Chase Flights as an Index to Nest Density in Mottled Ducks[1]

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Abstract: Waterfowl nest searches are labor intensive and expensive. Development of a method to estimate number of nests without conducting nest searches would be advantageous. Mottled duck (*Anas fulvigula maculosa*) chase flights were compared with number of nest initiations to determine if a quantifiable relationship exists. Frequency of chase flights over an area was independent of the number of nests found in the area ($P > 0.10$), precluding use of chase flight frequency to estimate nest density. Chase flight frequency does provide an index of breeding chronology. A highly significant relationship ($P < 0.0001$) between chase flights and total flights provides an index to mottled duck density that may be used to identify changes in population size and evaluate changes in habitat use.

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The mottled duck, a resident species of the Gulf Coast, is an important component of the waterfowl harvest in both Louisiana (Smith 1961) and Texas (Singleton 1953). The significance of this species in the harvest is heightened during years when migratory waterfowl numbers are reduced. To prevent over-exploitation, annual production estimates are essential. In other waterfowl species, such estimates are commonly derived from nesting studies (Miller and Johnson 1978). However, the nest searches conducted during such studies are both labor intensive and expensive, and may be counterproductive, because nests located by searchers are subject to a higher rate of predation

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(Sincock et al. 1964). Development of a method to estimate the number of nests without conducting nest searches would be advantageous to waterfowl managers.

The mottled duck, as well as many other dabbling ducks, participates in conspicuous aerial chases in the vicinity of the nest, termed chase flights (Hochbaum 1955, Sowls 1955, Dzubin 1957, Hori 1963, McKinney 1965, Weeks 1969, Allen 1981). This study sought to determine if a quantifiable relationship exists between these chase flights and nesting activity, so that a more efficient estimate of nest density could be developed.

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Study Area

The study was conducted in the prairie-marsh zone of southwestern Louisiana. The area is characterized by brackish and intermediate marsh bisected by well-drained ridges. The drier ridges are usually grazed for a portion of each year and burned periodically by cattlemen to promote new growth of vegetation.

Six approximately 20-ha study areas were selected for monitoring during the study in an area where mottled ducks have historically nested. All study areas were partially bordered by a drainage canal and were grazed with an approximate stocking rate of 1 cow per 3.5 ha. Study areas differed in dominant vegetation, amount of submerged surface, and burning history (Baker 1983).

Methods

Each of the 6 study areas was monitored for chase flight activity 4 times (2 morning and 2 evening) during each 3-week period between 1 March and 25 July during 1981 and 1982 for a total of 384 observation periods. Each observation lasted 3 hours. Morning observations began 15 minutes before sunrise; evening observations ended 15 minutes after sunset. All mottled duck flights over the study areas were recorded and classified as either chase flights or miscellaneous flights. Also recorded were the number of birds participating, whether the flight originated on the study area, and the behavior of the birds in flight.

Nest searches were conducted the last day of each 3-week segment. Nests were located by observing nesting hens leaving or returning to a nest and by conducting nest searches either on foot or by pulling a rope with bells attached at 1-m intervals stretched between 2 3-wheel motorcycles. The number of nests initiated in 3-week segments was used to correlate chase flight frequency to nesting activity.

Results

During the 2 nesting seasons, 39 mottled duck nests were located; 23 in 1981 and 16 in 1982. All nests were constructed in cordgrass (*Spartina patens*). Twenty-six nests were found on the study area (Table 1). Of that number, 65% were located on areas 1 and 2. Nest densities reached a maximum of approximately 1 nest per 1.5 ha on area 1. The mean distance from nest to permanent water was 160 m and ranged from 42 to 442 m.

The first nests were initiated in the third week of March each year. Mean date of nest initiation was 7 May 1981 and 8 April 1982. Nest initiations peaked in the last week of April 1981 and the last week of March 1982 (Fig. 1). A secondary pulse of nesting activity occurred in June 1981 and May 1982. The second peak of nesting activity in 1981 occurred immediately following 18.5 cm of rainfall on 10 and 11 June.

