Use of new technologies (bioacoustics and GIS) to analyze interactions between bottlenose dolphin and fish farms in "Serra Gelada" Marine Reserve (Alicante, Spain).

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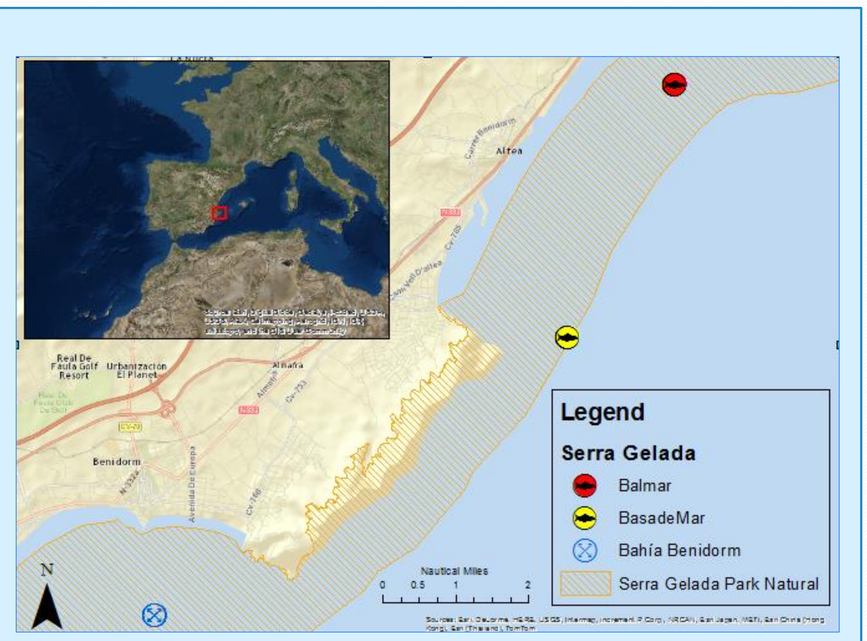
INTRODUCTION

In this project we have studied the patterns of presence of bottlenose dolphins (*Tursiops truncatus*) by biocustic devices (T-PODs) which were located on fish farms of Basademar and Balmar and in a buoy in the bay of Benidorm. To better understand the presence of cetaceans, the sounds were visualized on a map thanks to the software ArcGIS.

The information collected through the T-PODs, and other additional data, were incorporated into the Arc Marine data model developed by ESRI. The creation of the geodatabase is an initiative to benefit the user in order to organize and manage the data in a more rational manner. All this in order to better analyze the data.

Three points were selected to deploy the TPODs; two of them were located on demarcation buoys installed in the aquaculture farms (Balmar and Basademar) in the Serra Gelada Natural Park (Valencia, Spain) and a third in the bay of Benidorm.

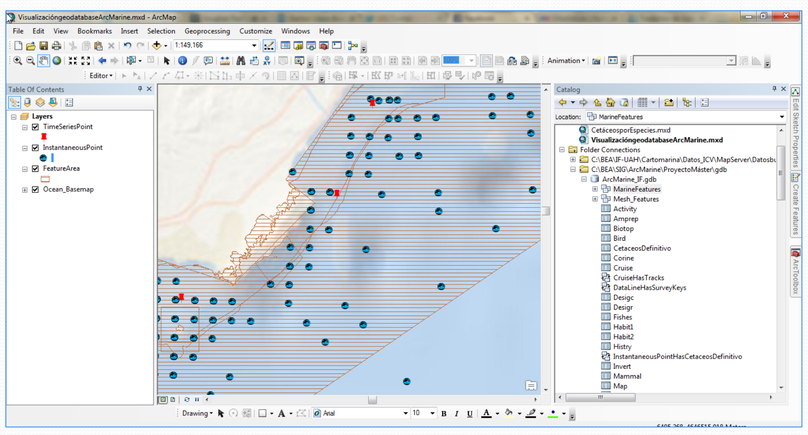


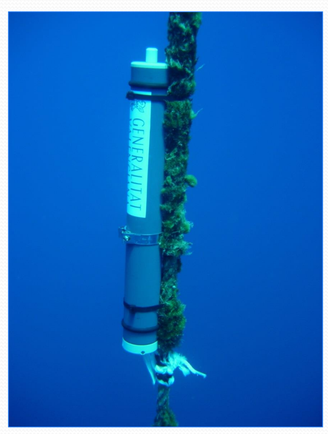
MATERIALS:

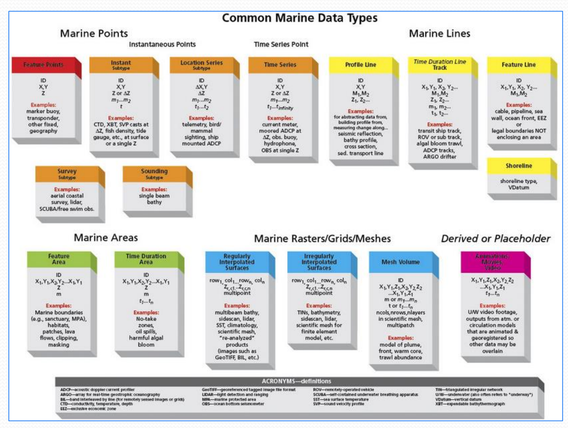
-Passive acoustic devices : T-PODs

-Arc Marine data model of ESRI

- "Time Slider" toolbox of ArcGIS







RESULTS:

