

## **Methodology adopted for the study of eggs and larvae of small-pelagic fishes in Tunisian waters**

R. Zarrad\* and R. Bedoui

### **Abstract**

For the sustainable exploitation of small-pelagic fish resources in Tunisia, the study of the entire life-cycle (egg, larva, juvenile and adult) is necessary. It is assumed that the level of annual recruitment is determined in the early-life stages. However, in Tunisia, such studies are rare. The INSTM had started a research programme in 2002 to study fish eggs and larvae of small-pelagics in their ecosystem.

Four seasonal and twelve monthly surveys were carried out in the Gulf of Tunis in order to determine the spawning and nursery areas and to study mortality, growth and trophic relationships through the relevant biotic and abiotic environmental parameters.

**Keywords :** egg, larva, small-pelagics, biotic, abiotic, environmental, Gulf of Tunis.

### **1. Introduction**

Small-pelagic fish species represent an important marine resource in Tunisia. In recent years, the average production has been about 30,000 metric tons. In 2002, the production was estimated at 31,521 tons (DGPA, 2002). However, the exploitable biomass was estimated at about 80,000 metric tons. Therefore, there is a high possibility of increasing the production. For sustainable exploitation, it is necessary to study the entire life-cycle: egg, larva, juvenile and adult. Early-life stages of fish in Tunisian waters have not been thoroughly studied, though it is assumed that the level of annual recruitment is determined during the early-life stages. It seems that the environmental conditions (biotic and abiotic) influence highly the recruitment variability and, in the future, the exploitable biomass.

However, few studies have been carried out in Tunisia. Ktari-Chakroun (1979) had studied the anchovy spawning areas along the Tunisian coast, in the sea passage between Tunisia and Sardinia and the Strait of Sicily. Two studies concerned the Gulf of Tunis, and were aimed at determining the spawning period of teleostean fishes (Turki and Ktari-Chakroun, 1985) and at inventorying their larvae (Turki, 1989). Daly-Yahia (1998), in the study of seasonal zooplankton dynamics had determined the spatio-temporal distribution of anchovy eggs and larvae sampled accidentally with zooplankton in the Bay of Tunis (off Tunis in the small Gulf of Tunis).

The INSTM started a research programme in 2002 to study fish eggs and larvae in the ecosystem.

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\*Institut National des Sciences et Technologies de la Mer. Port de pêche La Goulette, 2060 La Goulette, Tunisia- Tel/Fax: +216 71 735 848 E-mail: rafik.zarrad@instm.rnrt.tn

## 2. Materials and methods

### Studied area, sampling stations and investigation frequency

The research programme on fish eggs and larvae concerns all Tunisian waters. Currently, we are working in the Gulf of Tunis which is considered the best area to start such study. The Gulf is connected to many lagoons (notably the Tunis and the Ghar El Melh lagoons), and it receives the discharge of the only permanent river in Tunisia (the Majreda River). It seems to attract many fish species to spawn. It is commonly assumed that this Gulf is the nursery of the northern coast of Tunisia.

Sampling was conducted according to two strategies. During the seasonal survey, we used the R.V. "Hannibal". Samples were taken in the grid of 29 stations (Fig. 1) separated from each other by 4.8 nautical miles East-West and 6 nautical miles North-South. The monthly sampling was carried out at six stations between the seasonal stations (stations: 2; 3; 6; 11; 12 and 20).

