

14 • Location of the main West African pelagic stocks

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ABSTRACT

Location, biomasses distribution, exploitation of the different populations and some biological considerations of the West African pelagic fish stocks are presented.

RÉSUMÉ

La localisation, la distribution des biomasses, l'exploitation des différentes populations, ainsi que des considérations biologiques sur les stocks pélagiques Ouest-africains sont présentées.

INTRODUCTION

Important species of coastal pelagic fishes are rather few in comparison with other tropical areas. We identify eight species from Morocco to Angola with two main families, *Clupeidae* and *Carangidae*, both of them with three species and two monospecific families, *Engraulidae* and *Scombridae*. In addition we mention a very special species, *Balistes capriscus*, partly pelagic (young stages) and partly demersal, the tremendous development of this species along the coast during the last two decades was a major ecological event.

General distribution, main biological features and tentative populations identification are briefly reviewed below.

SARDINA PILCHARDUS (SARDINE)

General distribution and biology

Sardina pilchardus is found from the English Channel to Cape Timiris (19°N) including the Mediterranean Sea. A southward extension has taken place since 1972 with a maximum in 1976-77 (Dakar). This movement was related to the coastal upwelling strength. *S. pilchardus* spawns in winter in deep waters (100-300 m); otherwise the fish schools in shallow waters, feeding on phyto- and zoo plankton.

Populations

The distribution of *S. pilchardus* is discontinuous along the coast of West Africa where there are at least three populations. However, the degree of independence of each population is not known.

Northern and central populations. Northern (from Cape Sparte to Ifni) and central (south of Ifni to Cape Juby) populations are exploited mainly by Moroccan purse-seiner fleets, with an average production of 300 000 t/year. The potential production could be estimated between 250 000 and 400 000 t/year, according to the recruitment level.

Southern population. The main concentration is from Cape Bojador (26°N) to Cape Barbas (22°N). This population has been exploited by different countries predominated by USSR using mid-water trawlers. The production has fluctuated from 100 000 to more than 600 000 t/year. The potential production, sometimes indicated as 500 000 t/year, cannot be seriously computed from catch data with such variations.

SARDINELLA AURITA (ROUND HERRING, SARDINE)

General distribution and biology.

Along the coast of West Africa, the species is found from Cape Spartel to southern Angola including the Canary Islands, but is only frequent south of 24°N.

This species is known to prefer non-turbid, rather cool (< 24°C) and salt (S > 35 ‰) waters. The most important factor is probably the availability of preferential food. *S. aurita* is an active filter feeder on phytoplankton and zoo plankton. It remains in the upper layer when productivity is high. There are two general patterns:

- Pattern 1: during the warm season, fish is concentrated near the bottom in relatively deep water (70-100 m depth); and during upwelling, fish enters the coastal waters in the surface layer;
- Pattern 2: during the warm season, fish migrates along the coast, following the displacement of cold waters. Generally, the younger individuals do not participate in the migration and follow Pattern 1.

Populations

Several populations are found along the coast.

The northern population is found from 24°N to Bissagos Archipelago (12°N) in winter, migrating to Cape Timiris (19°N) in summer. The adult population follows movement Pattern 2. The stock off Mauritania and Guinea-Bissau is exploited by several countries including USSR, Romania, German Democratic Republic, etc. The catch is now around 100 000 t/year by mid-water trawlers, but much higher (about 350 000 t) in the seventies with a large international fleet of purse-seiners, mother ships and factory ships. Maximum yield would be about 350 000 t. However, the strong reduction into the biomass estimated acoustically during the two periods 1974 and 1981-84 necessitates a reconsideration of the former yield.

Southern Senegal sub-population. Young individuals (age class 1-2) of the above population, follow Pattern 1. Exploited by small scale canoes and Dakar-based purse-seiners, the total catch amounts to about 40 000 t/year, the potential production being 30 000-50 000 t according to environmental conditions.

The Guinea population covers from southern Senegal to Sierra Leone, but is possibly not homogeneous (Patterns 1 and 2?). The stocks are exploited by foreign fleet of

purse-seiners and trawlers. Potential production and yield are unknown.

