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Ecuador



NATIONAL INSTITUTE OF FISHERY, ECUADOR

2019 NATIONAL REPORT; FISHERIES AND BIOLOGICAL ASPECTS OF JACK MACKEREL (*Trachurus murphyi*) IN ECUADORIAN WATERS

Summary

This report presents brief biological and fishing aspects of jack mackerel, a resource caught as bycatch in the small pelagic fishery on the Ecuadorian continental coast, specifically when this species is accessible to the fleet.

1. INTRODUCTION

The small pelagic fishery represents the most important fishery resource in Ecuadorian waters due to the commercial and social importance. Its landings, processing (canned fish and flour fish) and exportations generate an important income to the country. The most important fishing resources captured by the purse seine fleet are: thread herring (*Opisthonema* spp.), chub mackerel (*Scomber japonicus*), Pacific anchoveta (*Cetengraulis mysticetus*), Frigate tuna (*Auxis* spp.), Round herring (*Etrumeus teres*), sardine (*Sardinops sagax*), anchovy (*Engraulis ringens*), jack mackerel (*Trachurus murphyi*), this species are distributed along the coast of Ecuador, being the Gulf of Guayaquil where the highest catches are recorded and the minor in front of Manabí coast (González et al., 2008).

The present document contains historical fishery and biological information of jack mackerel, collected for the small pelagic fish monitoring program of the National Institute of Fisheries in the Ecuadorian purse seine fleet, when this resource is available in Ecuadorians waters.

2. FISHING ASPECTS

2.1 FISHING EFFORT

Purse seine fleet for small pelagic fishes is made up of ships operating 20 to 22 days in month, during the period called “oscura” that correspond to new moon; fishing trips are daily and the activity begins from 20h00 to 05h00 hour (Aguilar, 1999).

The fleet at the beginning of the fishery was operating in zones close to the coast, making fishing activity on thread herring and Pacific anchoveta (Arriaga y Pacheco, 1989). For 1971 the fleet was conformed for 48 wooden small ships with 7 tons of capacity; since 1976 is registered and increase in number and size. In 1991, the fleet was conformed for 277 ships approximately, including wooden with few autonomy no refrigeration, and steel ships with refrigeration and autonomy (Aguilar, 1992).

National Institute of Fishery in order to study these resources, classified this ships into four different class, related to Total Register Tonnage (TRT): Class I belongs to independent fishermen, the activity is close to the coast. The class II, III and IV belong to fisheries industries, and catch

mackefell, *Etrumeus teres*, *Auxis* spp., jack mackerel and sometimes *Cetengraulis mysticetus* and *Opisthonema* spp.

It must be highlighted when jack mackerel is present in Ecuadorian waters, vessels class III and IV catch this specie (related to the operational activity, 15 miles), while is close to the coast, vessels class I and II may catch this resource.

2.2 FISHING GEAR

One of the principal components of fishing methodology for small pelagic fishes is the “seine”. This type of gear catches species with 70 meters of depth, and concentrated in compact schools; The dimensions for this gear can vary, in accordance to the size vessel (Castro 2012):

