A CHESAPEAKE BARN OWL POPULATION

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IN conjunction with Osprey (*Pandion haliaetus*) studies conducted in Chesapeake Bay, Maryland, from 1963 through 1969 (Reese, 1970), I gathered considerable information on nesting Barn Owls (*Tyto alba*). Recent nesting failures in some raptorial species, the concentration of the nesting owls in the Chesapeake, and the unusualness and accessibility of their nests prompted this study. Here I present my notes on the owls' nesting success at various stages of their reproductive cycle and compare my findings with those of other Barn Owl studies.

This study was made along the shorelines of Talbot and parts of Queen Annes and Dorchester Counties, Maryland (Figure 1). For a description of the territory covered see Reese (1970). In 1963 I found five Barn Owl nests in offshore duckblinds (Figure 2A) in tidewater portions of Talbot County, and for the next 6 years I was able to watch fairly regularly 74 of the 83 nests I located in Talbot and adjoining Queen Annes and Dorchester Counties. The largest number of active nests in one year was 19 in 1967 (Table 1). In 1964 visits were infrequent, but from 1965 on I visited most offshore nests by boat biweekly for 6 months each year, March through August, and made irregular visits during other months. On each visit I recorded the presence of adults and the nest contents. I marked all eggs with a felt-tip pen when first found, banded the fledglings before they left, and managed to catch and band some of the adults.

Nests.—All nests included in the study were in offshore duckblinds except one in an old cistern and one in a barrel mounted atop a 20-foot pole. These offshore nesting sites are unusual, though Tomkins (1929) found a Barn Owl nesting in an offshore range light on the lower Savannah River, and Cottam and Nelson (1937) report a similar nesting in a range tower on a marsh plain in South Carolina fully 2½ miles from the nearest solid land or trees. None of the nests I studied were this far from land, and most of the duckblind sites were less than 200 feet from shore.

Most nest sites were active each year of the study. In a few cases where drifting winter ice destroyed their duckblind, the owls nested the next spring in the blind nearest the old nest site. I suspected the same pairs of owls nested at the same sites in consecutive years, but had no marked adults to prove it. Potter and Gillespie (1926), however, caught a banded owl incubating eggs at the same site where it was banded incubating the previous year.

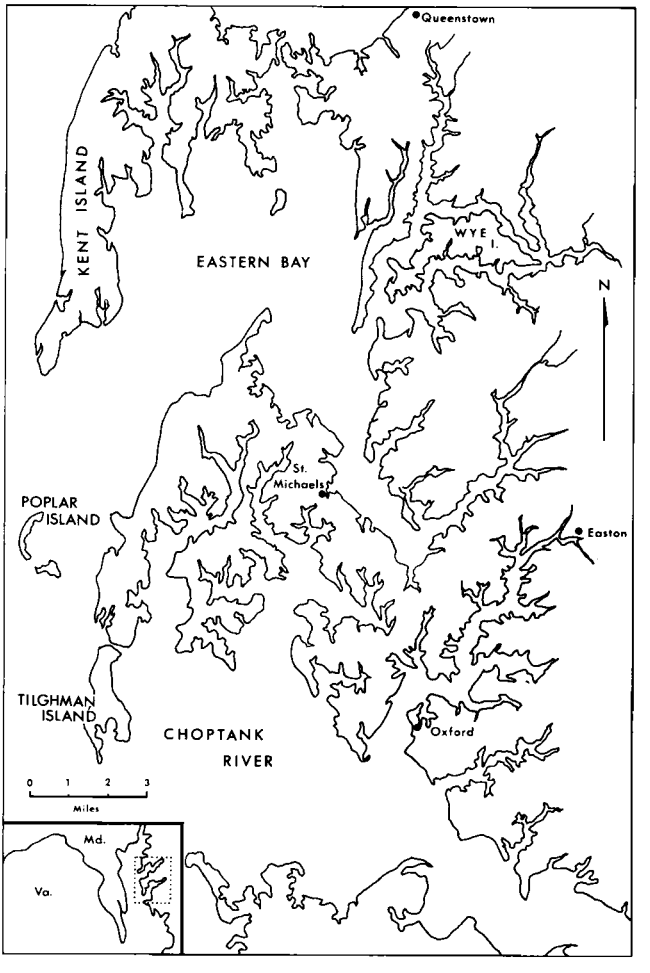

Figure 1. Map of the area covered on the Eastern Shore of Maryland.

Most owls nested in shadowed back corners of the blind under the bench (Figure 2B), but 10 nests were in open sunlight in the middle of the blind floor, and none of these 10 produced fledglings. In California Bent (1937) reports an unsuccessful exposed nest on a tin cupola roof. In Michigan Wallace (1948) found a nestling in an exposed nest on the roof of a tower, and Phillips (1951) in Ohio and Boyd and Shriner (1954) in Massachusetts report successful nests on balcony ledges.

