

COMBINING ENVIRONMENTAL AREA FRAME SURVEYS OF A FINITE POPULATION

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New ways to combine data from multiple environmental area frame surveys of a finite population are introduced. We show how to produce unbiased estimators from multiple frames, or how to reduce the risk of introducing significant bias in linear combination of estimators. For three commonly used area frame sampling designs, we show how to derive the design components needed at unit level of the finite population in order to combine multiple surveys without risking bias. If separate estimators are used in a linear combination with separately estimated variances, then there is a risk of introducing negative bias. By instead using pooled variance estimators, the bias of a linear combination estimator can be reduced. Hence, our results can be used to combine data from different surveys with improved accuracy and efficiency. If an existing survey did not provide sufficiently good estimators, then the results can also be used when planning a complementary survey to be combined with the existing survey. National environmental surveys often provide good enough estimators at national level, but may be too sparse to provide sufficiently good estimators for some domains. In these cases we should not discard the national survey when planning an extra sampling effort for such domains, but use all available information to produce the best possible estimators. Thus, regional environmental surveys can use data from national environmental surveys, or vice versa.

References

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