COMBINING SPATIAL STATISTICS, OMICS TOOLS AND PASSIVE ACOUSTICS: A NEW INTEGRATIVE APPROACH TO GET AT KEY PROCESSES OF A MARINE SONIFEROUS PREDATOR EXPLOITING TRAWLING FISHERY AND TO INFER ITS TROPHIC SPECTRUM

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The bottlenose dolphin (*Tursiops truncatus*, hereafter BD) is classified as an "ecologically relevant" species for the EU Marine Strategy Framework Directive (MSFD) and is often used as a model to assess the status and detect changes in different coastal habitats worldwide. Investigating BD trophic ecology and assessing the overlap between BD and human activities is particularly crucial in coastal areas subject to considerable anthropogenic pressures, in order to address appropriate conservation measures and set effective spatial management actions. In the Tyrrhenian Sea (Western Mediterranean Sea), the extreme BD adaptability allows it to consume different food resources depending on local availability, including the opportunistic exploitation of fisheries' activities, especially following bottom trawlers. Indeed, trawling may alter the species' distribution within the area, both directly (by attracting dolphins in specific feeding sites) and indirectly (by lowering its target preys' availability), thus requiring an appropriate modelling approach able to capture these interactions. In addition, BD exhibits soniferous behaviour, emitting various sounds with significant acoustic variability and complexity in different foraging contexts. This has led researchers to speculate that this species may modify its acoustic behaviour in response to the presence or abundance of specific prey.

In this PhD project both issues will be addressed in the Tiber River estuary area, a well-known area of feeding for BD, with the aim of testing the two following hypotheses: 1) Fishing trawlers' presence, together with prey availability and diversity, are important drivers and good predictors of BD distribution in the area and testify the strong relationship between BD and fishers; 2) BD acoustic repertoire, and its expression pattern, change in relation to the potential targeted prey inside/near the trawling net.

The distribution of trawling effort in the area will be estimated based on VMS and AIS data, and landings data (*i.e.*, kg of species catch by fishing vessels) will be used to estimate BD prey availability in the environment. A presence-only SDM approach will be applied to describe and predict the likelihood of BD presence in the area in relation to preys' biomass, likelihood of trawlers' presence, and different environmental parameters (*e.g.*, SST, distance from the coast). The spatial and temporal correlations (if any) between BD presence and fishing hot spots or activity of some vessels will be investigated. Secondly, BD vocalisations emitted during the feeding will be recorded in boat-based surveys using a towed hydrophone. BD trophic spectrum (*i.e.*, range of potentially consumed prey items) during each feeding event, with a special focus on the catch compositions of fishing vessels operating in the same area and the structure of the marine communities, will be inferred by eDNA metabarcoding. BD acoustic repertoire variability will be modelled in relation to its target preys' presence or abundance through different multivariate analysis tools and functional data analysis.