REPUBLIC OF KENYA

MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES & COOPERATIVES

STATE DEPARTMENT FOR FISHERIES AND THE BLUE ECONOMY

KENYA FISHERIES SERVICE

FISHERIES ANNUAL STATISTICAL BULLETIN 2018

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1.0 INTRODUCTION

Fisheries production in Kenya can be classified into three groups namely fresh water capture fisheries, marine capture fisheries and aquaculture (Hecky, Mugidde, Ramlal, Talbot, & Kling, 2010). The major sources of capture and aquaculture data (including prices) are Fisher folks dealing with marine and inland fishing such as Beach Management Units (BMUs); Aquaculture farmers, County Directors of Fisheries in the various counties, Kenya Marine and Fisheries Research Institute, Kenya National Bureau of Statistics (KNBS), Association of Fish Processors and Exporters of Kenya (AFIPEK), Government and

On fisheries data exchange, the State Department for Fisheries and the Blue Economy has active collaborative initiatives with various organizations. Due to the fact that some of the most important fisheries in the country are Trans-boundary, there are strong mechanisms of data sharing with the aim of fostering better management of the shared fisheries resources. The department thus exchanges data with regional bodies such as the Lake Victoria Fisheries Organization (LVFO), the Indian Ocean Tuna Commission (IOTC), the Food and Agricultural Organization (FAO) and the South West Indian Ocean Fisheries Commission (SWIOFC). Data exchange with these organizations is wide ranging encompassing all aspects of fisheries.

LVFO is also involved in setting benchmarks of data collections protocols by issuing standard operating procedures in data collection and analysis so that the data thus collected can be compared across the shared water body regardless of the country. Data exchange with Indian Ocean Tuna commission (IOTC) concerns tuna and tuna like species which are highly migratory. The stocks are shared by the countries bordering the Indian Ocean and for effective management, the member countries share fisheries data to enable species specific stock assessment in the Indian Ocean. The South West Indian Ocean Fisheries Commission mainly deals with demersal species, near-shore *pelagic*, *crustaceans* and *molluscs* which mainly are within a country's water boundaries or are shared with the immediate neighbours. The department also makes submissions to FAO statistical year books as well as for the annual economic survey reports by Kenya National Bureau of Statistics.

This report details on the fisheries production data for the years 2018 and compares the results with those of the previous years. The imports and export data are also important for evaluation of the per capita consumption of fish in the country.

1.2 NATIONAL FISH PRODUCTION

Kenya is endowed with both marine and inland water resources. The inland water resources include lakes, dams and rivers of varying sizes. Some of the major lakes include: Lake Turkana (6,405 Km^2), Lake Victoria-Kenyan side (6% of the whole lake =4,128 km^2), Naivasha (210 Km^2), Baringo (129 Km^2), and Lake Jipe (39 Km^2). Major rivers include Tana (700 Km), Athi/Galana/Sabaki (530 Km), Ewaso-Ngiro North (520 Km), Kerio (350 Km), Suam-Turkwel (350 km), Mara (280 km), Nzoia (240 km), Voi (200 km), Yala (170 km), Ewaso-Ngiro-south (140 km), Sondu (105 km), Malewa (105 km) and Kuja (80 km). Across the country are also dams stocked with fish and in areas like Uasin Gishu and Laikipia, the fish production is quite substantial (Halwart, Soto, & Arthur, 2007).

Further to these inland water resources, Kenya also enjoys a vast coastline of 640 km on the Western Indian Ocean, besides a further 200 nautical miles Exclusive Economic Zone (EEZ) under Kenyan jurisdiction. The total area of the territorial waters is 9,700 Km^2 while the Kenyan EEZ is 142,400 Km^2. Kenya also lays claim to extended EEZ reaching 350 km with an extra area of approximately 103,320Km^2. The total area for exploitation by the country is a massive 255,420 Km^2 which is about half of the Kenyan land cover area.

The Kenyan fishery is mainly artisanal with very few commercial/industrial vessels targeting mainly shallow water shrimps, deep water shrimps and lobsters. The country has for a period been having a Kenyan flagged long liner exploiting the EEZ. Other vessels are purse seines and long liners owned by Distant Water Fishing Nations (DWFN) which operate under Kenyan license in our Economic Exclusive Zone (EEZ) targeting Tuna and Tuna like species. The artisanal fishery accounts for most the inland and marine water catches reported in this bulletin and consequently it is currently the most important fishery in the country, even though our EEZ which is predominately for commercial fishing is under exploited with an estimated potential of between 150,000 to 300,000MT (Commonwealth secretariat report 2003 by Dr. George Habib).

The fisheries sector plays a significant role in employment and income generation. During the year under review the sector supported many people directly as fishermen and fish farmers with quite a number of stoked fish ponds. The sector supports about 1.2 million people directly and indirectly, working as fishers, traders, processors, suppliers and merchants of fishing accessories and employees and their dependents. Besides being a rich source of protein especially for riparian communities, the sector is also important for the preservation of culture, national heritage, and recreational purposes.

During the year (2018) under review, the total fish production was 150,128 MT worth 24,868 million Kenya shillings (Figure1. 1). The production was 9.8% increase compared to 135,895 MT worth 23,514 million Kenya shillings landed in 2017. Most of the production as in the past was from inland capture fisheries amounting to 109,553 MT with an ex-vessel value of Kshs.15,633 million. The production from marine and aquaculture was 25,391 and 15,184 MT respectively (Fig 1.2).

Inland capture fisheries contributed 83.2% of Kenya's total fish production, with the principal fishery being that of Lake Victoria. The lake accounted for 98,150MT or 65.8% of the country's total annual inland fish production in 2018. Lake Turkana, Kenya's largest freshwater body (6,405 km^2) produced 7,587 MT of fish during the year under review. Other freshwater-bodies of commercial importance included lakes Baringo (145MT), Naivasha (2,287MT), Jipe (131MT).

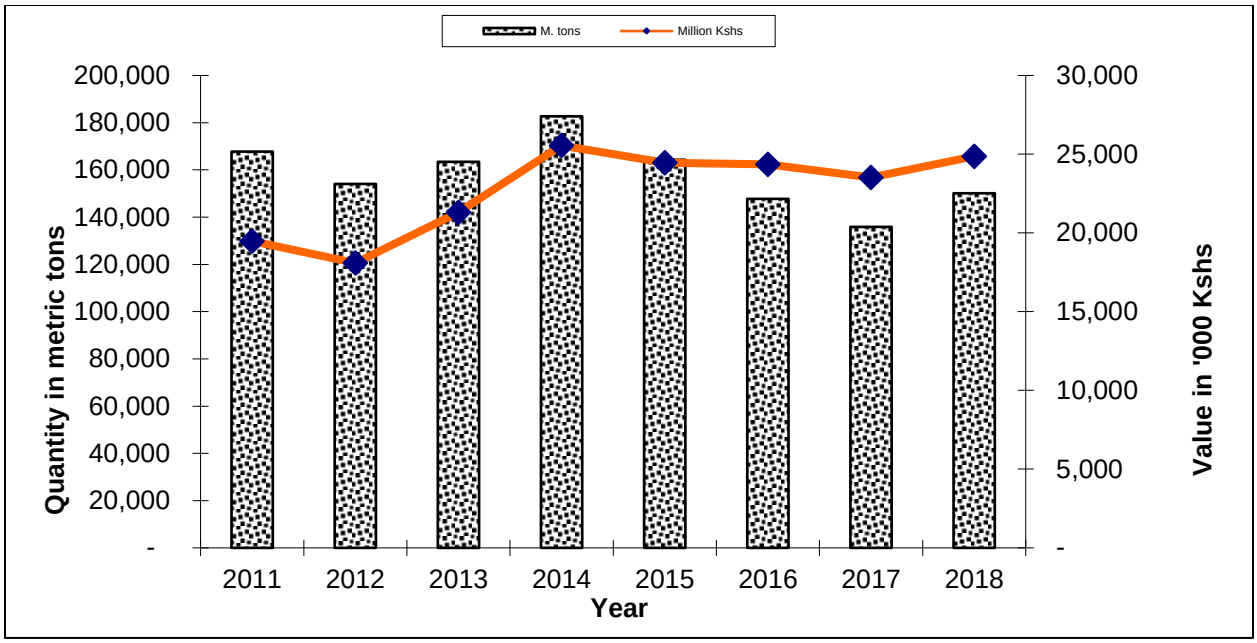

Figure 1. 1 Fish production by quantity and value 2010-2018

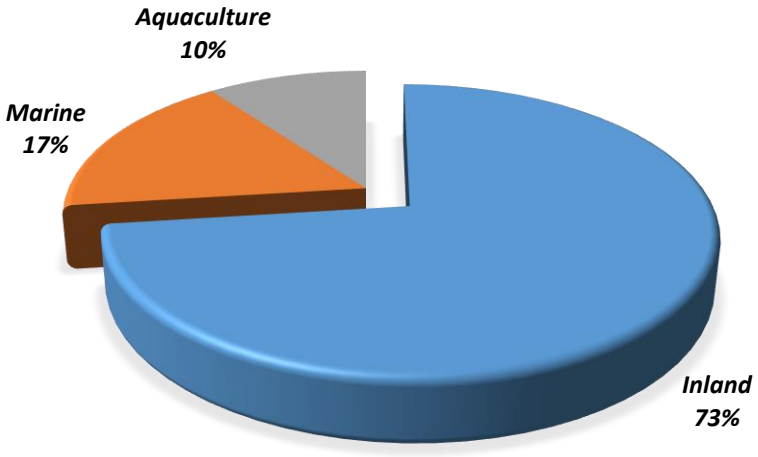

Figure 1. 2 National fish production by Fishery Category 2018

The fish and fish products produced in the country are marketed domestically or exported to the international markets (Ndanga, Quagrainie, & Dennis, 2013). The main fish and fishery products exported during the year under review included Nile perch products (fillets, maws, headless and gutted whole Nile perch), Octopus, Fish meal and marine shells. Fish and fishery products imported into the country included the following products among others: frozen mackerels, frozen tilapia, frozen tilapia fillets, frozen sardines, frozen pangasius fillets and tuna fish meals among others.

The fisheries production by different water bodies in 2018 and compares the fish production for the past four years (2015 – 2018).is shown in table 1.

Table 1. 1 Quantity of fish landings 2015 – 2018

Year	**2015**		**2016**		**2017**		**2018**	
Fresh Water	**M. Tons**	**Value 000 Kshs**	**M. Tons**	**Value 000 Kshs**	**M. Tons**	**Value 000 Kshs**	**M. Tons**	**Value 000 Kshs**
Lake Victoria	109,902	14,494,839	98,166	14,602,568	92,722	14,302,388	98,150	14,487,492
Lake Turkana	10,605	735,717	7,926	576,493	4,021	486,540	7,587	564,739
Lake Naivasha	1,072	132,617	1,064	141,006	1,689	222,579	2,287	287,194
Lake Baringo	176	54,859	141	41,595	155	46,606	145	43,442
Lake Jipe	122	21,031	106	18,719	112	21,756	131	38,260
Lake Kanyaboli	100	9,874	94	9,870	127	26,346	203	29,656
Lake Kenyatta	64	5,085	48	4,560	45	3,473	14	1,330
Tana River Dams	852	115,020	444	72,229	422	84,500	297	37,373
Aquaculture	18,656	5,014,149	14,952	4,253,844	12356	3,691,046	15,120	4,480,875
Tana River Delta	54	4,818	20	1,970	115	9,296	46	5,069
Turkwel	28	5,936	42	9030	35	9,905	34	9,822
Riverline	24	4,212	14	3500	10	2,368	320	86,400
Small Dams	0	0	0	0	300	75,120	339	42,015
Total Fresh Water	**141,655**	**20,598,157**	**123,017**	**19,735,384**	**112,109**	**18,981,923**	**124,673**	**20,113,667**
Marine	22,407	3,795,575	24,165	4,434,126	23,286	**4,375,822**	24221	4,457,809
Mariculture			35	1,050	51	1,530	64	1,920
Industrial (Marine)	248	69,599	544	177,947	449	126,376	1170	252,559
Marine Aquarium					0	28,701		42,414
Marine Total	**22,655**	**3,865,174**	**24,744**	**4,613,123**	**23,786**	**4,532,429**	**25,455**	**4,754,702**
Grand Total	**164,310**	**24,463,331**	**147,761**	**24,348,507**	**135,895**	**23,514,352**	**150,128**	**24,868,369**
	M. Tons	**Value. 000 Kshs**	**Quantity %**	**Value %**				
Inland Capture	109,553	15,632,792	73.0	62.9				
Marine Capture	25,260	4,752,782	16.8	19.1				
Aquaculture	15,184	4,482,795	10.1	18.0				
Total	**149,997**	**24,868,369**	**100**	**100**				

2.0 INLAND CAPTURE FISHERIES

2.1 LAKE VICTORIA FISHERY

Lake Victoria's contribution to total national annual fish production is enormous (65.8% in 2018) even in the face of rapidly declining fish stocks in the lake (Fryer, 1972). Capture fisheries of Lake Victoria are a source of livelihood to many people employed directly as boat owners, fishermen, fish traders, fish processors, etc. and indirectly as fishing gear manufacturers, boat builders, and ice producers among others. Lake Victoria is a multi-species fishery with hundreds of known species, but only *Rastrineobola argentea* (Omena), *Lates niloticus* (Nile perch), and *Oreochromis niloticus* (Nile tilapia) are of economic significance.

During the year 2018, fish production from Lake Victoria increased to 98,150MT with an ex-vessel value of Kshs.14,487 Million compared to 92,722MT with an ex-vessel value of Kshs.14, 302 Million landed in 2017. This year's figures translate into an increase of 5.8% in quantity while the ex-vessel value increased by 1.3% as compared to the previous year (figure 2.1).

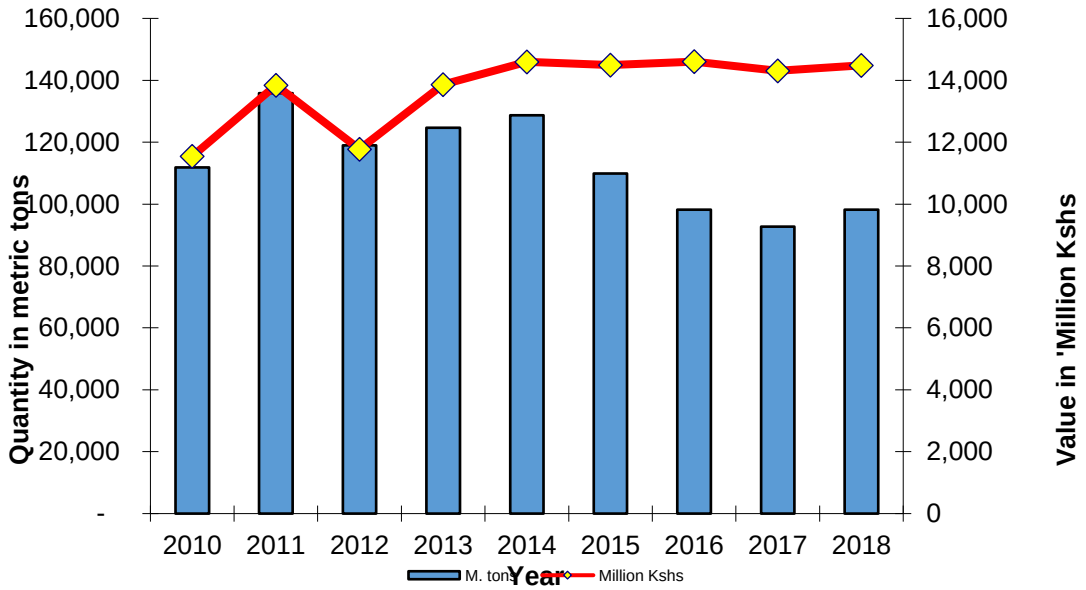

Figure 2. 1 Trends in annual fish landings from Lake Victoria fishery 2010-2018

Table 2. 1 Lake Victoria fish landings by Species, by County quantity and values 2018

