Bayesian Inference of Benthic Infauna Habitat Suitability along the U.S. West Coast

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Mitigating for increased human impact in US coastal waters associated with offshore renewable energy device deployment requires an understanding of the distribution of sensitive marine benthic species. For managers to make informed decisions that advance societal development while lessening the impact on species of interest, integrative models that consider interactions between various parts of the ecosystem and impacts are needed. One predictive method, Bayesian Networks (BNs) excels in its ability to handle multi-collinearity, missing data, small data sets, and allows for easy tracking of uncertainty through the modeling process. These challenges are common in typically underconstrained marine datasets. BNs were developed to statistically infer suitable habitat for several species of benthic infauna along the continental shelf of the Unites States Pacific Northwest. We used Netica object oriented software to implement the design and analysis of the statistical models and applied a cross validation model selection technique. Two regional maps were produced for each species, communicating habitat suitability and prediction uncertainty. With both maps, environmental managers will be better equipped to make decisions that progress human interests while minimizing impact on species of interest. These methods are broadly applicable to a wide range of ecosystem models, particular in underconstrained settings where detailed sampling over large regions is not practical.