CHAPTER 2.1.10.9 CERO	AUTHORS: T. FRÉDOU, R. SIQUEIRA LIMA, F. LUCENA-FRÉDOU (UFRPE)	LAST UPDATE: 30 June 2021 Original: English

2.1.10.9 Description of Cero (CER)

1. Names

1.a Classification and Taxonomy

Species name: *Scomberomorus regalis* (Bloch, 1793)
ICCAT species code: CER
ICCAT names: Cero (English), Carite chinigua (Spanish), Thazard franc (French).

According to Collette and Nauen (1983), cero is classified as follows:

- Phylum: Chordata
- Subphylum: Vertebrata
- Superclass: Gnathostomata
- Class: Osteichthyes
- Subclass: Actinopterygii
- Order: Perciformes
- Suborder: Scombroidei
- Family: Scombridae
- Subfamily: Scombrinae
- Genus: *Scomberomorus*
- Species: *Scomberomorus regalis*

1.b Common names

List of vernacular names used by different countries according to ICCAT, FAO and Fishbase (www.fishbase.org). The list of countries is not exhaustive, and some local names might not be included.

Bahamas: Cero.
Barbados: Kingfish mackerel.
Brazil: Cavala, Cavala-boca-larga, Cavala-branca, Cavala-canguçu, Cavala-pintada, Cavala-sardinheira, Cavala-serra, Serra, Serra-penincho, Serra-pininga.
China, Main: 条斑马鲛, 條斑馬鮫.
Colombia: Carite, Carite listrado, Carito, Carrita, Carrite.
Cuba: Cero, Pintada.
Denmark: Prægtig kongemakrel.
Dominican Republic: Sierra.
Estonia: Lääneatlandi kuningmakrell.
France: Thazard franc.
Germany: Königsmakrele.
Jamaica: Cero, Mackerel.
Martinique: Céro, Thazard atlantique, Thazard franc.
Mexico: Sierra.
Nicaragua: Carite chinigua.
Poland: Makrela królewska.
Portugal: Serra-malhada.
Puerto Rico: Alasana, Cero, Pelicán, Sierra.
Romania: Cero.
Russian Federation: Zapadnoatlanticheskaya makrel.

Spain: Carite chinigua.
St. Lucia: Cero mackerel.
Sweden: Karibisk kungsmakrill.
USA: Cero.
Venezuela: Carite chinigua, Carite rey, Sierra.

2. Identification

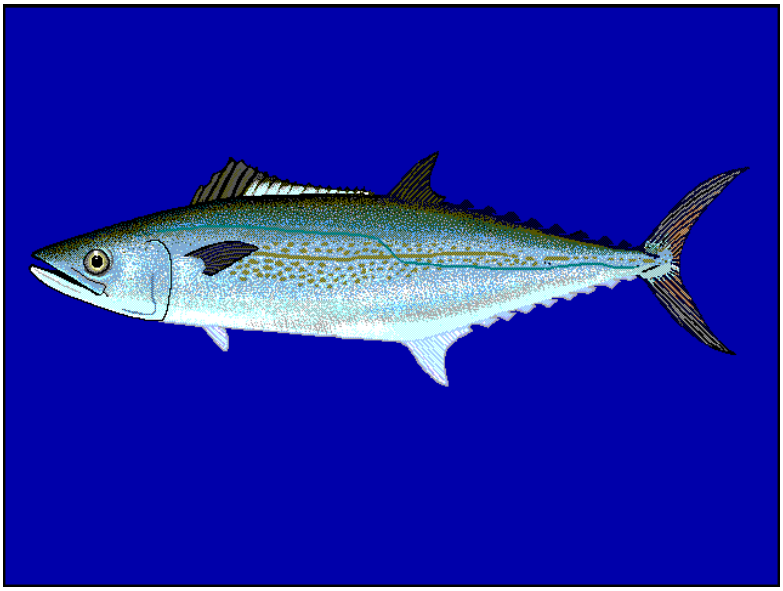

Figure 1. Drawing of an adult Cero by L. A. Cada.
(https://www.fishbase.de/Collaborators/CollaboratorSummary.php?ID=7)

Characteristics of *Scomberomorus regalis* (Figure 1)

Cero is laterally compressed (torpedo-shaped) with a reported maximum size of 83.5 cm fork length (FL) (Beardsley and Richards, 1970), 183 cm total length (TL) (Claro, 1994) and maximum weight of 7.76 kg (Szpilman, 2000).

Description from Collette and Nauen (1983):

Colour:

- Body silvery on sides with one long mid-lateral band.
- Yellow patches above and below the mid-lateral band.
- The anterior part of the first dorsal fin has a prominent black patch followed by a bluish spot, while the posterior part is white.

