

APPENDIX B: RECONSTRUCTION OF YEMEN'S CATCHES IN THE GULF OF ADEN, 1950–2010¹

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INTRODUCTION

In addition to the Red Sea, Yemen has access to the Gulf of Aden and Arabian Sea, which is characterized by high productivity due to the upwelling caused by southwestern monsoons. The southern coast of Yemen used to be under the People's Democratic Republic of Yemen (commonly known as South Yemen) until the unification of Yemen in 1990. The most productive part of that coast is east of Al Mukalla and the main port is Aden (Sanders and Morgan 1989) (Figure B1).

Most of the fishing is performed by artisanal fishers who are organized in cooperatives, from which fishery statistical data are collected; however, a lot of the fish, especially sardines are sold outside the cooperatives system, making it harder to keep records. The artisanal fishery targets mainly pelagic fishes (Bonfiglioli and Hariri 2004), using cast nets for small pelagic species and seines for larger pelagic species. The main small pelagic species caught is Indian oil sardine (*Sardinella longiceps*), caught in the near shore east of Al Mukalla by cast net. It is mainly processed for fish meal. The industrial fishery in the Gulf of Aden has been operated mainly by foreign fleets, although Yemen is also developing its own industrial fishery. The target is mainly cuttlefish (*Sepiidae*), taken by trawlers up to 120 m deep, but mainly less than 50 m (Sanders and Morgan 1989).

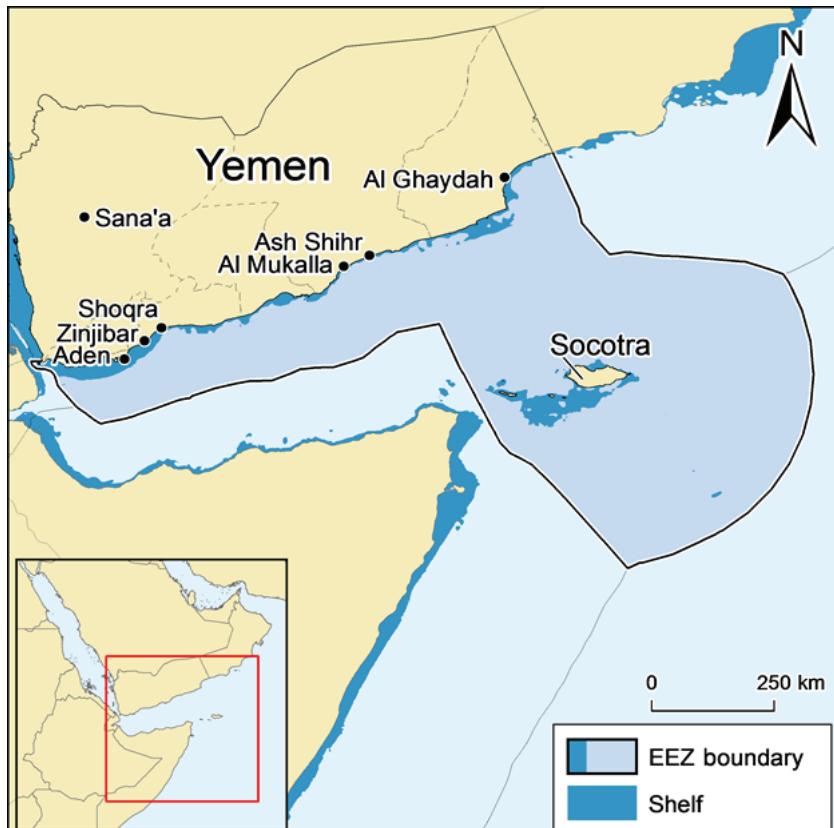


Figure B1: The Gulf of Aden and Arabian Sea coast of Yemen with its shelf area and Exclusive Economic Zone (EEZ).

CATCH RECONSTRUCTION METHOD

Total catch

In order to reconstruct the catches of the Gulf of Aden of Yemen, first the total catch of Yemen in the Gulf of Aden is calculated from the FAO data. The annual catch data for Yemen in the FAO database are for the whole country, i.e., both the Red Sea and the Gulf of Aden. The procedure of dividing the FAO data into the Red Sea and the Gulf of Aden is described in the main text (see Table 1 and Figure 2). Once the Gulf of Aden catch was calculated, it was further divided into artisanal and industrial fisheries using ratios available for some years and interpolating for the years it was missing (Table B1). From 1950 to 1966, all the catch was artisanal. The earliest indication of industrial catch was for 1967 (Edwards *et al.* 1985) for which a ratio of 0.025 of the total catch was assumed to be the share of the industrial fishery. From 1985 to 1994, catches of major groups were available (PERSGA 2001). The groups were divided into artisanal and industrial based on the ecology of the taxa. Pelagic fishes are caught by artisanal vessels and demersal taxa by industrial (Sanders and Morgan 1989; MoFW 2004). Taxa caught by both sectors were divided using the average of 2002 and 2003, which was already split by sector (MoFW 2004). Data by sector were also available for 1998 (FAO 2002) and 2006–2008 (MoFW 2008, 2012). For the years with missing data, they were interpolated, except for 2009 and 2010, for which the 2008 value was used.

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For each sector, the reconstructed catch was calculated using the ratio of reconstructed catch to FAO data for the Red Sea. For the artisanal fishery, the reconstructed total catch was 1.54 times the FAO data, and 1.31 times for the industrial fishery. Since the operation of the fisheries and their data recording systems are under the same administrative jurisdiction (MoFW 2004; Morgan 2006), this assumption is reasonable. In order to calculate the ratios for the Red Sea, the FAO Red Sea data were first divided into artisanal and industrial sectors using the ratios between the two sectors in the reconstructed catch; the totals of the sectors were then used to obtain the multiplication factor to calculate the Gulf of Aden catch based on the FAO data.

Table B1: Ratios and sources used for dividing the Gulf of Aden catch into artisanal and industrial fishery sector.

Year	Artisanal	Industrial	Source/Remark
1950-66	1.00	0.00	Edward <i>et al.</i> (1986)
1967	0.98	0.03	Edward <i>et al.</i> (1986), Start of industrial fishery and assumed to be only 2.5% of total catch
1968	0.95	0.05	Interpolation
1969	0.92	0.08	Interpolation
1970	0.89	0.11	Interpolation
1971	0.87	0.13	Interpolation
1972	0.84	0.16	Interpolation
1973	0.81	0.19	Interpolation
1974	0.79	0.21	Interpolation
1975	0.76	0.24	Interpolation
1976	0.73	0.27	Interpolation
1977	0.70	0.30	Interpolation
1978	0.68	0.32	Interpolation
1979	0.65	0.35	Interpolation
1980	0.62	0.38	Interpolation
1981	0.60	0.40	Interpolation
1982	0.57	0.43	Interpolation
1983	0.54	0.46	Interpolation
1984	0.51	0.49	Interpolation
1985	0.49	0.51	PERSGA (2001) Used ecology of taxa for categorization
1986	0.43	0.57	PERSGA (2001) Used ecology of taxa for categorization
1987	0.50	0.50	PERSGA (2001) Used ecology of taxa for categorization
1988	0.57	0.43	PERSGA (2001) Used ecology of taxa for categorization
1989	0.59	0.41	PERSGA (2001) Used ecology of taxa for categorization
1990	0.87	0.13	PERSGA (2001) Used ecology of taxa for categorization
1991	0.85	0.15	PERSGA (2001) Used ecology of taxa for categorization
1992	0.95	0.05	PERSGA (2001) Used ecology of taxa for categorization
1993	0.90	0.10	PERSGA (2001) Used ecology of taxa for categorization
1994	0.96	0.04	PERSGA (2001) Used ecology of taxa for categorization
1995	0.93	0.07	Interpolation
1996	0.89	0.11	Interpolation
1997	0.86	0.14	Interpolation
1998	0.82	0.18	FAO (2002)
1999	0.84	0.16	Interpolation
2000	0.85	0.15	Interpolation
2001	0.87	0.13	Interpolation
2002	0.89	0.11	MoFW (2004)
2003	0.95	0.05	MoFW (2004)
2004	0.96	0.04	Interpolation
2005	0.98	0.02	Interpolation
2006	0.99	0.01	MoFW (2012)
2007	0.98	0.02	MoFW (2012)
2008	1.00	0.00	MoFW (2012)
2009	1.00	0.00	2008 value
2010	1.00	0.00	2008 value

Catch composition

Artisanal fishery

The earliest catch composition data available for Yemeni catch in the Gulf of Aden were for 1985 – 1994 (PERSGA 2001) where the catches of major groups were given separately, i.e., not a catch composition matrix. Thus here, the catches were first allocated to either artisanal or industrial sector; the pelagic and demersal taxa were assigned to the artisanal and industrial sectors, respectively. The artisanal fishers of Yemen in the Gulf of Aden have traditionally targeted pelagic fishes, while the industrial fishery, mainly trawlers, target demersal fishes (Sanders and Morgan 1989; MoFW 2004). Total catches of cuttlefish and spiny (rock) lobster, which are caught by both sectors, were assigned to these two sectors using the average of ratios from 2002 and 2003, when they were reported by sector (MoFW 2004). The same procedure was followed to the catch composition data for 2006 and 2007 (MoFW 2012). From 1995 to 2001, 2004, and 2005, the catches of the pelagic species were interpolated.

