

CRIALES-HERNANDEZ, MARIA ISABEL. 2009. Spatio-temporal variability of zooplankton community structure and trophic processes off central Perú.

### SUMMARY

The coastal upwelling ecosystems of the Humboldt Current are characterized by high biological production. This productivity originates in the lower trophic levels in response to the fertilization of the surface layers with nutrients that are brought to upper layers through wind-driven processes. Phytoplankton is mainly consumed mainly by zooplankton, which in turn is preyed on by small pelagic fishes. These groups of organisms are subject to large perturbations due to intrannual (seasonal) and interannual (El Niño Southern Oscillation ENSO) physical fluctuations in oceanographic conditions. The objective of this study was to describe and quantify the spatio-temporal variability in phyto- and zooplankton biomass, composition, and size class distribution off open shores (continental shelf off Callao) and inside a semi-enclosed bay (Independencia Bay) in central Peru. An exhaustive review of the published and grey literature on the Peruvian coastal upwelling ecosystem, focusing specifically on zooplankton studies, concluded that there were still several information gaps and more research effort was needed. The present study investigated the vertical distribution and migration mechanisms that the dominant the zooplankton taxa have developed in response to the variability of the oxygen minimum zone (OMZ). Additionally research was carried out into the processes and factors that determine changes in zooplankton grazing and egg production for the dominant copepod species *Acartia tonsa* and how these processes are related to the ENSO. Furthermore, I present an exhaustive review of the published and grey literature on the Peruvian coastal upwelling ecosystem.

The present study showed that the phytoplankton community underwent extreme changes in density and composition, with a huge change between different ENSO phases. Dinoflagellates, nanoflagellates, and diatoms dominated during 2006, including ENSO-neutral conditions in April 2006 and the moderate El Niño in July and August 2006. Diatoms dominated in 2007, including ENSO-neutral conditions in February and April 2007 and the strong La Niña event that impacted the area from May to August 2007. Zooplankton were found mostly aggregated at the nearshore, and in the well-oxygenated upper 20m layer during ENSO-neutral and La Niña conditions. During warm conditions, all zooplankton was more dispersed throughout the upper 50 m due of the expansion of the OMZ depth. *Acartia tonsa* was generally the most abundant species, but its population was strongly reduced during the 2006 EN event. The study showed that *A. tonsa* ingestion rates and prey selectivity were modulated by the availability of phytoplankton in this area. The trophic impact of *A. tonsa* on the primary production during the period studies was also very variable. This wide variation in the trophic impact was caused by the asynchronous variability of primary production, *A. tonsa* abundance and ingestion rates. The results of this research show that the zooplankton community off Central Peru is strongly influenced by physical conditions. The most visible changes were associated with intrannual (seasonal) and interannual (ENSO) cycles. One fundamental physical factor that influences zooplankton distribution is the spatial variability in OMZ depth.