Favourable Lake and Attawapiskat Lake. Dr. Prince indicated that at Favourable Lake they had a canoe and did portage it through the bush for many kilometres in order to access remote lakes. When setting and hauling nets in lakes near the mine they tied two oil drums under a couple of poles strapped across the struts of the canoe. These "outriggers" prevented overturning. But they were not portaged to other lakes where everyone took their chances, including the nonswimmer Hope. Dr. Prince also indicated that the raft used on Rathouse Bay was the property of the local people who were very helpful at all times.

The librarians at the ROM provided access to Hope's journals, and Charlotte Goodwin made copies for me. The figure was prepared with the assistance of Brian Boyle in the ROM Photography Department.

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Red Crossbills Feeding at Mineral Sources

by
Ron Tozer

Introduction

The habit of various cardueline finches, including the Red Crossbill (*Loxia curvirostra*), to feed on sand and salt spread on road surfaces in winter has been widely observed and reported (e.g. Meade 1942; Lawrence 1949, 1982; Bent 1968; Terres 1982). Very small stones (in the "sand") are ingested as a source of grit required for digesting vegetable material in the gizzards of these granivorous birds (Lawrence 1949, Ehrlich et al. 1988). However, the apparent attraction to salt is not as readily explained, even though it has been known for a long time (e.g. Fisher 1888). Red Crossbills have been observed feeding at a wide variety of seemingly unusual mineral sources, including: coal ashes on which salt had been thrown, soapy dishwater, and snow discoloured by dog urine (Lawrence 1949); material from cattle salt blocks (Marshall 1940); salt spilled around ice cream freezers (Dawson et al. 1965); and "the material left in salt pork barrels" thrown outside lumber camps (Bent 1968)! It has been suggested that finches may be attempting "to satisfy a requirement for some mineral that they do not obtain in sufficient quantity in their food" (Dawson et al. 1965) when they undertake such behaviour.

Observations of various feeding activities by Red Crossbills recorded in Algonquin Provincial Park increased my interest in the subject, and so I undertook a search of the literature to learn more about it. This article summarizes what I found, and documents some of the sightings from the Park.

Sodium

Sodium sources have been reported as attractions for various birds, mammals, and even butterflies (Fraser 1985, Otis 1994). The birds may be attracted due to mineral dietary deficiencies, as previously noted. However, while the results of experiments on sodium chloride metabolism in captive Red Crossbills did not "exclude this possibility", it was concluded that "the ingestion of salt beyond that present in the food is unnecessary for maintenance of sodium balance and apparent good health by crossbills" even after they were fed a vegetable diet "relatively high in potassium and low in sodium, for many months" (Dawson et al. 1965). While we may not fully understand why Red Crossbills are attracted to sodium sources, there are many examples of its occurrence.

The most commonly observed situation which attracts Red Crossbills, and other finches, to sodium involves birds on roads in winter. De-icing salt (sodium chloride), usually mixed with sand, is commonly spread on roads and can be available to finches in massive quantities. For example, Fraser (1985) estimated that sodium chloride was spread on the Trans-Canada Highway near Wawa, Ontario at a "rate of 30-40 tonnes/km" each winter! Red Crossbills can be attracted to this road salt in large numbers; for instance, I counted over 300 birds along a 20 km stretch of Highway 60 between the West Gate and Found Lake in Algonquin Park on 28 February 1985. Also, due to the heavy winter application of sodium chloride, roadside pools of stagnant water can develop a sodium content of 100 to 600 parts per million (ppm) during the rest of the year (Fraser 1985). Many of these pools and puddles "are recharged with brine at each rainfall and show little tendency for Na (sodium) levels to decline during the summer" (Fraser 1985). Several finch species have been recorded "pecking in areas of damp soil near the salty water" of these puddles (Fraser 1985). Pools of this type in Algonquin Park are heavily used by moose (*Alces alces*), especially during spring and early summer, and also attract Red Crossbills. For example, on 27 September 1994, I observed fifteen individuals appearing to ingest mud at a heavily trampled "moose puddle" along Highway 60 near Kearney Lake, Sproule Township. On 11 November 1994, at another "moose puddle" beside the highway near Park (Long) Lake, Finlayson Township, I counted about 40 Red Crossbills feeding on the mud. Sixteen individuals were tightly clustered on a small stump (which appeared to have been previously submerged in the muddy water), crawling over it and probing in its crevices like a group of miniature parrots!

