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1.0 INTRODUCTION

The State Department of Fisheries in Kenya is mandated to sustainably manage, conserve and exploit Kenya’s fisheries resources to contribute to poverty reduction and wealth creation in the country. The department is keen to having objective, reliable and credible data and information on the status and trends of fisheries as this is the foundation of policy development and attendant management actions. This has been recognized in various international legal instruments including the 1982 UN convention on the law of the sea and the code of conduct for responsible fisheries amongst others. Towards this end the State Department of Fisheries has a full-fledged section of statistics that is dedicated to providing accurate and reliable data and information. Fisheries data are collected with the objective to ensure appropriate resource management. The data are used by scientists and fisheries managers for stock assessment, economic studies and an aid to fisheries decision management and policy making.

In Kenya fisheries data collection structure relies mainly from designated officers in the field. The data collection system is centralized where a landing site data collector usually a Fisheries Assistant or a member of a Beach Management Unit (BMU) collects daily primary data from the landing site, compiles monthly catch totals for each respective landing site and files returns to the County Director of Fisheries who compiles a county monthly statistical report including all the landing sites within the county and submits the monthly reports to National State Department of Fisheries head office. The data from all the counties are then compiled, analyzed and included in this Annual Statistical Bulletin which is released for each calendar year.

Fisheries data collection in the country has had its own challenges which included the following during the year under review:

1. Paradigm shift in fisheries management from a centralized command based system to one that puts emphasis on co-management with involvement of local fishing communities and other stakeholders in fisheries management as indeed provided for in the Fisheries (Beach management Units) regulations 2007. The shift towards co-management requires the involvement of fisher community in data collection, analysis and dissemination. As co-managers the communities’ role in data collection should be guided by providing regular training of local level data collectors and standardized data collection protocols. Due to lack of adequate funds it has not been possible to proactively engage the fisher community in data collection activities;

2. The departmental human resource constraints in deploying data collectors at every landing site;

3. Changes of artisanal fishing units. This is given more impetus due to the deployment of new and/or improved fishing gears in Kenya’s fishery waters.
This means that measures to estimate fishing effort have to be continuously revised. An example of this is the “Amouko” in Lake Victoria. This is a gear composed of many pieces vertically and horizontally integrated to make it more effective in catching many fish;

4. The challenge of ensuring data accuracy, quality and credibility that can be compared across regions and time scale due to lack of regular training of data collectors to update their skills.

5. Poor record-keeping and unsatisfactory reporting by fish farmers on fish production and marketing.

On fisheries data exchange, the State Department has active collaborative initiatives with various organizations. Due to the fact that some of the most important fisheries in the country are Tran-boundary, as a result 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). Data exchange with this organization 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.

Such data exchange initiatives are also extended to the Indian Ocean Tuna commission (IOTC) which deals mainly with highly migratory tuna and tuna like species. 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.

NB
The following symbols have been used in this Bulletin:
0 Meaning Nil
* Meaning the value was less than half of the unit used
- Meaning no data was available

2.0 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 Km²), Lake Victoria-Kenyan side (6% of the whole lake =4,128 km²), Naivasha (210 Km²), Baringo (129 Km²), and Lake Jipe (39 Km²). 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).

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 country’s coast is also located within the richest tuna belt in the South West Indian Ocean.

The Kenyan fishery is mainly artisanal with very few commercial/industrial vessels targeting mainly shrimps and several tens of 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 almost all 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 300,000 metric tonnes (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 a total of 61,252 people directly as fishermen and 67,883 fish farmers with 69,194 stoked fish ponds. The sector supports about 1.1 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 (2013) under review, fish production from Inland, Aquaculture and Marine artisanal fisheries amounted to 163,293 metric tonnes with an ex-vessel and farm gate value of Kshs. 21,283,592,000 (Table 1). This was an increase of 6.0% in quantity and 17.8% in ex-vessel and farm gate value compared with 2012 figures of 154,015 metric tonnes with an ex-vessel value of Kshs. 18,073,859,000. The increase in quantity can mainly be attributed to increase in production of fish from Lake Victoria and aquaculture which during the same period increased by 4.7% and 9.4% respectively (Table 2). The increase in production from Lake Victoria was attributed to the increase in *Rastrineobola argentea* (Omena) production which increased by 26% during the same period (Table 3). But generally fish production has been on the increased since 2007 fetching higher and higher ex-vessel value year after year figure 1.
Inland capture fisheries contributed 80% of Kenya’s total fish production, with the principal fishery being that of Lake Victoria. The lake accounted for 124,643 metric tonnes or 76% of the country’s total annual fish production in 2013. Lake Turkana, Kenya’s largest freshwater body (7,400 km²) produced 3,193 metric tonnes of fish during the year under review. Other freshwater-bodies of commercial importance included lakes Baringo (263 MT), Naivasha (231 MT), Kanyaboli (194 MT), Jipe (116 MT), Kenyatta (54 MT), the Tana River dams (705 MT), Takwel dam (59 MT), the Tana River delta (46 MT) and Riverine fishery (9 MT). Marine artisanal fish production was 9,134 metric tonnes equivalent of 5.6% of the national production while aquaculture production amounted to 23,501 metric tonnes contributing 14.4% of the total production, figure 2. Aquaculture earned fish farmers Kshs. 5,522,735,483 during the year under review.

Figure 1: Fish production by quantity and value 2004-2013
The fish and fish products produced in the country are marketed domestically or exported to the international markets. The main fish and fishery products exported during the year under review included Nile perch fillets, Octopus, Headless and gutted whole Nile perch, Nile perch fish maws, Tilapia and Barbus. Fish and fishery products imported into the country included the following products among others: frozen Mackerels, Sardines, *Tilapia niloticus*, Tuna, Prawns, Reef Cod, Lizard fish, Herrings and fish meals among others.
### Table 1 Fish landings by Weight, Value, Fishers, Ponds and fishing Crafts 2013

<table>
<thead>
<tr>
<th>Fresh water</th>
<th>M. tons</th>
<th>000 Kshs.</th>
<th>Fishers</th>
<th>Farmers</th>
<th>Crafts</th>
<th>Ponds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Victoria</td>
<td>124,643</td>
<td>13,858,682</td>
<td>40,078</td>
<td>13,468</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lake Turkana</td>
<td>4,338</td>
<td>438,646</td>
<td>7,000</td>
<td></td>
<td>1650</td>
<td></td>
</tr>
<tr>
<td>Lake Baringo</td>
<td>263</td>
<td>25,008</td>
<td>120</td>
<td>47</td>
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<td></td>
</tr>
<tr>
<td>Lake Naivasha</td>
<td>231</td>
<td>17,542</td>
<td>150</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lake Jipe/Dams</td>
<td>116</td>
<td>16,910</td>
<td>66</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lake Kanyaboli</td>
<td>194</td>
<td>12,004</td>
<td>188</td>
<td>99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lake Kenyatta</td>
<td>54</td>
<td>3,770</td>
<td>120</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tana River dams</td>
<td>705</td>
<td>73,024</td>
<td>316</td>
<td>180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takwel dam</td>
<td>59</td>
<td>11,849</td>
<td></td>
<td>67,883</td>
<td>69,194</td>
<td></td>
</tr>
<tr>
<td>Fish Farming</td>
<td>23,501</td>
<td>5,522,735</td>
<td>299</td>
<td>93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tana River delta</td>
<td>46</td>
<td>3,204</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riverine</td>
<td>9</td>
<td>2,046</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>154,159</td>
<td>19,985,420</td>
<td>48,337</td>
<td>67,883</td>
<td>61,252</td>
<td>69,194</td>
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</table>

<table>
<thead>
<tr>
<th>Marine water</th>
<th>M. tons</th>
<th>000 Kshs.</th>
<th>Quantity</th>
<th>% Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermersal</td>
<td>4,433</td>
<td>523,153</td>
<td>80</td>
<td>68</td>
</tr>
<tr>
<td>Pelagic</td>
<td>2,362</td>
<td>309,893</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Crustaceans</td>
<td>762</td>
<td>250,851</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>Other Marine</td>
<td>908</td>
<td>110,752</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molluscs</td>
<td>669</td>
<td>103,523</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Marine</strong></td>
<td>9,134</td>
<td>1,298,172</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>163,293</td>
<td>21,283,592</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Production</th>
<th>M. tons</th>
<th>000 Kshs.</th>
<th>Quantity</th>
<th>% Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inland Capture</td>
<td>130,658</td>
<td>14,462,685</td>
<td>80</td>
<td>68</td>
</tr>
<tr>
<td>Marine Capture</td>
<td>9,134</td>
<td>1,298,172</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>23,501</td>
<td>5,522,735</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>163,293</td>
<td>21,283,592</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
### Table 2: Quantity and Value of fish landings 2011 - 2013

