

## **MODELLING MARINE CIRCULATION AND HYPOTHETICAL DISCHARGES IN CALLAO BAY, PERÚ.**

*Correa David; Jorge Tam, José Pasapera, Miguel Saavedra y Augusto Ingunza*

### **ABSTRACT**

The objective was to simulate the marine circulation and hypothetical discharges in Callao bay, taking into account climatological seasonal variations and considering the direction and intensity of wind forcings. ROMS (Regional Oceanic Model System) model with the nesting tool AGRIF (Adaptive Grid Refinement in Fortran) were used. A hybrid bathymetry was used from ETOPO2, GEBCO, DHN and IMARPE; winds from MWF-Quikscat, tides from TPXO6.2, initial conditions from WOA, boundary conditions from COADS, and information of rivers, aquatic quality and domestic effluents. The model represented adequately the patterns of temperature, salinity and circulation at large scale and small scale in Callao bay. The hypothetical domestic effluent discharges were transported predominately towards north, with seasonal variations (to northwest in summer, due to rivers discharges). Simulations with northern winds scenarios, showed a transport of hypothetical discharges to Miraflores bay. During this study period, observed pollutants concentration in Callao bay exceeded the environmental quality standards of the Water Law, so the introduction of additional effluents should be avoided, and an adequate treatment and disposal system (i.e. treatment plant and submarine emissary) should be implemented.

## **LA NIÑA EVENT EFFECTS ON PERUVIAN FISHERY**

*Bouchon Marilú y Cecilia Peña*

### **ABSTRACT**

The cold event La Niña effects on Peruvian marine resources were analyzed with the information of the years 1988, 1996, 1999, 2000 and 2007. In these periods, the Peruvian anchovy (*Engraulis ringens*) was the dominant species in the purse-seine fleet catches. The distribution patterns of the main pelagic resources as Peruvian anchovy, Peruvian Pacific sardine (*Sardinops sagax*), Jack mackerel (*Trachurus murphyi*) and Pacific mackerel (*Scomber japonicus*) suffered important changes: their distribution increased to oceanic zone and their schools were found until 30 m depth. The anchovy reproductive process had bigger values than the historic pattern, and prolonged winter/autumn spawning. The Peruvian silverside catches increased.

**LA NIÑA EVENT: PROPOSAL OF DEFINITION AND CLASSIFICATION  
ACCORDING TO THE SEA SURFACE TEMPERATURE  
ANOMALIES IN EL NIÑO 1+2 AREA**

*Trasmonte Grace y Yamina Silva*

**ABSTRACT**

Using similar criteria as the NOAA's (Atmosphere and Oceanic American Administration), with its ONI (Oceanic El Niño definition of El Niño and La Niña), it has been defined and classified La Niña events as a function of three months running mean of Sea Surface Temperature Anomalies (SSTA) in the Eastern equatorial Pacific (Niño 1+2 region), which exerts a major impact in the environmental conditions at the Peruvian coast. For La Niña definition has been found a threshold value of  $-0.8$  °C, also considering a minimum duration of at least five running mean quarterlies. So, fourteen events were obtained since January 1951 until 2007, corresponding to years: 1954-56, 1962, 1964, 1966, 1967-68, 1970-71, 1973-74, 1975-76, 1985, 1988, 1996, 1999, 2001 and 2007. The majority of La Niña periods identified (between 65% and 79% respectively), are similar from another recognized classifications such as NOAA's index or the JMA (Japan Meteorological Agency) SST index.

**THE PACIFIC HARVESTFISH, *PEPRILUS MEDIUS* (PETERS) IN TUMBES,  
PERÚ. BIOLOGICAL-FISHING PARAMETERS  
AND MINIMUM SIZE OF CAPTURE**

*Ordinola Zapata, Elmer y Emperatriz Gómez Sulca*

**ABSTRACT**

The biometric and biological information was obtained in samples of Pacific harvestfish, *Peprilus medius*, collected of artisan fisheries, during April 2005 to February 2006. The total length (TL) ranged 15.0 to 35.0 cm; the average varied from 22.5 to 23.3 cm. The length and weight growth curves showed the highest peaks in the 2.5 years, values in which the critical age was determined; also yield per recruit was obtained at 2,5 years approximately. The percentage of spawning females and the Gonadosomatic Index (GSI), indicated that highest reproduction activities occur in summer seasons, with its maximum on February. Average sexual maturity was reached at TL of 21.3 cm. Then the minimum size of capture of 'Pacific Harvestfish' should be about 23.0 cm TL, with a juvenile tolerance not higher than 20% in the captures.