County	BUSIA		KISUMU		SIAYA		MIGORI		HOMABAY		TOTAL	
SPECIES	Wt (Kg)	Value (Ksh)	Wt (Kg)	Value (Ksh)	Wt (Kg)	Value (Ksh)	Wt (Kg)	Value (Ksh)	Wt (Kg)	Value (Ksh)	Wt (Kg)	Value (Ksh)
Alestes spp	-	-	2,748.71	435,223.50	903.00	68,711.59	-	-	4,178.00	225,460.00	7,829.71	729,395.09
Bagrus spp	-	-	1,089.77	137,529.36	18,528.00	1,788,811.00	11.00	2,200.00	4,440.00	256,160.00	24,068.77	2,184,700.36
Micropterus spp (Black bass)	-	-	33,652.22	4,274,470.43	792.00	60,478.00	-	-	-	-	34,444.22	4,334,948.43
Clarias spp	-	-	151,041.72	26,076,666.06	456,358.00	46,592,326.00	-	-	141,386.00	15,112,200.00	748,785.72	87,781,192.06
Rastreonobola argentea	651.00	117,320.00	1,332,152.86	144,179,014.99	11,654,003.00	666,059,888.00	842,654.00	91,292,594.00	32,587,067.00	3,879,729,014.00	46,416,527.86	4,781,377,830.99
Labeo spp	3,022,300.00	181,238,000.00	8,065.36	1,117,347.96	16.00	1,008.00	9,781.00	2,445,250.00	12.00	600.00	3,040,174.36	184,802,205.96
Haplochromis spp	-	-	70,302.62	20,332,597.74	216,011.00	41,350,118.00	29,792.00	2,601,400.00	494,530.00	33,898,250.00	810,635.62	98,182,365.74
Lates niloticus	111,003.00	11,045,300.00	1,916,849.88	234,623,427.27	10,522,163.00	2,193,986,681.00	1,969,628.00	504,697,287.00	19,868,114.00	4,977,563,822.00	34,387,757.88	7,921,916,517.27
Mormyrus spp	930,608.00	185,521,680.00	93.74	13,547.32	765.00	96,726.62	-	-	4,268.00	431,060.00	935,734.74	186,063,013.94
Protopterus spp	-	-	118,004.97	20,909,365.30	342,309.00	55,277,405.74	1,006.00	234,410.00	151,860.00	19,190,158.00	613,179.97	95,611,339.04
Synodontis spp	1,094.00	218,600.00	155,899.76	23,549,186.88	140,960.00	14,440,853.00	3,095.00	183,763.00	190,110.00	15,338,244.00	491,158.76	53,730,646.88
Oreochromis niloticus	152,648.00	15,264,800.00	296,147.96	66,674,174.30	1,782,335.00	256,386,655.00	226,622.00	52,535,342.00	461,294.00	132,905,742.00	2,919,046.96	523,766,713.30
Tilapia others	419,236.00	129,576,250.00	822.37	120,882.01	13,766.00	6,537,770.00			-	-	433,824.37	136,234,902.01
Unspecified	-	-	-	-	-	-			81,874.00	3,912,140.00	81,874.00	3,912,140.00
Caradina niloticus	240,848.00	39,313,820.00	-	-	6,934,669.00	361,749,382.62			-	-	7,175,517.00	401,063,202.62
Schilbe mystes			28,244.07	5,727,629.83	1,317.00	74,196.49			-	-	29,561.07	5,801,826.32
TOTAL	4,878,388.00	562,295,770.00	4,115,116.00	548,171,062.95	32,084,895.00	3,644,471,011.05	3,082,589.00	653,992,246.00	53,989,133.00	9,078,562,850.00	98,150,121.00	14,487,492,940.00

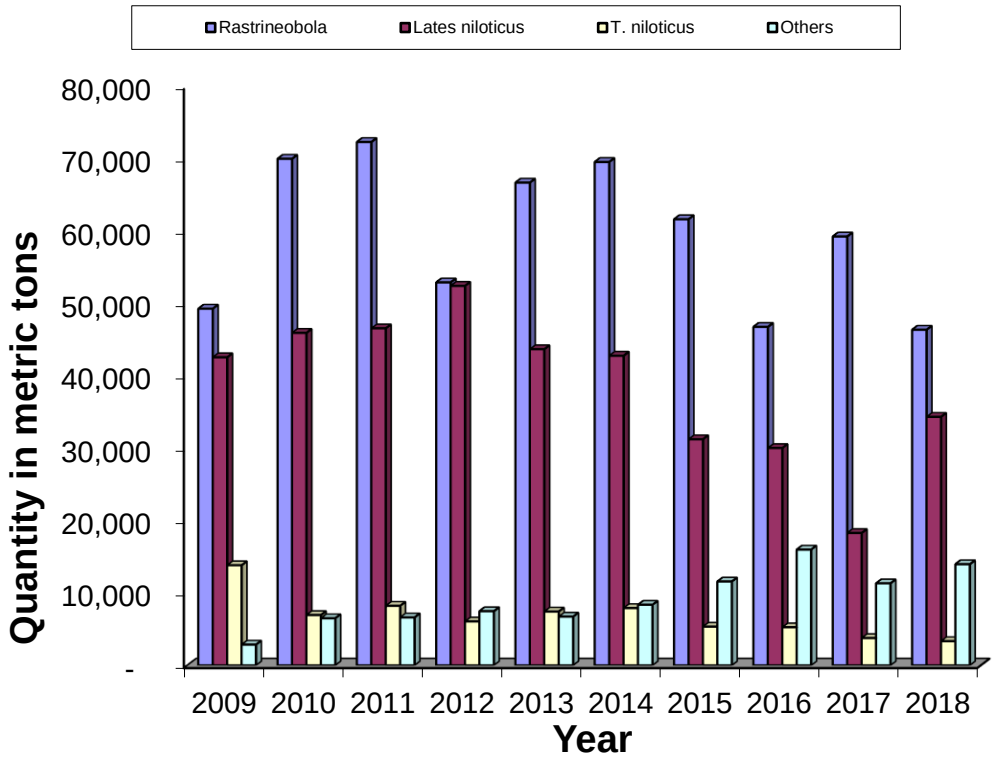

Figure 2. 2 Lake Victoria species catch composition 2007-2018

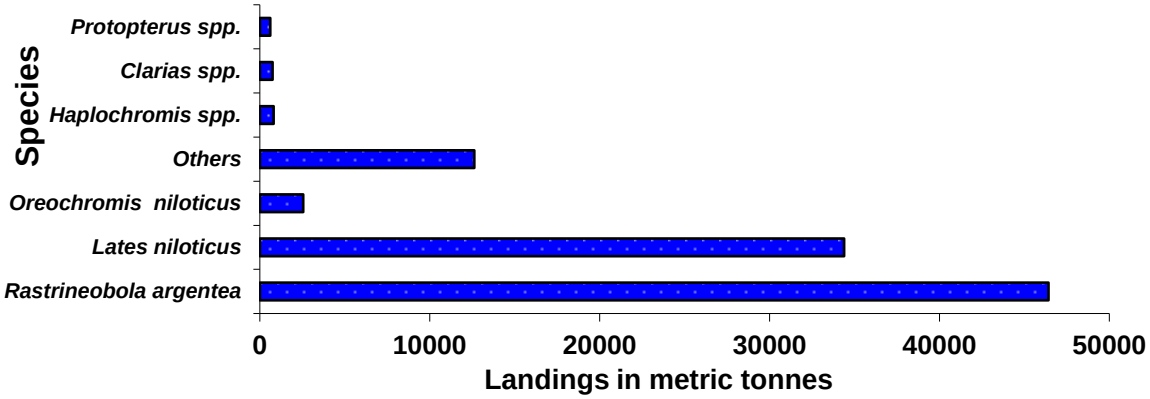

Figure 2. 3 Lake Victoria species catch composition 2018

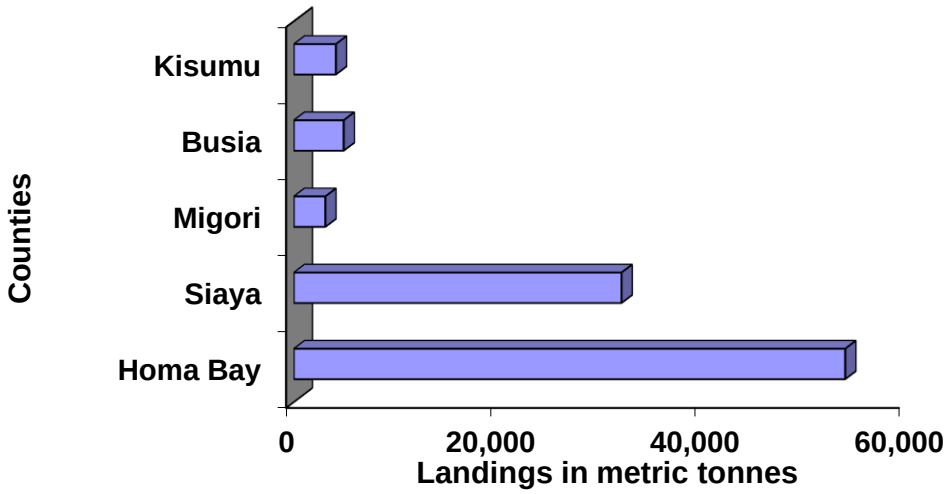

Figure 2. 4 Lake Victoria fish landings by Counties 2018

2.2 LAKE TURKANA FISHERY

Lake Turkana is Africa's fourth largest lake by volume and Kenya's largest inland lake measuring about 249 km long by 48 km at its widest part, with a delta extending into Ethiopia. It lies in a closed basin 365 meters above sea level. The lake has three volcanic islands namely the north, central and south islands. The central island has three saline crater lakes known for endemic species of tilapias. The islands are listed as UNESCOs world heritage sites.

Over 90% of the annual water discharge by volume is from river Omo originating from the Ethiopian highlands while the rest is from seasonal rivers Kerio and Turkwel. River Omo drains a large portion of the south western highlands of Ethiopia and therefore influences fluctuations in the lake's water level, which in turn affects the amount (or abundance) of fish stocks and hence fish production from the lake and livelihoods of the people around the lake and beyond. With no surface outlet, the water budget is a balance between river inflow and evaporation which imposes special physical chemical conditions making the lake saline. Therefore, any activities dealing with water abstraction or damning that interferes with the natural discharge rates of river Omo has a negative effect on the lake volume levels.

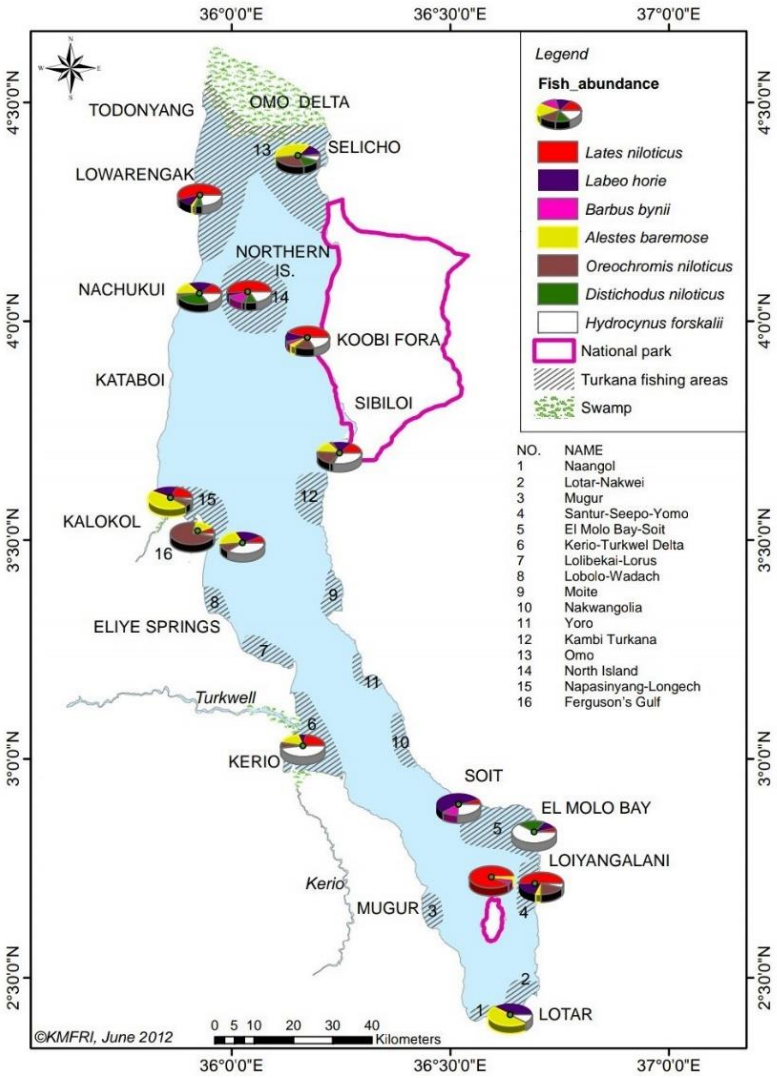

Figure 2. 5 Image representation of Lake Turkana

The lake has about 48 species of fish with a dozen supporting a commercial fishery. The species exploited commercially include, Nile perch (*Lates niloticus*), Tilapia (*Oreochromis niloticus*), Catfish (*Clarias gariepinus), synodontis schall, Hydrocynus forskalii, Labeo horie, Bagrus spp, Distichodus niloticus, Citharinus spp, Barbus spp* and *Alestes spp*. The fishery is characterized by bust cycles in fish landings associated with fluctuations in lake levels due to the dynamics of the climatic conditions especially precipitation leading to filling and drying up of the Ferguson's gulf. The filling up of the Ferguson's gulf is associated with boom in fish catches especially tilapias.

During the year under review, a total of 7,578 MT of fish were landed with an ex-vessel value of Kshs. 564,739 Thousand from both sides (Turkana and Marsabit counties) of the lake. This years' production was an increase of 35 % in quantity and 16.07% in value compared to 2017 production of 4,021MT with an ex-vessel value of Kshs.486, 540 Thousand. The trends in annual fish catches from Lake Turkana are determined by the lakes' water level and for that the catches have been

unpredictable for a long time. But there has been a continuous decline in the catches since 2015 apart from the increase in the year under review.

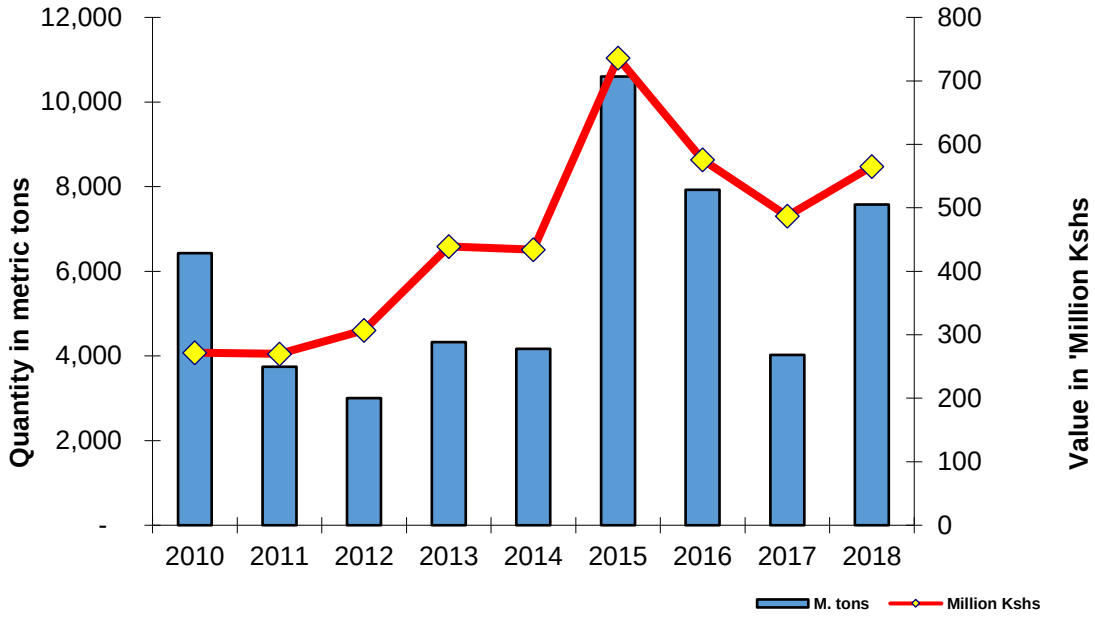

Figure 2. 6 Trends in annual fish landings from Lake Turkana fishery 2010-2018

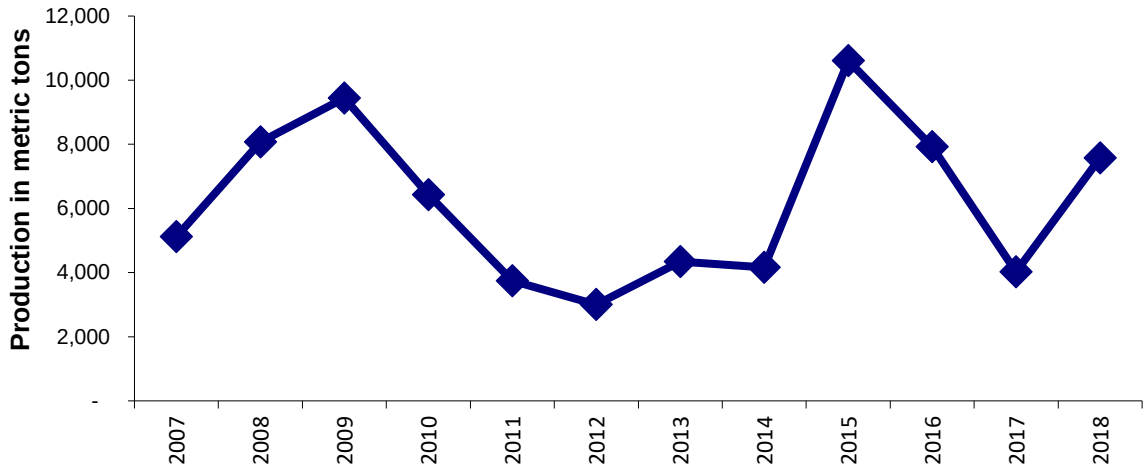

Figure 2. 7 Trends in annual fish landings from Lake Turkana fishery 2007-2018

Table 2. 2 Lake Turkana Monthly fish landings by Species 2018

	Alestes		Labeo		Tilapia niloticus		Others		Total	
Month	Kgs	Kshs	Kgs	Kshs	Kgs	Kshs	Kgs	Kshs	Kgs	Kshs
Jan	160,000	16,000,000	12,430	1,118,695	230,144	16,110,089	15,447	1,593,169	**418,021**	**34,821,953**
Feb	256,300	23,067,000	10,407	936,594	39,467	2,762,669	12,672	1,373,510	**318,845**	**28,139,773**
Mar	73,950	6,655,500	2,797	307,689	299,346	20,954,240	15,303	1,894,120	**391,397**	**29,811,549**
Apr	51,123	6,134,760	3,460	380,600	246,122	22,150,980	10,076	1,081,960	**310,781**	**29,748,300**
May	44,613	4,907,463	91,300	7,304,000	193,772	13,564,061	15,917	2,104,590	**345,603**	**27,880,114**
Jun	8,732	1,047,800	738	66,421	613,751	42,962,583	4,659	567,433	**627,880**	**44,644,238**
July	6,125	735,000	994	119,321	161,082	11,275,708	825	79,759	**169,026**	**12,209,788**
Aug	44,300	3,987,000	5,895	530,569	360,663	28,853,038	2,817	287,069	**413,675**	**33,657,675**
Sep	4,200	378,000	4,428	398,530	426,378	34,110,222	3,568	277,892	**438,574**	**35,164,644**
Oct	6,500	715,000	3,220	289,826	423,322	25,399,300	6,288	551,114	**439,330**	**26,955,240**
Nov	20,100	1,809,000	20,418	1,837,584	587,651	41,135,542	6,407	783,469	**634,575**	**45,565,595**
Dec	17,300	2,076,000	4,684	562,112	3,042,682	212,987,716	5,605	513,809	**3,070,270**	**216,139,637**
Total	**693,243**	**67,512,523**	**160,772**	**13,851,940**	**6,624,379**	**472,266,148**	**99,584**	**11,107,893**	**7,577,978**	**564,738,504**