Ghana and Ivory Coast population. This population is found off the Ivory Coast, Ghana and Togo. It seems to belong to a «dwarf» race with much smaller size at first maturity and maximum length; movement Pattern 1 is typical of this stock. There are some evidence of two sub-populations, eastern and western, with different breeding periods and perhaps growth characteristics. Production by purse-seiners and artisanal fishery had fluctuated between 10 and a maximum of 90 thousand tons reached in 1972. After this peak, the stock collapsed but recovered after 6 years. In the recent years, the exploitation has grown up and the production is more stable at a higher level (more than 100 thousand tons/year) supporting the hypothesis of the modification of the structure of the population.

Cape Lopez population. This population is restricted to the surrounds of Cape Lopez (0.30°S). It is composed of a «dwarf» race as in Ghana, following movement Pattern 1; it is not exploited and could provide a few thousand tons/year.

The Angola population spreads from southern Gabon to southern Angola. Young individuals follow movement Pattern 1 and adults Pattern 2 with seasonal migration. There is limited exploitation by Congo purse-seiners, very important production in Angola by a Soviet fleet of purse-seiners and trawlers with an average catch of 200-250 000 t. The potential production is unknown, but estimated to be near the sustained average catch.

SARDINELLA MADERENSIS (FLAT HERRING, HARENG)

General distribution and biology

The species is found from Cape Barbas (22°N) to southern Angola, including all the islands.

The species is well acclimatized to the low salinity and warm waters encountered along the West African coast. Fish school in the surface layer and are never found in deep waters. They feed mainly on zooplankton and the older individuals prey on fish larvae.

Migration occurs in the northern and southern areas of the distribution (Mauritania - Senegal and Angola - Congo) and is much more limited in the central area.

Populations

There are probably many populations or sub-populations.

The northern population extends from Cape Barbas to south of Dakar (adult stock). No catch records exist and are probably mixed with those of *Sardinella aurita*. However, the catch decreased from the seventies to the eighties with the departure of the large fleet of purse-seiners operating in shallow waters and its replacement by mid-water trawlers. The yield is unknown.

Southern Senegal sub-population. As for *S. aurita*, there is a sub-population of young classes staying south of Dakar for two years. Exploited by the Dakar purse-seiners and small scale fishery, the total catch is around 30 000 t/year and the potential production between 25 000 and 40 000 t/year depending on environmental conditions.

The Guinea population extends from southern Senegal (Casamance) to Sierra Leone. There may be several sub-populations. There are no catch data and no estimates of potential production.

Central group. Between Sierra Leone and Congo there are several sub-populations. Coastal exploitation is by artisanal craft and small purse-seiners. The total production amounts to a few thousands tons ; the yield is unknown except for the Ivory Coast sub-population ; the production is about 10 000 t/year.

The Angola population reaches from southern Gabon to south of Luanda (10°S). There are migrating stocks of adults from south to north (July-September) and reverse (October-November) with young populations staying in the coastal waters.

Surprisingly, the migrating adults were observed on the outer part of the shelf and even beyond, always on the surface (personal observation). This population is exploited by local purse-seiners in Congo and foreign purse-seiners in Angola. There are no catch data except for Congo. From an acoustic survey in the northern part, the biomass of the large adult population was estimated at about 100 000 t (1982).

ENGRAULIS ENCRASICHOLUS (ANCHOVY, ANCHOIS)

General distribution and biology

Distribution is from Norway to Angola. The anchovy of the Gulf of Guinea had been ascribed the name of *Anchoviella guineensis*. After examination of many specimens from different areas. Whitehead (British Museum) finally identified these populations as belonging to the European species. There remain a number of peculiarities (smaller size, lower number of rays, etc.) more racial than specific.

Feeding on zooplankton, the anchovy is found all along the coast, from shallow to deep water, even beyond the continental shelf. This observation is confirmed by the widespread distribution of eggs and larvae found from the coast to more than 100 nautical miles offshore. The hypothesis of the existence of two types (inshore and offshore) is not to be neglected.

Populations

There are probably several stock-units more or less independent. A few are considered below:

Mauritanian group. North of Cape Timiris, along the southwest border of Banc d'Arguin, schools of anchovy

are commonly found by research vessels. Soviet catch records mention 25 000 t/year. There is no more information.

