

# Taxonomic Sufficiency for soft-bottom macrozoobenthos long term study – A case study in Corsica



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### Introduction

Soft-bottom macrozoobenthos is one of the bioindicators used to identify the ecological quality status. Their studies are time consuming and need expertises for identification. To palliate at those disadvantages, taxonomic sufficiency (Ellis, 1985) is one of the research axes and must allow to calculate ecological indices. It is tested on the M-AMBI, a worldwide used index, recognized as habitat-specific.

This work is within the framework of the STARE-CAPMED program dedicated to STATION of Reference and rEsearch on Change of local and global Anthropogenic Pressures on Mediterranean Ecosystem Drifts. It is a long term monitoring program which notably studies soft-bottom macrozoobenthos.

### Objectives

Our objectives are the

1. Definition of reference conditions (bad and high) for M-AMBI calculation around Corsica, by habitat types and identification levels,
2. Adaptation of M-AMBI for Corsica: the J'MAMBI and of ecological class boundaries,
3. Application on a case study in the framework of the STARE-CAPMED program,
  - ➔ For an identification of useful taxonomic sufficiency.

Table 1: Identification of habitat types existing in Corsica. X: granulometric median of the sample; S: Sandy clearing in posidonia meadow, SF: Fine sand; SG: Coarse sand; SM: Medium sand; SMG: Medium or Coarse sand

Depth range	[0-35[m	[0-10[m	[10-35[m	[35-m
Median				
X<250µm	S	SF; [0-35[	SF; [0-35[	SF; [35-
250µm≤X<500µm	S	SM; [0-10[	SMG; [10-35[	SM; [35-
X≥500µm	S	SG; [0-10[	SMG; [10-35[	SG; [35-

