

## Introduction

The loss of key biological habitat is expanding, impacting ecosystems and the marine environment, particularly the French Atlantic coast. Artificial structures, known as artificial reefs (ARs), can be used to recreate key habitats and protect biodiversity. In 1999, in response to the decline of fish resources along the Landes coast, ARs were installed. The monitoring protocols for ichthyofauna are carried out by volunteer divers from the Atlantique Landes Récifs (ALR) association. A total of 3 structures were installed at 3 locations along the Landes coast (FIG N°1). The aim of this study is to identify whether the structure itself and the location of the ARs have an influence on the assemblages of ichthyofauna.

## Materials & methods

The data was acquired through underwater visual censuses carried out by volunteer divers from ALR, employing a standardized method specifically tailored for artificial reefs.

The data collection was focused solely on ichthyofaunal observations during the period from 2018 to 2022, encompassing two distinct structures named 'Babel' and 'Typi' (FIG N°2). These structures were deployed across three distinct locations. Subsequently, the gathered data underwent transformation into abundance and species richness matrices.

The ensuing statistical analysis was conducted utilizing the R software, employing PERMANOVA to assess significance. Significant results were further examined via SIMPER analysis, and graphical representation was achieved through nMDS (non-metric multidimensional scaling).

TAB N°1: results from the 3-factors PERMANOVA looking at the effect of location and structure on fish communities and the time factor.

	Species richness					Community abundance						
	df	Sum Sqs	Of	R2	F	P-value	df	Sum Sqs	Of	R2	F	P-value
<b>Structure</b>	1	0.12886		0.044	4.842	0.02	1	0.304		0.019	1.451	0.159
<b>Location</b>	2	0.309		0.106	5.086	0.003	2	1.746		0.109	4.319	0.0001
<b>Structure:</b>	4	0.313		0.108	2.942	0.09	4	2.130		0.133	2.545	0.124
<b>Location</b>												
<b>Structure: Years</b>	4	0.188		0.064	1.768	0.09	4	0.729		0.045	0.871	0.670
<b>Location: Years</b>	8	0.641		0.221	2.642	0.011	8	1.942		0.121	1.201	0.126