Southern Senegal group. Off Cape Roxo (12°N) big shoals of anchovy are commonly recorded above the slope of the shelf. There are no catch data.

Guinea group. Along the Guinea shelf, on the slope and on the shelf, schools of anchovy are common. There are no catch data.

Ghana population. After the collapse of the *Sardinella aurita* stock, anchovy has become a predominant pelagic species. Even after the recovery of the former species, it remains a major component of ghanaiian fishery and it fluctuates between 14 and nearly 100 thousand tons/year.

No important concentration has been noticed from Nigeria to Angola.

TRACHURUS TRACHURUS (HORSE MACKEREL, CHINCHARD NOIR)

General distribution and biology

Distribution is from Norway to Senegal, including the Mediterranean Sea. The species feeds on large zooplankton and micronekton: mainly euphausiids and cephalopods, demersal crustaceans and fish.

Breeding occurs mainly in winter in surface layer above 100 - 250 m depth.

In the region of interest, adults of the main stock migrate from north of Cape Blanc (summer) to north of Dakar (winter). Juveniles stay in the vicinity of nurseries. They are found in relatively deep waters, mainly caught in depths of 50 - 200 m, sometimes down to 400 m. During the cool season, they move closer to the coast.

Populations

Morphometrics and growth parameters imply at least two separate populations.

The northern population extends from 36°N to 29°N. Population increased from 2 000 t (in the early sixties) to 8 000 t (in the late seventies) but seems to be declining recently. The potential production is difficult to assess because of wide fluctuations in recruitment. The population is small in comparison with the following.

The southern population extends from 24°N to 20°N reaching 15°N during winter. Production is around 250 000t with a peak of nearly 400 000t in 1973. These values are tentative as the two species of *Trachurus* are not separated in the catch statistics. A potential production of 500 000t for the two species combined was assessed, assuming 65 %, or 325 000t for *T. trachurus* (from direct observations).

TRACHURUS TRECAE (HORSE MACKEREL,
CHINCHARD NOIR)

General distribution and biology

This species is confined to the West African coast from the Western Sahara to Namibia.

The general biological features of this species are very similar to those of *Trachurus trachurus*, at least for the northern population. In winter, the adult population migrates southwards as far as south of Senegal and then comes back to Cape Blanc. Juveniles stay in the vicinity of nurseries. They remain much closer to the coast than the young of *T. Trachurus*.

Populations

There are probably several populations or sub-populations along the coast ; three «groups» are under consideration:

The Cape Verde group lies from 24°N to 11°N with the main concentration in Mauritania and Senegal. The adults are found in the deeper part of the shelf and on the slope. Production is about 150 000 t.

The Guinea population stretches from 12°N (Cape Roxo) to 1°S (Cape Lopez). This is a «dwarf» race with much smaller maximum length, smaller size at first maturity, different growth parameters. It is likely that there are many sub-populations. None of them appears important in terms of stock. There is no consistent catch.

The Angola population «Cunene Horse Mackerel» extends from Cape Lopez to northern Namibia and is very similar to the northern race. Migrations occur along Angola and Congo in relation with marine seasons. Exploitation off Angola is by foreign fleets (mainly the USSR). Average production in the period 1977-80 was 300 000 t, with a peak of 430 000 t in 1978. It is possibly fully exploited, even probably overexploited according to the last catch statistics (a substantial reduction was seen in catches for 1980, 1981 and 1982).

DECAPTERUS RHONCHUS (YELLOW-TAIL
HORSE MACKEREL, CHINCHARD JAUNE)

General distribution and biology

The species is distributed from northern Morocco to Angola, with significant concentration south of Cape Barbas (22°N) only. It feeds on euphausiids, shrimps, squids, fishes, while specimens bigger than 25 cm are mainly eating fish, especially anchovy.

Populations

There are probably several populations.

The northern population extends from 22°N to 12°N. Adults migrate following the displacement of the cool waters. This population is characterized by a greater maximum length (40 cm). Catch statistics are not precise due to confusion with other horse mackerel. This pro-

duction is probably a few thousand tons/year. The potential production is not known.

Sierra Leone population. This population is found from 11°N to 8°N. According to Soviet investigations this sedentary population is characterized by morphometric differences, first maturity and maximum sizes are smaller. Production amounts to no more than 10 000 t.

