PALMER, R. S. 1972. Patterns of molting. *In* Avian Biology, D. S. Farner and J. R. King, eds., Vol. 2:65–102.

PEARSON, A. M., AND G. C. MOORE. 1940. Feathers may reveal age of Mourning Doves. Alabama Conserv. 1:9–10.

SADLER, K. C., R. E. TOMLINSON, AND H. M. WIGHT. 1970. Progress of primary feather molt of adult Mourning Doves in Missouri. J. Wildl. Manage. 34:783–788.

TERRES, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York.

U.S. FISH AND WILDLIFE SERVICE AND THE CANADIAN WILDLIFE SERVICE. 1977. Bird Banding Manual, Vol. II. Bird Banding Techniques. Population and Survey Division of the Canadian Wildlife Service.

WIGHT, H. M., L. H. BLANKENSHIP, AND R. E. TOMLINSON. 1967. Ageing Mourning Doves by outer primary wear. J. Wildl. Manage. 31:832–835.

PETER F. CANNELL, *Ornithology Dept., American Museum of Natural History, 79th Street & Central Park West, New York City, N.Y. 10024.* Received 14 Feb. 1983; accepted 11 Sept. 1983.

An Inexpensive Bird Exclosure.—In bird damage research and other ornithological studies, it is often important to exclude birds from an area to assess their effects on crops or insect populations (e.g., Sloan and Coppel 1968, Dolbeer and Woronecki 1979, Holmes et al. 1979). Conversely, one may want to enclose birds in a given location to monitor their behavior or food preferences. In addition, plant breeders often must protect experimental plots from birds to accurately determine crop or seed production rates. This note describes an exclosure design useful for all these purposes. We developed it to assess the effects of Red-winged Blackbird (*Agelaius phoeniceus*) predation on insect populations in cornfields. Other exclosure designs (e.g., Mitterling 1966, Campbell et al. 1981) are more expensive and require more time for construction.

The following materials are needed for one 6.1 × 9.14 × 2.4–3.6 m exclosure. The dimensions of the exclosure could be easily modified. Exclosures up to twice the size described are possible with this design. Approximate 1983 prices are shown in parentheses.

(1) a 15.2 × 10 m (50 × 30') section of Toron crop protection netting® [J. A. Cissel Company, Inc., P.O. Box 339, Farmingdale, NJ 07727 ($35)] The mesh size which we used was 2.2 cm square. A larger mesh would probably not exclude warblers and other small birds.
(2) 6 furring strips (rough-cut lumber: 4 strips 3.05 m long and 2 strips 4.27 m long ($7–9).
(3) 12 "one inch" fence staples ($1).
(4) 60 m of #18 nylon twine ($2–4).
(5) 4 tent stakes ($2–4); wood wedges can be substituted.

The total cost of materials was $48–54. A small step ladder, post-hole digger, tape measure, 2 m "hoisting stick," and a hammer are also needed during construction.

Before beginning field construction, the net and furring strips should be pre-cut to the desired specifications. Two fence staples should be placed about 3 cm from one end of each furring strip (one on each side, half way into the wood). It is helpful if the approximate locations where the 4 corner posts (the shorter furring strips) will support the net are marked on the net with flagging tape. The pre-cut net can be conveniently transported in a burlap sack.

At the exclosure site, the locations of the furring strips should be carefully measured and marked. The 2 longer strips should be centered in the middle of the area (see Fig. 1A). Use the post-hole digger to set one end of each strip about .5 m into the ground. Do not put the end with the staples in the hole. Tightly repack the soil around the strips. When all the posts have been set, place the netting along the long dimension of the