During the 6 years, I noted pairs roosting and/or found fresh pellets

TABLE 1

SUCCESS OF ACTIVE BARN OWL NESTS IN THE CHESAPEAKE BAY REGION

	1964		1965		1966		1967		1968		1969		Mean		SD	Totals
Total active nests	11		10		14		19		14		15		—		—	83
Nests with known outcome[1]	11	(100)[2]	8	(80)	10	(71)	16	(84)	14	(100)	15	(100)	12.3	(89)	—	74
Nests with eggs[3]	11	(100)	8	(100)	10	(100)	16	(100)	14	(100)	15	(100)	12.3	(100)	—	74
Nests with nestlings[3]	7	(64)	5	(63)	5	(50)	10	(63)	6	(43)	10	(67)	7.2	(58)	—	43
Nests fledging young[3]	6	(55)	5	(63)	5	(50)	10	(63)	6	(43)	10	(67)	7.0	(57)	—	42
Total eggs observed	63		36		67		70		102		66					404
Eggs hatching[4]	22	(35)	22	(61)	26	(39)	32	(46)	30	(29)	39	(59)	28.5	(42)	—	171
Eggs fledging young[4]	19	(30)	21	(58)	24	(36)	27	(39)	29	(28)	34	(52)	25.6	(38)	—	154
Eggs per nest with eggs	5.7		4.5		6.7		4.4		7.3		4.4		5.5		1.273	—
Average number nestlings per successful nest	3.7		4.4		5.2		3.2		5.0		3.9		4.2		0.775	—
Average number nestlings per nest with known outcome	2.0		2.8		2.6		2.0		2.1		2.6		2.3		0.347	
Percent nestlings fledged	86		95		92		84		97		88		90		5.614	
Average No. fledglings per successful nest	3.2		4.2		4.8		2.7		4.8		3.4		3.8		0.878	—
Average No. fledglings per nest with known outcome	1.7		2.6		2.4		1.7		2.1		2.3		2.1		0.374	—

[1] Percentage is ratio of nests with known outcome to total active nests.
[2] Numbers in parenthese indicate percent.
[3] Percentage based on nests with known outcome.
[4] Percentage based on total eggs known.

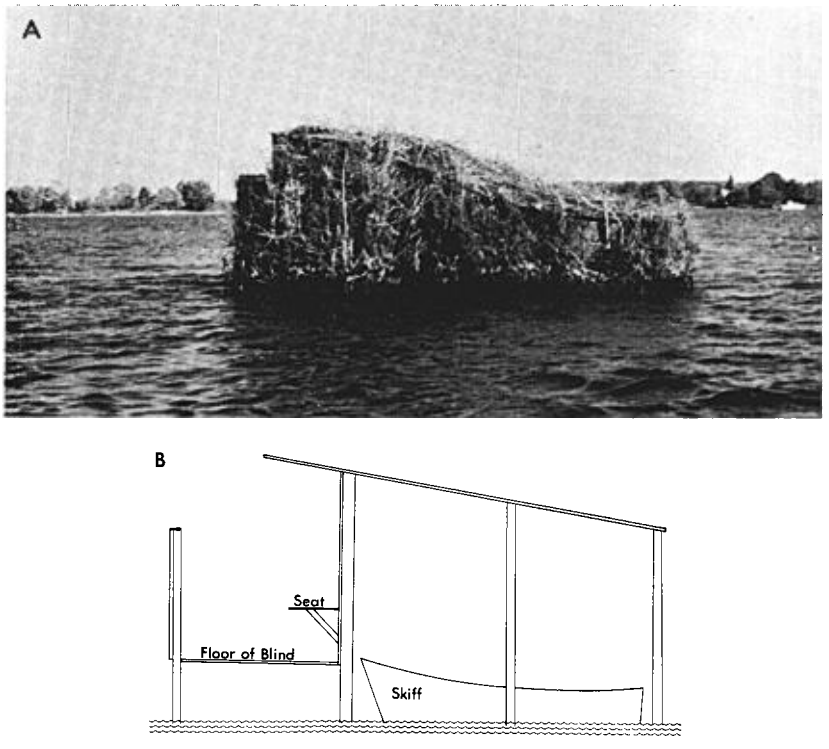

Figure 2. A, brush-covered offshore duckblind. B, diagram of duckblind with brush and side removed.

in blind nest sites at least 2 weeks prior to eggs. After being disintegrated by rain or broken in pieces by the adults (Wallace, 1948), the pellets were used to cushion the eggs.

All 74 nests studied contained eggs (Table 1). The percentage of these nests that produced nestlings and/or fledglings ranged between 43 and 67 percent annually during the 6 years. The low of 43 percent in 1968 was attributable to poor hatching success rather than to loss of nestlings.

