

## OLDSQUAW BROOD BEHAVIOR

By R. M. ALISON

Oldsquaw (*Clangula hyemalis*) brood behavior was investigated in the vicinity of Churchill, Manitoba in 1974 and 1975 by means of a banding - marking program. In May and June of these years, 35 adult females were captured and marked. In addition, in July and August, 128 immatures were caught and banded, 46 of which were also marked with nasal saddles (Alison, 1975a). Brood behavior was monitored through sightings of marked birds and recaptures of banded, unmarked individuals.

Communal broods of Oldsquaws were commonly observed, especially from mid-July to mid-August. Several instances of brood adoption were also noted. In one of these instances (22 July), a marked female, which successfully hatched a clutch of five eggs on 7 July 1975, adopted four other Oldsquaw ducklings, these about two days younger than her brood. An adult female was not present with the second brood and it is likely that the four adopted ones were from a brood of six which had previously vanished from a nearby pond subsequent to the death of the adult female. Two other instances of brood adoption involving marked adult females and banded broods were noted in 1975. Such behavior is not uncommon among waterfowl (Hochbaum, 1944).

Communal broods of Oldsquaws comprising as many as 135 individuals were observed. Frequently, the number of adult females accompanying these broods was insufficient to account for the total number of young assuming only combination of specific broods, each with the appropriate adult. In one communal flock of 56, 93% were immatures whereas another contained 32 immatures and only one adult female. Many of the young birds had evidently been adopted, perhaps through separation from their own parent. The composition of individual communal broods changed often, as individuals and groups of immatures and adults walked about from pond to pond.

### BROOD BEHAVIOR

Although anecdotal accounts of the brood behavior of this and other species are recorded (Bent, 1923; Phillips, 1925), detailed studies of the activities of the young of diving species are available only for Redheads (*Aythya americana*) (Low, 1945; Lokemoen, 1966) and Canvasbacks (*Aythya valisneria*) (Hochbaum, 1944 and 1960). In this study, older females marked in previous years tended to be more successful in rearing young than younger females, and the older birds and their broods possibly formed a nucleus for communal broods. Frequently some of the oldest females accompanied communal broods; very old females and their broods were seldom observed alone.

Certain females were exceptionally aggressive towards specific kinds of predators. One female, for example, routinely attacked and chased Herring Gulls (*Larus argentatus*) from the lake in which a large communal brood was present. Such attacks were frequently conducted in the air. When threatened by a winged predator, the entire brood always dove and while submerged, swam towards shore, eventually surfacing among dense shoreline vegetation. The birds never left the water to escape such an attack. If the pond was shallow, winged predators were often able to see the submerged ducklings and could dive beneath the surface and capture them. The young always swam very close to the pond bottom during escape attempts, usually causing debris to "boil up" and cloud the water. Ducklings often reversed direction and vanished into the turbid water. Such behavior may be of selective advantage in predator avoidance. Broods tended to occur on ponds with much bottom sediment, which might readily be agitated, rather than in ponds with rocky bottoms. Also, in most instances the adult female attempted to attract the predator away from the escaping ducklings. If the brood was surprised in deep water, far from shore, the female invariably dove, swimming in a zig-zag fashion close to the bottom causing agitation of bottom sediment. The young birds, unable to swim to protective shoreline vegetation, dove continuously into the turbid water, their activities increasing the turbidity. In these circumstances, immatures were very seldom captured by the predator.

When confronted by a human or large carnivore, the female and brood always swam to the center of the pond, remaining above the surface in alert posture. As the threat approached quite near the brood (within 25 m) the female, or in the case of a communal brood, all the adult females, swam toward the threat, frequently diving when within about 10 m and almost invariably surfacing beside the intruder in an apparent attempt to distract attention from the young. Movement by the intruder toward the young caused the female to approach more closely and continue this behavior, frequently calling and splashing violently on the water surface. During these activities, broods usually remained stationary.