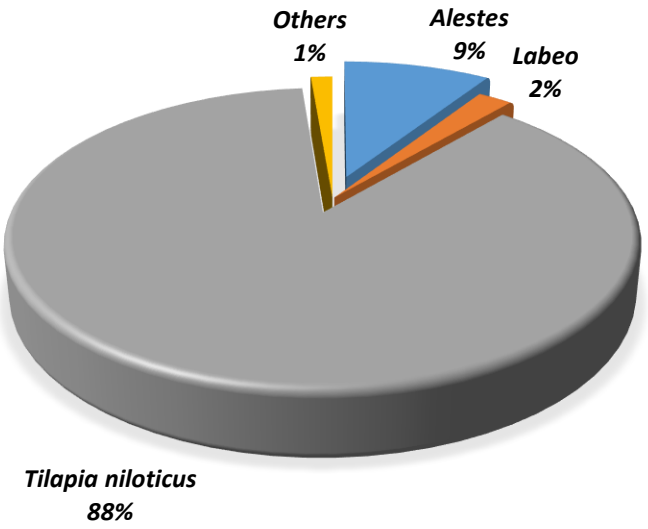

Figure 2. 8 Species composition in catches of Lake Turkana Fishery 2018

2.3 LAKE NAIVASHA FISHERY

The present fish population of Lake Naivasha comprises of the introduced species including largemouth bass (*Micropterus salmoides*) which was introduced in 1927, 1951 and 1956 from the United States of America, Tilapia zilli introduced from Lake Victoria in 1956. The introduction of Tilapia zilli also contained *Oreochromis leucostictus* and other tilapine species which are presently not encountered in the lake. The exotic rainbow trout (*Onchorhynchus mykiss*) occasionally strays

into the lake from river Malewa while *Barbus amphigramma* migrates between the lake and river Malewa. The Louisiana red swamp crayfish (*Procambarus clarkii*) was introduced in 1970 as a source of food for the bass. The *Procambarus clarkii* and *Barbus amphigramma* are not under commercial exploitation currently in the lake.

Species composition in the catches from the lake has drastically changed since the year 2002 where total catches were dominated by the *tilapiines*. However, over the last twelve years, *Tilapiines* contribution in catches has declined with the introduced *Cyprinus carpio* assuming greater prominence in the catches.

It is imperative for management and research to understand the implications of the *Cyprinus carpio* on the other fish species in the ecosystem. Besides, it is also important to understand the effects of the feeding habits of the *Cyprinus carpio* on the breeding grounds/nests of the *tilapiines* in the fishery.

During the year under review, a total of 2,287MT of fish with an ex-vessel value of Kshs.287, 194 Thousand were landed from Lake Naivasha. This was an increase of 35.41% in quantity and 29.03% increase in value compared to 2017 landings of 1,689MT with an ex-vessel value of Kshs.222, 579 thousand, (figure 2.9).

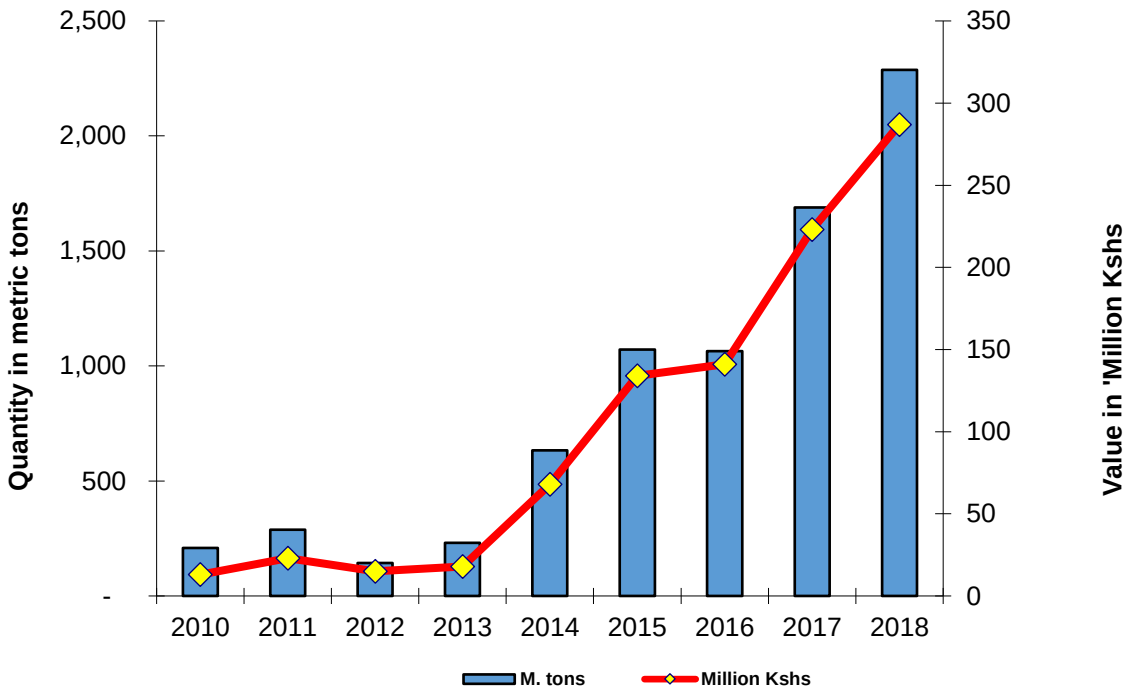

Figure 2. 9 Trends in annual fish landings from Lake Naivasha fishery 2010-2018

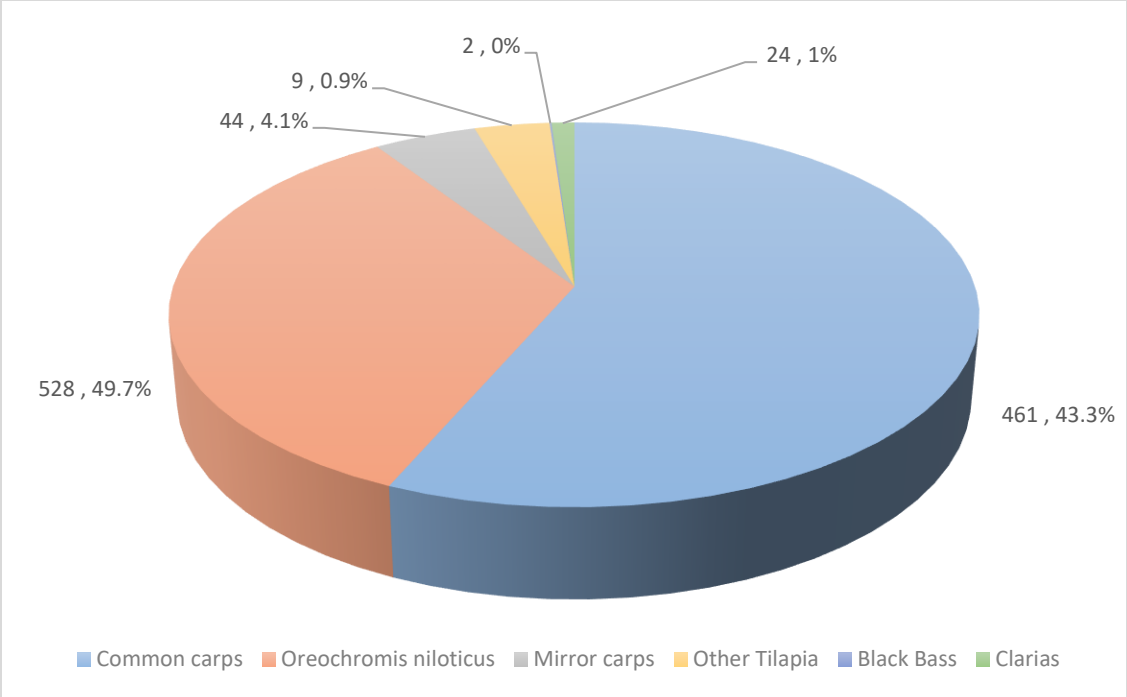

Figure 2. 10 Lake Naivasha species composition landings in metric tonnes 2018

Table 2. 3 Lake Naivasha Monthly fish landings by Species 2018

SPECIES	O. leucosticus		O. niloticus		Tilapia zilli		M. salmoides		C. gariepinus		Mirror carp		Common carp		TOTALS	
Months	**Kgs**	**Kshs**	**Kgs**	**Kshs**	**Kgs**	**Kshs**	**Kgs**	**Kshs**	**Kgs**	**Kshs**	**Kgs**	**Kshs**	**Kgs**	**Kshs**	**Kgs**	**Kshs**
Jan	42	6,990	82,378	18,488,661	0	0	19	11,123	255	24,916	279	19,999	71,821	7,505,305	**154,794**	**26,056,993**
Feb		0	77,515	15,285,419	0	0	12	4,142	478	179,721	196	13,280	101,628	9,497,765	**179,829**	**24,980,327**
Mar	120	25,482	86,394	17,963,358	0	0	68	31,824	4,102	595,656	1,319	78,610	119,974	17,479,463	**211,977**	**36,174,393**
Apr	535	89,093	67,022	10,577,471	0	0	84	41,949	5,480	594,046	915	77,365	123,641	13,363,871	**197,677**	**24,743,795**
May	305	62,040	80,440	10,577,471	0	0	33	12,944	5,076	487,720	1,290	122,250	211,251	13,355,139	**298,395**	**24,617,564**
Jun	29	5,585	41,530	7,084,124	0	0	53	15,773	2,077	348,170	277	22,580	100,863	1,095,630	**144,829**	**8,571,862**
Jul	3	554.753	25,723	5,332,922	0	0	40	10,577	1,860	298,790	905	101,960	121,198	12,967,432	**149,729**	**18,712,235**
Aug		66.57036	50,797	5,894,259	0	0	85	23,854	961	145,216	358	74,820	132,870	18,613,437	**185,071**	**24,751,654**
Sept	21	3,218	57,614	11,675,185	0	0	34	6,786	832	87,388	221	22,250	112,414	12,877,340	**171,136**	**24,672,167**
Oct	18	2,496	52,151	11,802,208	0	0	201	102,448	820	184,921	361	28,293	159,287	18,917,422	**212,838**	**31,037,789**
Nov	44	9,893	60,181	7,880,190	0	0	41	9,764	1,170	143,130	395	15,960	98,698	10,926,028	**160,529**	**18,984,965**
Dec	66	14,146	177,167	16,925,501	28	8,876	335	335,071	938	83,250	366	31,077	41,395	6,492,620	**220,295**	**23,890,540**
Total	**78,734**	**123,400**	**781,397**	**75,158,194**	**40**	**4,800**	**1,470**	**327,852**	**23,766**	**1,715,534**	**108,313**	**608,444**	**1,293,411**	**209,255,910**	**2,287,099**	**287,194,285**

2.4 LAKE BARINGO FISHERY

Lake Baringo is one of the Rift valley lakes with a surface area of 130 Km^2 and a mean depth of 5.6 meters. The lake has rivers El Molo, Perkerra and Ol arabel as the main inlets but with no obvious outlet and the waters are assumed to seep through to the underground bedrock which is believed to be volcanic. The fishery of Lake Baringo is currently based on four species including *Oreochromis niloticus* (Tilapia), *Barbus gregorii*, *Clarias mossambicus* and *Protopterus aethiopicus* which was introduced in the lake.

During the year under review a total of 145MT of fish with an ex-vessel value of Kshs.43, 442 Thousands were landed. This was a decrease of 6.45% in quantity and 6.79% decrease in value compared to last year's production of 155MT with an ex-vessel value of Kshs.46, 606 Thousands (table 2.4).

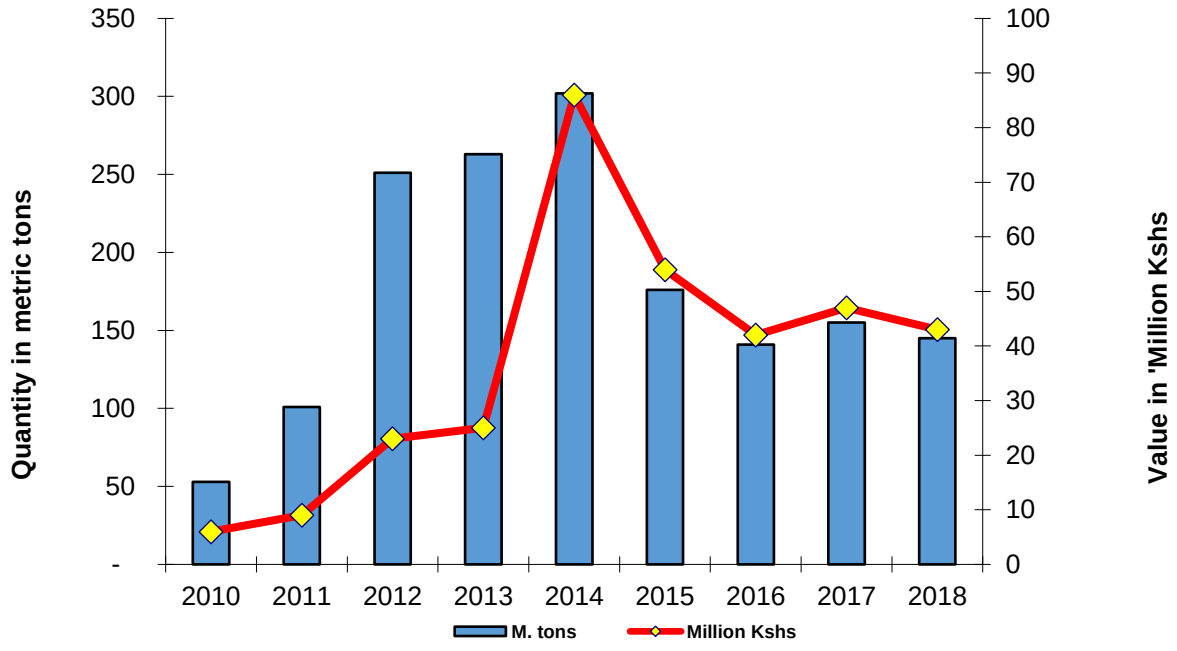

Figure 2. 11 Trends in annual fish landings from Lake Baringo fishery 2010-2017

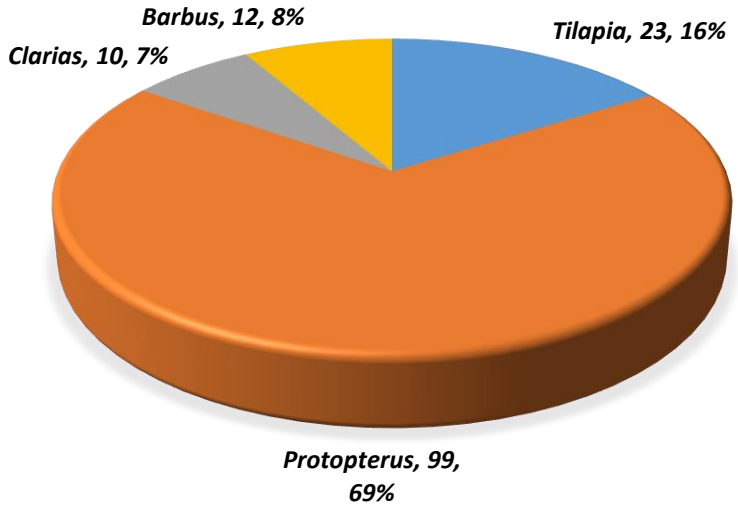

Figure 2. 12 Species composition for 2018

Table 2. 4 Lake Baringo Monthly fish landings by Species 2018

SPECIES	Barbus		Clarias		Protopterus		Tilapia niloticus		TOTAL	
Months	Kgs	Kshs	Kgs	Kshs	Kgs	Kshs	Kgs	Kshs	Kgs	Kshs
January	876	262,800	850	255,000	11,450	3,435,000	1,400	420,000	**14,576**	**4,372,800**
February	640	192,000	730	219,000	9,786	2,935,800	1,245	373,500	**12,401**	**3,720,300**
March	336	100,800	550	165,000	7,000	2,100,000	2,100	630,000	**9,986**	**2,995,800**
April	980	294,000	850	255,000	10,714	3,214,200	1,007	302,100	**13,551**	**4,065,300**
May	1,030	309,000	758	227,400	9,757	2,927,100	2,256	676,800	**13,801**	**4,140,300**
June	1,659	497,700	759	227,700	8,900	2,670,000	2,400	720,000	**13,718**	**4,115,400**
July	1,234	370,200	978	293,400	9,890	2,967,000	1,400	420,000	**13,502**	**4,050,600**
August	980	294,000	898	269,400	10,546	3,163,800	1,700	510,000	**14,124**	**4,237,200**
September	1,675	502,500	680	204,000	10,789	3,236,700	2,600	780,000	**15,744**	**4,723,200**
October	879	263,700	560	168,000	5,678	1,703,400	1,600	480,000	**8,717**	**2,615,100**
November	1,250	375,000	978	293,400	8,678	2,603,400	2,400	720,000	**13,306**	**3,991,800**
December	970	291,000	1,768	530,400	6,789	2,036,700	2,400	720,000	**11,927**	**3,578,100**
Total	**12,509**	**3,752,700**	**10,359**	**3,107,700**	**99,431**	**29,829,300**	**22,508**	**6,752,400**	**144,807**	**43,442,100**