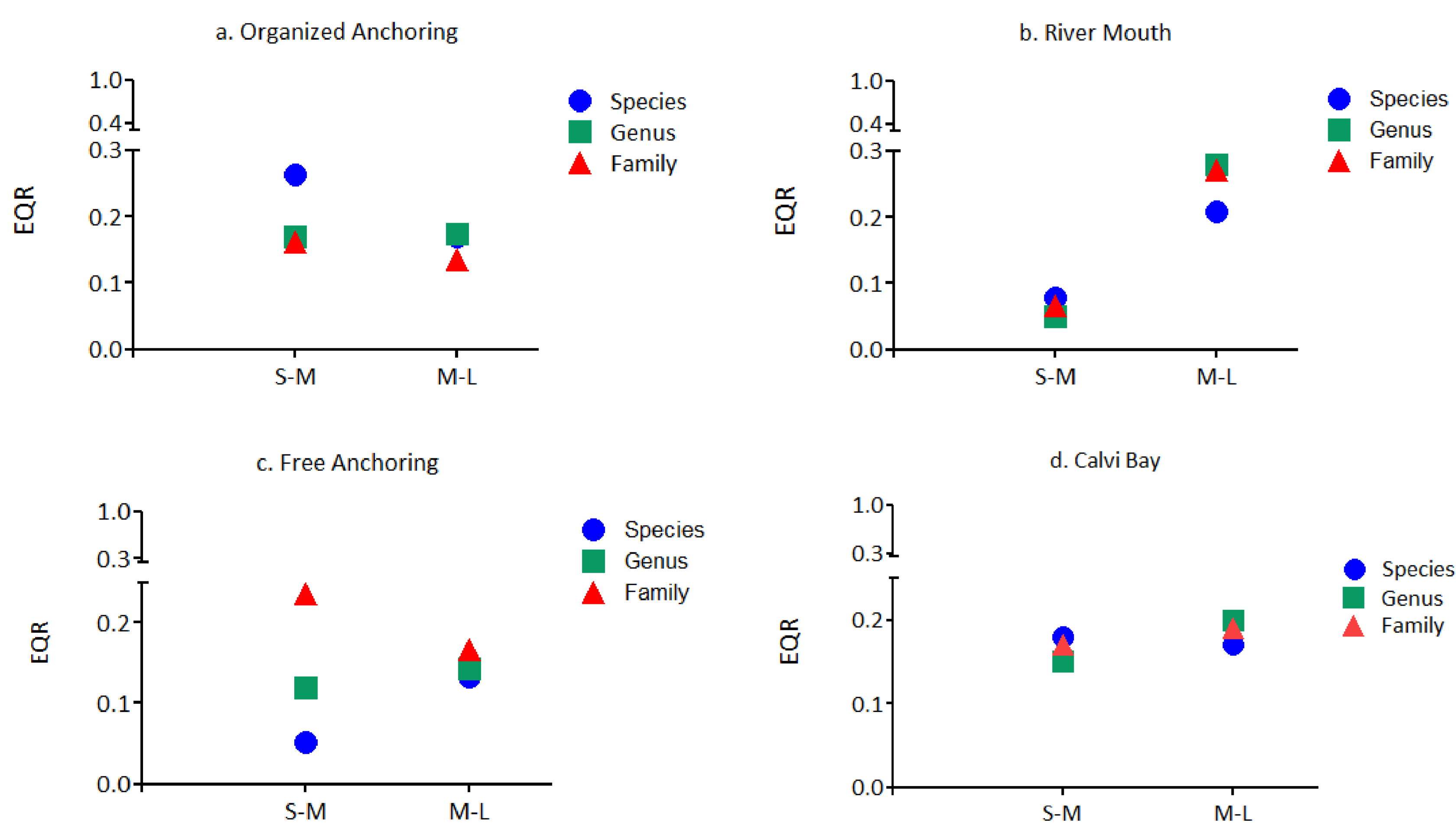


Figure 2 a-d: Evolution of **mean differences of EQRs** between populations sampled in different distances from a potential human influence source or at the Calvi bay level. S-M: Source-Mean distance difference; M-L: Mean-Long distance difference.

### Results

1. Eight habitats have been identified around Corsica (Table 1). For each habitat, reference conditions were determined at species, genus and family level. There are significant correlation between species and genus or family levels ( $R^2 = 0,93$  or  $0,75$ ,  $p < 0,05$ ).
2. Weighting by the J' Piélou index allows to refine result of the M-AMBI index,
3. In Calvi bay, ecological quality status were evaluated as high, good or moderate. The variation of Ecological Quality Ratios (EQRs) of macrofauna assemblages between distances from the source of influence vary between identification levels and from one impact to another (Figure 2a-c). These variations are smoothed when working at the bay scale (Figure 2d). Moreover, differences exist between samplings done in spring or in late summer (Figure 3).

### Material and Methods

198 stations around Corsica between 2006 and 2012 were used to identify habitat types via Permanova and Canonical Analysis of Principal coordinates with the add-on Permanova for PRIMER (Anderson et al., 2008; Clarke and Gorley, 2006).

90 stations were used to identify high and bad reference conditions for each habitat and identification levels.

A weighting of the M'AMBI values by Piélou Index (J'-1966) was postulated given the J'MAMBI.

Reference conditions and J'MAMBI were tested on 14 stations located in Calvi Bay (Figure 1) sampled during spring 2011 and late summer 2012 in the framework of the STARE-CAPMED program.

By comparison of results at different identification levels, taxonomic sufficiency was determined.

