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## SC11 – Doc32
## Annual Report of the Republic of Ecuador to SC11 2023 - Squid

*Republic of Ecuador*

# INSTITUTE FOR AQUACULTURE AND FISHERIES RESEARCH (IPIAP)

## ECUADOR ANNUAL REPORT: GIANT FLYING SQUID IN ECUADORIAN WATERS, 2022

1. INTRODUCTION

The giant squid *Dosidicus gigas* (d'Orbigny, 1835) fishery in Ecuadorian waters is under development and represents a fishing alternative for the Ecuadorian fishing sector. It is a highly migratory species and is distributed in the Eastern Pacific Ocean (Keyl et al., 2008). It is a short-lived, unstable and variable resource in its annual biomass (Ibañez et al., 2015), its seasonal distribution in Ecuadorian waters is influenced by the Humboldt current, in whose area of influence the giant squid makes vertical nocturnal movements for feeding, where it is caught by the artisanal fishing fleet in directed fishing and incidental fishing, mainly during the new (dark) moon.

This report presents the results achieved from the giant squid biological fishing monitoring recorded by the Public Institute for Aquaculture and Fisheries Research (IPIAP) on the Ecuadorian continental coast during 2022.

2. FISHING ASPECTS

a. FHISHING EFFORT

The artisanal fishing fleet caught giant squid in directed fishing, using hand lines with jigs, and bycatch with driftnets or surface gillnets. The captured squid was used mainly as bait for large pelagic fish (PPG) such as tuna, mahi mahi, albacore, billfish, etc. The fishing fleet was made up of fiberglass type vessels (F/V) with outboard motors (40 to 75 HP), and mother ships (with 2 to 10 fiberglass vessels) with stationary motors, established mainly in Manta.

b. FISHING ZONES

The giant squid was distributed near the coast in the southern region of La Puntilla de Santa Elena and far from the south-west coast of the Gulf of Guayaquil towards the border with Peru between 02° 10' and 03° 25' South Latitude and 84° West Longitude (Figure 1), registering a higher concentration in fishing areas with a Sea Surface Temperature (SST) between 21.5° and 22.4° C.

With the entry of cold waters from the Humboldt Current into the Gulf of Guayaquil, the fishing areas were seasonally distributed from south to north; between January and March they were far from the coast and the school was widely dispersed. Between April and May, schools of giant squid were available near the coast, possibly due to the presence of the Kelvin wave (ERFEN, 2022), while in June the fishing areas were far from the coast, decreasing catches. Between July and October, the fishing areas registered a gradual increase in their availability towards the southwest. In November and December, the fishing zones were dispersed in the Gulf of Guayaquil and the catches decreased.

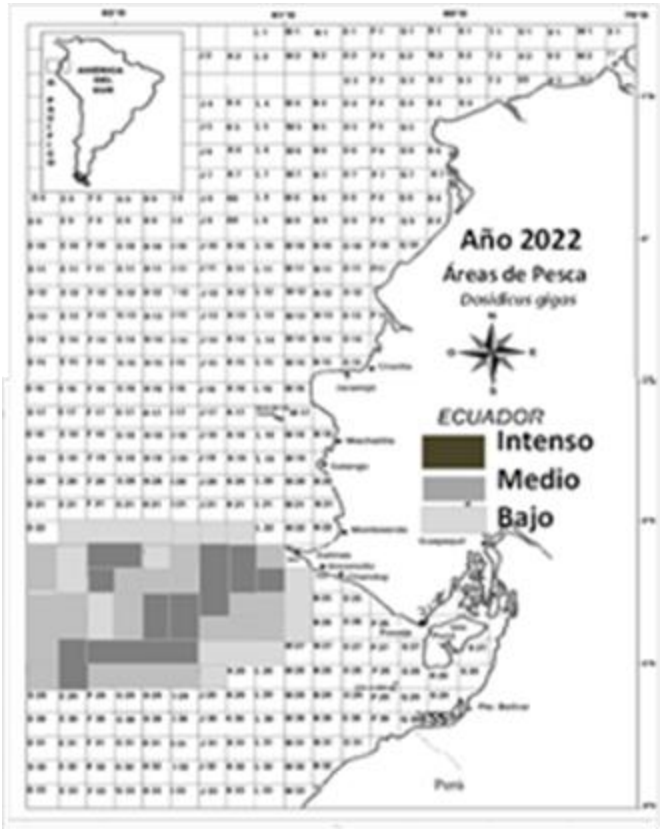


Figure 1. Spatial distribution of catches of *Dosidicus gigas*, during 2022

c. LANDINGS

On the Ecuadorian continental coast, a total landing of 5,906.7 t was estimated, which represented an increase of 211.4% in relation to 2021 (Table 1). The province of Santa Elena registered the highest landings (56%).