**THE PACIFIC THREAD HERRING, *OPISTHONEMA* SPP., BIOLOGICAL -  
FISHING PARAMETERS AND MINIMUM SIZE OF CAPTURE  
TUMBES, PERÚ.**

*Inga Barreto Carlos, Jesús Rujel Mena, Elmer Ordinola Zapata y Emperatriz Gómez Sulca*

**ABSTRACT**

From April 2005 to February 2006, in Tumbes, on board of artisan purse, the main areas besides biological and fishing information on this resource were annotated. The size range was 11.0 - 41.0 cm and the average from 24.0 - 26.1 cm. The higher yield by recruit occurred at 3.0 years approximately. The critical age was at 2,6 years. The percentage of spawning females indicated the greater reproductive activity during January to May, and the minimum in October to December. The average size of maturity was of 25.6 cm. In such sense, the minimum size of capture of "Pacific Thread Herring" should be around 26.0 cm TL.

***CHRYSAORA PLOCAMIA*, LESSON 1830 (CNIDARIA, SCYPHOZOA) OFF  
PISCO, PERU**

*Javier Quiñones-Dávila*

**ABSTRACT**

In the last 20 years, a global trend in jellyfish increasing biomass has been observed, whose dense aggregations, or blooms, could replace traditional dominant species in the food chain. In the Southwest Pacific *Chrysaora plocamia* is a dominant species, whose life cycle is influenced by the climate changes and human activities; its pelagic phase (medusa) exists during the period spring-summer-autumn; and the benthic phase (polyp) in winter. In the Pisco area (14°S), off Independencia bay shore, the species reached high average juvenile densities (290 medusae/1000 m<sup>3</sup>), whose highest concentrations were found close to the shoreline areas. A significant correlation was obtained between the sighting index and the average SST progressive increase for the 2004 – 2007 periods.

**A STUDY ON SHRIMPS (*PENAEOIDEA*) IN CALETA LA CRUZ, TUMBES.  
FEBRUARY – JUNE 2003**

*Ordinola Zapata, Elmer; Carlos E. Inga Barreto y Solange A. Alemán Mejía*

**ABSTRACT**

The surveys were carried aboard two vessels trawling craft. In 65 sets of fishing, with an effective time of 158 h, we obtained a total catch of 72,940 kg. The shrimp resource, comprising ten species, accounted for 1.7% of the total. Commercial by catch included 15 fish and five invertebrates, as "descarte" we identified 18 fish and 20 invertebrates. The

size range of shrimp (carapace length) was 12.2 mm (*Sicyonia aliaffinis*, in march) and 64.0 mm (*Litopenaeus stylirostris*, June). The sex ratio was favorable to females with the exception of *L. stylirostris* and *L. occidentalis*. During the evaluation period, there was high percentage of immature in *L. vannamei* and *F. californiensis* and spawning in *Farfantepenaeus disdorsalis*, *Sicyonia brevirostris*.

## **PERUVIAN ANCHOVY GROWTH VARIATION EXPRESSED IN ITS OTOLITH RADII**

*Goicochea, Carlos y Sonia Arrieta*

### **ABSTRACT**

We analyzed the variations in the growth of the anchovy *Engraulis ringens* during normal periods and periods of El Niño, based on analysis of the size of the radii of otoliths. The samples examined were collected during four pelagic cruises 1998 to 2004. In one year old specimens, measures of total otolith radius (R) and the first annual ring radius ( $r_1$ ) were analyzed. We determined the statistical differences between the measures of the  $r_1$  of otoliths collected in both periods. During El Niño events, the  $r_1$  had a larger size, and the TL of the anchovy was lower, as evidenced by back-to LT for  $r_1$  past ages for these events.