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RECONSTRUCTION OF MARINE FISHERIES CATCHES FOR LIBYA (1950-2010)

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ABSTRACT

Total marine fisheries catches by Libya were estimated from 1950 to 2010, including large-scale and small-scale commercial catches, subsistence catches, as well as discards. Total reconstructed catches increased from around 10,600 t·year^{-1} in the 1950s to approximately 96,000 t·year^{-1} in the 2000s This estimated catch is over 2 times the landings reported by the FAO on behalf of Libya, even though catches of tunas and billfishes were not included in this study (because they are being reconstructed separately).

Due to unavailability of local data, commercial landings (small-scale and large-scale) were reconstructed based on catch per unit of effort (CPUE) from neighbouring southern Tunisia, and estimates of subsistence catches were obtained by applying a catch *per capita* rate to the Libyan coastal population. Discards were estimated using studies from other fisheries in the Mediterranean. Since the beginning of the conflict in Libya, in 2011, there is practically no control of the increasing fishing activities and illegal fishing, particularly by foreign vessels.

INTRODUCTION

Libya is a North African country in the eastern part of the Maghreb, and which lies between latitudes of 22° and 32° N and longitudes of 10° and 25° E (Metz 1989; Otman and Karlberg 2007). With an area of approximately 1,775,500 km^2, Libya is fourth in size among the countries of Africa (Otman and Karlberg 2007). Libya is bordered by the Mediterranean Sea in the north, Tunisia and Algeria in the west, Egypt in the east, Sudan in the southeast and Nigeria and Chad in the south (FAO 2005; Otman and Karlberg 2007). The climate is Mediterranean in coastal areas, with mild winters, warm summers and enough rainfall, but it is Saharan in the desert, which covers 90% of the country, with very hot summers and extreme diurnal temperature ranges (Metz 1989; World of Information 2006).

A 2012 census estimated the Libyan population at 6,155,000 (www.worldbank.org). Although Libya has always been considered an under-populated country, i.e., three persons per km^2 (Otman and Karlberg 2007), the distribution of this population is very heterogeneous, and concentrated in the narrow coastal strip, which represent 10% of the country. Indeed, 85% of the population live in urban areas, and 50% live in the two main cities of Tripoli, the capital situated in the far west of the country, and Benghazi in the east (World of Information 2006; Otman and Karlberg 2007; European Commission 2009).

The Libyan population is composed of mainly Arabs and Berbers, but also small communities of Greeks, Maltese, Italians, Egyptians, Pakistanis, Turks, Indians, and Tunisians (World of Information 2006). Libya has been under the influence of Berbers, Ancient Egyptians, Phoenicians, Greeks, Romans, Byzantine, Greeks, Ottomans, Italians, French, and British (Metz 1989; Leftesi 2008).

Since the Roman era, Libya has been divided into three regions: Tripolitania, Cyrenaica, and Fezzan, a historical division based on geography (Metz 1989; Otman and Karlberg 2007). Tripoli is situated in the region of Tripolitania, on the western coast, and is culturally attached to the 'Maghrib' (i.e., countries of the northwest of Africa), with which it shares a common history. On the other hand, Cyrenaica, covering all the eastern part of the country, is attached to the Mashriq (i.e., countries of the 'east') and especially to Egypt. As for Fezzan, it is situated in the desert of the southern west of the country and is unrelated to the Maghrib or the Mashriq. Rather, the Fezzan is populated by nomads and tribal dynasties that control the oases (Metz 1989; Otman and Karlberg 2007).

Libya gained its independence in 1951, but it was the discovery of petroleum in 1959 and the revolution of September 1969 that led to the main changes in the history of the country (Metz 1989). In fact, before 1959, Libya was considered as one of the world's poorest countries and agriculture was its principal source of income. However, climate conditions and poor soils limited agricultural production, and foreign aid seemed necessary to help the country survive (Farely 1971; Wright 1981; World of Information 2006). The oil exploitation that started in the end of the 1950s rapidly turned Libya into a relatively wealthy country (Leftesi 2008). In the 1960s, oil exports allowed sectors such as manufacturing and education to develop (Leftesi 2008). Nevertheless, only a small minority of the population benefited from the oil revenues (Otman and Karlberg 2007).

Thus, in 1969, the revolution led by Colonel Muammar Al Gadhafi against King Idrisi brought deep changes in the country, i.e., a change from capitalism to socialism. All private companies were nationalized and the state took control of both production and service sectors (Leftesi 2008). By 1970, Libya had become the fourth largest oil producer in the world (Otman and Karlberg 2007). But, the domination of the state over economic activities led to misuse of economic resources, lower productivity and product quality, higher production costs and lower return on capital (Leftesi 2008). In 1988, the private sector was invited back into the country; many companies were re-privatized, and foreign investors were encouraged to invest in Libya (Leftesi 2008). However, the years following 1986 were marked by a deterioration of the political relations between Libya and the West, particularly the US. Sanctions were imposed on Libya, which forced it into economic isolation.

