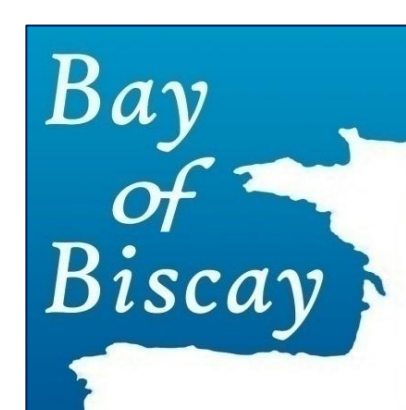


# Does spatial distribution of fauna depend on algal belts on intertidal boulder fields of the French Basque coast ?



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## Introduction

For coastal waters conservation and in the context of European directives (WFD: Water Framework Directive, MSFD: Marine Strategy Framework Directive), good ecological status of water and conservation of marine ecosystem should be achieved.

Since 2008, for the WFD, a protocol has been adapted from Brittany, on the water body "Basque coast" for the indicator "intertidal macroalgae" to qualify the ecological status. Methodological approach is needed to implement this indicator with the integration of fauna, because knowledge are lacking on biodiversity and spatial distribution for this specific area.

The aim of this work is to describe the spatial distribution of fauna on the habitat "boulder fields" (Corine code 1170-9) on the Guéthary Natura 2000 site "rocky Basque coast and offshore extension". The main objective is to confirm if spatial distribution of fauna depends on algal belts. If yes, it is necessary to identify species which discriminate the spatial distribution.

