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### SPAWNING BIOMASS OF THE ANCHOVY IN THE NORTH CENTRAL ZONE OF PERUVIAN SEA (3°30' to 15°S) DURING WINTER 2002

Patricia Ayón Dejo and Betsy Buitrón Díaz

The RVs Olaya and SNP2 0208 cruise was carried out from the 3<sup>rd</sup> to 31<sup>st</sup> August 2002 from Caleta La Cruz to Punta Infiernillos. The spawning biomass of Peruvian anchoveta was assessed in 5,4 million tons ( $\pm 2,7$  t, 95% confidence limits were found). The whole survey area was covered by anchoveta spawning from in shore to 115 mn, with important high density nuclei, some far away off the northern coast (5° a 6°30'S); and in the central coast near to shoreline (6°30' a 10°30'S). The spawning biomass corresponded to a young population with a good factor of condition and a full spawning.

### BIOLOGICAL AND FISHING ASPECTS OF THE MAIN PELAGIC RESOURCES. WINTER 2002

Julio Mori; Carlos Goicochea, Cecilia Peña and Arturo Ventosilla

The Peruvian anchoveta spawning biomass survey RVs Olaya and SNP2 0208, was carried out from Caleta La Cruz to Punta Infiernillo during 7<sup>th</sup> to 31<sup>st</sup> August. Total catch was 4.933,7 kg, anchovy (*Engraulis ringens*) 63,3%, carrot lobster (*Pleuroncodes monodon*) 22,3%, Flying squid (*Dosidicus gigas*) 9,5%, long nose anchovy (*Anchoa nasus*) 2,9% and catfish (*Galeichthys peruvianus*) 1,3%. Lighthfish (*Vinciguerria lucetia*), and common squid (*Loligo gahi*) were also caught. Anchovy had a wide distribution; registered until 120 mn off shore between 9 and 10°S, TL between 8.5 to 17.5 cm; mode of 13,0 cm, and approximately 1 year old. Spawning occurred in whole area during the evaluation.

### DISTRIBUTION AND BIOMASS OF IMPORTANT PERUVIAN PELAGIC RESOURCES. WINTER 2002

Ramiro Castillo; Francisco Ganoza, Salvador Peraltila and Jairo Calderón

The work was developed during the Spawning biomass BICs Olaya and SNP2 0208 cruise, during 7<sup>th</sup> to 31<sup>st</sup> August 2002, from Caleta La Cruz a Punta Infiernillos. The stratified systematic sampling had greater intensity in the coastal zone until the 35 mn. The evaluation was made by the direct hydroacoustic method, with scientist echosound EK-500 Simrad with 120 frequencies of 38 kHz. The distribution area was determined by means of the interpolator program of Surfer data and the biomass was determined by the method of stratification in 10' x 30' isosparalitoral areas, using the Echoview, Map Info and Excel programs. The anchoveta (*Engraulis ringens*) was predominant (4.495.955 t,  $\pm 18$ , 39%); widely distributed but in dispersed areas, up to 125 mn of the coast; their greater concentrations were between 10 and 6°S: from Mórrope to Chérrepe, Punta Chao to Casma and Huarmey to Punta Bermejo: Towards south of Cerro Azul the species was scarce; vertically, she was found at the upper 45 m, but in the area between 20 to 35 mn off the coast from Pimentel to Punta Chérrepe, was deeper, reaching to 95 m. The samasa or long nose anchovy (*Anchoa nasus*) was mainly near the coast in the north (487.887 t). The múnida (*Pleuroncodes monodon*) was detected near the coast between Chicama and Pucusana in dispersed concentrations and, in many occasions, shared areas with the anchoveta (1.058.182 t). The catfish (*Galeichthys peruvianus*) (6.689 t) was registered mainly near the coast of Pimentel and from Salaverry to Punta Chao. Vinciguerria (*Vinciguerria lucetia*) (703.090 t) and the giant squid (*Dosidicus gigas*) (20.107 t) was detected in

isolated areas between Paita to Pucusana; due to the cover of horizontal and vertical sampling these species could be underestimated.