This embargo ended in 2004 (Otman and Karlberg 2007; Leftesi 2008). Beginning in 2006, many international oil firms established themselves in Libya and started offshore oil exploitation, notably because low production costs and Libya's proximity to Europe made it an ideal destination for oil industry investments. Additionally, Libya has the largest proven oil reserves in Africa (IUCN 2011). In 2006, revenues from oil represented 25% of GPD; because of

a relatively small population, Libya had one of the highest per capita GPD in Africa (World of Information 2006; European Commission 2011c). In 2011, a civil war, combined with a foreign intervention, ended Gadhafi's rule.

Agriculture in Libya has become less and less important since the expansion of the oil industry, causing 75% of the food to be imported. However, the country is self-sufficient in fruit and vegetables, and dairy products and poultry (World of Information 2006; Otman and Karlberg 2007). In contrast to most Mediterranean countries, Libya became officially open to tourism in only February of 2005 (World of Information 2006) and is therefore not yet considered a touristic destination.

Libya's fishing industry

Libya has the second largest continental shelf, of about 65,000 km^2, and some of the richest fishing grounds in the Mediterranean. But this wealth was not exploited until recently, and the fishing sector employs less than 0.0025% of Libya's population (Serebetis 1952; Metz 1989; Reynolds *et al.* 1995; CMPE 2006; IUCN 2011). However, the fishing sector still plays an important role in the economy of the country, and support a considerable export industry (FAO 2005). Libya is almost self-sufficient in fish with a low estimated *per capita* consumption of fresh fish products of approximately 7 $kg \cdot year^{-1}$ (FAO 2005). Nearly 95% of the total catches are for direct human consumption (European Commission 2009).

Since the 1950s, fishing activities have been more important on the west side, i.e., in Tripolitania, than on the east coast, i.e., in Cyrenaica (Serebetis 1952). However, even in the 1950s, fishing was not popular among Libyans, with practically no boat building. This indifference may have given the widespread, but erroneous notion that the Libyan sea is poor in fish. Thus, Serebetis (1952) wrote:

> *"...Fish catches could easily be increased since fish are abundant, but the fishermen do not want to increase them because that would lead to lower prices. They justify their attitude by the high price of the raw materials for the nets, cords, etc. They are all agreed in following this policy and apparently foreign fishermen who were encouraged by the authorities to come were forced to go away again by the serious threats of the local fishermen..."*

In the 1950s, there were less than 200 boats off the whole coast of Tripolitania. These boats were all artisanal (Serebetis 1952). The annual *per capita* consumption at that time in Tripoli, the most important fishing center of the time, was equivalent to 2 kg (Serebetis 1952).

Fishing in Cyrenaica was even less important and more backward than in Tripolitania. In Benghazi, i.e., the main fishing port in Cyrenaica, there were only 20 boats for 60,000 inhabitants, of which only 8 belonged to professional fishers. The daily fish consumption of the entire city of Benghazi was 30 to 50 kg, which is extremely low (Serebetis 1952; Bourgeois 1958). There was also a lack of nets, and the main methods used for fishing were hooks and lines, Greek longlines, and explosives (Serebetis 1952). Further in the eastern coast, in Derna, there were a few fishers who operated from beaches and sold their catches in the Nile Market. These fishers used to fish with explosives, and also to fish from lagoons between Benghazi and Toukra

(Serebetis 1952). In addition to this, some subsistence fishing was noticed in the region of Bomba, "*...A group of Yugoslav refugee has settled at Bomba, these men live by fishing though they are not fishermen by profession...*", but there was no commercial fishing there. However, the sea near this village was very productive, but because of the very low demand, it was not exploited. "*...One night a boat using a harpoon caught 100 kg of large top quality fish. Another day one of the fishermen from Bomba had a catch of 300 kg and he was obliged to travel all the way to Benghazi (500 km) to sell his fish...*"; beyond this, there were no fishers between Derna, a port city situated in eastern Libya, and the Egyptian border (Serebetis 1952).

Before World War II, a small number of Italian trawlers used to fish near Tripoli and Benghazi and sell their fish locally. In the early 1950s, the situation was still similar, as Libya did not have trawlers of its own; however, many Greek and Italian trawlers were fishing in Libyan waters, i.e., the Greeks off the coast of Cyrenaica and the Italians off the coast of Tripolitania. They were freezing the fish to sell it in Europe (Serebetis 1952; Bourgeois 1958).

