

Evaluating acoustic indices in the Valdivian rainforest, a biodiversity hotspot in South America

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Passive acoustic monitoring is becoming an extensively used tool to evaluate the status and variation of populations of sound producing animals. The analyses of extensive acoustic recordings for identification and detection of acoustic signals of different species is highly time-consuming, either by traditional audiovisual procedures or by developing effective automated recognizers. These drawbacks in data analysis have promoted research efforts aimed to develop acoustic diversity indices, which are relatively easily obtained by means of different algorithms considering spectral and/or temporal properties of the sounds contained in the recordings. Nevertheless, studies performed in different environments and geographical areas reveal inconsistencies in the association between acoustic diversity indices and biodiversity, suggesting the need of new studies to evaluate commonly used acoustic diversity indices as proxies of the richness of sound producing animal species. The Valdivian rainforest from Chile, South America, is recognized as a biodiversity hotspot because of the high proportion of endemic species and their threatened status associated to anthropogenic activity. As it is imperative to evaluate cost-effective strategies for biodiversity monitoring, in this study we evaluated seven acoustic indices to assess their reliability as proxies of the variation in bird and anuran species richness, two important components of the biodiversity of this threatened environment. Our results indicate that most of the acoustic indices tested fail to describe satisfactorily the variation in species richness. Nevertheless, two indices, namely the Temporal Entropy and the Acoustic Evenness Index, may potentially serve as an indicator of bird

richness, but future studies should fine-tune these indices to obtain a robust validation of its use within this environment. We expect that this work will contribute to the understanding of the significance and potential use of acoustic indices within this biodiversity hotspot as well as in other regions of interest for conservation.