For 2002, 2003, 2006 and 2007, taxa with minor catch (e.g., sea cucumber) were put under ‘others’. The pelagic group of the artisanal catch, which has the biggest share (up to 99% for some years) was divided further to its components using detailed data from 1986 to 1989 (Saeed 1995). Detailed composition data were also available for 2006 and 2007 (MoFW 2012); however, there were some missing taxa, which were calculated as the average value of 1986–1989 and the ratios deducted from the group ‘others’ (Table B2). For the years composition of pelagic fishes was not given, 1990–2005, it was interpolated, and for 1985 the averages of 1986–1989 were used.

Table B2: Sources used to calculate the catch composition (%) of the pelagic fisheries catches in Yemen's Gulf of Aden EEZ.

Taxa	1986	1987	1988	1989	2006	2007
Anchovy	2.60	37.68	30.11	18.15	39.09	39.57
Shark	16.07	16.84	15.78	10.78	8.14	7.82
<i>Sardinella longiceps</i>	8.85	7.58	9.46	0.00	6.47	6.47
<i>Euthynnus affinis</i>	3.63	2.79	3.77	3.25	2.82	3.77
<i>Thunnus albacares</i>	3.30	1.49	4.52	2.19	25.16	23.22
<i>Scomber commerson</i>	3.40	1.52	1.00	1.48	2.56	1.84
<i>Rastrelliger kanagurta</i>	3.66	1.52	0.55	0.99	3.72	3.66
<i>Istiophorus platypterus</i>	0.13	0.15	0.68	0.63	0.40	0.40
<i>Thunnus tonggol</i>	0.38	0.29	0.50	0.49	2.88	2.87
<i>Auxis thazard</i>	0.17	0.29	0.21	0.07	0.19	0.19
<i>Katsuwonus pelamis</i>	0.12	0.10	0.06	0.09	0.09	0.09
<i>Psettodes erumei</i>	0.02	0.01	0.01	0.00	0.01	0.01
Others	57.67	29.74	33.34	61.88	8.47	10.08
Source	Saeed (1995)	Saeed (1995)	Saeed (1995)	Saeed (1995)	MoFW (2012)	MoFW (2012)

* Italic values are averages of 1986-1989

Once the pelagic fishes were broken down to their components, the overall composition of artisanal fishery was calculated together with the invertebrate (cuttlefish, rock lobster and octopus) catch. The octopus catch reported was for 2003 (MoFW 2004), thus the same value was used from 2001 to 2010 because, according to the FAO database, that is the period octopus catch was reported. This procedure took care of the catch composition of the artisanal fishery from 1985 to 2007. From 1950 to 1984, the catch composition of 1985 was used and from 2008 to 2010 averages of 2006 and 2007 were used (Table B3).

Subsistence fishery

Similar to the Red Sea, the catch and composition of the subsistence fishery in the Gulf of Aden was calculated as a proportion of the artisanal fishery. In the Red Sea calculation, besides the percentage of the artisanal catch, this included the total catch of the small pelagic beach seine fishery which was solely a subsistence fishery. However, in the Gulf of Aden this was not the case because catching small pelagic fish is a major part of the artisanal fishery. The subsistence was calculated to be 30% of the artisanal from 1950 to 1974. This is a reasonably conservative estimate given that fishers in the region claim to give more than 50% of their catch to family, friends and people who need support before the artisanal fishery became commercialized with the advent of motorization (which for Yemen started to have an impact in 1975). Thus, the percentage was lowered to 20% for 1975. Even if the fish given freely is getting less and less, it is still part of the tradition. Hence it was assumed to be 10% of the artisanal catch in 2010, and interpolated between 1975 and 2010.

Table B3: Catch composition (%) of the artisanal fishery of Yemen in the Gulf of Aden.

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Remarks
1950-84	20.97	14.09	6.13	3.18	2.72	1.75	1.59	0.38	0.39	0.18	0.09	0.01	4.29	0.96	0.00	43.26	1985 value
1985	20.97	14.09	6.13	3.18	2.72	1.75	1.59	0.38	0.39	0.18	0.09	0.01	4.29	0.96	0.00	43.26	PERSGA (2001)
1986	2.44	15.10	8.32	3.41	3.10	3.19	3.44	0.12	0.35	0.16	0.11	0.02	4.90	1.18	0.00	54.16	PERSGA (2001)
1987	36.51	16.32	7.35	2.70	1.44	1.48	1.48	0.14	0.28	0.28	0.10	0.01	1.84	1.26	0.00	28.82	PERSGA (2001)
1988	29.28	15.34	9.20	3.66	4.39	0.98	0.53	0.67	0.48	0.21	0.06	0.01	1.80	0.96	0.00	32.42	PERSGA (2001)
1989	17.51	10.40	0.00	3.13	2.11	1.43	0.95	0.61	0.48	0.07	0.09	0.00	2.79	0.78	0.00	59.67	PERSGA (2001)
1990	18.91	10.37	0.37	3.14	3.45	1.50	1.12	0.60	0.62	0.07	0.09	0.00	1.67	0.79	0.00	57.29	PERSGA (2001)
1991	20.30	10.31	0.75	3.15	4.82	1.58	1.29	0.60	0.76	0.08	0.09	0.00	0.79	0.75	0.00	54.74	Interpolation
1992	21.49	10.15	1.12	3.12	6.14	1.64	1.44	0.58	0.90	0.09	0.09	0.00	0.64	1.01	0.00	51.59	Interpolation
1993	22.64	9.97	1.49	3.09	7.45	1.70	1.60	0.57	1.04	0.09	0.09	0.00	0.93	0.96	0.00	48.38	Interpolation
1994	24.14	9.93	1.89	3.10	8.88	1.78	1.78	0.56	1.19	0.10	0.09	0.00	0.05	0.67	0.00	45.84	Interpolation
1995	25.33	9.77	2.26	3.07	10.21	1.84	1.94	0.55	1.33	0.11	0.09	0.00	0.20	0.60	0.00	42.69	Interpolation
1996	26.53	9.61	2.64	3.04	11.53	1.91	2.09	0.53	1.46	0.12	0.09	0.00	0.35	0.52	0.00	39.54	Interpolation
1997	27.72	9.45	3.01	3.02	12.86	1.97	2.25	0.52	1.60	0.12	0.09	0.01	0.51	0.45	0.00	36.39	Interpolation
1998	28.92	9.29	3.39	2.99	14.18	2.03	2.41	0.50	1.74	0.13	0.09	0.01	0.66	0.38	0.00	33.25	Interpolation
1999	30.11	9.13	3.76	2.96	15.51	2.09	2.56	0.49	1.87	0.14	0.09	0.01	0.81	0.31	0.00	30.12	Interpolation
2000	31.31	8.97	4.14	2.93	16.84	2.15	2.72	0.48	2.01	0.14	0.09	0.01	0.97	0.23	0.00	26.99	Interpolation
2001	32.50	8.80	4.51	2.91	18.16	2.21	2.88	0.46	2.15	0.15	0.09	0.01	1.12	0.16	0.02	23.85	Interpolation
2002	33.70	8.64	4.88	2.88	19.49	2.27	3.04	0.45	2.29	0.16	0.09	0.01	1.27	0.09	0.02	20.73	MoFW (2004)
2003	34.50	8.39	5.20	2.82	20.57	2.31	3.16	0.43	2.40	0.16	0.09	0.01	2.37	0.13	0.02	17.42	MoFW (2004)
2004	35.57	8.21	5.55	2.79	21.81	2.36	3.30	0.41	2.52	0.17	0.09	0.01	2.73	0.11	0.02	14.31	Interpolation
2005	36.63	8.03	5.90	2.75	23.04	2.42	3.44	0.40	2.65	0.17	0.09	0.01	3.09	0.09	0.02	11.21	Interpolation
2006	37.68	7.85	6.24	2.72	24.26	2.47	3.59	0.38	2.78	0.18	0.09	0.01	3.44	0.07	0.02	8.23	MoFW (2012)
2007	38.40	7.59	6.28	3.66	22.53	1.79	3.55	0.39	2.79	0.18	0.09	0.01	2.78	0.04	0.02	9.89	MoFW (2012)
2008-10	38.04	7.72	6.26	3.19	23.40	2.13	3.57	0.39	2.78	0.18	0.09	0.01	3.11	0.05	0.02	9.06	Average of 2006 & 2007