Sponge harvesting in Libya, which is not included in this study, was one of the most important economic activities in the 1950s and the 1960s, particularly on the eastern coast of Libya. Following a period of strong decline, due in part to coastal pollution, sponge fishing started expanding again (Otman and Karlberg 2007).

Overall, fishing was almost negligible in Cyrenaica, and very limited in Tripolitania. However, a certain balance had been established between supply and demand (Serebetis 1952). During the 1970s, the fishing industry was still not important, with most of Libya's fishing fleet located on the western coast and especially around Tripoli. The fishing boats were estimated in 1979 at 338 units.

In the 1980s, the government started to increasingly encourage the development of fisheries, and to increase the demand for fish products. Hence, in 1986, a new port was constructed at Zuwarah (i.e., Northwestern Libyan coast), several ice plants were built along the coast and agreements for joint development of fishing were signed with neighbouring countries, such as Tunisia and Spain (Metz 1989). In 1988, the Libyan government created the Secretariat of Marine Wealth (SMW), tasked with developing the fishing industry. This national institution was financed by the state and was managing 24 marine fishery cooperatives called "*jamaia*" ("جمعية").

These cooperatives that were established were meant to act as fishing centres along the Libyan coast, and to meet the needs of the artisanal fishing sector; thus, they were open to all fishers who have valid boat and fishing licenses. In 2000, the Libyan government applied a decentralization policy and dissolved the SMW, whose functions were transferred to local regional authorities "*sha'abiyat*" ("شعبية") (Reynolds *et al.* 1995; Otman and Karlberg 2007).

In February 2005, Libya claimed an exclusive fishery zone which extended for a distance of 62 nautical miles from the boundaries of territorial waters (Alsied 2006). In May 2009, the country declared an Exclusive Economic Zone estimated at 355,120 km^2 (European Commission 2011a). Large-scale and small-scale commercial catches are not accurately covered by the official statistics; thus, this category includes the unreported portion of the artisanal and industrial catches.

METHODS

Available data for total landings were assembled by species and year, for the period 1950-2010, from the Food and Agriculture Organization (FAO) FishStat database and were used in this study as a reported baseline, to which we added illegal, unreported and unregulated industrial and artisanal catches; discards; and subsistence fisheries. However, this catch reconstruction does not cover bluefin tuna (*Thunnus thynnus*), little tunny (*Euthynnus alletteratus*) and swordfish (*Xiphias gladius*), as their catches are being reconstructed separately. To estimate unreported commercial catches, subsistence, and discards, we used information from independent and governmental studies, previous catch reconstructions of neighbouring countries and grey literature, while following the general catch reconstruction approach outlined in Zeller *et al.* (2007).

Illegal, unreported, and unregulated commercial catches:

Libyan fishers practice four different activities: various artisanal fishing, 'lampara' (purse seine) fishing, trawling, and tuna fishing (Reynolds *et al.* 1995). Lamboeuf *et al.* (2000) defined 4 types of artisanal fishing activities according to the fleet, gears, size, and targeted species (Table 1).

The number of artisanal vessels increased considerably from 220 in 1950 to 1,266 in 2000 (Serebetis 1952; Lamboeuf *et al.* 2000; IUCN 2011). As for the industrial fishing vessels, they are composed of privately owned trawlers with lengths between 13 to 33 m (FAO 2005). The number of trawlers increased from 10 in 1950 to 140 in 2008 (Serebetis 1952; Sacchi 2011).

Most of the Libyan marine catch is sold fresh in large urban markets. However, a fraction of the small pelagic fishes are channeled to canning plants (Reynolds *et al.* 1995). The marketing chain of fish has improved considerably since its privatization, with more facilities for distributing and handling fish (Otman and Karlberg 2007).

To reconstruct large-scale and small-scale unreported commercial catches, we first identified anchor points for the fishing effort in Libya, i.e., the number of industrial vessels (trawlers) and of artisanal vessels (lampara or others), as well as the catch per unit effort (CPUE) of the different types of vessels in nearby southern Tunisia from the official statistical reports of the Tunisian fisheries department provided by Halouani (personal communication) (Table 2). While the CPUE for the industrial fleet in 1950 was identified from the study of Serebetis (1952) on Libyan fisheries, we assumed that the CPUE of artisanal vessels in 1950 was 20% higher than the one of the mid-1970s (i.e., first CPUE anchor point for artisanal fishing).

The annual number of the different types of vessels for the period 1950-2010 was obtained through interpolation between anchor points (Table 3), which complete the time series. Then, we estimated the geometric mean of their CPUEs and performed an extrapolation back and forth to complete the time series. Catches by vessel type were estimated by multiplying their number in each year by the estimated CPUEs. Finally, to estimate the unreported marketed catches, we subtracted the annual landings reported by the FAO from the reconstructed catch.

Taxonomic disaggregation

We assumed that the species composition was the same in the industrial as in artisanal FAO catches, except for small pelagics which are all caught with artisanal gear.