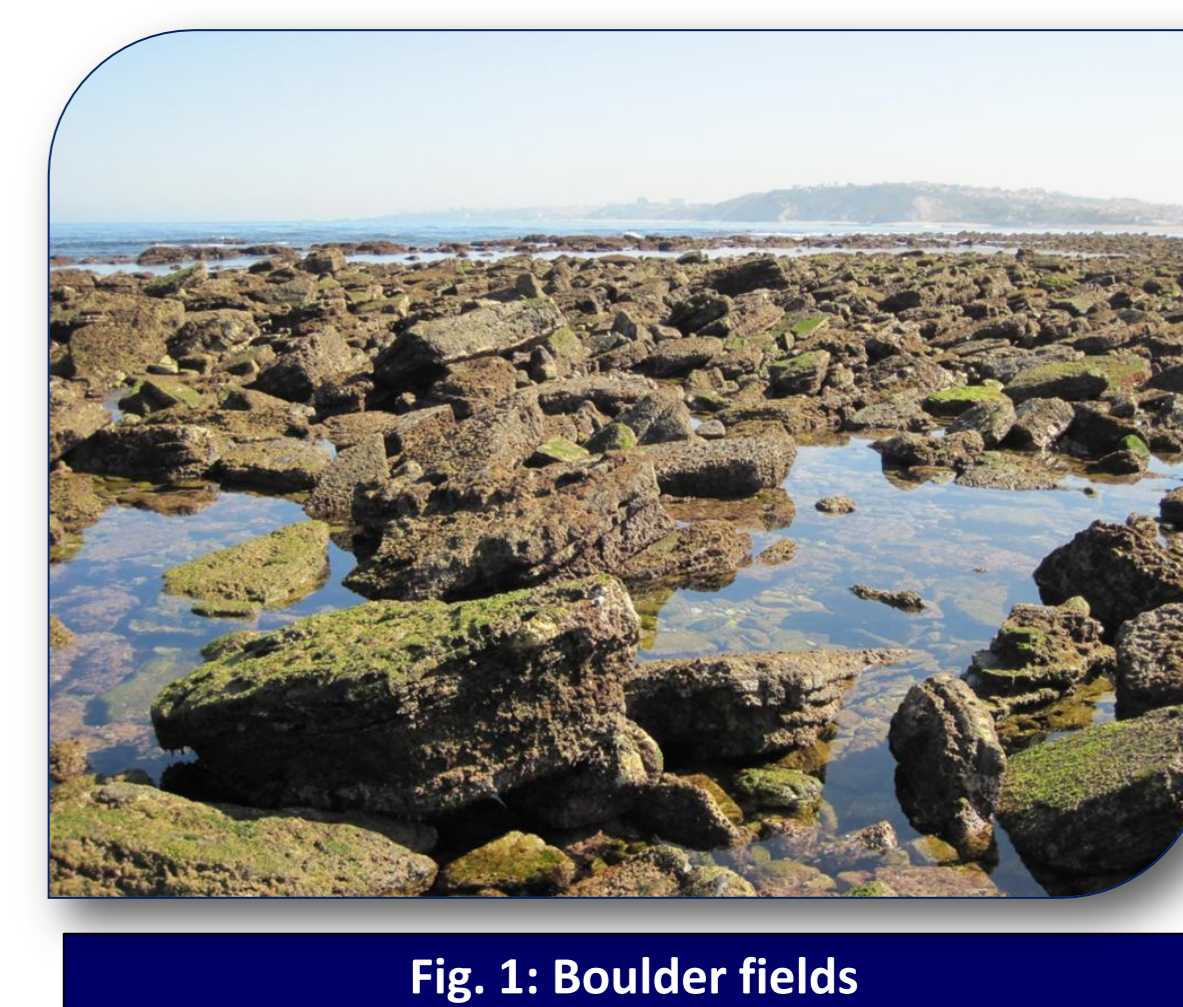


Fig. 1: Boulder fields

## Materials & Methods

➤ Two microhabitats have been identified and sampled on the boulder fields from algal belts defined during the WFD:

- Upper mediolittoral (*Halopteris scoparia* and *Gelidium spp.* belt)
- Lower mediolittoral (*Corallina spp.* and *Caulacanthus ustulatus* belt)

