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June 10th, 2020  
Prof. Spencer Barrett, Editor-in-Chief  
Proceedings of the Royal Society B

Dear Prof. Barrett,

Please find attached our manuscript entitled "Stereo-video monitoring and physiological trials reveal metabolic demands of reef fishes in the wild" for consideration as a research article in *Proceedings of the Royal Society B*.

Fishes are key players in biogeochemical cycles in aquatic ecosystems from the poles to the tropics. However, understanding the role of fishes for ecosystem-scale energy and nutrient fluxes is challenging, in part because it requires the precise quantification of the metabolic demand of fishes in their natural environment. Metabolic rates of fishes are generally quantified through lab-based physiological trials at rest or full exertion. However, fishes in the wild rarely reside at resting metabolic rates or exercise maximally. Unfortunately, our capacity to accurately estimate metabolic rates in wild fishes that pursue their normal, daily activities in their natural environment, and our ability to understand how fishes affect critical ecosystem-scale dynamics, is currently limited.

In our manuscript, we introduce a novel approach to estimate the field metabolic rate of fishes through the integration of traditional respirometry experiments and *in situ* measurements of swimming speeds via stereo-video systems. We exemplify our approach through a case study of seven distinct coral reef fish species, estimating the field metabolic rates of each species across their size range.

Through our new approach, we demonstrate that the field metabolic rate varies considerably across species and body size, and that the scaling coefficient of field metabolic rates is often much higher than the widely assumed value of ~0.75. As a consequence, contributions of large fishes to biogeochemical fluxes may be much higher than the values estimated through traditional techniques. Finally, by scaling up organismal estimates, we highlight the importance of community structure for the role of fishes in ecosystem functioning, as composition greatly influences community-level metabolism.

Our manuscript demonstrates that the coupling of physiology and stereo-video provides a novel, widely applicable, and non-destructive method to estimate field metabolic rates of fishes in their natural environment, which improves our predictions of the role of fishes in the flux of energy and elements in ecosystems. In light of the fundamental importance of fishes for humanity and the intensifying anthropogenic threats to aquatic ecosystems, our work represents a timely advance in ecology and provides a new avenue for conservation biologists to gauge anthropogenic impacts on ecosystem services. Therefore, we believe our paper is ideally suited for the broad readership of *Proceedings of the Royal Society B.*

Thank you for your consideration. We look forward to your response.

Kind regards,

Nina M. D. Schiettekatte, on behalf of all authors