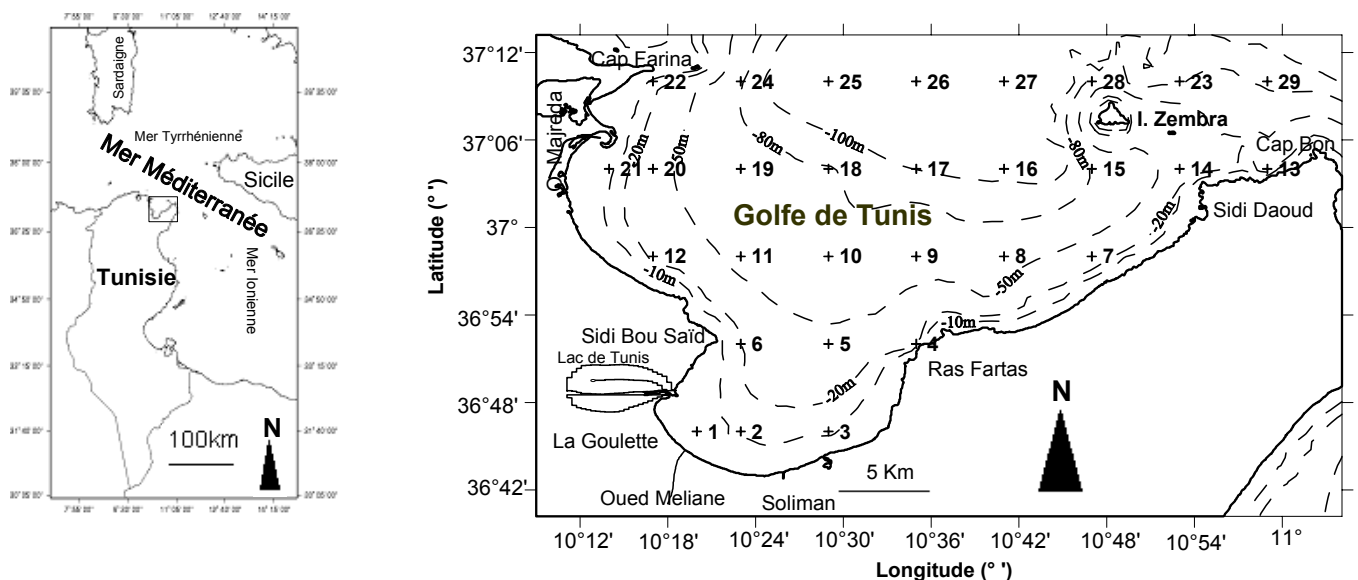


Figure 1 : Sampling stations in the Gulf of Tunis.

### Measurement and sampling

At each station, sea-surface temperature, salinity, dissolved oxygen, pH and turbidity were measured monthly and seasonally. The marine currents – speed and direction – were measured only seasonally.

Some climatic data, such as temperature, direction and speed of wind, were collected in situ. Water samples were collected to study phytoplankton and to analyse nutrient salts and chlorophyll-*a*.

Zooplankton was sampled by trawling at sea surface with a net of 17 cm diameter and a 100- $\mu$ m mesh size during 10 minutes. In addition, zooplankton was collected with fish eggs and larvae. All zooplankton was collected with the aim of studying the prey larvae and the predators of the eggs and the larvae.

Seasonal ichthyoplankton sampling was carried out by oblique Bongo-net tows at a ship speed of 3 knots and with a wire speed of 1 m/s. The same gear was used for each seasonal survey: a 60-cm-diameter Bongo-net (mesh size 335  $\mu\text{m}$ ). A *Hydrobios* flowmeter was placed in the mouth of the net to estimate volume filtered. Monthly sampling was carried out with a simple net of 47 cm diameter and a 300- $\mu\text{m}$  mesh size. The tows were made at the sea surface and at night during 15 minutes.

Zooplankton with ichthyoplankton samples were preserved in 4% buffered formaldehyde.

### Surveys

Four seasonal surveys were carried out in: summer, from 26 to 30 August 2002; autumn, from 21 to 25 October 2002; winter, from 13 to 17 February 2003; and spring, from 11 to 15 April 2003. The monthly surveys were started in February 2003 and until October we carried out nine surveys.

### 3. Results

We shall have data on environmental parameters. Meteorological data will be collected: temperature, wind speed and direction, atmospheric pressure, precipitation and evaporation.

Following plankton analysis, sorting, identification and counting, we shall have data on distribution and abundance of phytoplankton, zooplankton and ichthyoplankton. A data base will be established, perhaps using Access software. It will be interrogated for use in GIS applications (for example ArcView software).

### 4. Conclusion

Initially, the research programme on fish eggs and larvae has allowed the training of Tunisian researchers in sampling techniques which allowed seasonal and monthly surveys to be carried out in the Gulf of Tunis.

Currently, we need to identify species of eggs and larvae, particularly of small-pelagic species. Subsequently, we shall be able to localize specific spawning areas and nursery. In the future, we shall study daily growth and mortality. Then, we could study eggs and larvae in interaction with their environment.

### 5. References

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