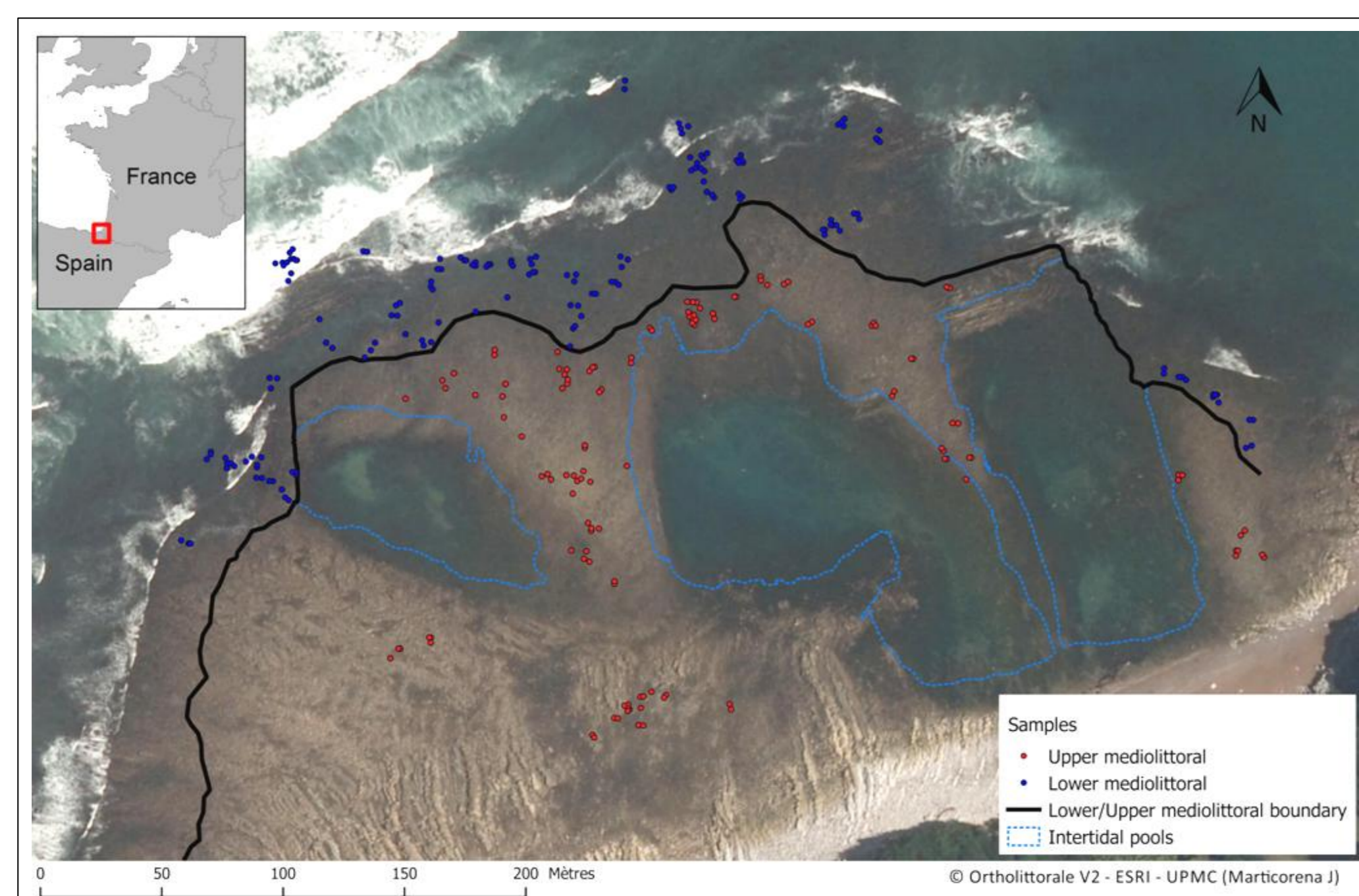


Fig. 2: Map of Guéthary rocky shore showing the study site and the sampling plan

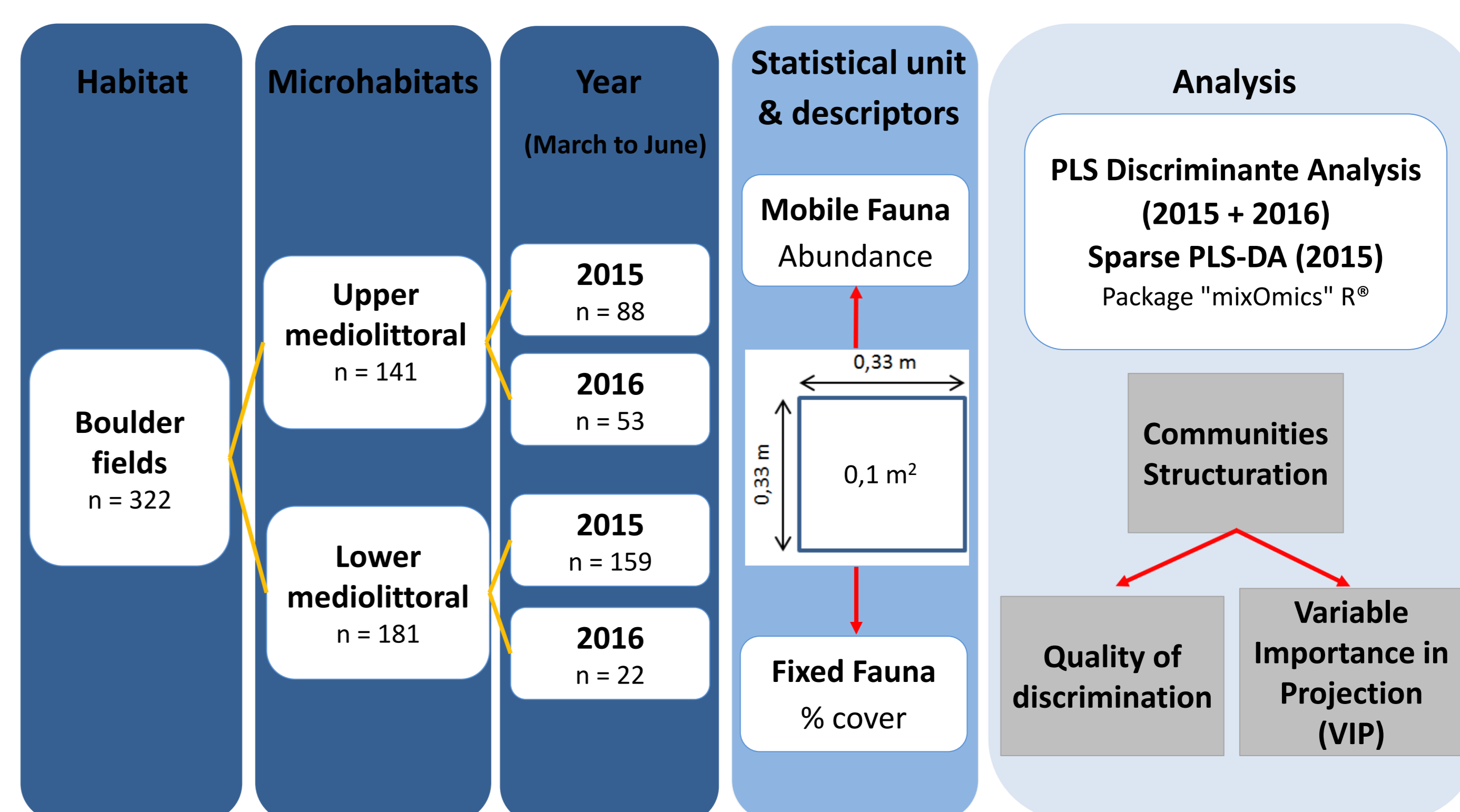


Fig. 3: Experimental design and methods

➤ PLS-DA and Sparse PLS-DA were performed on taxa matrix (mobile and fixed fauna) in order to study communities structuration, quality of discrimination and VIP.

➤ Two-way Anova, based on factor coordinates of PLS-DA, were used to assess microhabitat and year effects.

