GENERAL NOTES

Sex differences in alarm responses of wintering Evening Grosbeaks.—Flocked birds probably attract the attention of predators to a greater degree than do solitary individuals. Conspicuous colors, movements, or vocalizations tend to promote flock cohesion while increasing predation risks; thus flocked birds must effect a compromise between the need to communicate among themselves and the need to evade predators (Wiley, Auk 88:881–892, 1971; and references cited therein).

A species illustrating such a compromise is the Evening Grosbeak (*Hesperiphona vespertina*), which occurs in sizable flocks during the winter in several parts of the U.S. The flocks are conspicuous, both visually (due particularly to the boldly patterned plumage of males) and auditorily (due to the grosbeaks' frequent use of loud calls). During a study of winter social behavior in this species, I observed the alarm responses of males and of females in grosbeak flocks. This paper describes some sexual differences in alarm responses which might function to reduce predation in this species.

Methods.—Wintering Evening Grosbeaks were observed from February to May 1976 at Logan, Utah on a 200-m semi-urban wooded stretch bordering the Logan River. Three hundred grosbeaks were banded of an estimated total of at least 700–800 individuals that frequented the study area (Balph and Balph, Bird-Banding 47:340–344, 1976).

Alarm responses within feeding groups of grosbeaks were documented in April and early May at a 0.86 × 0.86 m elevated platform provisioned with sunflower seeds and situated 1.5 m from the nearest cover. The birds were watched through 1-way glass from a blind positioned 0.5 m from the platform.

Counts were made at 15- to 30-sec intervals of the number of males and females present. If, during a given period between counts, the feeding group showed a generalized alarm response in which some individuals adopted a "freezing" stance at the platform and others escaped, a count immediately was made of the number of males and females remaining at the platform. One hundred such instances were recorded.

Additional observations were made of the incidence of distress calls or "squeals" among 189 individuals during trapping and banding operations. Squealing was recorded as present if a bird produced the call one or more times when handled.

Alarm responses within feeding groups.—Evening Grosbeaks feeding in groups at the platform sporadically exhibited fright responses. Such responses appeared sometimes to be caused by the flight overhead of a hawk or shrike or by human activity, although in most instances I was unable to discern an obvious stimulus for the behavior. Typically, the birds suddenly became alert and ceased to eat; then, a fraction of a second later, some or all members of the group flew away, often to nearby trees. Sometimes a bird at the platform gave the *keer* call, which in most contexts functioned as a contact vocalization, just prior to the initial moment of alertness. Escaping birds either were silent or, more often, gave the *bree* call ordinarily associated with agonistic interactions. Occasionally, an escaping bird gave a chirping sound.

Individuals that remained at the platform during a fright adopted a crouched posture and remained motionless and silent for several seconds or longer. Birds freezing in this manner appeared extremely alert and tended to fly away at the slightest fear-producing stimulus. If they did not become further alarmed, they eventually resumed feeding at the platform.

The mean number of males counted at the platform just prior to a fright was 12.8 ($n = 100$, $SD = 6.16$), and of females, 17.7 ($n = 100$, $SD = 6.76$). The pre-fright sex ratio thus was 1.38:1.00 in favor of females. This ratio did not differ significantly from

TABLE 1

OCCURRENCE OF DISTRESS CALLS AMONG MALE AND FEMALE EVENING GROSBEAKS AT SUCCESSIVE CAPTURES

Capture	Previous Behavior	Males (n)		Females (n)	
		Captured	Calling	Captured	Calling
1	—	87	67	102	93
2	Called at 1	7	3	11	10
	Did not call at 1	2	0	1	0
3	Called at 1 and 2	—	—	1	1
	Called at 1 but not 2	2	0	—	—

the sex ratio of 254 grosbeaks trapped in the same part of the winter (1.31 females to 1.00 males) ($\chi^2 = 0.18$, df = 1, $P > 0.5$).

The mean number of males observed to freeze at the platform during a fright was 1.6 ($n = 100$, $SD = 1.63$), whereas that of females was 6.8 ($n = 100$, $SD = 4.36$), producing a post-fright sex ratio of 4.30:1.00 in favor of females. In 92 of 100 cases, a greater proportion of females than males exhibited the freezing response; this result differs significantly from chance expectation ($\chi^2 = 70.56$, df = 1, $P < 0.001$). If one compares male to female numbers at the platform before and after the onset of frights, a highly significant difference is again obtained ($\chi^2 = 149.34$, df = 1, $P < 0.001$). Thus, females showed a greater tendency than males to freeze at the platform when alarmed, and males exhibited a greater tendency than females to flee. This difference of behavior appeared also to hold for grosbeaks that became alarmed while resting or feeding on buds in leafless trees, although I did not make quantitative observations of responses in this situation.

