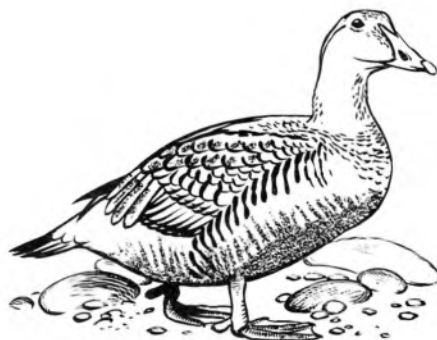


Exploitation of others' vigilance by the Common Eider *Somateria mollissima*



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*Individuals obtain advantages from group-living through reduced probability of predation (Hamilton 1971). In addition to reducing the perimeter exposed to predators, flocking behaviour also increases vigilance, and thereby reduces the chance of surprise attacks (Krebs & Davies 1986). In the Common Eider *Somateria mollissima* flocking behaviour during brood-rearing is very frequent. These groups are often called crèches, and such behaviour has been explained as an adaptation for minimizing predation on the ducklings (Ahlén & Andersson 1970, Gorman & Milne 1972, Bédard & Munro 1976, Munro & Bédard 1977a,b, Bustnes & Erikstad 1991a). However, females, that do not care for young themselves, are often temporarily present in or near crèches (Munro & Bédard 1977a, Schmutz et al. 1982, Bustnes & Erikstad 1991b). Adult Common Eider are exposed to dangers, such as harassment by kleptoparasitic gulls (Ingolfsson 1969) and, in some areas (e.g. northern Norway), predation from birds of prey such as White-tailed Eagles *Haliaeetus albicilla* (Norderhaug 1978). Females that care for ducklings spend 40 to 45% of a feeding bout watching for potential duckling predators (Bustnes & Erikstad 1991a). It would thus seem advantageous for a female without young to stay close to brood-caring females, thereby exploiting the high degree of vigilance that will enable them to feed more effectively (Bustnes & Erikstad 1991b). In order to test this hypothesis, I recorded time budgets of females, without young, that were feeding close to or away from crèches.*

Study area and methods

The field work was conducted in the fjords near Tromsø (69°49'N, 18°15'E), northern Norway, in June and July 1989. Feeding females without young were selected randomly for time budget analysis. I did not record the total time budgets of the birds, but only the time budget during feeding bouts. The females were divided into three groups: (a) females feeding within 10 m of a crèche but which showed no interest in the ducklings, (b) females within 10 m of other females (one or more) and (c) lonely females with no females or crèches within 50 m. Each female was observed from 10 to 20 minutes (mean 18 minutes), and her behaviour was recorded every 15 seconds. The observation time varied because some females stopped feeding and changed activity (swam away, went to rest on shore or started continuous preening) before they had been observed for 20 minutes. When females changed activity during observation, recordings after feeding had stopped were excluded. Records shorter

than 10 minutes were also excluded. Behaviour was divided into various categories including **swim** (during food search) and **alert** (watching for predators) divided into **low alert** (head up) and **high alert** (extreme head up). **Social interactions** with other birds were recorded, but took up less than 1% of time and were excluded from the analyses. **Self maintenance behaviours** included **feed** (head submerged or just above the surface) and **preen**. The frequency of each behaviour was expressed as a percentage of the total records of each observation period. To test for differences between the groups, I used a oneway ANOVA and Fisher PLSD test on arcsin transformed percent values (Sokal & Rohlf 1981) (for further details of the method see Rushforth Guinn & Batt 1985, Bustnes & Erikstad 1991a).

Statistical analyses were performed with Staviw SE+ Graphics (Feldman *et al.* 1987) on a MacIntosh computer. Observations were made using a 20-60x spotting scope or 10x40 binoculars.

Results

I observed two incidents of gulls *Larus* spp. harassing feeding adult Eiders during the brood-rearing period. One was attacked by a Herring Gull *Larus argentatus* and one by a Great Black-backed Gull *L. marinus*. In addition, I saw one female and one male resting on the shore being harassed by Herring Gulls.

