Hunting Methods of the Glaucous Gull and Escape Maneuvers of its Prey, the Dovekie.—The Glaucous Gull (*Larus hyperboreus*) is the most important predator of the Dovekie (*Plautus alle*) on Spitsbergen, but there is no information concerning the hunting strategy of this species (Bateson, Br. Birds 54:272–277, 1961; Løvenskiold, Avifauna Svalbardensis, Norsk Polarinst. Skrifter, Oslo, 1964; Norderhaug, Antarctic Ecol. 1:558–560, 1970). When studying the breeding biology of the Dovekie in the region of Hornsund, south-west Spitsbergen in 1974 and 1975 (Stempniewicz, Acta Ornithologica 18:141–165, 1981), I observed about 200 attacks on Dovekies by Glaucous Gulls during 300 h of field investigations. In 1980 I quantified Glaucous Gull predation on Dovekies (Table 1). These observations were all made during the breeding season of the Dovekie, i.e., from 15 June to the end of August. For detailed data concerning the study area, nesting habitat, nest density, chronology of breeding activities of the Dovekie, as well as the significance of Glaucous Gull predation, see Stempniewicz loc. cit.). This note describes the hunting strategy of the Glaucous Gull and the behavior of the Dovekies during the gulls' attack and pursuit.

Glaucous Gulls constantly patrolled the Dovekie colonies throughout the summer. The colonies appeared to be divided by the gulls into separate hunting territories from which all other gulls were immediately chased (except for the members of the particular gull's family). When patrolling its territory, a gull flew against the wind, low above terrain, along the slope. The folds in the terrain and rocks protruding from the mountainside enabled the predator to appear suddenly in the colony, surprising the Dovekies. On noticing a gull the Dovekies immediately took flight, uttering loud cries. They flew away from the gull and diagonally down-slope to gain speed, then the whole Dovekie flock circled the colony, returning when the danger had passed. On hearing the cries uttered by flushed birds, the nestlings on the surface of the colony, and the adults entering or leaving the nesting crevices at that time, immediately took cover within nest burrows and reappeared at the surface only after the return of the circling flock. It seems that continuous vocal contact between the birds on the surface, in the nesting crevices, and in the air, kept them oriented as to the existing situation and helped them to avoid danger.

Repeated patrol flights over the colony flushed Dovekies and enabled the Glaucous Gull to search out an object of attack. Any Dovekie which behaved differently from the rest of the flock (e.g., a single bird, slowed down at the moment of taking to the air) became the object of interest to the gull. Such a pattern of selective choice of the potential prey was particularly evident in the period when the young Dovekies were leaving the colony. At that time the gulls ignored adults completely. The predator did not chase the flock which frequently consisted of hundreds or thousands of individuals which flew at great speed and gave piercing cries. By pursuing its quarry, the gull prevented it from joining the flock. The flock thereby abandoned the bird chased by the gull. As a rule, the victim flew down the slope to gain the maximum speed, its only maneuver being fairly regular zigzags. At this stage of the chase, the distance between the birds was crucial. If it was greater than about 10 m, either the victim reached the water, or after a longer or shorter chase, the predator gave up (despite its greater speed). If the distance between the birds was less than about 10 m, the gull continued the chase and gradually caught up with its victim. I observed such pursuits to cover 200 m to more than 3 km. In each of 89 cases observed, the moment the predator was within 1 or 2 m of its prey, the Dovekie (whether adult or young bird flying for the first time) folded its wings and dropped almost vertically. The gull was unable to carry out such an evolution, therefore first it slowed down and then plunged after its prey. At the same time the Dovekie dove into the water if this was nearby, or landed on the ground and squeezed itself into a handy crevice, or—not finding any hiding place—it took off again and tried to escape by flying low over the land. In the last case, the Dovekie's fate was sealed, in the first two cases, its fate depended upon the depth and extent of the water or kind of crevice. The consequence of the diving maneuver carried out over the land was sometimes that the bird struck the rocks.

The greater the height at which the flying Dovekie was attacked by the Glaucous Gull, the greater the time gained to find a shelter, after carrying out the diving maneuver. A distinct difference was observed in the height at which Dovekies flew over the sea and over the land. Over the sea, where there was not only relatively little danger from the

TABLE 1. Dovekies killed by Glaucous Gulls in Hornsund region, Spitsbergen, 1980.

Age-class Period	Adults 16–18 June	Young birds testing wings 6–14 August	Young birds leaving the colony 12–21 August
Area under observation	Whole southern slope of Arie mountain, area of breeding colony, ca. 22,000–25,000 m^2	Part of slope of Arie mountain, area of breeding colony, ca. 5500 m^2	Whole southern slope of Arie mountain, area of breeding colony, ca. 22,000–25,000 m^2
Number of Dovekies killed by gulls	10 birds per 15 h observation, i.e., 0.6–0.7 birds/24 h/1000 m^2	33 birds per 36 h observation, i.e., 4.0 birds/24 h/ 1000 m^2	32 birds per 21 h observation, i.e., 1.5–1.7 birds/24 h/1000 m^2

Glaucous Gulls but also the opportunity for a fast dive into the water, the Dovekies flew very low, just above the surface of the water. Over the land however, the Dovekies more often flew 50–200 m over the ground, or even higher (estimated in relation to terrain of a known height). In my opinion this was related, among others, to the greater danger from the gulls and to difficulties in Dovekies finding safe shelter quickly.