Vessels Class I – II

Length	220 – 450 bz
Depth	20 – 60 bz
Mesh size in cabecero	5/8" – 1 1/8" inch

Vessels Class III – IV

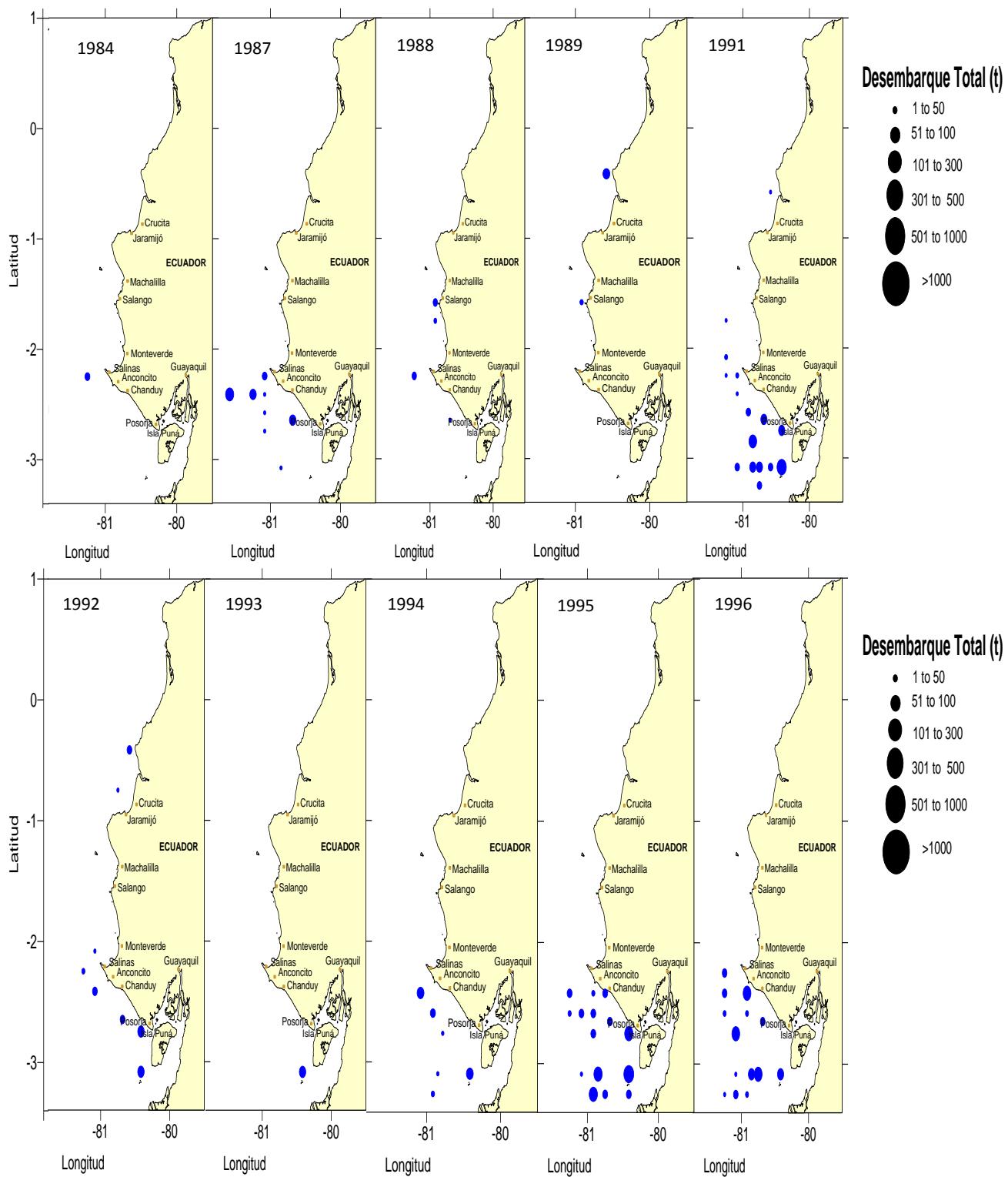
Length	330 - 450 bz
Depth	40 - 60 bz
Mesh size in cabecero	¾" – 1 1/8" inch

According to Ministerial Agreement 047 (April 9, 2010), it was established that “Fishery of small pelagic fishes as mackerel (*Scomber japonicus*), thread herring (*Opisthonema* spp.), jack mackerel (*Trachurus murphyi*), pacific anchoveta (*Cetengraulis mysticetus*); frigate tuna (*Auxis* spp.) and similar, must be done with seines and mesh size not less than 1 1/8" inch. (González 2012).

2.3 FISHING ZONES

When Jack Mackerel is available in Ecuadorian waters, the principal fishing zones with the higher concentrations were recorded in the Gulf of Guayaquil and around Peninsula de Santa Elena; catch information of JM is recorded in the National Institute of Fishery data base since 1984; during 1991, 1995 - 1996 were registered catches in the internal part of Gulf of Guayaquil; being around Santa Clara Island 1 600 t reported in both periods. In 2001 were reported catches in front of Manabi Coast, and south of Isla de la Plata.

