Tree Swallow Productivity Near Saskatoon, Saskatchewan

Mary I. Houston and ***C. Stuart Houston***
863 University Drive
Saskatoon, SK S7N 0J8

INTRODUCTION

A previous paper discussed the nesting success of a 122 km, 250 nest box trail centered on Saskatoon, Saskatchewan (Houston and Houston 1987). That paper reported on return rates and longevity of 9,049 nestlings and 1,010 adult Tree Swallows *(Tachycineta bicolor)* banded through 1985. We wish to report on annual success and productivity for Tree Swallows on this nest box trail for the period 1970 - 1997.

METHODS

Study area and methods. - The Saskatoon Junior Natural History Society initiated this project as "The Prairie Bluebird Trail," but the greatest beneficiary has been the Tree Swallow. Nest boxes were made of unpainted plywood, 14.4 cm high, with inside measurements of 8 x 8 cm. Each box had a round entry hole of 2.4 cm diameter (to exclude starlings) and no associated perch. Nest boxes were placed on fence posts at densities of one to six per kilometer. Higher concentrations of nest boxes bordered the best habitat—sandy pastures. Nest boxes were visited every 10 days from the last week of May through the first week in August. Except in 1983, young not found dead at the subsequent visit were presumed to have fledged.

The 23 juniors who built the bird houses made almost every conceivable error. Because hinges were too expensive, they used two strips of wood nailed to the roof and in turn fastened to the upper sides of the box by removable nails. Shingle nails were used in the initial construction, but they were not strong enough. As many as 70 roofs, blown off during prairie windstorms, required retrieval and replacement during one inspection of 200 houses. Lumber was donated by lumber yards and construction firms, but the juniors soon learned not to accept ordinary planks, which split too easily, and particle board, from which nails worked loose within a year. Another kind of problem was discovered when positioning the houses. At first many boxes were placed along side roads away from traffic, but vandalism was high—some were shot at, some knocked down, and others stolen. Houses were placed facing into the field or pasture, so that the entrance hole would not draw attention, but many boxes were rubbed down by livestock in the pastures. Subsequently, houses were built only of plywood, most were placed along paved highways, and the box and entry hole faced the highway. The houses are relatively inconspicuous across wider highway ditches and people are less inclined to stop and vandalize (Houston 1971).

Boxes were moved to a new site if used by a House Sparrow *(Passer domesticus)*, particularly if within 100 m of an active farmyard or if shrubbery grew up near the box. In this way, we reduced maximum House Sparrow occupancy from 52 boxes in 1982 to as low as 0 in 1994. House Sparrows occupied a mean of 4.5 boxes/year over the past 12 years.

Bird boxes were cleaned out each April, in part because up to 30 boxes may be occupied over winter by deer mice *(Peromyscus maniculatus)*.

RESULTS

Tree Swallows respond quickly to box placement, sometimes entering a box within five min of its erection; they have used boxes on 3553 occasions in 28 years. Occupancy rates of boxes by all species combined have been high, from 76.3% in 1982 to 99.1% in 1972, with an overall mean of 90.1% (Table 1). These occupancy rates include use by deer mice (10 times with summer nests with young); Mountain Bluebirds *(Sialia currucoides)*, 1713 uses; Eastern Bluebirds *(Sialia sialis)*, 7 uses; hybrid Eastern x Mountain Bluebirds, 2 uses; House Wrens *(Troglodytes aedon)*, 169 uses; and House Sparrows, 445 uses.

Table 1. Tree Swallow use on Saskatoon nest box trail, 1970-1997. (Note that many boxes were used by two different species during one summer.)

