

Supplementary Materials for

High seas fisheries play a negligible role in addressing global food security

Laurenne Schiller*, Megan Bailey, Jennifer Jacquet, Enric Sala

*Corresponding author. Email: laurenne.schiller@dal.ca

Published 8 August 2018, *Sci. Adv.* **4**, eaat8351 (2018)
DOI: 10.1126/sciadv.aat8351

This PDF file includes:

Table S1. Data sources and associated analyses.

Table S2. Species caught on the high seas and associated primary and secondary importers from 2002 to 2011.

Table S3. Species caught on the high seas and associated primary and secondary exporters from 2002 to 2011.

SUPPLEMENTARY MATERIALS

Table S1. Data sources and associated analyses.

Data source	Content	Years (analysis)
Sea Around Us (v. 47)	Annual catch data (country, species)	2009-2014 (total volume by sector); 2002-2011 (HS fishing countries & HS species catch/trade)
FAO FishStat (v. 3.01)	Annual trade data (imports/exports, country, product type)	2002-2011 (species catch/trade)
FAO The State of World Fisheries and Aquaculture (2016)	Annual production values (global total, sector)	2009-2014 (total volume by sector)

Table S2. Species caught on the high seas and associated primary and secondary importers from 2002 to 2011. Trade statistics refer to species in raw and/or unprocessed form (i.e., fresh, frozen products). Data: FishStat.

Species	Family	Average annual HS catch (103 t)	Proportion of total catch from the HS (%)	Primary importer (PI)	PI proportion of global imports (%)	Secondary importer (SI)	SI proportion of global imports (%)
Skipjack tuna	Scombridae	966.6	35	Thailand	63	Japan	6
Yellowfin tuna	Scombridae	562.5	34	Thailand	21	Japan	20
Bigeye tuna	Scombridae	335.7	64	Japan	75	Ecuador	5
Chilean jack mackerel ¹	Carangidae	307	22	Netherlands	38	Japan	28
Argentine shortfin squid ¹²	Ommastrephidae	149.5	25	Spain	36	Italy	22
Blue whiting	Gadidae	130.8	10	Netherlands	49	Belarus	11
Chub mackerel	Scombridae	113.1	10	South Korea	98	Chile	2
Albacore tuna	Scombridae	104.5	42	Thailand	30	Spain	19
Japanese anchovy ²	Engraulidae	96.6	6	Spain	67	Turkey	17
Jumbo flying squid ¹²	Ommastrephidae	83.8	7	Spain	36	Italy	22
Pacific saury	Scomberesocidae	81.7	9	South Korea	95	Japan	5
Swordfish	Xiphiidae	64.7	52	Italy	30	Spain	21
Antarctic krill ³	Euphausiidae	37.4	24	USA	100	NA	NA
Japanese jack mackerel ¹	Carangidae	28.9	9	Netherlands	38	Japan	28
Northern prawn ⁴	Pandalidae	27.8	8	Denmark	62	Sweden	10
Flathead grey mullet	Mugilidae	23.3	13	NA	NA	NA	NA
Frigate tuna ⁵	Scombridae	17.1	7	Japan	13	Vietnam	8
Narrowbarred Spanish mackerel ⁷	Scombridae	14.6	3	Japan	100	NA	NA
Atlantic cod	Gadidae	11.3	1	Denmark	16	Portugal	16
Southern bluefin tuna	Scombridae	11.1	48	Japan	93	USA	2
Kawakawa ⁵	Scombridae	10.6	4	Japan	13	Vietnam	8
Greenland halibut	Pleuronectidae	7.6	7	Denmark	39	China	25
Shortfin mako shark	Lamnidae	7.6	18	NA	NA	NA	NA
Striped marlin ⁶	Istiophoridae	6.5	53	Japan	78	Taiwan	20
Pacific bluefin tuna ⁸	Scombridae	5.3	21	Japan	58	Spain	13
Patagonian toothfish ⁹	Nototheniidae	4.8	17	USA	48	Japan	22
European anchovy ²	Engraulidae	4.5	0	Spain	67	Turkey	17
Black marlin ⁶	Istiophoridae	4	24	Japan	78	Taiwan	20
Indo-Pacific sailfish	Istiophoridae	4	11	NA	NA	NA	NA
Antarctic toothfish ⁹	Nototheniidae	3.7	100	USA	48	Japan	22
Wellington flying squid ¹²	Ommastrephidae	3	39	Spain	36	Italy	22
Patagonian grenadier ¹⁰	Merlucciidae	2.4	1	France	28	Germany	18
Indo-Pacific king mackerel ⁷	Scombridae	2.1	1	Japan	100	NA	NA
Atlantic bluefin tuna ⁸	Scombridae	2	5	Japan	58	Spain	13
Silver seabream ¹¹	Sparidae	2	7	Spain	27	South Korea	16
Blue marlin ⁶	Istiophoridae	1.4	27	Japan	78	Taiwan	20
Atlantic sailfish	Istiophoridae	1.3	24	NA	NA	NA	NA
Roundnose grenadier ¹⁰	Macrouridae	1.2	17	France	28	Germany	18
Bullet tuna ⁵	Scombridae	1.1	5	Japan	13	Vietnam	8

¹not differentiated by species in FishStat - data refer to all horse and jack mackerels collectively; ²not differentiated by species in FishStat - data refer to all anchovies collectively; ³given information available in primary literature, this information appears to be incomplete; ⁴not differentiated by species in FishStat - data refer to all Pandalidae prawns collectively; ⁵not differentiated by species in FishStat - data refer to all tunas and bonitos not otherwise specified; ⁶not differentiated by species in FishStat - data refer to all marlins collectively; ⁷not differentiated by species in FishStat - data refer to all Spanish mackerels collectively; ⁸not differentiated by species in FishStat - data refer to Pacific and Atlantic bluefin combined; ⁹not differentiated by species in FishStat - data refer to Antarctic and Patagonian toothfish combined; ¹⁰not differentiated by species in FishStat - data refer to all grenadiers collectively; ¹¹not differentiated by species in FishStat - data refer to all sea breams collectively; ¹²species not included in FishStat - data refer to all squids collectively

Table S3. Species caught on the high seas and associated primary and secondary exporters from 2002 to 2011. Trade statistics refer to species in raw and/or unprocessed form (i.e., fresh, frozen products). Data: FishStat.