2.5 LAKE JIPE FISHERY

Lake Jipe watershed is an important transponder wetland ecosystem between Kenya and Tanzania. It covers approximately 30Kms square bordered by Tsavo-West national park to the south East, Mt Kilimanjaro to the south, and North Pare Mountains to the west. The lake is fed by river Limu

which originates from Mt Kilimanjaro slopes and River Muvulani from Pare Mountains. The lake Outflows into River Ruvu. The lake Jipe is experiencing severe catchment degradation mainly due to anthropogenic activities that lead to eutrophication, siltation and pollution.

During the year 2018, a total of 131 MT of fish with an ex-vessel value of Kshs.38.3 Million were landed from Lake Jipe. This reflected an increase of 17 % in quantity and 75.89% increase in value compared to previous year 2017 production of 112MT with an ex-vessel value of Kshs 21,756 Thousands.

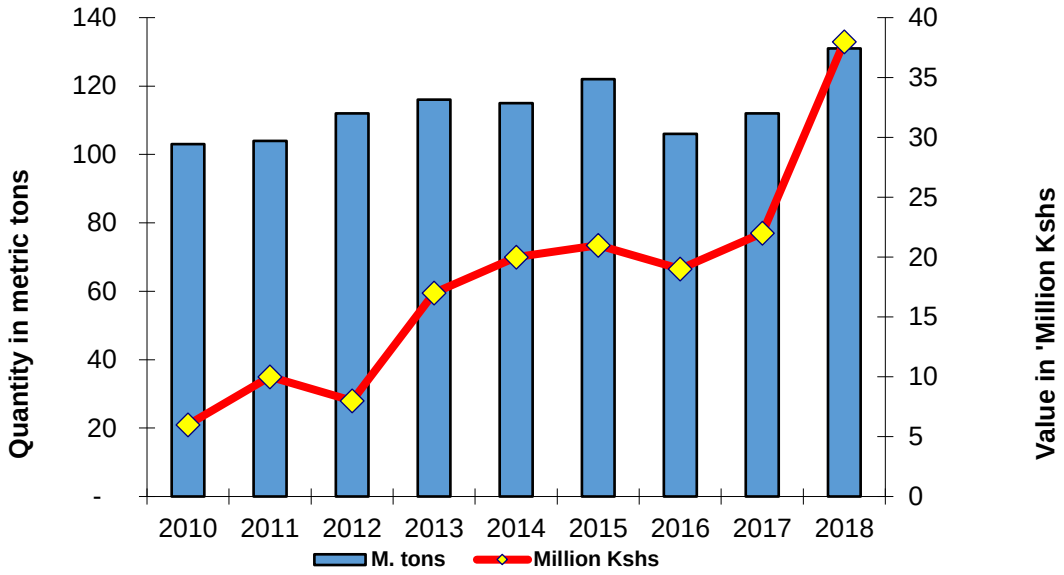

Figure 2. 13 Trends in annual fish landings from Lake Jipe fishery 2009-2018

Table 2. 5 Lake Jipe Monthly fish landings by Species 2018

	Tilapia		Clarias		Total	
Month	**Kgs**	**Kshs**	**Kgs**	**Kshs**	**Kgs**	**Kshs**
Jan	10,161	3,048,300	1,275	318,750	11,436	3,367,050
Feb	9,894	2,968,200	1,181	295,250	11,075	3,263,450
Mar	9,357	2,807,100	1,496	374,000	10,853	3,181,100
Apr	9,310	2,793,000	1668	417,000	10,978	3,210,000
May	9,163	2,748,900	1782	445,500	10,945	3,194,400
Jun	8,985	2,695,500	1892	473,000	10,877	3,168,500
Jul	8,538	2,561,400	1,551	387,750	10,089	2,949,150
Aug	8,501	2,550,300	1,507	376,750	10,008	2,927,050
Sep	8,971	2,691,300	1,338	334,500	10,309	3,025,800
Oct	9,290	2,787,000	1,536	384,000	10,826	3,171,000
Nov	9,783	2,934,900	1,720	430,000	11,503	3,364,900

Dec	9,949	2,984,700	1,812	453,000	11,761	3,437,700
Total	**111,902**	**33,570,600**	**18,758**	**4,689,500**	**130,660**	**38,260,100**

2.6 LAKE KANYABOLI FISHERY

Lake Kanyaboli is one of the satellite lakes of Lake Victoria and it is located in Siaya County. The fisheries of the lake are comprised of the following fish species: *Oreochromis niloticus*, *Protopterus aethiopicus, and Haplochromis* and *Clarias spp*. A total of 203 MT with an ex-vessel value of Kshs.29,656 Thousands were landed from the lake during the year under review. This was a 136.22% increase in quantity and 66.34% increase in ex-vessel value compared with 2017 figures of 127MT with a value of Kshs.26, 346 Thousands.

Table 2. 6 Table showing fish species and landings over the year 2018.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Species	Wt (Kg)	Wt (Kg)	Wt (Kg)	Wt (Kg)	Wt (Kg)	Wt (Kg)	Wt (Kg)	Wt (Kg)	Wt (Kg)	Wt (Kg)	Wt (Kg)	Wt (Kg)	Wt (Kg)
Clarias	2,000	1,571	2,610	4,082	3,403	1,741	2,437	3,070	3,214	2,537	1,783	2,192	**30,641**
Haplochromiines	1,428	1,993	1,683	1,900	1,993	4,501	1,389	2,277	1,476	2,245	1,492	1,558	**23,933**
Protopterus	1,213	1,599	2,034	7,005	5,432	5,681	5,144	3,739	3,418	3,700	2,418	1,940	**43,322**
Tilapia niloticus	8,862	10,694	8,995	7,746	10,905	8,839	10,178	6,026	8,090	7,150	8,498	9,122	**105,104**
TOTAL	**13,504**	**15,857**	**15,322**	**20,732**	**21,733**	**20,761**	**19,147**	**15,112**	**16,198**	**15,632**	**14,190**	**14,812**	**203,000**

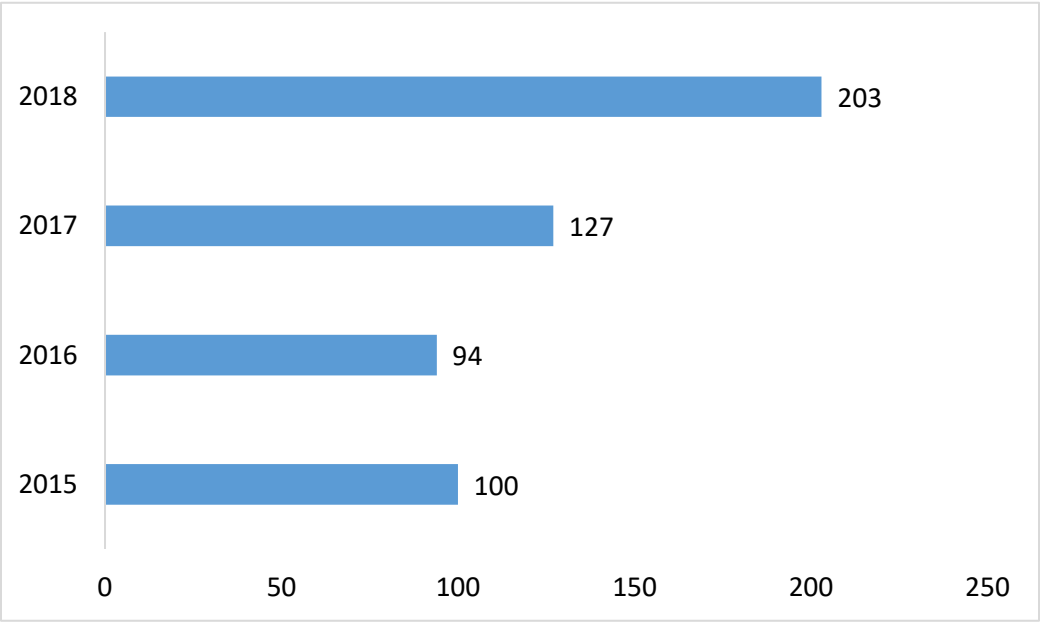

Figure 2. 14 Trends in annual fish landings from Lake Kanyaboli fishery 2015-2018

2.7 LAKE KENYATTA FISHERY

During the year under review a total 14MT of fish with an ex-vessel value of Kshs.1.3 Million were landed from Lake Kenyatta in Lamu County of the coast province. This was a 68.89% decline in quantity of the fish landed and a corresponding decrease of 61.70% in ex-vessel value compared with 2017 figures of 45MT with an ex-vessel value of Kshs.3.4 Million. The catch composition from this lake comprised of three species namely, *Protopterus spp*, *Clarias spp* and *Tilapia spp*.

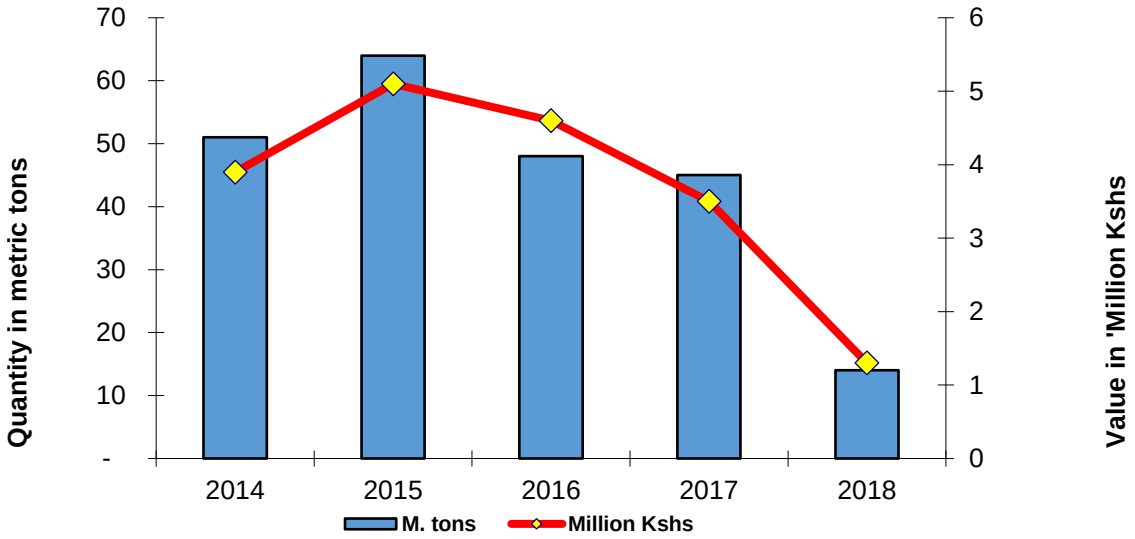

Figure 2. 15 Trends in annual fish landings from Lake Kenyatta fishery 2014-2018

2.8 TANA RIVER DAMS FISHERY

A total of 297MT of fish with an ex-vessel value of Kshs. 37,373 Thousands were landed from the main fishery water bodies of the Tana River dams of Masinga, Kamburu, and Kiambere. This production reflected a decrease of 29.62% in quantity and a decline of 55.77% in value compared to 2017 figures of 422MT with an ex-vessel value of Kshs.84, 500 Thousands, figure 10. Tana River dam's fish production is determined by the level of water in the dams and this causes fluctuations of the total annual landing depending on the water level in the dams.

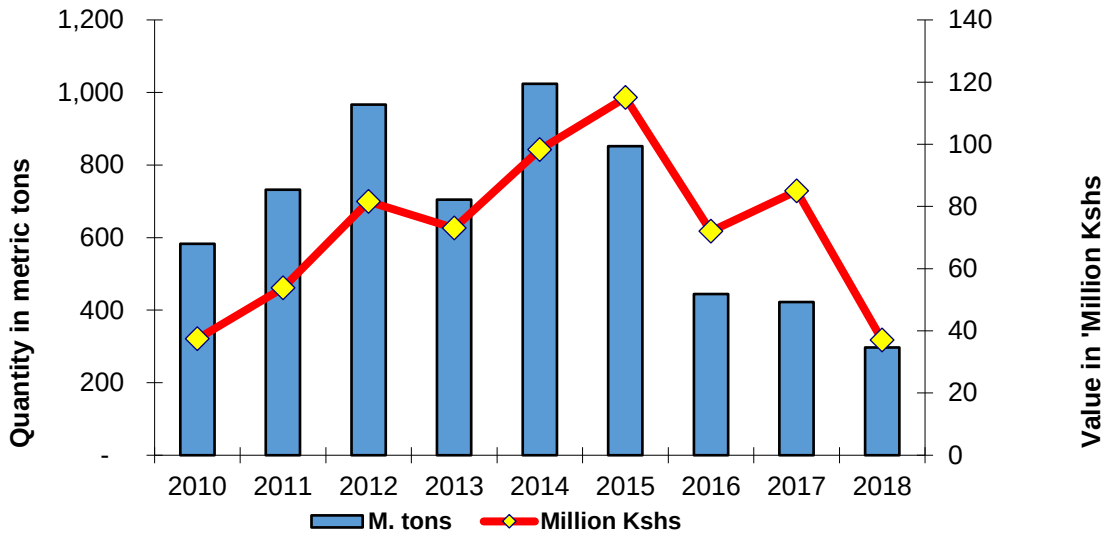

Figure 2. 16 Trends in annual fish landings from Tana River Dams fishery 2009-2018

2.9 TANA RIVER DELTA

Fresh water fish landings from Tana River delta in Tana River County during the year under review amounted to 46MT with an ex-vessel value of Kshs.5 Million. This was a decrease of 60% in quantity and a 45.47% decrease in ex-vessel value compared to 115MT with an ex-vessel value of Kshs.9.2 Million landed in 2017.

