SAS INSTITUTE INC. 1982. SAS user's guide: statistics. SAS Inst. Inc., Cary, N.C. 584pp.

STICKLEY, A. R., JR., D. L. OTIS, AND D. T. PALMER. 1979. Evaluation and results of a survey of blackbird and mammal damage to mature field corn over a large (three state) area. Pages 169–177 *in* J. K. Beck, ed. Vertebrate pest control and management materials, 680. Am. Soc. Testing Materials, Philadelphia, Pa.

WRIGHT, R. G., AND R. N. PAISLEY. 1990. Turkey populations and management. Wis. Dep. Nat. Resour. Proj. Update RS-234. Madison. 8pp.

———, ———, AND J. F. KUBISIAK. 1989. Farmland habitat use by wild turkeys in Wisconsin. Proc. East. Wildl. Damage Control Conf. 4:120–126.

ZAR, J. H. 1984. Biostatistical analysis. Prentice-Hall, Englewood Cliffs, N.J. 718pp.

Received 3 September 1991.
Accepted 3 September 1992.
Associate Editor: Swallow.

***Wildl. Soc. Bull.* 21:45–46, 1993**

A RESTRAINING DEVICE FOR HANDLING NORTHERN BOBWHITES

STEPHEN J. DEMASO, ***Oklahoma Department of Wildlife Conservation, Oklahoma City, OK 73152***

ALAN D. PEOPLES, ***Oklahoma Department of Wildlife Conservation, Oklahoma City, OK 73152***

No information is available about restraining birds prior to marking, because usually ≥2 people work together to mark birds (Lehmann 1984:118). Budgetary or personnel constraints may allow only 1 person to trap and mark birds in the field. When 1 researcher has to hold, age, band, collect blood, take measurements, and mark a captured bird, that bird may experience increased handling stress, a broken wing or leg, or it may escape.

We describe a method for banding and radiomarking northern bobwhites (*Colinus virginianus*) by 1 individual.

METHODS

Restraining Device Construction

The restraining device was constructed with 1.9-cm (¾-inch) wood. The device is a 4-sided box, with top and bottom dimensions of 30.5 × 12.7 cm (12 × 5 inches) (Fig. 1). The 2 sides are 12.7 × 12.7 cm (5 × 5 inches). A 3.8-cm- (1.5-inch) diameter hole was cut in the top of the restraining device (Fig. 1). All dimensions can be varied for different species. The restraining device was fastened together with glue and nails. The top and edges of the holder should be sanded to prevent injury to the bird.

Using the Restraining Device

Once the bird is caught, its legs are inserted through the hole in the top of the device. A spring-operated clothespin is attached above the knee-joint of each leg (Fig. 1).

Testing the Restraining Device

Time Considerations.—We compared the handling times of our method (1 person) with the traditional method (2 people). Five individuals and 5 pairs were used as replicates. Handling time was measured as the time it took to remove a bird from a trap, age the bird, attach a leg band, attach a radiotransmitter, and release the bird. Handling times were rounded to the nearest second. Mean handling times were compared with a 2-tailed t-test.

Welfare of Restrained Bobwhites.—We evaluated the welfare of bobwhites by comparing the survival rate of birds for ≥2 weeks after attaching radiotransmitters. Fifteen birds were tagged using our method and 15 birds were tagged using the traditional method. Survival rates were calculated using the Kaplan-Meier method with staggered entry (Pollock et al. 1989). Mean survival rates were compared using a normal 2-tailed Z-test.

RESULTS AND DISCUSSION

Mean handling times differed (t = 4.73, P = 0.0015) between our method ($\bar{x}$ = 76 sec,

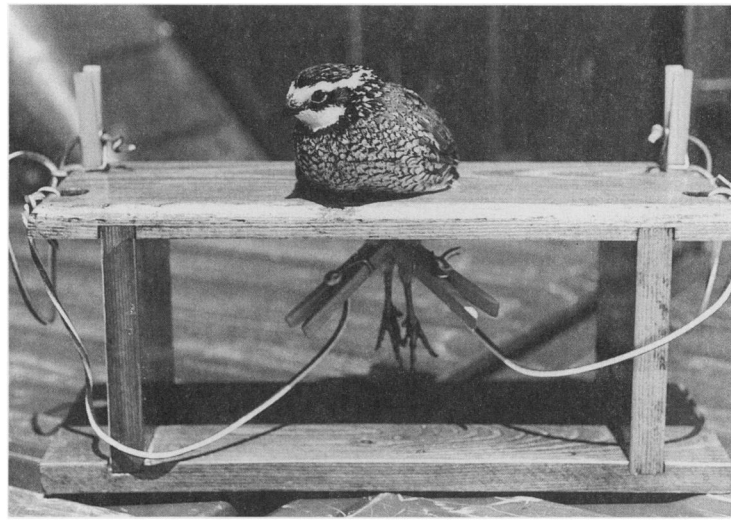

Fig. 1. Northern bobwhite in restraining device, note placement of clothespins for securing the bird.

SE = 3.6) and the traditional method ($\bar{x}$ = 57 sec, SE = 1.5). Mean survival rates did not differ (Z = 0.13, P = 0.8945) between our method ($\bar{x}$ = 0.65, SE = 0.08) and the traditional method ($\bar{x}$ = 0.61, SE = 0.03).

Although the handling time differed between methods, we feel that the practicability of our device negated this difference by decreasing costs and the number of people required to handle birds. Our method did not influence survival rates of marked birds compared to the traditional method.

One technician has marked >600 bobwhites using the restraining device without incidence of escape or injury. This technique may be applicable to other species following appropriate modifications. Advantages of this technique over previous methods include use and data collection by 1 person, reduced cost of research, and the device is easily transported and used in the field.

Acknowledgments.—We thank J. Boren, R. Lochmiller, H. Namminga, S. Rice, M. Shaw, and J. Sullivan for reviewing this manuscript. Thanks also are extended to S. Cox and numerous Oklahoma Department of Wildlife Conservation employees who assisted with data collection and the manuscript. Funding was a contribution of Federal Aid in Wildlife Restoration, Oklahoma Project W-82-R-31.

LITERATURE CITED

LEHMANN, V. W. 1984. Bobwhites in the Rio Grande plain of Texas. Texas A&M Univ. Press, College Station. 371pp.

POLLOCK, K. H., S. R. WINTERSTEIN, C. M. BUNCK, AND P. D. CURTIS. 1989. Survival analysis in telemetry studies: the staggered entry design. J. Wildl. Manage. 52:7–15.

Received 9 March 1992.
Accepted 31 August 1992.
Associate Editor: McComb.