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Statistical models of fecal coliform levels in Pacific Northwest estuaries for improved shellfish harvest area closure decision making

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ABSTRACT

There is a substantial need for tools that effectively predict spatial and temporal fecal pollution patterns in estuarine waters. In this study, statistical models of exceedances of shellfish fecal coliform (FC) water quality criteria were developed using a 10-year dataset of FC levels and environmental data. Performance (sensitivity, specificity, and predictive capacity) of five different types of models was tested (MLR regression, Tobit (censored) regression, Firth's binary logistic regression (BLR), classification trees, and mixed-effects regression) for each of three conditionally managed shellfish-harvesting areas in Tillamook Bay, Oregon (USA). The most influential variables were related to precipitation and river stage height in the wet season and wind and tidal-stage in the dry season. Classification tree and Firth's BLR approaches better explained exceedances of shellfish water quality standards than the current closure thresholds. Findings demonstrate the utility of statistical modeling approaches for improved management of shellfish harvesting waters.

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