For 2011 fishing zones were reported in front of Province of Manabi, being this around Peninsula de Santa Elena where were registered the higher concentrations of jack mackerel (figure 1).



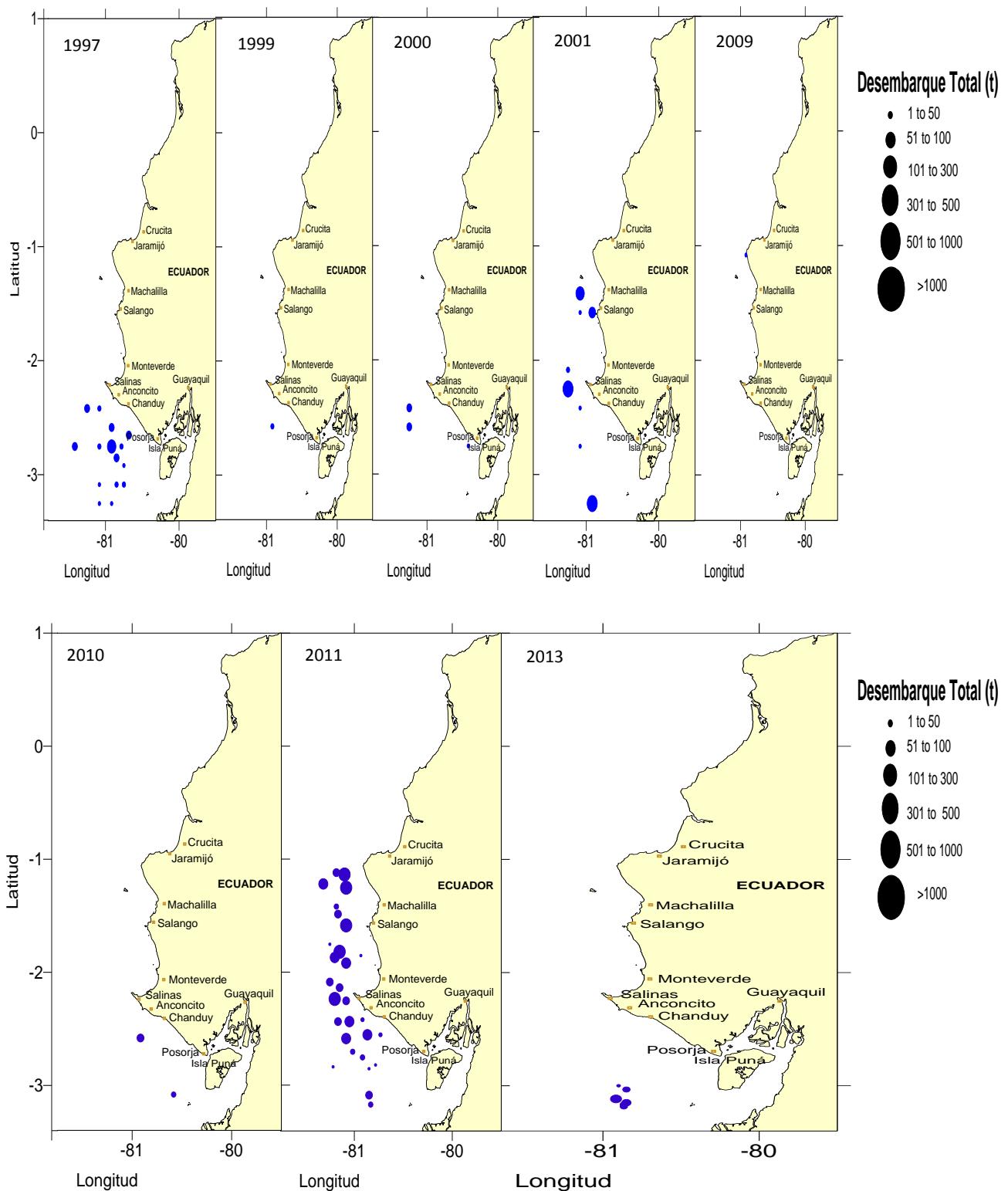


Figure 1. Distribution of jack mackerel catches in Ecuadorian waters.