1: Anchovy; 2: Shark; 3: *Sardinella longiceps*; 4: *Euthynnus affinis*; 5: *Thunnus albacares*; 6: *Scomber commersoni*; 7: *Rastrelliger kanagurta*; 8: *Istiophorus platypterus*; 9: *Thunnus tonggol*; 10: *Auxis thazard*; 11: *Katsuwonus pelamis*; 12: *Psettodes erumei*; 13: Cuttlefish; 14: Rock lobster; 15: Octopus; 16: Others

Industrial fishery

The industrial fishery in the Gulf of Aden of Yemen was operated mainly by USSR vessels until 1990. After the reunification of Yemen, it is done almost exclusively by Yemeni vessels (Koehn and Aklilu 1999). As far as the catch composition of industrial fishery is concerned, data were available for the following years: 1985 – 1994 (PERSGA 2001); 1998 (PERSGA 2002); 2002 and 2003 (MoFW 2004), and 2006 and 2007 (MoFW 2012). All of these sources reported 'demersal fishes' as a whole. Invertebrates (cuttlefish, squid, shrimp, rock lobster, deep sea lobster, crabs and octopus) were divided to artisanal and industrial sector using ratios from 2002 and 2003 (MoFW 2004; see text in the above for details). The demersal fishes, which accounted for up to 95% in some years, were further disaggregated using data from Edward *et al.*, (1986) into catfish (25.6%), jacks (15.6%), grunts (13.3%), seabream (13.3%) and 'others' (32.2%). For years in which data were missing, they were interpolated, except for 1950 – 1984, where data from 1985 were used and for 2008 – 2010, where the mean 2006 and 2007 was used (Table B4).

The industrial (trawl) fishery discards portion of its catch, which is usually large and needs to be accounted explicitly. The total discard amount for Yemen in the Gulf of Aden was calculated using the retained catch, multiplied by the ratio of discard to retained industrial catch of Yemen in the Red Sea (where discards were twice the amount retained). This is a reasonable extrapolation, because the trawl operation and regulations in both areas are very similar. The catch composition of the discarded catch was also calculated using the overall (1950–2010) average of Red Sea industrial discard composition (Table 11).

The catch composition of each sector was compared with the taxonomic composition of the data Yemen reported to FAO (www.fao.org/fishery/statistics/software/fishstat/en), and some subsequent adjustments performed. The few taxa explicitly accounted for in the FAO database were included to the reconstruction catch using their proportions from the total catch, and their catches subtracted from the group 'others'. In addition, for sectors where the final value of the 'others' was more than 10% of the total for the respective sector, it was reduced to 10% and the extra catch distributed to the already identified taxa in proportion to their contribution to the total of the sector.

Table B4: Catch composition (%) of the retained industrial fishery catch of Yemen in the Gulf of Aden.

Year	Catfish	Jacks	Grunts	Seabream	Cuttlefish	Squid	Shrimp	Rock lobster	Deep sea lobster	Crabs	Octopus	Others	Remarks
1950-84	23.65	14.41	12.29	12.29	6.59	0.00	0.00	1.04	0.00	0.00	0.00	29.75	1985 value
1985	23.65	14.41	12.29	12.29	6.59	0.00	0.00	1.04	0.00	0.00	0.00	29.75	PERSGA (2001)
1986	23.81	14.51	12.37	12.37	6.00	0.00	0.00	1.01	0.00	0.00	0.00	29.94	PERSGA (2001)
1987	24.49	14.92	12.72	12.72	2.94	0.00	0.00	1.41	0.00	0.00	0.00	30.80	PERSGA (2001)
1988	24.27	14.79	12.61	12.61	3.78	0.00	0.00	1.42	0.00	0.00	0.00	30.53	PERSGA (2001)
1989	23.60	14.38	12.26	12.26	6.54	0.00	0.00	1.28	0.00	0.00	0.00	29.68	PERSGA (2001)
1990	19.39	11.81	10.07	10.07	18.21	0.00	0.00	6.06	0.00	0.00	0.00	24.39	PERSGA (2001)
1991	22.57	13.75	11.73	11.73	7.14	0.00	0.00	4.71	0.00	0.00	0.00	28.39	PERSGA (2001)
1992	15.18	9.25	7.89	7.89	19.30	0.00	0.00	21.39	0.00	0.00	0.00	19.10	PERSGA (2001)
1993	19.86	12.10	10.32	10.32	13.05	0.00	0.00	9.37	0.00	0.00	0.00	24.98	PERSGA (2001)
1994	20.49	12.49	10.65	10.65	1.84	0.00	0.00	18.10	0.00	0.00	0.00	25.78	PERSGA (2001)
1995	19.91	12.13	10.34	10.34	6.95	1.64	0.05	13.58	0.02	0.00	0.00	25.04	Interpolation
1996	19.32	11.77	10.04	10.04	12.05	3.28	0.11	9.05	0.05	0.00	0.00	24.30	Interpolation
1997	18.73	11.42	9.73	9.73	17.15	4.91	0.16	4.53	0.07	0.00	0.00	23.56	Interpolation
1998	18.15	11.06	9.43	9.43	22.26	6.55	0.21	0.00	0.10	0.00	0.00	22.82	PERSGA (2002)
1999	18.47	11.26	9.60	9.60	22.50	4.37	0.46	0.44	0.07	0.00	0.00	23.24	Interpolation
2000	18.80	11.46	9.77	9.77	22.74	2.18	0.71	0.88	0.03	0.00	0.01	23.65	Interpolation
2001	19.13	11.66	9.94	9.94	22.98	0.00	0.96	1.33	0.00	0.00	0.01	24.06	Interpolation
2002	19.13	11.66	9.94	9.94	22.98	0.00	0.96	1.33	0.00	0.00	0.01	24.06	MoFW (2004)
2003	10.46	6.37	5.43	5.43	56.54	0.00	0.69	1.80	0.00	0.01	0.10	13.16	MoFW (2004)
2004	12.47	7.60	6.48	6.48	49.37	0.00	0.46	1.35	0.00	0.01	0.07	15.71	Interpolation
2005	14.49	8.83	7.53	7.53	42.20	0.00	0.23	0.91	0.00	0.00	0.03	18.25	Interpolation
2006	16.50	10.06	8.57	8.57	35.03	0.00	0.00	0.46	0.00	0.00	0.00	20.80	MoFW (2012)
2007	19.45	11.85	10.10	10.10	23.75	0.00	0.00	0.23	0.00	0.00	0.00	24.52	MoFW (2012)
2008-10	17.97	10.95	9.34	9.34	29.39	0.00	0.00	0.35	0.00	0.00	0.00	22.66	Average of 2006-07

RESULTS AND DISCUSSION

Historically, Yemen's catches in its Gulf of Aden EEZ has, except for a brief period in the early 1990s, represented the bulk of the catch in Yemen's waters (Figure 2). The total catch was low until it started to increase at the beginning of the 1970s with the introduction of trawlers, while the largest increase was at the beginning of the 1990s, which corresponds with the unification of Yemen and stability of the country; finally, the total catch declined after its peak in 2004 (Figure B2, Table B5). Overall, the Gulf of Aden represented 77% of the total 9.8 million t reconstructed catch for all of Yemen from 1950 to 2010, which represented a little more than double the catch reported to FAO.

The artisanal fishery was the largest contributor to the total catch; jointly with the subsistence fishery, it is the only continuous fishery, in contrast to the industrial fishery, which appeared only in the mid-1960s. The industrial catch (both retained and discarded) was high from the mid-1970s to the end of 1980s (Figure B2). Industrial discards are high relative to the retained catch (i.e., 67% of the industrial catch), because the fishery's main target is shrimp, which usually accounts for only a small fraction of the total catch. Overall, from 1950 to 2010, the artisanal fishery accounted for 63% of total catch, discards (18%), the industrial fishery retained catch (9%) and the subsistence fishery (10%). Recall that here, 'subsistence' refers to fish that is consumed by crew or freely given to family and friends by the artisanal fishery, and which is not recorded at all in fisheries statistics. This definition is in line with the delineation by the fishery administration of Yemen.