<table>
<thead>
<tr>
<th>FRESH WATER</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M. tons</td>
<td>000 Kshs</td>
<td>M. tons</td>
</tr>
<tr>
<td>L. Victoria</td>
<td>133,801</td>
<td>13,847,170</td>
<td>118,992</td>
</tr>
<tr>
<td>L. Turkana</td>
<td>3,746</td>
<td>275,919</td>
<td>3,001</td>
</tr>
<tr>
<td>L. Naivasha</td>
<td>288</td>
<td>23,229</td>
<td>143</td>
</tr>
<tr>
<td>L. Baringo</td>
<td>102</td>
<td>9,469</td>
<td>251</td>
</tr>
<tr>
<td>L. Jipe/Dams</td>
<td>104</td>
<td>9,554</td>
<td>112</td>
</tr>
<tr>
<td>Lake Kanyaboli</td>
<td>173</td>
<td>12,676</td>
<td>125</td>
</tr>
<tr>
<td>Lake Kenyatta</td>
<td>233</td>
<td>8,000</td>
<td>33</td>
</tr>
<tr>
<td>Tana River Dams</td>
<td>732</td>
<td>53,781</td>
<td>967</td>
</tr>
<tr>
<td>Tana Delta</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fish Farming</td>
<td>19,584</td>
<td>4,223,471</td>
<td>21,487</td>
</tr>
<tr>
<td>Riverine</td>
<td>53</td>
<td>3,480</td>
<td>39</td>
</tr>
<tr>
<td>TOTAL</td>
<td>158,816</td>
<td>18,466,750</td>
<td>145,150</td>
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<table>
<thead>
<tr>
<th>MARINE FISH</th>
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<tbody>
<tr>
<td>Lamu County</td>
<td>2150</td>
<td>138987</td>
<td>2,062</td>
<td>170,483</td>
<td>2,147</td>
<td>177,666</td>
</tr>
<tr>
<td>Tana River County</td>
<td>704</td>
<td>51735</td>
<td>596</td>
<td>43,979</td>
<td>698</td>
<td>66,158</td>
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<tr>
<td>Kilifi County</td>
<td>2152</td>
<td>250305</td>
<td>2,061</td>
<td>335,820</td>
<td>2,136</td>
<td>319,831</td>
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<tr>
<td>Mombasa County</td>
<td>860</td>
<td>121327</td>
<td>782</td>
<td>129,236</td>
<td>855</td>
<td>158,104</td>
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<tr>
<td>Kwale County</td>
<td>1879</td>
<td>174510</td>
<td>1,976</td>
<td>198,066</td>
<td>1,867</td>
<td>222,039</td>
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<tr>
<td>TOTAL</td>
<td>7,744</td>
<td>736,864</td>
<td>7,477</td>
<td>877,584</td>
<td>7,703</td>
<td>943,798</td>
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<table>
<thead>
<tr>
<th>CRUSTACEA</th>
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<th></th>
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<td>Lamu County</td>
<td>162</td>
<td>79576</td>
<td>132</td>
<td>69,905</td>
<td>215</td>
<td>113,073</td>
</tr>
<tr>
<td>Tana River County</td>
<td>51</td>
<td>7563</td>
<td>129</td>
<td>21,654</td>
<td>68</td>
<td>10,747</td>
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<tr>
<td>Kilifi County</td>
<td>70</td>
<td>22806</td>
<td>164</td>
<td>64,125</td>
<td>93</td>
<td>32,407</td>
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<tr>
<td>Mombasa County</td>
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<td>40619</td>
<td>207</td>
<td>48,374</td>
<td>247</td>
<td>57,717</td>
</tr>
<tr>
<td>Kwale County</td>
<td>105</td>
<td>25974</td>
<td>108</td>
<td>29,195</td>
<td>140</td>
<td>36,907</td>
</tr>
<tr>
<td>TOTAL</td>
<td>574</td>
<td>176,539</td>
<td>739</td>
<td>233,253</td>
<td>762</td>
<td>250,851</td>
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<table>
<thead>
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<th>MOLLUSCS</th>
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</thead>
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<td>Lamu County</td>
<td>85</td>
<td>32,222</td>
<td>86</td>
<td>19,842</td>
<td>90</td>
<td>36,889</td>
</tr>
<tr>
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<td>2098</td>
<td>18</td>
<td>1,563</td>
<td>37</td>
<td>2,402</td>
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<td>Kilifi County</td>
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<td>12823</td>
<td>178</td>
<td>28,335</td>
<td>116</td>
<td>14,681</td>
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<tr>
<td>Mombasa County</td>
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<td>7904</td>
<td>77</td>
<td>11,494</td>
<td>74</td>
<td>9,048</td>
</tr>
<tr>
<td>Kwale County</td>
<td>330</td>
<td>35379</td>
<td>289</td>
<td>35,026</td>
<td>351</td>
<td>40,503</td>
</tr>
<tr>
<td>TOTAL</td>
<td>629</td>
<td>90,427</td>
<td>649</td>
<td>96,260</td>
<td>669</td>
<td>103,523</td>
</tr>
</tbody>
</table>

| MARINE TOTAL  | 8,947 | 1,003,830 | 8,865 | 1,207,098 | 9,134 | 1,298,172 |
| GRAND TOTAL   | 167,763 | 19,470,579 | 154,015 | 18,073,859 | 163,293 | 21,283,592 |
Table 3: *Fresh Water and Marine fish catches by Species, Weight and Value 2011-2013*

<table>
<thead>
<tr>
<th>Fresh Water</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>000 Kshs</td>
<td>M. tons</td>
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<tr>
<td>Lates niloticus</td>
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</tr>
<tr>
<td>Demersal</td>
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<td>408,567</td>
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<td>Pelagic</td>
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<td>Sardines</td>
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<tr>
<td>Unspecified</td>
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<tr>
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<td></td>
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</tr>
<tr>
<td>Spiny Lobster</td>
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<tr>
<td>Prawns</td>
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<td>54,719</td>
<td>408</td>
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<tr>
<td>Crabs</td>
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<td>40,922</td>
<td>235</td>
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<td><strong>TOTAL</strong></td>
<td>574</td>
<td>176,539</td>
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<table>
<thead>
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<th>Molluscs</th>
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<th>2013</th>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oysters</td>
<td>30</td>
<td>1,903</td>
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<tr>
<td>Beche-de-mers</td>
<td>134</td>
<td>17,600</td>
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<tr>
<td>Octopus</td>
<td>419</td>
<td>40,093</td>
<td>394</td>
</tr>
<tr>
<td>Squids</td>
<td>46</td>
<td>30,832</td>
<td>144</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>629</td>
<td>90,427</td>
<td>649</td>
</tr>
</tbody>
</table>

**TOTAL MARINE** | **8,947** | **1,003,830** | **8,865** | **1,207,098** | **9,134** | **1,298,172**

**GRAND TOTAL** | **167,763** | **19,470,579** | **154,015** | **18,073,858** | **163,293** | **21,283,592**

12
Capture fisheries in Kenya is mainly from lakes Victoria, Turkana, Naivasha, Baringo, Jipe, Tana River dams, Tana river delta and Indian Ocean and it accounted for 85.6% of the country’s total fish production in 2013 slightly down from 86.1% the previous year. Lake Victoria accounted for 89.26% of all the fish from capture fisheries in Kenya during the year under review. Lake Turkana contributed 3.00%, Tana river dams 0.50%, Lake Baringo 0.19%, Lake Naivasha 0.17%, Lake Kanyamboli 0.14%, Lake Jipe 0.08%, Lake Kenyatta 0.04%, Tukwel dam 0.04%, Tana river delta 0.03%, Riverine 0.01% while marine artisanal fisheries contributed 6.54% of all the fish from capture fisheries.

In capture fisheries, gill netting was the most used fishing method during the year. The other methods included use of gears such as long line hooks, hand line, traditional traps, trolling, ring nets, cast nets and small (mosquito) seines for *Rastrineobola argentea* fishing. There are other methods which were used but are currently prohibited due to their destructive nature. They include; Beach seining, Monofilament gill netting, Trawl netting, Scuba diving, spear gunning and vertical integration of gears.

### 3.1 Lake Victoria Fishery

Lake Victoria’s contribution to total national annual fish production is enormous (76.4% in 2013) even in the face of rapidly declining fish stocks in the lake. Capture fisheries of Lake Victoria are a source of livelihood to many people employed directly as boat owners, fishermen (40,078), 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 which contributed 93.7% of total catches from the lake (Kenyan side) during the year under review (Tables 4, 5 and 6). This has been the case for a number of years, figure 3 and table 4. However, for the last few years there have seen a rapid decline of fish stocks in Lake Victoria thereby creating a wide gap between supply and demand for fish in the country. In response to this undesirable situation, the government has taken concrete steps to promote aquaculture development in the country. It introduced and implemented the Fish Farming Enterprise Productivity Program (FFEPP) to bridge the existing supply-demand gap.

During the year 2013, fish production from Lake Victoria increased to 124,643 metric tonnes with an ex-vessel value of Kshs 13,858,682,000 compared to 118,992 metric tonnes with an ex-vessel value of Kshs 11,775,377,000 landed in 2012 This year’s figures translate into an increase of 4.7% in quantity and 17.7% in ex-vessel value of compared to the previous year. For the three species of commercial value, *Lates niloticus*’ production decreased by 16.7% while *Rastrineobola argentea* and
Oreochromis niloticus increased by 26.0% and 22.4% respectively compared to the previous year. In terms of species contribution to the total weight of fish landed from the lake, Rastrineobola argentea took the lead with 53.5%, Lates niloticus, 35.1%, Oreochromis niloticus, 6.0%, Clarias spp, 1.9%, Protopterus aethiopicus, 0.9%, Haplochromis, 0.9% and the others species combined contributed 1.8%, figure 4. Homa bay County contributed 64.3% of the total landings, Siaya 19.7%, Migori 7.5%, Kisumu 4.5% and Busia 4.1%, figure 5 and table 6.

Figure 3: Lake Victoria species catch composition 2004-2013
Figure 4: Lake Victoria species catch composition 2013

<table>
<thead>
<tr>
<th>Species</th>
<th>Landings in metric tons</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. nilotus</td>
<td>43,736 (35.1%)</td>
<td></td>
</tr>
<tr>
<td>R. argentea</td>
<td>36,717 (53.5%)</td>
<td></td>
</tr>
<tr>
<td>O. niloticus</td>
<td>7,445 (6.0%)</td>
<td></td>
</tr>
<tr>
<td>Clarias</td>
<td>2,329 (1.9%)</td>
<td></td>
</tr>
<tr>
<td>Protopterus</td>
<td>1,070 (0.9%)</td>
<td></td>
</tr>
<tr>
<td>Haplochromis</td>
<td>1,112 (0.9%)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>2,233 (1.8%)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 5: Lake Victoria fish landings by Counties 2013

<table>
<thead>
<tr>
<th>County</th>
<th>Landings in metric tons</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homa bay</td>
<td>80,105 (64.3%)</td>
<td></td>
</tr>
<tr>
<td>Migori</td>
<td>9,400 (7.5%)</td>
<td></td>
</tr>
<tr>
<td>Kisumu</td>
<td>5,550 (4.5%)</td>
<td></td>
</tr>
<tr>
<td>Siaya</td>
<td>24,509 (19.7%)</td>
<td></td>
</tr>
<tr>
<td>Busia</td>
<td>5,079 (4.1%)</td>
<td></td>
</tr>
</tbody>
</table>
The following are some of the challenges facing Lake Victoria fisheries which need immediate attention:

(i). The declining trend in species fish catches apart from *Rastrienobola argentea* and *Clarias spp* over the last decade or so could be an indicator of reduced fish stocks particularly *Lates niloticus* and every effort towards fish stock rejuvenation, including restocking, deserve attention since it directly threatens food security and income for livelihoods, which eventually culminates into hunger, joblessness, wrangles among the stakeholders, increased crime rates and social aspects.