Natural mineral springs ("licks") can contain "50-200 ppm Na plus high levels of some other minerals" (Fraser 1985). These licks may have "14 to 120 times more sodium" than other nearby non-lick areas (Fraser 1980), and were recorded as major attractions for birds such as Purple Finch (*Carpodacus purpureus*) and Pine Siskin (*Carduelis pinus*) in a study at Sibley (now Sleeping Giant) Provincial Park (Fraser 1985). Speirs (1985) reported Red Crossbills "hopping about our feet at a salt lick at Montreal Falls by Lake Superior

one summer".

Aquatic plants growing in shallow lakes and ponds are another rich source of sodium, having up to 500 times more sodium than leaves of woody plants (Fraser et al. 1980). Moose consume large quantities of aquatic plants during summer, apparently because of a "specific hunger for Na" (Fraser 1980). Actively growing aquatic plants are not a food source for finches, but these plants may become an attraction after they die. Red Crossbills are frequently observed feeding on exposed areas of "mud" (consisting of rotting aquatic plants and their roots) at lakes and ponds which attract moose in Algonquin Park (e.g. six birds feeding on "mud" at Hobo Lake, Finlayson Township, on 29 July 1994, reported by Doug Tozer). I suspect these crossbills are attracted to the sodium released from the rotting aquatic vegetation at these sites.

Calcium

Seeds of Scots Pine (*Pinus sylvestris*) and Norway Spruce (*Picea abies*), which were eaten by crossbills in Finland, consisted of about 95 per cent organic matter and 5 per cent inorganic matter (Pulliainen 1972). Nearly 4 per cent of the latter was nitrogen, while potassium, phosphorus, magnesium and calcium were contained in the remaining 1 per cent. Such findings may suggest a calcium (or other mineral) deficiency in the diet of crossbills. A wide variety of crossbill feeding behaviours have been reported which may be manifestations of a hypothetical need for calcium.

Meade (1942) reported large numbers of White-winged Crossbills (*L. leucoptera*) and small numbers of Red Crossbills that were ingesting a mixture of calcium chloride and sand spread on a road in New York state during March. In this case it was theorized that the attraction might have been the fine gravel, a craving for salt, and/or moisture gathered by the calcium chloride.

Ingestion of supplementary calcium in the breeding season has been documented for several bird species in northern areas (Ficken 1989). For example, nestling Lapland Longspurs (*Calcarius lapponicus*) in Alaska "ate bones and egg shell fragments" (Seastedt and MacLean 1971). Females might be attracted to sources of this mineral since "calcium needs for egg laying may be particularly high" (Ficken 1989). Nethersole-Thompson (1975) observed female Scottish Crossbills (*L. scotica*) nibbling "a capercaillie's (*Tetrao urogallus*) skeleton" and carrying "a mountain hare's bone to the top of a pine", when breeding during March, and concluded that "these birds evidently needed calcium". Similarly, Baily (1953) reported that Red Crossbills had secured "scrapings from the bleached bones of deer" during the breeding cycle.

Wood ash is rich in calcium, and its consumption has been reported for various birds, both during the breeding period and at other seasons. Species reported eating ash include: Red Crossbills (Bent 1968); Parrot Crossbills (*L. pytyopsittacus*) and Common Redpolls (*Carduelis flammea*) (Pulliainen et al. 1978); Boreal Chickadees (*Parus hudsonicus*) (Ficken 1989); and even hummingbirds (*Trochilidae*) (des Lauriers 1994)! In the case of Boreal Chickadees, it was

shown that the ash where the birds repeatedly fed was much higher in calcium (2580 ppm) than nearby ash (600 ppm) where they never fed, suggesting an ability to detect richer concentrations (Ficken 1989). There have been numerous observations of Red Crossbills eating wood ash at campfire sites in Algonquin Park (e.g. three males and two females at Opalescent Lake, Stratton Township, 9 September 1963, reported by Russ Rutter).

Parrot Crossbills in Finland were reported eating the outer layer of decaying old pine logs, in the walls of buildings and lying on the ground. "Nutrient analyses showed high ash and calcium contents in the wood samples" (Pulliainen et al. 1978). I did not find reports of this behaviour by Red Crossbills, but it may well occur.

Red Crossbills in Crater Lake National Park, Oregon, were observed to feed on a powdery crust ("probably made up of calcium salts dissolved from the rock material") that formed on cliff faces of pumice (Aldrich 1939). The crossbills clung to the cliff faces, placed their heads sideways against the crust (which was loose and only one-sixteenth of an inch thick), and licked it off with their tongues while holding their bills open widely (Aldrich 1939). This same manner of feeding has been recorded at various man-made mineral sources, as noted below.