2.4 LANDINGS

In Ecuadorian waters, first reports of this species were identified for Massay (1983); afterwards, in 1984 and 1990, has been reported irregular catches (September - October), located in the southern of Gulf of Guayaquil (Aguilar 1992); the landings were associated to secondary species in the small pelagic fishery.

During 1990 jack mackerel represented 4 144 t of the total landings of small pelagic fish, reaching in 1991 a total of 45 313 t; fishing records of this species were variable in subsequent years, reporting in 1995 up to 174 393 t.

During the period 2002 - 2009, the availability of this resource was minimal, reporting catches isolated in 2002, 2007 and 2009 (604 t, 927 t and 1 935 t, respectively).

From the last week of December 2010 were reported catches of jack mackerel off the coast of Ecuador, the same corresponded the 25% of total landings (4 613 t), for the first quarter 2011 important landing were registered (69 153 t), then disappearing in landings of small pelagic fishes, until August 2012 with 77 t. By 2013 there were 3 563 t; For the last years the catch records have been minimal in relation to the previous years (Table 1, figure 2).

Table 1. Historical catches (t) of Jack mackerel in Ecuadorian Waters

Years	Small Pelagic Fishes	Jack Mackerel
1981	1043115	-
1982	1158282	-
1983	546863	-
1984	1343433	-
1985	1998587	-
1986	1267501	-
1987	753668	-
1988	949327	-
1989	691373	-
1990	234747	4144
1991	230767	45313
1992	211239	15022
1993	349709	2673
1994	239493	36575
1995	247541	174393
1996	566733	56782
1997	391207	30302
1998	163182	25900
1999	237208	19072
2000	410047	7122
2001	299926	133969
2002	179346	604



2003	201039	-
2004	175948	-
2005	235534	-
2006	223183	-
2007	214942	927
2008	245791	-
2009	244521	1935
2010	198937	4613
2011	157774	69373
2012	203016	77
2013	202112	3563
2014	253807	9
2015	284732	289
2016	389147	-
2017	336999	54
2018	169836	23