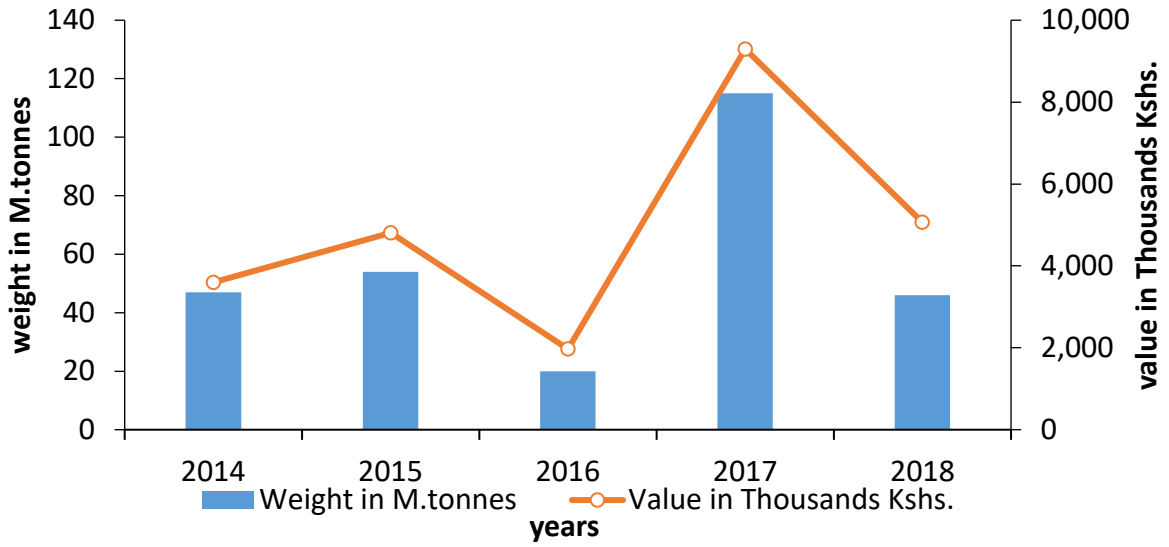

Figure 2. 17 Trends in annual fish landings from Tana River Delta fishery 2014-2018

Table 2. 7 Tana River Delta Monthly fish landings by Species 2018

SPECIES	Tilapia		Clarias		Protopterus		Others		TOTALS	
Months	Kgs	Kshs	Kgs	Kshs	Kgs	Kshs	Kgs	Kshs	Kgs	Kshs
Jan	497	49,700	176	14,080	141	11,280	206	12,360	**1,020**	**87,420**
Feb	336	33,600	305	24,400	211	16,880	43	2,580	**895**	**77,460**
Mar	-	-	550	55,000	950	76,000	1,090	87,200	**2,590**	**218,200**
Apr	443	44,300	271	21,680	300	24,000	370	22,200	**1,384**	**112,180**
May	413	49,560	2,990	299,000	1,150	92,000	950	76,000	**5,503**	**516,560**
Jun	398	47,760	3,200	320,000	1,300	104,000	780	62,400	**5,678**	**534,160**
Jul	683	81,960	3,200	320,000	1,300	104,000	780	62,400	**5,963**	**568,360**
Aug	1,020	122,400	2,500	320,000	900	104,000	950	62,400	**5,370**	**608,800**
Sep	1,250	150,000	1,370	320,000	1,050	104,000	600	62,400	**4,270**	**636,400**
Oct	950	114,000	1,650	320,000	960	104,000	980	62,400	**4,540**	**600,400**
Nov	900	114,000	850	320,000	880	104,000	1,000	62,400	**3,630**	**600,400**

Dec	800	96,000	1,700	170,000	2,000	160,000	1,030	82,400	**5,530**	**508,400**
Total	**7,690**	**903,280**	**18,764**	**2,504,160**	**11,142**	**1,004,160**	**8,779**	**657,140**	**46,373**	**5,068,740**

2.10 TURKWEL DAM

Turkwel Dam is one of the major Hydro Electric Power Station in Kenya. It is situated in North West of Kenya, in the border of Turkana, West Pokot and Pokot North Sub-Counties. The dam was constructed under the control of Kerio Valley Development Authority (KVDA) from 1986 to 1991 and is still under the management of KVDA. The State Department of Fisheries has been working with KVDA and Moi University on the introduction of fish in this Dam for commercial exploitation since 2006. The dam has an area of 66 square Km with a capacity of 1,641 cubic meters. Data of fish landings from the dam recorded for the first time in 2013.

During 2018, a total of 34MT of fish with an ex-vessel value of Kshs 9.8 Million was landed from the dam. This was a 2.85% (1 MT) decrease in quantity and 0.83% decrease in value of the fish landed compared with 2017 figures of 35MT with an ex-vessel value of Kshs9.9 Million (figure 2.18).

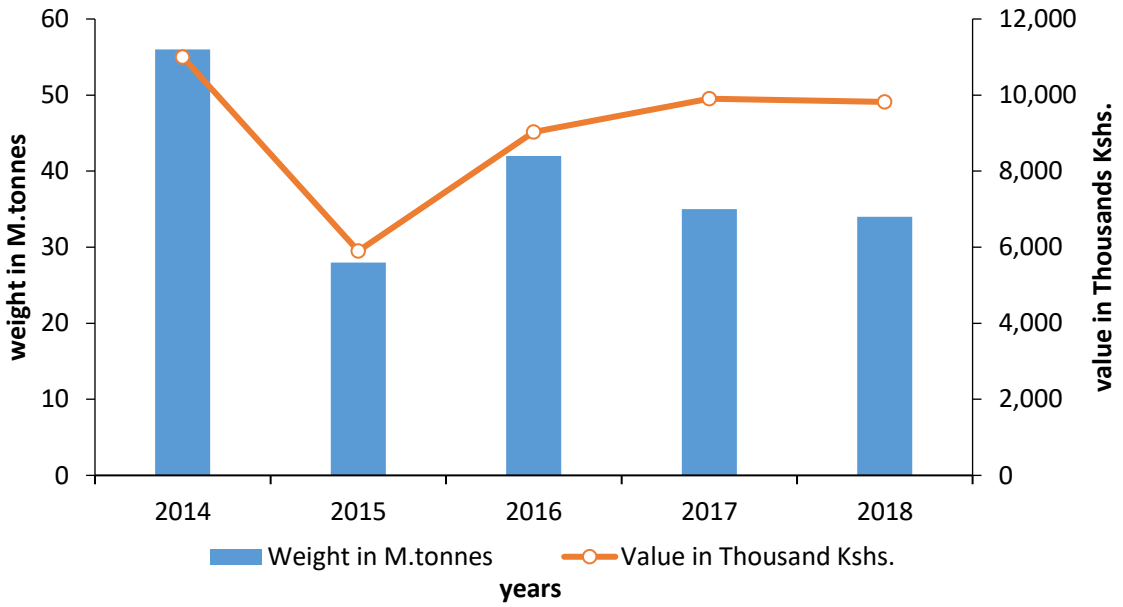

Figure 2. 18 Trends in annual fish landings from Turkwel Dam fishery 2014-2018

2.11 RIVERINE

During the year 2018, a total of 320MT of fish with an ex-vessel value of Kshs.86,400 Thousands were landed compared to previous year 2017 production of 10MT with an ex-vessel value of Kshs.2, 368 Thousands, (figure 2.19).

Year	*Quantity (MT)*	*VALUE (000 Kshs)*
2015	11	4212
2016	5	3500
2017	10	2368
2018	320	86400

Figure 2. 19 Trends in annual fish landings from Riverine fishery 2016-2018

3.0 MARINE CAPTURE FISHERY

3.1 MARINE ARTISANAL LANDINGS

The marine artisanal fishery capture over the reporting period increased compared to 2017 estimated production. A total of 24,221 MT was landed with a value of Ksh. 4.458 billion was landed in 2018 while 23,286 MT and ex-vessel value of Kshs. 4.691 billion was reported in 2017. The catch represented an increase of 4.0% in both fish production and ex-vessel value.

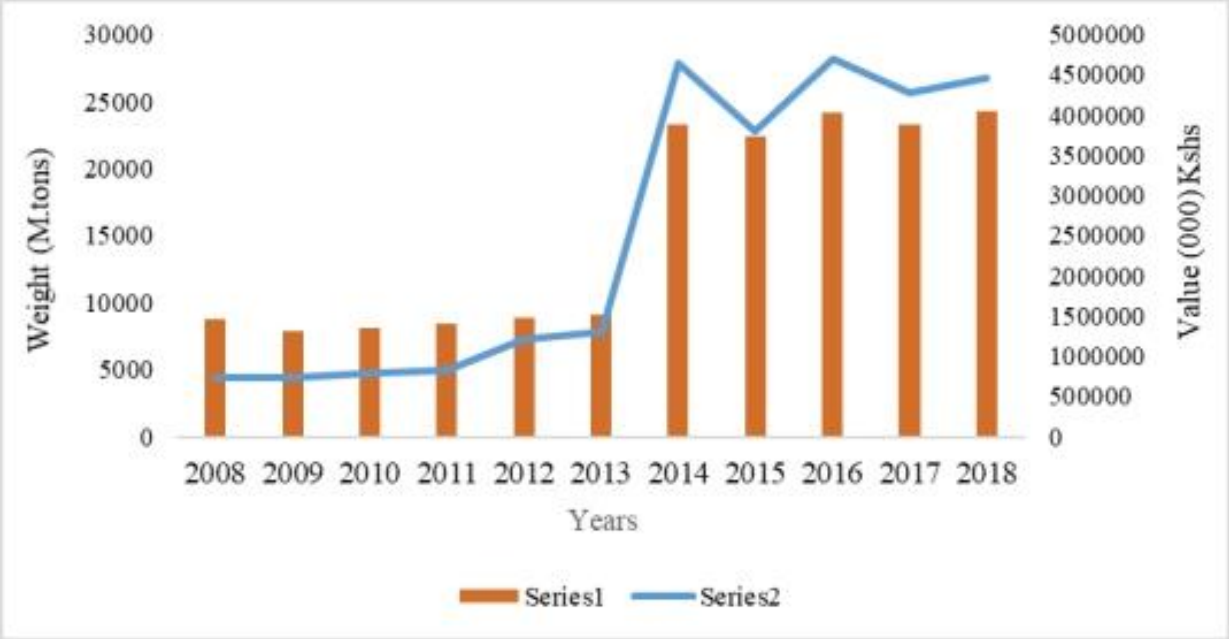

Figure 3. 1 Trends of marine fish production by quantity and value 2008-2018

Demersal species dominated artisanal marine fisheries catch in 2018, accounting for 57% (13,727 MT) of the total landings. Pelagic species contributed 22% (5,381 MT) while Molluscs accounted for 9% (2,101 MT). Crustaceans contributed 8% (1987 MT) and Sharks & rays 4% (1024 MT) (Fig 22).

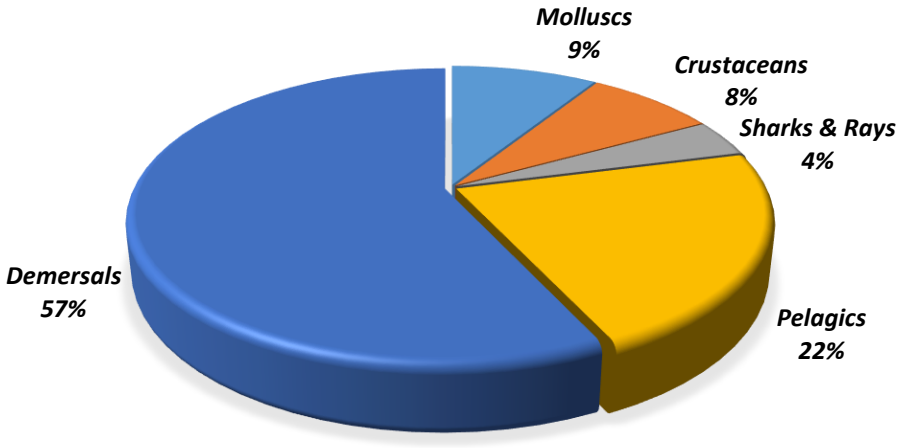

Figure 3. 2 Percentage contribution of marine fish species groups 2018

The trend for demersal fish showed an increasing trend from 2014 to 2018 (Fig 3.3). A decreasing trend occured in pelagics, from 9,303 MT in 2016 to 5,381 MT in 2018 (Fig 3.3). Sharks and rays increased slightly from around 842 MT in 2017 to 1024 MT. There was an increasing trend through the years 2014 to 2018 for both crustaceans and molluscs.

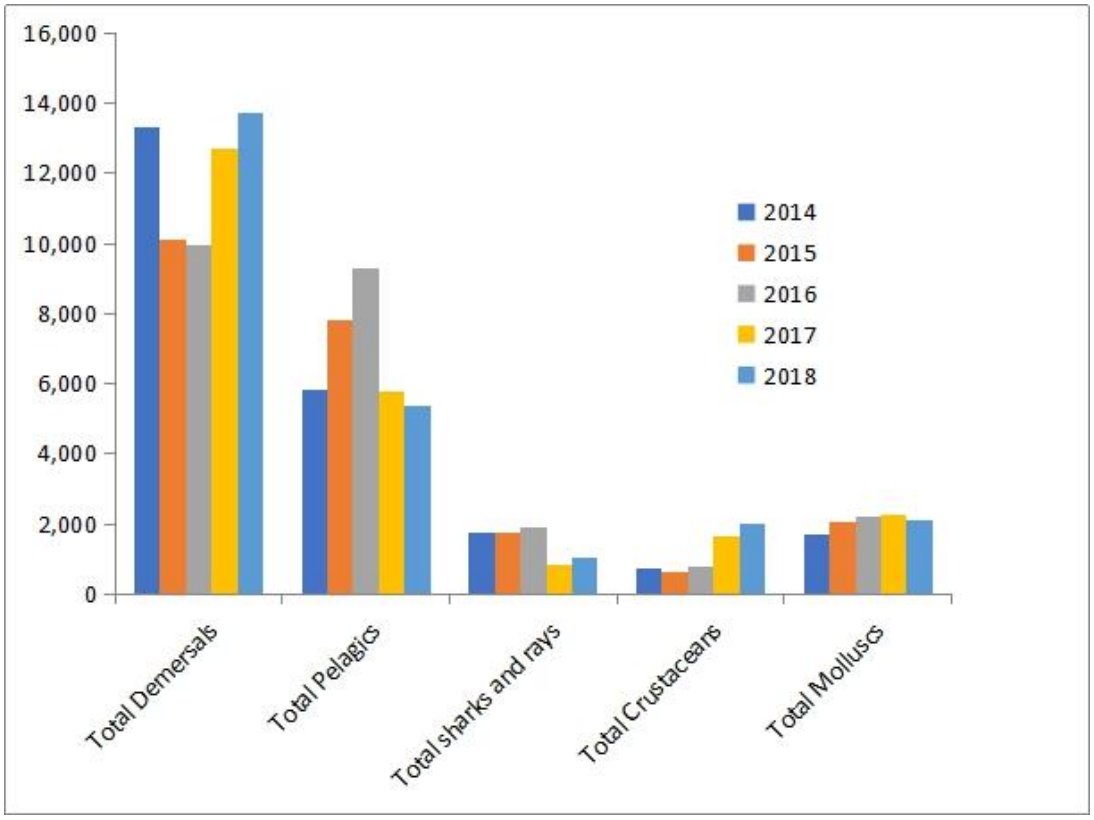

Figure 3. 3 Trends of landings of marine fish species groups 2014-2018

In the year 2018, the County that contributed the highest quantity of marine landings was Lamu County which registered a total value of 7,911 Mt (32.7 % of the total landings) with an ex-vessel value of Ksh. 1.109 billion (24.9% of the total ex-vessel value). Kwale county contributed 6,193 Mt (25.6%) with ex- vessel value of Ksh. 1.16 billion (26.1%), followed by Kilifi county with 5,910 Mt (24.4%) with ex-vessel value of Ksh.1.19 billion (26.7%). Mombasa contributed 2,953 Mt (12.2%) with ex-vessel value of Ksh. 836 Million (18.8%). The County that contributed the least quantity was Tana River County which registered a total value of 1255 Mt (5.2%) with ex-vessel value of Ksh. 160 Million (3.6%).