The catch reported by FAO on behalf of Libya for the period 1950-2010 were not detailed until 2007, i.e., a large fraction was reported as "marine fishes nei" (MMF). To improve the taxonomic composition of the reported data as assigned to large- and small-scale commercial sectors, we applied the proportions of each species relative to 2010 (i.e., the year with the most detailed species disaggregation in the FAO data) to the MMF data.

The species disaggregation of the unreported commercial artisanal catches is based on (Shakman and Kinzelbach 2007), who provide catch composition data for the coastal waters of Libya in the form of three lists of commercial fish species and their percentages in the west (60%), center (22%) and east coast of Libya (18%). We used these percentages to obtain a weighted average catch composition for the entire coast. There were many Lessepsian (i.e., Red Sea) species in these lists of commercial fish species, and these were included in catches only since their first record in Libyan waters (Appendix 4).

The taxonomic disaggregation of unreported industrial catches is based on a report by Nafkha *et al.* (2011) about fishing in deep waters of nearby southern Tunisia. This report includes a list of the species caught by trawlers, from which we took the percentage contribution of each species, and multiplied it by the annual unreported industrial catch to estimate the annual catches of each species.

Subsistence fishery

Subsistence fishing is performed by people who fish for their own consumption and that of their families and friends. The coastal population of Libya is considered to consist of people living within a 5 km range from the coast in rural areas (Table 4), and who do not have easy access to markets. We estimated this population for the decades from 1950 to 2010 (Table 4) and interpolated the years in between.
In the absence of information from Libya, we assumed an annual *per capita* rate of subsistence catches in Libya of 3 kg/capita/year. Then, we performed a taxonomic disaggregation of the subsistence catches using the same approach as for unreported artisanal commercial catches.

Discards
Discards include non-commercial species, damaged fish, and undersized fish (GFCM 2011). There is plenty of biodiversity in Mediterranean fisheries catches, and thus discards are important, especially in the trawl fisheries (Carbonell *et al.* 1998; Lleonart *et al.* 1999; Machias *et al.* 2001; Kelleher 2005).

Discards were derived by gear/sector (lampara, trawl, etc.) from a report by the (European Commission 2011b). Of the 300 species caught in the eastern Mediterranean, only about 10% are always marketed and 30% are occasionally retained, according to their size at which they were caught, and market demands. Moreover, at least 60% are always discarded (Machias *et al.* 2001).

RESULTS AND DISCUSSION

Total marine catches were reconstructed for Libya for the period 1950-2010, including the following main components: reported artisanal catches (40.6%), reported industrial catches (2.7%), subsistence catches (0.5%), artisanal discards (8.8%), industrial discards (25.5%), unreported industrial catches (5.3%), and unreported artisanal catches (16.7%).

The reconstructed catches were 2.3 times the landings reported by the FAO on behalf of Libya, used here as a reported baseline, for the period 1950-2010. It should be noted that this study does not take into account large pelagic fishes, i.e., bluefin tuna, little tunny, and swordfish, as the catch of these fishes are being reconstructed separately.

The reconstructed total catches increased from around 10,600 t·year^{-1} in 1950s (1,290 t reported) to approximately 14,500 t·year^{-1} in the 1960s-1970s (2,070 t reported in the 1960s and 3,480 t reported in the 1970s). During the 1980s, the reconstructed catch reached around 32,400 t·year^{-1} (12,820 t reported) and nearly 47,700 t·year^{-1} during the 1990s (31,800 t reported). During the 2000s, the catches increased rapidly to a first peak of 78,600 t in 2000, then to around 108,500 t in 2004 and 111,000 t in 2008 (with 48,000 t, 38,600 t, and 46,330 t reported, respectively).

The unreported catches increased strongly by the beginning of the 2000s, due to lack of control of fishing activities in Libyan waters. Discards are also very high. The estimated subsistence catch is negligible.

The catch composition suggested that various sardines (24% of total catches), and particularly round sardinella (*Sardinella aurita*, 20% itself), are most common in Libyan catches, followed by porgies and seabreams (Sparidae, 13%), jacks and horse mackerels (Carangidae, mostly*Trachurus* spp.; 12%), and goatfishes (Mullidae, 7%) (Figure 2b). Spinefoots (Siganidae, 6.8%), European anchovy (*Engraulis encrasicolus*, 3.5%) and chub mackerel (*Scomber japonicus*, 3.3%) were the other major taxa caught in Libya.

This catch reconstruction for the period 1950 to 2010 combines the reported landings (industrial and artisanal) along with our best estimates of unreported large- and small-scale commercial and subsistence catches, as well as estimates of unreported artisanal and industrial discards. Some of these estimates are very tentative, but they likely represent a more accurate picture of the total catch volume than omitting these components entirely (which is the default result of not reporting on existing, but unmonitored components).

