SUMMARY

1. Caspian Terns nest on three islands in Lake Michigan and two or three islands in Georgian Bay.
2. Nesting is done in compact colonies, and is seldom done in association with other species, such as the Herring Gull.
3. Banding and return records of the late Mr. William Lyon with those of the Ludwig Banding Station have been reviewed in detail.
4. 8,025 young Caspian Terns have been banded with 110 returns recovered.
5. The largest mortality appears in the first six months of life.
6. 24 states or countries are represented in this series of returns.
7. The winter range of the Caspian Tern extends from the southern United States to the West Indies, Central and South America.
8. The Caspian Tern travels more during the first three years of life.
9. The Caspian Terns probably do not nest until the third year of life.

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MEASUREMENTS OF TARSAL CIRCUMFERENCES FROM LIVING RAPTORIAL BIRDS

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INTRODUCTION

IN a recent note, Pough (1939) gave a series of measurements made on museum skins of the circumferences of the tarsi of a group of hawks, kites, eagles and vultures. Also listed were suggested band sizes for these birds. Completely lacking were measurements from living birds, for, as Pough pointed out, such data have not been extensively collected.

Inspired by this note and its plea for the accumulation of such measurements, the writers began the collection of data on all available living or freshly killed raptores. It was felt that information on 245 individuals, representing 28 species, was significant enough for publication.

The Pennsylvania Game Commission permit held by one of us (R. M. S.), allowing the handling of the protected species, is gratefully acknowledged.

MATERIAL

We were careful to measure no birds prior to the minimum banding age (about three weeks). The measurements were taken as follows: a light cotton thread was knotted snugly around the tarsus midway between the foot and the tibio-tarsal joint. The thread was

then cut with a razor and the loop was straightened out and measured, thus giving accurately the tarsal circumference.

A considerable number of these birds were in the hands of individuals as pets, trained falcons, etc. For example, the four gyrfalcons belonged to Captain R. L. Meredith, of Boonton, New Jersey who obtained them alive from Greenland. However, the majority were wild ones measured at the time of banding.

The freshly killed birds which we measured, met their deaths in a variety of ways. Many, especially the Sharp-shinned Hawks, were measured after a day's collection in the wake of the gunners in the Hawk Mountain area. Others were picked up during the regular open season on upland game. The remainder were birds found struck by automobiles, taken from operators of pole-traps, and obtained from coöperating taxidermists.

OBSERVATIONS

The question of the actual sizes of the bands used on raptores was first considered. The circumference in millimeters of bands 3 to 8 (taken from Pough's paper—expressed there in inches) is approximately as follows: no. 3, 17.5; no. 4, 22.5; no. 5, 27.0; no. 6, 33.5; no. 7, 45.0; and no. 8, 70.0. Whereas the difference between bands 3 and 4, 4 and 5, and 5 and 6 respectively is about 5.5.mm., that between numbers 6 and 7 is 11.5 mm. and between 7 and 8 is 25.0 mm. The significance of these figures becomes apparent when one examines the table, wherein are expressed Pough's tarsal measurements as compared to the writers', plus suggested band sizes from several sources. The bands recommended by the present authors are chosen on the basis that it is best to band with the smallest ring which will cause the bird no discomfort. This minimizes loss over the foot and reduces the ever-present danger of extraneous material lodging between band and leg.

Inspection of the table reveals that although we are in general agreement with previously listed band sizes, some further suggestions are indicated. According to the measurements, no. 3 is the correct band for Sharp-shins. For the Swainson's and Harris' Hawks, although too few data are available for finality, no. 6 seems best. Even though only two Pigeon Hawks were measured, the probable size range does not seem to warrant a band larger than no. 3. This is also the proper size for the Sparrow Hawk.

Despite the fact that only a single record was obtained for the Black Vulture, this measurement fits in well with data for the Turkey Vulture, which finds no. 8 much too large and no. 6 too small, 7 being correct.

