

slow down. Invariably it would overtake and pass the flock, returning in a large arc to glide in from behind, only to repeat the pattern. At no time during our 10 minutes of observation did it abandon its attempt at gaining flock position. This incident took place over a week after the peak migration of Snow Geese through the Delta area. Apparently this bird was a straggler that for some reason did not continue migration with its own species.

Soaring by Snow Geese in conspecific flocks has been reported in the past. Williams (Condor, 44:76, 1942) observed 123 birds soaring near Brigham City, Utah, in October 1941. Sooter (Wilson Bull., 57:202, 1945) recorded 22 Snow Geese soaring on apparent rising air currents in February 1942 at Tulelake, California.

The incident at Delta is interesting in that the Snow Goose was attempting to emulate the typical flight pattern of a flock of another species. Evidently the pelicans produced the appropriate visual cues for the goose to identify with them. Both species are large white birds with black primaries. Perhaps the pelicans provided a supernormal releaser (Eibesfeldt. Ethology: The biology of behavior. Holt, Rinehard Winston, New York, 1970) to the Snow Goose, which would explain its persistence in attempting to fly with them in spite of apparent difficulties. One of us (B.D.J.B.) has frequently observed lone Snow Geese in association with flocks of Canada Geese (*Branta canadensis*). Since the Snow Goose is a polymorphic species with both a white and a dark (Blue Goose) phase, it would appear that the possible releaser stimulus for the species may be various large dark or white goose-like birds.—PATRICK J. CALDWELL AND BRUCE D. J. BATT, *Delta Waterfowl Research Station, Delta, Manitoba, Canada. RIN 3A1. Accepted 2 November 1973.*

**A study of Mottled Duck broods in the Merritt Island National Wildlife Refuge.**—This study, conducted in the Titusville, Florida area in the summer of 1967, was designed to investigate various aspects of brood survival and biology in the Florida race of the Mottled Duck (*Anas fulvigula fulvigula*).

*Study Area.*—The main study area consisted of spoil islands located in the Indian River and of mosquito control impoundments bordering the western shore of Merritt Island. The Indian River is a shallow estuary separating the island from the mainland; tides other than wind-caused are negligible. The mosquito control impoundments are bordered by a series of low dikes. Water levels fluctuate greatly, and the ponds commonly go dry during drought, as during the spring of 1967. At other times water may reach a depth of 3 feet or more, with rainfall the main source of water.

Vegetation within the mosquito control impoundments varies greatly. Saltgrass (*Distichlis spicata*) is common in all impoundments, and sawgrass (*Cladium jamaicensis*) is locally abundant. Other plants that are quite common include: red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia nitida*), leatherleaf fern (*Acrostichum* spp.), cattail (*Typha domingensis*), sedges (*Cyperus* spp.), spikerushes (*Eleocharis* spp.), water hemp (*Acnida cuspidata*), hyssop (*Bacopa menneria*) and rushes (*Juncus* spp.).

*Hatching.*—Between 15 June 1967 and 5 September 1967, eight Mottled Duck nests were found on the spoil islands. Four clutches hatched, while two were abandoned and two were destroyed by predators. The time elapsing between the hatching of the first and the last young in a nest was found to be less than four hours. Females with their broods remained at the nest for eight to 15 hours after the first young hatched.

*Movements of broods.*—On the Indian River spoil islands, the movements of only two females with broods could be determined. In both cases, the females led their broods

towards the east (refuge) end of the island. These ducklings experienced much difficulty traveling through vegetation and often lost their balance. In one instance, a hen moved her brood approximately 100 feet in about seven hours.

Efforts to follow movements away from the islands were unsuccessful. A distinct possibility exists that these occurred at night. In several instances, broods known to be on the islands at nightfall could not be located there the following dawn. Circumstantial evidence seems to indicate that movements away from the islands take place within 24 hours of hatching, as no broods were found on the islands after that interval. Exactly where broods go after leaving the islands is unknown. Four broods were color marked but none of the ducklings was seen again.

*Brood rearing habitat.*—Night-lighting, ground surveys, and aerial surveys were all used to locate broods. Night-lighting was also used to capture ducks. When a brood was sighted, it was classified as to the stage of development according to the duckling classification system developed by Gollop and Marshall (Wildlife investigational techniques, Edward Bros., Inc., Ann Arbor, Michigan 1963). Broods consisting of young with down are classified as Class I, those with ducklings that possessed a combination of down and feathers are Class II, and those with young fully feathered but unable to fly are Class III.

All Class I brood sightings were made on the spoil islands, in or near nesting habitat. Most (72.7 percent) of the Class II broods were found in habitats characterized by either stands of saltgrass, interspersed with water not exceeding a depth of 12 inches and some mangrove, or in potholes 100 feet or less in diameter bordered by dense stands of cattail.