Chase flights were first observed over the study areas on 7 March 1981 and 6 March 1982. Chase flight activity followed a bimodal pattern both years, peaking first in late March and again in late June 1981 and early May 1982 (Fig. 2). Total flight activity and nest initiations followed a similar distribution.

An average of 30.1 chase flights was observed over each area, while an average of 4.3 nests was initiated on each area (Table 1). The greatest frequency of chase flights occurred over areas 3, 4, and 5; but the least number of nests was observed on these areas. The greatest number of nest initiations occurred on area 1, but less than the average number of chase flights was observed over this area.

Frequency of chase flights over an area was not dependent upon number of nests found on the areas ($P > 0.10$). Also, no significant change ($P > 0.10$) in chase flight frequency was observed between 3-week periods. A highly significant correlation ($P < 0.0001$) was found, however, between the number of chase flights and total flights on each area (Table 2).

The areas with the greatest frequency of chase flights, areas 3, 4, and 5,

Table 1. Number of chase flights and nest initiations during the 1981 and 1982 nesting season.[a]

Sampling area	1981		1982		Total	
	Chase flights	Nests found	Chase flights	Nests found	Chase flights	Nests found
1	16	13	10	0	26	13
2	2	1	6	3	8	4
3	19	1	15	1	34	2
4	39	3	18	0	57	3
5	28	0	6	0	34	0
6	10	2	12	2	22	4
Total	114	20	67	6	181	26

[a] Sample size = 32 standard observations per sampling area per year.

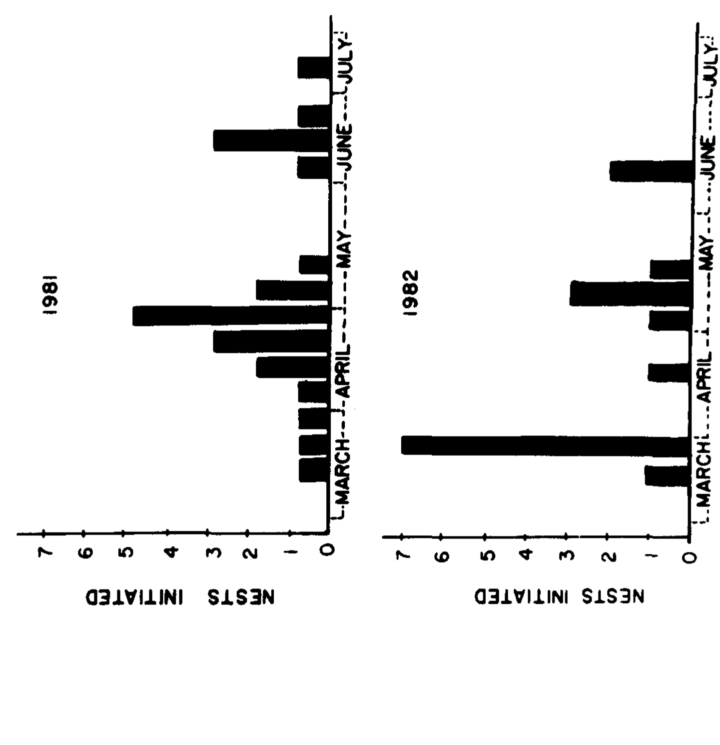

Figure 1. Number of mottled duck nests initiated each week during the 1981 and 1982 nesting seasons.