The sight of a gull chasing a Dovekie encouraged other gulls in the vicinity to join in. The moment the victim was captured by one of the gulls, the others attacked it fiercely in an attempt to steal the quarry. As a result, the Dovekie may pass from one gull to another before it is finally swallowed. Occasionally the Dovekie took advantage of the confusion and escaped. Holding the quarry in its beak, the gull would shake it several times and swallow it (whole), either in flight, or after settling on the ground.

The strong wind distinctly favored the success of the gull predation. During windy weather Dovekies had a difficult time taking wing, gaining sufficient speed, and landing. On 16 June 1980 during 3 h of observation (strong wind) the Glaucous Gulls killed 4 adult Dovekies, while on 18 June 1980 during 3 h of observation (calm weather) gulls killed only 1 adult bird in the same observation area.

In a similar way gulls hunted young Dovekies flying from the breeding colony, but success usually took less time and effort. Compared to the adults more fledgling Dovekies were caught while still airborne than were driven to the ground and caught there. The situation differed in the case of flightless, young Dovekies testing their wings in the colony. The sudden appearance of a Glaucous Gull gave rise to rapid attempts to escape and the chicks—sometimes unable to find or reach their own nesting crevice—tried to squeeze into the nearest available hole. If this was too tight or shallow, the gulls had no difficulty in capturing the nestlings. Gulls were frequently observed walking around the colony in search of poorly hidden chicks and eggs as well as birds stricken against the rocks or injured by the gulls.

Young Dovekies leaving the colony were killed by gulls more frequently than adults and less frequently than nestlings testing their wings on the surface of the breeding colony (Table 1). Data included in the table enable only an estimation of the proportions of the age-classes of the Dovekie killed by gulls.

The observations described suggest that the following factors may influence the predation of the Glaucous Gull on the Dovekie: (a) the well-developed vocal warning system of the Dovekie; (b) the flock behavior of the Dovekie making it more difficult for the gull to select the object of an attack; (c) the number of Dovekies staying in the breeding colony or flying in the flock; (d) the distance between the colony and the sea—the shorter the distance, the greater the chance of escape for the Dovekie (especially young birds) pursued

by the gull; (e) the altitude at which the Dovekie's colony is situated—the higher a colony is situated, the greater the chance of escape for the Dovekie when chased by the gull, after carrying out the diving maneuver; (f) the exposure of the colony—the more open the colony terrain, the less possibility of surprising the Dovekies staying in the colony by the gulls; (g) the weather conditions—strong wind increases the effectiveness of the gull predation.—LECH STEMPNIEWICZ, *Department of Animal Ecology, Institute of Biology, Gdańsk University, Czolgistów 46, 81-378 Gdynia, Poland.* Received 10 July 1980; accepted 16 Sept. 1982.

Glaucous Gulls Stealing Spoil from Parasitic Jaegers.—Piracy is a manner of foraging, particularly common in the jaegers (Stercorariidae) and gulls (Laridae) (e.g., Fisher and Lockley, Sea birds, Collins, London, 1954; Belopolski, Ekologia morskich kolonialnych ptic Barenceva Moria, [in Russian], Izdat. Akad. Nauk SSSR, Moskva-Leningrad, 1957; Hatch, Auk 87:244–254, 1970). Jaegers feed largely by harrying other seabirds, in particular gulls and terns, until they disgorge and drop food which the jaegers then snatch. Cases where gulls steal food from jaegers are much rarer. Parmelee and MacDonald (Natl. Mus. Can. Bull. 169:61, 1960) reported Glaucous Gulls (*Larus hyperboreus*) attacking and stealing food from Long-tailed Jaegers (*Stercorarius longicaudus*) which had been foraging at the dump at Eureka, Ellesmere Island. Belopolski (op. cit.) described Mew Gulls (*Larus canus*) snatching fish dropped by birds being pursued by a jaeger. Morrison (Wilson Bull. 90:649–650, 1978) observed Herring Gulls (*Larus argentatus*) stealing spoil from Parasitic Jaegers (*Stercorarius parasiticus*) by direct attack.

When studying the breeding biology of the Dovekie (*Plautus alle*) in the region of Hornsund, south-west Spitsbergen (Stempniewicz, Acta Ornithologica 18:141–165, 1981) I was also interested in the Glaucous Gull which is the most important predator of the Dovekie. During field studies on Spitsbergen, in summer 1974 and 1975, I observed several cases of Glaucous Gulls stealing food disgorged by a Kittiwake (*Rissa tridactyla*) that was being pursued by a Parasitic Jaeger. In each of 12 observations, the Glaucous Gull joined the jaeger in harrying the Kittiwake. Next, the gull flew a few meters below and behind the Kittiwake, whereas the jaeger was usually to be found over and behind its quarry. The appearance of the Glaucous Gull did not noticeably affect the behavior of the other two birds. After disgorging of the food by the Kittiwake, both the Glaucous Gull and the Parasitic Jaeger tried to catch it. However, the Glaucous Gull won this competition in 9 of the 12 cases because of the shorter distance it had to cover to retrieve the dropping spoil. After either of the birds grabbed the food, the other one ceased to be interested in it.

The foraging manner of the Glaucous Gull described above takes less time and effort from the gull than hunting the Dovekies, especially the adult Dovekies. However, it was used fairly rarely, despite the high frequency of the Kittiwakes harried by the Parasitic Jaegers in the region of Hornsund. The food disgorged by the Kittiwakes (consisting of marine macroplankton) probably did not constitute spoil large enough to be worthwhile for the Glaucous Gulls to make it the main target for foraging.—LECH STEMPNIEWICZ, *Department of Animal Ecology, Institute of Biology, Gdańsk University, Czolgistów 46, 81-378 Gdynia, Poland.* Received 10 July 1980; accepted 16 Sept. 1982.