(ii). Significant change in attitude by fishers towards conservation of the lakes’ resources is necessary to curb on the illegalities within the lake.

(iii). Infestation of the lake by aquatic weeds i.e. Water Hyacinth and the Hippo grass which in most cases resulted into virtually blocking most landing sites and fishing grounds resulting into relocation of fishers to the open areas. This was mainly encountered in Homa bay County during the year under review.

(iv). The major challenge afflicting the fisheries of Lake Victoria is still mainly attributed to over fishing and habitat degradation. These have had adverse impacts to the fishery by changing the species diversity and reduction in total harvestable biomass. Over fishing is caused typically by problems associated with open access fisheries as outlined below:

**a). Increased number of fishers and fishing crafts**

The number of fishers in Lake Victoria (Kenyan side) has increased from 38,431 in 2000 to 40,078 (4.3% increase) in 2012. The number of fishing crafts increased from 11,515 in 2000 to 13,468 (17.0%) in 2012 on the Kenyan side of the lake while lake wide fishers increased from 129,305 to 205,249 (58.7%) and fishing crafts from 42,519 to 69,549 (63.6%) during the same period. (*Lake Victoria (Kenya) biennial fisheries frame survey 2012 National report and Lake Victoria biennial fisheries frame survey 2012 Regional report*).

**b). Increase in legal and illegal fishing gears:**

The effort in terms of legal gear such as gill net and long line hooks have increased tremendously. The number of legal gill net of mesh size =>5 inches increased from 99,821 in 2000 to 154,012 (54.3%) in 2012 while the number of the illegal mesh sizes <5 inches increased from 33,544 to 54,115 (61.3%) during the same period. Generally, the total number of gillnets of all mesh sizes continued to increase over the years with an increase of 154.4% (from 133,365 to 206,127) between 2000 and 2012. The number of Long line hooks had the highest increase during the same period having increased from 1,039,893 to 2,478,976 an increase of 138.4%. Other illegal nets, such as monofilament gillnets have increased from 58 in 2004 to 469 in 2006, 4,190 in 2008 before declining to 1,468 in 2010 and then increasing tremendously by 728.4% to 12,161
monofilament gillnets in 2012. Efforts to remove these destructive gears should be stepped up and the effects of the expanding long line fishery in particular need to be evaluated and the fishery regulated accordingly.

The State Department of Fisheries is concerned about the sustainability of Lake Victoria fisheries. Scientists have advised that the fish stocks are continuously declining and unless this is effectively dealt with, the sustainability of the fishery remains under threat. This will eventually have a negative impact on other businesses and the fishers.

All stakeholders especially fish processors and gear distributors should collaborate with the State Department of Fisheries in order to manage Lake Victoria fisheries resources sustainably. As it has been noted above, many illegal gears are still in use and this can only be controlled with the cooperation of all the stakeholders.
<table>
<thead>
<tr>
<th>Species</th>
<th>2011 M. tons</th>
<th>2011 000 Kshs</th>
<th>2011 % Comp</th>
<th>2012 M. tons</th>
<th>2012 000 Kshs</th>
<th>2012 % Comp</th>
<th>2013 M. tons</th>
<th>2013 000 Kshs</th>
<th>2013 % Comp</th>
</tr>
</thead>
<tbody>
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<td><em>Lates niloticus</em></td>
<td>46,612</td>
<td>9,100,611</td>
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<td>7,472,681</td>
<td>44</td>
<td>43,736</td>
<td>8,521,449</td>
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<tr>
<td><em>Ratineobola Argentae</em></td>
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<td>3,224,846</td>
<td>54</td>
<td>52,948</td>
<td>2,813,882</td>
<td>44</td>
<td>66,717</td>
<td>3,552,513</td>
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<td><em>Tilapia niloticus</em></td>
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<td>1,112,239</td>
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<td>6,081</td>
<td>899,643</td>
<td>5</td>
<td>7,445</td>
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<tr>
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<td>Mar</td>
<td>Apr</td>
<td>May</td>
<td>Jun</td>
<td>Jul</td>
<td>Aug</td>
<td>Sep</td>
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<td>612</td>
<td>705</td>
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<td>186</td>
<td>195</td>
<td>197</td>
<td>202</td>
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<tr>
<td></td>
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<td>20,562</td>
<td>20,776</td>
<td>18,997</td>
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<td>69</td>
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<td>93</td>
<td>99</td>
<td>95</td>
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<td>195</td>
<td>166</td>
<td>173</td>
<td>189</td>
</tr>
<tr>
<td></td>
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<td>13,313</td>
<td>11,467</td>
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<td>14,010</td>
<td>11,933</td>
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<td>1,191,014</td>
<td>1,256,487</td>
<td>1,069,307</td>
<td>1,230,506</td>
</tr>
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</table>
Table 6: Lake Victoria Annual fish landings by Species, Weight, Value and by Counties 2013

<table>
<thead>
<tr>
<th>County</th>
<th>Busia</th>
<th>Siaya</th>
<th>Kisumu</th>
<th>Homa Bay</th>
<th>Migori</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Species</td>
<td>M. tons</td>
<td>000 Kshs</td>
<td>M. tons</td>
<td>000 Kshs</td>
<td>M. tons</td>
<td>000 Kshs</td>
</tr>
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3.2 MARINE CAPTURE FISHERY

The marine capture fishery is composed of coastal and near shore artisanal, semi-industrial and offshore industrial fisheries. Artisanal and semi-industrial fisheries are exploited by the coastal local communities while the industrial fisheries are exploited by foreign fishing companies. During the year under review, the artisanal fishing fleet comprised of 2,913 fishing crafts and 12,915 fishermen (Marine Artisanal Fisheries Frame Survey 2014 report) while the semi-industrial fleet had only one licensed trawlers. The inshore waters which are fishing grounds for artisanal fishermen are over-exploited and degraded. Great potential exists in the exploitation of the Kenyan EEZ where estimates done in 1975-1980 indicate potential of 100,000 to 150,000 metric tonnes annually (FAO, 1980) and more recent estimates indicate potential of 300,000 metric ton (Habib 2003). This fishery is currently exploited by Distant Water Fishing Nations (DWFN) upon payment of access fees to the State Department of Fisheries. The State Department has limited capacity for Monitoring, Control and Surveillance (MCS) to ensure compliance with the established fisheries management standards, besides it is possible that vessels could be accessing our EEZ resources without payment of access fees. However the challenge at hand is large and needs a comprehensive approach in order to establish and deploy a national fisheries enforcement unit. A well trained and a disciplined law enforcement unit is critical toward the management of every fishery particularly when its operation is based on best scientific information.

The artisanal fishing activities are affected by Kenya’s coastal oceanographic conditions which are caused by changes in the monsoon wind system (UNEP, 1998) that results to seasonal reversal process with NE monsoons between November-March and SE monsoons between May-September. These oceanographic processes cause distinct seasonality in the artisanal fishery, with high catches during the NE monsoon than the SE monsoon. These two seasons are referred to as Kazi kazi and Kusi by the locals. During Kazi kazi the sea is calm and there is a lot of fishing activities and fish landings are normally high while during Kusi the winds render the sea rough thus unfavorable to fishing trips.

During the year under review, a total of 9,134 metric tonnes of assorted fish species with an ex-vessel value of Kshs. 1,298,172,000 were landed by the artisanal fishers. This production reflected an increase of 3% from last year’s production of 8,865 metric tonnes with an ex-vessel value of Kshs. 1,207,098,000 (Tables 7,8 and 9). The landings were done by 12,915 fishers using 2,913 fishing crafts with different types and sizes of fishing gears. The landings were done at some 197 landing sites distributed all along the whole stretch of the Kenyan Coastline.
Landings from artisanal fishery have been increasing, declining then increasing in cycles while the value of the fish has maintained an upward trend over the years. Fish production from the marine artisanal fishery for the last ten years (2004-2013) has remained fairly constant between 7,000 and 9,000 metric tonnes only showing marginal fluctuations as shown in figure 6 below.

In 2013, demersal fish species category dominated the marine artisanal fish landings by contributing 4,433 metric tonnes (48.5%) of the total marine landings while pelagic fish category contributed 2,362 metric tonnes (25.9%), the sharks, rays and sardines category made up 908 metric tonnes (9.9%) of the landings, crustaceans 762 metric tonnes (8.3%) and molluscs 669 (7.3%) figure 7. This trend has been the same over a number of years, figures 8.
Figure 7: Percentage contribution of marine fish species groups 2013

Figure 8: Trends of landings of marine fish species groups 2011-2013
During the year under review, Lamu County contributed the highest quantity of marine artisanal landings of 2,452 metric tonnes (or 26.8% of the total landings) with an ex-vessel value of Kshs 327,628,000 (or 25.2% of the total ex-vessel value). Lamu was followed by Kwale 2,358 metric tonnes (25.8%) with an ex-vessel value of Kshs 299,449,000 (or 23.1%), Kilifi 2,345 metric tonnes (25.7%) with an ex-vessel value of Kshs 366,919,000 (28.3%), Mombasa 1,178 metric tonnes (12.9%) with an ex-vessel value of Kshs 224,869,000 (17.3%), and lastly was Tana river county with a contribution of 803 metric tonnes or 8.8% with an ex-vessel value of Kshs 79,307,000 or 6.1% of the total ex-vessel value of all the marine artisanal landings as shown in figure 9 below.

