whether it was the windrowed midges to which the swallows first responded. The dead midges appeared fresh and their nutritional content was likely still similar to that of living midges. The swallows exploiting this clumped, stationary food source probably used less energy than they would in aerial pursuit. Such hypothesized conservation of energy might have been important if the swallows had flown a long distance the previous day or night.

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Diet of Glaucous Gulls in western Alaska.—The Glaucous Gull (*Larus hyperboreus*) is an arctic circumpolar species that has received attention because its diet includes economically important species of fish and birds (Olson, Fed. Pittman-Robertson Rept., Proj. 3-R-6:34–62, 1951; Uspenski, Can. Dept. North. Aff. and Nat. Resour., 1958; Belopolskii, Israel Prog. Sci. Transl., Jerusalem, Israel, 1961). With one exception (Olson 1951), however, large-sample diet studies of this gull have been conducted only in the northern Atlantic and European areas.

This report describes a comparative field study of Glaucous Gulls in two different habitats near the Bering Sea, in western Alaska. The coastal study area was at Kokechik Bay (60°40′N, 166°W), on the western tip of the Yukon-Kuskokwim Delta of Alaska, within Clarence Rhode National Wildlife Range. I used this area from 20 June–17 August 1972 and 10 May–17 August 1973. Gulls at the coast nested both in colonies and as isolated pairs.

The inland study area, 40 km SE of the coastal area, was 11 km from the nearest point on the Bering Sea coast. I used this area from 26 April–9 September 1974 and 11 June–2 July 1979. Inland Glaucous Gulls bred only in isolated pairs. Both study areas are less than 3 m above mean sea level and are subject to floods.

I determined the diet of Glaucous Gulls from stomach contents, and from regurgitated pellets and food remains collected at nests (food remains are items too large to be organized into pellets by the digestive tract). Weathered pellets and food remains from previous years were not collected. The stomachs for 1972 were collected by D. Eisenhauer (Eisenhauer and Kirkpatrick, Wildl. Monogr. 57:1–62, 1977) at Kokechik Bay.

I summarized the data as percentage of stomachs, pellets, and food remains containing each food category (i.e., as percent frequency occurrence). Lumping together different sources of food data appears to be justified. Pellets and food remains were collected at the same time in the same manner. In 1972, the only year from which sufficient numbers of both stomachs and other food data are available for comparison, the stomachs, pellets, and food remains ranked the food categories similarly, except for a bias in favor of mammals in the pellets plus food remains, and a bias in favor of terrestrial invertebrates in the stomachs. With few exceptions, the more limited data from other years support this result. Statistical analysis of the data comprised χ^2 comparisons, interpreted conservatively ($P \leq 0.01$) by consideration of patterns of differences rather than results of individual tests.

TABLE 1

PERCENT FREQUENCY OCCURRENCE OF FOODS IN GLAUCOUS GULL STOMACHS, REGURGITATED PELLETS, AND SEPARATE ITEMS OF FOOD REMAINS AT NESTS

Year (location)	1972 (coast)	1973 (coast)		1974 (inland)		1979 (inland)	
Time relative to gull hatch peak	After	Before	After	Before	After	Before	After
Sample sizes							
Stomachs	26	8	40	0	15	0	0
Pellets	17	65	4	40	117	29	33
Food remains	39	17	9	20	64	29	18
Food categories							
Mammals	6.1	57.8	1.9	25.0	1.5	10.3	2.0
Adult birds	24.4[a]	5.6	0.0	16.7	30.6	32.8	25.5
Eggs, downy young		21.1	22.6	36.7	39.8	36.2	60.8
Fish	67.1	51.1	66.0	38.3	47.4	19.0	15.7
Marine invertebrates	22.0	6.7	30.2	15.0	9.7	12.1	7.8
Terrestrial invertebrates	4.9	2.2	15.1	0.0	1.0	0.0	0.0
Marine vegetation	6.1	3.3	0.0	0.0	0.0	0.0	0.0
Terrestrial vegetation	1.2	2.2	9.4	0.0	2.0	0.0	2.0

[a] Combined avian foods.