External:

- Body entirely covered with small scales.
- Pointed snout.
- Gillrakers on first arch: 2-4 on upper limb; 10-14 on lower limb; 12-18 total, usually 15-16.
- First dorsal fin with 16-18 spines (usually 17); second dorsal with 16-19, followed by 7-9 finlets.
- Anal fin with 15-20 rays (usually 18 or 19) followed by 7-10 finlets (usually 8).
- Pectoral fin with 20-24 rays (usually 21 or 22), fairly short, 3.6 to 5.9% of FL.
- Pectoral fin with scales.
- Lateral line gently descends to the midline on caudal peduncle.

- Pelvic fins fairly long, 4.4% to 6.3% of fork length, when compared to *S. brasiliensis* (3.6 to 5.9% for FL).
- Three keels on each side of the peduncle.

Internal:

- Swim bladder absent.
- Total vertebrae of 47 or 48, 19 or 20 precaudal and 28 or 29 caudal.
- Intestine with two folds and three limbs.

3. Distribution and population ecology

3.a Geographical distribution

Cero is distributed along tropical and subtropical waters of the Western Atlantic from Massachusetts to Brazil, particularly in the Bahamas and west Indies, and native to Trinidad and Tobago (**Figure 2**).

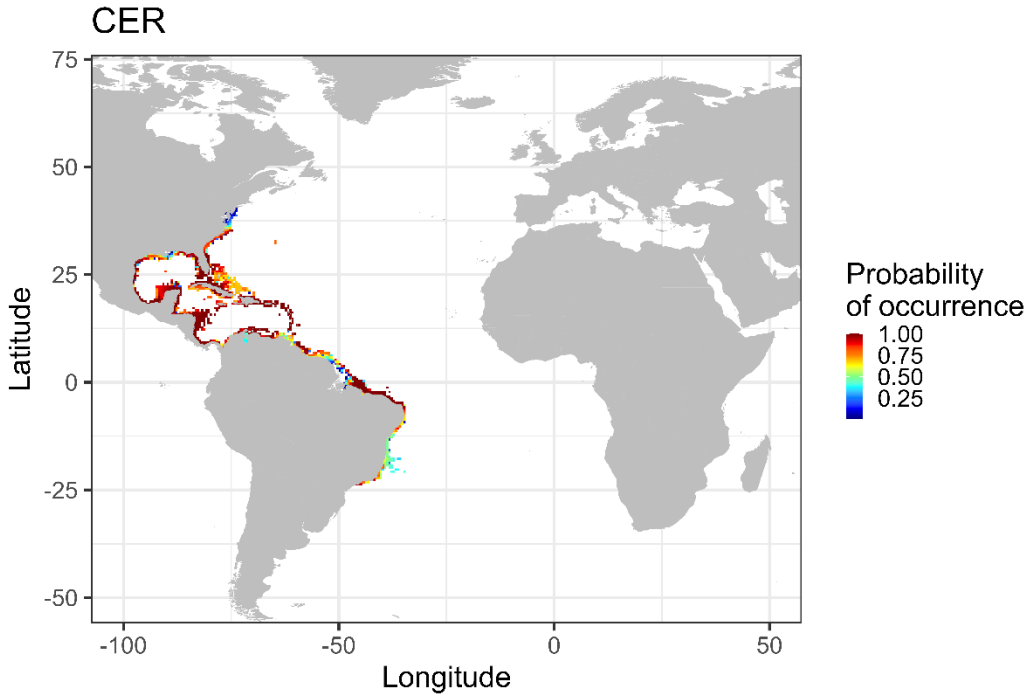

Figure 2. Spatial distribution map for Cero based on the data available on aquamaps.org website. Distribution range colours indicate degree of probabilities of occurrence.

3.b Habitat preferences

This species is a coastal epipelagic fish, commonly found in clear midwater or near the surface, and around coral reefs (Collette and Nauen, 1983; Collette and Russo 1985; Figuerola-Fernández *et al* 2007).

3.c Migrations

As it is common to the Scombridae family, *Scomberomorus regalis* does not undertake an extensive open-ocean migration (Banford, 1998). In the Caribbean, Cero migrates seasonally, being more frequent during winter (Harbone *et al*., 2017). In the northeast of Brazil, its migration takes place while in search of food, following fishes from the Gerreidae family (Pinto, 2016).

4. Biology and life history parameters

4.a Growth

There is a lack of information on this topic.

4.b Length-Weight relationship

Published length-weight relationships are only available for the Northwest Atlantic and are shown in **Table 1**.

Table 1. Published Cero length-weight relationships. SL: Standard Length, TL: Total Length, FL: Fork Length, Weight in Kg.

Equation	N	Length range (cm)	Sex	Area	Reference
$W=0.02020xFL^{2.8}$	262	40.0 - 66.0	Unsexed	Cuba	León and Guardiola, 1984
$W=0.01236xFL^{2.92491}$	56	21.3 - 83.5	Unsexed	South Florida	Beardsley and Richards, 1970

No conversion factors are available for the species.