## Results

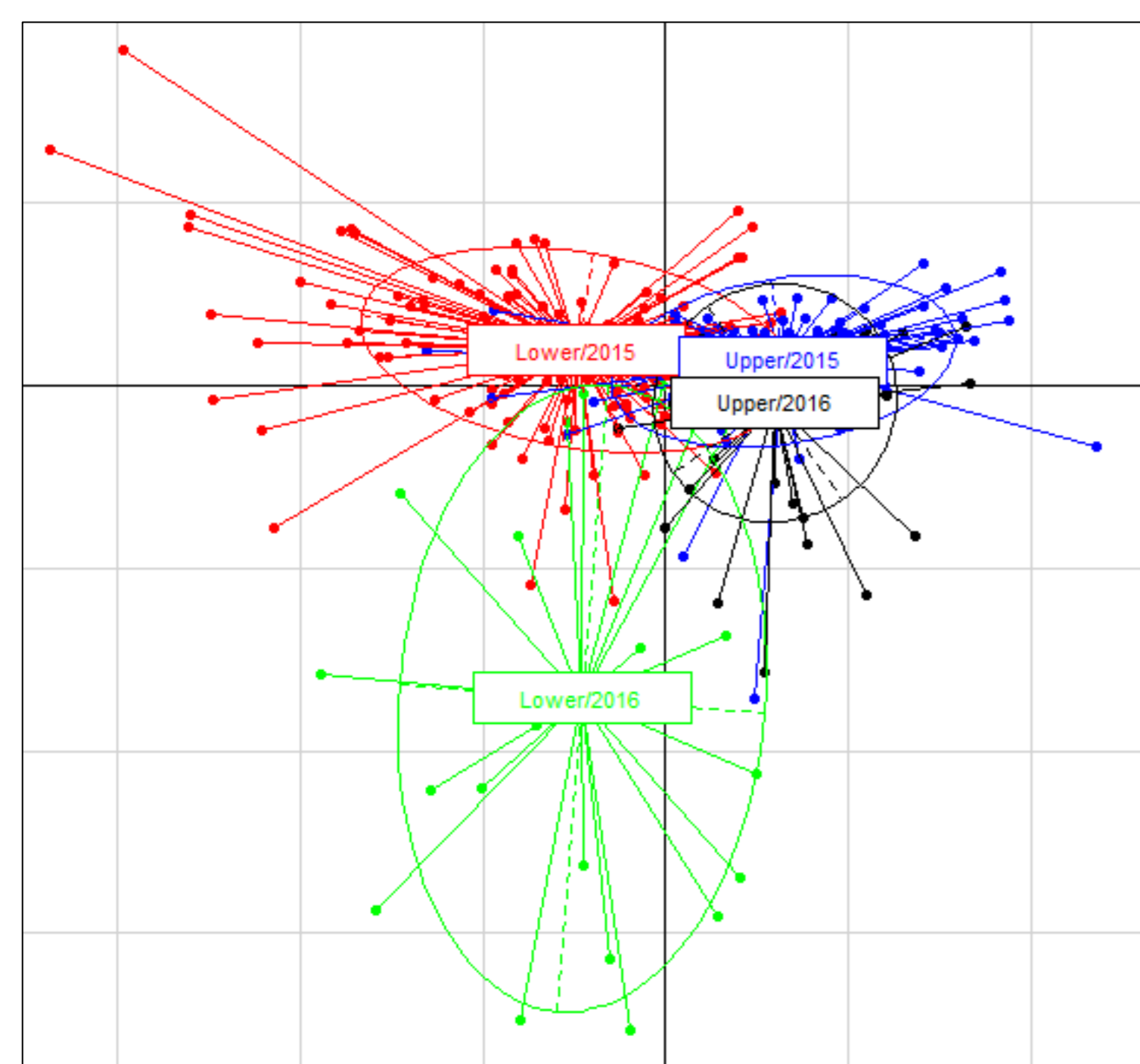


Fig. 4: Result of PLS-DA based on distribution of mobile and fixed fauna (82 taxa) sampled in two microhabitats (Lower and Upper mediolittoral) of boulder fields in 2015 and 2016