Year	Total # Boxes	# Boxes Used	% Boxes Used	# TS Adult	# TS Succ.	# TS Fail	%TS Succ.	Young	# TS Yg./ Nest	Other Species	# Boxes Empty
1970	160	145	90.6	30	53	-	-	292	5.5	15	15
1971	208	191	91.8	76	100	-	-	586	5.9	28	17
1972	215	213	99.1	80	104	-	-	552	5.3	90	2
1973	224	214	95.5	99	57	-	-	334	5.9	93	10
1974	225	218	96.9	67	76	56	57.6	379	5.0	107	7
1975	246	236	95.9	85	102	53	65.8	451	4.4	95	10
1976	251	231	92.0	67	105	38	73.4	503	4.8	128	20
1977	251	246	98.0	52	121	14	89.6	611	5.0	122	5
1978	251	244	97.2	65	122	46	72.6	619	5.1	110	7
1979	253	239	94.5	63	94	59	61.4	469	5.0	74	14
1980	236	230	97.5	58	103	48	68.2	528	5.1	94	6
1981	250	230	92.0	54	84	59	58.7	434	5.2	110	20
1982	240	183	76.3	59	91	21	81.3	466	5.1	85	57
1983	244	191	78.3	24	114	17	87.0	526	4.6	64	53
1984	240	202	84.2	53	97	35	73.5	433	4.5	87	38
1985	215	190	88.4	61	121	22	84.6	571	4.7	56	25
1986	216	180	83.3	47	100	29	77.5	497	5.0	70	36
1987	234	217	92.7	34	114	26	81.4	491	4.3	93	17
1988	233	211	90.6	62	85	52	62.0	365	4.3	96	22
1989	244	190	84.8	35	84	33	71.8	422	5.0	95	34
1990	227	197	86.8	62	85	25	77.3	315	3.7	112	30
1991	230	202	87.8	46	74	32	69.8	355	4.8	116	28
1992	184	155	84.2	46	75	17	81.5	367	4.9	72	29
1993	219	200	91.3	43	38	99	27.7	154	4.1	96	19
1994	227	193	85.0	17	94	28	77.0	460	4.9	44	34
1995	224	194	86.6	60	117	39	75.0	559	4.8	66	30
1996	227	202	89.0	76	93	53	63.7	431	4.6	80	25
1997	210	193	91.9	69	114	35	76.5	590	5.2	54	17
Total	**6364**	**5737**	**90.1**	**1590**	**2617**	**936**	**73.7**	**12760**	**4.9**	**2346**	**610**

We banded 12,760 nestling and 1590 adult female Tree Swallows in 28 consecutive seasons; together with 5904 nestling and 426 adult Mountain Bluebirds. Success and failure rates were not compiled during the first four years and are available for only 24 of the 28 years. For Tree Swallows, successful nests were ones from which at least one nestling departs; and nesting success is the measure of successful nests from available nest boxes used by Tree Swallows.

Tree Swallow success has varied from 27.7% in 1993, as a result of cold wet rains, and 62.0% in 1988, a year of extreme heat and drought, to a high of 89.6% in 1977. There have been 2617 successful Tree Swallow nests and 936 failed nests, for an average success rate of 73.7%. Productivity of successful nests has varied from 3.7 to 5.9 young/nest but has averaged 4.9 young/nest. The figure of 4.0 young/nest in 1993 is misleadingly high because an unknown number of nestlings died after banding but disappeared before the next nest box check.

DISCUSSION

Our nesting success for Tree Swallows of 73.7% (n = 3553 nests) is slightly lower than the 78.8% ± 17.2 SD reported from 10 populations, mostly in eastern North America (n = 3458; Robertson et al. 1992). Our number of 4.9 young/successful nest, at banding visit, was slightly higher than the 4.57 ± 0.42 SD reported from eight populations, 77% of the nests being those of Stiles in Alberta (Robertson et al. 1992).

At this latitude, Tree Swallow success is closely related to weather variables, as seen in two extreme years. In 1988, egg mortality was high in extreme heat and the nest failure rate was 38%; in 1993, nestling mortality was high in cold, wet weather, and the nest failure rate was 72.3%. These two special years will be reported in greater detail elsewhere. Other years with high nest failure rates include 1974 (42.4%) and 1981 (41.3%), where the causative factors were not readily evident, and 1996 (36.3%) where there was another spell of cold, wet weather in late June.

Tree Swallows and Mountain Bluebirds were very rare on the open plains at the beginning of European settlement. Now there are bird house trails, short and long, all across the settled portions of the three prairie provinces. Both of these attractive and beneficial species have increased as fast as boxes were placed for them.

LITERATURE CITED

Houston, D. V. 1971. The prairie bird house trail. *Inland Bird Banding Assoc. News* 43: 58-61.

Houston, M. I. and C. S. Houston. 1987. Tree Swallow banding near Saskatoon, Saskatchewan. *N. Am. Bird Bander* 12: 103-108.

Robertson, R. J., B. J. Stutchbury and R. R. Cohen. 1992. Tree Swallow, *In* The Birds of North America, No. 11. A. Poole, P. Stettenheim & F. Gill, eds. Philadelphia: The Academy of Natural Sciences; Washington, DC: The American Ornithologists' Union.