When a threat approached to within about 10 m of the young, the brood immediately scattered and dove, behaving in the manner described previously. In these instances, attempts to drive the brood for banding purposes were totally ineffective. Although the birds dove continuously, once submerged, they did not progress in any particular direction nor did they venture beyond the area clouded by their diving and swimming activities. Frequently, the clouded area did not exceed 10 m in diameter and yet, whenever I approached a brood and caused it to scatter and dive in this manner, the birds continued to dive and surface within the turbid area rather than swim away to clear water. This diving behavior always continued until the departure of the threat.

Before each dive and while submerged, the female and young vocalized regularly, uttering the warning call "urk" (Alison, 1975b). In this manner, the birds communicated under water without visual contact.

## BROOD MOVEMENTS

Daily movements of 22 broods (adult female and at least five ducklings marked) were recorded. Typically individual broods remained on relatively small ponds (about 750 m<sup>2</sup>) for about 1.5 weeks after hatching. During this interval, few communal broods were seen. However, at an age of about 1.5-2 weeks (and older), broods were frequently led by the adult female to nearby ponds. During the pre fledging period (average 35 days) each brood might move to 10-20 different ponds. With increasing age, the broods frequented larger ponds. In some instances, relatively large distances were travelled. One brood walked 2.0 km in one night; another walked 5.2 km through dense cover in three nights, remaining on suitable ponds during the day.

Movement between ponds or lakes always occurred at night (between 2300 and 0600). Prior to movement, the adult females frequently flew about the vicinity apparently searching for another suitable pond or water area. Several such exploratory flights were conducted by individual females in a single afternoon; these were the only occasions when they abandoned the brood before fledging. At dusk, the broods were led overland to the chosen destination (not necessarily the nearest open water). Sometimes, involving communal broods, the entire flock did not follow one female and thus the congregation split. Even after fledging, flocks comprised solely of immatures frequently appeared on the study area, although such visits from Hudson's Bay occurred only between 0900 and 1650.

About mid-July, communal broods began to occur on large lakes, although the number of birds comprising these flocks varied daily as birds arrived and departed. Broods usually remained on individual lakes for only about 8-10 days before departing, sometimes en masse, for nearby lakes. Eventually, the fledged birds flew (or perhaps walked) to Hudson's Bay. Individual females invariably led their broods over the same route year after year. Thus, certain lakes traditionally supported large flocks of immatures whereas others supported none.

## DISCUSSION

Although communal broods occur among Oldsquaws, such behavior being presumably of selective advantage, the mechanism enhancing survival of immatures is unknown. The defensive actions of adult female Oldsquaws, although apparently relatively ineffective when performed by one female in the presence of more than one predator (Salomonsen, 1950), frequently succeed in protecting the young when performed by several associated females. Similarly, predation upon adult females in such congregations may be reduced as compared to the loss by predation of lone females or females with one brood.

Certain escape behavior performed by immatures involving activities which tend to cause bottom sediment to cloud the water would be of greater escape value when performed by large numbers of individuals (i.e., communal broods). Therefore, despite the

possible increased predation of flightless immatures walking in large congregations between ponds, escape behavior performed by the young and defensive behavior of the adult females is more effective when performed in large assemblages and apparently, as a result, such flocking behavior is of selective value. It is possibly disadvantageous, however, in those instances where frequent overland movements between ponds are necessary as food supplies are depleted by large numbers of congregated Oldsquaws. It is unknown whether interpond movements are stimulated by declining food supplies. Furthermore, frequent brood movements between ponds do not apparently occur among other species of diving ducks (Poston, 1974), particularly in areas where ponds are more productive nutritionally.

Adult females conduct their broods to the same ponds year after year. Older females probably produce more fledged young than younger females, because the former, in addition to locating their nests so as to minimize predation loss, conduct their broods to ponds or lakes in which the young might escape predation more readily than elsewhere. Thus, the breeding nucleus of an Oldsquaw population may comprise only the oldest, most experienced adult females, possibly not more than 10-20% of the breeding females. One of the most productive females was at least seven years old. Increased breeding success with age has also been reported for Canvasbacks and Lesser Scaup (*Aythya affinis*) (D. Trauger, pers. comm.).

Suitable management of Oldsquaws on the breeding grounds would therefore comprise identification and retention of those lakes traditionally frequented by Oldsquaw broods in those areas in which they might be threatened by development.

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