Characterization of micronektonic spatial structure using ecosystemic acoustics descriptors applied in three Atlantic African Large Marine Ecosystems

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Abstract

Using the segmentation algorithm within Matecho (Perrot *et al*., 2018) we are able to deliver 15 descriptors to characterize the acoustic micronektonic layers in the water column. Even if the species composition is not known, these descriptors which are obtained using the same methodology allow for comparison between ecosystems and to study inter-annual variability. Some of these descriptors are new and others are based on the ones usually used to characterize pelagic fish schools using echointegration per shoal (Weill *et al*., 1993). In this work we will focus on the new ones and show some application cases in the three Atlantic African Large Marine Ecosystems, to monitor potential perturbations due to global change. All layer descriptors are estimated per layer and per elementary sampling unit of 0.1 nautical miles (ESU) with an accuracy of 1 meter depth. In this study we present four classes of descriptors: spatial (*e.g*. altitude, mean depth, minimal depth); morphological (*e.g*. width, ESU number, filling rate of water column); acoustic (*e.g*. mean volume backscattering strength S_v (dB)) and the layer number per ESU. In this study we focus on the original descriptors: (i) Filling rate of the water column (%): this indicator is based on the calculation of the width of the micronektonic layer vs. the local bottom depth. (ii) Filling rate contribution of first layer (%): this indicator shows the contribution of the first layer (the closest layer of surface) in the global filling rate. It is computed by dividing the filling rate of first layer by the filling rate of all layers. (iii) Number of layers: this indicator is calculated for each ESU, giving the number of layers in this water column. The descriptors have been computed over more than 1 million of ESUs, 992 737 in the CCLME, 166 183 in the GCLME and 462 807 in the BCLME. Such descriptors

allow classification of micronekton layers and appear relevant to monitor changes in the ecosystem. Next step will be to use multifrequency or even wide-band data to improve the quality of descriptors. They were efficiently applied to study diel vertical behaviour as well as the effect of water mass characteristics on the spatial structure of the layers. In future applications it should help in the classification of the layers per functional group as well as to improve our knowledge on ecosystem organization and functioning.

Keywords: ecosystem descriptor, sound scattering layer, tropical Atlantic, fisheries acoustics.

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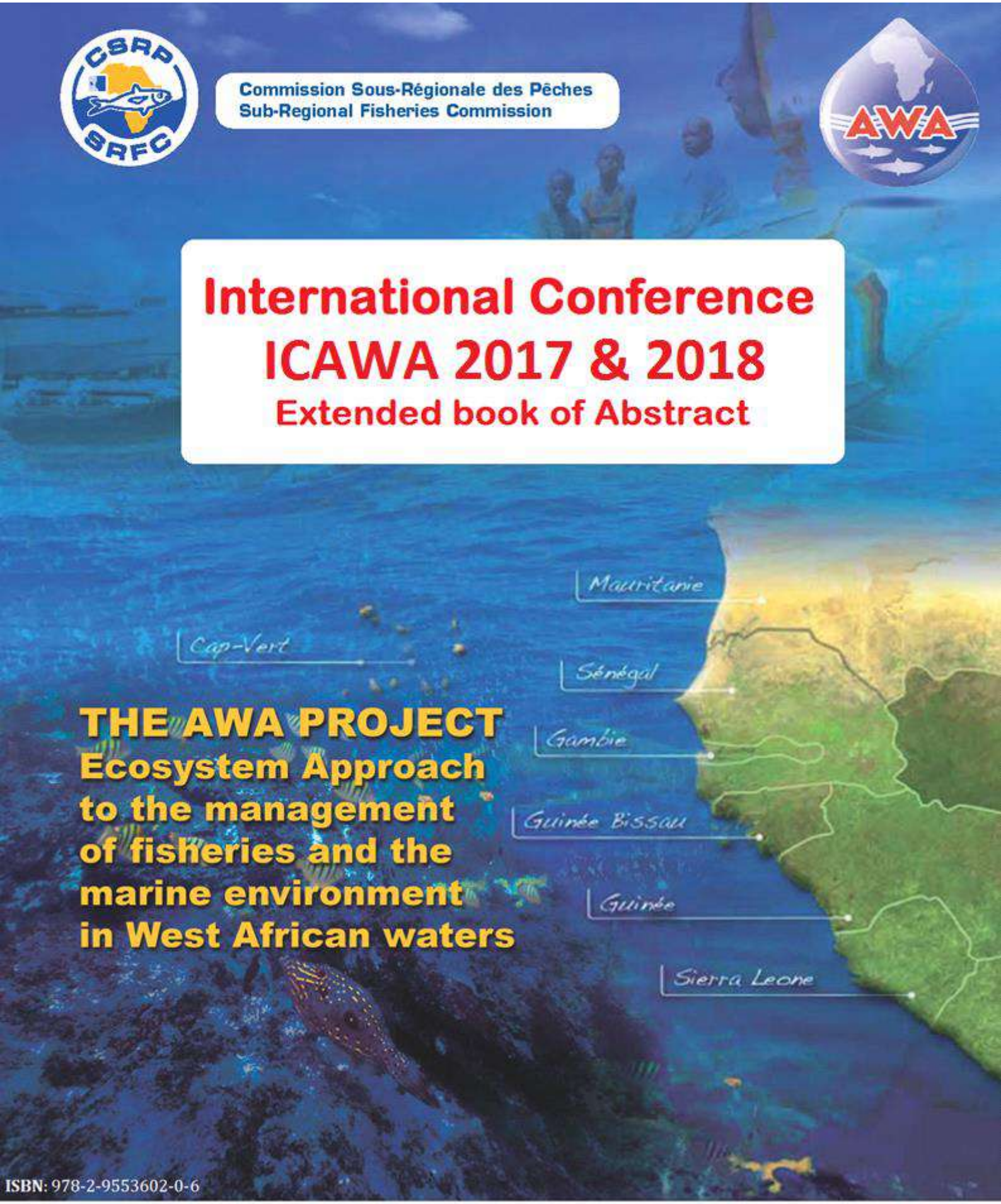
Extended book of Abstract



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The both last ICAWA edition, 2017 and 2018, was done as a joint event with other closely related meeting. In 2017 with the inauguration of the OSCM in Cabo Verde underlining AWA cooperation with INDP and UNICV as well as Geomar and collaborators. In 2018 ICAWA was join to Preface final meeting following the memorandum of understanding signed a couples of years before between the two consortium and which have led at the end to a common policy session followed by the redaction of a policy brief taking advantage of the results of the both projects. Some abstract aside ICAWA joint session are missing see the orgniser to get more information.

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These two edition of ICAWA were joint with OSCM inauguration and the final meeting of the European preface project, respectively in 2017 and 2018.

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