

MENDO AGUILAR, JAIME 1991. Stock identificación of Peruvian anchoveta (*Engraulis ringens*): morphometric, tagging/recapture, electrophoretic, and ecological studies.

ABSTRACT

This study presents an analysis of the population structure of the Peruvian anchoveta, *Engraulis ringens* off the coast of Peru and northern Chile, based on information on fishery, growth, meristic and morphometric, tagging/recapture and electrophoretic data.

Gaps in the regional distribution of fishery landings along the coast have previously been interpreted as indicating stock separation. The analysis of map of acoustic surveys carried out in the present study led to the conclusion that gaps detected in landing places do not correspond to gaps in the anchoveta distribution. Seasonal trends in the landings showed some differences among landing places from the northern/central Peru and From the south of Peru and northern Chile.

Morphometric and meristic characters collected at four places in the northern, central, and in the southern region were analyzed using standard analysis of variance (ANOVA) and multivariate techniques. Most of the morphometric characters were significantly different between samples, particularly head length of pectoral fin. Intestine length showed the highest significance. However, the contrast of means of metric characters did in general not allow to infer on separation between samples from the northern/central and southern region. Only intestine length suggested a clear north-south trend in the samples. Also the discriminant analysis showed no clear latitudinal pattern.

One should expect in any case a more efficient separation from multivariate techniques than from comparisons of single variables. The cluster analysis carried out on 43 averaged observations grouped very well, with some mixing between samples from central and southern regions.

Anchoveta length-frequency data recorded during 1962 to 1988 in the southern region were analyzed using the ELEFAN I software to estimate the parameters of a seasonally oscillating von Bertalanffy growth function. Growth performance indices (ϕ') were computed and used for comparing growth of anchoveta from the northern/central and southern regions. Additionally available published and unpublished data on maximum length expressed as total length in cm and recorded along the Peruvian and Chilean coast during the 1950s to 1980s were analyzed to detect trends in latitude and time. The mean values of the growth parameters obtained for anchoveta from the southern region were similar to those obtained by other authors for anchoveta from the northern/central region.

Thus, mean values of ϕ' were practically the same for both regions. Notable differences in seasonal oscillations of growth rate were not detected. Hence, a clear evidence of stock separation from Peru and Chile based on growth parameter comparisons was not found. However, maximum recorded lengths showed stronger changes in time in the northern/central region of Peru than in the southern and northern regions of Peru and Chile respectively. Density-dependent growth, observed for the anchoveta from the northern/central as well as for those from the southern region, is discussed.

Recoveries from two tagging operations carried out by IMARPE in February and August 1974 along the Peruvian coast, each with 60000 tagged anchoveta, were analyzed with respect to stock separation. Recovery rates from the processing plants were approximately 10 and 12% respectively. Anchoveta released in the northern/central regions showed stronger migrational movements than those released in the southern region. Stronger movements were observed in summer than in winter. The anchoveta from the northern region migrates southward more strongly than those from the central and southern region. Anchovetas from the south migrate northward and southward only slightly. This means that there is limited mixing between anchoveta from the northern/central and those from the southern regions.

Anchoveta samples collected in the north, center and south of Peru were examined for variation at 8 enzyme loci using polyacrylamide electrophoresis. Electrophoretic variants were observed at three loci. Average heterozygosities were estimated at 12.7 and 13.1% in samples from the northern/central respectively and 8.2 % in the sample from the southern region. None of the samples showed significant departures from Hardy-Weinberg expectations, which indicates that allelic frequencies depend on locality. The values for Nei's genetic distance for all loci average at 0.0184, which is higher than that observed for other anchovies.

The traditional hypothesis about the existence of two genetically distinct stocks (northern/central and southern) along the Peruvian coast is supported by the results of the tagging/recapture and electrophoresis studies.

The effect of sample size and the possible influence of the "El Niño" phenomenon on these results are discussed.