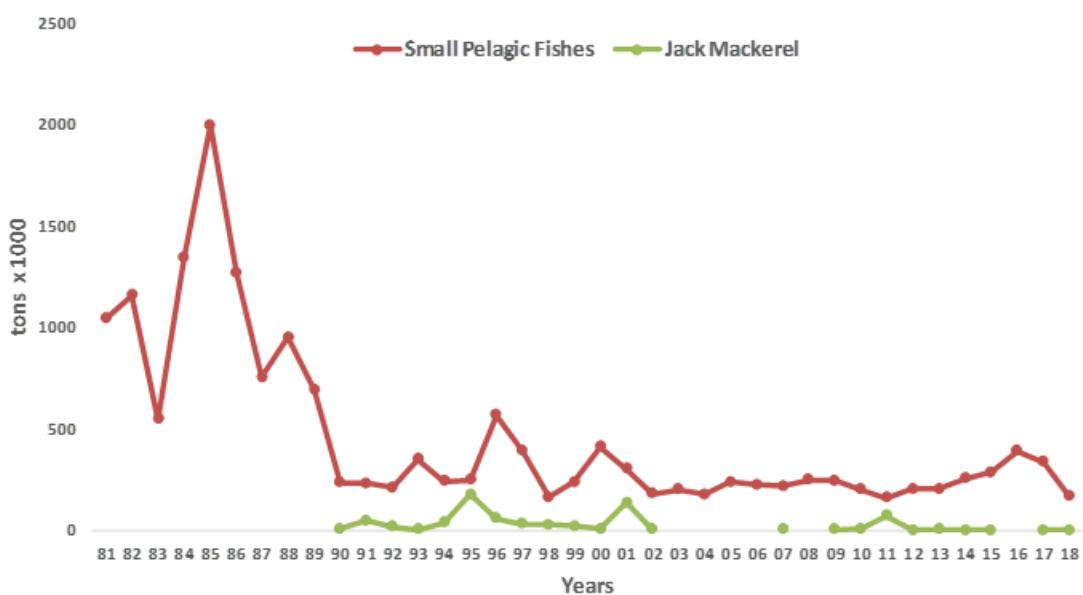


Figure 2. Total annual landing (t) of small pelagic fishes versus Jack Mackerel.

3. BIOLOGICAL ASPECTS

3.1 SIZE STRUCTURE

Considering the total data, the size structure ranges from 14 to 66 cm LT, denoting the presence of two main groups of size classes (14 to 31 and 32 to 63 cm TL), as well as two strong modal groups (28 and 29 cm TL) (figure 3).

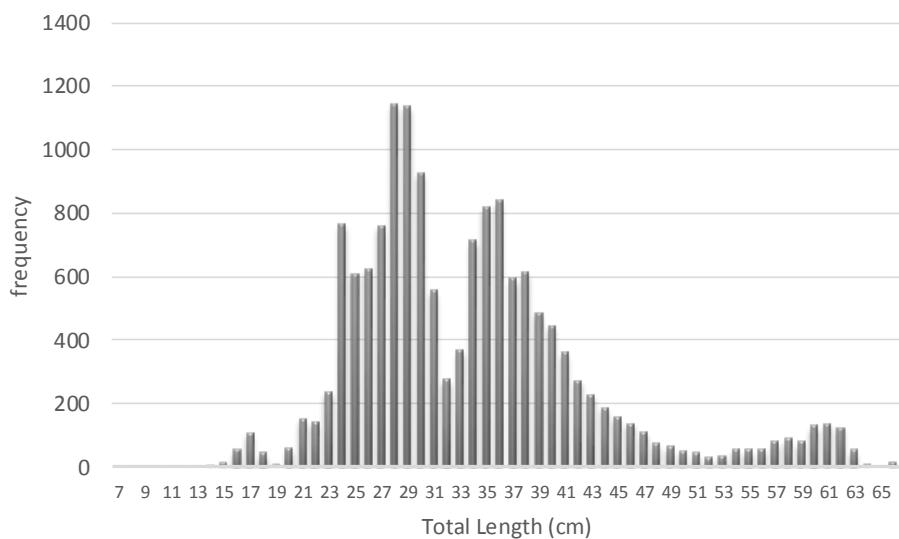


Figure 3. Length composition of Jack Mackerel, registered in Ecuadorian waters.

The JM length composition may be described in phases: 1) For the years 1984 to 2001 ranged between 14 and 66 cm TL, mostly represented by individuals between 24 to 38 cm TL; 2) 2011 - 2013, the structure was composed of organisms between 25 and 43 cm TL, mostly between 28 and 40 cm TL, and 3) 2015 - 2017 the range was between 25 and 39 cm TL, with higher presence of organisms between 27 and 31 cm TL (Figure 4 and 5).

