Bird Population Studies For Suburban Students

JOHN H. COGGINS

THE STUDENT WHO LIVES in the city or suburbs and wants to work with wildlife probably dreams of following bighorn sheep over the Rocky Mountains, or huddling in a blind on a cliffside to watch nesting golden eagles. While these are unquestionably attractive adventures, those who feel that wildlife studies must be postponed until one is in the wilderness will be missing opportunities for study and enjoyment of wildlife that lives within a few blocks of home. Almost any city or suburb has a large and diverse bird population. There is a small but growing body of literature about birds of the urban and suburban areas (for example, Bull 1973; DeGraff et al. 1975; Emlen 1974; Guthrie 1974; Stewart 1973; and Williamson 1973).

Several years ago it occurred to me that the large avian populations of suburban Connecticut would be ideal subjects for study by my ecology classes at Middlesex Community College. Students could study nesting and mating behavior in the blue spruce on their home lawns, conduct bird censuses, study the effects of human density on species numbers or nest heights,

Fig. 1. A bird trapped in the mist net must be carefully and quickly removed.

Fig. 2. The wing chord of a Slate-colored Junco *(Junco hyemalis)* is measured to determine its sex.

assign feeding heights within wooded parks, and so on. The opportunities are endless and, perhaps even more important, students seem to love studying birds.

Without question the most popular field work in my ecology class over the last few years has been a mark-and-recapture study of birds, carried out in my back yard. Students who are not even registered for the course sign up for a morning of bird study. Twenty-year-olds notorious for late sleeping get up at 5 a.m. three mornings in a row, on a weekend, to participate.

Such basic wildlife study skills as netting, bird handling, banding techniques, and methods of determining the age and sex of birds are gained through studies of this type. Even more important is the understanding and appreciation of nature that comes from watching the sun rise, hearing bird songs start, and admiring a bird briefly in the hand before releasing it.

It should be noted that any capture, handling, or banding of birds requires a federal license. If a school

The author is assistant professor of science at Middlesex Community College, 100 Training Hill Rd., Middletown, Conn. 06457. A 1966 graduate in biology from Bowdoin College, Coggins holds M.A.T. and M.S. degrees in biology and is presently working toward a Ph.D. in higher education administration at the University of Connecticut. He was named Connecticut Conservation Educator of the Year by the National Wildlife Federation in 1972, and he received the Conservation Award for Environmental Instruction from *Field and Stream* in 1973. This year he has been recognized as an Outstanding Educator of America by the OEA program of Fuller & Dees. Coggins was involved in medical research for two years at Letterman Army Institute of Research, investigating sweat gland occlusion resulting from skin disease (a common problem in tropical areas, such as Viet Nam). His other interests include photography, backpacking, fishing, and scuba diving.

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Table 1. Sample data sheet. Increasing the number of samples will usually increase the accuracy of the estimate of *P*.

Sample	*m*	*t*	*r*	*y*	tm^2	*tmy*	*P*
#1	0	27	0	0	0	0	0
#2	27	24	7	.29	17496	189	92
#3	44	31	11	.35	77512	673	115
#4	64	27	15	.56	188104	1633	115

does not have a licensed bander on its staff, there may be one living in the community. Most banders I know welcome help with net placement and companionship during the capture period.

Estimating Populations

I usually set up the field work as a population study. There are a number of formulas for estimating populations using mark-recapture techniques, but I find Hayne's (1949) method easy to use and accurate for short-term studies in which births, deaths, immigration, and emigration are not to be considered. Hayne's formula is

$$P = \frac{\Sigma tm^2}{\Sigma tmy}$$

where *P* is an estimate of the population size
t is the number of animals in the sample
m is the number of animals in the population which have been marked
y is the proportion of *t* that are marked, determined by *r/t*, where *r* equals the number of recaptures in the sample (table 1).