![Figure 9: Marine fish production by Quantity, Value and Counties 2013](image)

The most common fishing gears used by the artisanal fishers were gillnets, traditional traps (usio, malema), seine nets (which include beach, prawn and reef seines), long line hooks, hand lines, cast nets and trammel nets among others.
Table 7: Marine fish landings by Species, Weight and Value 2011 - 2013

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<th>2012 M. tons</th>
<th>2012 000 Kshs</th>
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### Table 9: Marine fish landing by Species, Weight and Value and by Counties 2013

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<th>Kilifi</th>
<th>Mombasa</th>
<th>Kwale</th>
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<td>M. Tons 000 Kshs</td>
<td>M. Tons 000 Kshs</td>
<td>M. Tons 000 Kshs</td>
<td>M. Tons 000 Kshs</td>
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<td>158 22,609</td>
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<td>84 19,036</td>
<td>150 19,260</td>
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<td>Surgeon fish</td>
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<td>79,308</td>
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3.3 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. 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 damming that interferes with the natural discharge rates of river Omo has a negative effect on the lake volume levels.

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*, *Laboe 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. The peripheral communities entirely rely on fishing directly supporting about 7,000 fishers and 6,500 fish traders and transporters.

During the year under review, a total of 4,338 metric tonnes of fish were landed with an ex-vessel value of Kshs 438,646,000 from both sides (Turkana and Marsabit counties) of the lake. This years’ production was an increase of 44.6% in quantity and an increase of 42.6% in ex-vessel value compared to 2012 production of 3,001 metric tonnes and an ex-vessel value of Kshs 307,382,000. 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 2009 apart from the increase in 2013, figure 10.
During the year under review, *Tilapia spp* dominated the landings by contributing 1,812 metric tonnes (or 41.8%) followed by *Labeo horie* 657 metric tonnes (15.2%), *Lates niloticus* 583 metric tonnes (13.4%), *Alestes* 329 metric tonnes (7.6%) and *Distichodus niloticus* 330 metric tonnes (7.6%). These five species combined contributed 85.5% and the other species combined contributed the remaining 14.5%, figure 11 and table 10. The Western side (Turkana county) produced the bulk of the lake’s production of 96.7% (4,193 metric tonnes) while the Eastern side (Marsabit county) contributed only 3.3% (145 metric tonnes), Table 11.

*Figure 10: Trends in annual fish landings from Lake Turkana fishery 1990-2013*
One of the major challenges in the exploitation of the Lake Turkana fishery is lack of cold storage facilities within reach forcing all fishers to sale almost all their catches as dried or smoked products which are inferior products and consequently fetch highly reduced market prices per nominal unit weight.

There is also need to evaluate the data collection system in the region due to the expansiveness of the lake shoreline and build capacity of the local fishers groups and Beach Management Units (BMUs) through training to effectively undertake primary data collection. With fisheries staff strength of just 18 persons from both sides of the lake as at December 2012, it is important to enlist the support of the fishing communities to help in collecting timely and accurate data for planning and policy review.

Some of the main challenges facing Lake Turkana fishery which need to be addressed include the following:

- Lack of appropriate fish handling and preservation facilities that usually lead to post harvest losses and poor quality of fish and fishery products;
- Poor state of landing site access roads, which make marketing impossible at some landing sites such as Todonyang and Namukuse;
- Armed conflicts between the Turkana in Kenya and the Dasenach in Ethiopia over fishing and grazing grounds in the River Omo delta. Many lives have been lost especially on the Kenyan side;
- Weak and unfavorable fish marketing systems along the fish landing sites;

![Figure 11: Species composition in catches of Lake Turkana Fishery 2013](image-url)
Rampant insecurity in the lake which make resource Monitoring, Control and Surveillance a risky affair;
Insufficient funds for training Beach Management Units in data collection

There is an urgent need to develop a sound management plan for Lake Turkana fishery. The State Department of Fisheries should strengthen community participation in Fisheries resource management, utilization and conservation in the entire lake through:
• Capacity building of BMU officials and fishers from both sides of the lake;
• Train fishers on appropriate hygiene and sanitation, fish handling, processing and fish value addition.

Table 10: Lake Turkana fish landings by Species, Weight and Value 2013

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<th>County</th>
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<th>Eastern side</th>
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<td>Species</td>
<td>M. tons</td>
<td>000 Kshs</td>
<td>M. tons</td>
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<td>Lates niloticus</td>
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<td>Tilapias</td>
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<td>Labeo</td>
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<td>Barbus</td>
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<td>Citharinus</td>
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<td>Hydrocy forskalii</td>
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<td>Synodontis</td>
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<td>Alestes</td>
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<td>27,359</td>
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<td>Bagrus</td>
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<td>8,550</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>4,193</strong></td>
<td><strong>425,424</strong></td>
<td><strong>145</strong></td>
</tr>
</tbody>
</table>

Table 11: Lake Turkana Monthly fish landings by Weight and Value 2013

<table>
<thead>
<tr>
<th>Month</th>
<th>Western side</th>
<th>Eastern side</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M. tons</td>
<td>000 Kshs</td>
<td>M. tons</td>
</tr>
<tr>
<td>January</td>
<td>659</td>
<td>78,147</td>
<td>18</td>
</tr>
<tr>
<td>February</td>
<td>559</td>
<td>59,805</td>
<td>19</td>
</tr>
<tr>
<td>March</td>
<td>407</td>
<td>41,120</td>
<td>14</td>
</tr>
<tr>
<td>April</td>
<td>232</td>
<td>25,404</td>
<td>15</td>
</tr>
<tr>
<td>May</td>
<td>442</td>
<td>42,225</td>
<td>4</td>
</tr>
<tr>
<td>June</td>
<td>402</td>
<td>38,702</td>
<td>8</td>
</tr>
<tr>
<td>July</td>
<td>552</td>
<td>38,751</td>
<td>8</td>
</tr>
<tr>
<td>August</td>
<td>362</td>
<td>38,021</td>
<td>9</td>
</tr>
<tr>
<td>September</td>
<td>327</td>
<td>35,465</td>
<td>12</td>
</tr>
<tr>
<td>October</td>
<td>148</td>
<td>14,820</td>
<td>9</td>
</tr>
<tr>
<td>November</td>
<td>61</td>
<td>7,928</td>
<td>9</td>
</tr>
<tr>
<td>December</td>
<td>41</td>
<td>5,034</td>
<td>22</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>4,193</strong></td>
<td><strong>425,424</strong></td>
<td><strong>145</strong></td>
</tr>
</tbody>
</table>


3.4 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 metres. The lakes 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.

The fishery was previously based on the tilapiine species, however owing to changes in the lakes biophysical processes such as siltation and species introductions, the fishery is currently dominated by *Protopterus aethiopicus*.

During the year under review a total of 263,445 Kgs of fish with an ex-vessel value of Kshs. 25,008,451 were landed. This was an increase of 4.8% in quantity and 6.4% in ex-vessel value compared to last year’s production of 250,624 Kg valued at Kshs. 23,513,800.

The species catch composition was dominated by *Protopterus aethiopicus* having contributed 72% (190 metric tonnes) followed by *Tilapia spp* 17% (44 metric tonnes), *Clarias spp* 10% (26 metric tonnes) and *Barbus spp* with 1% (3 metric tonnes), figure 12 and table 12.

---

**Figure 12: Percentages catch by species composition in Lake Baringo in 2013**

- **Protopterus**: 190 metric tonnes (72%)
- **Tilapia**: 44 metric tonnes (17%)
- **Clarias**: 26 metric tonnes (10%)
- **Barbus**: 3 metric tonnes (1%)
Table 12: Lake Baringo Monthly fish landings by Species, Weight and Value 2013

<table>
<thead>
<tr>
<th>MONTH</th>
<th>Tilapia Kgs</th>
<th>Tilapia Kshs</th>
<th>Protoperus Kgs</th>
<th>Protoperus Kshs</th>
<th>Clarias Kgs</th>
<th>Clarias Kshs</th>
<th>Barbus Kgs</th>
<th>Barbus Kshs</th>
<th>Total Kgs</th>
<th>Total Kshs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>1,852</td>
<td>183,459</td>
<td>9,101</td>
<td>912,072</td>
<td>845</td>
<td>46,283</td>
<td>104</td>
<td>5,217</td>
<td>17,902</td>
<td>1,147,030</td>
</tr>
<tr>
<td>Feb</td>
<td>3,314</td>
<td>328,283</td>
<td>8,110</td>
<td>812,795</td>
<td>790</td>
<td>43,268</td>
<td>147</td>
<td>7,342</td>
<td>12,361</td>
<td>1,191,688</td>
</tr>
<tr>
<td>Mar</td>
<td>3,528</td>
<td>349,435</td>
<td>8,310</td>
<td>832,883</td>
<td>1,565</td>
<td>85,768</td>
<td>128</td>
<td>6,376</td>
<td>13,531</td>
<td>1,274,461</td>
</tr>
<tr>
<td>Apr</td>
<td>2,449</td>
<td>242,525</td>
<td>9,723</td>
<td>974,425</td>
<td>1,950</td>
<td>106,870</td>
<td>133</td>
<td>6,666</td>
<td>14,255</td>
<td>1,330,486</td>
</tr>
<tr>
<td>May</td>
<td>2,799</td>
<td>277,202</td>
<td>11,949</td>
<td>1,197,595</td>
<td>2,571</td>
<td>140,858</td>
<td>118</td>
<td>5,893</td>
<td>17,437</td>
<td>1,621,549</td>
</tr>
<tr>
<td>Jun</td>
<td>2,072</td>
<td>205,258</td>
<td>9,132</td>
<td>915,207</td>
<td>1,063</td>
<td>58,223</td>
<td>242</td>
<td>12,076</td>
<td>12,508</td>
<td>1,190,764</td>
</tr>
<tr>
<td>Jul</td>
<td>2,780</td>
<td>275,332</td>
<td>11,921</td>
<td>1,194,692</td>
<td>1,023</td>
<td>56,036</td>
<td>207</td>
<td>10,337</td>
<td>15,930</td>
<td>1,536,397</td>
</tr>
<tr>
<td>Aug</td>
<td>3,828</td>
<td>379,148</td>
<td>13,720</td>
<td>1,375,017</td>
<td>1,015</td>
<td>55,622</td>
<td>288</td>
<td>14,395</td>
<td>18,851</td>
<td>1,824,182</td>
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<tr>
<td>Sep</td>
<td>4,396</td>
<td>435,408</td>
<td>13,846</td>
<td>1,387,673</td>
<td>1,731</td>
<td>94,871</td>
<td>284</td>
<td>14,202</td>
<td>20,258</td>
<td>1,932,154</td>
</tr>
<tr>
<td>Oct</td>
<td>6,338</td>
<td>627,716</td>
<td>16,329</td>
<td>1,636,505</td>
<td>3,251</td>
<td>178,156</td>
<td>551</td>
<td>27,534</td>
<td>26,469</td>
<td>2,469,911</td>
</tr>
<tr>
<td>Nov</td>
<td>6,696</td>
<td>663,257</td>
<td>20,689</td>
<td>2,073,440</td>
<td>6,048</td>
<td>331,427</td>
<td>586</td>
<td>29,273</td>
<td>34,019</td>
<td>3,097,397</td>
</tr>
<tr>
<td>Dec</td>
<td>4,050</td>
<td>401,091</td>
<td>57,291</td>
<td>5,741,816</td>
<td>4,247</td>
<td>232,714</td>
<td>336</td>
<td>16,810</td>
<td>65,924</td>
<td>6,392,431</td>
</tr>
<tr>
<td>TOTAL</td>
<td>44,102</td>
<td>4,368,113</td>
<td>190,120</td>
<td>19,054,120</td>
<td>26,098</td>
<td>1,430,096</td>
<td>3,125</td>
<td>156,122</td>
<td>263,445</td>
<td>25,008,451</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>44</td>
<td>4,368</td>
<td>190</td>
<td>19,054</td>
<td>26</td>
<td>1,430</td>
<td>3</td>
<td>156</td>
<td>263</td>
</tr>
</tbody>
</table>
3.5 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.

