FROM FIELD AND STUDY

Long-eared Owl (*Asio wilsonianus*) at its nest in San Diego County, California. Photograph by Ed Harrison and Frances Roberts.

Sub-nival Feeding of the Redpoll in Interior Alaska: A Possible Adaptation to the Northern Winter.—The Common Redpoll (*Acanthis flammea*) is one of the few species of bird that regularly over-winters in the cold, interior region of Alaska. There are but five other passerine birds that do so in the Fairbanks area—the Raven (*Corvus corax*), the Canada Jay (*Perisoreus canadensis*), the Black-capped Chickadee (*Parus atricapillus*), the Hudsonian Chickadee (*Parus hudsonicus*), and a second fringillid, the Pine Grosbeak (*Pinicola enucleator*). The Hoary Redpoll (*Acanthis hornemanni*) perhaps also over-winters here, as a few specimens have been taken from mixed flocks of the two species in the late winter and early spring, but this fact is difficult to establish from field observations, and all but three specimens out of a series of thirteen from the Fairbanks area seem to be referable to *flammea*. In addition to the above, wintering populations of the White-winged Cross-bill (*Loxia leucoptera*) may, as elsewhere in the North, occur at sporadic intervals, probably correlated with the fluctuation in the abundance of its specialized food, coniferous seeds.

Little is known about how these birds are capable of surviving under sub-arctic winter conditions, which present two major problems to living organisms: (1) an extremely low environmental temperature and (2) a marked scarcity of food. Certainly a complex of physiological, somatic, behavioral, and ecological factors is involved. The excellent series of papers by Scholander, Hock, Walters, Irving, and Johnson (Biol. Bull., 99, 1950:225-271) has opened a way to an understanding of the roles of physiological heat-regulation and body-insulation in the adaptation of arctic animals to cold. On the other hand, the winter problem of food-scarcity has not, to my knowledge, received detailed treatment in the literature, although it is quite generally recognized to exist.

With this latter problem in mind, the following observations on the Common Redpoll are offered to suggest the basis for a more extended view of the many possible ways in which birds come to face the far northern winter.

Near the Fairbanks Country Club, about seven miles outside Fairbanks, there is a grain field, well-sown to weeds, mostly *Chenapodium album*, to which the redpolls commonly resort for food. On the afternoon of December 2, 1950, as I was skiing past this field, a group of seven redpolls, fol-

lowed soon after by another group of twenty-five, flew by and alighted in the field. The sky was overcast; the temperature about zero degrees F. There had been a light snow the night before, with slight continuing flurries throughout most of that day, about three inches of fresh snow having fallen. In the days preceding this new snow there had been some strong winds that caused considerable drifting and crusting of the old snow, conditions unusual for the region. On this day no weeds were visible above the snow in the field, and hence I was puzzled to know how the birds could obtain their food. As I skiied out toward them, I saw that they were, in fact, feeding under the snow!

In many places the snow had drifted out from under the bent-over tops of the weeds, creating tunnels and openings below the surface, which allowed the birds access to seeds that had fallen on the ground previous to the snows. In some instances, also, where the taller plants had formed a sufficient canopy to support the snow-cover, seeds still adhering to the shorter plants were available for foraging in the air-spaces thus created under the snow. At several places the entrances to these sub-nival chambers appeared to have been dug out by the birds themselves, as there were many scratch marks in the snow, although this appearance might have been produced by the frequent exit and entrance of the redpolls into and out of these holes.

Several redpolls were seen to fly out of these burrows as I approached; several were seen actually picking up seeds under the snow before they were flushed out; and two birds refused to leave their shelters until I had stopped by their burrows not more than two feet from them. These observations suggest a possible adaptation to the problem of winter food-scarcity.

On frequent trips to this field during the remainder of the winter no similar activity was observed, and in fact redpolls were not again recorded for the area until March 29, when a flock of fifteen was seen in some alders bordering the field.

Other personal observations indicate that throughout the year in interior Alaska, the redpolls feed primarily upon the seeds of alders (*Alnus*) and birches (*Betula*) in keeping with their arboreal predispositions, but they also feed to a very considerable extent—especially in areas of human occupance—upon the seeds of lamb's quarters, *Chenadodium album,* and to a lesser extent upon some other cruciferous and composite weed seeds. The seeds of these food plants are eaten green (and in the flowering stage) in the spring and summer and in the dried state in the autumn and throughout the winter.

When the winter snows are at their maximum depth, however, most of the *Chenapodium* weeds are completely covered. In addition, the fruit bearing branches of the alders and birches are often heavily laden with snow. Then one must suppose these birds are hard put to find enough to eat. The importance of the snow-cover as a factor limiting the availability of food to birds during the northern winter in Arctic Lapland has been discussed recently by D. W. Snow (Ibis, 94, 1952:133-143), and among the adaptations to the arctic winter listed by him is the "ability to find food under the snow" (*op. cit.,* p. 140). My observation suggests that the Common Redpoll, at least under some circumstances, is so adapted in interior Alaska—or perhaps more correctly put, it has a sufficiently adventuresome disposition to utilize sub-nival situations, despite the fact that it is primarily an arboreal species. Such ecological and behavioral plasticity would seem to be of definite survival value in the far northern winter environment.—Tom J. Cade, *Alaska Cooperative Wildlife Research Unit, College, Alaska, May 15, 1952.*

Bird Notes from Western Montana.—The following records appear to add significant information to that previously published on the birds of western Montana. Items reported are supplementary to Saunders' "A Distributional List of the Birds of Montana" (Pac. Coast Avif. No. 14, 1921) and to subsequent distribution notes appearing in the Auk, Condor and Murrelet.

Aechmophorus occidentalis. Western Grebe. This grebe previously has been reported nesting in Lincoln County and in Glacier Park. It is a common breeder farther south at Ninepipe Migratory Bird Refuge in Lake County, approximately 50 miles north of Missoula. On August 5, 1940, I saw an adult with nine rather large young and on June 11, 1941, two adults were noted, each with a downy chick on its back.

Phalacrocorax auritus. Double-crested Cormorant. Saunders lists this as "a rare migrant" whereas Weydemeyer and Marsh (Condor, 38, 1936:185-198) found this species nesting at Lake Bowdoin in Phillips County in 1932 and 1935. For a number of years a small breeding colony has occurred regularly near Hilger Landing on the upper Missouri River in Lewis and Clark County about 10 miles