## **PHYSICAL OCEANOGRAPHIC CONDITIONS DURING THE PERUVIAN ANCHOVETA SPAWNING BIOMASS CRUISE IN WINTER 2002**

Luis Vásquez Espinoza

One of the objectives of the BICs Olaya and SNP2 0208 cruise was to know the physical marine characteristics, in order to relate them with the behavior of the spawning fraction of the Peruvian anchoveta population. The conditions were moderately warm between Puerto Pizarro and Cerro Azul, except for the offshore warm waters and the area to the south of Cerro Azul, characterized by slightly cold conditions. In August 2002 the marine environment was disturbed due to the unusual advection of saltier open ocean waters that originated large mixing areas with cold coastal waters. The weakness of winds and the approach of the subtropical saltier waters towards the coast motivated that the upwelling processes were restricted to nearshore areas to the north of the Callao, and were more intense to the south of 12°S.

## **PERUVIAN PHYTOPLANKTON COMMUNITY DURING THE WINTER 2002**

Patricia Villanueva and Sonia Sánchez

A total of 133 phytoplankton samples obtained in the Spawning Anchoveta Biomass Assessment RV Olaya and SNP2 cruise 0208 were analyzed. The volumes of plankton fluctuated from 0,05 to 3.75 mL/m<sup>3</sup>, with 1,0 mL/m<sup>3</sup> average. The extreme values were registered between 30-60 mn off the coast; the maximum was 3.0 mL/m<sup>3</sup> (at 14 to 15°S) and the minimum, 0,35 mL/m<sup>3</sup> (at 10 to 11°S). In surface, the phytoplankton was moninant in 51% of the evaluated area; at 10 m of depth, the greater cellular concentrations (1000x10<sup>3</sup> cel/L) were registered in front of Paita and Chimbote, with predominance of upwelling species in both places. *Ceratium breve* (ESW) was determined with an unusual displacement to the south. *Protoperdinium obtusum* (CCW) was located in the coastal zone except in Punta Falsa and Pucusana, where it was outside the 60 mn. *Ceratium praelongum* (SSW) reached its greatest influence between the 11° and 13°S.

## **HYDROCHEMICAL CONDITIONS OFF NORTHE-CENTRAL PERUVIAN COAST IN WINTER 2002**

Georgina Flores Gonzáles; Jesús Ledesma Rivera, Carlos Robles Cáceres  
Miguel Sarmiento Díaz

The cruise to estimate the Peruvian anchoveta spawning biomass, BIC Olaya and SNP2 0208, was carried out from Caleta La Cruz (3°40'S) to Punta Infiernillos (15°S) up to 120 nm, during August 7<sup>th</sup> to 31<sup>st</sup>, 2002. Dissolved oxygen, nutrients and chlorophyll-a were analyzed. In the surface of the sea, the 5.0 mL/L isoxxygen line, that limits the cold coastal waters (CCW) was impelled towards the coast in front of the area from Pimentel to Pucusana, by the projection of subtropical superficial waters (SSW), and great processes of mixture of that water mass with CCW were recorded. The phytoplankton biomass in chlorophyll-a terms, was high (1.0 a 17 µg/L), associated to high concentrations of nutrients (phosphates, nitrates y nitrites) in a narrow band near to the coast; the silicates displayed values >5 mL/L in a vast distribution.

## **CAPTURES AND OBSERVATIONS ON THE *BRYDE'S WHALE, BALAENOPTERA BRYDEI* (OLSEN), IN THE PERUVIAN SEA NORTHWEST, 1968-1985**

Pedro Ramírez Advíncula

The present paper analyzes the captures (CPUE) of this whale, during October 1968 to March 1985 in front of Paita, Perú ( $5^{\circ} 5' S$ ,  $81^{\circ} 7' W$ ). It also includes the observations (OPUE) since October 1975 to April 1985. A total of 6051 specimens were captured, mainly between  $3^{\circ}30' S - 8^{\circ} S$ ,  $81^{\circ}$  and  $85^{\circ} W$ . Captures took place almost every month of the year, with numbers increasing in spring and in summer. The CPUE gradually decreased through the years, this could have been due to the quotas imposed or because of the capture's selection. A total of 6.311 specimens were observed; the OPUE was higher than the CPUE. The initial estimated stock in 1968 was of 17 388 specimens; in 1985, when the close season began, the stock was 11.425. Estimations for a sustainable capture of 384 specimens with an effort of 285 ships day, were also made. If the opportunity for the reopening of the hunting season arises, it will be advisable to carry out an evaluation of the state of the population first.