Lake Naivasha commercial fishery had been declining before the year 2001 necessitating a one year ban on fishing in 2001 and the subsequent years, up to date, there has been an annual closed season during the breeding season (1st June to 31st August), to allow the fish stocks to recover. The recent accidental introduction of Common carp (*Cyprinus carpio*) has created a shift in the fish production from the lake. The *Cyprinus carpio* is believed to have come through river Malewa from Nyandarua highlands during the El-Nino period of 1998-1999.

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 230,963 Kgs of fish with an ex-vessel value of Kshs. 17,542,071 were landed from Lake Naivasha. This was an increase of 61.5% in quantity and 13.5% in value compared to 2012 landings of 143,330 Kgs valued at Kshs 15,459,939 to the fishers. Common carp (*Cyprinus carpio*) continued to be the most dominant species accounting for 86.0% (198,540 Kgs) of the total catch. The other species contribution were Mirror carp accounting for 10.2% (23,563 Kg), *Oreochromis niloticus* 2.6% (5,905 Kgs), lake ‘Naivasha tilapia’ (*Oreochromis leucostictus*) 1.0% (2,382 Kgs) and Black bass (*Micropyerus salmoides*) 0.2% (562 Kgs). *Tilapia zilli* and *Clarias* landings were a mere 1Kg and 11 Kgs respectively, figure 13.
During the year under review, average monthly fish catches for the months fished i.e. January to May and September to December was 25.7 metric tonnes with a peak just before the annual closure in May and another peak after the closure in September and October, figure 14 and Table 13.

During the year 2013, a total of 50 fishing crafts were licensed to operate in the lake for a period of 9 months (3 months were closed fishing season) and these were operated by an average of 150 fishers per month.

The annual closed season on fishing activities in Lake Naivasha was effected from 1st June to 31st August during the year under review, as part of management measure to allow the fishery to recover.
Figure 14: Lake Naivasha monthly catches in metric tonnes 2013
Table 13: Lake Naivasha Monthly fish landings by Species, Weight and Value 2013

<table>
<thead>
<tr>
<th>Month</th>
<th>Black Bass</th>
<th>O. leucosticus</th>
<th>O. niloticus</th>
<th>T. zilli</th>
<th>Common carps</th>
<th>Mirror carps</th>
<th>Clarias</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>32</td>
<td>10,165</td>
<td>269.5</td>
<td>71,740</td>
<td>676</td>
<td>144,514</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Feb</td>
<td>32</td>
<td>7,860</td>
<td>278</td>
<td>61,220</td>
<td>447</td>
<td>112,342</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mar</td>
<td>11</td>
<td>2,870</td>
<td>514</td>
<td>66,776</td>
<td>294.5</td>
<td>59,597</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Apr</td>
<td>10</td>
<td>1,040</td>
<td>557</td>
<td>59,682</td>
<td>384</td>
<td>19,237</td>
<td>1</td>
<td>255</td>
</tr>
<tr>
<td>May</td>
<td>24</td>
<td>2,630</td>
<td>575</td>
<td>50,456</td>
<td>740.5</td>
<td>189,375</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLOSED SEASON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sep</td>
<td>121</td>
<td>28,302</td>
<td>14</td>
<td>730</td>
<td>1,150</td>
<td>263,325</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Oct</td>
<td>129</td>
<td>31,371</td>
<td>17</td>
<td>1,018</td>
<td>896</td>
<td>172,663</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nov</td>
<td>108</td>
<td>26,568</td>
<td>33</td>
<td>4,290</td>
<td>645</td>
<td>142,545</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dec</td>
<td>93</td>
<td>21,762</td>
<td>124.5</td>
<td>16,185</td>
<td>672</td>
<td>153,888</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>562</td>
<td>132,568</td>
<td>2,382</td>
<td>332,097</td>
<td>5,905</td>
<td>1,323,260</td>
<td>1</td>
<td>255</td>
</tr>
</tbody>
</table>

| Month | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs | M. tons | 000 Kshs |
|-------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|
|       | 1       | 133      | 2       | 332      | 6       | 1,323    | *       | *       | 199     | 14,112   | 24      | 1,640    | 0       | 2       | 231     | 17,542   |
3.6 LAKE JIPE FISHERY

During the year 2013, a total of 116 metric tonnes of both Tilapia and Clarias with an ex-vessel value of Kshs 16,910,000 were landed from Lake Jipe. This reflected an increase of 3.6% (or 4 metric ton) in quantity and 1.2% in ex-vessel value compared to previous year 2012 production of 112 metric tonnes valued at Kshs 6,715,000. The only two species (Tilapia and Clarias) caught in the lake showed a steady average production of 8 metric tonnes per month for Tilapia and 1 metric ton for Clarias (Table 14). Tilapia contributed 85.1% (99 metric tonnes) and Clarias 15.9% (17 metric tonnes), figure 15.

![Graph showing species catch in Lake Jipe 2013](image)

**Figure 15:** Percentages composition of species catch in Lake Jipe 2013

The challenges which faced capture fisheries in Lake Jipe during the year under review included:

- Floating vegetation continued to stand out as the biggest problem faced by the fishers. The vegetation abstracts fishing crafts motion besides serving as hiding ground for the fish hence impacting substantially on the low production;
Siltation – there is observable high rate of silt deposition in the lake’s bed which is caused by among others sand harvesting activities on the banks of River Lumi and increased agricultural activities along the river course. The siltation has contributed to creation of a shallow inlet point in the lake which eventually brings about diversion of the river course off the lake and the water ends up in Nyumba ya Mungu reservoir in Mwanga district of Tanzania. The knock on effect accruing from this is and not limited to proliferation of water weeds, increased salinity and receding of the lake shoreline.

Table 14: Lake Jipe Monthly fish landings by Species, Weight and Value 2013

<table>
<thead>
<tr>
<th>Month</th>
<th>Tilapia</th>
<th>Clarias</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M. tons</td>
<td>000 Kshs</td>
<td>M. tons</td>
</tr>
<tr>
<td>Jan</td>
<td>9</td>
<td>1,345</td>
<td>1</td>
</tr>
<tr>
<td>Feb</td>
<td>9</td>
<td>1,283</td>
<td>1</td>
</tr>
<tr>
<td>Mar</td>
<td>8</td>
<td>1,234</td>
<td>1</td>
</tr>
<tr>
<td>Apr</td>
<td>8</td>
<td>1,191</td>
<td>1</td>
</tr>
<tr>
<td>May</td>
<td>8</td>
<td>1,233</td>
<td>2</td>
</tr>
<tr>
<td>Jun</td>
<td>8</td>
<td>1,172</td>
<td>2</td>
</tr>
<tr>
<td>Jul</td>
<td>8</td>
<td>1,125</td>
<td>2</td>
</tr>
<tr>
<td>Aug</td>
<td>8</td>
<td>1,157</td>
<td>1</td>
</tr>
<tr>
<td>Sep</td>
<td>8</td>
<td>1,209</td>
<td>1</td>
</tr>
<tr>
<td>Oct</td>
<td>8</td>
<td>1,253</td>
<td>1</td>
</tr>
<tr>
<td>Nov</td>
<td>8</td>
<td>1,274</td>
<td>2</td>
</tr>
<tr>
<td>Dec</td>
<td>9</td>
<td>1,359</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>14,834</td>
<td>17</td>
</tr>
</tbody>
</table>

3.7 TANA RIVER DAMS FISHERY

A total of 705 metric tonnes of fish with an ex-vessel value of Kshs 73,024,000 were landed from the main fishery water bodies of the Tana River dams of Masinga, Kamburu, and Kiambere. This production reflected a decrease of 27.1%
in quantity and 10.5% in ex-vessel value compared to 2012 figures of 967 metric tonnes valued at Kshs 81,609,469.

The most important species in the catches were *Cyprinus carpio* (Common carp), *Tilapia spp*, and *Clarias gariepinus*. Landings of *Cyprinus carpio* were the highest at 288 metric tonnes (or 40.9%) followed by *Tilapia spp* 232 metric tonnes (32.9%) and *Clarias gariepinus* 184 metric tonnes (26.1%). The other species (the Eels, *Barbus spp*, *Labes spp* and *Mormyrus*) combined contributed 0.1% (Table 15). 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 16.