The coastal gulls' diets did not differ between years (Tables 1, 2; only data collected after the gull hatch were compared). The single exception in the terrestrial invertebrates category is the result of the sampling bias mentioned earlier; when the test is made with only stomachs, the difference disappears ($\chi^2 = 0.35$, df = 1, $P > 0.01$).

Only one food category was consistently different between years in the inland gulls' diet. The reduced emphasis on fish in 1979 is coincident with the absence of a potential terrestrial competitor, the red fox (*Vulpes vulpes*), which, together with the resident Arctic fox (*Alopex lagopus*) population, devastated the waterfowl nests in 1974. An unusual series of severe storms in 1979 also may have made eggs more available to gulls by causing nest abandonment, and may have increased the availability of crippled adult birds. Although foxes potentially could help gulls by disturbing nests, there is evidence (Strang, J. Wildl. Manage. 44:220–222, 1980) that Glaucous Gulls may not take advantage of such opportunities. The importance of competitive pressure from foxes is uncertain; however, there are no consistent differences between 1974 and 1979 in the gulls' use of avian foods. Fish might simply have been more abundant in 1974.

The only consistent change in diet within a single breeding season on both study areas was in the frequency of mammal consumption (Tables 1, 2). The mammals, nearly all of which were tundra voles (*Microtus oeconomus*), were consumed heavily prior to the median gull egg hatching date, when the rodents were exposed and crowded on hilltops by spring floods.

I pooled data between years to compare diets of coastal and inland Glaucous Gulls (Tables 1, 2). Birds (mostly waterfowl) were more important foods for inland gulls than for coastal gulls, and fish were more important for coastal gulls. Marine invertebrates were more important for inland gulls before the gull eggs hatched, and for coastal gulls after the hatch. None of the remaining food categories showed consistent differences between study areas.

TABLE 2

CHI-SQUARE VALUES FROM COMPARISONS OF GLAUCOUS GULL DIETS (PERCENT FREQUENCY OCCURRENCE OF EACH FOOD CATEGORY CONSIDERED SEPARATELY) BETWEEN LOCATIONS, BETWEEN YEARS, AND BETWEEN TIMES

Comparison (sample sizes)	Mammals	Adult birds[a]	Eggs and downy young	Fish	Marine invert.	Terrestrial invert.	Marine veg.	Terrestrial vegetation
Between locations (coast vs inland)								
Before gull hatch (90 and 118)	77.4**	80.5**	16.7**	23.5**	8.9**	2.7	4.0	2.7
After gull hatch (135 and 247)	4.6	22.3**	65.2**	51.6**	33.0**	20.0**	9.5**	3.4
Between years								
1972 vs 1973 (82 and 53)	1.6	0.1		0.0	2.1	11.8**	3.4	6.4
1974 vs 1979								
Before gull hatch (60 and 58)	6.6**	10.7**	0.0	9.2**	0.4	0.0	0.0	0.0
After gull hatch (196 and 51)	0.1	0.6	9.5**	20.6**	0.2	0.5	0.0	0.0
Between times (before vs after gull hatch)								
1973 (90 and 53)	67.7**	3.2	0.1	4.7	45.8**	39.4**	1.8	12.3**
1974 (60 and 196)	57.6**	27.3**	0.8	6.9**	4.3	0.6	0.0	1.2
1979 (58 and 51)	19.6**	1.6	14.8**	0.5	1.5	0.0	0.0	1.2

[a] Data on adult birds, eggs and downy young combined for the 1972 vs 1973 comparison.
** $P < 0.01$, df = 1 for each test; sample sizes obtained from Table 1.

Most of the fish consumed by Glaucous Gulls were cod (*Eleginus gracilis*), both at the coast, where at least 61% of the fish taken were of this species, and inland, where the proportion was at least 78%.