4.c. Reproduction

- *Spawning*

Cero off South Florida has a prolonged spawning period that may extend throughout most of the year with a peak in May (Finucane and Collins, 1984). Similarly, Cero off Puerto Rico reproduces virtually throughout the whole year, with an increase in reproductive activity during the period from April-September. No information is available for the species in the Southwest Atlantic.

- *Maturity*

Fork length at first maturity off Puerto Rico is 350 and 413 mm Fork Length (FL) for males and females respectively.

- *Fecundity*

Fecundity study from the Coastal Waters of South Florida showed estimates varying from about 160,000 to 2.23 million eggs in females ranging between 38 and 80 cm. The relationship between fecundity and total weight was: $F = -1.079 \times 10^{-1} + (4.342 \times 10^{-4})$ TW (Finucane and Collins, 1984).

- *Sex ratio*

There is a lack of information on this topic.

4.d First life stages

- *Eggs and larvae*

Eggs and larvae are pelagic (Richards, 2005; Fahay, 2007). Eggs are spherical with a diameter of 1.16-1.22 mm and one oil globule (0.34-0.36 mm of diameter). The yolk is homogenous, and chorion is smooth. Hatch size is 3.4 mm NF (notochord length) (Richards, 2005; Fahay, 2007). Larvae present pigmentation on the forebrain, midbrain, over gut, cleithral symphysis, ventral margin of tail, and a distinct patch on the gular area (Richards, 2005). The body, snout, and jaws are relatively elongated (Fahay, 2007). Cero larvae have a large head, 30-40% of standard length (SL), prominent teeth and a large mouth, where the upper jaw may be moderately longer than the lower one (Fahay, 2007).

- *Recruitment*

There is a lack of information on this topic.

4.e Diet

This species feeds mainly on smaller ray-finned fish, including anchovies, clupeids, and atherinids. Also, *S. regalis* feeds on cephalopods (squids), crustaceans (shrimp) and other invertebrates (Collette and Nauen, 1983; Bester and Perrotta, 2017).

4.f Physiology

There is a lack of information on this topic.

4.g Behaviour

Cero occasionally forms schools (Randall, 1967). Usually, it travels alone or in small groups (Ristori, 2012). *Scomberomorus regalis* is able to evade bird predation because of their bluish back coloration, which acts as a camouflage preventing them from being detected (Bester and Perrotta, 2017). This species can travel at a speed of 50km per hour. It has strong and triangular teeth, and when associated with its velocity this is an advantage for capturing their prey (Randall, 1967; Bester and Perrotta, 2017). As a way to deceive or scare its prey, this species makes a long low leap thorough the surface, exiting into the air and making a splash while returning to the water (Randall, 1967).

4.h Natural mortality

There is a lack of information on this topic.

4.i Populations/Stock structure

There is a lack of information on this topic.

5. Description of fisheries

5.a Catch composition

Cero catches ranged between 200 and 300 thousand tonnes in the 90s. However, really low catches (below 1000 tonnes) were reported after 1998. No statistics are available in the Southwest Atlantic (**Figure 3**).

Cero are commercially caught with gillnet lines in the West Indies and the Bahamas, and are also valued sportfish taken by trolling with cut bait in Florida (Collette and Nauen, 1983). However, most of the reported catch remains unclassified (**Figure 4**).