![Figure 16: Tana River dams’ fish catch trends in metric tonnes 2004 – 2013](image)
Table 15: Tana River dams Monthly fish landings by Species, Weight and Value 2013

<table>
<thead>
<tr>
<th>Month</th>
<th>Tilapia</th>
<th>Common carp</th>
<th>Clarias</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M. tons</td>
<td>000 Kshs</td>
<td>M. tons</td>
<td>000 Kshs</td>
<td>M. tons</td>
</tr>
<tr>
<td>Jan</td>
<td>30</td>
<td>2,733</td>
<td>14</td>
<td>1,362</td>
<td>*</td>
</tr>
<tr>
<td>Feb</td>
<td>32</td>
<td>2,865</td>
<td>13</td>
<td>1,349</td>
<td>*</td>
</tr>
<tr>
<td>Mar</td>
<td>29</td>
<td>2,766</td>
<td>16</td>
<td>1,776</td>
<td>*</td>
</tr>
<tr>
<td>Apr</td>
<td>13</td>
<td>1,179</td>
<td>12</td>
<td>1,330</td>
<td>*</td>
</tr>
<tr>
<td>May</td>
<td>15</td>
<td>1,376</td>
<td>15</td>
<td>1,842</td>
<td>*</td>
</tr>
<tr>
<td>Jun</td>
<td>14</td>
<td>1,273</td>
<td>15</td>
<td>1,900</td>
<td>*</td>
</tr>
<tr>
<td>Jul</td>
<td>13</td>
<td>1,185</td>
<td>16</td>
<td>2,212</td>
<td>*</td>
</tr>
<tr>
<td>Aug</td>
<td>13</td>
<td>1,284</td>
<td>14</td>
<td>1,964</td>
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<td>Sep</td>
<td>15</td>
<td>1,557</td>
<td>16</td>
<td>2,423</td>
<td>*</td>
</tr>
<tr>
<td>Oct</td>
<td>16</td>
<td>1,574</td>
<td>18</td>
<td>1,993</td>
<td>*</td>
</tr>
<tr>
<td>Nov</td>
<td>19</td>
<td>1,994</td>
<td>17</td>
<td>2,175</td>
<td>*</td>
</tr>
<tr>
<td>Dec</td>
<td>23</td>
<td>2,455</td>
<td>18</td>
<td>2,154</td>
<td>*</td>
</tr>
<tr>
<td>Total</td>
<td>232</td>
<td>22,240</td>
<td>184</td>
<td>22,479</td>
<td>1</td>
</tr>
</tbody>
</table>

3.8 LAKE KENYATTA FISHERY

During the year under review a total of 54,000 Kgs of fish with an ex-vessel value of Kshs. 3,770,101 were landed from Lake Kenyatta in Lamu County of the coast province. There was an 63.6% increase in quantity of the fish landed coupled with 72.8% increase in ex-vessel value compared with 2012 figures of 33 metric tonnes with an ex-vessel value of Kshs 2,182,652. The catch composition from this lake comprised of three species namely Tilapia spp, Protopterus spp and Clarias spp. Tilapia spp contributed 46% of the total catch, Clarias spp. 28% and Protopterus spp 26% figure 17 and Table 16. The fishing effort was 120 fishers using 40 fishing crafts. Fishing was mainly passive with gillnetting, long line hooks and hand line hooks being the most common methods of fishing.
Figure 17: Percentages composition of species catch in Lake Kenyatta 2013

Table 16: Lake Kenyatta Monthly fish landings by Species, Weight and Value 2013

<table>
<thead>
<tr>
<th></th>
<th>Tilapia</th>
<th>Clarias</th>
<th>Protoperus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kgs</td>
<td>Kshs</td>
<td>Kgs</td>
<td>Kshs</td>
</tr>
<tr>
<td>Jan</td>
<td>2,331</td>
<td>87,704</td>
<td>734</td>
<td>61,614</td>
</tr>
<tr>
<td>Feb</td>
<td>1,907</td>
<td>71,815</td>
<td>2,116</td>
<td>177,760</td>
</tr>
<tr>
<td>Mar</td>
<td>1,059</td>
<td>39,403</td>
<td>2,439</td>
<td>204,908</td>
</tr>
<tr>
<td>Apr</td>
<td>1,059</td>
<td>41,310</td>
<td>2,439</td>
<td>204,908</td>
</tr>
<tr>
<td>May</td>
<td>2,754</td>
<td>194,473</td>
<td>1,526</td>
<td>128,186</td>
</tr>
<tr>
<td>Jun</td>
<td>2,331</td>
<td>69,273</td>
<td>728</td>
<td>61,142</td>
</tr>
<tr>
<td>Jul</td>
<td>2,331</td>
<td>92,788</td>
<td>731</td>
<td>61,378</td>
</tr>
<tr>
<td>Aug</td>
<td>2,754</td>
<td>237,689</td>
<td>877</td>
<td>73,654</td>
</tr>
<tr>
<td>Sep</td>
<td>1,483</td>
<td>122,022</td>
<td>956</td>
<td>80,264</td>
</tr>
<tr>
<td>Oct</td>
<td>2,754</td>
<td>235,147</td>
<td>947</td>
<td>79,555</td>
</tr>
<tr>
<td>Nov</td>
<td>3,602</td>
<td>288,532</td>
<td>953</td>
<td>80,027</td>
</tr>
<tr>
<td>Dec</td>
<td>636</td>
<td>50,843</td>
<td>483</td>
<td>40,604</td>
</tr>
<tr>
<td>Total</td>
<td>25,000</td>
<td>1,531,000</td>
<td>14,929</td>
<td>1,254,000</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>25</td>
<td>1,531</td>
<td>15</td>
<td>1,254</td>
<td>14</td>
<td>985</td>
<td>54</td>
<td>3,770</td>
</tr>
</tbody>
</table>
3.9 LAKE KANYABOLI FISHERY

Lake Kanyaboli is one of the satellite lakes of Lake Victoria. It is located in Siaya County. The fisheries of the lake are comprised of the following fish species: *Oreochromis niloticus*, *Protopterus aethiopicus*, *Haplochromis* and *Clarias* spp. A total of 194 metric tonnes with an ex-vessel value of Kshs 12,003,895 were landed from the lake during the year under review. This was a 55% increase in quantity of the fish landed coupled with a 42% increase in ex-vessel value compared with 2012 figures of 125 metric tonnes with a value of Kshs 8,479,311.

The main species in catches were Tilapia which contributed 54.7% (106 metric tonnes) of the total catch followed by Clarias 19.5% (38 metric tonnes), Protopterus 18.4% (36 metric tonnes) and Haplochromis 7.4% (14 metric tonnes), figure 18 and Table 17. The fishing activities were undertaken by 188 fishers operating 99 fishing crafts.

![Figure 18: Percentages composition of species catch in Lake Kanyaboli 2013](image)

![Table 17: Lake Kanyaboli Monthly fish landings by Species, Weight and Value 2013](table)
<table>
<thead>
<tr>
<th>Month</th>
<th>Tilapia</th>
<th>Protopterus</th>
<th>Clarias</th>
<th>Haplochromis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kgs</td>
<td>Khs</td>
<td>Kgs</td>
<td>Khs</td>
<td>Kgs</td>
</tr>
<tr>
<td>Jan</td>
<td>6,159</td>
<td>363,929</td>
<td>1,386</td>
<td>95,671</td>
<td>2,694</td>
</tr>
<tr>
<td>Feb</td>
<td>14,006</td>
<td>827,527</td>
<td>4,056</td>
<td>280,044</td>
<td>3,497</td>
</tr>
<tr>
<td>Mar</td>
<td>5,090</td>
<td>300,747</td>
<td>2,065</td>
<td>142,561</td>
<td>4,371</td>
</tr>
<tr>
<td>Apr</td>
<td>14,359</td>
<td>848,378</td>
<td>4,114</td>
<td>284,059</td>
<td>3,846</td>
</tr>
<tr>
<td>May</td>
<td>7,460</td>
<td>440,747</td>
<td>2,415</td>
<td>166,774</td>
<td>1,526</td>
</tr>
<tr>
<td>Jun</td>
<td>5,383</td>
<td>318,043</td>
<td>2,843</td>
<td>196,302</td>
<td>1,324</td>
</tr>
<tr>
<td>Jul</td>
<td>9,270</td>
<td>547,710</td>
<td>1,209</td>
<td>83,505</td>
<td>1,767</td>
</tr>
<tr>
<td>Aug</td>
<td>7,869</td>
<td>464,941</td>
<td>3,269</td>
<td>225,712</td>
<td>1,413</td>
</tr>
<tr>
<td>Sep</td>
<td>6,912</td>
<td>408,393</td>
<td>3,729</td>
<td>257,484</td>
<td>4,325</td>
</tr>
<tr>
<td>Oct</td>
<td>11,144</td>
<td>658,436</td>
<td>3,548</td>
<td>244,964</td>
<td>3,986</td>
</tr>
<tr>
<td>Nov</td>
<td>11,657</td>
<td>688,764</td>
<td>3,652</td>
<td>252,169</td>
<td>4,803</td>
</tr>
<tr>
<td>Dec</td>
<td>6,808</td>
<td>402,233</td>
<td>3,387</td>
<td>233,862</td>
<td>4,337</td>
</tr>
<tr>
<td>Total</td>
<td>106,116</td>
<td>6,269,875</td>
<td>35,673</td>
<td>2,463,108</td>
<td>37,889</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Month</th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>106</td>
<td>6,270</td>
<td>36</td>
<td>2,463</td>
<td>38</td>
<td>2,571</td>
<td>14</td>
<td>699</td>
<td>194</td>
<td>12,004</td>
</tr>
</tbody>
</table>

**3.10 TAKWEL 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 districts. 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 a area of 66 square Km with a capacity of 1,641 cubic metres. Data of fish landings from the dam were recorded for the first time during the year under review.

