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DIET OF THE SNOWY OWL IN THE ABSENCE OF SMALL MAMMALS

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Snowy Owls (*Nyctea scandiaca*) prey mostly on small mammals (Pitelka et al. 1955, Watson 1957, Taylor 1974), though they are known to eat birds (Murie 1929, Gross 1944, Wiggins 1953, Campbell and MacColl 1978). On Agattu Island in the Near Island group of the western Aleutian Islands, the owls occur in the absence of small mammals and subsist entirely on a diet of birds. From June to August 1975 one of us (LGF) collected 141 pellets which were analyzed to determine the Snowy Owl diet in this unusual ecological situation.

Snowy Owls have been seen sporadically throughout the Aleutians and are found consistently on Agattu, Buldir, and Attu (Turner 1886, Murie 1959). While they are known to breed on the Commander Islands (Murie 1959) and on Attu where Norway rats (*Rattus norvegicus*) are present, they did not appear to breed on Agattu in 1974-77 (J. L. Trapp, pers. comm.). We saw no evidence of nesting, breeding displays, or territorial behavior in 14 h of observation in June 1975. No immatures were seen on Agattu, although they have been seen on Buldir.

STUDY AREA

Agattu Island (173° 36' E, 52° 14' N) is about 22,500 ha, of which approximately one-third is mountainous, with a maximum elevation of 634 m. The rest of the island is low rolling hills and plateaus of typical tundra vegetation, approximately 200 m above sea level. The plateau is dotted with hummocks, small hills, small ponds and lakes. Sand and cobble beaches line some of the coast but most of the shoreline is precipitous cliffs. The study area was on the plateau and covered the southeastern one-fifth of the island.

The passerine avifauna on Agattu Island consists of Snow Buntings, Song Sparrows, Gray-crowned Rosy Finches (*Leucosticte tephrocotis*), Winter Wrens (*Troglodytes troglodytes*), and, most abundantly, Lapland Longspurs. Seabirds are diverse and abundant, including Pelagic and Red-faced cormorants (*Phalacrocorax pelagicus* and *P. urile*), Glaucous-winged Gulls (*Larus glaucescens*), Black-legged Kittiwakes (*Rissa tridactyla*), Common and Thick-billed murrelets (*Uria aalge* and *U. lomvia*), Pigeon Guillemots (*Cephus columba*), and Horned and Tufted puffins. Ancient Murrelets were rare in inshore waters, with flocks of 20-130 birds occasionally encountered offshore. Two colonies of storm-petrels were located on the island, but no breeding colonies of Ancient Murrelets were discovered.

METHODS

Pellets were collected from a 4,000-ha area of mounds and hummocks where the owls roosted. Pellets ranged in condition from fresh (warm, wet and slimy) to piles of weathered bones of unknown age. Similar pellets of arctic foxes (*Alopex lagopus*) and Parasitic Jaegers

(*Stercorarius parasiticus*) could be recognized by size, shape, and, in the case of disintegrating pellets, by the size of the bones. Bones were compared to specimens in the Museum of Vertebrate Zoology. Because of the absence of skulls in many pellets, specimens generally were identified from a combination of humeri, tarso-metatarsi, femora, clavicles, and pelvises as well as bill and skull fragments. The presence in a pellet of one or more identifiable bones of a bird was considered to represent one prey occurrence, bones from two individuals of the same species in a pellet to represent two occurrences, etc., even if major skeletal elements were missing. Weights were obtained from Sherrod et al. (1976) and from specimens in the Museum of Vertebrate Zoology.

RESULTS

Of 141 pellets collected, 90 had remains of at least one identifiable food item (Table 1). Percentages of the diet calculated on the basis of individual occurrence are highly correlated with proportions calculated by species occurrence in the pellets (Spearman rank $r = 0.93$, $P < 0.001$). Occurrence of individuals as prey is also correlated with calculated weight ($r = 0.58$, $P < 0.05$). Based on calculated weight, these 90 pellets revealed Ancient Murrelets to be the primary prey species (68.4%). While small birds (storm-petrels and fringillids) represented 41% of the individuals identified in the pellets, their total contribution to the owl diet based on weight was only 10.2% (6.1% for storm-petrels and 4.1% for all fringillids combined). Alcids (other than Ancient Murrelets) and ducks made up 19.9% by weight, and shorebirds the remaining 1.4%. The 51 pellets with unidentifiable bone fragments (often bits of ribs from large birds), or without any bones possibly were the result of flesh being stripped from large prey. Thus, the importance of large birds such as puffins, ducks, and cormorants (weighing between 340 and 760 g) may have been considerably underestimated. We found some evidence of nest predation: several pellets contained egg shell fragments and one contained the humeri of seven fringillid nestlings. Similar predation has been reported elsewhere in the Arctic (Custer 1973).

