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December 16, 2025

Dear Editors,

On behalf of the author team, I am pleased to submit our paper, "Marine biotoxin depuration rates: management applications, research priorities, and predictions for unstudied species", for consideration as a Research Paper in *Harmful Algae*.

Monitoring and managing the public health risk posed by marine biotoxins is a daunting challenge. With 1000s of kilometers of coastline, 1000s of seafood species, and dozens of biotoxins, monitoring cannot occur everywhere at once. Improving the cost-effectiveness of biotoxin monitoring is thus critical to expanding coverage to more species, toxins, and locations. Notably, understanding the rate at which seafood species depurate biotoxins can be used to optimize the cadence of biotoxin monitoring, which can free up funds for expanded testing.

Our paper empowers more efficient marine biotoxin monitoring and management through a multi-pronged assessment of biotoxin depuration rates. First, we conduct a systematic literature review to collate published depuration rates, synthesize information on the factors that impact depuration, and identify best practices for future depuration studies. Second, we prioritize species for future study by identifying highly produced seafood species that are vulnerable to biotoxins but have gone unstudied. Finally, we use a phylogenetic regression model trained on our database of biotoxin depuration rates to predict rates for unstudied species, which can be used to guide monitoring programs until depuration studies are completed.

We found that only 85 marine species have published estimates of biotoxin depuration rates. Depuration rates for non-bivalves and for toxins besides paralytic shellfish toxins (PSTs) are especially understudied. Depuration half-lives varied from 0.03 to 1269 days based on species, toxin, tissue, and environmental conditions. In general, depuration accelerates with increased temperature and food availability, with implications for aquaculture siting, depuration enhancement, and biotoxin monitoring. We identified unstudied bivalve and finfish depuration rates that should be high priorities for future research. Finally, we predict PST depuration rates, the only syndrome with sufficient training data, for 102 unstudied species. These predictions can guide efficient monitoring and management until depuration rates become available.

Overall, we demonstrate how biotoxin depuration rates can be used to forecast depuration timelines, which can be used to design more efficient monitoring programs and to support informed management and business decisions.

Thank you for your consideration and we look forward to hearing from you.

Sincerely, on behalf of all authors,
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