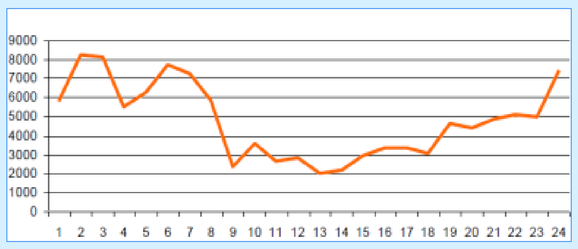
1. Arc Marine Data Model:

1."*Feature area*" (feature class): representing marine protected areas "MPA Area"; 2."*Instantaneous Point*" (feature class): representing observations of cetaceans; 3. Table "*Definitive cetaceans*" (object class): observations of cetaceans; 4."*InstantaneouspointHasCetaceosDefinitivo*" (relationship): this connection was created to link the table "definitive cetaceans "with the feature class "Instantaneous Point"; 5. "*Time Series Point*" (feature class): representing the location of the acoustic devices; 6. "*TSType*" (object class): Table where the cetacean data and the characteristics of the bioacoustic devices are saved; 7. "*Time Series*" (object class): This table records the data time logged by the bioacoustic devices; 8. "*TSTypeHasTime Series*" (relationship); 9."*TimeSeriesPointHasTSType*" (relationship).

2. Daily and Seasonal pattern of cetaceans and the Encounter Rate:

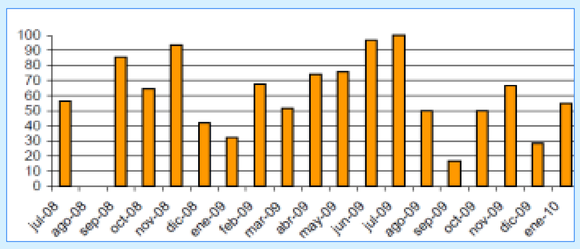
Graph 1: Daily pattern

The presence of dolphins is greater during night time.



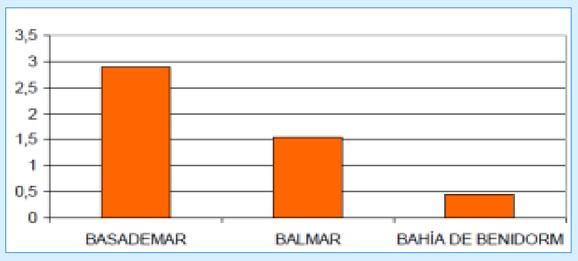
Graph 2: Total positive days

The presence of dolphins in the study area occurs throughout all year.

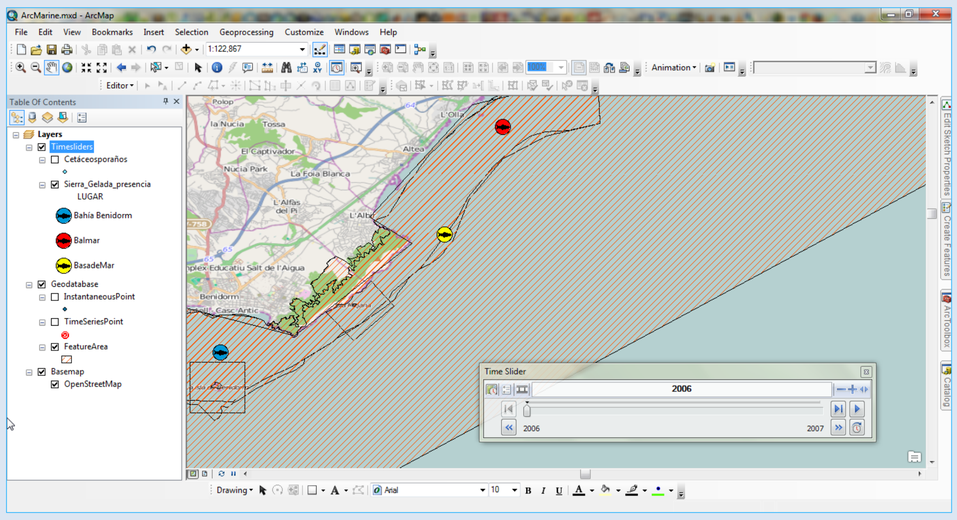


Graph 3: Encounter rate/day

The presence of dolphins is greater in areas near fish farms than in the control area .



3. Arc GIS project with "time slider" tool:



CONCLUSIONS

-It can be concluded that the presence of fish farms in the study area produce an attractive effect on dolphins in the protected area.

-"Arc Marine" is a totally affordable data model and provides wide versatility for marine data storage.

-The merge of the passive acoustic devices together with the "time slider" tool could help to understand the distribution of cetaceans in a given area. The possibility of using the "time slider" tool using the data obtained in real time acoustic devices must be considered in the future like as a practical application.

-This multidisciplinary approach can help managers during their decisions making, specially in protected areas.

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