The reported catch (the part of the reconstructed catch accounted in the FAO data) represented only 32% of the total catch (Figure B3, Table B6). The unreported catch and discards accounted for 50% and 18%, respectively. Both the unreported catch and discards are not accounted in the FAO database, the main difference between the two is that unreported catches are landed while discards are thrown back to the sea, i.e., not landed.

The dominant sector, artisanal, had a stable and low total catch level until the mid-1990s when it started to show an increasing trend. The highest increase, however, started in 2000. The artisanal fishery exploits a large number of taxa. Foremost are Clupeidae (37% of the artisanal catch), caught in the productive waters in the eastern part of the Yemeni Gulf of Aden waters. The distant second is yellowfin tuna (*Thunnus albacares*; 16%) and sharks (14%). The top 9 taxa made up 88% of the total catch (Figure B4).

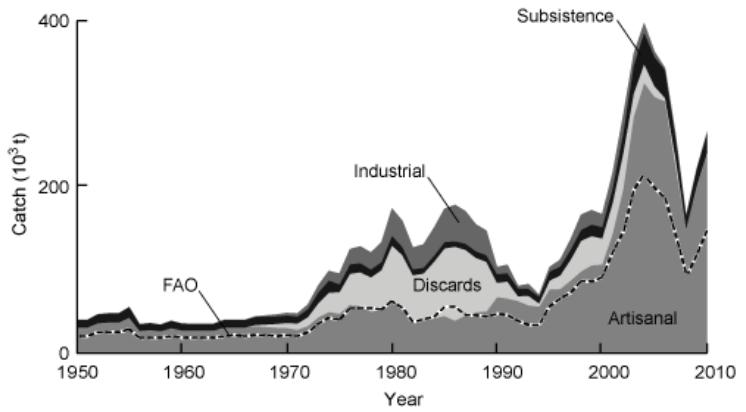


Figure B2: Reconstructed total catch of Yemen in its Gulf of Aden EEZ from 1950 to 2010 by sector compared to the total supplied to FAO.

The subsistence fishery follows a similar trend to the artisanal fishery, simply because it was calculated a ratio of the artisanal fishery (Figure B5). For more detailed catch composition of the artisanal and subsistence fisheries, see Tables (B7 and B8), respectively.

The industrial fishery, which was mainly trawling for shrimp, started in 1967 and the catch increased to a peak in 1986 (Figure B6, Table B9). Then, it declined drastically towards the end of the 1980s as the cold war was ending and most of the trawlers operating in the Gulf of Aden, which originated from the Soviet Union, stopped their operation. Although, the industrial fishery in the Gulf of Aden is almost non-existent since 2008, its contribution to the total catch from 1950 to 2010 (27%) was higher than that of its analog in the Red Sea (18%), reflecting the different ecology of the two seas. The Red Sea has extensive coral reefs, which makes it less convenient for trawling, while the Gulf of Aden has more suitable ground for trawling. Sea catfishes (Ariidae) dominate the industrial fishery catch, with 28% of the retained catch. The discarded industrial catch follows a similar pattern to the retained catch, with ponyfishes (Leiognathidae) dominating with 61% (Figure B7, Table B10).

For the whole Gulf of Aden, Clupeidae is the dominant taxon (27%), followed by yellowfin tuna (*Thunnus albacares*) at 11%, both of which are the dominant taxa in the artisanal fishery. The third most important taxon is ponyfishes (11%), the most important discarded group of the industrial fishery (Figure B8; see Table B11 for detailed composition). Twelve taxa make up more than 80% of the total catch of Yemen in the Gulf of Aden. Catches are increasingly dominated by pelagic fishes, which contributed 65% of the total catch from 1950 to 2010.

Least important in terms of bulk catch, but very valuable in monetary terms are shrimp, octopus, crabs, lobster and sea cucumber, which were only reported for the most recent years, but contributed less than 1% of the reconstructed total catch. Cuttlefish, however, accounted for 4% of the total catch, the highest contribution of any invertebrate. Demersal catches, in contrast to pelagic fishes, have declined since their peak in the mid-1980s to their lowest value at the beginning of 1990s and almost disappeared after 2008. The 1990s decline was a result of the departure of the Soviet fleet and collapse of the Yemeni trawl fleet following the reunification of Yemen in 1990.

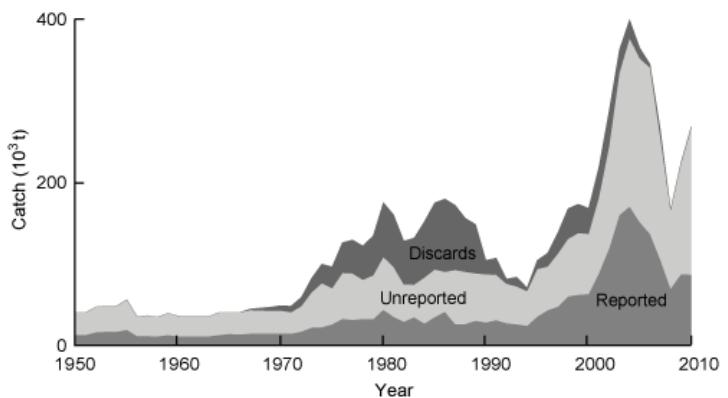


Figure B3: Reconstructed total catch for Yemen in its Gulf of Aden EEZ from 1950 to 2010 by component. Reported catch refers to the part of the reconstructed catch accounted in the FAO data.

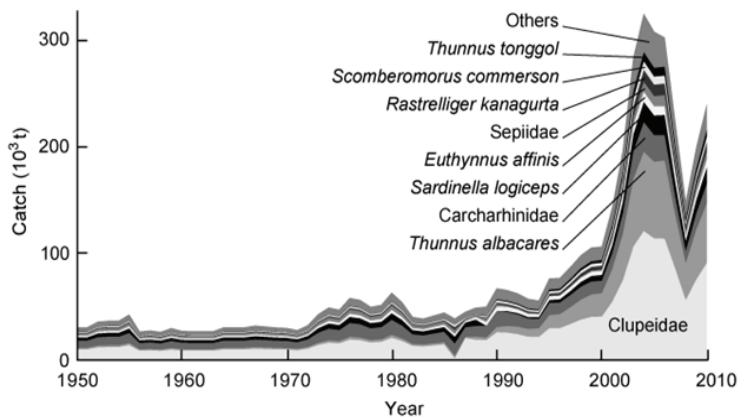


Figure B4: Composition of the reconstructed catch of the artisanal fishery of Yemen in the Gulf of Aden from 1950 to 2010.

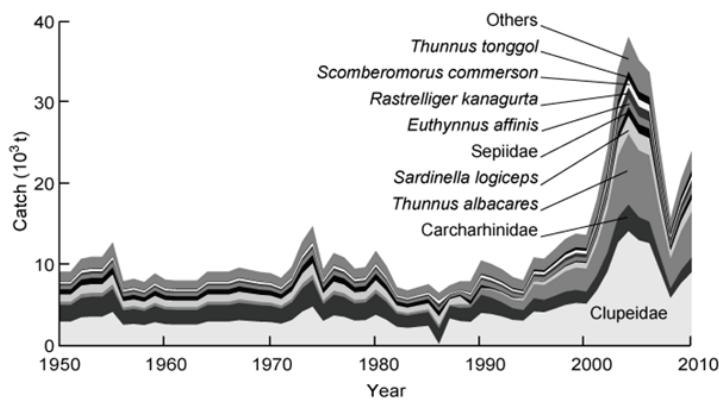


Figure B5: Composition of the reconstructed catch of the subsistence fishery of Yemen in the Gulf of Aden from 1950 to 2010.