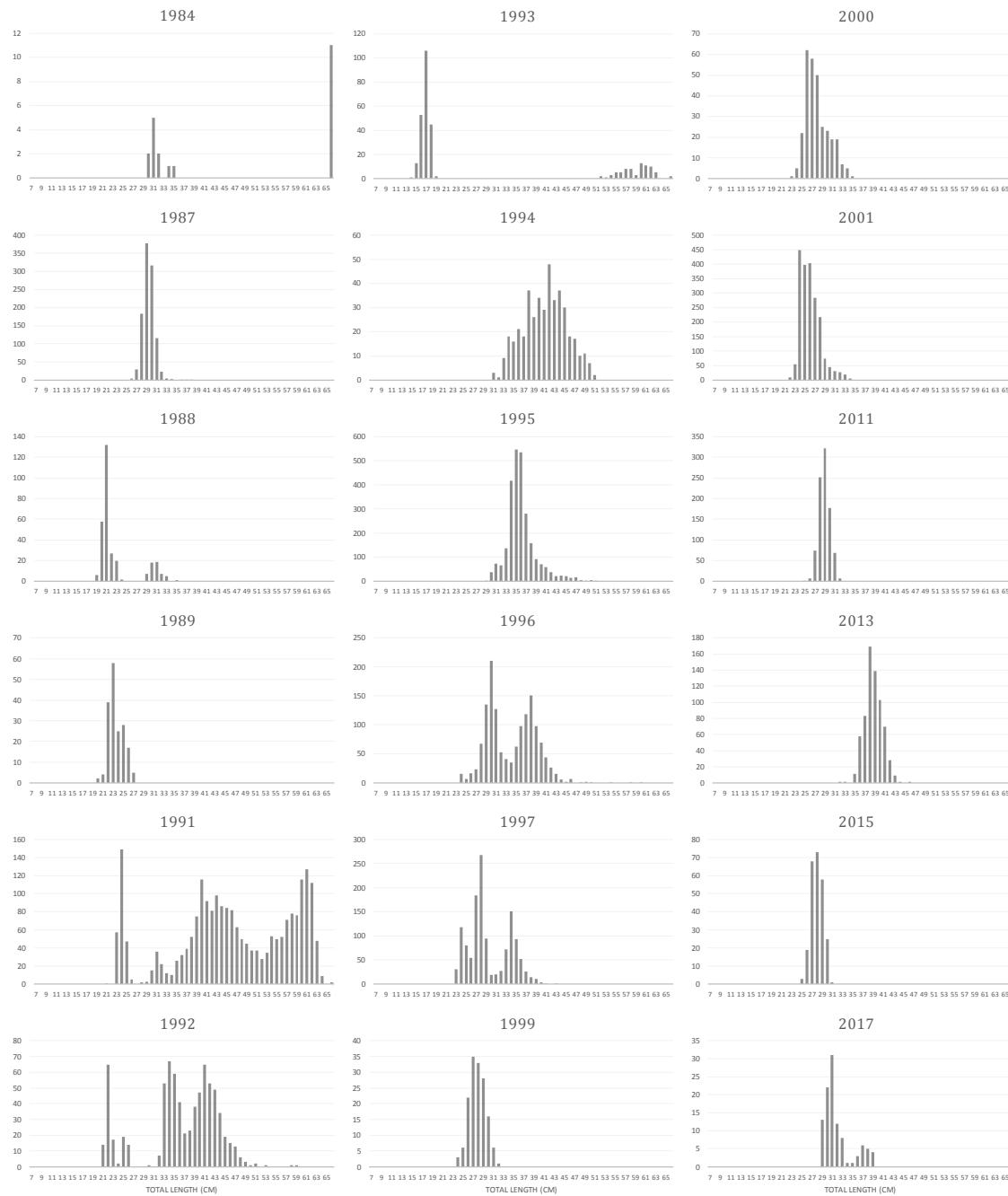


Figure 4. Historical Size structure of Jack mackerel in Ecuadorian waters.