Nesting periods.—Barn Owls nest in Maryland throughout the year (Stewart and Robbins, 1958) but hunting activities prevented nesting in the duckblind sites from November to February. Extreme egg dates during the 6 years were 21 March and 7 September, which compare favorably with 18 March and 20 September extremes for Maryland given by Robbins and Van Velzen (1968). During the period 28 March through 9 April, 35 (49 percent) of the nests studied contained eggs. Fewer nests with eggs were found thereafter, and no eggs were found after September.

TABLE 2
EGG FAILURES OF CHESAPEAKE BARN OWLS

	1964	1965	1966	1967	1968	1969	Totals
Abandoned	14	4	12	16	44	11	101
Disappeared	17	8	20	10	23	8	86
Broken in nest	—	—	8	2	2	2	14
Exceeded required incubation	1	—	1	3	3	4	12
Adult killed[1]	9	2	—	—	—	—	11
High tide or rain	—	—	—	7	—	2	9
TOTALS	41	14	41	38	72	27	233

[1] Eggs left after Osprey killed incubating bird when flushed from the nest.

Extreme dates for nestlings were 7 April and 10 October, which also agrees with the Stewart and Robbins (1958) range of 11 April and 6 November.

Incubation.—The owl of the nesting pair that appeared larger, more cinnamon in color, and more reluctant to flush I considered the female. The male was rarely seen at the nest site after the full clutch was laid, and I have never seen or captured an incubating owl that I was sure was a male. Reed (1897), Potter and Gillespie (1925), Earl (1934), and Cottam and Nelson (1937) also suspected the female to be the principal or sole incubator.

Incubation periods were determined from biweekly checking of marked eggs. My notes indicate incubation periods between 20+ and 35– days with the 11 best approximations about 24 to 30 days. This compares favorably with the 30 days given by Wallace (1948) for Michigan, 21 to 24 days or longer estimated by Forbush (1927) in Massachusetts, 21 days cited by Reed (1897) in Pennsylvania, and 32 to 34 days compiled by Nice (1954).

Eggs.—The average number of eggs per nest with eggs for the 6 years ranged between 4.4 and 7.3 annually (Table 1) and had a combined 6-year average of 5.5 eggs per nest. Of 404 eggs found during the 6 years 171 (42 percent) hatched and 154 (38 percent) fledged. Annually 29 to 61 percent of the eggs hatched and 28 to 58 percent fledged (Table 1).

Table 2 shows some of the reasons why 233 (58 percent) of the eggs studied failed to hatch. The largest number (43 percent) of egg failures resulted from nest abandonment; 22 pairs abandoned their eggs when

repeatedly disturbed by water sports (cruising, fishing, crabbing, water skiing). Included here are 10 eggs from 2 nests abandoned in 2 different years as a result of my studies. Disappearance of eggs caused 37 percent of the failures. I never found any sign of the missing eggs or their shells at the nest site—they just vanished completely.

Re-laying.—In 1966 two Maryland owls laid a second clutch that fledged. One laid a second clutch in mid-May, soon after the first clutch laid in April failed, and the other laid a second clutch in mid-June. The latter bird probably laid the second clutch before the first young finally left, though eggs and fledglings were not observed at the same time.

In 1968 three owls laid second clutches after their first clutch failed. Two second clutches were laid in mid-May and the third in mid-June. Two were unsuccessful and the outcome of the third was not determined. One of the two unsuccessful pairs in 1968 went on to lay a third and fourth clutch. In all 21 eggs were laid in this nest between 22 March and 20 August. The first three clutches were unsuccessful; the fourth one fledged young.

Stewart (1952) reports the banding of an adult Barn Owl with five young in New York on 27 July 1939. On 5 December 1939 the banded adult was recaptured at the same nest site with a second brood of three young. While I neither saw nor caught any marked adult owls, my familiarity with the individual birds through frequent observations suggested the second clutches were laid by the same owls that laid the first clutch.

Ames (1967) and Morejohn (1955) report overlapping clutches in Connecticut and California respectively. Bent (1937) reports a California owl laid 24 eggs in one year, and Reed (1897) reported similar re-laying in a Pennsylvania nest from which he repeatedly collected the eggs between 31 March and 9 June. Wallace (1948) found re-laying in Michigan correlated with periods of high meadow mouse (*Microtus pennsylvanicus*) availability. He also suggests that continuous nesting at a given site may possibly represent reoccupation of a favored nesting site by a new pair after the first vacated it.

From my observations in Maryland, I believe additional factors are also important in inducing re-laying, such as the bird's age, fertility, and reaction in disturbance, the suitability and previous success of the nest site, and climatic conditions. For instance, some owls remained on the nest when disturbed while others flushed at the distant sound of a boat approachnig. Nest sites previously used were more successful than those used for the first time. Frequently disturbed nest sites usually fail and are soon abandoned while successful sites (that fledge at least one young) are usually occupied again and again.