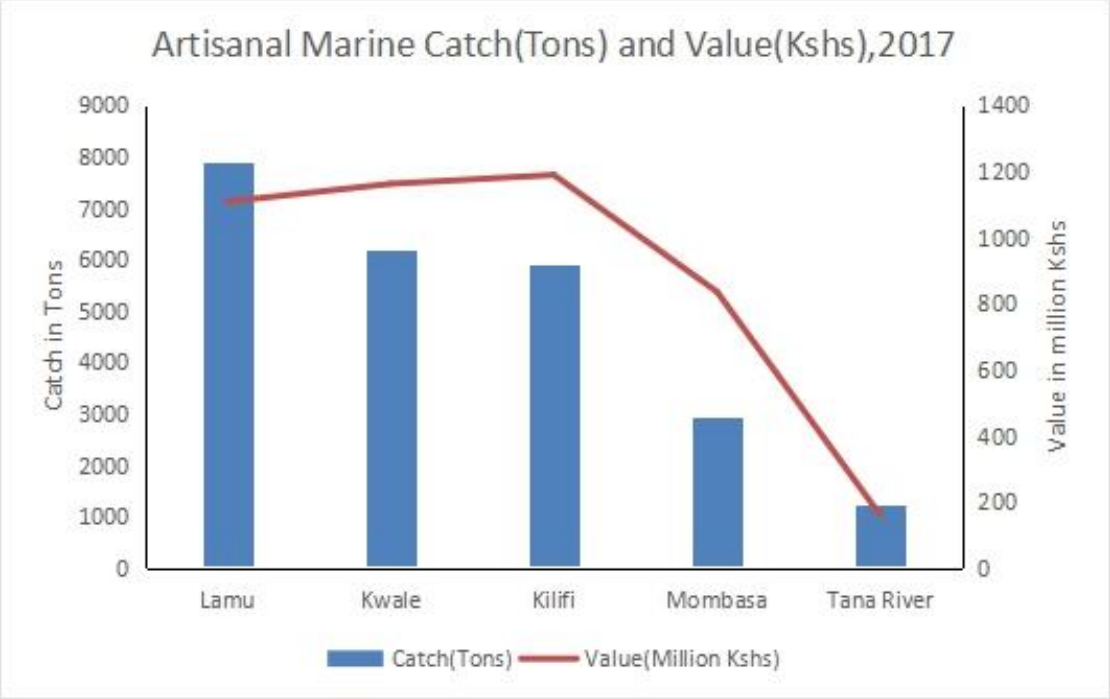

Figure 3. 4 Landings of marine fish species 2018

Table 3. 1 Marine Fish Landings by Species, Weight and Value 2014 to 2018

SPECIES		2014		2015		2016		2017		2018	
Demersals	**Demersals**	**Catch (Tons)**	**Value('000 Kshs)**	**Catch (Tons)**	**Value('000 Kshs)**	**Catch (Tons)**	**Value('000 Kshs)**	**Catch (Tons)**	**Value('000 Kshs)**	**Catch (Tons)**	**Value('000 Kshs)**
Siganidae	Rabbitfishes	2,507	410,586	1,488	240,562	2,294	424,526	1,985	325,139	2,006	268,879
Lutjanidae	Snappers	3,358	567,335	1,687	290,809	1,640	275,157	1,475	233,326	1,369	193,956
Lethrinidae	Scavengers	1,947	316,779	1,247	198,576	1,368	236,753	1,912	334,255	1,959	235,797
Scaridae	Parrotfishes	1,231	167,355	846	103,516	1,269	159,364	1,588	189,654	1,770	185,077
Serranidae	Groupers	573	90,523	694	106,912	483	77,868	607	144,041	631	104,598
Haemulidae	Grunts/Blackskin	597	86,944	399	54,189	414	59,404	852	126,494	1,306	197,975
Mugilidae	Mullets	320	47,015	454	60,267	376	58,110	489	60,589	624	77,011
Acanthuridae	Surgeonfishes/Unicorn	295	40,765	510	65,586	317	42,308	673	102,613	840	142,587
Nemipteridae	Threadfin breams	572	81,623	630	72,834	296	39,833	0	0	-	-
Mullidae	Goatfishes	174	30,210	182	30,325	269	51,774	321	56,803	329	54,824
Gerreidae	Pouter	0	0	0	0	0	0	455	60,983	2,021	301,890
Scatophagidae	Streaker	0	0	0	0	0	0	157	15,332	379	67,570
Ariidae	Catfish	0	0	0	0	0	0	457	54,376	313	74,094
Mixed demersal		1,729	300,352	1,998	270,271	1,250	164,016	176	187,459	179	22,708
Total demersals		**13,302**	**2,139,486**	**10,135**	**1,493,847**	**9,974**	**1,589,113**	**12736**	**1,891,066**	13,727	1,926,966
Pelagics											
Belonidae	Needlefishes	1,682	374,967	2,313	447,961	2,759	427,214	0	0		-
Scombridae	Tunas/Mackerels/Kingfish/ Bonitos	522	75,995	1,215	174,201	1,798	379,180	2077	411,329	1,894	323,291
Carangidae	Jacks/Trevallies/Queenfish	767	129,278	795	141,985	1,186	230,220	899	147,141	942	174,412
Sphyraenidae	Barracudas	534	95,070	729	131,432	709	129,897	729	11,585	610	141,505
Hemiramphidae	Halfbeaks	725	89,350	632	71,619	883	109,711	0	0	-	-
Clupeidae	Sardines	457	86,738	649	113,493	618	69,622	543	62,344	634	70,108
Engraulidae	Anchovies	48	5,302	285	37,036	455	60,638	0	0	-	-
Istiophoridae	Sailfishes	431	85,403	402	70,207	235	49,576	200	35,462	176	28,552
Xiphiidae	Swordfishes	180	35,783	158	24,191	160	35,786	429	11,328	-	-
Chirocentridae	Wolf Herrings	198	26,388	274	29,709	266	31,499	0	0	-	-
Chanidae	Milk fish	0	0	0	0	0	0	228	29,231	610	95,182

Menidae	Moonfish	0	0	0	0	0	0	0.5	125	266	51,347
Congridae	Eel	0	0	0	0	0	0	3.7	466	-	-
Coryphaenidae	Dolphin fish	0	0	0	0	0	0	287	7,810	-	-
Mixed pelagics		291	45,117	392	57,158	235	37,575	768	106,951	248	36,346
Total pelagics		**5,834**	**1,049,390**	**7,845**	**1,298,994**	**9,303**	**1,560,917**	**5780**	**928,071**	5,381	920,747
Others											
Sharks &Rays	Sharks & Rays	1,312	181,563	1,236	166,696	1,033	161,706	842	147,055	1,023	168,232
mixed fish/Others	mixed fish/Others	423	48,039	525	58,596	880	112,622	0	0	0	0
Total		**1,735**	**229,622**	**1763**	**225,422**	**1,913**	**274,328**	**842**	**147,055**	**1,023**	**168,232**
Crustaceans											
Palinuridae	Lobsters	408	885,657	263	343,600	390	651,024	300	382,870	424	407,971
Portunidae	Crabs	135	43,389	145	70,274	163	90,161	584	239,399	664	266,601
Penaeidae	Prawns/Shrimps	170	39,061	213	60,637	220	146,480	763	284,675	899	377,962
Total crustaceans		**713**	**968,107**	**621**	**474,512**	**772**	**887,664**	**1647**	**916,943**	1,987	999,202
Molluscs											
Octopodidae	Octopus	1,610	233,756	1832	258,926	2,063	349,414	1469	244,389	1,430	261,686
Loliginidae	Squids	35	8,198	147	32,853	64	15,447	661	99,254	554	148,880
Sepiidae	Cuttlefishes	45	10,493	47	8,994	70	8,671	0	0	-	-
Holothuridae	Sea cucumber	13	2,297	19	2,158	6	4,986	86	47,692	82	28,276
	Oysters									40	3,819
	Marine shells									-	-
Total molluscs		**1,703**	**254,744**	**2,045**	**302,930**	**2,203**	**378,518**	**2281**	**397,891**	2,101	442,660,
Total Marine		**23,287**	**4,641,349**	**22,407**	**3,795,575**	**24,165**	**4,690,541**	**23286**	**4,281,026**	24,221	4,457,809

Table 3. 2 Marine Fish Landings by county 2018

County	**Kilifi**		**Kwale**		**Lamu**		**Mombasa**		**Tana River**		**Total**	
	Catch (Kg)	**Value**	**Catch (Kg)**	**Value**	**Catch (Kg)**	**Value**	**Catch (Kg)**	**Value**	**Catch (Kg)**	**Value**	**Catch (Kg)**	**Value**
Marine fishes												
Demersals	2,282,765.83	415,375,816.59	2,821,616.31	461,967,984.24	6,256,433.90	501,496,058.53	1,522,099.04	453,197,056.90	844,410.26	94,944,898.30	13,727,325.34	1,926,981,814.56
Pelagics	2,328,234.08	408,659,708.69	1,618,492.60	284,204,932.55	656,784.66	95,034,044.53	525,619.09	109,788,437.50	252,141.85	23,085,202.34	5,381,272.28	920,772,325.61
sharks and rays	385,870.46	57,402,066.05	342,166.24	59,328,947.93	71,300.14	6,660,673.24	167,789.38	37,319,312.80	56,751.44	7,523,758.90	1,023,877.67	168,234,758.92
	4,996,870.38	**881,437,591.33**	**4,782,275.15**	**805,501,864.72**	**6,984,518.70**	**603,190,776.30**	**2,215,507.51**	**600,304,807.20**	**1,153,303.55**	**125,553,859.54**	20,132,475.29	3,015,988,899.09
Crustaceans	238,032.50	148,276,447.20	537,165.25	197,784,409.13	656,550.77	446,968,072.74	492,988.93	176,312,560.76	62,746.15	29,821,138.20	1,987,483.59	999,162,628.03
Molluscs	674,958.01	160,677,706.42	873,289.52	159,386,421.88	269,837.93	58,478,312.37	244,134.96	59,792,982.90	38,794.32	4,372,116.00	2,101,014.75	442,707,539.57
TOTALS	**5,909,860.89**	**1,190,391,744.95**	**6,192,729.92**	**1,162,672,695.73**	**7,910,907.40**	**1,108,637,161.41**	**2,952,631.40**	**836,410,350.86**	**1,254,844.02**	**159,747,113.74**	**24,220,973.62**	**4,457,859,066.69**

3.2 MARINE INDUSTRIAL LANDINGS

3.2.1 Trawling

Industrial trawl fishery is categorized as shallow water fishery operated within internal waters of Malindi and Ungwana bays in the deepwater fishery 5nm from the baseline. During the year under review, four industrial trawlers were licensed for shallow water prawn trawl fishery. The target species is prawns, a high value resource mainly for export market but also consumed locally. The fishery is seasonal and fishing was conducted from April to October. Three of the vessels applied for licenses to fish in areas beyond 12nm during the closed season (November to March). In addition, two other vessels were licensed to fish in areas beyond 5nm from the baseline in the year under review.

Shallow Water Prawn Fishery

Prawn trawling in Kenya has been in operation for over four (4) decades. From 2010, the number of vessels to operate in the 3-5nm zone of the prawn management area was reduced to only 4, hence the fishing capacity for the shallow water prawns was maintained to a maximum of 4 in 2018.

Since inception, between 4 and 20 commercial bottom shrimp trawlers have operated in the bay with most of the fishing effort concentrated within the mouths of the two main rivers discharging into the bay; namely the Sabaki River around Malindi and the Tana River within the Kipini area. Prawn Fishery Management Plan (PFMP of 2010) is used to regulate the fishery with a closed season from 1st November to 31st March.

Table 3. 3 Catch, Effort, Species Composition and Value of Landings in 2018

No. of vessels	4
No. of fishing days	600
No. of nets	4
Fishing Distance(nm)	4.0-10
Fishing Depth(m)	9-80

Species Composition and Value of Landings

During the year under review, the industrial trawlers landed a total catch of 520.4 tons which was a 50.4% increase compared to the previous year, 2017, were 346 tons were landed with an ex-vessel value of Kshs. 189.6 Million an 64.2% increase compared to Kshs. 115.5 Million in 2016. The species caught comprises of prawns, assorted fin fish species, others and trash (Table 3.4).

The term 'other species' consisted of octopus, squids, cuttlefish, lobsters and Crabs caught as bycatch in the fishery.

There was an increase in production in terms of catch and value from April to May. Thereafter, the production reduced significantly and it remained fairly constant in the months of June to October. The month that registered the highest value in terms of catch was May at 103.4 Tons with an ex-vessel value of Kshs 32.9 Million (Figure 25).

Table 3. 4 Monthly fish catch (Ton) from the shallow water prawn fishery, 2018

Months	Prawns (Kg)	Fin Fish (Kg)	Others (Kg)	Total (Kg)	Trash (Kg)	Value (Kshs)
April	18,330	61,365	30	79,725	3,403	28,777,500
May	17,461	85,876	32	103,369	3,655	32,898,100
June	14,438	47,019	8	61,465	-	22,400,000
July	17,338	53,619	-	70,957	3,355	26,328,000
August	16,028	45,238	8	61,274	3,829	23,474,800
September	21,229	49,281	-	70,510	4,593	28,962,300
October	17,635	56,482	391	74,508	-	27,265,650
Total	**122,156**	**397,736**	**469**	**520,361**	**18,835**	**189,604,850**

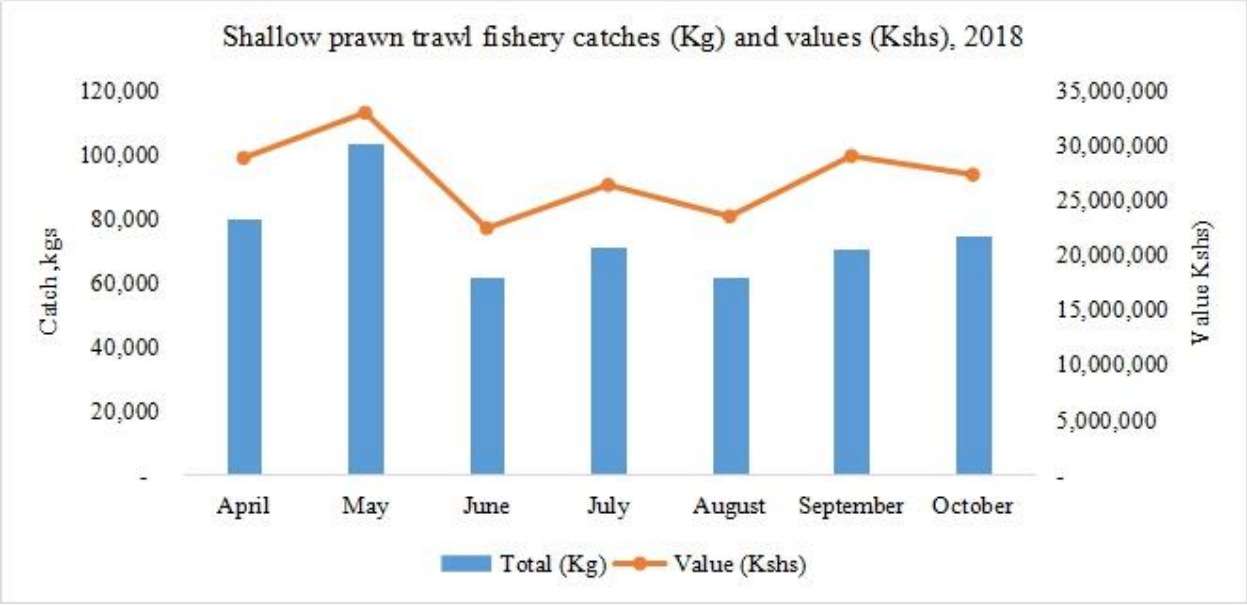

Figure 3. 5 Monthly trends in catch levels and value from the shallow prawn trawl fishery, 2018

3.2.2 Deepwater trawl fishery

Table 3. 5 Catch, Effort, Species Composition and Value of Landings in 2018

Fishing Effort

No. of vessels	3
No. of fishing days	352
No. of nets	3
Fishing Distance(nm)	5-24
Fishing Depth(m)	160-1190

During the year under review, a total catch of 141 tons were landed compared to 41.6 tons reported in 2017. The value for this catch was Kshs. 42.3 Million an increase compared to Kshs 9.1 Million in 2017.The landed catch comprised of prawns, assorted fin fish species, others and trash were landed by the industrial trawlers (Table 3.6). The 'other species consisted of octopus, Squids, cuttlefish, lobsters and Crabs.

The production reduced slightly from January to February in terms of catch from 37.8 Tons to 32.3 Tons. In between, the months of March to September, there was no fishing activity carried out due to the closed seasons as per the Prawn Fishery Management Plan. Fishing resumed in November. The highest production was reported in December at 46 tons with an ex-vessel value of Kshs 16.2 Million (Table 3.6)

Table 3. 6 Monthly fish catch from the trawl fishery off Malindi-Ungwana Bay (deep sea), 2018

Months	Prawns (Kg)	Fin Fish (Kg)	Others (Kg)	Total (Kg)	Trash (Kg)	Value (Kshs)
January	1,070	26,073	10,750	37,893	-	8,864,975
February	230	21,471	10,694	32,395	-	8,248,125
November	7,256	15,840	1,684	24,780	4,199	10,911,275
December	9,801	33,753	2,444	45,998	5,962	16,182,500
Total	**18,357**	**97,137**	**25,571**	**141,065**	**10,161**	**42,341,450**

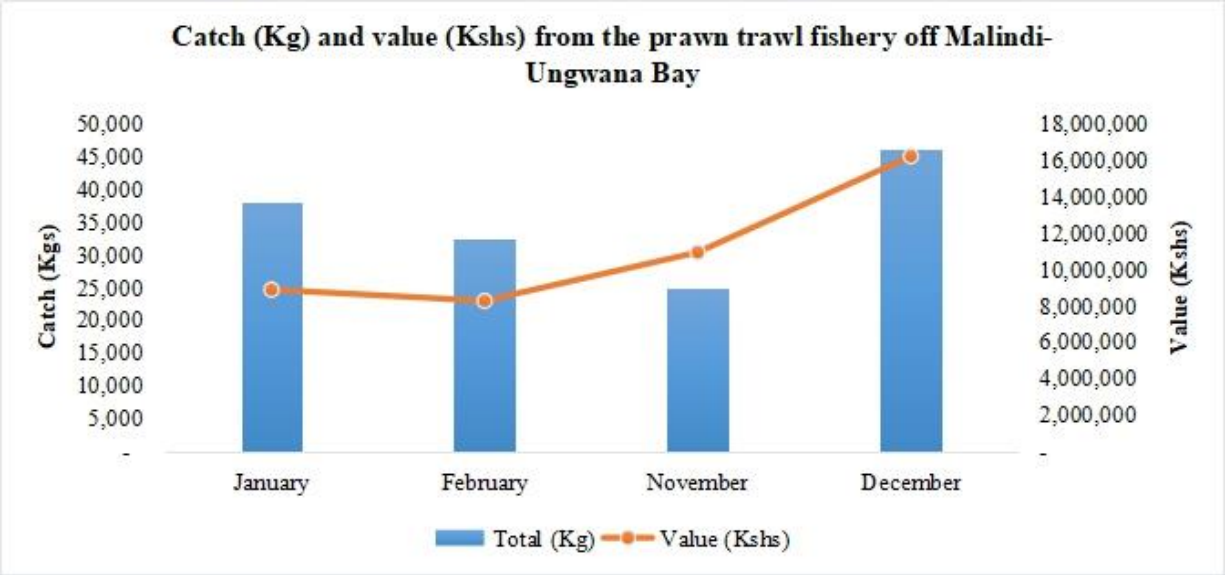

Figure 3. 6 Monthly trends in catch levels and value from the trawl fishery off Malindi-Ungwana Bay (deep sea), 2018

3.2.3 Deepwater crab pot fishery

In 2018, one longline crab pot vessel was licensed during the year under review, fishing was carried out only in the month of December for 12 days. The number of fishing gears used was 862 traps. A total catch of 480 Kgs comprising of crabs was landed by the deep-water crab pot vessels (Table 3.7). The catch increased considerably as from mid-December towards the end of the month with the highest daily recorded at 85 Kgs.