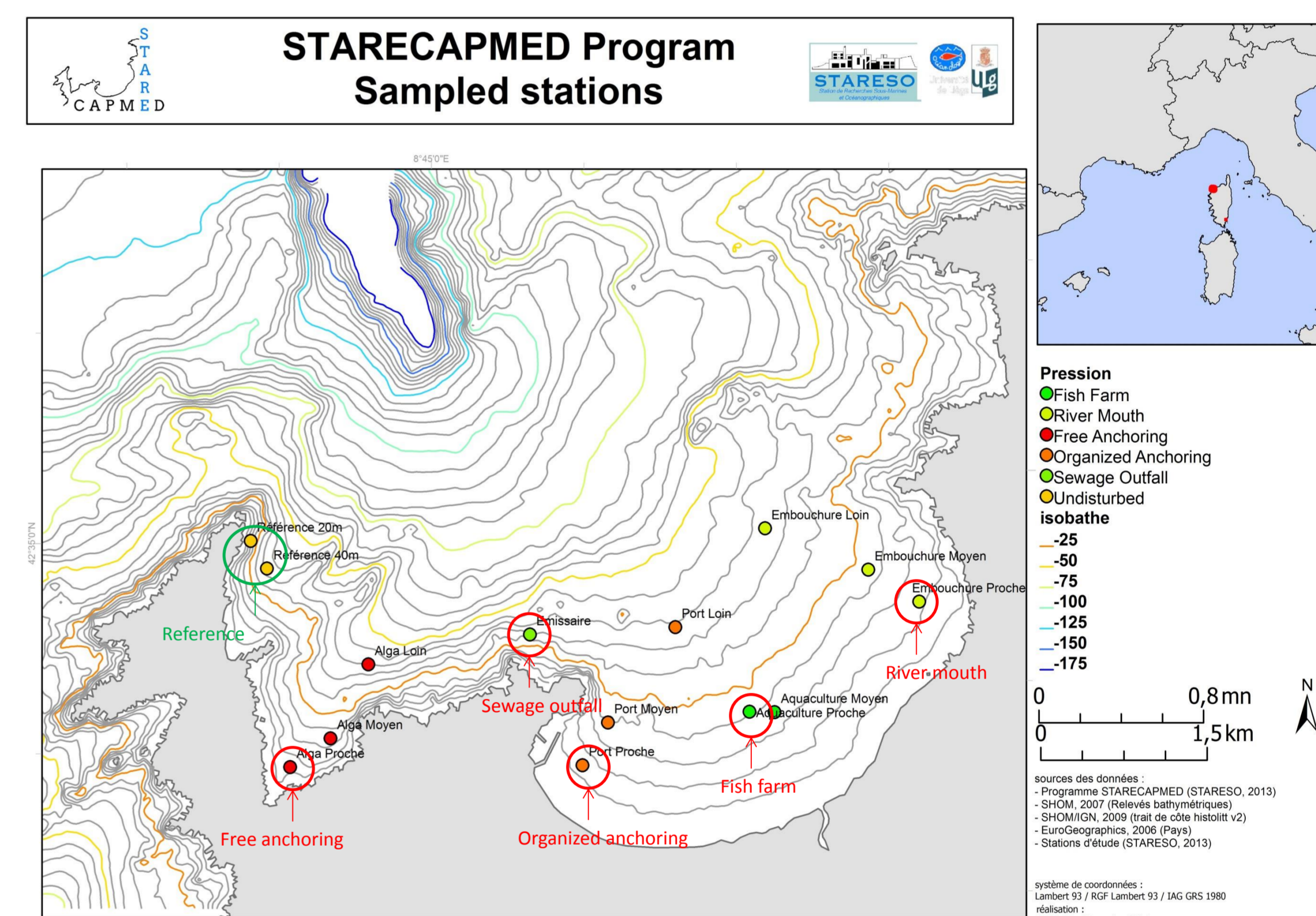


Figure 1: Sampled stations in Calvi bay

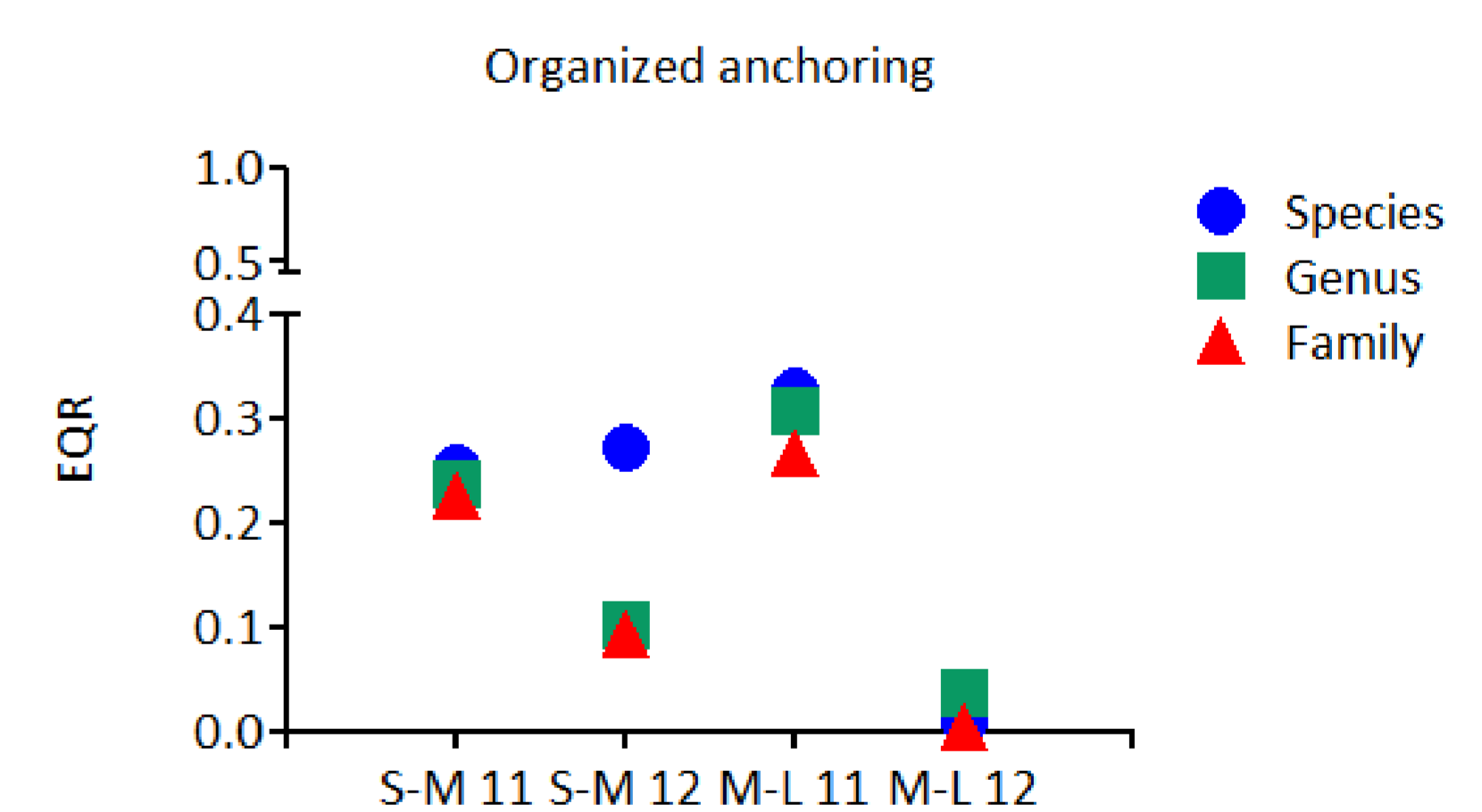


Figure 3: Example of **variations of EQRs** on organized anchoring plan influence at **two sampling periods**. S: source; M: Mean distance from the source; L: long distance from the source. 11: **spring 2011**; 12: **late summer 2012**.

### Conclusions

In the case of weak human influences, J'MAMBI allows to refine difference between stations.

For a general overview, family level seems to be sufficient but not to follow influences independently or depending of the season.

### Bibliography:

Anderson, M.J., Gorley, R.N., Clarke, K.R., 2008. PERMANOVA+ for PRIMER: Guide to Software and Statistical Methods. PRIMER-E, Plymouth, UK./Clarke, K.R., Gorley, R.N., 2006. PRIMER v6: User Manual/Tutorial. PRIMER-E, Plymouth./ Ellis, D., 1985. Taxonomic sufficiency in pollution assessment. Marine Pollution Bulletin 16, 459/Pielou, E.C., 1966. The measurement of diversity in different types of biological collections. Journal of Theoretical Biology 13, 131-144.