During the year a total of 59 metric tonnes of fish with an ex-vessel value of Kshs 11,849,000 were landed from the dam. The fisheries of the dame are comprised of two species: Tilapia (*Oreochromis niloticus*) and *Clarias spp*. Tilapia landings contributed 93.2% (55 metric tonnes) while Clarias contributed 6.8% (4 metric tonnes) during the review period, figure 19. Average monthly catches were between 4 and 6 metric tonnes, figure 20 and Table 18.
Figure 19: Percentages composition of species catch in Takwel dam 2013

Figure 20: Takwel dam monthly fish catches in metric tonnes 2013
Table 18: Turkwel dam Monthly fish landings by Species 2013

<table>
<thead>
<tr>
<th>Month</th>
<th>Tilapia Kgs</th>
<th>Tilapia Kshs</th>
<th>Clarias Kgs</th>
<th>Clarias Kshs</th>
<th>Total Kgs</th>
<th>Total Kshs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>3,850</td>
<td>770,000</td>
<td>400</td>
<td>80,000</td>
<td>4,250</td>
<td>850,000</td>
</tr>
<tr>
<td>Feb</td>
<td>4,260</td>
<td>852,000</td>
<td>300</td>
<td>60,000</td>
<td>4,560</td>
<td>912,000</td>
</tr>
<tr>
<td>Mar</td>
<td>4,180</td>
<td>836,000</td>
<td>1,200</td>
<td>240,000</td>
<td>5,380</td>
<td>1,076,000</td>
</tr>
<tr>
<td>Apr</td>
<td>4,095</td>
<td>819,000</td>
<td>1,420</td>
<td>284,000</td>
<td>5,515</td>
<td>1,103,000</td>
</tr>
<tr>
<td>May</td>
<td>4,200</td>
<td>840,000</td>
<td>160</td>
<td>32,000</td>
<td>4,360</td>
<td>872,000</td>
</tr>
<tr>
<td>Jun</td>
<td>3,840</td>
<td>768,000</td>
<td>5</td>
<td>1,000</td>
<td>3,845</td>
<td>769,000</td>
</tr>
<tr>
<td>Jul</td>
<td>4,085</td>
<td>817,000</td>
<td>-</td>
<td>-</td>
<td>4,085</td>
<td>817,000</td>
</tr>
<tr>
<td>Aug</td>
<td>4,860</td>
<td>972,000</td>
<td>15</td>
<td>3,000</td>
<td>4,875</td>
<td>975,000</td>
</tr>
<tr>
<td>Sep</td>
<td>5,210</td>
<td>1,042,000</td>
<td>8</td>
<td>1,600</td>
<td>5,218</td>
<td>1,043,600</td>
</tr>
<tr>
<td>Oct</td>
<td>5,780</td>
<td>1,156,000</td>
<td>24</td>
<td>4,800</td>
<td>5,804</td>
<td>1,160,800</td>
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<tr>
<td>Nov</td>
<td>5,502</td>
<td>1,100,400</td>
<td>30</td>
<td>6,000</td>
<td>5,532</td>
<td>1,106,400</td>
</tr>
<tr>
<td>Dec</td>
<td>5,785</td>
<td>1,157,000</td>
<td>36</td>
<td>7,200</td>
<td>5,821</td>
<td>1,164,200</td>
</tr>
<tr>
<td>TOTAL</td>
<td>55,647</td>
<td>11,129,400</td>
<td>3,598</td>
<td>719,600</td>
<td>59,245</td>
<td>11,849,000</td>
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</table>

<table>
<thead>
<tr>
<th>M. tons '000 Kshs</th>
<th>M. tons '000 Kshs</th>
<th>M. tons ‘000 Kshs</th>
<th>M. tons ‘000 Kshs</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>56</td>
<td>11,129</td>
<td>3</td>
</tr>
</tbody>
</table>

3.11 TANA RIVER DELTA

Fresh water fish landings from Tana River delta in Tana River County during the year under review amounted to 45,971 Kgs with an ex-vessel value of Kshs 3,204.175. This was an increase of 18% in quantity of the fish landed coupled with a 33% increase in ex-vessel value compared 38,976 Kgs with an ex-vessel value of Kshs 2,409,130 landed in 2012. The landings comprised of *Tilapiines* 17 metric tonnes (38%), *Clarias spp* 16 metric tonnes (35%) and *Protopterus spp* 13 metric tonnes (28%), figure 21 and Table 19.
Figure 21: Percentages composition of species catch in Tana river delta 2013

Table 19: Tana River delta freshwater monthly fish landings by Species 2013

<table>
<thead>
<tr>
<th>Month</th>
<th>Tilapia</th>
<th>Clarias</th>
<th>Protopterus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kgs</td>
<td>Kshs</td>
<td>Kgs</td>
<td>Kshs</td>
</tr>
<tr>
<td>Jan</td>
<td>1,268</td>
<td>86,964</td>
<td>1,586</td>
<td>108,784</td>
</tr>
<tr>
<td>Feb</td>
<td>1,411</td>
<td>94,530</td>
<td>1,504</td>
<td>104,694</td>
</tr>
<tr>
<td>Mar</td>
<td>1,416</td>
<td>97,291</td>
<td>1,602</td>
<td>101,893</td>
</tr>
<tr>
<td>Apr</td>
<td>1,458</td>
<td>96,841</td>
<td>1,171</td>
<td>77,846</td>
</tr>
<tr>
<td>May</td>
<td>1,268</td>
<td>89,942</td>
<td>1,533</td>
<td>105,859</td>
</tr>
<tr>
<td>Jun</td>
<td>1,522</td>
<td>103,610</td>
<td>897</td>
<td>58,890</td>
</tr>
<tr>
<td>Jul</td>
<td>1,842</td>
<td>119,436</td>
<td>1,507</td>
<td>97,190</td>
</tr>
<tr>
<td>Aug</td>
<td>1,922</td>
<td>124,876</td>
<td>1,573</td>
<td>100,910</td>
</tr>
<tr>
<td>Sep</td>
<td>1,933</td>
<td>126,061</td>
<td>1,471</td>
<td>95,267</td>
</tr>
<tr>
<td>Oct</td>
<td>1,809</td>
<td>116,717</td>
<td>1,434</td>
<td>93,672</td>
</tr>
<tr>
<td>Nov</td>
<td>822</td>
<td>54,862</td>
<td>956</td>
<td>63,082</td>
</tr>
<tr>
<td>Dec</td>
<td>719</td>
<td>46,867</td>
<td>806</td>
<td>52,163</td>
</tr>
<tr>
<td>TOTAL</td>
<td>17,390</td>
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<td>16,041</td>
<td>1,060,247</td>
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</tbody>
</table>

<table>
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<tr>
<th></th>
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<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
<th>M. tons</th>
<th>000 Kshs</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>17</td>
<td>1,154</td>
<td>16</td>
<td>1,060</td>
<td>13</td>
<td>990</td>
<td>46</td>
<td>3,204</td>
</tr>
</tbody>
</table>
4.0 AQUACULTURE (FISH FARMING)

Prior to the year 2007, several initiatives on fish farming in Kenya had been executed by the Department of Fisheries. The main activities were geared towards using fish farming as a tool for poverty alleviation and food security, and were addressed through various project activities that included but not limited to: pond construction and management, stocking rates trials, feed trials, integration of fish farming with other agricultural activities, brood stock management, seed quality and evaluation of growth performance of Nile tilapia and Catfish strains.

These initiatives had limited impacts due to slow uptake of fish farming by entrepreneurs emanating from lack of information on fish farming technology and culture practices, limited funding by Government, and limited political support from the policy makers.

The Initiation of the Fish Farming Economic Stimulus Programme started during the 2009/2010 financial year in Kenya, has revolutionized fish farming practices in the country and has made Kenya a fish producing and fish eating Nation. The project was implemented in high aquaculture potential areas of Western Kenya, Nyanza, parts of Rift Valley, Eastern, Central Kenya and Coast regions. These regions are endowed with a lot of water resources that include springs, wetlands, rivers, water reservoirs and the temporary water bodies.

The State Department of Fisheries has aggressively been promoting aquaculture development in the country to counter the declining production from capture fisheries. Aquaculture, being a food production sub sector, is being mobilized to positively contribute towards food security, generate income and create employment to our young generation.

To enhance aquaculture production, up to date (end of 2013), the State Department has trained fishers, implementing officers and stakeholders on fish farming practises; conducted a national aquaculture suitability appraisal and developed suitability maps for 210 Constituencies in the country; developed a fish breeding structure with a holding capacity of over 200,000 brood-stock; developed fish feed specifications for tilapia, catfish and trout and related supply chain; procured 54 Fish Feed Pelletizing machines and distributed them to the constituencies; procured 148 Motorcycles and recruited 286 Fisheries Extension Officers for extension service delivery in the constituencies; constructed (4) Fish Processing Plants in Tetu, Imenti South, Rongo and Lurambi constituencies; constructed a state of the art fish processing factory in Mitunguu, Meru County in collaboration with private sector investors; constructed 3 Recirculation Aquaculture Systems (RAS) in Kiambaa (Jambo Fish Farm & Samaki Tu Fish Farm) and Kisumu Rural (Thinqubator Fish Farm) Constituencies; constructed
over 69,194 fish ponds country-wide (46,824 fish ponds in 160 Constituencies country-wide by GOK, and some other 22,370 ponds under the multiplier effect by farmers and investors and stocked them with over 100 million fingerlings; increased the area under aquaculture from 722 hectares in 2008 to 2,076 hectares in 2013; increased national aquaculture production from 4,452 metric tonnes in 2008 to 23,501 metric tonnes in 2013.

Fish farming production during the year (2013) was 23,500,812 Kgs (23,501 metric tonnes) with a farm gate value of Kshs. 5,522,735,483 compared to 21,486,828 Kgs (21,487 metric tonnes) valued at Kshs. 4,633,634,405 in 2012. This production was from 69,194 ponds with an area of 20,758,200 metres square (2,076 hectares), 161 tanks measuring 23,085 metres square and 124 reservoirs with an area of 744,000 square metres throughout the country. Over the last ten years, fish production has increased from as low as 1,035 metric tonnes produced in year 2004 to the present production of 23,501 metric tonnes, figure 22.

