A COMPARISON OF METHODS FOR ESTIMATING PREY BIOMASS OF BARN OWLS

CARL D. MARTI

Raptor Research Center, Boise State University, Boise, ID 83725 U.S.A.

Key Words: Barn Owl; Tyto alba; Microtus; prey mass; prey mass biases; Utah.

Knowing the mass of prey is important to precisely calculate the quantity of food consumed, and, in turn, the caloric intake and energy requirements of a raptor. Researchers addressing those questions usually estimate prey mass consumption by multiplying the number of a given prey species taken by the raptor by the mean mass of that prey, obtained either from the literature or from animals captured near the study area (Jacobi et al. 1981, Marks and Marti 1984, Steenhof and Kochert 1985). An important uncertainty remains with this technique: how well does the prey biomass estimated using mean prey masses match the prey mass of prey actually captured and consumed? Although it is rarely possible to obtain masses of prey individuals captured by a raptor, it is achievable in several species known to store prey (Boreal Owl [Aegolius funereus], Korpimäki [1987]; Eurasian Pygmy-Owl [Glaucidium passerinum], Solheim [1984]; Northern Hawk-Owl [Surnia ulula], Ritchie [1980]; Barn Owl [Tyto alba], Marti et al. [2005]; Eleonora’s Falcon [Falco eleonorae], Vaughan [1961]; Merlin [F. columbarius] Pitcher et al. [1979]; and American Kestrel [F. sparverius], Collopy [1977]). The prey stored by these species can provide data for testing the accuracy of calculating prey biomass using published mean prey masses.

My objective for this study was to determine the best source of prey mass for estimating the mean biomass of prey consumed by Barn Owls.

Methods

Study Area. My study area was in Box Elder, Davis, and Weber counties, Utah. The area was formerly shrub-steppe desert, but that community has been entirely supplanted by irrigated agriculture and urban development. Annual precipitation averaged 35 cm, and mean temperatures for January and July were −3.5°C and 23.9°C, respectively. Most of the Barn Owls studied nested in boxes erected for them (Marti et al. 1979). See Marti (1988) for more details on the study area.

Sources of Data. I obtained specimens of prey captured by Barn Owls by visiting nest boxes from 1977–1991 at least once per month during the breeding season. To avoid bias from desiccation, I weighed only whole, fresh prey items most likely captured by the owls in the night before. I recorded the species of the prey items, and used a Pesola scale to weigh specimens to the nearest 0.1 g before returning them to the box.

Data from specimens trapped during the owls’ breeding season were obtained from the Utah Museum of Natural History mammal collection and H. Egosque (unpubl. data). These data were collected 10–20 yr prior to my study but during the same months when Barn Owls breed, at the same altitude, and within 80 km of my study area. Two species of voles were present on the study area, meadow vole (Microtus pennsylvanicus) and montane vole (M. montanus), but I did not separate them for the following calculations because they are almost identical in appearance and positively identifying them to species requires examination of dental characteristics. Additionally, the sample of voles trapped near my study area (Utah Museum of Natural History mammal collection; H. Egosque unpubl. data) revealed no difference in mass between the species (t = 1.53, P = 0.13, df = 63).

Published prey mass data were from Steenhof (1983) who used data from specimens collected in southwest Idaho (approximately 480 km from my study area) and supplemented with data from a variety of published and unpublished sources. Thus, these data are representative of what raptor researchers must often rely on for estimating mass of prey.

Comparison of Methods for Estimating Prey Size. To test the best source of data for estimating mean prey mass consumed, I used 10 samples of prey from regurgitated pellets that I collected on the same study area (Marti 1988). Each sample represented a monthly collection of prey from individual Barn Owl nests; samples were selected randomly with the only criteria being that N for each sample was >100 prey individuals and was from the breeding season. An estimate of the mean prey biomass for each

1 Email address: cmarti@spro.net