In a number of instances it was found that a particular band, correct for most members of a species, was too large for certain individuals. For instance, some few Red-tails are too small for no. 7; some Red-shoulders for no. 6; some Broad-wings for no. 5 (no. 6

Bird (*Arranged according to band size—smallest first*)	*Tarsal Circumference in Millimeters*				*Band Size Recommended*			
	Stabler and Hoy Data			*Pough's (1939) List**	*Old Audubon Soc. List*	*Pough's (1939) List*	*Bird Banding Notes*	*Stabler and Hoy*
	Number Birds	*Range*	*Average*					
Hawk, Sharp-shinned	27	10–14	12.0	14.5	3	4	3	3
Hawk, Pigeon	2	14–14	14.0	16.0	3	4	4	3
Hawk, Sparrow	44	11.5–14.5	13.2	12.5	3	3	4	3
Owl, Saw-whet	1	–	19.0	–	–	–	4	4
Hawk, Marsh	4	17–22.5	18.8	22.0	5	5	5	4 and
Hawk, Broad-winged	6	18–24	21.6	22.5	5	5	6	4 and
Owl, Screech	16	18–21.5	19.2	–	5	–	5	5
Hawk, Cooper's	21	18.5–25.5	22.2	22.5	5	5	5	5
Owl, Long-eared	6	17–28	23.1	–	–	–	6	5 and 6
Owl, Barn	11	22.5–29	26.0	–	6	–	6	5 and 6
Hawk, Red-shouldered	17	21–29	23.7	25.0	6	6	6	6
Hawk, Swainson's	2	28–30	29.0	32.0	–	7	6	6
Owl, Short-eared	1	–	29.5	–	–	–	6	6
Hawk, Harris'	3	26–31	28.0	29.0	–	7	–	6
Falcon, Prairie	5	25–31	28.2	24.5	–	6	6	6
Caracara, Audubon's	2	30–31	30.5	28.5	7	6	–	6
Hawk, Duck	13	22.5–34	28.4	28.5	6	6	6	5, 6 and 7
Goshawk	7	24–33	28.6	28.5	–	6	6	6 and 7
Hawk, Red-tailed	23	28–38.5	32.6	38.5	7	7	7	6 and 7
Gyrfalcon	4	33–35	34.5	32.0	–	7	–	7
Owl, Barred	1	–	36.0	–	6	–	7	7
Vulture, Black	1	–	39.0	33.5	8	7	8	7
Vulture, Turkey	6	36–40	37.8	28.5	8	6	8	7
Owl, Snowy	1	–	50.0	–	–	–	8	8
Owl, Great Horned	6	44–51	47.3	–	8	–	8	8
Osprey	8	41–53	46.0	41.5	6	7	8	8
Eagle, Bald	3	50–58	53.3	51.0	8	8	8	8
Eagle, Golden	4	61–71	66.0	57.5	8	8	8	8

* These were given in inches and have been transposed into millimeters for the sake of comparison. Also, Pough did not state the number of birds measured, nor whether his figures represented averages.

seems much too large); some Marsh hawks for no. 5, and so on.

In the case of the Peregrine, an unusual range was noted. Some very small males took a no. 5, and some females were actually too large for no. 6. The Peregrines listed for no. 7 bring up another suggestion. Several species are slightly too large for no. 6, and find no. 7 much over size (Goshawk, Gyrfalcon, Peregrine), while others are similarly too large for no. 7 and find no. 8 too big (Snowy and Great Horned Owls, Osprey). As a result of these situations, we should like to recommend strongly the formation of two new band sizes, a no. 6A—circumference about 39 mm., and a no. 7A—circumference about 58 mm. The 6A would be perfect for such as large Goshawks, Gyrfalcons and Peregrines, where no. 7 is too large, and the 7A would fit better on Ospreys, Great Horned Owls and Snowy Owls, where no. 8 is over-size. In banding several Great Horned Owls and Turkey Vultures, it has been found necessary to cut down the band recommended, a practice which we feel has little in its favor.

In two of the species studied, we have sufficient data from both nestling and post-nestling (adult and immature) individuals to allow for a comparison of the tarsi of the two age groups. We are fortunate in that one is a species with a feathered tarsus (Screech Owl), the other with a naked tarsus (Sparrow Hawk). In the case of the falcon, the nestlings gave an average circumference of 13.2 mm., the older ones an identical figure. The nestling owls averaged 18.6 mm., while the grown birds averaged 19.7 mm. In other words for Sparrow Hawks at least, there is no average difference between the tarsal circumferences of nestlings over three weeks of age, and birds that have left the nest and are on their own. The slightly greater average for the post-nestling Screech Owls can probably be accounted for by the increase of tarsal feathering over that of the nestling.

CONCLUSIONS

1. Data are presented on the tarsal circumferences of 245 raptores, representing 28 species. Band sizes are recommended on the basis of these data.

2. It is urged that a new band between nos. 6 and 7, and one between nos. 7 and 8, be issued. The first (6A) should be about 39 mm. in circumference, the second (7A) about 58 mm.

3. Finally, we should like to suggest that it is probably unwise to recommend but a single band size for certain species of raptores, where individual variation is a pronounced characteristic.

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