This study showed that the artisanal fishery is very important in the Libyan EEZ, while industrial fishing is not. Note also that the FAO data feature an unexplained decrease of catches from 2000 to 2007, which differs from our results and does not have any explanation. Actually, by the mid-2000s, catches increased, due to the fact that the economic and political situations of the country were improving in that period. Indeed, in 2004, the embargo on Libya was ended which allowed economic development, including the encouragement of fishing activities.

Since 2011, many conflicts have been taking place in Libya and there is no control of the fishing activities anymore, which we think increased substantially, especially in the form of illegal foreign fishing.

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Table 1. Artisanal fishing activities according to the fleet, gears, size, and targeted species

Fishing craft	Gear used	Length (m)	Targeted species
Batah	Trammel net and pots	6	Octopus
Flouka	Multi-gears	3-7.5	Multiple
Mator	Multi-gears (mainly nets and hooks)	6-18	Multiple
Lampara	Large seine net	8-17	Small pelagic fishes

Table 2. CPUE anchor points for the fisheries of southern Tunisia based on reports of the Tunisian Department of fisheries (Halouani pers comm.).

Year	CPUE Trawlers	CPUE Artisanal (Others)	CPUE Artisanal (Lampara)
1950	100	-	-
1974	46.04	2.26	41.67
1975	50.32	3.09	46.04
1981	51.3	5.35	-
1982	57.26	5.36	-
1983	61.5	5.96	-
1984	68.33	5.66	-
1988	46.73	6.1	153.39
1990	37	4.02	163.28
1991	30.66	3.75	165.36
1993	39.72	3.17	71.61
1994	33.21	2.67	76.79
1995	34.06	2.24	72.68
1996	*36.17*	*2.61*	*92.34*
1997	*46.53*	*2.84*	*84.46*
1998	*48.78*	*2.62*	*118.28*
1999	*53.18*	*2.48*	*212.61*
2000	55.21	2.73	337
2001	55.01	2.77	225.87
2002	54.95	2.69	194.94
2003	61.99	2.53	516.81
2004	58.82	3.17	593.03
2005	55.13	3.16	536.54
2006	50.23	2.85	436.88

Table 3. Anchor points for fishing effort (number of vessels) for the fisheries of Libya.

Year	Industrial fishing effort	Artisanal fishing effort		Source
	Trawlers	Number of lampara boats	Other artisanal vessels	
1950	10	13	207	Serebetis (1952)
1958	60*	-	-	Serebetis (1952); Bourgeois (1958)
1979	-	-	312	Metz (1989)
1993	85	130	2087 **	Reynolds et al. (1995)
1995	91	130	1911	Breuil (1997); Haddoud and Rawag (2007)
2000	105	135	1131	Lamboeuf et al. (2000); (Haddoud and Rawag 2007); IUCN (2011)
2005	-	104	1407	Shakman and Kinzelbach (2007)
2008	140	165	2300 **	Sacchi (2011)

*50 Greek trawlers according to Bourgeois (1958) and 10 Italians according to Serebetis (1952)
** We assumed that 60% only of the artisanal vessels were operational based on the study of Shakman and Kinzelbach (2007) who stipulated that 68% only of the 1866 fleet are operational, i.e. 1266.

Table 4. Anchor points for the rural Libyan coastal population within 5 km from coastline

Year	Population
1990	86,229
2000	102,609
2010	125,931

*To estimate the coastal population of Libya, we obtained the estimates of whole population from 1960 to 2010 from World Bank and for the period 1950-1959 from populstat. We then extracted the estimates of rural coastal population from the data of the Socioeconomic Data and Applications Center available for the years 1990, 2000 and 2010. For the periods 1990-2000 and 2000-2010, we made interpolations of the rural coastal population. for the period 1950-1989, we applied the percentage of the coastal population of 1990, 2%, to the whole population for each year of the 1950-1989 time period.