Young.—Potter and Gillespie (1925) and Pickwell (1948) note that Barn Owls were reluctant to flush from nests containing young. By contrast, I often found nestlings unattended by an adult once they were strong enough to stand. Audubon (1834) comments that the parent owls feed and attend the young less frequently as they grow, delivering food to them in the night only.

During the 6 years 154 (90 percent) of the 171 nestlings fledged, the rate varying annually from 84 to 97 percent (Table 1). Of the 17 nestlings lost, 2 half-grown young were found dead in the nest from no apparent cause in 1966. The other 15 disappeared between visits to the nests in other years. Pickwell (1948) observed a half-eaten young in a California nest, and Hawbecker (1945) found the remains of a young owl in a pellet he collected. Ingram (1959) gives circumstantial evidence that fratricide, in all probability followed by cannibalism, is far more common among birds of prey than suspected. I saw no direct evidence of fratricide or cannibalism, but most of the young that vanished were less than 2 weeks old and the smallest members of the brood.

The period from hatching to leaving the nest for 14 young owls ranged between 64 and 66 days. This compares well with the 62- and 66-day periods for two nestlings Pickwell (1948) watched in California.

Stockpiling food.—Stockpiling of prey beside the incubating or brooding bird has been reported in Pennsylvania (Reed, 1897), California (Hawbecker, 1945), and Michigan (Wallace, 1948), and the latter correlates it with rodent availability. They mention from 13 to 189 mice at a given nest at one time. I found stockpiling in Maryland in 1966, 1967, and 1969, but only in one or two nests each year, and only once did the reserve exceed five mice. On 23 April 1966 I found a nest with 54 rodents scattered about the floor of the blind, nearly all of them *Microtus pennsylvanicus.*

Nest success.—From the banding records for 1948 through 1963, mostly in southern California and the Great Lakes region, Henny (1969) computed requirements necessary to maintain a stable Barn Owl population. He estimates that 44 to 53 percent of the breeding age population must produce at least one fledgling annually, or 1.9 to 2.2 young per breeding age female, to ensure population stability, and he compiled an average of 4.2 young per successful nest. Keith (1964) gives an average of 4.4 young per nest for 10 nests spanning a 30-year (1932-1963) period in Massachusetts. Table 1 shows my average of 4.2 young per successful nest, 57 percent of the nests succeeding, and a 6-year average of 2.1 fledglings per nest with known outcome (include successful and unsuccessful nests) are well within Henny's computed limits.

Interspecific contacts.—Other species that nest on the same offshore

duckblinds and may influence Barn Owl nesting success include Green Herons (*Butorides virescens*), Mallards (*Anas platyrhynchos*), Black Ducks (*Anas rubripes*), Ospreys, Barn Swallows (*Hirundo rustica*), House Sparrows (*Passer domesticus*), and Common Grackles (*Quiscalus quiscula*). Ospreys always nest on top of the blind; Mallards and Black Ducks either inside or on top; Barn Swallows inside or under the floor; Green Herons, House Sparrows, and Grackles usually in the brush on the outside of the blind. As shown earlier, most Barn Owls nest inside under the bench. All of these species have been found nesting within inches of one another, though usually separated by a board or by brush.

I saw no contacts between Barn Owls and Green Herons, Mallards, Black Ducks, or Barn Swallows. House Sparrows and Common Grackles are occasionally among the owl's food remains or in their pellets, and both species tend to mob the owl when flushed in daylight. The most serious interactions were with Ospreys nesting near by, which often attacked the owls when I flushed them on my visits. The owls are an easy prey for the Ospreys, for the nearest cover is usually at least 100 yards or more away. During the first years of my study Ospreys killed three nesting owls that I flushed, and downed eight others that they did not injure seriously. Approaching the duckblind quietly and placing an owl decoy on top of the blind to occupy the Osprey's attention before flushing the owl helped remedy this situation, and no owls were killed during my later inspection trips.

Reed (1897) in Pennsylvania and Wilson (1938) in Michigan saw crows (*Corvus* sp.) mob a nesting Barn Owl flushed from its nest. When Potter and Gillespie (1925) released a brooding Barn Owl they had banded in Pennsylvania, a Sparrow Hawk (*Falco sparverius*) that was nesting nearby chased it. On the other hand Wallace (1948) and Moore (1945) noted no conflict between Barn Owls and Rock Doves (*Columba livia*) nesting at the same site in Michigan, and Wilson (1938) noted none between a nesting Mourning Dove (*Zenaidura macroura*) and a nearby roosting Barn Owl. Harte (1954) watched a Rough-legged Hawk (*Buteo lagopus*) pass within 50 feet of a diurnally hunting Barn Owl in New York; neither bird outwardly reacted to the other.

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