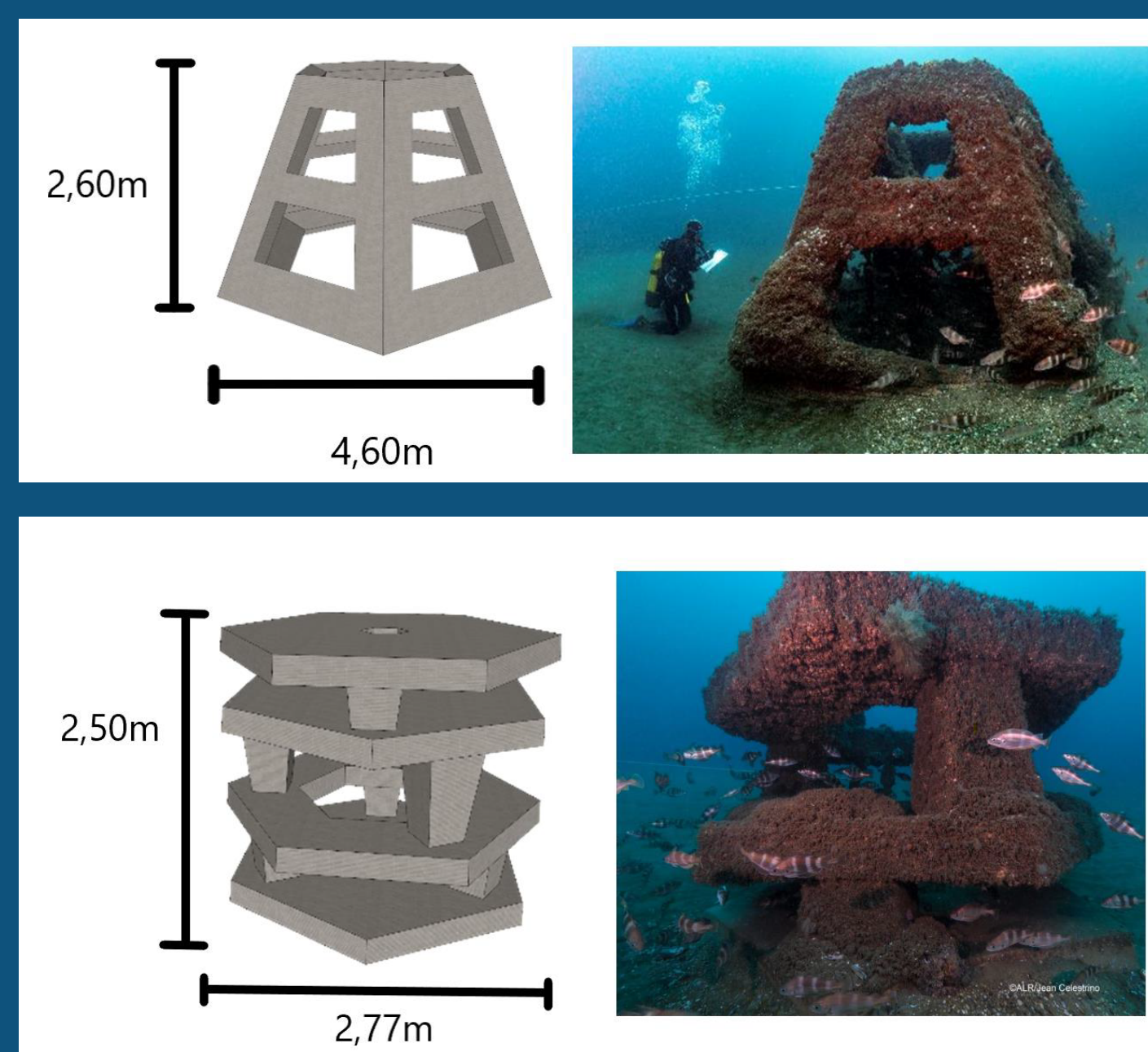
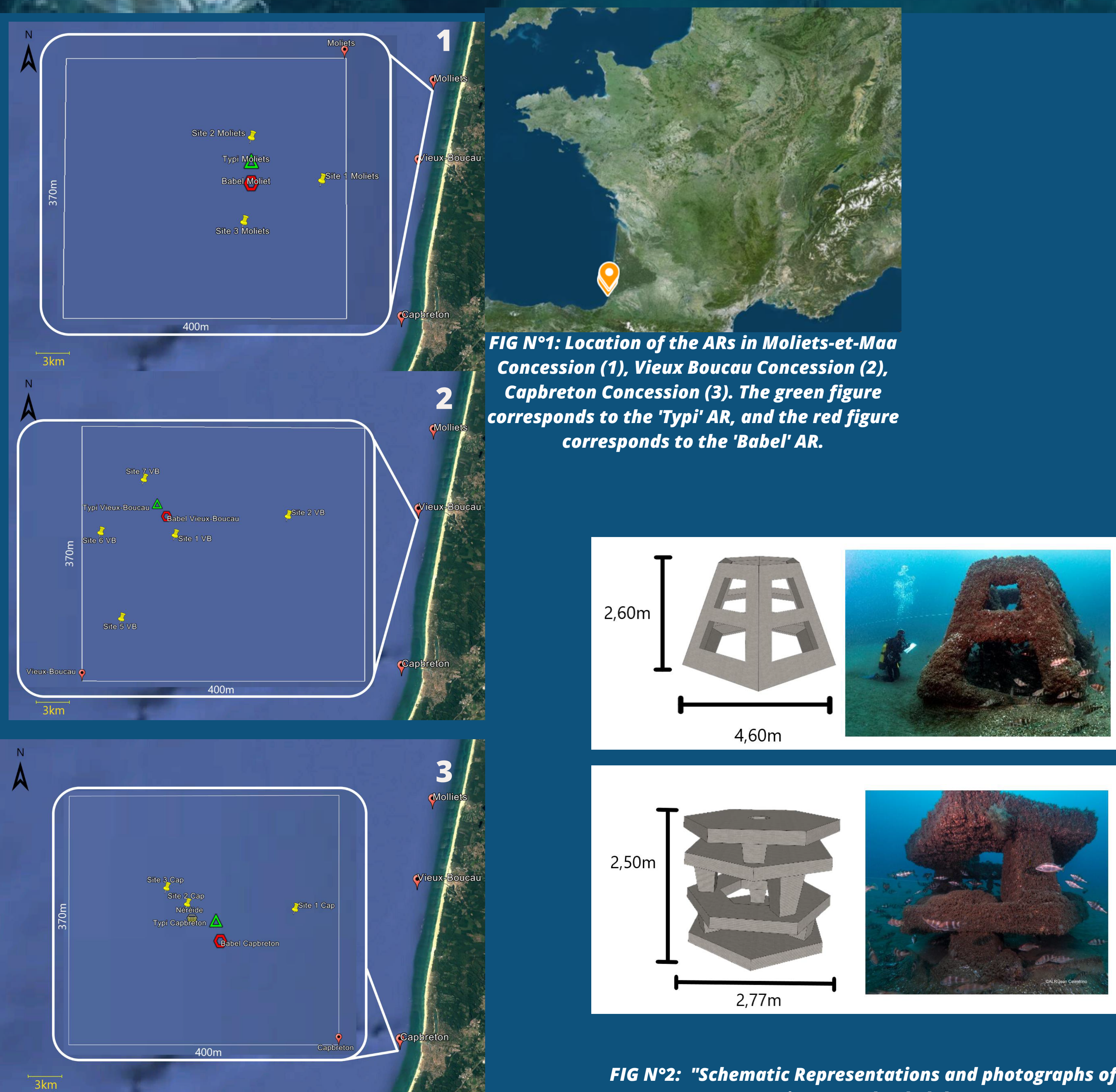


FIG N°2: Schematic Representations and photographs of ARs: Typi (top) and Babel (bottom)