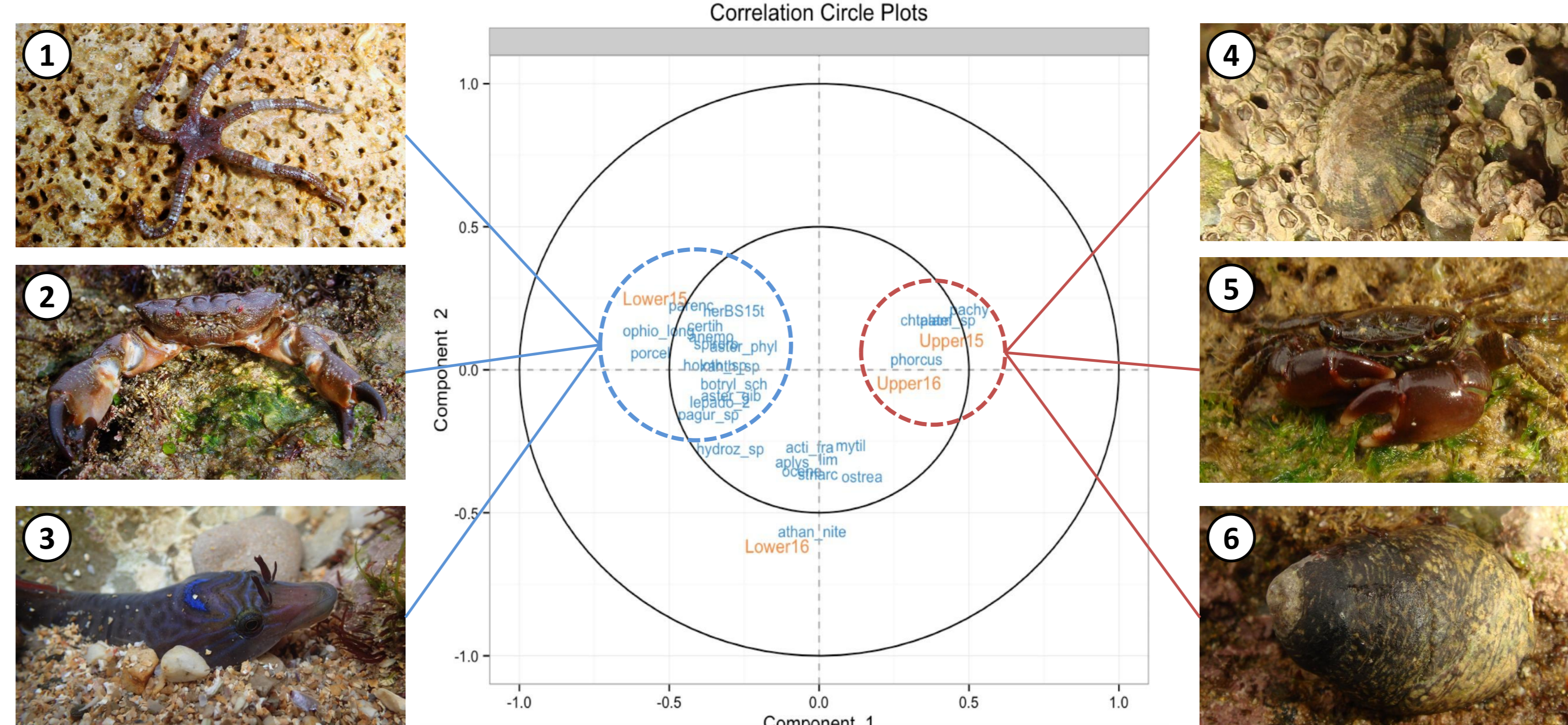


Fig. 5: Correlation circle of variables of PLS-DA (F1 x F2). Only taxa contribution upper than 0.25 are drawn

Tab. 1: Sparse PLS-DA VIP with taxa characteristics of upper mediolittoral (red) and lower mediolittoral (blue)

VIP	
Z	<i>Pachygrapsus marmoratus</i> 5
	<i>Patella sp.</i> 4
	<i>Chthamalus sp.</i> 4
	<i>Phorcus lineatus</i> 6
Z	<i>Mytilus edulis</i>
Z	<i>Ostrea edulis</i>
	<i>Porcellana platycheles</i>
	<i>Ophioderma longicauda</i> 1
	<i>Anemonia viridis</i>
	<i>Lepadogaster lepadogaster</i> 3
	<i>Xantho spp.</i> 2
Z	<i>Botryllus schlosseri</i>
	<i>Spirobranchus spp.</i>
	<i>Spirorbinae</i>
	<i>Cerithium spp.</i>

Z: ZNIEFF determinant species

➤ PLS-DA shows microhabitat and year effects (Fig. 4):

- ✓ 1<sup>st</sup> axis discriminates fauna distribution between lower and upper mediolittoral zones (Two-way anova, p-value < 2.10<sup>-16</sup>).
- ✓ 2<sup>nd</sup> axis highlights a relevant annual variability in lower mediolittoral samples (p-value < 2.10<sup>-16</sup>) but not in upper mediolittoral (p-value = 0.9).

➤ Sparse PLS-DA revealed 15 important taxa (VIP>1) to discriminate microhabitats in 2015 (Fig. 5; Tab. 1):

- ✓ Upper mediolittoral is characterized by 6 taxa with high abundance.
- ✓ Lower mediolittoral is more diversified, 9 taxa are revealed.

➤ The best model to discriminate algal belts is obtained using 32 taxa, with a miss classification estimated at 17.8 % (Fig. 6).