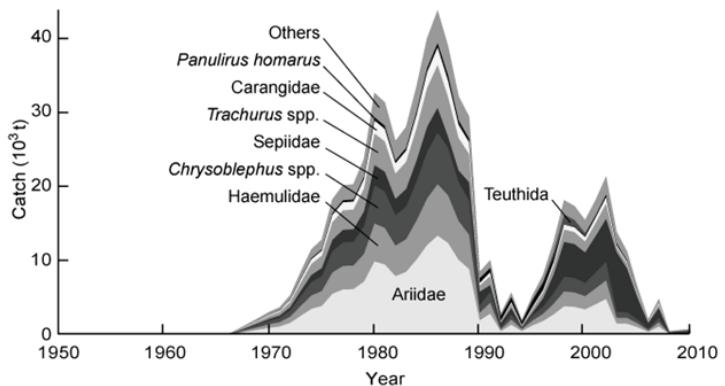


Figure B6: Composition of the retained industrial fishery catch of Yemen in its Gulf of Aden EEZ from 1950 to 2010.

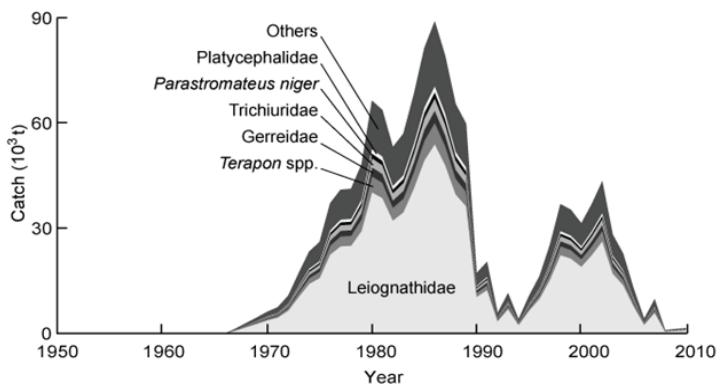


Figure B7: Composition of the discarded industrial fishery catch of Yemen in its Gulf of Aden EEZ from 1950 to 2010.

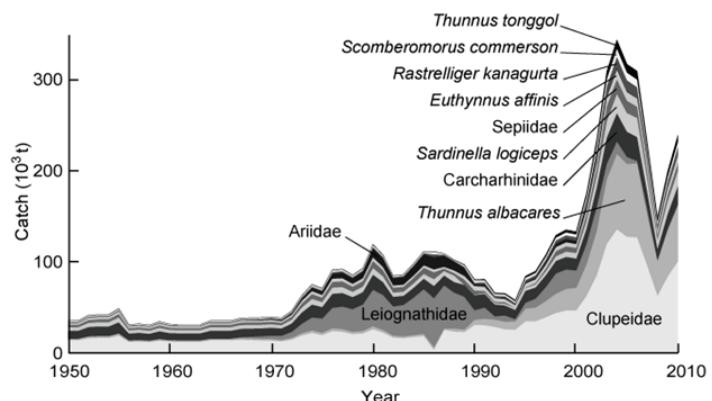


Figure B8: The composition of the total catch of Yemen in its Gulf of Aden EEZ from 1950 to 2010.

This reconstruction of the catch of Yemeni fisheries in the Gulf of Aden, even if brief and preliminary, improves the understanding of Yemen's fishery, in these waters both in terms of sectorial resolution and taxonomic breakdown over a long period of time. There were many data gaps, hence the need for the catch reconstruction effort, where we filled them with transparent assumptions with the best knowledge available. These are open for constructive criticism, as this work is by no means final or conclusive. We view it only as a first iteration towards improving our understanding of Yemen's fisheries in the Gulf of Aden.

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Table B5: Reconstructed total catch (in tonnes) of Yemen in its Gulf of Aden EEZ from 1950 to 2010 by sector compared to the total supplied to FAO.

Year	FAO landings	Reconstructed total catch	Artisanal	Discards	Subsistence	Industrial
1950	20,889	39,765	30,589	0	9,177	0
1951	20,865	39,765	30,589	0	9,177	0
1952	24,366	46,605	35,850	0	10,755	0
1953	25,047	47,719	36,707	0	11,012	0
1954	25,010	47,719	36,707	0	11,012	0
1955	28,900	55,354	42,580	0	12,774	0
1956	17,735	34,675	26,673	0	8,002	0
1957	18,581	35,948	27,652	0	8,296	0
1958	17,536	34,198	26,306	0	7,892	0
1959	20,101	38,811	29,855	0	8,956	0
1960	18,245	35,471	27,285	0	8,186	0
1961	17,980	34,994	26,918	0	8,075	0
1962	17,939	34,994	26,918	0	8,075	0
1963	17,899	34,994	26,918	0	8,075	0
1964	20,444	39,765	30,589	0	9,177	0
1965	20,945	39,765	30,589	0	9,177	0
1966	19,790	39,765	30,589	0	9,177	0
1967	22,217	44,006	32,210	1,429	9,663	704
1968	22,079	45,155	31,314	2,979	9,394	1,468
1969	20,709	46,304	30,418	4,529	9,125	2,232
1970	21,670	48,156	29,959	6,169	8,988	3,040
1971	20,147	47,522	27,990	7,459	8,397	3,676
1972	24,992	58,227	32,454	10,742	9,736	5,294
1973	36,051	81,440	42,934	17,166	12,880	8,460
1974	42,777	98,785	49,228	23,304	14,768	11,485
1975	40,729	95,434	47,142	26,033	9,428	12,830
1976	54,083	124,899	58,148	37,035	11,463	18,253
1977	54,209	128,203	56,198	40,919	10,919	20,167
1978	53,414	120,815	49,811	41,176	9,535	20,294
1979	51,978	133,137	51,563	48,129	9,723	23,721
1980	62,614	173,806	63,147	66,271	11,727	32,662
1981	54,439	158,921	54,080	63,604	9,889	31,348
1982	37,458	126,848	40,361	53,068	7,265	26,155
1983	40,882	130,560	38,766	56,889	6,867	28,038
1984	43,168	150,562	41,627	68,111	7,255	33,569
1985	56,316	173,439	44,533	81,235	7,634	40,037
1986	55,893	178,125	38,868	88,893	6,552	43,811
1987	46,248	170,509	45,087	79,010	7,472	38,940
1988	45,140	154,527	49,065	65,292	7,991	32,179
1989	44,125	147,063	49,975	59,679	7,996	29,413
1990	47,653	103,426	67,177	17,210	10,556	8,482
1991	45,516	106,070	65,522	20,389	10,109	10,049
1992	38,653	80,609	62,489	5,800	9,463	2,858
1993	34,329	82,912	57,279	11,470	8,510	5,653
1994	33,561	69,834	55,692	4,037	8,115	1,990
1995	55,907	103,346	76,476	10,681	10,925	5,264
1996	66,296	111,993	76,889	16,304	10,764	8,035
1997	72,526	136,762	87,084	25,277	11,943	12,458
1998	86,000	166,364	98,199	36,827	13,187	18,150
1999	86,438	171,785	105,376	35,207	13,849	17,352
2000	91,288	166,922	106,417	31,364	13,682	15,458
2001	119,765	216,754	143,630	36,887	18,056	18,180
2002	146,817	285,544	196,692	43,331	24,165	21,356
2003	195,830	359,749	283,699	28,138	34,044	13,868
2004	214,976	396,818	324,889	22,688	38,058	11,182
2005	197,393	362,161	307,936	12,749	35,193	6,284
2006	185,326	342,406	302,458	4,184	33,702	2,062
2007	143,131	263,108	224,202	9,756	24,342	4,808
2008	92,622	165,860	148,730	943	15,723	465
2009	118,017	221,980	199,565	1,265	20,527	623
2010	146,108	266,110	239,855	1,520	23,985	749

Table B6: Reconstructed total catch (in tonnes) for Yemen in its Gulf of Aden EEZ from 1950 to 2010 by component. Reported catch refers to the part of the reconstructed catch accounted in the FAO data.