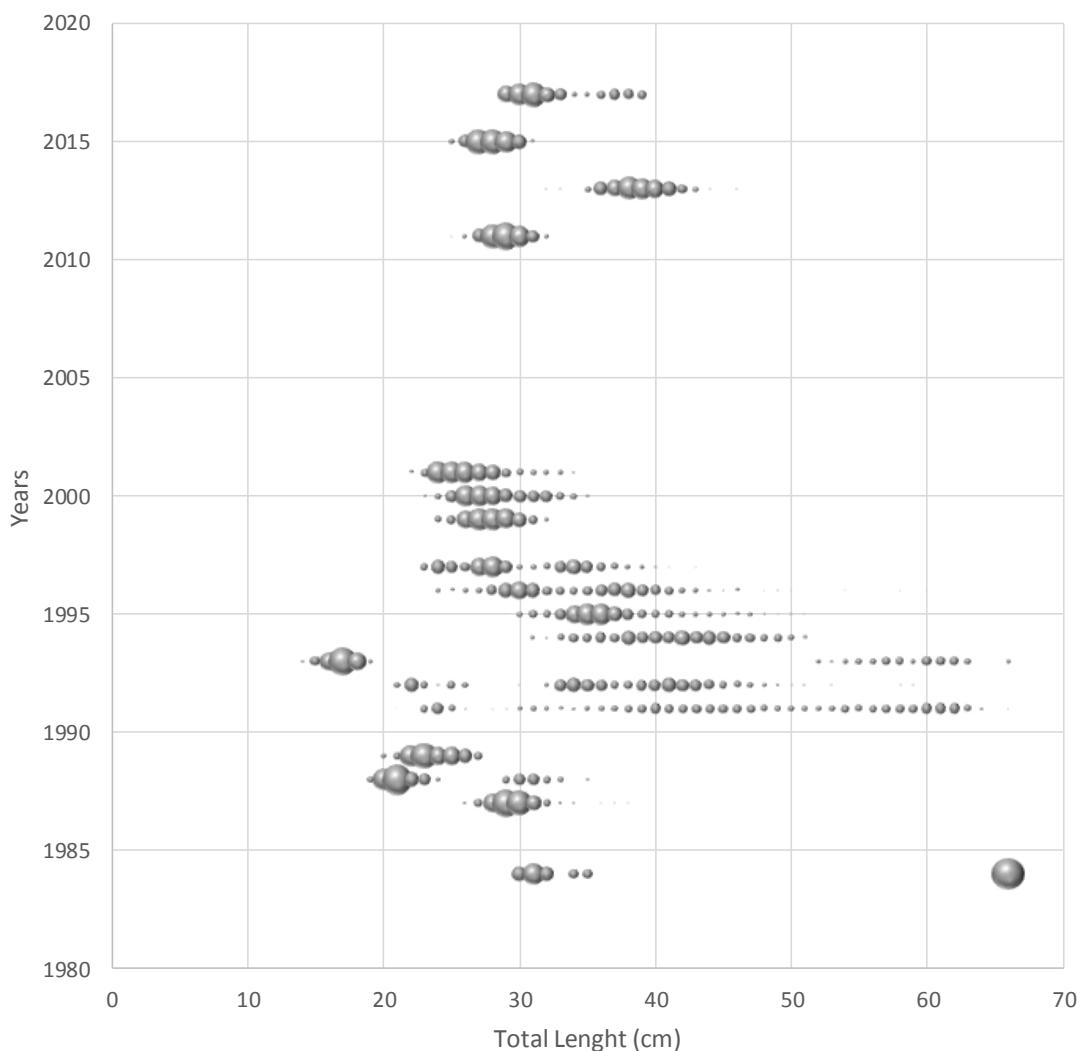


Figure 5. Bubbles diagram of size structure of Jack mackerel in Ecuadorian waters.

For this report, the length-weight relationship was estimated considering combined sexes, since the number of available data did not allow to be done separately (males and females). The results show a strong relationship between length and weight (figure 6).