All Class III broods were found in habitats similar to those of Class II broods, but the former used more open water. This is reflected in open water frequency values of 18.2 percent for Class II broods and 38.5 percent for Class III broods. This may be an indication that as broods increase in age there is a tendency to move into more open marshes. Wright (High tide and an east wind; the story of the Black Duck, Stackpole Co., Harrisburg, Pa. 1954) observed a similar situation in Black Duck (*Anas rubripes*) broods.

*Periods of brood activity.*—The activities of broods were observed day and night with the exception of the period extending from 01:00–06:00. Peak periods of activity extended from 10:00 until 12:00, then tapered off until 14:00 when activity resumed and continued through early evening. The periodicity of brood activity at night was not clearly delineated.

*Brood mortality.*—There was a reduction in brood size with age of ducklings, i.e. 7.0 young per age Class I brood (average of seven broods), 6.5 per Class II brood (average of eleven broods), and 3.8 per Class III brood (average of thirteen broods). These figures were derived by dividing the total number of young by the total number of broods recorded for that age class. The sources of mortality were not discerned, but brood abandonment may have been a factor (see below).

*Bond between the hen and her brood.*—The strength of the bond between the female and her brood lessens as the brood grows older. The female was seen with her brood in 85.5 percent of all Class I sightings, 54.5 percent of the Class II sightings, and 38.5 percent of the Class III sightings. Females with newly hatched ducklings still in the nest were quite solicitous, flushing only when the vegetation covering the nest was parted. While observers remained near the nest the hen quacked loudly, performed a broken wing display, and swam about just offshore from the nest. In the cases of many Class II and III broods, the hen would fly off and leave the brood when startled.

Steiglitz and Wilson (J. Wildl. Mgmt. 32:921-924, 1968) found that 67.1 percent of Mottled Duck nests in the Merritt Island area are initiated prior to 16 April. My study was conducted during the latter part of the 1967 nesting season, and brood abandonment may account in part for the relatively low percent of Class II and Class III broods being seen with the female. Hochbaum (The Canvasback in the prairie marsh, Stackpole Co., Harrisburg, Pa., 1959) observed that a hen may remain with an early-hatched brood until it is ready to fly, while broods hatched later may be left when two or three weeks old or earlier. Early abandonment of late-hatched broods may also result in a greater mortality of such broods. Grice and Rogers (The Wood Duck in Massachusetts, Mass. Div. Fisheries and Game, Boston, 1965) indicated that only 22 percent of late-hatched Wood Ducks (*Aix sponsa*) reached flying stage, versus 66 percent in early-hatched individuals.

*Sex and age ratios.*—The sex and age of 70 Mottled Ducks captured by night-lighting or in wire traps were determined. The ratio of males to females in immatures was found to be 0.9:1 (in mature birds 1.3:1), while immatures outnumbered adults 1.72:1.

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**Aerial feeding by Snowy and Great Egrets in Louisiana waters.**—Various aerial feeding methods have been described for the Snowy Egret (*Egretta thula*). The most common is hovering over shallow water, while stirring the water or raking the bottom vegetation with the feet, which has been described by Bond (Auk, 51:500-502, 1934), Grimes (Auk, 53:439, 1936), Meyerriecks (Wilson Bull., 71:153-158, 1959), and Sprunt (Auk, 53:203, 1936). Picking up food in direct flight has been reported by Dickinson (Auk, 64:306-307, 1947) and Jenni (Ecol. Monogr., 39:258, 1969), while Kushlan (Wilson Bull., 84:199-200, 1972) has described the taking of food in direct flight while the feet are dragged through the water.

In Barataria Bay, Jefferson and Plaquemines parishes, Louisiana, I observed on 32 occasions the hover method of feeding described for the Snowy Egret. The sightings were made from 24 May through 25 July 1972 and from 29 May through 26 July 1973. In these instances, the egrets were feeding on dead fish that were at or very near the surface in 4 to 5 feet of water. The egrets would pick up small fish with their bills while hovering over the surface of the water. On a few occasions the feet dangled in the water, but no stirring or foot dragging of the type described by the above authors was observed.

Groups of 12 to 120 Snowy Egrets were observed feeding on the dead fish discarded from boats trawling in the bay for shrimp. Feeding with the Snowy Egrets on these occasions were Great Egrets (*Casmerodius albus*), as well as Forster's Terns (*Sterna forsteri*), Royal Terns (*Thalasseus maximus*), and Ring-billed Gulls (*Larus delawarensis*). The Great Egrets flew 3 to 5 feet above the surface of the water, the legs horizontal and the head tucked back in the normal flying position, until a dead fish was sighted near the surface. On approaching the fish the egret would hover, extend the head downward, and pick the fish up with the bill. During this time the legs dangled beneath the egret, and the feet often dragged the surface of the water. The egrets would then fly upward and swallow the fish while in flight. This behavior was repeated many times by