The availability of eggs and young birds was greater on the inland study area. Eisenhauer (M.Sc. thesis, Purdue Univ., Lafayette, Indiana, 1976) estimated that 5315 waterfowl nests were present at Kokechik Bay in 1973. The availability per gull averaged 8.2 nests, considerably lower than my estimate of 28.2 waterfowl nests per inland gull in 1974. The latter estimate is based on waterfowl nest densities I measured on a 411.4-ha lowland tundra subset of the inland study area, with an extrapolation to the remaining lowland parts of that study area. Time constraints limited my search to pond edges in 1979, and several potentially nest-swamping storms had occurred before my search began, so the estimate of nest availability is lower than in 1974, at 20.2 nests per gull, but still is higher than the coastal availability in 1973.

Densities of marine invertebrates and dislodged *Fucus* (the only marine plant consumed by the gulls) generally are much higher at the coast. *Eleginus* moves to the deeper ocean waters in summer (Andriyashev, Israel Prog. Sci. Transl., Jerusalem, Israel, 1954), and so should have been more available at the coast than on the inland rivers.

I do not believe that inland gulls flew to the coast to feed, for three reasons. (1) I noted the directions of 39 departures or arrivals of gulls leaving or entering three nesting territories on 19 different days between 19 May and 26 July 1974. Only 7.7% of those arrivals or departures were in the quadrant closest to the sea (southwest), 48.8% were in the quadrant closest to the Kashunuk River (southeast), and the remainder were divided almost equally between the other two quadrants (northwest and southeast). (2) Furthermore, inland gulls did not exhibit the coastal gulls' tide-related activity pattern. Gulls in large numbers flew over the river channel in Kokechik Bay at low tide, surface plunging for fish, and then walked ahead of the rising water's edge to pick up invertebrates and *Fucus* from the intertidal zone mud. At high tide, Glaucous Gulls were nearly absent from the bay. Such a pattern was not evident among the isolated pairs nesting inland at the Kashunuk River in 1974, where the numbers of inland gulls passing observation points on the Kashunuk River within 2 h of low tide ($\bar{x} = 7.71$ gulls per session, N = 14 two-h observation sessions) were not different from numbers of gulls passing at other times ($\bar{x} = 9.60$ gulls per session, N = 20; Mann-Whitney *U*-test, $z = -0.94$, $P > 0.05$). (3) Finally, the species of invertebrates eaten by inland gulls (isopods and small clams) were not the same as those eaten by colonial gulls nesting near the mouth of the Kashunuk River. On one visit to the colonies in early August 1974, I noticed that the accumulated pellets and food remains were nearly all of a distinctive clam species different from those consumed by inland gulls; remains of other invertebrates, fish, etc., were relatively scarce. Isopods, clams and *Eleginus* all occur within the inland study area, which is close enough to the coast for the tidal flux to reverse the Kashunuk's direction of flow routinely.

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Vocal behavior of the Northern Oriole.—The vocal behavior of several species of Icteridae has been described, e.g., Red-winged Blackbird (*Agelaius phoeniceus*) (Orians and Christman, Univ. Calif. Publ. Zool. 84, 1968; Smith et al., Condor 82:259–266, 1980), Brown-headed Cowbird (*Molothrus ater*) (West et al., J. Comp. and Physiol. Psychol. 93:124–133, 1979), Common Grackle (*Quiscalus quiscula*) (Ficken, Auk 80:52–72, 1963; Wiley, Anim. Behav. 24:570–584, 1976), Western Meadowlark (*Sturnella neglecta*) (Fish et al., Am. Zool. 2:409, 1962; Falls and Krebs, Can. J. Zool. 53:1165–1178, 1975), and Eastern Meadowlark (*S. magna*) (Lanyon, Bull. Am. Mus. Nat. Hist. 134:1–26, 1966), but little information on vocalizations exists for *Icterus* spp. The purpose of this note is to describe the vocalizations of male Northern (Baltimore) Orioles (*Icterus galbula galbula*), and particularly the song variation found in one locality in Michigan.

Methods.—This study was conducted in an area of approximately 140 ha in Kensington Metropark, located in Oakland County in southeastern Michigan, from 9 May–25 June 1980.