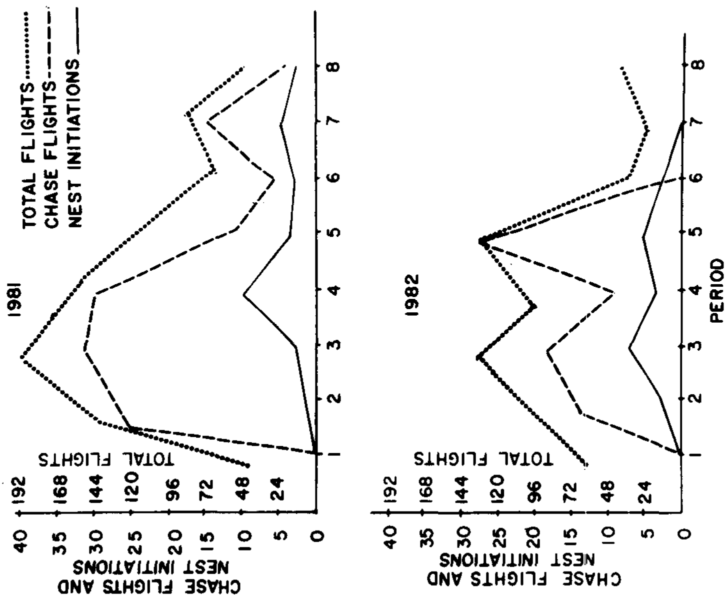

Figure 2. Number of mottled duck chase flights, total flights and nest initiations on the sampling areas during three week periods in 1981 and 1982 nesting seasons.

had the greatest amount of area inundated during the nesting season. Areas 1 and 2, with the least chase flight activity, had the least amount of area submerged when data were collected. The same relationship was observed for total flights with the majority of total flights being over the inundated areas.

Early in the nesting season, chase flights were of short duration followed by the initiating drake returning to the loafing area from which the chase was initiated. As the season progressed, chase flights became longer and often ended in forced copulation as previously reported by Allen (1981). Late in the nesting season, chase flight activity often started as a single drake chasing an intruding pair, but as many as 5 other drakes joined in the chase. Also, drakes made fewer visits to their loafing areas as the season advanced.

Drakes were observed to have up to 3 preferred loafing areas. During most observed chase flights, the drake flew from one of these loafing areas to pursue the intruding female. For 14 nests where pairs could be identified, the mean distance between loafing area of the drake and the nest was 590 m, with a range of 150 to 1,250 m.

Discussion

There is disagreement in the literature as to the behavioral significance of chase flight activity. Chase flights have been reported to be in defense of nesting area (Hochbaum 1955, Dzubin 1957), sexual in nature (Lebret 1958, Hori 1963), or a combination of both (McKinney 1965). In mottled ducks, Singleton (1953) and Stutzenbaker (1979) thought chase flights were aggressive defense of nesting territory; however, Allen (1981) said "the female of the intruding pair is the main impetus for chase behavior."

Chase flight activity in mottled ducks in Louisiana is as characterized by Weeks (1969) and Allen (1981): erratic flight often accompanied by much vocalization with the chase directed towards the female of the intruding pair. Additionally, chases were observed in Louisiana that were directed towards unpaired hens.

The initiation of chase flight activity in March of both years was similar to that reported by Engling (1950) in Texas, but 3 weeks later than reported in Louisiana by Weeks (1969) and Allen (1981). The peak of chase flight activity each year in March was, however, similar to that previously observed in Louisiana (Allen 1981).

The bimodal pattern of nest initiations apparently reflects concentrated renesting attempts. The second peak of nesting in 1981 followed a heavy rain that probably destroyed many active nests. Previous studies have found renesting common in mottled ducks after first nests were destroyed by floods or predators (Engling 1950, Stutzenbaker 1979).

Ambient temperature appears to influence the intensity of nesting activity in mottled ducks. While water levels and rainfall were similar during March between years, the peak of nesting activity in March 1982 was 1 month earlier than in 1981. Corresponding temperatures averaged 2.3° C higher for March 1982.

Most of the chase flight activity occurred over areas with the greatest interspersion of submerged and emergent marsh. Such areas were used by mated drakes for loafing and by other drakes and hens for feeding. Weeks (1969) and Allen (1981) also found areas with high interspersion to support greater numbers of chase flights and suggested that these areas support the highest nest densities. In this study and in Texas (Stutzenbaker 1979), nests were not found in areas of high interspersion, but were concentrated on the well-drained cordgrass ridges.

