%), Japan (84%), Bangladesh (96%)) of products were listed as various categories of non-specified seafood/fish type and 'sticks'. It is obviously not possible to investigate these products any further when there is no detail

[118] http://www.iuufishing.noaa.gov/

provided. More information is required in the US lists if the MMPA rule is to be meaninfully enacted.

Traceability is also complicated by the growth in the fish processing sector. Outsourcing processing is a substantial market globally; for example, whole frozen fish from European and North American markets may be sent to Asia (mainly China but also India, Indonesia and Vietnam, Thailand) to be filleted and packaged, and then re-imported, sometimes back to its original country, and sometimes not (FAO 2016). In some cases it is clear in the US import data that fish have been imported for processing and then re-exported (e.g. North Atlantic groundfish in China's exports). There is provision in the MMPA rules to cover such import-export situations: in order that seafood products with import prohibitions under the MMPA are not imported into the US by intermediary/processing nations, those nations must certify that they do not import seafood from fisheries with import prohibitions, or that they have procedures in place to certify that they are not exporting such seafood to the US after processing (NOAA 2016).

How to address these data gaps? Pauly et al. (2014) make some suggestions specifically with regard to the documentation of China's DWF and the EU, but which also have wider applicability. These are noted in the 'China' section above, but briefly comprise:

- A greater insistence from the FAO on proper reporting of both domestic and distant water catches by region and taxa;
- The establishment (by the EU or others) of research groups to investigate fisheries, especially DWF, using unconventional research approaches if necessary. The aim would be to improve what is currently considered the norm in the conduct of DWF;
- Encouraging developing countries to make public the agreements they have with countries which fish in their EEZs, as the fishing nations themselves often do not disclose details of such arrangements;
- Greater transparency about the ownership, flagging and operation of fleets, especially DWF, as the arrangments are currently often very complicated, and impede the acquisition of data;
- Making illegal fishing a criminal matter rather than fisheries matter.

However, even with effective data gathering, many fisheries will not be affected by the MMPA rule if they do not export to the US. This applies especially to artisanal subsistence fisheries using gillnets which can have significant bycatch, largely undocumented (e.g. (Bordino et al. 2002, Young and Iudicello 2007, Mangel et al. 2013, Reeves et al. 2013, Amano et al. 2017)). There are therefore some very obvious omissions of some of the most pressing global bycatch problems in this report as, even if the nations involved are exporters to the US, there is no overlap between the products exported and the nations' most problematic bycatch fisheries. Where there is a possibility that there may be an overlap, this has been noted, with the understanding that it is up to the exporting nations to verify, by means of clear documentation, that their exports are not from high-bycatch fisheries.

Strategies have still not been developed which allow for simple, effective bycatch mitigation in many of the world's fisheries. In most cases, bycatch mitigation would be much better viewed as part of general fisheries management policy rather than as a separate issue. It is hoped that the strong financial incentive of US exports might encourage nations to invest research and development into strategies, where they have previously not been motivated to do so.

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