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2024 AFSC Seminar Series

Kimberly Ledger, AFSC Genetics Program

Tuesday, April 23rd @ 10 am Pacific

From tanks to sea: environmental DNA applications of cod in Alaska



Environmental DNA (eDNA) has significant potential to detect species that pose challenges for non-molecular sampling methods. However, a key obstacle in applying eDNA data for ecosystem management is uncertainty surrounding the ability to estimate abundance or biomass. In this study, we use experimental tanks with known biomasses of multiple species to explore the feasibility of (1) estimating species proportions from eDNA metabarcoding data and (2) scaling metabarcoding proportions with absolute eDNA concentrations of a single species obtained with qPCR to estimate absolute eDNA concentrations of additional species. The focal species for this study were three gadid fish that are key components of marine ecosystems in Alaska: Walleye pollock (*Gadus chalcogrammus*),

Pacific cod (*Gadus macrocephalus*), and Arctic cod (*Boreogadus saida*). After designing gadid-specific metabarcoding primers and accounting for PCR biases in the metabarcoding data, we found corrected read proportions closely approximated the true biomass proportions of species. Furthermore, we found strong relationships between absolute eDNA concentration and absolute biomass for Arctic cod and Pacific cod using quantitative metabarcoding data combined with estimates of Walleye pollock eDNA concentration derived from qPCR. These findings suggest that it is possible to accurately quantify compositional relationships and estimate metrics of biomass for gadids in real-world scenarios. Furthermore, this work provides a framework for developing primers and analytical approaches that can be applied to other species to improve the utility of eDNA for marine ecosystem management.

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