

**Alternative sample designs for the deployment of observers in the North Pacific**

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The North Pacific hosts one of the largest fisheries and data collection programs in the world. Each year the U.S. National Marine Fisheries Service releases its Annual Deployment Plan (ADP) for the collection of fishery-dependent information by observers from the North Pacific. This study compared the relative performance of 12 alternative sampling designs for the 2016 ADP through simulated sampling of past fishing trips. Sampling designs were defined by combinations of six potential stratifications and whether allocations were proportional to effort or to reduce the weighted variance of total groundfish retained and discarded (“optimal allocation”). Performance metrics for each design included a gap analyses as well as single-stage estimates of precision and accuracy. These three metrics were combined into a single score, and gap analysis scores were used in a “hurdle-model” approach for final design evaluations. The four designs with above-average gap analyses and final scores were proposed for the 2016 ADP. The 2016 ADP deploys observers in units of randomly selected trips that are stratified by three gear types. Selection rates for each strata resulted from the sample size from a blended optimal allocation strategy, the cost of an observer day, anticipated fishing effort, and available funding. While it is possible to allocate samples with the intent to reduce variance according to multiple objectives, it is difficult to establish these objectives and their relative importance. This study highlights the value of using multiple metrics to assess the performance of alternative sampling designs.

**Keywords:** sampling design evaluation, simulation, sample allocation, performance metrics, observer programs, fishery analyses.

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