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Ocean Science Discussions

Interactive comment on "Ecological niche of three teuthophageous odontocetes in the northwestern Mediterranean Sea" *by* E. Praca and A. Gannier

Anonymous Referee #1

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Praca and Gannier examine the ecological niches of three teuthophageous oconto-cetes in the northwestern Mediterranean Sea using Ecological Niche Factor Analysis (a presence-only habitat modeling technique) and discriminant analysis. The spatial resolution of the analysis was 9x9km. The ecological variables investigated include depth and slope of the seafloor, distance to the 200m depth contour, SST, SST fronts, sea surface salinity, and chlorophyll concentration. The ecological variables that exhibit temporal variability were averaged across two seasons ("summer" = June - August, and "phytoplankton bloom" = February - April) and over the ten years of the study period. This paper built upon previous studies by analyzing data collected over a larger spatial extent than previous cetacean-habitat analyses for the NWMS.

General Comments I agree with Referee #2 in that the manuscript needs to be thor-

oughly edited for grammar, punctuation, and selection of particular words and phrases; however, I consider such issues to be easily corrected and not worth dwelling on. On a technical note, I have several comments, which I will mention here and elaborate upon below in my "Specific Comments." First, I do not think the authors sufficiently justified their choices of analytical methods, and I think the "Data collection and standardisation" section left out details that are necessary for evaluating the appropriateness of the methods they selected. Second, the manuscript could be improved by providing more details about the model evaluation methods applied, including "rules of thumb" regarding what constitutes a "good" model.

Specific Comments 1. Justification of analytical methods The authors justify the application of ENFA to their data on p.5: "'True' absence data (when animals are actually absent) are not easy to collect for mobile or inconspicuous species, such as cetaceans which are able to spend long periods underwater. Biases may be caused by 'false' absence data, when animals are present but not detected. For pilot whales and Risso's dolphins, such biases could not be avoided by the use of acoustic data collected along the survey track, as for sperm whales. Then we chose to use a presence-only method: the Ecological-Niche Factor Analysis (ENFA)." This justification is insufficient and somewhat misleading. A primary distinction between presence-absence methods (such as GLMs or GAMs) and presence-only methods (such as ENFA) is that the former are calibrated by the absences and, therefore, result in probabilities of occurrence, whereas the latter are not calibrated, producing only relative measures of "habitat suitability." False absences can cause biases in presence-absence methods to the extent that probabilities of occurrence may be underestimated, but this is no different than considering such results to be a relative measure, such as the output from ENFA. If detection probability is homogeneous, presence-absence methods will not result in spatially biased predictions. In fact, presence-absence methods are more appropriate for analyzing data that were not collected systematically or randomly with respect to the study area. The authors did not state how their survey was designed, so the reader is unable to determine whether presence-only methods were appropriately ap-

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plied in this respect. Furthermore, presence-absence methods address a very different question than presence-only methods do: the former are used to estimate or predict the probability of animal occurrence given a suite of ecological variables, whereas the latter are used to estimate the POTENTIAL for a given habitat to be favorable for a given species (Zaniewski et al., 2002). That is, presence-absence methods identify where a species is likely to occur, whereas presence-only methods address the question of "potential biodiversity." Thus, the goal of the study should partially determine whether one applies a presence-absence method or a presence-only method to analyze cetacean-habitat data. The authors cite Brotons et al. (2004) on p.10 to justify their use of ENFA, but the reader is left to wonder whether the authors correctly interpreted the message in Brotons et al. (2004). In particular, Brotons et al. (2004) state in their abstract that, "Models for wide-ranging and tolerant secies were more sensitive to absence data, suggesting that presence/absence methods may be particularly important for predicting distributions of this type of species." Could the sperm whales of the NWMS be considered "wide-ranging and tolerant"? Brotons et al. (2004) add, "Our results suggest, however, that if absence data is available, methods using this information should be preferably used in most situations." In general, I believe that if there is a question as to whether one type of analysis should be preferred over another, both analytical techniques should be applied and their results compared. In addition, both ENFA and discriminant analysis are fundamentally linear methods. The authors provide no discussion on why they believe the relationships between the cetaceans they examined and the predictor variables included in their models should be linear. Without such insight, it is often wise to apply a method that can incorporate non-linear or non-parametric methods. Finally, the authors state on p.10 that, "our modelling strategy was to attempt a global description in a temporally and spatially heterogeneous area," yet they provide no rationale for pooling ecological variables that exhibit inter-annual variability together for use in their analysis.

2. Elaboration of model evaluation methods I think that my concerns regarding the model evaluation methods are best addressed on a point-by-point basis.

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[p.5, paragraph 2, suggested edit] "HS values range from zero to 100: a cell adjacent to the median of an axis would score 100 and a cell outside of the species distribution would score zero."

[p.5, 1st para under "Model validation"] Move definition of Boyce Index from p.6 to directly after the first sentence of this paragraph.

[p.6, eqns (1), (2), (3)] It is unclear what the authors mean by "validation cells." I assume this is the set of presences contained in the validation data set. If so, this should be explicitly stated. Similarly, what cells are used to compute A_i and sum(A_i)? Is A_i the collection of cells in the study area, regardless of whether they contained a "presence," that belongs to a given HS window i? Finally, is there a rule of thumb for what indicates a good fit based on B? This is important information for a reader to evaluate the analysis.

[p.6, 1st complete paragraph, suggested edit] "We define an HS window as a range of HS values with a constant span of 20 units. F_i is first computed in the HS window ranging from zero to 20 units ([0:20]), then the window is shifted...."

[p.6 and p.8] On p.6, the authors state, "If a model properly predicted the suitable areas of one species...it features a monotonically increasing p/e curve." On p.8, the authors state that the pilot whale "p/e curve increased quasi-monotonically between 39 and 90 HS index, but decreased between 0 and 39, and between 90 and 100." Does this p/e curve really support the authors' contention that the pilot whale model was "a well fitted model"?

3. Other points [p.10, para2] The authors state, "spatial pooling of presence data in the NWMS clearly attenuated the accuracy of our models at smaller scale. For example, taking account of observations in the Ligurian Sea alone, the sperm whale could have a deeper habitat than the one we modelled." If I understand the second sentence correctly, it addresses an issue of spatial extent rather than pooling of the presence data into 9x9 km cells.

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[p.10, para2] "The offshore presence cells...correspond to only 19% of our data set. For this reason, they were not considered as representative of the main habitat in the modeling process." If I understand this correctly, this is a bias that presence-only methods such as ENFA are unable to account for.

Technical Details -Tables: Write out entire variable name in tables, or provide a key for the abbreviations. -Figure 2: I cannot see the arrows in this figure. -Figure 3: Overlay sightings and acoustic detections on the HS maps so that readers can better evaluate model fit.

Interactive comment on Ocean Sci. Discuss., 4, 785, 2007.