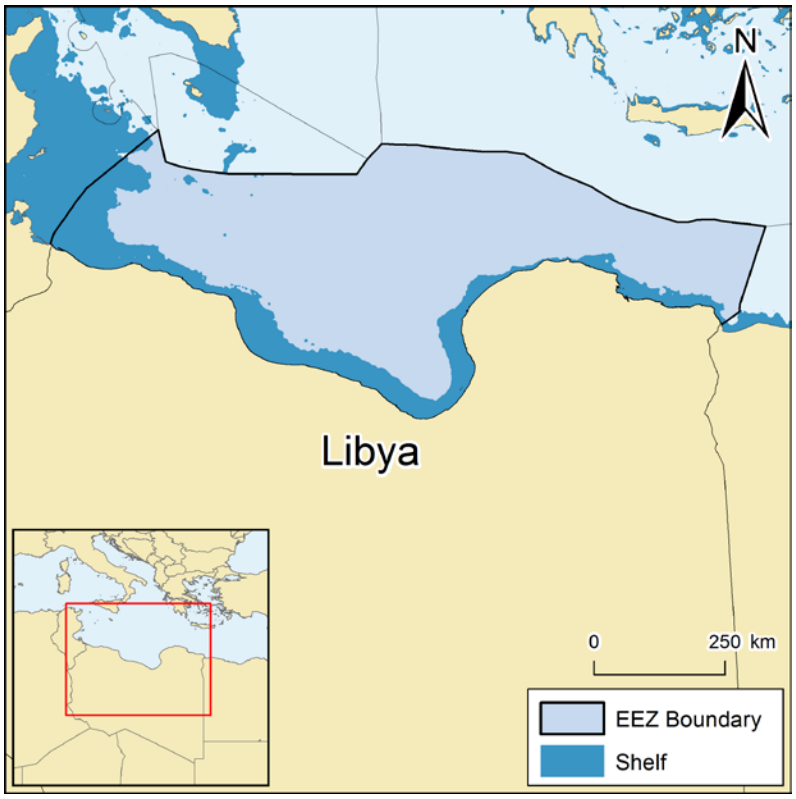

Figure 1. Map of the north of Libya, its shelf and EEZ-equivalent marine area.

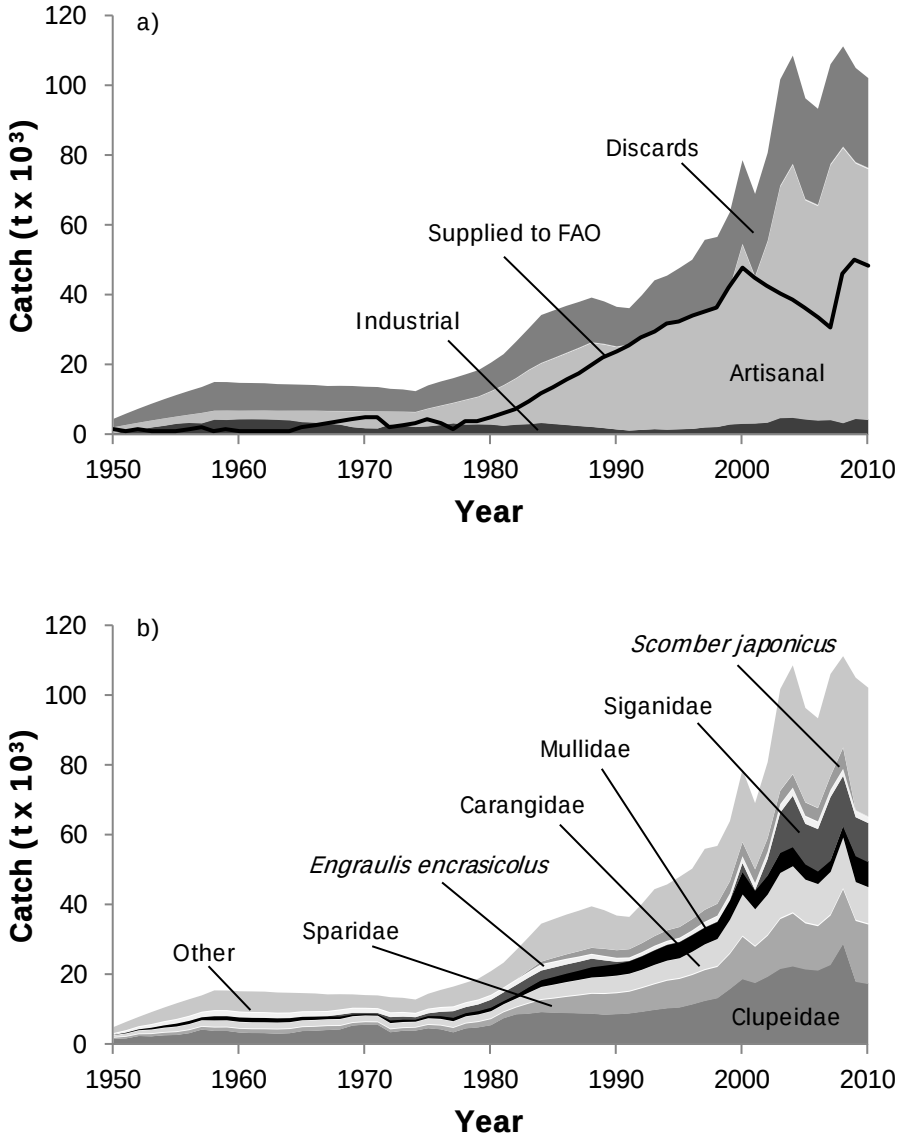

Figure 2. Total reconstructed catches for Libya by a) fisheries sector, plus discards, for 1950-2010. Landings reported by FAO on behalf of Libya are overlaid as line graph. Note that subsistence catches are too small to be visible; and b) by main taxonomic group; note the 'Other' includes 62 additional taxonomic groups (see Appendix Table 2).

