The National Wild Pheasant Conservation Plan

Key Literature:
Pheasant population monitoring

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Note: The literature cited below represents a subset of the information used when making pheasant management decisions related to this topic. It is intended to provide a general sense of the primary research available on the subject, but is not comprehensive. Other information on the topic may also be available in books and technical bulletins that do not lend themselves well to this form of summarization. The list will be periodically updated upon request by National Wild Pheasant Technical Committee members.

Gates, J. M. 1966. Crowing counts as indices to cock pheasant populations in Wisconsin. Journal of Wildlife Management 30:735-744.

Abstract: Reliability of the crowing count was investigated in 1959-64 on an area of known pheasant populations in east-central Wisconsin. Certain assumptions implicit in use of the crowing count as a population index were tested: (1) that the timing of counts was uniform each year in relation to the seasonal trend in crowing, (2) that a constant fraction of the cock population was crowing at all density levels, (3) that annual variations in sex ratios did not influence crowing behavior, and (4) that crowing intensity was independent of population density. Only the latter assumption was rejected. Crowing intensity increased about 8 percent per unit increase of 100 cocks on the study area. This degree of bias was regarded as relatively unimportant operating over the narrow range of year-to-year population change in the present study. Since population levels often differ to a greater extent between areas than they do between years in the same area, density bias may be more important where crowing counts are used for regional comparisons. The importance of making crowing counts only under optimal weather conditions in order to minimize sampling error is stressed. Under Wisconsin conditions, the crowing count appeared to be reliable as an annual index to cock pheasant populations.

J. H. Giudice, K. J. Haroldson, A. Harwood, and B. R. McMillan. 2013. Using time-of-detection to evaluate detectability assumptions in temporally replicated aural count indices: an example with Ring-necked Pheasants. Journal of Field Ornithology. 84:98-112.

Abstract: The validity of treating counts as indices to abundance is based on the assumption that the expected detection probability, E(p), is constant over time or comparison groups or, more realistically, that variation in p is small relative to variation in population size that investigators seek to detect. Unfortunately, reliable estimates of E(p) and var(p) are lacking for most index methods. As a case study, we applied the time-of-detection method to temporally replicated (within season) aural counts of crowing male Ring-necked Pheasants (*Phasianus colchicus*) at 18 sites in southern Minnesota in 2007 to evaluate the detectability assumptions. More specifically, we used the time-of-detection method to estimate E(p) and var(p), and then used these estimates in a Monte Carlo simulation to evaluate bias-variance tradeoffs associated with adjusting count indices for imperfect detection. The estimated mean detection probability in our case study was 0.533 (SE = 0.030) and estimated spatial variation in E(p) was 0.081 (95% CI: 0.057–0.126). On average, both adjusted (for p hat) and unadjusted counts of crowing males qualitatively described the simulated relationship between pheasant abundance and grassland abundance, but the bias-variance tradeoff was smaller for adjusted counts (MSE = 0.003 vs. 0.045, respectively). Our case study supports the general recommendation to use, whenever feasible, formal population-estimation procedures (e.g., mark-recapture, distance sampling, double sampling) to account for imperfect detection. However, we caution that interpreting estimates of absolute abundance can be complicated, even if formal estimation methods are used. For example, the time-of-detection method was useful for evaluating detectability assumptions in our case study and the method could be used to adjust aural count indices for imperfect detection. Conversely, using the time-of-detection method to estimate absolute abundances in our case study was problematic because the biological populations and sampling coverage could not be clearly delineated. These estimation and inference challenges may also be important in other avian surveys that involve mobile species (whose home ranges may overlap several sampling sites), temporally replicated counts, and inexact sampling coverage.

Luukkonen, D. R., H. H. Prince, and I. L. Mao. 1997. Evaluation of pheasant crowing rates as a population index. Journal of Wildlife Management 61:1338-1344.

Abstract: Assumptions of many call-count indexes remain untested. One assumption of the pheasant crowing count index is that crowing rates are similar among populations. We measured crowing rates of ring-necked (*Phasianus colchicus torquatus*), Sichuan (*P. c. strauchi*), and hybrid rooster pheasants from 1 hour before until 1 hour after sunrise, 1992-93. We tested hypotheses that crowing rates were unrelated to subspecies, age, year, and weather variables. A model predicting crowing rates included subspecies and time from sunrise as significant effects (R^2 = 0.41). This model described a parabola where crowing rates reach maximum at 9 minutes after sunrise, regardless of subspecies. Temperature, wind velocity, and cloud cover were not significant in explaining crowing rate variation. Recommendations for improving the crowing count survey include: conducting surveys from 30 minutes before to 30 minutes after sunrise, increasing the listening period length from 2 to 4 minutes for ring-necked pheasant populations, and adjusting for subspecific differences in crowing rates.