Distress behavior of restrained birds.—Evening Grosbeaks that I trapped, banded, and measured often produced squeals when handled. Of 189 individuals for which I recorded the presence or absence of this vocalization at initial capture, 77% of males squealed, whereas 91% of females gave the call (Table 1). A significantly greater proportion of females than males squealed when handled for the first time ($\chi^2 = 7.25$, df = 1, $P < 0.01$). In general agreement with this finding is J. Ogden's (quoted in Norris and Stamm, Bird-Banding 36:83–88, 1965) observation that, of 10 Evening Grosbeaks captured in mist nets, 5 females gave distress calls during removal from the nets, whereas 5 males gave no calls. Parks' (Bird-Banding 16:32–36, 1945; Bird-Banding 18:57–76, 1947) descriptions also suggest that females of this species squealed more often than males when handled.

Twenty-one of the 189 individuals were recaptured one or more times 1–10 days after they were banded. Such birds either repeated the initial response when handled and measured on later occasions or, alternatively, called on the first but not on subsequent occasions (Table 1). Although my sample sizes are too small to permit a meaningful statistical analysis, the fact that several birds squealed at initial capture but not on later occasions, whereas none showed the reverse pattern, suggests that habituation to handling was a factor affecting response frequencies. In all but one case, individuals that called at initial capture but not thereafter were males. It thus seems possible that Evening Grosbeaks differ sexually not only in the propensity to give distress calls at first

capture, but also in the tendency to cease responding when handled for a second or third time.

Squealing by hand-held grosbeaks often was accompanied by a visual display in which the bill was opened and the tail spread. Some birds also raised the crest; and occasional individuals spread the wing, maintaining it for several seconds in a horizontally extended position, when I released my hold on one wing. The latter behavior appeared to be more common among vocal females than among vocal males.

Discussion.—Cryptically colored animals may avoid detection by predators by remaining motionless against an appropriate background (reviewed by Alcock, Animal Behavior: an Evolutionary Approach, Sinauer Associates, Inc., Sunderland, Mass., 1975). It seems possible that sex-associated differences in the alarm responses of wintering Evening Grosbeaks are adaptively related to the species' sexual dimorphism in plumage coloration. To me, the plumage of females appears much less conspicuous than that of males against a variety of backgrounds in winter and spring. The sexual difference in visual conspicuousness seems more marked when the birds are stationary than when they are in flight. If the difference is similarly evident to animals that prey upon this species, then female Evening Grosbeaks should benefit more than males by freezing in relatively open situations. Conversely, males should increase their chances for survival by fleeing immediately to cover when alarmed. Males, by fleeing, might secondarily reduce the probability of a predator's detecting exposed, motionless females. One might expect to find similar differences of behavior in males and females of some other bird species showing comparable dimorphism in plumage coloration.

The sexual differences I observed in the distress responses of restrained Evening Grosbeaks seem problematical. One could speculate that these differences bear some relationship to differential alarm responses in free-ranging flocks. Since females apparently rely more extensively than males upon concealment in open situations, they should be more vulnerable than males in the event of detection by a predator. A second line of defense (i.e. squealing) thus might be more important to females than to males. However, an examination of Norris and Stamm's (1965) findings on interspecific differences in the occurrence of distress calls among restrained birds reveals no obvious relationship between cryptic coloration and the tendency to squeal when handled.

In many species, squealing by a captured individual stimulates birds of the same and sometimes of other species to mob the predator, potentially providing the victim with an opportunity to escape (reviewed by Thorpe, Cambridge Monogr. Exp. Biol. 12:1–143, 1961). Free-ranging Evening Grosbeaks did not mob me when I removed squealing conspecifics from traps, although the possibility remains that the birds might mob a predator under different circumstances. In any event, it seems possible that squealing—with its concomitant visual display, which contains several postural elements used intraspecifically in threat—might function in this species to startle or repel a predator and thereby to increase a victim's chances for escape.

Summary.—Observations were made of alarm responses among Evening Grosbeaks wintering at Logan, Utah. When a feeding flock became alarmed, females exhibited a significantly greater tendency than males to freeze rather than to fly to cover. Females also showed a significantly greater tendency than males to give distress squeals when handled. It is hypothesized that sexual differences of response to danger stimuli may be adaptively related to sexual dimorphism in plumage coloration in this species.——MARTHA HATCH BALPH, *Dept. of Wildlife Science, Utah State Univ., Logan 84322.* *Accepted 7 Dec. 1976.*