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EFFECTS OF MIST-NETTING FREQUENCY ON CAPTURE RATES AT MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP (MAPS) STATIONS

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Abstract. Data from the Monitoring Avian Productivity and Survivorship (MAPS) Program were analyzed to evaluate the effect of frequency of operation (number of days per 10-day period) of mist nets at MAPS stations on capture rates of adult and young birds. A negative relationship existed between netting frequency and the number of captures of adult birds per unit effort. This suggests that net avoidance by adult birds can be an important consideration at higher frequencies. There also was a negative relationship between netting frequency and the rate of capture of individual adults; this demonstrates saturation of effort. With regard to young birds, however, netting frequency had no effect on either type of capture rate. These results indicate that data from stations run at high frequencies will produce inflated productivity indices by lowering capture rates of adults but not of young. Thus, when pooling data from stations operated at differing frequencies for large-scale demographic monitoring, the data must be adjusted to control for netting frequency. We interpret these findings and suggest more rigorous approaches to the study of these phenomena.

Key Words: capture rate, MAPS, mist net, net avoidance, netting frequency, productivity.

Constant-effort mist netting has been shown recently to be a viable method of monitoring demographic parameters of landbird populations (Baillie 1990; Baillie et al. 1986; Butcher et al. 1993; DeSante 1992; DeSante et al. 1993a,b; Nur and Geupel 1993a,b; Peach et al. 1991, Ralph et al. 1993). However, many questions remain regarding the optimal design of monitoring programs using mist netting, not least of which concerns the frequency at which mist nets should be operated (Nur and Geupel 1993b, Ballard et al. *this volume*). The question of how often to operate mist nets is not merely academic. Mist netting, although providing information not readily obtainable by other methods, such as point counting, is relatively labor intensive. Managers and researchers need to know what sampling effort is required to produce accurate and precise estimates of the target parameters (e.g., population size, productivity, survivorship, recruitment) in the most efficient manner possible. Furthermore, to avoid undue disturbance to the birds themselves, netting should not be conducted at a frequency higher than that necessary to obtain the desired information.

From a bird's point of view, there is no reward associated with being captured in a mist net. Common sense and anecdotal evidence suggest that after such an experience (particularly if repeated), birds are likely to stay away from the net for some time. This phenomenon is known as "net avoidance" or "net shyness," although it is debatable whether birds are avoiding the nets themselves, the net sites, both, or neither. The existence, magnitude, and duration of net avoidance undoubtedly vary among species and probably among individuals, and are likely to increase with repeated capture. At the population level, different age classes are likely to show different degrees of net avoidance due to behavioral differences and degree of naiveté. The degree of net-site avoidance undoubtedly depends to some extent on the site's proximity to a bird's nest in the breeding season, and on its proximity to food, shelter, or other resources, and thus net-site avoidance may vary seasonally.

Net avoidance is generally assumed to exist in mist-netting studies, but few studies have been conducted to examine its magnitude and effects on indices and estimates of population parameters. Stamm et al. (1960) documented steady declines, which they attributed to net shyness, in capture rates of all species combined immediately before and after spring migration in Maryland. As further evidence, they found a marked increase in capture rate, followed by another decline, after relocating their nets (an indication that birds learned to avoid the site of capture, rather than recognizing the nets *per se*). Swinebroad (1964), however, was unable to demonstrate net avoidance in a New Jersey Wood Thrush (*Hylocichla mustelina*) population and in fact had a higher-than-expected proportion of recaptures (based on population estimates from spot mapping); he concluded that placement of nets in areas of high activity within actively defended thrush territories resulted in a disproportionately high rate of repeat captures.