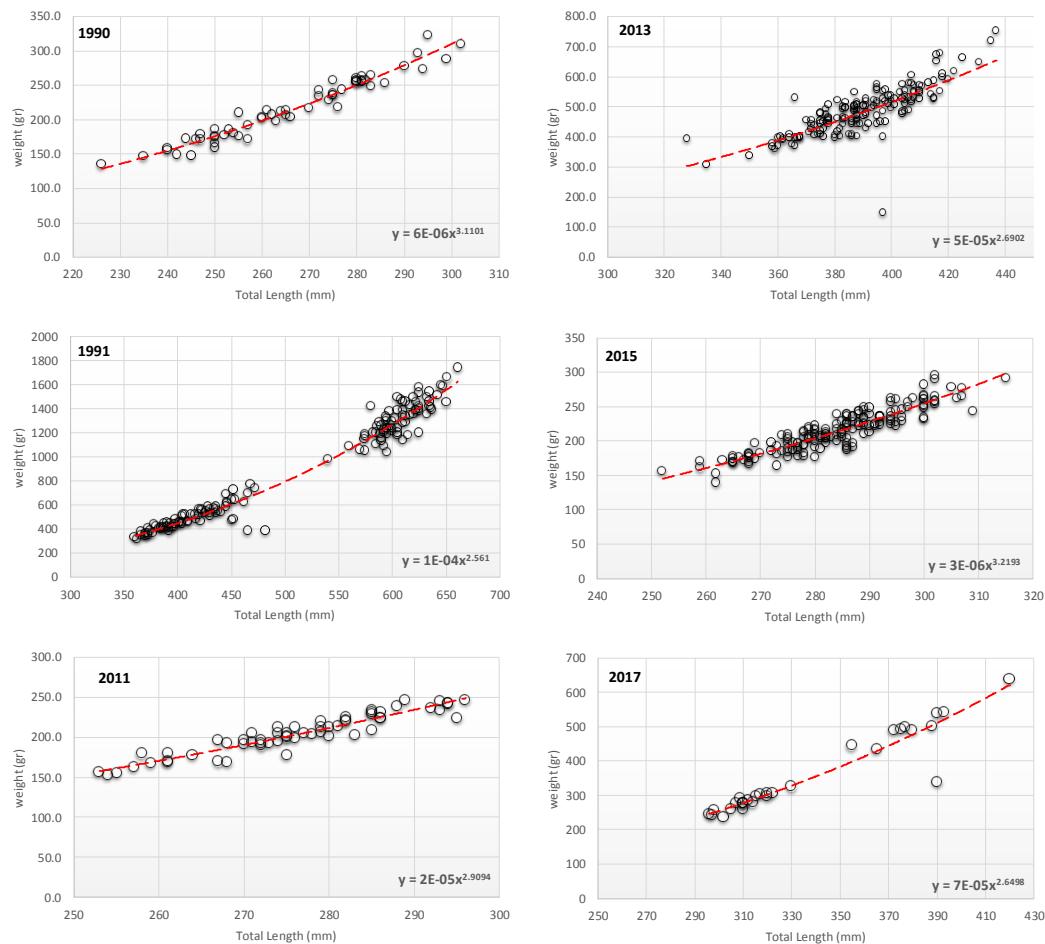


Figure 6. Length weight relationship of Jack mackerel registered in Ecuadorian waters.

3.2 SEXUAL MATURITY STAGES

The different stages of sexual maturity for the years in which samples were available, stand out for both males and females the presence of stage 3 (sexually mature), with the exception of 2015 where individuals in stage 2 predominated (figure 8).

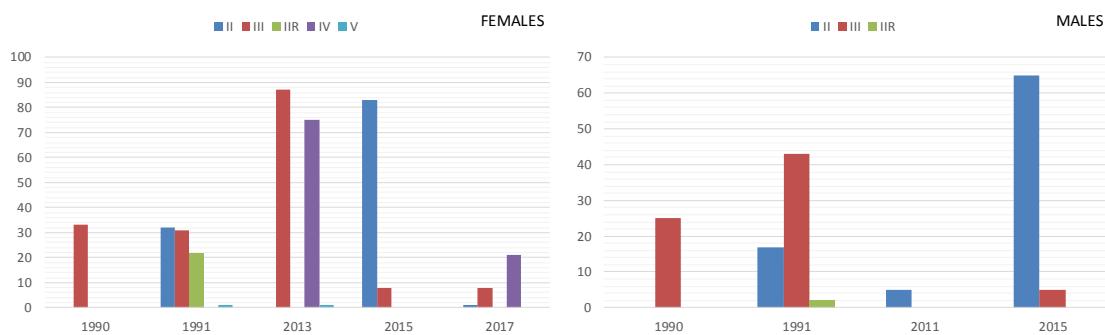


Figure 8. Sexual maturity stages of jack mackerel.

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