



*House Wren photo by Alan H. Nagahara*

son (1984, 1988) provide detailed descriptions of the study area. House Wrens are insectivorous, secondary-cavity-nesting passerines readily attracted to nestboxes. The Mackinaw study area (108 ha) contains 585 identical nestboxes that are distributed in north-south rows.

In central Illinois, House Wrens are migratory, arriving on the study area in late April, and are generally double brooded, initiating first broods in mid-May (early season) and second broods in early July (late season). Females alone incubate for 13 days before the first eggs hatch. Nestlings are fed by one or both parents through nest-leaving (between brood-day 14-17) and for an additional 1-2 weeks after nest-leaving (Kendeigh 1941).

**General Procedures**—All nestboxes were checked twice weekly from early May until mid-August to determine the date of laying initiation in each nest and to determine the status of existing nests. A clutch size was assigned for a nesting attempt when the same number of eggs was recorded on two consecutive visits and there was evidence that incubation had commenced. Near the time of hatching, nests were visited daily to determine

brood-day 0. On brood-day 12 nestlings were weighed to the nearest 0.1 g on a portable Ohaus balance and banded with a numbered aluminum U.S. Fish and Wildlife leg band. The date of nest-leaving (termination date) was assigned by checking each nest daily from brood-day 14 until all nestlings had left the nest.

**Feeding Experiment**—Twenty grams of live mealworm larvae were placed daily in food dishes located on top of nestboxes. During the 1990 early season, the experiment consisted of two treatments: 1) food added to nests during the nestling stage and 2) unmanipulated nests. Additional treatments were added during the 1990 late season. Nests were assigned randomly to the following treatments: 1) food supplement during the incubation period, 2) food supplement during the nestling period, 3) food supplement during both the incubation and nestling periods (multiple treatment), 4) unmanipulated nests.

During the 1990 breeding season, I noticed Blue Jays were attracted to the supplement and were actively excluding wrens. Food dishes were covered with galvanized wire mesh (mesh diameter = 25 mm) from the late season of 1991 until the end of the

study. The mesh allowed easy access by House Wrens but was small enough to prevent Blue Jays from feeding at the dishes. The addition of the wire mesh quickly eliminated Blue Jay visits to supplemented nests. During the 1992 breeding season, nest watches of ~ 10 min were made at each nest weekly after the food supplement was added to establish whether adults utilized the mealworms. When wrens were not excluded by Blue Jays, they readily consumed the supplement. I was able to verify the use of mealworms for ~ 86% of all supplemented nests in 1992 (N = 110 nests supplemented).

**Data Analysis**—Early and late-season nests were analyzed separately because of seasonal differences in clutch size (Finke et al. 1987) and nestling mass (Harper et al. 1992). All statistical analyses were performed by SAS-PC software (SAS Institute 1989) and all assumptions of statistical analyses were verified. Parametric tests were used unless assumptions of normality could not be met.

Nest success of supplemented and control nests (before and after the addition of the wire mesh screen) were compared by a  $G$ -test of independence with Williams' correction for continuity (Sokal and Rohlf 1981). A Kruskal-Wallis test was performed on incubation-period length (calculated from the day the penultimate egg was laid until brood-day 0) and nestling-period length (calculated from brood-day 0 until nest-termination date) of successful nests by treatment. Nestling mass and survival to nest-leaving were analyzed in order to determine if predation risk resulted in lowered nestling survivability or quality, or both. Since the condition of nestlings at nest-leaving affects the probability of recapture (C. F. Thompson unpubl. data, Harper et al. 1992), ANCOVAs were performed on mean relative brood mass (brood-day 12) by treatment for each year, with brood size as the