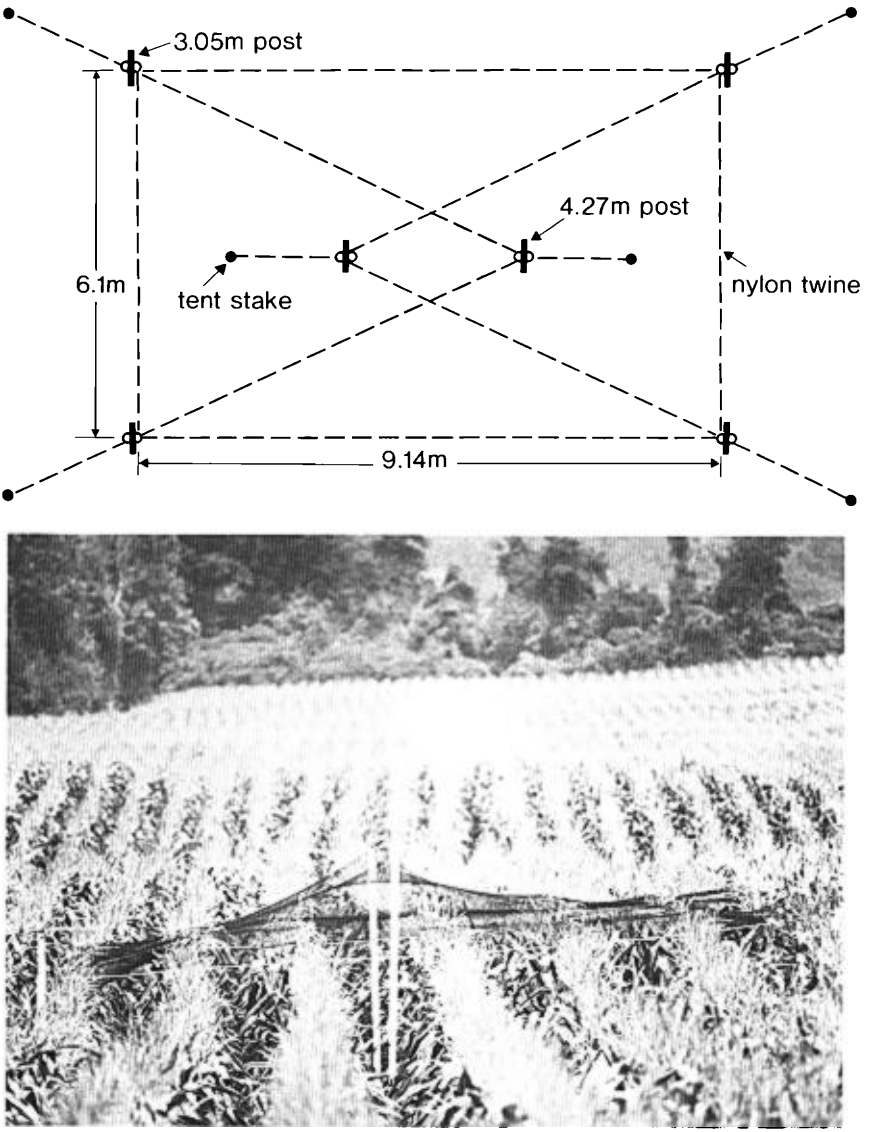

FIGURE 1. Exclosure design. A. Top view of exclosure (schematic) showing locations of posts, nylon twine, and tent stakes. B. Front view of finished exclosure in cornfield.

exclosure site and hoist the netting over the posts using the 2 m stick. Orient the netting so that the flagged locations are approximately over the corner posts. Next, guy down each of the posts using a 4.6 m length of nylon twine tied to the outside staple of the furring strip and secured to the ground with a tent stake.

Using the pattern shown in Fig. 1A, string the nylon twine among posts to remove the sag from the netting; the step ladder will be needed for this. Tie off each section of string tautly (using the "inside" staples) to obtain the maximum exclosure space. The outside guy strings can be used to readjust the tension.

The final step is to stake the 4 sides of the netting to the ground. It is essential that this is done carefully to exclude birds. Our failure to properly secure the sides on one of our 18 exclosures resulted in bird entrance into the exclosure. The excess netting at each corner can be used for investigator access. The finished exclosure should resemble Fig. 1B. Total construction time (starting with pre-cut materials) for 2 people is about 2 h. An exclosure can be dismantled in less than 30 min.

Exclosures constructed when the corn was less than 1.5 m tall withstood high winds and hard rains without damage. In addition, corn yield was not significantly affected by the netting ($P = .27$, paired t-test, n = 18 exclosures, dry weight of 10 ears in both exclosures and controls). Insect abundances inside and outside the exclosures were also generally equivalent. Visual counts of insects per 10 plants revealed no differences ($P > .10$, n = 110) between exclosure and control areas among the 7 most common insect groups. Yellow pan traps (Southwood 1978), however, showed that the netting may act as a barrier to the movement of flying insects such as northern corn rootworm beetles (*Diabrotica longicornis* Say) and long-legged flies (*Dolichopus* spp.) (difference between control and exclosure areas, $P = .005$ and .008 respectively, paired t-test, n = 32).

Properly constructed exclosures effectively excluded all birds for the 2 months that they were used, even though several of the fields where the exclosures were located had high blackbird visitation. Nearly all materials recovered at the end of the study could be reused.

We thank M. Crovella and J. P. Hayes, Jr. for field assistance and R. A. Dolbeer and J. P. Hayes, Jr. for reviewing the manuscript.

LITERATURE CITED

CAMPBELL, R. W., T. R. TORGERSON, S. C. FORREST, AND L. C. YOUNGS. 1981. Bird exclosures for branches and whole trees. Gen. Tech. Rep. PNW-125. USDA, Forest Service, Pacific Northwest Forest and Range Exp. Station, Portland, Oregon.

DOLBEER, R. A., AND P. P. WORONECKI. 1979. The effect of blackbird feeding and insecticides on earworm populations in sweet corn fields. U.S. Fish Wildl. Serv., Denver Wildl. Res. Center, Bird Damage Res. Rep. No. 12.

HOLMES, R. T., J. C. SCHULTZ, AND P. NORTHNAGLE. 1979. Bird predation on forest insects: an exclosure experiment. Science 206:462–463.

MITTERLING, L. A. 1966. Construction of a "beta-confinement" bird enclosure. Bird-Banding 37:123–125.

SLOAN, N. F., AND H. C. COPPEL. 1968. Ecological implications of bird predation on the larch casebearer in Wisconsin. J. Econ. Entomol. 61:1067–1070.

SOUTHWOOD, T. R. E. 1978. Ecological methods. 2nd edition. Chapman and Hall, London.

ERIC K. BOLLINGER AND JAMES W. CASLICK, *Department of Natural Resources, New York State College of Agriculture and Life Sciences, Cornell University, Ithaca, New York 14853.* Received 5 Nov. 1982; accepted 4 Oct. 1983.

Direct Canada-Mexico Recovery of a Banded Least Flycatcher.—Studies of migrants in Ontario and of specimens from throughout the range show that adult (AHY = after hatching year) Least Flycatchers (*Empidonax minimus*) migrate south an average of about 38 days in advance of the immatures (HY = hatching year). Median "autumn" migration dates for AHY Least Flycatchers are 22 July (with the middle 90% of the records spanning the period 11 July–13 August) at Long Point, Ontario, and 3 August for specimens collected in the southern United States. Arrivals of AHY Least Flycatchers in Mexico and Central America start in early and mid-August, respectively. The corresponding dates for HY Least Flycatchers are 29 August (90% from 17 August to 13 September) at Long