## **ON THE MINIMUM LENGTH OF BRYDE'S WHALE HUNT IN PERUVIAN SEA**

Pedro Ramírez Advíncula

The captures of Bryde's whale, *Balaenoptera brydei* (Olsen), in northern Peruvian sea, were made following the minimum length regulation established by the Permanent South Pacific Commission (10,70 m) and the International Whaling Commission (12,20 m). These lengths do not protect the resource. Since we are in close season since April 1985, It is suggested to increase the minimum length of capture to 12,6 m for this zone of the Pacific when the season is opened. This would give the species the opportunity to reach, at least, the first sexual maturity.

## **FISHERY BIOLOGICAL SURVEY AND ENVIRONMENTAL QUALITY IN HUARMEY, ANCASH. AUTUMN 2000**

Jorge Tam; Francisco Ganoza and Rita Orozco

The objective was to determine in front of Huarmey area ( $10^{\circ}00' S$  y  $10^{\circ}08' S$ ), up to 5,0 mn off the coast, the distribution, concentration and biological characteristic of the existing coastal resource and their relationships with environmental conditions and the quality of marine media, during May 2000. Oxygen, sulfur and pH were found within the water quality standards. (Class V, VI) of the Peruvian General Water Law. However, oxygen levels must be considered low and were associated to cold waters. Oil and greases average value of total suspended solids at surface was 3,29 mg/L and the maximum (4,60 mg/L) was found off Huarmey harbor. The average value of total suspended solids at surface was 98,22 mg/L, slightly lower than the water quality standard (100 mg/L). The distribution of neritic resources was dispersed in almost all the surveyed area, the highest concentrations were found towards the coastal zone and, vertically, the fish schools were located between 3 and 2 m depth. Besides seabirds, three species of fishes, five mollusks and one crustacean were recorded. The underwater observations, found not any alteration produced in the rocky substrate, nor evidence of organic matter detritus of recent origin. Seasonal changes, the generalized cooling and the scarce food availability in the area, explain the relative absence of resources near the coast, especially the pelagic ones (sardine, horse mackerel and mackerel), and cannot be attributed to local pollution. The use of explosives, whenever it occurred, had no negative effects over the fish distribution at large spatial and temporal scales. The reduction of fishes in the zone of Puerto Grande and Huarmey could be due, in part, to the recovery state in which the cold water species were found, after the El Niño 1997-98.

## **CAPTURE AND CONDITIONING TO CAPTIVITY OF PERUVIAN ANCHOVY *ENGRAULIS RINGENS***

Carlos Espinoza; Angel Perea, Jairo Calderón, Carlos Salazar, Betsy Buitrón, Víctor Vera, Enrique Meklenburg and Pablo Rojas

This paper describes the methodology of capture alive anchovies by means of a liftnet with attraction lights and their later conditioning to the captivity in rearing tanks. The captures were made in Callao and Miraflores bays. The net, carrying the transducer of a portable echosound, was placed in the anchoveta shoals located, and the lights to attract the fish were turn on. The captured fish were placed in fiber glass tanks of 300 L of capacity and maintained with ventilation and constant water flow. Later they were transported to the Laboratory of Experimental Biology (LBE) del IMARPE, and placed in tanks of 10 m<sup>3</sup>. The conditioning tanks were part of a system of water recirculation, which consisted of an impelling pump of water, a floating bead filter, a control equipment of temperature and a system of ultraviolet light. Mortality total average was of 35% during the 30 days in captivity, being critical the first 10 days (29.8%), after that it diminished quickly down to zero. Mortality was mainly of stressed and injured dishes during the capture, which caused an increase of the ammonia levels dissolved in the water of the tanks that was controlled later. With the methodology used it was possible to obtain 65% of fish of the total captured, at the end of the process, these fishes were used to carry out the later experimental tests.