the western Canada Goose (*B. c. moffitti*) may differ greatly from that of other races of Canada Geese if the limit is proportional to the size of the bird.

The proximity of duck nests to goose nests reported herein may not have been accidental, as some ducks may be inclined to nest close to nesting geese to benefit from the goose's superior ability to deter predators (Long 1970, Giroux 1981). Egg retrieval by geese can result in the destruction of duck clutches laid within a goose's retrieval limit, and, consequently, there may be selection for ducks to situate their nests at some optimal distance from goose nests.

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Molts and Plumages of Gadwalls in Winter

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Previous studies of Anatinae during the nonbreeding season suggested that the attainment of the breeding (alternate) plumage may be related to the time of pair formation (Weller 1965, McKinney 1970, Armbruster 1982). In these studies, however, no attempt was made to quantify the timing and sequences of molt or to relate the timing of molt to the age or sex of the individual.

The plumage sequence of Gadwalls (*Anas strepera*) has been described by Bellrose (1978), and Oring (1968) traced the molt sequence of a captive flock of Gadwalls over a 2-yr period. In this study I describe the molt sequence of immature and adult birds wintering in Louisiana and relate the timing of molt to age, sex, courtship activities, and energetics.

Observations and collections of Gadwalls were conducted in southwest coastal Louisiana on Rockefeller and Marsh Island State Wildlife Refuges (SWR), Sabine National Wildlife Refuge (NWR), and on privately owned lands within 20 km of Rockefeller Refuge. These areas have been described in Paulus (1982).

I collected Gadwalls by shooting on Rockefeller and Marsh Island SWR from November 1977 through March 1978 and from hunters at Sabine NWR and marshes adjacent to Rockefeller SWR from November 1977 through early January 1978. Two studies were conducted to determine molt sequences of Gadwalls in winter. First, I examined hunter-killed birds externally and subjectively categorized the percentage of prealternate molt completed by immature and adult Gadwalls as 0–25% (early body molt), 26–50% (body molt nearly completed, lower rump molt underway), 51–75% (body molt completed, lower rump molt nearly completed), and 76–100% (rump molt completed, tertials renewed and fully elongated, head crest evident in males).

A second study involved the preparation of a pterylosis diagram, similar to that used by Billard and Humphrey (1972), for Gadwalls collected on Rockefeller and Marsh Island SWR. From this diagram, I determined the degree of molt for the entire bird and for each body region by internal and external examination of feathers and feather tracts, and I subjectively categorized the degree as none, light (only a few feathers growing), moderate (numerous new feathers growing), or heavy (nearly all feathers growing). Pterylosis diagrams and plumage analyses were limited to adults, because only a few immature birds were collected.

Age and sex were determined by internal examination of the gonads and bursa of Fabricius. The relationship between the percentage of prealternate molt completed, courtship activities, and time of pairing was determined during activity-budget observations of Gadwalls in Louisiana (Paulus 1984).

The prealternate molt for most adult males began on the breeding grounds or while the birds were migrating south, and by late January the prealternate molt was completed (Table 1, Fig. 1). Major areas of feather replacement for adult males during fall were the neck and humeral regions. Immature males were

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TABLE 1. Summary of the completion of the prealternate molt of Gadwalls taken in Louisiana by hunters.

		Percentage molt completed			
	n	0–25	26–50	51–75	76–100
November					
Adult males	36	0	0	4	32
Adult females	23	1	16	6	0
Immature males	32	3	7	21	1
Immature females	25	5	17	3	0
December					
Adult males	33	0	0	2	31
Adult females	17	0	3	14	0
Immature males	5	0	2	3	0
Immature females	13	0	8	5	0
January					
Adult males	16	0	0	0	16
Adult females	1	0	0	1	0
Immature males	1	0	0	1	1
Immature females	2	0	0	2	0

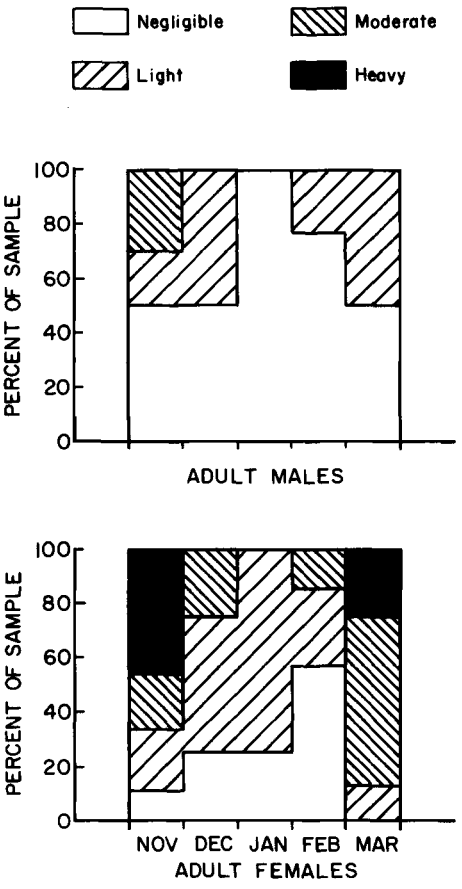

Fig. 1. Degree of molt of adult male and female Gadwalls collected during winter, 1977–1978, on Rockefeller and Marsh Island SWR.