Appendix Table A1. Time series of reported fisheries landings (FAO) for Libya vs. total reconstructed catch (in tonnes), followed by reconstructed landings by sector and discards.

Year	FAO landings	Total reconstructed catch	Industrial	Artisanal	Subsistence	Discards
1950	1,300	4,700	510	1,700	62	2,410
1951	1,100	6,200	1,090	1,790	62	3,240
1952	1,600	7,600	1,370	2,140	63	4,020
1953	1,100	9,000	2,110	2,010	64	4,770
1954	1,100	10,300	2,580	2,130	66	5,480
1955	900	11,500	3,160	2,100	68	6,160
1956	1,300	12,600	3,420	2,370	70	6,800
1957	2,000	13,700	3,270	3,010	73	7,390
1958	1,200	15,200	4,320	2,600	75	8,190
1959	1,300	15,200	4,260	2,690	78	8,130
1960	900	14,900	4,420	2,480	86	7,950
1961	700	14,900	4,450	2,470	89	7,870
1962	700	14,800	4,400	2,550	92	7,790
1963	1,100	14,600	4,300	2,590	95	7,600
1964	1,200	14,500	4,120	2,770	99	7,510
1965	2,100	14,400	3,630	3,270	103	7,420
1966	2,400	14,300	3,470	3,420	107	7,310
1967	3,100	14,000	3,150	3,670	111	7,110
1968	4,000	14,100	2,910	3,890	115	7,170
1969	4,500	14,000	2,190	4,590	120	7,140
1970	5,000	13,800	1,890	4,810	125	7,020
1971	5,000	13,700	1,830	4,830	130	6,950
1972	2,100	13,200	2,970	3,660	135	6,470
1973	2,500	13,000	2,620	3,960	140	6,330
1974	3,300	12,600	2,250	4,250	146	5,920
1975	4,169	14,200	2,420	5,050	152	6,590
1976	3,260	15,300	2,780	5,510	158	6,870
1977	1,710	16,300	3,270	5,830	164	7,010
1978	3,678	17,400	2,940	7,050	171	7,230
1979	4,076	18,600	2,990	7,890	177	7,520
1980	4,802	20,700	2,930	9,470	185	8,130
1981	6,147	23,100	2,580	11,510	192	8,850
1982	7,115	26,700	2,900	13,220	201	10,420
1983	9,700	30,500	3,040	15,440	209	11,800
1984	11,700	34,300	3,390	17,050	217	13,670
1985	13,700	35,700	3,090	18,760	224	13,590
1986	15,700	36,900	2,810	20,490	231	13,410
1987	17,700	38,100	2,510	22,250	238	13,080
1988	19,700	39,300	2,260	24,050	244	12,750
1989	21,916	38,200	1,930	23,920	250	12,110
1990	23,672	36,700	1,560	23,540	259	11,310
1991	25,630	36,300	1,250	24,380	264	10,390
1992	27,575	40,000	1,440	26,130	269	12,160
1993	29,365	44,200	1,630	27,730	273	14,590
1994	31,578	45,600	1,500	30,070	278	13,730
1995	32,460	47,800	1,610	30,850	283	15,050
1996	34,188	50,100	1,710	32,480	288	15,650
1997	35,403	55,800	2,110	33,290	293	20,120
1998	36,117	56,700	2,240	33,880	298	20,240
1999	42,000	63,800	2,940	39,060	303	21,460
2000	48,000	78,600	3,160	51,220	308	23,900
2001	45,100	68,900	3,220	41,880	315	23,520
2002	42,700	80,700	3,480	51,740	322	25,140
2003	40,400	101,700	4,780	66,220	329	30,340
2004	38,596	108,500	4,870	72,360	336	30,910
2005	36,300	96,300	4,380	62,750	343	28,790
2006	33,300	93,300	4,070	61,420	350	27,430
2007	30,563	106,000	4,210	72,970	357	28,470
2008	46,327	111,100	3,340	78,780	364	28,630
2009	50,210	105,000	4,560	73,120	371	26,910
2010	48,555	102,100	4,250	71,800	378	25,630

Appendix Table A2. Total reconstructed catch (t) by major taxa for Libya, 1950-2010. 'Others' includes 62 additional taxa.

