

SUCCESS OF MARSH HAWK NESTS IN NORTH DAKOTA

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DURING the early history of the Lower Souris National Wildlife Refuge a research program was instituted by the Fish and Wildlife Service to determine the most important elements affecting the nesting of ducks on the Souris marshes. The following notes, the results of observations on marsh hawks, *Circus cyaneus*, made incidental to studies of nesting ducks, were made principally in the years 1937, 1938, and 1939. Mr. Joseph Hickey kindly gave considerable assistance in tabulating and organizing the data.

When a nest was located, it was marked and the pertinent information recorded. If not too far out of the way, the nest was revisited periodically, until it was destroyed or the young large enough to band. At some nests the observations were continued until the young were able to fly. We were successful in banding 150 young birds. Of these, returns were received on only 12, or 8 per cent; Table 1 gives a brief summary of them.

TABLE 1
RETURNS FROM 150 MARSH HAWKS BANDED ON LOWER SOURIS REFUGE,
NORTH DAKOTA

<i>Date banded</i>	<i>Date recovered</i>	<i>Fate</i>	<i>Place</i>	<i>Approximate distance in miles and direction</i>
June 21, 1937	Sept. 11, 1937	Shot	Everman, Texas	1025—S
June 24, 1937	Nov. 20, 1937	"Found"	Lolita, Texas	1375—S
July 2, 1937	Dec. 5, 1940	Shot	Hepler, Kansas	800—SSE
July 5, 1937	Dec. 27, 1937	Shot	Lowrey, La.	1350—SSE
July 5, 1937	Mar. 9, 1938	Killed	Michoacan, Mexico	2050—S
July 5, 1937	Nov. 26, 1937	Shot	Ranger, Texas	1025—S
July 10, 1938	June 21, 1945	Shot	Underwood, N. Dak.	80—SSW
July 10, 1938	Aug. 14, 1938	Shot	Edgewood, Brit. Columbia	800—WNW
Sept. 21, 1938	Sept. 7, 1942	Shot	Butte, N. Dak.	50—S
June 22, 1939	Nov. 1, 1940	Shot	Waelder, Texas	1325—S
June 28, 1939	Mar. 9, 1940	Shot	Edcouch, Texas	1550—S
June 26, 1941	Jan. 23, 1943	Shot	Terry Co., Texas	1075—S

When nests were not located until after the young were hatched, only those with broods of "average" size were included for computing average. Even so, the averages of clutch size are undoubtedly slightly lower than the true average due to the fact that a few eggs or young birds were probably removed before we discovered the various nests. This belief is supported by the fact that the clutches averaged smaller in 1937, a year of relatively high nest-loss.

Likewise, the average hatch recorded was smaller than the true average, since the parent birds removed some dead young from the nests before the fate of all eggs was determined. Neither was there any way of telling the total hatch when there were young in the nests on the date of discovery. In the latter case, small broods were excluded from the hatch data, but "average" broods were included.

The average number of young surviving to various ages is reasonably accurate but is based upon relatively few observations of the older broods. Average ages of broods were estimated from known laying or hatching dates, or from degree of plumage development.

TABLE 2
BREEDING-CYCLE CHRONOLOGY, VICINITY OF UPHAM, NORTH DAKOTA

	1937	1938	1939
<i>Spring arrival dates</i>	March 19	March 16	March 23
<i>First nests started</i>	about May 13	about April 26	about May 7
<i>Last nests started</i>	May 22	about May 30	about June 1
<i>First hatches</i>	about June 3	about May 20	about June 1
<i>Last hatches</i>	June 15	June 20	about June 25
<i>Young able to fly</i>	July 8 to 20	June 15-July 15	July 5 to 30

Additional arrival dates—March 12, 1940 (some wintered in 1939-40); March 24, 1941; March 24, 1943; March 12, 1946; March 22, 1947.