slower than adult males to complete the prealternate molt, having completed approximately only half of their body molt by December.

Adult females were replacing feathers throughout the study, but the majority of feather replacement occurred during the prealternate molt in fall and prebasic molt in spring. The prealternate molt of females in fall was much heavier than that of males and primarily involved the lower breast, belly, rump, and back. The degree of prebasic molt was heavy in all body regions in spring. Immature females appeared to molt at a rate similar to that of adult females in fall.

Environmental conditions, body condition, and pairing strategies are suggested as being three important factors influencing the timing of molt in Gadwalls and other Anatinae. Male Gadwalls molt in fall or early winter, when temperatures and food supplies are optimal and the metabolic demands of molt are least stressful. Gadwalls, as well as most Anatinae studied, reach peak body condition (in terms of weight and available lipid reserves) in fall or early winter (Paulus 1980, Jorde 1981, Reinecke et al. 1982). However, because molts of some species of Anatinae occur primarily during mid-winter or early spring (Weller 1965) and females of most species are observed molting throughout winter, confining molt to periods when environmental or body conditions are optimal may not be critical.

The attainment of the alternate plumage in males appears to be important in the initiation of courtship activities, pair formation, and in mate selection by females (Weller 1965, Armbruster 1982). In Louisiana, only male Gadwalls that had completed 75% or more of their prealternate molt courted females or were paired. The timing of peak pair formation in Anatinae varies among species and may be related to food choice and resource use (Paulus 1983). Thus, in males, the prealternate molt may be delayed until just before the optimal period for pair formation. Because female plumage characteristics probably play less of a role in courtship and the replacement of feathers before nesting may be important, molt in females is expected to deviate from that of males.

In Anatinae, the timing of molt appears to be related to age, adult males completing their prealternate molt before immature males. (McKinney 1965, Billard and Humphrey 1972). Because adult male Gadwalls completed the prealternate molt about 1 month before immatures, they were able to begin courtship and pair-formation activities earlier than immatures. Paired Gadwalls were dominant over unpaired Gadwalls and probably had greater access to

preferred resources than did unpaired birds during winter (Paulus 1983). Thus, adults should be more successful in obtaining resources and experience greater survivorship in winter. These benefits should insure that more experienced breeders return to the breeding grounds in optimum condition and may, in part, account for the significantly greater contribution of adult, as compared with immature, males to reproductive activities on the breeding grounds (Blohm 1982).

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Interspecific Egg Dumping by a Great Egret and Black-crowned Night Herons

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The terms "egg dumping" and "brood parasitism" describe the laying of eggs in another individual's nest. Brood parasitism, implying some regularity of occurrence, has been reported for a relatively small but diverse number of bird species. The phenomenon has important implications for the reproductive biology of both the parasite and the host, and the topic has received considerable theoretical attention (e.g. Weller 1959, Hamilton and Orians 1965, Payne 1977, Yom-Tov 1980). Egg dumping has been suggested as an evolutionary precursor to brood parasitism (Hamilton and Orians 1965).

Recent studies (Yom-Tov 1980, Brown 1984) suggest that intraspecific brood parasitism, difficult for avian hosts and human observers to detect, may be more widespread than is currently believed. For example, prevalent intraspecific brood parasitism has been discovered in Cliff Swallows (*Hirundo pyrrhonota*; Brown 1984). This is the first report of widespread intraspecific brood parasitism by a colonial animal, although bird colonies have previously been suggested as being favorable for the development of brood parasitism (Hamilton and Orians 1966).

Neither brood parasitism nor egg dumping has, to our knowledge, been reported for the Ardeidae or Ciconiiformes. Here, we describe two cases in which Black-crowned Night Herons (*Nycticorax nycticorax*) abandoned eggs in Snowy Egret (*Egretta thula*) nests and one case in which a Great Egret (*Casmerodius albus*) abandoned an egg in a Black-crowned Night Heron nest. We speculate that a regular low level of brood parasitism may occur among colonially nesting herons.

We conducted this study at Clark's Island, an island of about 30 ha at the mouth of Plymouth Har-

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