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Survey effort allocation using advanced design: clam population as case study

Nathalie Caill-Milly, Frank D'Amico, Noëlle Bru, Florence Sanchez, Jennifer Brown, Muriel Lissardy

Abstract (300 words) :

The planning strategies for the Manila clam (Ruditapes philippinarum) resource in Arcachon Bay use an adaptive co-management approach, linking scientific advice with fishermen's current practice. This management framework is based on data collected from field surveys. Surveys started in 2000 and have continued biennially thereafter. Here we describe work to assess and compare the performances of different sample design options for monitoring the stock of this infaunal bivalve, using simulation methodology.

Random stratified sampling (RSS) is a sampling protocol used most commonly for surveys of this nature, and at this scale. We compared RSS with recently developed, spatially balanced survey designs. One of these designs is generalized random tessellation stratified (GRTS) which has mainly be used for aquatic resources characterized by linear networks. Here we extend its application to fisheries.

In our research the steps followed were: 1) creation of a virtual population using geostatistics based on the existing data, 2) selection of sampling stations (optimal number and locations) with RSS and GRTS designs using statistical resampling methods, 3) interpolation of the biomass and abundance values relating to the selected stations to compute estimations, 4) comparison of the designs' precision and costs .

In our study GRTS performed better than RSS for estimating survey parameters. These results are encouraging but need to be extended for other surveys with different sized strata. Integration of the operating costs complements our findings. GRTS emerges as promising sample design both in terms of optimizing the design and satisfying financial constraints. The practical implementation of the design into large-scale operational surveys is discussed. The design allows the large-scale survey to be retained even in an environment of decreased funding for monitoring. Such optimization of survey designs is necessary in a fisheries with an annual production of around 500-600 tones. The GRTS design will be a useful design for other exploited bivalves' populations that are important components of the marine benthic ecosystem.