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C. Stewart, S. Iverson, C. Field, D. Bowen, W. Blanchard, S. Lang, J. Kamerman, H. Steeves, and J. McNichol, Qfasa: Quantitative fatty acid signature analysis, 2021, R package version 1.1.1

Calibration Coefficient Estimation in Quantitative Fatty Acid Signature Analysis, The Western North American Region of The International Biometric Society Annual Meeting, Virtual, 2021

Quantitative Fatty Acid Signature Analysis with Simultaneous Estimation of Calibration Coefficients, Science Atlantic Conference for Math, Stats, and CS, Dalhousie University, 2019

Outlier Detection Methods for Quantitative Fatty Acid Signature Analysis, Canadian Statistics Student Conference, University of Calgary, 2019

Simultaneous Maximum Unified Fatty Acid Signature Analysis

UNIVERSITY OF NEW BRUNSWICK

THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

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by

Jennifer M. McNichol

in the Department of Mathematics & Statistics

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Examining Committee

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Abstract

Quantitative Fatty Acid Signature Analysis (QFASA) has been the cornerstone of dietary estimation for marine predators since its introduction in 2004. However, QFASA relies upon calibration coefficients (CCs) to account for the differences in fatty acids (FAs) between a predator and its prey. CCs are determined by way of captive feeding studies and must be uniquely determined for each species of predator, creating a major limitation for QFASA. One recent approach proposed expanding QFASA to simultaneously estimate diet and CCs, though it has not been thoroughly tested. Another takes a maximum likelihood approach to QFASA which has shown promising results but still relies on predetermined CCs. In this thesis we take inspiration from both of these approaches to develop a maximum likelihood model to estimate both diet and CCs. In addition to two real life applications, a simulation study is conducted to evaluate our model in comparison to existing models.