Table 3. 7 Daily crab-catch from the crab-pot fishery in 2018

Date	Number of Pots	Weight of crabs(Kg)
11/12/2018	50	30
12/12/2018	50	15
13/12/2018	50	15
14/12/2018	55	20
15/12/2018	55	15
16/12/2018	98	35
17/12/2018	103	45
18/12/2018	55	25
19/12/2018	50	60
20/12/2018	103	70
21/12/2018	100	85
22/12/2018	93	65
Grand Total	**862**	**480**

The vessel started with 50 pots and increased to 103 pots during the first voyage in December. The lowest catch recorded was 15 Kgs from a set of 55 pots (Figure 3.7).

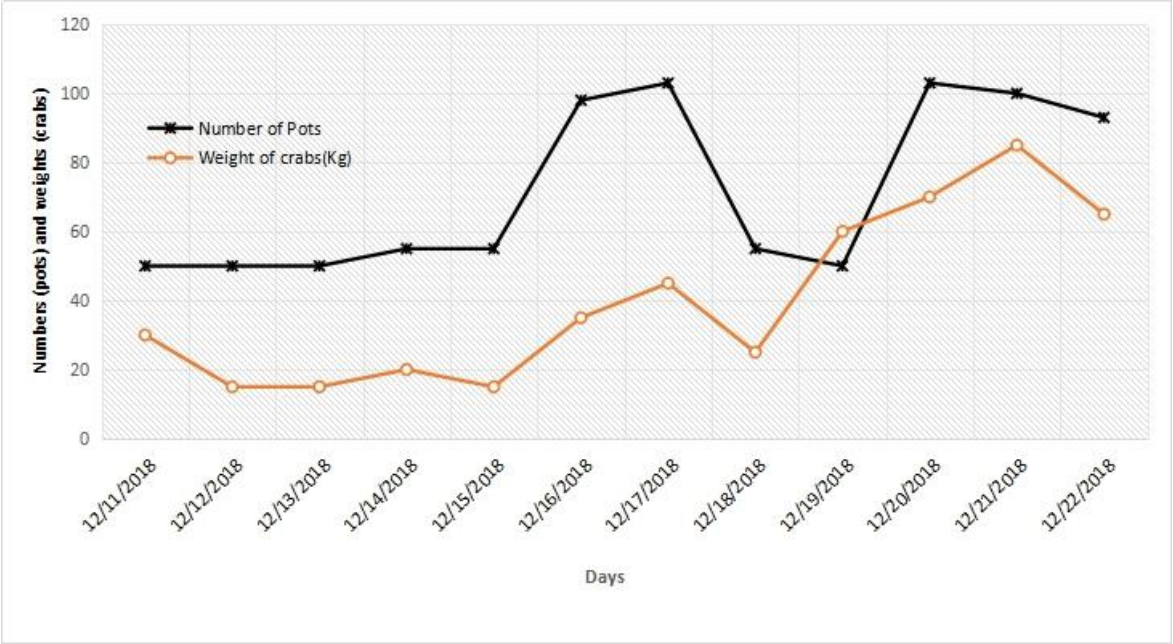

Figure 3. 7 Daily pot numbers/crab catch trend from the crab-pot fishery off Malindi-Ungwana Bay, 2018

3.2.4 Industrial longline data

Longlining

The longline fishery is conducted beyond the 12 nautical miles, within the 200 nautical miles in the Kenya's Exclusive Economic Zone (EEZ) and the high seas. Within the year under review, three industrial longline vessels were licensed to fish in the Kenya EEZ. The fishing effort was based on number of days fished, the number of hooked deployed, average length of setline and hours fished per set. In 2018 the three vessels fished for a total of 339 days, with 4,682 hooks. The length of the ranged between 69,565 -105,767 and the average fishing hours per set was 21.23. A total of 508 tons, valued at 203.6 million was landed from industrial longline fishing compared to 62 tons landed in 2017 (Table 3.8).

Table 3. 8 Monthly fish catch from Longline offshore fishery, 2018

Common names	Months													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total (Kgs)	Value (000') Kshs
Swordfish	2,097	951		23,757	32,754	8,205	6,007	57,309	38,778	18,678	30,511	58,966	278,013	139,006.50
Yellowfin tuna	4,182	8,871	523	6,204	33,572	4,770	556	7,866	8,257		8,787	21,170	104,758	31,427.40
Blue shark				7,595	14,450	2,207	29	1,724	983	701	1,620	9,633	38,942	9,735.50
Bigeye tuna	2,349	621	55	166	4,657	1,422	71	4,264	2,890	1,634	2,750	6,499	27,378	8,213.40
Other species NEI*	648	1,201	91	1,523	3,281	1,342	474	1,534	2,116	168	2,295	6,567	21,240	5,310.00
Tuna NEI*				2,682	7,821	554					5		11,062	3,318.60
Mako sharks				1,138	60	89	70	1,485	662	283	792	3,120	7,699	1,924.80
Marlins	90	2,582	73	511	1,088	1,205	144	186	873	35	601	1,373	8,761	2,190.30
Sharks NEI*	1,275	2,904	55				257	323	833			25	5,672	1,418.00
Silky shark				172	373	329	53	1,201	783		37	120	3,068	767
Sail fish	32	162	18	105	619	96		12	22		96	96	1,258	314.5
Total	**1 0,673**	**17,292**	**815**	**43,853**	**98,675**	**20,219**	**7,661**	**75,904**	**56,197**	**21,499**	**47,494**	**107,569**	**507,851**	**203,625.90**

The total value for the industrial longline catch was estimated Kshs. 204 Million with swordfish valued at Kshs. 139 Million, yellowfin and bigeye valued at Ksh. 43 Million, blue sharks at Kshs. 9.7 Million while the rest of the species were valued at Ksh. 5 million and below (table 3.8).

The monthly landings showed that the vessel landed more fish in December (108 ton), followed by May (99 tons) and the least was July at 8 tons (Figure 3.8).

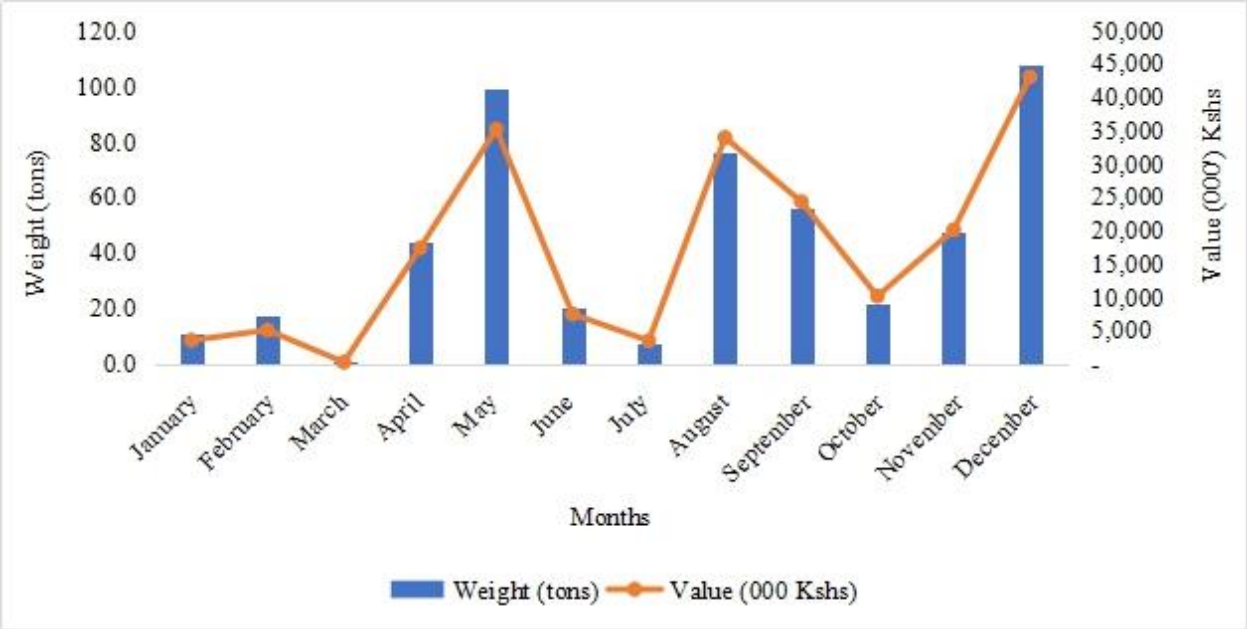

Figure 3. 8 Monthly trends in catch levels and value from the offshore longline fishery, 2018

The vessels target tuna and tuna like species and sword fish. Sharks and other assorted fish species are caught as by catch based on the gears operation. The catch was dominated by Swordfish (55%) followed by Yellowfin tuna (21 %), Blue shark (8%), Bigeye tuna (5%), other species (4%), other Tunas (2%) and other sharks at 1 % (Figure 3.9). The species caught in negligible amounts was the sail fish at 0.2% (Figure 3.9).

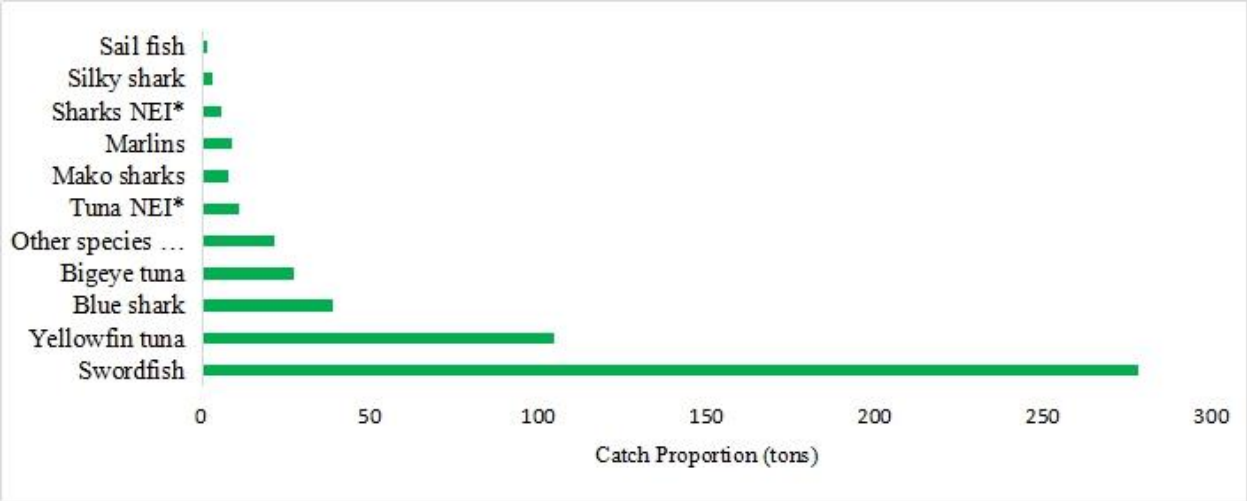

Figure 3. 9 Catch proportions (Tons)

4.0 AQUACULTURE (FISH FARMING)

Freshwater aquaculture development in Kenya in recent years has been fast growing. Compared to an annual production of about 1,000 MT in 2006, production had increased to an estimated 15,320 Million tonnes in 2018. This has been mainly the result of a nationwide fish farming mass campaign as part of the Economic Stimulus Programme launched by the Government of Kenya (GoK) during the period 2009-2013. As a result, the area of fishponds has increased and other support has been provided along different aquaculture value chains.

Nevertheless, there is a lack of reliable data as regards aquaculture production at County and National level and estimates from different sources range from 10,000 to about 40,000MT per year. Aquaculture sector is gaining momentum as production from catch fisheries decreases and demand increases due to population growth. There is already a significant gap (12,356MT in 2017), between the projected demand and production of fish, which is expected to increase and is projected to be 360,000MT/year by 2025. This lack of supply has resulted in a continuous decline of per capita average consumption, due to rising prices and limited availability. This shows the significant domestic growth potential of the aquaculture sector. The GoK is looking into ways of promoting aquaculture and using fish products for food relief programs as a means to enhancing food security and improving health.

At present, several ponds are out of production due to issues with quality of feeds and fingerlings, as well as poor selection of sites for some of the ponds. Some of the fingerlings farms, supported by the programme are getting out of business in certain areas due to low demand. This has consequently led to the observed decline in fish production from aquaculture. Mariculture production of seaweeds is being practiced commercially, mainly at Kibuyuni in south coast and is planned for uptake in other areas as it has demonstrated that seaweed production can succeed in Kenya. In addition, cage culture production is being practiced commercially mainly in Lake Victoria in Kenya.

Over the last ten years, fish production from aquaculture has increased from 4,895MT produced in year 2009 to the production of 24,096MT in 2014 from which production has declined to the current 15,120MT valued at Kshs.4, 480 Million. This production reflected an increase of 22.33% in quantity and 21.39% increase in value compared to 2017 figures of 12,356MT with an ex-vessel value of Kshs.3, 691 Million. The total production from Mariculture was a total of 64MT valued at Kshs.1.9 Million. This production reflected an increase of 25.49% in total catch and value from last year's (2017) production of 51MT valued at Kshs.1.5 Million and the total production from Cage culture was a total of 963, 230MT valued at Kshs.279, 838, 282. This production reflected an increase of 323.23% in total catch and 251.3% increase in value from last year's (2017) production of 2227, 589MT valued at Kshs.79, 655, 975

Table 4. 1 Fish landings by Weight and Value from Aquaculture, mariculture and Cageculture 2016-2018

	Aquaculture		Mariculture		Cageculture	
years	weight in MT	Value in '000 Kshs.	weight in MT	Value in '000 Kshs.	weight in MT	Value in '000 Kshs.
2016	14,952	4,253,844	35	1,050	-	-
2017	12,356	3,691,046	51	1,530	228	79,656
2018	15,320	4,480,875	64	1,920	963	279,8384254

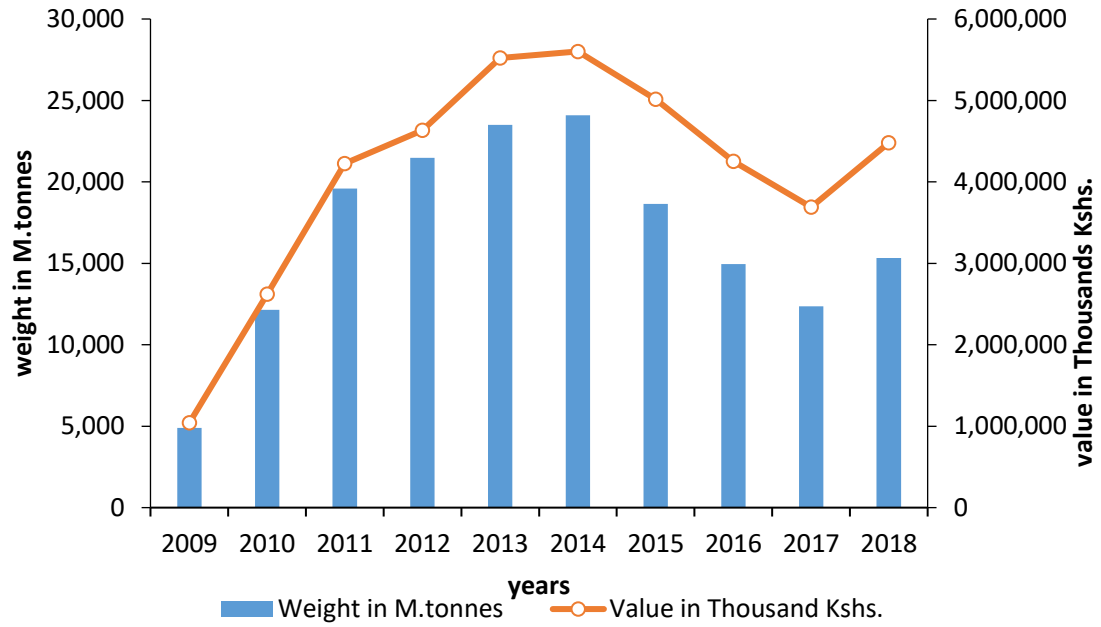

Figure 4. 1 Trends in annual fish landings from Aquaculture fishery 2009-2018

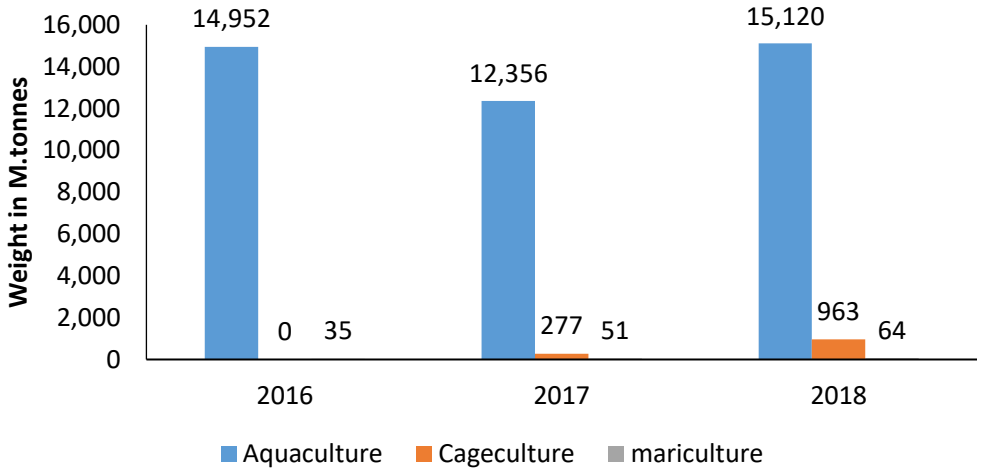

Figure 4. 2 Trends of Aquaculture, cage culture and mariculture fishery 2016-2018

5.0 EXPORTS OF FISH AND FISHERY PRODUCTS

During the period under review, a total of 7250 MT of fish and fishery products valued at 2.9 billion, 366, 776 live aquarium fish valued at 34.2 million and 192,672 aquarium invertebrates valued at 8.4 million were exported earning the country Kshs. 3.017. In the marine sub-sector, during the same period 1187 MT of Molluscs valued at 636.7 million were processed. Other notable exports were 57 MT of Fish heads, tails and maws valued at Kshs 372.5 million and 532 MT of crustaceans valued at Kshs 281 million as well as 696 MT of Nile perch valued at 322 million (table 5.1). The main markets for the marine ornamental fishes were the EU, USA, China and Japan.