**Table 1.** Monthly landing (t) of giant squid by provinces on the Ecuadorian coast 2022

| Provinces | Landings (t) monthly of giant flying squid | | | | | | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Abr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dic. | |
| Esmeraldas | (-) | (-) | (-) | (-) | (-) | 0.9 | 1.9 | 1.0 | (-) | (-) | (-) | (-) | 3.8 |
| Manabí | 44.7 | 90.0 | 29.5 | 27.0 | 25.1 | 147.8 | 283.5 | 245.8 | 359.0 | 464.6 | 367.9 | 394.0 | 2478.9 |
| Santa Elena | 140.4 | 130.2 | 191.3 | 1231.1 | 666.7 | 101.8 | 212.0 | 237.2 | 202.8 | 51.3 | 66.3 | 78.6 | 3309.7 |
| Guayas | (-) | (-) | (-) | 13.5 | 25.0 | (-) | (-) | (-) | (-) | (-) | (-) | (-) | 38.5 |
| El Oro | (-) | 0.5 | 0.6 | 0.1 | (-) | 5.0 | 34.6 | 33.0 | 2.0 | (-) | (-) | (-) | 75.8 |
| Total (2022) | 185.1 | 220.7 | 221.4 | 1271.7 | 716.8 | 255.5 | 532.0 | 517.0 | 563.8 | 515.9 | 434.2 | 472.6 | 5906.7 |
| Total (2021) | 63.8 | 99.3 | 76.6 | 111.9 | 68.3 | 847.6 | 250.4 | 60.9 | 44.0 | 116.2 | 112.3 | 45.2 | 1896.5 |

Source: IPIAP-SRP; (-) Data not available

In the province of Santa Elena for 2022, a total landing of 3,309.7 t was estimated, increasing by 156.2% in relation to 2021. In the fishing port of Santa Rosa, the landing corresponded to 2,866.3 t (Table 2).

**Table 2.** Monthly landing (t) of giant squid in the fishing port of Santa Rosa, period 2022

| Port | Landings (t) monthly of giant flying squid | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dic. | |
| Sta. Rosa | 134.0 | 130.2 | 190.4 | 895.8 | 569.5 | 99.8 | 210.4 | 237.2 | 202.8 | 51.3 | 66.3 | 78.6 | 2866.3 |

Source: IPIAP-SRP; (-) Data not available

3. BIOLOGICAL ASPECTS

a. MANTLE LENGTH STRUCTURE

A total of 4 647 organisms were analyzed, between females and males with a size range that fluctuated between 13 and 55 cm of mantle length (LM) for combined sexes, from incidental fishing with gillnets and directed fishing with manual jigs.

In the mantle length (ML) frequency distribution, the presence of two groups of size classes is shown, the first with a range between 13 and 27 cm ML and a mode of 19 cm ML and the second group between 28 and 55 cm ML with a mode of 40 cm ML (Figure 2).

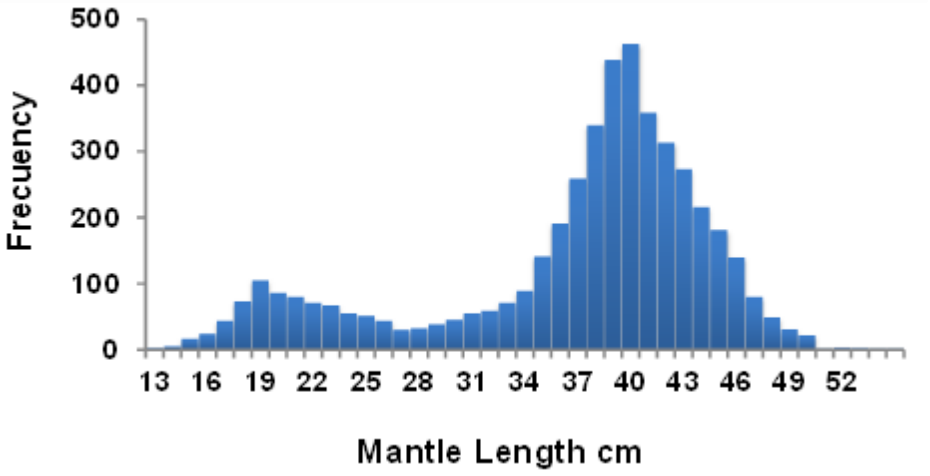


Figure 2. Mantle length frequency distribution of giant flying squid, during 2022

b. SEXUAL MATURITY STAGES

A total of 3 995 female organisms were analyzed; comprising 15.0% stage I (immature), 84.9% stage II (mature), and 0.1% stage III (mature) (Figure 3). It should be noted that females were more frequent and more numerous (86%) than males (14%) throughout the year.

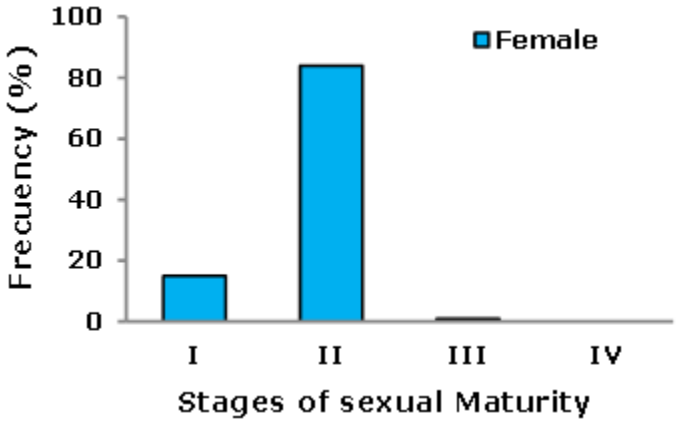


Figure 3. Stages of Sexual maturity of *Dosidicus gigas*, during 2022

Table 3 shows the female organism categorized by size class, according to the stage of sexual maturity.

**Table 3.** Number of female organisms by size class and maturity stages, 2022

| Stages | 12 - 24 cm ML | 25 - 39 cm ML | 40 - 50 cm ML | > a 51 cm ML |
|---|---|---|---|---|
| | N | N | N | N |
| I | 480 | 98 | 21 | 0 |
| II | 31 | 1301 | 2052 | 8 |
| III | 0 | 2 | 2 | 0 |
| IV | 0 | 0 | 0 | 0 |