The time budget analyses showed that females feeding in or close to crèches spent significantly more time feeding (70%) than lonely females (56%) and females feeding in flocks (56%). They were also less alert (20%) than both the other groups (26% flock-feeding females and 31% for females alone). There were few differences between lonely females and flock-feeding females, but the latter tended to be more alert (Table 1).

Discussion

Several categories of non-caring Common Eider females have been found in or near crèches; among these are failed nesters, brood abandoning females (Schmutz *et al.* 1982, Bustnes & Erikstad 1991b), young and non-breeding females (Schmutz *et al.* 1982). This study supports the hypothesis that their attraction to crèches is a selfish tactic that exploits the high level of vigilance of brood-caring females. They can thus reduce their own vigilance and feed more effectively. Females caring for young have no option but to be vigilant, because their ducklings are exposed to heavy predation and need to be pro-

tected (Munro & Bédard 1977b, Mendenhall & Milne 1985, Swennen 1989).

Common Eider females do not feed during egg-laying and incubation, and are in poor body condition when their eggs hatch (Gorman & Milne 1971, Korschgen 1977, Parker & Holm 1990). Thus, non-caring females that have laid and incubated eggs (failed nesters and females that abandon or lose their ducklings) are in great need of replenishing their body reserves. Gorman & Milne (1972) found that such females were not in crèches, but Bustnes & Erikstad (1991b), studying this Norwegian population, observed failed nesters and brood abandoners in or near crèches for about 40% of their time. Depletion of nutrient reserves is not a prerequisite for crèche attendance in Common Eiders, since females that have not nested (young and non-breeding females) show similar behaviour.

My observations indicate that gulls cause some problems for adult Eiders by kleptoparasitism in the brood rearing period and, since brood-caring females utter alarm calls when gulls or other avian predators approach their brood (Munro & Bédard 1977b), all females in or near crèches will be warned and their safety increased.

Behavioural ecology theory predicts that each individual in a group will attempt to gain more benefit than the others (Krebs & Davies 1986), and this study has produced an example of what seems to be a "cheating" tactic. Since Eiders do not hold brood territories, such "cheating" individuals probably have to be accepted, even if some brood-caring fe-

Table 1. Percent time (means \pm SE) that Common Eider females allocated to different behaviours during feeding bouts in relation to whether they were attending crèches, feeding alone or feeding with other females. Data from the Tromsø area, north Norway.

Behaviour category	Group 1 Feeding with crèche <i>n</i> =20	Group 2 Feeding with other females <i>n</i> =11	Group 3 Feeding along <i>n</i> =12	p-value ^a
Swim	7.8 \pm 1.5	10.6 \pm 2.9	8.5 \pm 2.1	0.88
Alert				
High	0.2 \pm 0.1	0.5 \pm 0.3	1.0 \pm 0.7	0.24
Low	19.9 \pm 1.1	25.8 \pm 1.1	30.0 \pm 1.9	0.0082 ^b
Total	20.1 \pm 1.2	26.2 \pm 1.1	31.1 \pm 2.1	0.0001 ^c
Self maintenance behaviour				
Feed	69.6 \pm 1.7	55.5 \pm 5.1	55.5 \pm 2.6	0.0007 ^d
Preen	2.25 \pm 0.7	7.4 \pm 2.6	4.9 \pm 1.4	0.032 ^e
Total	71.8 \pm 1.6	63.3 \pm 3.1	61.4 \pm 2.7	0.0031 ^d

^aOneway ANOVA, Fisher PLSD test.

^bGroup 3 significantly different from Group 1 and Group 2.

^cAll groups significantly different.

^dGroup 1 significantly different from Group 2 and Group 3.

^eGroup 1 significantly different from Group 2.

males behave aggressively toward non-caring females (Munro & Bédard 1977a pers. obs.). This may be because they compete with caring females and their broods for food. Bustnes & Erikstad (1991b) found that failed nesters and brood abandoners did not participate in rearing activities, and left the

crèches at the slightest disturbance. However, because of the heavy predation on ducklings, a positive effect of their presence cannot be ruled out completely since additional females may, to some extent, confuse the predator.

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