25 June 2020

Dear Editor,

Enclosed for your consideration for publication in *Nature*, we present a global assessment of commercial fishing impacts on ocean ecosystems and an analysis demonstrating a potential solution to balance ecosystem impacts while maintaining fishery catches, entitled "*Avoiding tradeoffs between global seafood production and seafloor impacts through fisheries innovation.*"

Wild capture seafood contributes to approximately 8% of the global protein demand annually, representing a critical food supply. However, impacts to seafloor habitats from wild harvested fishing have become a rising challenge to the sustainability of commercial fishing. And, with human population expansion forecasted to expand protein demand by 50% by 2050, ensuring long term sustainable fisheries production from the ocean represents a key global food supply challenge.

To advance solutions to address the sustainability of wild capture seafood, we implemented a suite of novel analyses that both quantify the scale of seafloor habitat impacts from fishing and demonstrate potential solutions to address this sustainability challenge. First, we estimate the current state of global seafloor impacts from commercial fishing using a dynamic habitat impact-recovery model and leverage global databases on fishing and ocean habitats. To our knowledge this is the first such global estimate to translate the distribution of fishing effort to forecasted ecosystem impact.

Second, we evaluate food-habitat impact tradeoffs from commercial fishing in the context of global food supply. Using recently developed catch-only fishery assessment tools, we estimate that global fisheries harvest from the seafloor could sustainably expand by 22%, making significant contributions to increasing protein demands. However, we demonstrate these increases would come at additional seafloor impact and compare these habitat impact-food tradeoffs against alternative animal-sourced protein supplies including beef and chicken production.

Finally, we demonstrate how innovations in fishing gear designs may help overcome habitat impact-food tradeoffs from fishing, providing one potential solution to help mitigate impacts to ocean ecosystems while maintaining wild seafood supplies.

We believe this article fits well in the scope of *Nature* because we both assess current habitat impacts from a global food supply source, but critically, also demonstrate potential solutions to address sustainability challenges. It is our hope that readers will both appreciate the ecologically based global assessment of seafloor impacts as well as spur discussion about tradeoffs and solutions to minimize them. As such, this article will be informative for a broad ecosystem management and food systems audience.

Thank you for considering our article for publication in *Nature*. Please don't hesitate to contact Scott Smeltz (corresponding author) if you have any questions regarding this submission.

Sincerely,

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