Many groups of a «small race». These groups reach from Ivory Coast to Cape Lopez and are characterized by much smaller maximum and first maturity size. There are small local catches. No important stock has been identified.

SCOMBER JAPONICUS (CHUB MACKEREL,
MAQUEREAU ESPAGNOL)

General distribution and biology

This species is distributed from southern Europe to Namibia. It feeds on euphausiids, fish, squids, and to a lesser degree zooplankton. Breeding occurs from February to April in the north, above the deep part of the shelf.

Populations

There are several populations, with different growth parameters and size at first maturity and maximum length.

The northern population reaches from Cape Sparte to Cape Blanc. The maximum length is 53 cm (according to Soviet investigations) and production is about 150 000 t. The status of the stock is controversial.

Senegal - Mauritanian population. The maximum length is 44 cm. The total production of this population would not exceed 10 000 t at present. It is probably greatly underestimated if Guinea Bissau is included.

The Ghana population extends from Sierra Leone to Nigeria ; it is characterized by even smaller maximum length (29 cm) and size at first maturity. In Ghana and Ivory Coast the purse-seine fishery caught about 10 000 t/year until 1973. This stock disappeared in 1974 amazingly one year later the *Sardinella aurita* stock. Since this period, significant catches occurred only in 1986 (20 thousand tons) and 1988 (8 thousand tons).

Congo - Angola population. Very few data are available on this stock. It is assumed to extend from Cape Lopez to South Angola. It shows the same characteristics as the so-called «Senegal - Mauritania» population. There is no significant catch in Gabon - Congo and is unknown in Angola.

Southern population: Namibia and Republic of South Africa Characteristics of this population are probably

similar to those of the northern population. There have been important fluctuations in the catches: 200 000 t in 1977-78, followed by years with very small catches and a return to the former average of 50-60 000 t/year. It was pointed out that in the meantime the stock migrated from the southern region (1-6 ICSEAF) to areas 1.4 and 1.3. The production estimated at 200 000 t is very doubtful in the light of recent history.

BALISTES CAROLINENSIS (TRIGGERFISH, BALISTE)

General distribution and biology

Distribution of this species is from Cape Timiris (19°N) to Angola. Very scarce before 1970, it has become one of the most common within a few years. The reasons for this development have not yet been well understood (Caverivière, this Volume).

This fish is a predator living and feeding on the bottom in the adult stage and in mid-water during its pelagic young stage. Its pelagic diet consists of various preys such as fish larvae, euphausiids and all the small nekton. The adult near-bottom population lives on sandy bottoms (according to Soviet investigations). In Guinea, this type of bottom is found from 25 to 75 m depth. The pelagic population is spread over all the deeper part of the shelf and sometimes beyond. The species is, at least partly, protogynous. The sudden «explosion» of the stock evidences the high reproductive capacity of the species.

Populations

Three major groups can be identified.

The Guinea population lies from Southern Senegal to Sierra Leone. The bulk of the stock is off Guinea and Guinea Bissau, but the main exploitation takes place off Sierra Leone (USSR fishing vessels). In 1980, 44 000 t were caught (up to this time, they had been discarded) with lesser catches during recent years. The biomass of the stock was assessed acoustically during several surveys. It appeared to increase from 440 000 t in 1978 to more than one million in 1984.

The Ghana population reaches from western Ivory Coast (Cape Palmas) to Benin. The catch in Ghana only was about 6 000 t/year (maximum catch 13 000 t in 1979). In 1981, the biomass of this population was estimated by acoustic surveys at 500 000 t (R/V Fridtjof Nansen) or 115 000 t (R/V Capricorne).

The Gabon population is distributed from Nigeria to southern Congo. In 1982, this species was found on the shelf between Fernando Po and Cameroon and in small quantities north of Cape Lopez (Gabon). In 1985, the R/V Fridtjof Nansen found a concentration of *Balistes* estimated at 50 000 t north of Cape Lopez and also on the Congo shelf.

SOURCE OF INFORMATIONS

This review is mainly based on:

- CECAF series
- FAO reports
- ICSEAF series
- reports of R/V Fridtjof Nansen acoustic cruises on West Africa
- reports of R/V Capricorne in the same area
- «grey literature»
- personal observations