Year	Clupeidae	Sparidae	Carangidae	Mullidae	Siganidae	*Engraulis encrasicolus*	*Scomber japonicus*	Other
1950	1,730	330	410	196	3	300	0	1,720
1951	1,880	470	590	382	3	470	0	2,380
1952	2,550	510	770	459	5	630	0	2,670
1953	2,460	660	930	700	4	790	0	3,430
1954	2,760	730	1,080	846	4	930	0	3,900
1955	2,850	830	1,220	1,031	4	1,070	0	4,480
1956	3,360	880	1,380	1,099	7	1,200	0	4,740
1957	4,380	810	1,500	1,051	5	1,320	0	4,680
1958	4,010	980	1,660	1,390	4	1,490	0	5,650
1959	4,010	1,010	1,660	1,372	5	1,470	0	5,630
1960	3,540	1,090	1,620	1,434	5	1,430	0	5,810
1961	3,400	1,120	1,610	1,457	4	1,420	0	5,890
1962	3,370	1,140	1,590	1,446	4	1,400	0	5,870
1963	3,210	1,230	1,600	1,399	11	1,360	0	5,780
1964	3,360	1,210	1,580	1,352	10	1,340	0	5,660
1965	3,970	1,140	1,580	1,182	13	1,320	0	5,210
1966	4,060	1,150	1,580	1,131	15	1,300	0	5,080
1967	4,270	1,150	1,580	1,016	21	1,250	0	4,760
1968	4,450	990	1,620	884	569	1,230	0	4,350
1969	5,540	760	1,550	677	482	1,200	0	3,830
1970	5,790	740	1,530	583	392	1,160	0	3,640
1971	5,740	750	1,510	572	397	1,130	0	3,650
1972	3,620	860	1,390	966	956	1,100	0	4,330
1973	4,050	790	1,360	860	891	1,070	0	4,030
1974	4,110	830	1,330	751	745	980	0	3,810
1975	4,770	980	1,510	822	802	1,090	0	4,250
1976	4,460	1,090	1,540	974	1,257	1,110	0	4,890
1977	3,600	1,280	1,540	1,165	1,919	1,110	0	5,670
1978	4,740	1,390	1,690	1,101	1,746	1,130	0	5,590
1979	5,030	1,540	1,790	1,153	1,948	1,150	0	5,960
1980	5,650	1,760	1,880	1,198	2,306	1,150	0	6,770
1981	7,630	1,730	1,940	1,088	2,513	1,170	0	7,070
1982	8,750	1,980	2,200	1,230	2,842	1,320	0	8,420
1983	8,950	2,900	2,760	1,710	2,834	1,420	400	9,510
1984	9,370	3,530	3,350	2,118	2,811	1,600	700	10,850
1985	9,230	4,080	3,620	2,384	2,744	1,490	1,000	11,110
1986	9,140	4,650	3,860	2,615	2,670	1,380	1,250	11,390
1987	9,030	5,170	4,080	2,863	2,580	1,250	1,500	11,610
1988	8,960	5,710	4,280	3,147	2,501	1,140	1,700	11,880
1989	8,640	5,980	4,540	3,388	1,566	1,030	2,000	11,070
1990	8,800	6,040	4,660	3,518	670	910	2,150	9,920
1991	9,010	6,270	4,760	3,731	156	760	2,350	9,240
1992	9,490	6,810	4,880	4,010	160	890	2,550	11,220
1993	10,030	7,380	5,170	4,297	166	1,010	2,750	13,430
1994	10,480	7,940	5,360	4,643	172	880	3,000	13,110
1995	10,720	8,240	5,520	4,790	178	930	3,050	14,370
1996	11,590	8,470	6,270	4,949	185	1,020	3,200	14,440
1997	12,610	8,850	7,000	4,964	189	1,350	3,400	17,450
1998	13,370	9,010	7,600	5,066	191	1,460	3,400	16,550
1999	15,990	10,120	9,420	5,657	245	1,640	3,500	17,190
2000	18,840	12,200	11,690	6,657	2,665	1,740	4,000	20,790
2001	17,750	10,410	10,330	5,517	273	1,800	3,900	18,950
2002	19,540	11,790	11,430	5,623	4,884	1,860	3,800	21,750
2003	21,790	14,320	12,810	5,997	11,677	2,180	3,800	29,090
2004	22,520	15,210	13,120	5,730	14,816	2,140	3,800	31,150
2005	21,660	13,230	12,110	4,644	11,720	2,070	3,800	27,040
2006	21,340	12,730	11,660	3,883	12,226	1,940	3,800	25,680
2007	22,930	14,220	12,100	3,445	18,340	1,860	3,900	29,220
2008	28,890	15,760	14,430	3,412	14,634	1,800	6,030	26,160
2009	18,110	17,480	10,710	7,696	11,263	1,680	0	38,020
2010	17,470	17,080	10,290	7,425	11,309	1,570	0	36,910