The Challenges of Standardizing Colonial Waterbird Survey Protocols – What is Working? What is Not?[1]

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Our ability to manage and conserve colonial waterbird species throughout Mexico, Meso-America, Canada, the Caribbean nations, and the United States is presently hampered by a lack of reliable information on the status and trends of their populations, information that can only be obtained by collecting comparable data using standardized data collection techniques that estimate bias. The U.S. Geological Survey, Patuxent Wildlife Research Center is working in concert with the North American Waterbird Monitoring Partnership (Kushlan et al. 2002) to coordinate waterbird monitoring efforts and to develop an agreed-upon set of survey methods that incorporate bias estimation. To determine the practicality of implementing methods that require measures of detection probability and to test the error associated with specific survey methods prior to their adoption as standards, several tests have been conducted the field.

The U.S. Geological Survey and U.S. Fish and Wildlife Service conducted a study to measure the detection probability associated with aerial photographs of colonies of breeding Common Murres (*Uria aalge*) and Brandt's Cormorants (*Phalacrocorax penicillatus)*. Aerial photographs have been used to estimate the number of Common Murres and Brandt's Cormorants along the California coast for many years and the ability to detect birds has been assumed to be within a few percentage points. For Brandt's Cormorants, the use of aerial photographs as a reliable method for estimating numbers was validated, with a mean detection probability (p) of 103.6 percent (95 percent CI, 101.8-105.5 percent) for birds and a mean p of 96.1 percent (95 percent CI, 94.1-98.1 percent) for nests.

For Common Murres however, the mean detection probability was only 89.7 percent (95 percent CI, 88.0-91.5 percent). These results suggest the need to implement additional measures to reduce estimation error and to incorporate detection probability into analyses of population trends.

Monomoy National Wildlife Refuge in Massachusetts used a dependent double observer approach to measure the detection probability associated with ground counts of Black-crowned Night Herons (*Nycticorax nycticorax)* and Snowy Egrets (*Egretta tula)* at a breeding colony. The average detection probability measured for Black-crowned Night Herons was 94 percent (95 percent CI and SE of 1.65), validating the use of ground counts to estimate populations on the refuge. The number of Snowy Egret observations was too small to determine detection probabilities.

Observer-related factors also contribute significantly to the reliability of population estimates (Erwin 1982, Verner 1985). Researchers at the University of Florida used a controlled simulation to look at the interobserver variation and accuracy associated with estimating large numbers of densely aggregated birds in vegetation via aerial surveys and aerial photographic counts. A large model was constructed of plywood and other materials to mimic everglades wetlands as seen from the air by observers during aerial surveys. Rice grains were painted white and were used to represent large white egrets or storks that are easily seen from the air and were distributed in varying densities within the model everglades system. Observers walked around the model and conducted counts at varying altitudes by changing their heights above the model. For aerial surveys, the absolute value of the mean total error for observers was approximately 50 percent; for photographic counts the absolute value of the mean error was approximately 21 percent. These results suggest extreme caution be used when interpreting data collected using aerial surveys to estimate population sizes or trends.

Researchers at the University of Florida also looked at the effects of nesting asynchrony on our ability to estimate numbers using "snapshot" counts. Comparisons were made between snapshot counts and repeated visits to a colony during the breeding cycle. Results showed that very early and late survey dates picked up

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almost no nests. Furthermore, counts conducted during "peak" periods of activity were poor estimators of the total numbers of nests initiated, sometimes undercounting the total breeding population by greater than 50 percent.

Literature Cited

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