The procedure consists of capturing the birds, banding them so that they may be identified, and releasing them. The official and most complete manual for bird banding procedures is the *North American Bird Banding Manual* (USDI et al. 1972). Probably the most widely used aid to species identification is Peterson (1974). Robbins et al. (1966) is also a good field guide, and has, I believe, a clearer section on waterfowl than Peterson. For identifying birds in the hand, Roberts (1955) has written an excellent key. Although Roberts' manual specifies Minnesota area birds, it has much wider applicability. For age and sex determination Wood (1969) provides an easy-to-follow key for 162 species (mostly Passeriformes). Wood also provides information on proper procedures for banding and banding schedule codes.

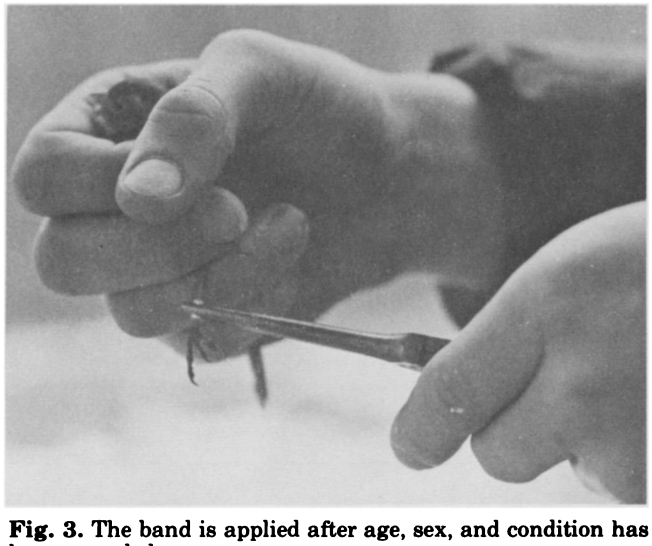

Fig. 3. The band is applied after age, sex, and condition has been recorded.

On subsequent days, birds are identified as new captures or recaptures. The proportion of recaptures to total sample is theorized to be indicative of the total sample's relation to the population size. With reference to table 1, the sum of the tm^2 and *tmy* columns provides greater accuracy for the estimate of *P* with each successive sample.

Birdfeeder Studies

The population may be estimated for a quadrat of a given size, or for birds utilizing a particular site, such as a bird feeder. If the number of birds utilizing a feeder is to be estimated, individual populations may be projected using Hayne's formula, or all the species may be considered together as the *P*.

I personally prefer to estimate the populations using a birdfeeder. The variety and density of birds at a feeder is greater than would be found in a small sample quadrat, and for this reason the feeder provides more action and excitement and greater opportunity for educational experience.

Activity at a bird feeder increases with cold weather, and often heightens dramatically at the onset of a storm. While winter is the ideal time for birdfeeder studies, it is important that banding not be done on a very cold day, since birds taken on a cold day may expend more energy during the struggle of capture and banding than they are able to restore. Banding during a storm is also unwise, because food sources may be iced over or less available for several days following, creating an extra hardship on a bird already weakened by the banding procedure. I have found that at 40 °F the birds are eager enough to feed that they provide an active banding session, and yet can be handled without dangerous weakening.

A "mist net" 12 meters long by 2.6 meters high with a 36-mm mesh, especially designed for bird capture and hung in the direction of most frequent approach to the feeder, should intercept many of the birds coming to feed (fig. 1). The ground feeders, since they usually fly in low, are much more likely to hit the net. Some species have a tendency to drop down to a feeder from neighboring trees, which makes it unlikely that they will be caught.

When there is snow on the ground, the net is more easily seen by the birds, and it is more visible when the sun is high. The first dim light of early morning is best for capture and banding.

Birds may also be captured in baited cages which

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Velocity of blood flow vs. total cross-sectional area of vessels (Langley et al. 1969).