Year	Reported	Unreported	Discards
1950	12,420	27,346	0
1951	12,417	27,348	0
1952	15,651	30,954	0
1953	16,265	31,453	0
1954	16,250	31,468	0
1955	18,584	36,769	0
1956	10,908	23,767	0
1957	10,843	25,105	0
1958	10,630	23,568	0
1959	12,222	26,589	0
1960	10,670	24,801	0
1961	10,744	24,250	0
1962	10,721	24,272	0
1963	10,700	24,294	0
1964	12,329	27,436	0
1965	13,598	26,168	0
1966	13,019	26,746	0
1967	13,939	28,638	1,429
1968	14,012	28,165	2,979
1969	14,192	27,583	4,529
1970	14,097	27,890	6,169
1971	13,917	26,146	7,459
1972	16,416	31,069	10,742
1973	21,293	42,982	17,166
1974	21,755	53,726	23,304
1975	25,237	44,164	26,033
1976	32,025	55,839	37,035
1977	30,689	56,595	40,919
1978	31,854	47,785	41,176
1979	31,607	53,400	48,129
1980	43,108	64,428	66,271
1981	34,500	60,817	63,604
1982	28,502	45,279	53,068
1983	34,035	39,637	56,889
1984	26,241	56,210	68,111
1985	34,192	58,012	81,235
1986	40,538	48,694	88,893
1987	25,690	65,809	79,010
1988	25,723	63,512	65,292
1989	29,758	57,626	59,679
1990	27,515	58,701	17,210
1991	30,466	55,214	20,389
1992	26,667	48,143	5,800
1993	25,432	46,010	11,470
1994	23,502	42,295	4,037
1995	34,744	57,921	10,681
1996	42,445	53,243	16,304
1997	46,842	64,644	25,277
1998	59,358	70,178	36,827
1999	61,365	75,213	35,207
2000	62,111	73,447	31,364
2001	87,467	92,400	36,887
2002	117,679	124,534	43,331
2003	158,366	173,244	28,138
2004	168,912	205,217	22,688
2005	149,833	199,579	12,749
2006	135,485	202,737	4,184
2007	104,004	149,349	9,756
2008	68,901	96,016	943
2009	86,237	134,478	1,265
2010	85,928	178,662	1,520

Table B9: Composition of the retained industrial fishery catch (in tonnes) of Yemen in its Gulf of Aden EEZ from 1950 to 2010.

Year	1	2	3	4	5	6	7	8	9	10	11	12	13
1950	0	0	0	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	0	0	0	0	0	0	0	0	0	0
1953	0	0	0	0	0	0	0	0	0	0	0	0	0
1954	0	0	0	0	0	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	0	0	0	0	0	0
1957	0	0	0	0	0	0	0	0	0	0	0	0	0
1958	0	0	0	0	0	0	0	0	0	0	0	0	0
1959	0	0	0	0	0	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	213	111	111	59	92	38	9	0	0	0	0	0	70
1968	445	231	231	124	192	79	19	0	0	0	0	0	147
1969	676	351	351	188	292	120	30	0	0	0	0	0	223
1970	921	479	479	257	398	163	40	0	0	0	0	0	304
1971	1,114	579	579	310	481	198	49	0	0	0	0	0	368
1972	1,604	833	833	447	693	284	70	0	0	0	0	0	529
1973	2,563	1,332	1,332	714	1,107	455	112	0	0	0	0	0	846
1974	3,479	1,808	1,808	969	1,503	617	152	0	0	0	0	0	1,149
1975	3,887	2,019	2,019	1,083	1,679	689	170	0	0	0	0	0	1,283
1976	5,530	2,873	2,873	1,540	2,389	981	242	0	0	0	0	0	1,825
1977	6,110	3,174	3,174	1,702	2,639	1,084	268	0	0	0	0	0	2,017
1978	6,148	3,194	3,194	1,713	2,656	1,090	269	0	0	0	0	0	2,029
1979	7,186	3,733	3,733	2,002	3,105	1,274	315	0	0	0	0	0	2,372
1980	9,895	5,141	5,141	2,757	4,275	1,755	433	0	0	0	0	0	3,266
1981	9,497	4,934	4,934	2,646	4,103	1,684	416	0	0	0	0	0	3,135
1982	7,923	4,117	4,117	2,207	3,423	1,405	347	0	0	0	0	0	2,615
1983	8,494	4,413	4,413	2,366	3,670	1,506	372	0	0	0	0	0	2,804
1984	10,170	5,283	5,283	2,833	4,393	1,804	445	0	0	0	0	0	3,357
1985	12,129	6,301	6,301	3,379	5,240	2,151	531	0	0	0	0	0	4,004
1986	13,398	6,961	6,961	3,379	5,788	2,376	567	0	0	0	0	0	4,381
1987	12,401	6,443	6,443	1,487	5,357	2,199	717	0	0	0	0	0	3,894
1988	10,117	5,256	5,256	1,576	4,371	1,794	591	0	0	0	0	0	3,218
1989	8,885	4,616	4,616	2,461	3,838	1,576	480	0	0	0	0	0	2,941
1990	1,957	1,017	1,017	1,838	846	347	611	0	0	0	0	0	848
1991	2,850	1,481	1,481	901	1,231	505	594	0	0	0	0	0	1,005
1992	483	251	251	614	209	86	680	0	0	0	0	0	286
1993	1,347	700	700	885	582	239	636	0	0	0	0	0	565
1994	494	257	257	44	214	88	437	0	0	0	0	0	199
1995	1,258	654	654	439	544	223	858	103	3	2	0	0	526
1996	1,846	959	959	1,151	797	327	865	313	10	5	0	0	804
1997	2,748	1,428	1,428	2,516	1,187	487	664	721	24	11	0	0	1,246
1998	3,841	1,995	1,995	4,711	1,659	681	0	1,386	45	21	0	0	1,815
1999	3,758	1,952	1,952	4,577	1,624	666	90	888	94	13	1	0	1,735
2000	3,425	1,780	1,780	4,143	1,480	608	161	398	130	6	1	0	1,546
2001	4,121	2,141	2,141	4,952	1,780	731	286	0	208	0	3	0	1,818
2002	4,841	2,515	2,515	5,817	2,091	859	336	0	244	0	3	0	2,136
2003	1,503	781	781	8,126	649	267	258	0	99	0	15	1	1,387
2004	1,489	774	774	5,894	643	264	162	0	55	0	8	1	1,118
2005	1,002	521	521	2,919	433	178	63	0	16	0	2	0	628
2006	387	201	201	821	167	69	11	0	0	0	0	0	206
2007	1,115	579	579	1,362	482	198	13	0	0	0	0	0	481
2008	97	50	50	159	42	17	2	0	0	0	0	0	46
2009	130	68	68	213	56	23	3	0	0	0	0	0	62
2010	157	81	81	256	68	28	3	0	0	0	0	0	75

1: Ariidae; 2: Haemulidae; 3: *Chrysoblephus* spp.; 4: Sepiidae; 5: *Trachurus* spp.; 6: Carangidae; 7: *Panulirus homarus*;

8: Teuthida; 9: Penaeidae; 10: Palinuridae; 11: *Octopus* spp.; 12: Brachyura; 13: Others

Table B10: Composition of the discarded industrial fishery catch (in tonnes) of Yemen in its Gulf of Aden EEZ from 1950 to 2010.

Year	1	2	3	4	5	6	7	8	9	10
1950	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	0	0	0	0	0	0	0
1953	0	0	0	0	0	0	0	0	0	0
1954	0	0	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	0	0	0
1957	0	0	0	0	0	0	0	0	0	0
1958	0	0	0	0	0	0	0	0	0	0
1959	0	0	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0
1967	867	98	56	56	28	28	14	14	14	9
1968	1,807	204	117	117	58	58	29	29	29	19
1969	2,748	310	177	177	89	89	44	44	44	29
1970	3,743	423	241	241	121	121	60	60	60	40
1971	4,525	511	292	292	146	146	73	73	73	48
1972	6,517	736	420	420	210	210	105	105	105	69
1973	10,415	1,176	672	672	336	336	168	168	168	110
1974	14,139	1,596	912	912	456	456	228	228	228	150
1975	15,794	1,783	1,019	1,019	509	509	255	255	255	167
1976	22,469	2,537	1,450	1,450	725	725	362	362	362	238
1977	24,826	2,803	1,602	1,602	801	801	400	400	400	263
1978	24,982	2,821	1,612	1,612	806	806	403	403	403	265
1979	29,200	3,297	1,884	1,884	942	942	471	471	471	310
1980	40,207	4,539	2,594	2,594	1,297	1,297	648	648	648	426
1981	38,589	4,357	2,490	2,490	1,245	1,245	622	622	622	409
1982	32,197	3,635	2,077	2,077	1,039	1,039	519	519	519	341
1983	34,515	3,897	2,227	2,227	1,113	1,113	557	557	557	366
1984	41,323	4,666	2,666	2,666	1,333	1,333	667	667	667	438
1985	49,286	5,565	3,180	3,180	1,590	1,590	795	795	795	523
1986	53,932	6,089	3,479	3,479	1,740	1,740	870	870	870	572
1987	47,936	5,412	3,093	3,093	1,546	1,546	773	773	773	508
1988	39,613	4,472	2,556	2,556	1,278	1,278	639	639	639	420
1989	36,208	4,088	2,336	2,336	1,168	1,168	584	584	584	384
1990	10,442	1,179	674	674	337	337	168	168	168	111
1991	12,370	1,397	798	798	399	399	200	200	200	131
1992	3,519	397	227	227	114	114	57	57	57	37
1993	6,959	786	449	449	224	224	112	112	112	74
1994	2,449	277	158	158	79	79	40	40	40	26
1995	6,480	732	418	418	209	209	105	105	105	69
1996	9,892	1,117	638	638	319	319	160	160	160	105
1997	15,336	1,731	989	989	495	495	247	247	247	163
1998	22,343	2,523	1,442	1,442	721	721	360	360	360	237
1999	21,360	2,412	1,378	1,378	689	689	345	345	345	226
2000	19,029	2,148	1,228	1,228	614	614	307	307	307	202
2001	22,380	2,527	1,444	1,444	722	722	361	361	361	237
2002	26,289	2,968	1,696	1,696	848	848	424	424	424	279
2003	17,071	1,927	1,101	1,101	551	551	275	275	275	181
2004	13,765	1,554	888	888	444	444	222	222	222	146
2005	7,735	873	499	499	250	250	125	125	125	82
2006	2,538	287	164	164	82	82	41	41	41	27
2007	5,919	668	382	382	191	191	95	95	95	63
2008	572	65	37	37	18	18	9	9	9	6
2009	768	87	50	50	25	25	12	12	12	8
2010	922	104	60	60	30	30	15	15	15	10