Loafing areas were often not available in close proximity to the nest, so chase flights initiated by paired drakes often occurred near the loafing areas at some distance from the nest site. The large distances between the loafing areas (where the chases originated) and the nest sites may have contributed to the lack of an observed relationship. By expanding the size of the study area, a relationship may be found. However, the ability of the observer to differentiate between the various flight activities would rapidly erode as the distance between the observer and the ducks increased.

Chase flight frequency appears to provide a reliable index to breeding chronology, because the initiation of chase flight activity corresponded to the beginning of nesting activity and peaks of chase flight activity were similar to peaks in nesting activity each year. However, the lack of a quantifiable relationship between chase flight frequency over the study areas and nesting activity within the areas precludes use of chase flight frequency as an index to nest density.

Because chase flight frequency is closely related to the number of mottled ducks using an area for feeding and loafing, chase flight frequency may provide a useful index to mottled duck density. Employment of this technique could assist managers in identifying annual changes in population size and evaluate changes in habitat use during the breeding season of the mottled duck.

Literature Cited

Allen, J. A. 1981. Nesting and productivity of mottled ducks in the marshlands of southwestern Louisiana. M.S. Thesis, La. State Univ., Baton Rouge. 101pp.

Baker, O. E., III. 1983. Nesting and brood rearing habitats of the mottled duck in the coastal marsh of Cameron Parish, Louisiana. M.S. Thesis, La. State Univ., Baton Rouge. 70pp.

Dzubin, A. 1957. Pairing displays and spring and summer flights of the mallard. Blue Jay. 15:10–13.

Engeling, G. A. 1950. Nesting habits of the mottled duck (*Anas fulvigula maculosa*) in Colorado, Fort Bend, and Brazoria counties, Texas. M.S. Thesis, Texas A&M Univ., College Station. 177pp.

Hochbaum, H. A. 1955. Travels and traditions of waterfowl. Univ. Minn. Press, Minneapolis. 301pp.

Hori, J. 1963. Three-bird flights in the mallard. Wildfowl Trust Annu. Rep. 14: 124–132.

Lebret, T. 1958. The "jump-flight" of the mallard (*Anas platyrhynchos*) the teal (*Anas crecca*) and the shoveler (*Anas clypeata*). Arden. 1(2):68–72.

McKinney, D. R. 1965. Spacing and chasing in breeding ducks. Wildfowl Trust Annu. Rep. 16:92–106.

Miller, H. W. and D. H. Johnson. 1978. Interpreting the results of nesting studies. J. Wildl. Manage. 42(1):471–476.

Sincock, J. C., M. M. Smith, and J. J. Lynch. 1964. Ducks in Dixie. Pages 99–109 *in* J. P. Kinduska, ed. Waterfowl tomorrow. U.S. Dep. Int., Fish and Wildl. Serv., Washington, D.C.

Singleton, J. R. 1953. Mottled duck studies. Pages 85–122 *in* Texas coastal waterfowl survey. Tex. Game and Fish Comm. Fed. Aid Rep. Ser. 11.

Smith, M. M. 1961. Louisiana mottled duck surveys, final report, July 1951–June 1958. La. Wildl. and Fish. Comm., Fed. Aid Proj. W-17R and W-29R. 24pp.

Sowls, L. K. 1955. Prairie ducks. Stackpole Co., Harrisburg, Pa. 193pp.

Stutzenbaker, C. D. 1979. The mottled duck, its life history, ecology and management. Tex. Parks and Wildl. Dep., Fed. Aid Proj. W-90R. 273pp. (Draft)

Weeks, J. L. 1969. Breeding behavior of mottled ducks in Louisiana. M.S. Thesis, La. State Univ., Baton Rouge. 79pp.