

Developing a User-Friendly System for Predicting Harmful Levels of Marine Biotoxins

Schweinfurth, Lila (School: Oregon Episcopal School)

Ingesting marine biotoxins such as domoic acid (DA), a neurotoxin produced by the diatom *Pseudo-nitzschia* spp., and paralytic shellfish poison (PSP), a neurotoxic byproduct of the saxitoxin-producing dinoflagellate *Alexandrium* spp., can lead to life-threatening illnesses. A previous study by Schweinfurth (2020) developed highly accurate models using 20 years of Oregon shellfish biotoxin data in conjunction with NASA MODIS-Aqua satellite data to make same-day predictions as to when and where these biotoxins occurred along the Oregon Coast. The current project builds upon this previous study by developing multivariate time series models using Gradient Boosting and Random Forest algorithms to create a user-friendly web application for public access to biotoxin level predictions. Users select a date and choose from among 32 locations to view forecasts of biotoxin levels. Time series models exceeded expectations, achieving accuracies ranging from 0.90 - 0.99 for predictions up to 5 weeks in advance. These readily accessible forecasts, available to anyone with a computer or smartphone, could ultimately save lives by alerting the public as to the best times and locations for recreational shellfish harvesting. They may also assist local communities in optimizing biotoxin testing plans and prevent biotoxin ingestion when hazardous weather conditions preclude regular testing. Developing similar models for areas that lack the resources to routinely test for biotoxins in shellfish could mitigate marine biotoxin exposure globally.

Awards Won:

Second Award of \$2,000

National Oceanic and Atmospheric Administration - NOAA: Second Award of \$500