1: Leiognathidae; 2: *Terapon* spp.; 3: Gerreidae; 4: Trichiuridae; 5: *Parastromateus niger*; 6: Platycephalidae; 7: Clupeidae; 8: Mullidae; 9: Stomatopoda; 10: *Carangoides malabaricus*

B10 continued

Year	11	12	13	14	15	16	17	18	19	20	21
1950	0	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	0	0	0	0	0	0	0	0
1953	0	0	0	0	0	0	0	0	0	0	0
1954	0	0	0	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	0	0	0	0
1957	0	0	0	0	0	0	0	0	0	0	0
1958	0	0	0	0	0	0	0	0	0	0	0
1959	0	0	0	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0
1967	9	7	3	1	1	1	0	28	28	28	140
1968	18	15	6	3	1	1	1	58	58	58	291
1969	27	23	9	4	2	2	1	89	89	89	443
1970	37	32	12	5	3	3	1	121	121	121	604
1971	45	38	14	6	3	3	2	146	146	146	730
1972	64	55	21	9	5	5	2	210	210	210	1,051
1973	103	88	33	15	7	7	4	336	336	336	1,680
1974	140	120	45	20	10	10	5	456	456	456	2,280
1975	156	134	50	22	11	11	6	509	509	509	2,547
1976	222	191	71	32	16	16	8	725	725	725	3,624
1977	246	211	79	35	18	18	9	801	801	801	4,004
1978	247	212	79	35	18	18	9	806	806	806	4,029
1979	289	248	93	41	21	21	10	942	942	942	4,710
1980	398	341	128	57	28	28	14	1,297	1,297	1,297	6,485
1981	382	327	123	55	27	27	14	1,245	1,245	1,245	6,224
1982	319	273	102	46	23	23	11	1,039	1,039	1,039	5,193
1983	342	293	110	49	24	24	12	1,113	1,113	1,113	5,567
1984	409	351	131	58	29	29	15	1,333	1,333	1,333	6,665
1985	488	418	157	70	35	35	17	1,590	1,590	1,590	7,949
1986	534	457	172	76	38	38	19	1,740	1,740	1,740	8,699
1987	474	407	152	68	34	34	17	1,546	1,546	1,546	7,732
1988	392	336	126	56	28	28	14	1,278	1,278	1,278	6,389
1989	358	307	115	51	26	26	13	1,168	1,168	1,168	5,840
1990	103	89	33	15	7	7	4	337	337	337	1,684
1991	122	105	39	17	9	9	4	399	399	399	1,995
1992	35	30	11	5	2	2	1	114	114	114	568
1993	69	59	22	10	5	5	2	224	224	224	1,122
1994	24	21	8	3	2	2	1	79	79	79	395
1995	64	55	21	9	5	5	2	209	209	209	1,045
1996	98	84	31	14	7	7	3	319	319	319	1,595
1997	152	130	49	22	11	11	5	495	495	495	2,474
1998	221	190	71	32	16	16	8	721	721	721	3,604
1999	211	181	68	30	15	15	8	689	689	689	3,445
2000	188	161	61	27	13	13	7	614	614	614	3,069
2001	221	190	71	32	16	16	8	722	722	722	3,610
2002	260	223	84	37	19	19	9	848	848	848	4,240
2003	169	145	54	24	12	12	6	551	551	551	2,753
2004	136	117	44	19	10	10	5	444	444	444	2,220
2005	77	66	25	11	5	5	3	250	250	250	1,248
2006	25	22	8	4	2	2	1	82	82	82	409
2007	59	50	19	8	4	4	2	191	191	191	955
2008	6	5	2	1	0	0	0	18	18	18	92
2009	8	7	2	1	1	1	0	25	25	25	124
2010	9	8	3	1	1	1	0	30	30	30	149

11: Synodontidae; 12: *Nemipterus* spp.; 13: Haemulidae; 14: Ariidae; 15: Carangidae; 16: Sphyraenidae;
17: Sepiidae; 18: *Portunus pelagicus*; 19: Soleidae; 20: Tetraodontidae; 21: Others

B11 continued

Year	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1950	0	607	0	0	0	238	0	0	0	0	0	0	0	0
1951	0	607	0	0	0	238	0	0	0	0	0	0	0	0
1952	0	712	0	0	0	279	0	0	0	0	0	0	0	0
1953	0	729	0	0	0	286	0	0	0	0	0	0	0	0
1954	0	729	0	0	0	286	0	0	0	0	0	0	0	0
1955	0	845	0	0	0	332	0	0	0	0	0	0	0	0
1956	0	530	0	0	0	208	0	0	0	0	0	0	0	0
1957	0	549	0	0	0	215	0	0	0	0	0	0	0	0
1958	0	522	0	0	0	205	0	0	0	0	0	0	0	0
1959	0	593	0	0	0	232	0	0	0	0	0	0	0	0
1960	0	542	0	0	0	212	0	0	0	0	0	0	0	0
1961	0	534	0	0	0	210	0	0	0	0	0	0	0	0
1962	0	534	0	0	0	210	0	0	0	0	0	0	0	0
1963	0	534	0	0	0	210	0	0	0	0	0	0	0	0
1964	0	607	0	0	0	238	0	0	0	0	0	0	0	0
1965	0	607	0	0	0	238	0	0	0	0	0	0	0	0
1966	0	607	0	0	0	238	0	0	0	0	0	0	0	0
1967	92	649	56	56	38	251	28	28	28	28	28	0	14	14
1968	192	641	117	117	80	244	58	58	58	58	58	0	29	29
1969	292	633	177	177	122	237	89	89	89	89	89	0	44	44
1970	398	635	241	241	166	233	121	121	121	121	121	0	60	60
1971	481	604	292	292	201	218	146	146	146	146	146	0	73	73
1972	693	715	420	420	289	253	210	210	210	210	210	0	105	105
1973	1,107	965	672	672	462	334	336	336	336	336	336	0	168	168
1974	1,503	1,130	912	912	627	383	456	456	456	456	456	0	228	228
1975	1,679	1,034	1,019	1,019	701	339	509	509	509	509	509	0	255	255
1976	2,389	1,305	1,450	1,450	997	417	725	725	725	725	725	0	362	362
1977	2,639	1,292	1,602	1,602	1,101	402	801	801	801	801	801	0	400	400
1978	2,656	1,175	1,612	1,612	1,108	355	806	806	806	806	806	0	403	403
1979	3,105	1,251	1,884	1,884	1,295	367	942	942	942	942	942	0	471	471
1980	4,275	1,576	2,594	2,594	1,783	448	1,297	1,297	1,297	1,297	1,297	0	648	648
1981	4,103	1,391	2,490	2,490	1,712	383	1,245	1,245	1,245	1,245	1,245	0	622	622
1982	3,423	1,073	2,077	2,077	1,428	285	1,039	1,039	1,039	1,039	1,039	0	519	519
1983	3,670	1,068	2,227	2,227	1,531	273	1,113	1,113	1,113	1,113	1,113	0	557	557
1984	4,393	1,192	2,666	2,666	1,833	293	1,333	1,333	1,333	1,333	1,333	0	667	667
1985	5,240	1,327	3,180	3,180	2,186	312	1,590	1,590	1,590	1,590	1,590	0	795	795
1986	5,788	1,613	3,479	3,479	2,414	108	1,740	1,740	1,740	1,740	1,740	0	870	870
1987	5,357	1,556	3,093	3,093	2,233	96	1,546	1,546	1,546	1,546	1,546	0	773	773
1988	4,371	1,321	2,556	2,556	1,822	506	1,278	1,278	1,278	1,278	1,278	52	639	639
1989	3,838	1,450	2,336	2,336	1,601	761	1,168	1,168	1,168	1,168	1,168	1,807	584	584
1990	846	1,877	674	674	355	965	337	337	337	337	337	1,623	168	168
1991	1,231	1,689	798	798	514	873	399	399	399	399	399	1,710	200	200
1992	209	2,001	227	227	88	758	114	114	114	114	114	1,584	57	57
1993	582	1,702	449	449	244	631	224	224	224	224	224	1,662	112	112
1994	214	1,127	158	158	89	577	79	79	79	79	79	1,528	40	40
1995	544	1,664	418	418	228	737	209	209	209	209	209	1,188	105	105
1996	797	1,540	638	638	334	686	319	319	319	319	319	856	160	160
1997	1,187	1,289	989	989	498	718	495	495	495	495	495	882	247	247
1998	1,659	563	1,442	1,442	697	750	721	721	721	721	721	807	360	360
1999	1,624	555	1,378	1,378	682	746	689	689	689	689	689	779	345	345
2000	1,480	503	1,228	1,228	621	700	614	614	614	614	614	688	307	307
2001	1,780	590	1,444	1,444	747	878	722	722	722	722	722	625	361	361
2002	2,091	553	1,696	1,696	877	1,118	848	848	848	848	848	593	424	424
2003	649	721	1,101	1,101	279	1,482	551	551	551	551	551	560	275	275
2004	643	584	888	888	274	1,576	444	444	444	444	444	509	222	222
2005	433	369	499	499	183	1,386	250	250	250	250	250	507	125	125
2006	167	230	164	164	70	1,292	82	82	82	82	82	252	41	41
2007	482	110	382	382	202	962	191	191	191	191	191	246	95	95
2008	42	88	37	37	18	634	18	18	18	18	18	138	9	9
2009	56	117	50	50	24	849	25	25	25	25	25	150	12	12
2010	68	141	60	60	28	1,017	30	30	30	30	30	156	15	15