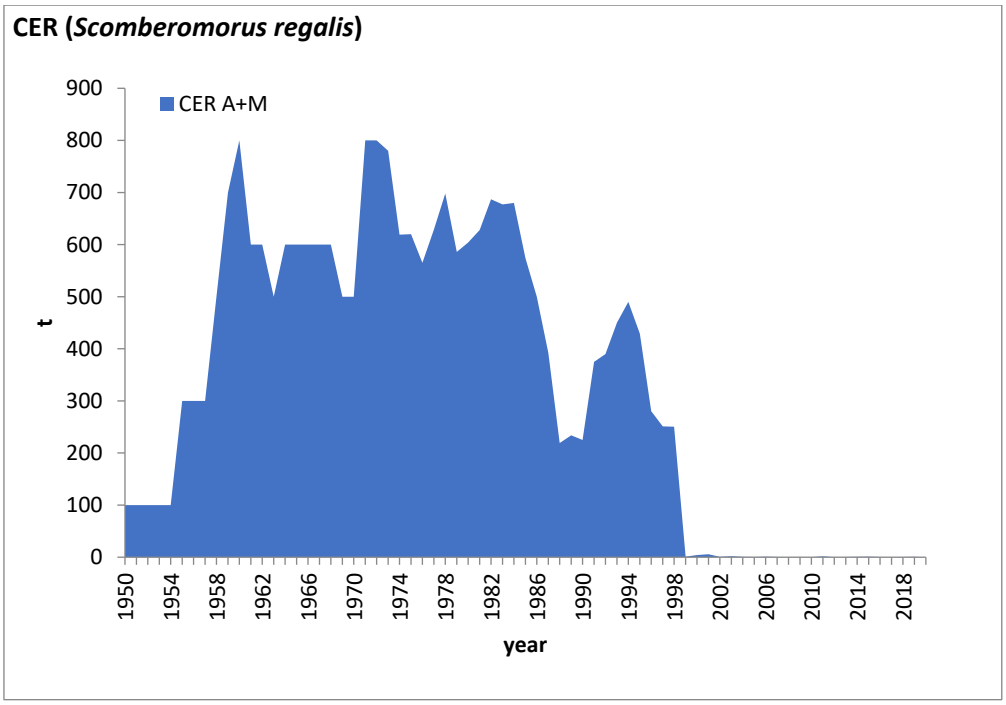

Figure 3. Total catches (t) of cero (*Scomberomorus regalis*) in the ICCAT database by year between 1950 and 2020.

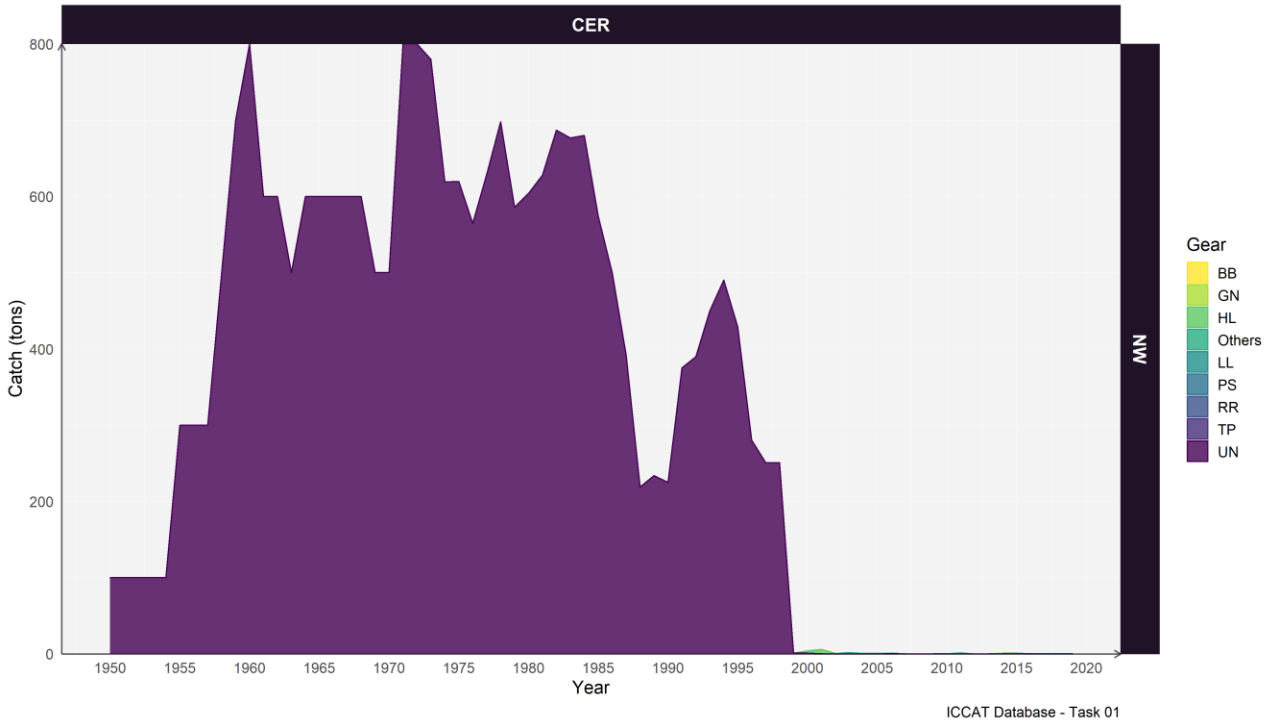

Figure 4. Total catch of cero (*Scomberomorus regalis*) by fishing gear.

5.b Length and age composition

No size data is available for cero in ICCAT Task 2 size data. There are no estimates of catch-at-size or catch-at-age for cero.

6. Stock assessment

Although there is no formal stock assessment, a risk assessment analysis (Productivity and Susceptibility Analysis) carried out for the pelagic tuna longline fleets in South Atlantic and Indian Ocean, classified *S. regalis* vulnerability with low risk (Lucena-Frédou *et al*., 2017). Considering the global assessment carried out by the International Union of conservation of Nature (IUCN), through its Red List of Threatened Species, the category of Least Concerned (LC) has been assigned (see https://www.iucnredlist.org/; Collette *et al*., 2011).

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