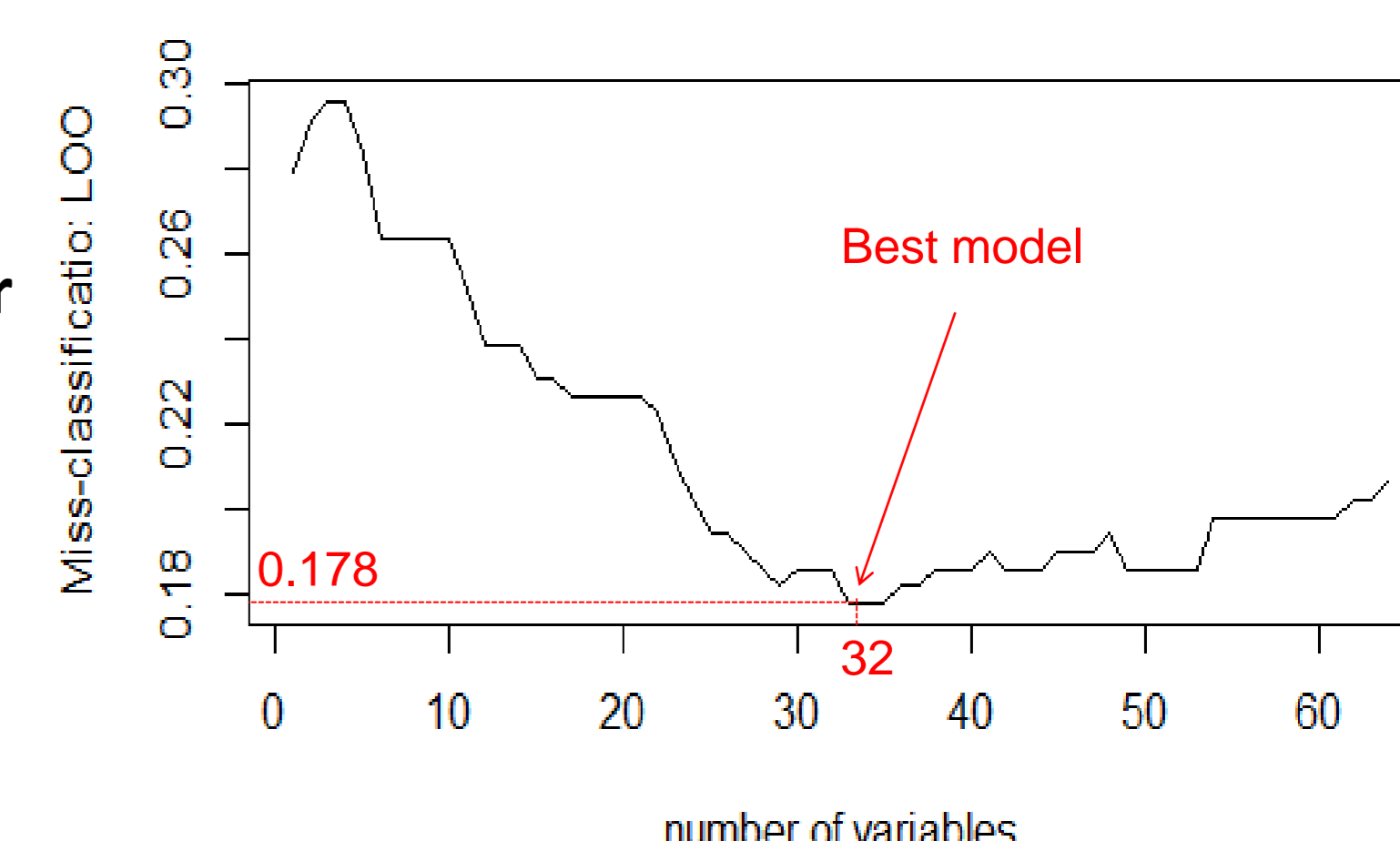


Fig. 6: Summary of cross validation of sparse PLS-DA

## Discussion

➤ As in Brittany, the faunal spatial distribution in boulder fields of Guéthary depends on algal belts described in WFD.

➤ Study is ongoing. So, the variability observed in lower mediolittoral in 2016 could be explained by seasonality, low sample size (n = 22) and taxa occurrence.

➤ 15 statistical important taxa were revealed. However a specific attention will be necessary in future works to qualify the ecological status including biogeographic characteristics.

An ecological approach is necessary to improve the assessment of the habitat quality and its functionality (opportunistic, introduced, distribution limit...). Those results contribute to enhance the sampling plan of intertidal ecosystem assessment with relevant indicators.