

Changes in size and abundance of *Donax trunculus* related to depth and bottom characteristics

A. VOLIANI, R. AUTERI, R. BAINO and G. GIANNARDI
 Consorzio Regionale di Idrobiologia e Pesca, Livorno (Italia)

INTRODUCTION: Sandy bottoms resources in shallow waters off Tuscany have been for a long time exploited by artisanal shell-fishing. These resources have been recently studied by an appraisal fishing survey. A wide series of quantitative and biological information has been collected, aimed at defining both population structure and geographical distribution.

MATERIAL AND METHODS: 141 tows have been performed with a professional boat-operated dredge on the sandy bottoms between Livorno and Viareggio. The 25 km coastline has been sampled by means of 4 systematic campaigns within the 1-5 meters depth range. Furthermore, 7 monthly collections have been carried out with a close-mesh net dredger to survey the presence of smaller individuals which had not yet recruited to the professional fishery. The catches have been used to define local species abundance and size distribution. The structural composition of the sediment has been determined in 21 sites by standard Weber sieves.

RESULTS: The highest yields of *Donax trunculus* (more than 2 kg/tow) have been obtained to the north of the Arno River mouth within the 3.5 meters depth: Figure 1 illustrates the average annual catch per tow in the examined area in relation to geographical allocation and depth.

The analysis of the grain size reveals that sandy bottom is on the average quite uniform to the north of the Arno River mouth: 0.25-0.5 mm up to 3.5 meters depth and 0.12-0.25 mm from 3.5 to 5.5 meters; towards the south the sandy bottom is progressively finer from the Arno River mouth (>0.5 mm) to Calambrone (<0.25 mm). These results are due to the solid outflow of Arno River and their differential dispersion by the coastal marine streams (Aiello et al., 1975).

The above mentioned highest yields have been found in the depth range of 1-3.5 meters and with a medium sandy ground (0.25-0.50 mm) in agreement with previous findings (Costa et al., 1987). The mean weight of individuals is significantly related to the depth (Figure 2) and the resulting regression is linear and increases with the depth.

The increase in size with depth is also confirmed by the frequency distribution of age classes. In the histogram of Figure 3, the relative abundance of juveniles (between 15 and 22 mm length) and adults (over 23 mm length) is plotted on a depth axis.

CONCLUSION: *Donax trunculus* finds its optimum ground on medium sandy bottoms (grain size from 0.25 to 0.5 mm) and it represents a valid resource for the local fishing activity only in the northern area, from the Arno River mouth up to 3.5 m depth where this bottom sediment type is dominant.

The size distribution shows a positive trend with increasing depth. This is firstly due to the intense fishing effort which acts mainly on lower depths, where higher yields are common, secondly to the movement of the adult specimens also confirmed by the poor presence of young individuals at higher depths.

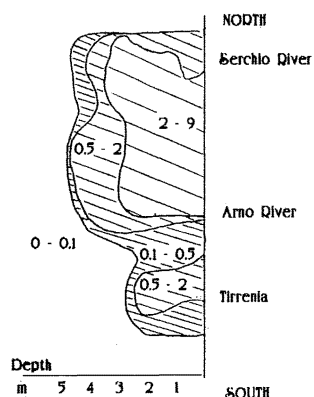


Figure 1. Mean catch per tow (kg) in the surveyed area.

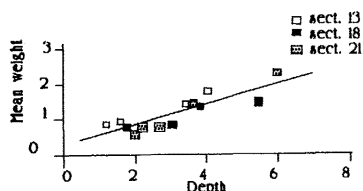


Figure 2. Relation between the individual mean weight (g) and the depth (m) in three sectors and the resulting regression line.

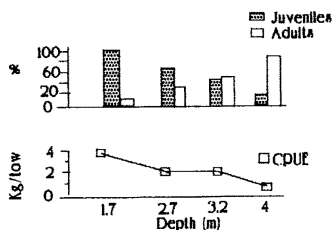


Figure 3. Relative presence of juveniles and adults, and CPUE at different depths.

REFERENCES

- Costa C., Bianchini M., Ceccarelli P., Orecchia P., Rambaldi E., Volterra L., 1987. Indagine sui molluschi bivalvi di interesse commerciale (telline, cannolicchi e vongole) delle coste della Toscana, del Lazio e della Campania. Quad. Ist. G. Brunelli, (7) 58 pp.
- Aiello E., Bartolini C., Caputo C., D'Alessandro L., Fanucci F., Fierro G. et al., 1975. Il trasporto litoraneo lungo la costa toscana tra la foce del Fiume Magra e i Monti dell'Uccellina. Boll. Soc. Geol. It., 94, 1519-1571.