	Area (cm^2)	*Average velocity* (cm/sec)
Aorta	4.50	40.00
Arteries	20.00	9.00
Arterioles	400.00	0.45
Capllaries	4,500.00	0.04
Veins	40.00	4.50
Vena cava	18.00	10.00

15. (a) flow rate X resistance (b) no change (c) a decrease (d) increase (e) decrease	16. One should not confuse flow rate (volume/time) with velocity (distance/time). Assuming flow rate is constant for the entire circulatory system (see #15[b]), the velocity decreases with increasing total cross-sectional area. Mathematically, total blood flow rate = average velocity (over a given cross-section) X cross-sectional area. The total cross-sectional area of the various types of vessels and their average blood velocity are compared in the table. (a) Which vessel has the lowest average blood velocity? (b) Why is the lowest blood velocity advantageous in that vessel type?
16. (a) capillaries (b) It allows for more time for exchange of materials between cells and blood.	

REFERENCES

GUYTON, A. C. 1966. *Textbook of medical physiology,* 3rd ed. W. B. Saunders Co., Philadelphia.

JACOB, S. W., and C. A. FRANCONE. 1974. *Structure and function in man,* 3rd ed. W. B. Saunders Co., Philadelphia.

LANCLEY, L. L., I. R. TELFORD, and J. B. CHRISTENSEN. 1969. *Dynamic anatomy and physiology,* 3rd ed. McGraw-Hill Book Co., New York.

Audiotutorial Conference

The International Audio-Tutorial Congress Annual Conference will be held November 5-7 at the University of Louisville, Louisville, Ky. Information is available from Stanley Nelson, University of Minnesota, Waseca, Minn. 56093.

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permit entry but have no exit, or in simple box traps sprung at a distance with a string.

Conclusion

I recognize that there are some who feel winter feeding of birds is unwise since it may result in larger populations than would exist naturally. There are also critics who view studies of populations at a feeder as worthless since the birds are not in a completely "natural" setting. I contend that winter feeding is harmful only if it is not continuous. As to whether a bird feeder study is unworthy of scientific examination, I would point out that with humans spreading into more and more wildlife habitats, there cannot be enough knowledge gained about those situations where man and other animals interact.

For the students, these population studies have provided more than experience in statistical manipulation and some wildlife handling techniques (fig. 2 and 3). They seem to be genuinely excited by the discovery of research opportunities in their own communities and to gain a heightened awareness and appreciation of their environment. For the instructor that is ample reward, and ample justification for continuing the studies.

REFERENCES

BULL, J. 1973. Exotic birds in the New York City area. *Wilson Bulletin* 85(4):501.

DeGRAFF, R. M., J. W. THOMAS, and H. R. PYWELL. 1975. Relationships between songbird nesting height, housing density, and vegetation in New England suburbs. *Proceedings of the Northeast Fisheries and Wildlife Conference,* Feb. 22-24, 1975. New Haven, Conn.

EMLEN, J. T. 1974. An urban community in Tucson, Arizona: derivation, structure, regulation. *Condor* 76(2):184.

GUTHRIE, D. A. 1974. Suburban bird populations in southern California. *American Midlands Naturalist* 92(2):461.

HAYNE, D. W. 1949. Two methods for estimating populations from trapping records. *Journal of Mammalogy* 30(4):399.

PETERSON, R. T. 1947. *A field guide to birds.* Houghton Mifflin, Boston.

ROBBINS, C. S., B. BRUUN, and H. S. ZIM. 1966. *Birds of North America.* Golden Press, New York.

STEWART, P. A. 1973. Replacement of cavity-nesting starlings and house sparrows after removal. *Wilson Bulletin* 85(3):291.

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF SPORT FISHERIES, and DEPARTMENT OF THE ENVIRONMENT, CANADIAN WILDLIFE SERVICE. 1972. *North American bird banding manual.* Government Printing Office, Washington, D.C.

WILLIAMSON, R. D. 1973. Bird and people neighborhoods: Rock Creek Park. *Natural History* 82:55.

WOOD, M. 1969. *A bird-bander's guide to determination of age and sex of selected species.* Pennsylvania State University Press, University Park.

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