DISCUSSION

Our results are surprising for several reasons. Between 20 May and 2 August 1975, personnel of the U.S. Fish and Wildlife Service spent 240 days on Agattu conducting field work. Although over 90% of their time was spent on the coast, only once was a Snowy Owl seen there (G. Ellison, pers. comm.); all other sightings were inland on the southeastern plateau. Thus the high proportion of Ancient Murrelets and storm-petrels in the diet was unexpected and suggests that the owls foraged along the coast largely at night when these birds emerge and return to their burrows (Gabrielson and Lincoln 1959, Ainley et al. 1974, Sealy 1976). If owls frequently visited seabird colonies during the day, they would have been observed near the coast more often, and diurnal seabirds would have occurred more often in the pellets.

The importance of storm-petrels and murrelets in the owl diet was unexpected for a second reason: the populations of these and other ground-nesting species have declined abruptly on Agattu (Turner 1886, Clark 1910, J. L. Trapp, pers. comm.). Since the introduction of arctic foxes in the early twentieth century,

TABLE 1. Diet of the Snowy Owl on Agattu Island.^a

Prey species	Number of individuals	Number of pellets in which species occurred	Total live weight (grams)
Fork-tailed or Leach's storm-petrel (<i>Oceanodroma furcata</i> or <i>O. leucorhoa</i>)	29 (21.0%)	22 (21%)	45 (6.1%) ^b
Green-winged Teal (<i>Anas crecca</i>)	4 (3.0%)	4 (4%)	400 (7.4%)
Harlequin Duck (<i>Histrionicus histrionicus</i>)	2 (1.5%)	2 (2%)	650 (6.0%)
Rock Sandpiper (<i>Calidris ptilocnemis</i>)	2 (1.5%)	2 (2%)	80 (0.7%)
Unidentified scolopacid	2 (1.5%)	2 (2%)	80 (0.7%) ^d
Horned or Tufted puffin (<i>Fratercula corniculata</i> or <i>Lunda cirrhata</i>)	1 (1.0%)	1 (1%)	675 (3.1%) ^c
Cassin's Auklet (<i>Ptychoramphus aleuticus</i>)	2 (1.5%)	1 (1%)	150 (1.4%)
Auklet (<i>Aethia</i> spp.)	5 (3.5%)	5 (5%)	85 (2.0%) ^d
Ancient Murrelet (<i>Synthliboramphus antiquus</i>)	64 (46.0%)	48 (46%)	230 (68.4%)
Song Sparrow (<i>Melospiza melodia</i>)	2 (1.5%)	1 (1%)	45 (0.4%)
Lapland Longspur (<i>Calcarius lapponicus</i>)	14 (10.0%)	12 (11%)	30 (2.0%)
Snow Bunting (<i>Plectrophenax nivalis</i>)	2 (1.5%)	1 (1%)	35 (0.3%)
Unidentified fringillid	10 (7.0%)	4 (4%)	30 (1.4%) ^d

^a Based on the analysis of 90 pellets containing one or more identifiable fragments.

^b Weight for *O. leucorhoa*.

^c Weight of the two species averaged.

^d Weight of the smallest species of group known from Agattu Island.

similar reductions in numbers of ground-nesting birds have occurred throughout the Aleutians (Murie 1959). In addition to the two known colonies of storm-petrels, there apparently is a remnant population of Ancient Murrelets on Agattu, and Snowy Owls may seek them out as their preferred food.

SUMMARY

An analysis of 90 Snowy Owl pellets collected in 1975 in the Aleutian Chain, where no small mammals occur, revealed that Ancient Murrelets composed 68.4% of the diet (based on calculated weight of prey). Other alacids comprised 6.5%, and ducks 13.4%. Egg shell fragments in some pellets and the remains of nestling fringillids in another indicated nest predation. That many pellets contained nothing but feathers suggests that waterfowl, puffins, gulls, and other large seabirds may be more important in the owls' diet than indicated by skeletal remains in the pellets. No evidence was found that Snowy Owls bred on Agattu in the years 1974-1977.

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