15: *Trachurus* spp.; 16: *Panulirus homarus*; 17: Gerreidae; 18: Trichiuridae; 19: Carangidae; 20: *Istiophorus platypterus*; 21: *Parastromateus niger*; 22: *Platycephalidae*; 23: *Portunus pelagicus*; 24: Soleidae; 25: Tetraodontidae; 26: *Scomberomorus guttatus*; 27: Mullidae; 28: Stomatopoda

B11 continued

Year	29	30	31	32	33	34	35	36	37	38	39	40	41	42
1950	111	0	0	0	56	0	0	0	6	0	0	0	0	3,977
1951	111	0	0	0	56	0	0	0	6	0	0	0	0	3,977
1952	130	0	0	0	66	0	0	0	7	0	0	0	0	4,661
1953	133	0	0	0	67	0	0	0	7	0	0	0	0	4,772
1954	133	0	0	0	67	0	0	0	7	0	0	0	0	4,772
1955	154	0	0	0	78	0	0	0	8	0	0	0	0	5,535
1956	97	0	0	0	49	0	0	0	5	0	0	0	0	3,468
1957	100	0	0	0	51	0	0	0	5	0	0	0	0	3,595
1958	95	0	0	0	48	0	0	0	5	0	0	0	0	3,420
1959	108	0	0	0	55	0	0	0	6	0	0	0	0	3,881
1960	99	0	0	0	50	0	0	0	5	0	0	0	0	3,547
1961	97	0	0	0	49	0	0	0	5	0	0	0	0	3,499
1962	97	0	0	0	49	0	0	0	5	0	0	0	0	3,499
1963	97	0	0	0	49	0	0	0	5	0	0	0	0	3,499
1964	111	0	0	0	56	0	0	0	6	0	0	0	0	3,977
1965	111	0	0	0	56	0	0	0	6	0	0	0	0	3,977
1966	111	0	0	0	56	0	0	0	6	0	0	0	0	3,977
1967	117	9	9	7	59	0	0	0	6	1	0	0	0	4,398
1968	113	19	18	15	58	0	0	0	6	1	0	0	0	4,509
1969	110	29	27	23	56	0	0	0	6	2	0	0	0	4,621
1970	108	40	37	32	55	0	0	0	6	3	0	0	0	4,802
1971	101	48	45	38	51	0	0	0	5	3	0	0	0	4,736
1972	117	69	64	55	60	0	0	0	6	5	0	0	0	5,800
1973	155	110	103	88	79	0	0	0	8	7	0	0	0	8,107
1974	178	150	140	120	90	0	0	0	9	10	0	0	0	9,829
1975	157	167	156	134	80	0	0	0	8	11	0	0	0	9,488
1976	194	238	222	191	98	0	0	0	10	16	0	0	0	12,410
1977	187	263	246	211	95	0	0	0	10	18	0	0	0	12,733
1978	165	265	247	212	84	0	0	0	8	18	0	0	0	11,993
1979	171	310	289	248	87	0	0	0	9	21	0	0	0	13,210
1980	208	426	398	341	106	0	0	0	11	28	20	0	0	17,239
1981	178	409	382	327	90	0	0	0	9	27	89	0	0	15,756
1982	132	341	319	273	67	0	0	0	7	23	71	0	0	12,571
1983	127	366	342	293	64	0	0	0	7	24	76	0	0	12,934
1984	136	438	409	351	69	0	0	0	7	29	14	0	0	14,910
1985	145	523	488	418	74	0	0	0	7	35	44	0	0	17,170
1986	142	572	534	457	101	0	0	0	19	38	91	0	0	17,622
1987	186	508	474	407	67	0	0	0	5	34	0	0	0	16,881
1988	158	420	392	336	46	0	0	0	5	28	0	0	0	15,313
1989	83	384	358	307	107	0	0	0	2	26	0	0	0	14,578
1990	118	111	103	89	140	0	0	0	3	7	0	0	0	10,306
1991	119	131	122	105	129	0	0	0	4	9	0	0	0	10,563
1992	115	37	35	30	115	0	0	0	4	2	0	0	0	8,049
1993	105	74	69	59	99	0	0	0	4	5	0	0	0	8,267
1994	106	26	24	21	93	0	0	0	4	2	0	0	0	6,975
1995	147	69	64	55	122	103	3	0	6	5	0	2	0	10,312
1996	149	105	98	84	117	313	10	0	6	7	0	5	0	11,164
1997	170	163	152	130	126	721	24	0	7	11	0	11	0	13,622
1998	192	237	221	190	135	1,386	45	0	9	16	0	21	0	16,557
1999	207	226	211	181	139	888	94	1	9	15	0	13	0	17,103
2000	210	202	188	161	134	398	130	1	10	13	0	6	0	16,625
2001	284	237	221	190	174	0	208	43	14	16	0	0	0	21,596
2002	389	279	260	223	229	0	244	56	19	19	0	0	0	28,461
2003	555	181	169	145	314	0	99	88	27	12	0	0	1	35,915
2004	634	146	136	117	346	0	55	89	32	10	0	0	1	39,633
2005	600	82	77	66	315	0	16	76	30	5	0	0	0	36,189
2006	600	27	25	22	305	0	0	71	31	2	0	0	0	28,024
2007	447	63	59	50	227	0	0	53	23	4	0	0	0	25,776
2008	295	6	6	5	150	0	0	35	15	0	0	0	0	14,901
2009	394	8	8	7	200	0	0	47	20	1	0	0	0	19,977
2010	473	10	9	8	240	0	0	56	24	1	0	0	0	23,972

29: *Auxis thazard thazard*; 30: *Carangoides malabaricus*; 31: Synodontidae; 32: *Nemipterus* spp.; 33: *Katsuwonus pelamis*; 34: Teuthidae;
 35: Penaeidae; 36: *Octopus* spp.; 37: *Psettodes erumei*; 38: Sphyraenidae; 39: *Xiphias gladius*; 40: Palinuridae; 41: Brachyura; 42: Others