Species	Family	Average annual HS catch (103 t)	Proportion of total catch from the HS (%)	Primary exporter (PE)	PE proportion of global exporter (%)	Secondary exporter (SE)	SE proportion of global exports (%)
Skipjack tuna	Scombridae	966.6	35	Taiwan	20	South Korea	14
Yellowfin tuna	Scombridae	562.5	34	Taiwan	18	France	15
Bigeye tuna	Scombridae	335.7	64	Taiwan	55	South Korea	15
Chilean jack mackerel ¹	Carangidae	307	22	Netherlands	22	Chile	20
Argentine shortfin squid ¹²	Ommastrephidae	149.5	25	Argentina	17	South Korea	14
Blue whiting	Gadidae	130.8	10	Netherlands	39	United Kingdom	16
Chub mackerel	Scombridae	113.1	10	South Korea	54	South Africa	31
Albacore tuna	Scombridae	104.5	42	Taiwan	33	Japan	12
Japanese anchovy ²	Engraulidae	96.6	6	Italy	47	France	17
Jumbo flying squid ¹²	Ommastrephidae	83.8	7	Argentina	17	South Korea	14
Pacific saury	Scomberesocidae	81.7	9	Taiwan	59	Japan	37
Swordfish	Xiphiidae	64.7	52	Spain	27	Taiwan	24
Antarctic krill ³	Euphausiidae	37.4	24	Brazil	100	NA	NA
Japanese jack mackerel ¹	Carangidae	28.9	9	Netherlands	22	Chile	20
Northern prawn ⁴	Pandalidae	27.8	8	Denmark	58	Greenland	3
Flathead grey mullet	Mugilidae	23.3	13	NA	NA	NA	NA
Frigate tuna ⁵	Scombridae	17.1	7	Indonesia	21	Vietnam	8
Narrowbarred Spanish mackerel ⁷	Scombridae	14.6	3	India	58	Germany	42
Atlantic cod	Gadidae	11.3	1	Norway	23	Iceland	20
Southern bluefin tuna	Scombridae	11.1	48	Australia	74	Taiwan	16
Kawakawa ⁵	Scombridae	10.6	4	Indonesia	21	Vietnam	8
Greenland halibut	Pleuronectidae	7.6	7	Greenland	24	Denmark	21
Shortfin mako shark	Lamnidae	7.6	18	NA	NA	NA	NA
Striped marlin ⁶	Istiophoridae	6.5	53	Taiwan	98	Maldives	1
Pacific bluefin tuna ⁸	Scombridae	5.3	21	Spain	26	Turkey	13
Patagonian toothfish ⁹	Nototheniidae	4.8	17	Chile	21	France	17
European anchovy ²	Engraulidae	4.5	0	Italy	47	France	17
Black marlin ⁶	Istiophoridae	4	24	Taiwan	98	Maldives	1
Indo-Pacific sailfish	Istiophoridae	4	11	NA	NA	NA	NA
Antarctic toothfish ⁹	Nototheniidae	3.7	100	Chile	21	France	17
Wellington flying squid ¹²	Ommastrephidae	3	39	Argentina	17	South Korea	14
Patagonian grenadier ¹⁰	Merlucciidae	2.4	1	New Zealand	42	Argentina	29
Indo-Pacific king mackerel ⁷	Scombridae	2.1	1	India	58	Germany	42
Atlantic bluefin tuna ⁸	Scombridae	2	5	Spain	26	Turkey	13
Silver seabream ¹¹	Sparidae	2	7	Greece	32	South Korea	29
Blue marlin ⁶	Istiophoridae	1.4	27	Taiwan	98	Maldives	1
Atlantic sailfish	Istiophoridae	1.3	24	NA	NA	NA	NA
Roundnose grenadier ¹⁰	Macrouridae	1.2	17	New Zealand	42	Argentina	29
Bullet tuna ⁵	Scombridae	1.1	5	Indonesia	21	Vietnam	8

¹not differentiated by species in FishStat - data refer to all horse and jack mackerels collectively; ²not differentiated by species in FishStat - data refer to all anchovies collectively; ³given information available in primary literature, this information appears to be incomplete; ⁴not differentiated by species in FishStat - data refer to all Pandalidae prawns collectively; ⁵not differentiated by species in FishStat - data refer to all tunas and bonitos not otherwise specified; ⁶not differentiated by species in FishStat - data refer to all marlins collectively; ⁷not differentiated by species in FishStat - data refer to all Spanish mackerels collectively; ⁸not differentiated by species in FishStat - data refer to Pacific and Atlantic bluefin combined; ⁹not differentiated by species in FishStat - data refer to Antarctic and Patagonian toothfish combined; ¹⁰not differentiated by species in FishStat - data refer to all grenadiers collectively; ¹¹not differentiated by species in FishStat - data refer to all sea breams collectively; ¹²species not included in FishStat - data refer to all squids collectively