Table 5. 1 Exports of Fish and Fishery Products 2018

Commodity	M. Tons	000Kshs	% Quantity	% Value
Other Fish	4,269	1,452,177	61.71	49.46
Molluscs	1,187	636,732	17.16	21.69
Fish heads, tails and maws	57	372,500	0.82	12.69
Crustaceans	532	281,048	7.69	9.57
Livers and roes	40	153,810	0.58	5.24
Nile Perch	696	32,235	10.07	1.10
Fillets	123	2,297	1.77	0.08
Tilapia	2	1,378	0.02	0.05
Salmon	2	1,067	0.03	0.04
Other crustaceans	3	740	0.04	0.03
Trout	5	666	0.08	0.02
Others	2	1,261	0.03	0.04
Sub-Total	**6,917**	**2,935,911**	**100.00**	**100.0**
Live Fish	**M. Tons**	**000Kshs**	**% Quantity**	**% Value**
Live Fish	287	36,421	86.13	93.22
live ornamental fish	46	2,647	13.87	6.78
Sub-Total	**333**	**39,068**	**100.00**	**100.00**
GRAND TOTAL	**7,250**	**2,974,980**		

5.1 Marine Aquarium exports

5.1.1 Aquarium Fin Fish

In 2018, 366,776 aquarium fish valued at Kshs 34,241,906 exported compared with an average of 323,691 fish exported in 2017. This represented a 13.3% increase in the volumes of aquarium fish exported. The trend of aquarium fish export between 2010 and 2018 (Figure 5.1). Twenty species made up 60% of the total exports, with the top five species being *Paracanthurus hepatus, Anthias squamipinnis, Centropyge acanthops, Ecsenius midas* and *Halichoeres iridis*.

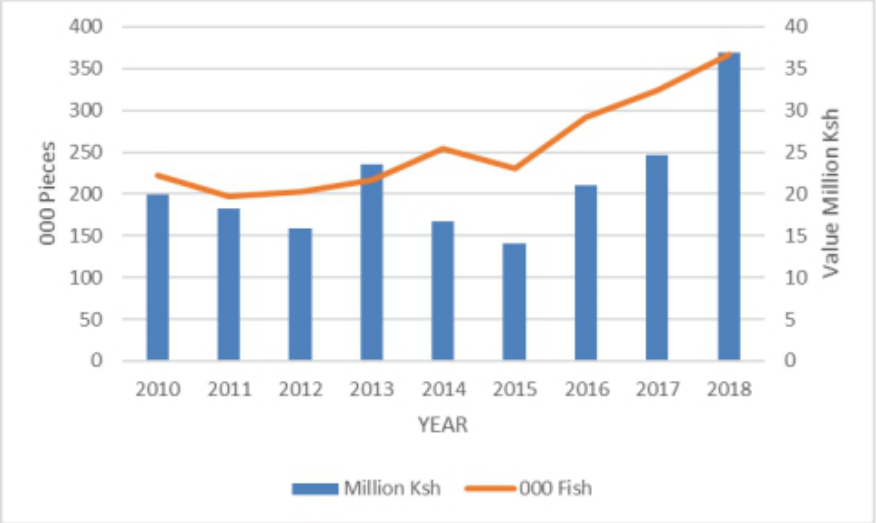

Figure 5. 1 Annual trends of aquarium fish exports in numbers and value in during 2010 - 2018.

Table 5. 2 The monthly composition of the top 20 most exported marine aquarium species in 2018

	Species	**Common Name**	**Number**	**Value**
1	*Paracanthurus hepatus*	Blue Surgeonfish	15,058	3,232,195
2	*Anthias squamipinnis*	Lyretail Coralfish	30,849	1,827,299
3	*Centropyge acanthops*	Orangeback Angelfish	16,350	1,762,287
4	*Ecsenius midas*	Golden Blenny	11,147	1,613,416
5	*Halichoeres iridis*	Rainbow Wrasse	9,681	1,053,892
6	*Nemateleotris manificia*	Fire Goby	13,000	1,053,570
7	*Pomacanthus chrysurus*	Goldtail Angelfish	1,051	1,016,105
8	*Chromis viridis*	Blue-green Chromis	29,136	904,267
9	*Macropharyngodon bipartitus*	Rare Wrasse	11,108	873,038
10	*Labroides dimidiatus*	Bluestreak Cleaner Wrasse	17,117	703,437
11	*Acanthurus leucosternon*	Powder Blue Tang	4,816	668,685
12	*Salarias fasciatus*	Lawnmower Blenny	12,125	538,230
13	*Pseudocheilinus hexataenia*	Six-line Wrasse	9,365	535,389
14	*Chromis Vanderbilt*	Vanderbilt's Chromis	12,028	527,283
15	*Valenciennea strigata*	Bluestreak Goby	6,942	517,522
16	*Nemanthias carberryi*	Threadfin Anthias	5,775	453,889
17	*Sphyrna lewini*	Scalloped Hammerhead	8	410,000
18	*Cirrhilabrus exquisitus*	Exquisite Wrasse	4,743	359,514
19	*Anampses meleagrides*	Spotted Wrasse	3,771	320,394
20	*Doryhamphus excisus*	Blue Striped Pipefish	5,874	275,471
21	Others		146,832	15,596,024
	Total		**366,776**	**34,241,906**

5.1.2 Invertebrates

The number of marine invertebrates exported in 2018 was 191,672 valued at 8,387,066.90 which was an increase of 8.8 % from compared to 176,130 invertebrates valued at Kshs.5,835,949.50 exported in 2017 (Figure 5.2). The export value however increased to 8.8 million Kshs. compared to 5.8 million Kshs. in 2017. Twenty species made up 82.8% of the invertebrates exports (table 5.3).

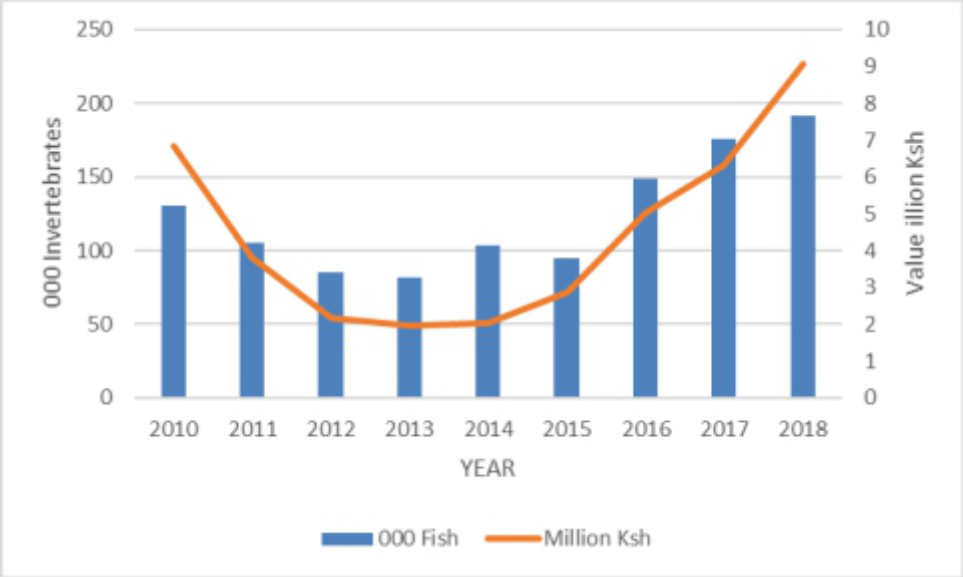

Figure 5. 2 Annual trends in the marine invertebrates' exports in numbers and value during 2010 – 2018

Table 5. 3 The monthly composition of the top 20 most exported marine invertebrate species in 2018

Species	Sum of Pieces	Sum of Total Value (USD)
Lysmata – grabhanii	24,103	2,430,158
Hippolysmata grabhami	5,747	648,703
Heteractis Magnifica	5,303	585,860
Clibinareus sp	30,805	563,516
Nerita - sp.	33,015	403,109
Hymenocera - picta	4,887	427,723
Sarcophyton sp.	2,118	300,755
Cespitularia sp.	1,419	277,793
Dolabella	5,559	253,261
Radianthus mix med	1,415	226,983
Hymenocera elegans	4,680	410,117
Cerithium Caeruleum	16,742	197,902
Protogaster - linckii	3,222	169,321
Capnella sp.	1,131	115,059
Diadema Urchin - sp.	2,101	123,357
Stichodactyla - sp.	1,433	217,028
Lunella coronata	7,898	101,651
Trochus maculatus	5,201	91,656
Lobophytum sp.	996	133,344

Sabellastarte - sp.	969	86,573
Others	32,928	623,198
Grand Total	191672	8387066.89

6.0 IMPORTS OF FISH AND FISHERY PRODUCTS

In 2018, Kenya imported 26,383 MT of fish and fishery products worth Kshs 2.975 billion (Table 20). The imports were mainly composed of *Mackerel* 8763 MT (33%) of the total fish and fishery products imported during the year. These were followed by frozen sardines with 409 MT which was 1.55%. Notably there was drastic decline in importation of frozen tilapia from to 409 MT. The imports originated largely from Asian countries, notably China, Japan, Korea and Vietnam with most of the *Oreochromis niloticus* imported from China, Tanzania and Uganda (Fig 36).

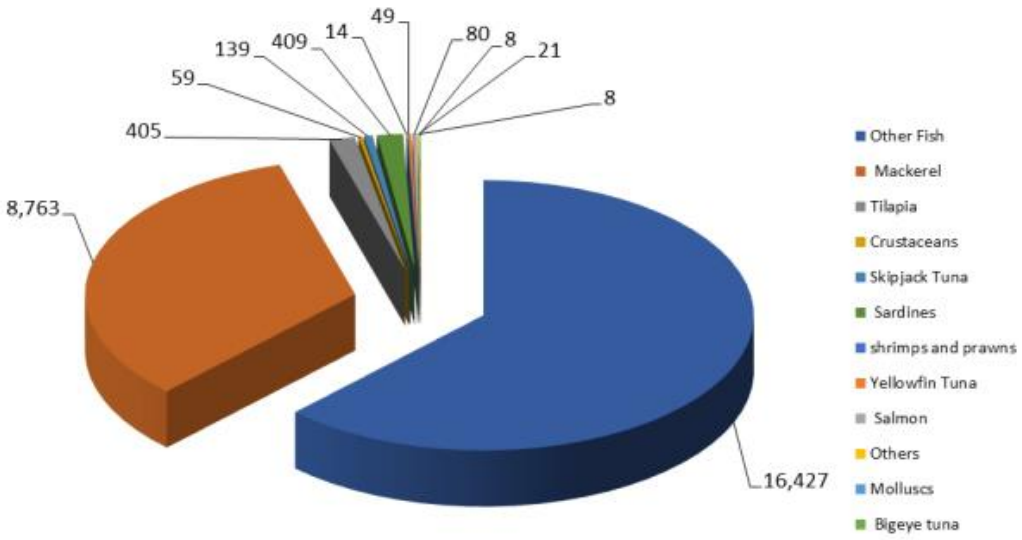

Figure 6. 1 Import of fish and fish products by quantities (MT) for 2018

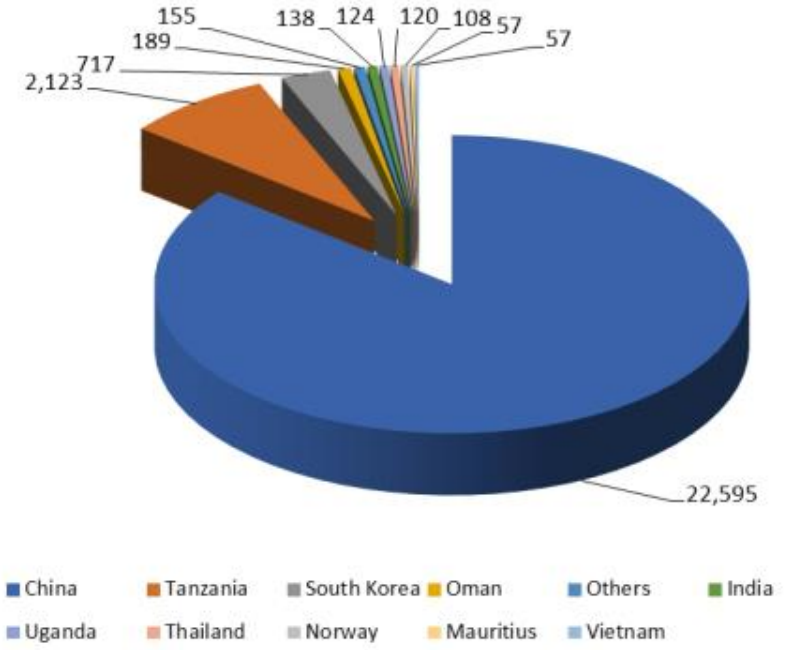

Figure 6. 2 Fish imports in tons by Country of origin in 2018

Table 6. 1 Imports of Fish and Fishery Products 2018

Product	Quantity (M. Tons)	Value ('000Kshs)	% Quantity	% Value
Other Fish	16,427	1,706,618	62.27	57.37
Mackerel	8,763	986,142	33.22	33.15
Sardines	409	23,266	1.55	0.78
Tilapia	405	132,349	1.53	4.45
Skipjack Tuna	139	38,597	0.53	1.3
Salmon	80	10,338	0.3	0.35
Crustaceans	59	38,729	0.22	1.3
Yellowfin Tuna	49	11,037	0.19	0.37
shrimps and prawn	14	14,764	0.05	0.5
Molluscs	8	4,971	0.03	0.17
Bigeye tuna	8	1,742	0.03	0.06
Caviar	6	702	0.02	0.02
Live Fish	3	1,328	0.01	0.04
live ornamental fis	3	918	0.01	0.03
Trout	3	1,002	0.01	0.03
Anchovies	3	1,330	0.01	0.04
Fillets	1	122	0	0
Others	2	723	0.01	0.02
TOTAL	**26,383**	**2,974,678**	**100**	**100**

REFERENCES

Fryer, G. (1972). Conservation of the Great Lakes of East Africa: A lesson and a warning. *Biological Conservation*, *4*(4), 256–262. https://doi.org/10.1016/0006-3207(72)90121-8

Halwart, M., Soto, D., & Arthur, J. R. (Eds. . (2007). Cage aquaculture Regional reviews and global overview. In *FAO Fisheries Technical Paper* (Vol. 498). https://doi.org/978-92-5-105801-5

Hecky, R. E., Mugidde, R., Ramlal, P. S., Talbot, M. R., & Kling, G. W. (2010). Multiple stressors cause rapid ecosystem change in Lake Victoria. *Freshwater Biology*. https://doi.org/10.1111/j.1365-2427.2009.02374.x

Ndanga, L. Z. B., Quagrainie, K. K., & Dennis, J. H. (2013). Economically feasible options for increased women participation in Kenyan aquaculture value chain. *Aquaculture*, *414–415*, 183–190. https://doi.org/10.1016/j.aquaculture.2013.08.012