## Results

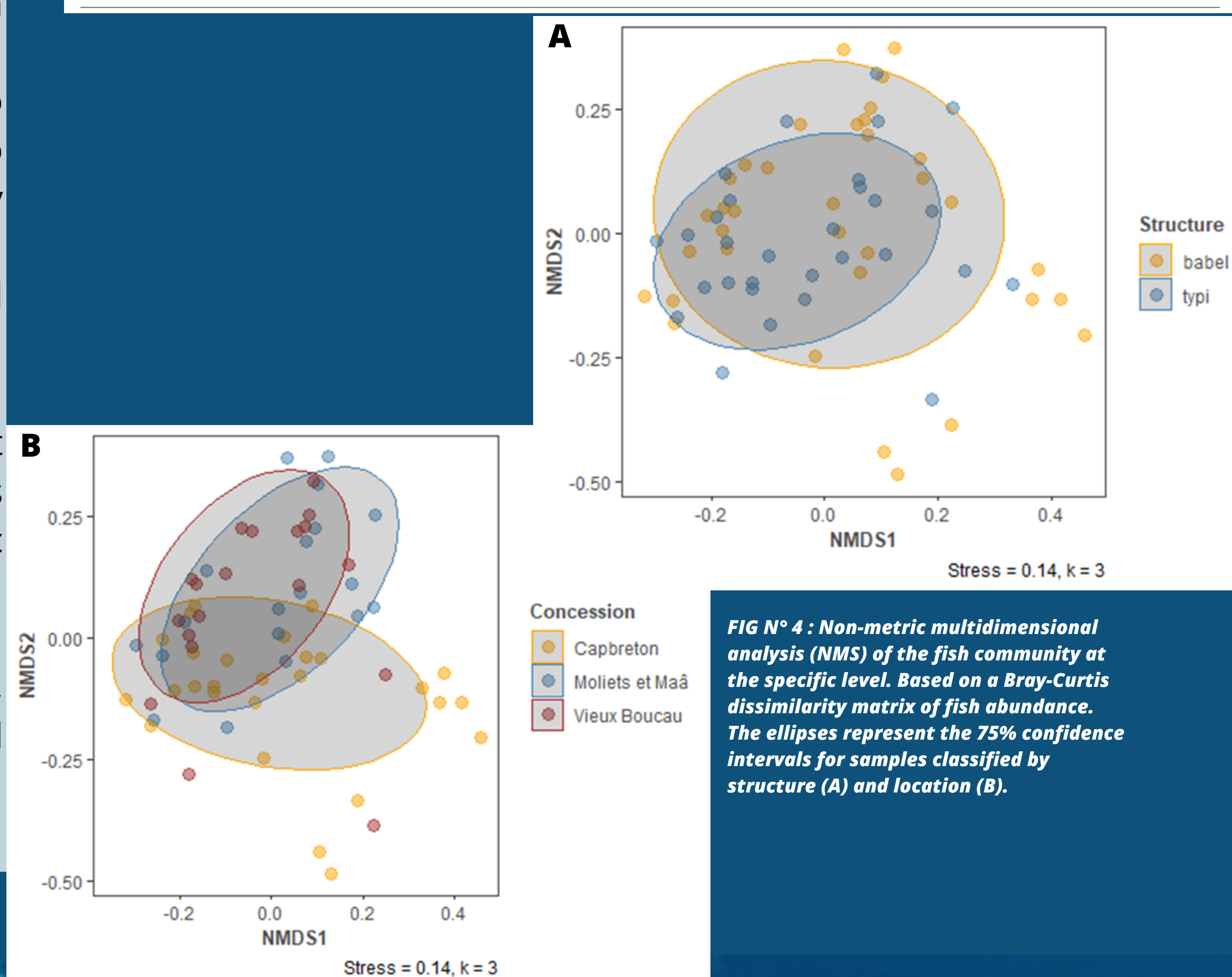
A total of 65 UVCs were conducted identifying 39 species of fish between 2018 and 2022.

There were significant differences in species richness between the two structures "Babel" and "Typi" (TABN°1). However, there were no significant differences in the abundance of the fish community between these two structures.

The location had a significant influence on both species richness and community abundance.

The SIMPER analysis identified "Capbreton" as the most different location in terms of fish species composition and abundance. This result was further confirmed by the NMS (non-metric multidimensional scaling) analysis.

The temporal variation strongly influences species richness, community abundance, on the structural aspect, and spatial distribution of ARs.



## Discussion/Conclusion

The structural differences between the two types of artificial reefs have minimal impact on overall abundance but do affect the number of species present on each reef. Caution is advised due to significant variations in species richness between the structures, which may be influenced by their close proximity within each concession. This can be explained by the movement of pelagic species between them (confirmed by photo identification on one species). The Capbreton concession stands out with distinct species assemblages and specific richness attributed to factors like the immediate presence of the Gouf, a natural rocky area with a critical nursery function and feeding area for various species.

In conclusion, understanding the influence of structural differences on artificial reefs is essential for effective AR management and coastal planning, particularly considering specific environmental factors for reef placement.