![Production 2004 - 2013 in metric tons](image)

**Figure 22: Aquaculture production for last ten years (2004-2013)**

The following constraints continued to affect aquaculture activities during the year under review:

- Inadequate readily available and affordable quality fish seed (fingerlings);
- Inadequate good quality and affordable fish feeds;
- Poor adoption of fish husbandry techniques by some farmers even after being trained on basic pond management;
- Water scarcity due to other competing uses – industry, domestic and agriculture;
- Inadequate market information for use by fish farmers;
- Lack of good credit facilities and schemes for fish farmers;
- Security and safety of fish in ponds posed by thieves and predators;
- Poor book keeping and record management leading to inaccurate data from farmers along the aquaculture value chain e.g. input costs, management cost, quantities of fish harvested and value;
- Sub optimal staffing levels especially extension personnel;
- Inadequate facilitation in terms of transport and timely funds towards carrying out of fisheries extension service provision.

Management and ownership of fish ponds is mainly by individual fish farmers while self-help groups are the ones who manage dams/reservoirs in the country. Fisheries extension staff assists the farmers in the best pond and dam/reservoir management practices.

The State department of fisheries policy on shifting fish farming from subsistence to commercial enterprise demands increased and reliable fish seed and feed production for the farmers.

5.0 EXPORTS OF FISH AND FISHERY PRODUCTS

During the year under review, a total of 6,742 metric tonnes of fish and fishery products were exported earning the country Kshs. 2,568,886,000 in foreign exchange. In quantity, exported fish products were mainly Nile perch products and its by-products totaling 5,783 metric tonnes or 85.6% of the total exports (i.e. fillets 5,156 metric tonnes or 76.5%, Headless and Gutted whole Nile perch 428 metric tonnes or 6.3% and fish maws 199 metric tonnes or 3.0%), Octopus 455 metric tonnes (6.7%), Tilapia 205 metric tonnes (3.0%), marine shells 134 metric tonnes (2.0%) and Barbus 54 metric tonnes (0.8%) table 20. This year’s Nile perch products and by-products export of 5,783 metric tonnes was a decreased of 36.6% from the previous years’ export of 9,122 metric tonnes. By country destination, Netherlands had the lion’s share of Nile perch products exports at 1,380 metric tonnes or 23.9%. Netherlands was followed by Israel with 1,038 metric tonnes (17.9%), Portugal 685 metric tonnes (11.8%), France 506 metric tonnes (8.7%), Germany with 488 metric tonnes (8.4%), Spain 288 metric tonnes (5.0%), Greece 264 metric tonnes (4.6%) and China with 255 metric tonnes (4.4%) among others, figure 23.
By Nile perch products and by-products type, exports of chilled fillets contributed the highest percentage of 47% (2,666 metric tonnes) followed by frozen fillets 43% (2,490 metric tonnes), frozen headless and gutted whole Nile perch 5% (310 metric tonnes), frozen maws 3% (199 metric tonnes) then chilled headless and gutted whole Nile perch 2% (118 metric tonnes) figure 24.

Apart from the above mentioned exports, 1,509 metric tonnes of Tuna loins were processed at a labour charge of Kshs. 215,260,000 and trans-shipped through the port of Mombasa. This quantity was a decrease of 72% from the previous year’s trans-shipment of 5,305 metric tonnes.
Figure 24: Exports of Nile perch by product type 2013

Table 20: Exports of Fish and Fishery Products 2013

<table>
<thead>
<tr>
<th>Commodity</th>
<th>M. Tons</th>
<th>000Kshs</th>
<th>% Quantity</th>
<th>% Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nile perch Fillets</td>
<td>5,156</td>
<td>1,958,999</td>
<td>76.5</td>
<td>76.3</td>
</tr>
<tr>
<td>H &amp; G Whole Nile perch</td>
<td>428</td>
<td>143,456</td>
<td>6.3</td>
<td>5.6</td>
</tr>
<tr>
<td>Fish maws</td>
<td>199</td>
<td>272,391</td>
<td>3.0</td>
<td>10.6</td>
</tr>
<tr>
<td>Frozen Lobsters</td>
<td>15</td>
<td>18,417</td>
<td>0.2</td>
<td>0.7</td>
</tr>
<tr>
<td>Live Lobsters</td>
<td>11</td>
<td>7,150</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Live Crabs</td>
<td>17</td>
<td>5,897</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Frozen Octopus</td>
<td>455</td>
<td>118,651</td>
<td>6.7</td>
<td>4.6</td>
</tr>
<tr>
<td>Frozen Squids</td>
<td>3</td>
<td>1,120</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Bech-der-mer</td>
<td>5</td>
<td>2,572</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Shark fins</td>
<td>6</td>
<td>3,929</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Marine shells</td>
<td>134</td>
<td>7,552</td>
<td>2.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Frozen Seabream</td>
<td>5</td>
<td>1,951</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Frozen Snappers</td>
<td>26</td>
<td>7,918</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Frozen Mixed fish</td>
<td>23</td>
<td>1,961</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Tilapia</td>
<td>205</td>
<td>13,546</td>
<td>3.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Barbus</td>
<td>54</td>
<td>3,376</td>
<td>0.8</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>6,742</strong></td>
<td><strong>2,568,886</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
6.0 IMPORTS OF FISH AND FISHERY PRODUCTS

In 2013, Kenya imported 5,269 metric tonnes of fish and fishery products worth Kshs 523,531,000. These imports were mainly composed of Mackerels with 2,916 metric tonnes which was 55.3% of the total fish and fishery products imported during the year. These were followed by *Tilapia niloticus* 739 metric tonnes (14.0%), Sardines 370 metric tonnes (7.0%), mixed marine fish 356 metric tonnes (6.8%), frozen Tuna 256 metric tonnes (4.9%), Pangasius fillets 117 metric tonnes (2.2%), Prawns 85 metric tonnes (1.6%), fish meal 85 metric tonnes (1.6%), frozen Lizard fish 82 metric tonnes (1.6%), Reef Cod 81 metric tonnes (1.5%) and Salmon 49 metric tonnes (0.9%), figure 25 and table 21. The imports originated largely from Asian countries, notably India, Pakistan, Japan and Korea but all the *Tilapia niloticus* was imported from China.

Some 450,000 Trout ova and 20,649 pieces of aquarium fish worthy Kshs 1,049,000 and 629,000 respectively were also imported during the year under review.
### Table 21: Imports of Fish and Fishery Products 2013

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Quantity (M. Tons)</th>
<th>Quantity (Pieces)</th>
<th>Value ('000Kshs)</th>
<th>% Quantity</th>
<th>% Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frozen Lizardfish</td>
<td>82</td>
<td></td>
<td>4,316</td>
<td>1.6</td>
<td>0.8</td>
</tr>
<tr>
<td>Frozen Mackerels</td>
<td>2,916</td>
<td></td>
<td>169,053</td>
<td>55.3</td>
<td>32.3</td>
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<tr>
<td>Frozen Mixed Marine Fish</td>
<td>356</td>
<td></td>
<td>24,502</td>
<td>6.8</td>
<td>4.7</td>
</tr>
<tr>
<td>Frozen Pangasius Fillets</td>
<td>116</td>
<td></td>
<td>9,597</td>
<td>2.2</td>
<td>1.8</td>
</tr>
<tr>
<td>Frozen Pangasius Fingers</td>
<td>1</td>
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<td>157</td>
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<td>0.0</td>
</tr>
<tr>
<td>Frozen Sardines</td>
<td>370</td>
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<td>18,514</td>
<td>7.0</td>
<td>3.5</td>
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<tr>
<td>Atlantic salmon</td>
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<td></td>
<td>823</td>
<td>0.0</td>
<td>0.2</td>
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<tr>
<td>Fresh Salmon</td>
<td>11</td>
<td></td>
<td>1,272</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Frozen salmon</td>
<td>34</td>
<td></td>
<td>10,960</td>
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<td>2.1</td>
</tr>
<tr>
<td>Smoked Salmon</td>
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<td></td>
<td>1,607</td>
<td>0.0</td>
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<tr>
<td>Frozen Tuna</td>
<td>258</td>
<td></td>
<td>23,856</td>
<td>4.9</td>
<td>4.6</td>
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<tr>
<td>Frozen Tilapia</td>
<td>392</td>
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<td>37,286</td>
<td>7.4</td>
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<tr>
<td>Frozen Tilapia fillets</td>
<td>347</td>
<td></td>
<td>137,623</td>
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<td>26.3</td>
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<tr>
<td>Frozen Prawns</td>
<td>85</td>
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<td>47,960</td>
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<td>9.2</td>
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<tr>
<td>Frozen Shrimps</td>
<td>9</td>
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<td>4,128</td>
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<tr>
<td>Frozen King fish</td>
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<td></td>
<td>3,195</td>
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<td>0.6</td>
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<tr>
<td>Frozen Reef Cod</td>
<td>81</td>
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<tr>
<td>Frozen Dorado</td>
<td>4</td>
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<td>717</td>
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<td>0.1</td>
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<tr>
<td>Frozen Herrings</td>
<td>75</td>
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<tr>
<td>Frozen Galate</td>
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<td>115</td>
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<tr>
<td>Frozen Sword fish</td>
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<td>168</td>
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<tr>
<td>Frozen Fillets</td>
<td>18</td>
<td></td>
<td>6,124</td>
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<tr>
<td>Assorted fish products</td>
<td>7</td>
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<td>2,391</td>
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<td>0.5</td>
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<tr>
<td>Fish feed</td>
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<td>2,154</td>
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<td>0.4</td>
</tr>
<tr>
<td>Tuna fishmeal</td>
<td>60</td>
<td></td>
<td>6,966</td>
<td>1.1</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Sub Total</strong></td>
<td><strong>5,269</strong></td>
<td></td>
<td><strong>523,531</strong></td>
<td><strong>100.00</strong></td>
<td><strong>100.00</strong></td>
</tr>
<tr>
<td>Aquarium fish</td>
<td>20,649</td>
<td></td>
<td>629</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trout ova</td>
<td>-</td>
<td>450,000</td>
<td>1,049</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>5,269</strong></td>
<td><strong>470,649</strong></td>
<td><strong>525,209</strong></td>
<td></td>
<td></td>
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</tbody>
</table>