TABLE 3
NESTING SUCCESS OF MARSH HAWKS

<i>Clutch size</i>	1937	1938	1939	Total	
<i>Total nests with complete clutches</i>	31	16	13	60	
<i>Total eggs in complete clutches</i>	151	84	68	303	
<i>Range, nests having</i>	3 eggs	1	0	0	1
	4 eggs	8	3	1	12
	5 eggs	17	6	8	31
	6 eggs	4	7	4	15
	7 eggs	1	0	0	1
<i>Mean number of eggs per clutch</i>	4.87	5.25	5.23	5.05	
<i>Standard deviation</i>	0.806	0.774	0.599	0.768	
<i>Nests and eggs hatched</i>					
<i>Total nests with complete histories</i>	35	14	11	60	
<i>Total nests hatched</i>	23	11	9	43	
<i>Percent of nests hatched</i>	66	79	82	72	
<i>Total young hatched</i>	91	48	36	175	
<i>Range, nests having</i>	1 young	1	0	0	1
	2 young	1	0	1	2
	3 young	5	2	1	8
	4 young	9	4	5	18
	5 young	5	4	1	10
	6 young	2	1	1	4
<i>Mean number in hatched nests</i>	3.96	4.36	4.00	4.07	
<i>Standard deviation</i>	1.186	0.924	1.118	1.099	

TABLE 4
SURVIVAL OF YOUNG IN NESTS THAT HATCHED*

Period of observation	1937		1938		1939		Total		Standard deviation
	broods	young	broods	young	broods	young	broods	young	
31-35 days	7	20	3	11	1	4	11	35	1.079
26-30 days	8	24	3	11	4	15	15	50	0.976
21-25 days	12	36	6	22	7	25	25	83	1.029
16-20 days	18	64	10	39	7	25	35	128	1.110
11-15 days	21	76	10	43	8	29	39	148	1.128
6-10 days	23	88	11	48	9	36	43	172	1.175
0-5 days	23	91	11	48	9	36	43	175	1.100

* Table does not indicate total survival under headings "broods" and "young." These data are on nests at which observations were continued to the ages indicated in column 1. The average sizes were obtained from the total observations of each brood size.

The following records of nests give some information on egg-laying and incubation, further illustrating the irregularities of the nesting period cited by Bent (United States Nat. Mus. Bull. 167, 1937).

(1) A nest in 1937 (no. 2) contained one egg on May 14 and 15, six on May 25 and June 3, seven on June 9; one young hatched June 15, three young and one pipped egg in nest on June 23. If all the eggs were laid by the same female, this represented a laying period of 20 or 21 days and a probable sporadic incubation period of 30 or 31 days on one egg.

(2) Another nest in 1937 (no. 10) contained two eggs on May 22, three eggs on May 24, four eggs on May 27, and five eggs on June 11, a laying period of seven or eight days for five eggs.

(3) A nest in 1938 (no. 2) contained one egg on May 3, two eggs May 5, four eggs May 11, six eggs May 16, a laying period of at least 10 days.

A few records indicate that between 30 and 40 days elapse between the date the first egg is laid and the date of first hatch. The hatching period may include at least eight days, or all the young may hatch within a few days.

As recorded by Bent, most young could fly a little at 30 days of age and fly well at 35 days.

TABLE 5

APPROXIMATE HATCH AND SURVIVAL, ALL NESTING ATTEMPTS (1937, 1938, 1939)

	Number of broods observed	Total nests represented by broods observed	Young observed*	Average for all nests	Standard deviation
<i>Hatched</i>	43	60	175	2.92	2.069
<i>Banding age</i> (16-20 days)	35	51	128	2.51	1.943
<i>Fledged</i> (31-35 days)	11	16	35	2.19	1.759

* See Table 3 for nest success; 68 per cent of nests observed held at least one or more young to banding and fledgling ages.

TABLE 6

RELATION OF CLUTCH SIZE TO BROOD SIZE AT 16-20 DAYS OF AGE (1937, 1938, 1939)

Eggs in clutch	Number of records for each brood size						Nests destroyed or failing to hatch	Number of nests not checked	Total
	1	2	3	4	5	6			
3		1							1
4	1	1	3	2			4	1	12
5		2	4	7	6		8	4	31
6		1	1	3	3	1	1	5	15
7			1						1
<i>Total</i>	1	5	9	12	9	1	13	10	60

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