Dr. Alan Knox (*British Birds* 71: 541) noted that "crossbills are well known for their habits of picking

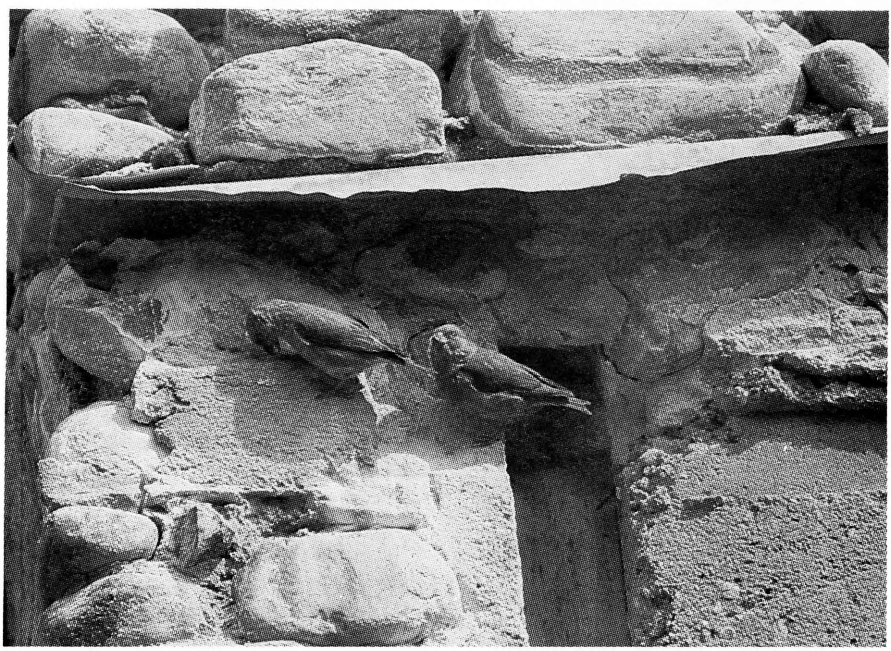

Figure 1: Red Crossbills on chimney at Lake Travers, Algonquin Park. Photo by *Michael Runtz.*

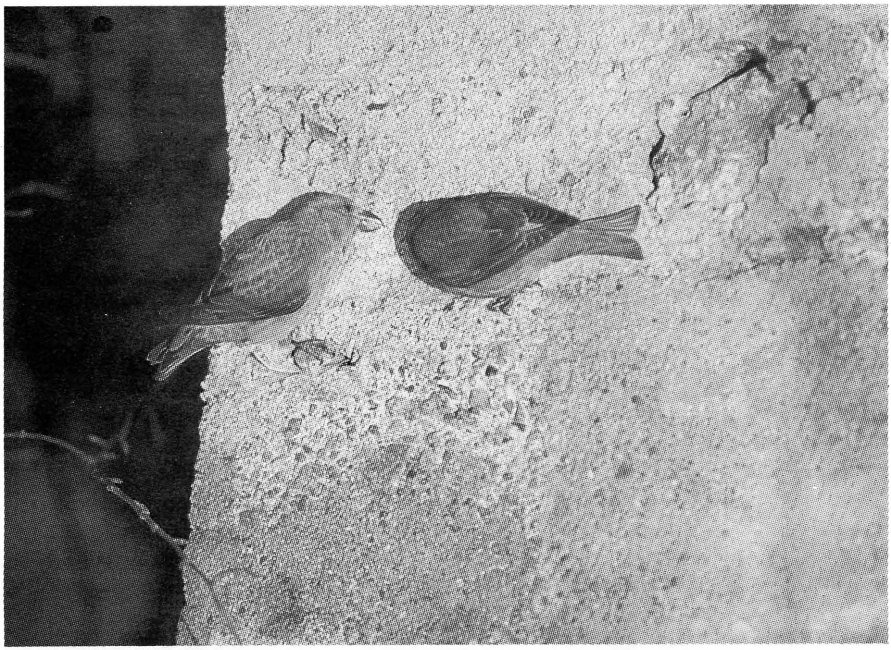

Figure 2: Red Crossbills on chimney, feeding where a patch of material has been removed. Photo by *Michael Runtz.*

around chimney-stacks and eating putty", but that while "this behaviour is very common" it is "surprisingly poorly documented". There are various reports (especially in the European literature) involving crossbills feeding on mortar and putty, apparently attracted to their calcium carbonate content. For instance, Red Crossbills in Germany appeared to eat soil from below a stone wall, but analysis showed they were consuming flakes of calcium carbonate from the wall (Sainsbury 1978). Scottish Crossbills were seen to eat putty from windows (Watson 1955, Nethersole-Thompson 1975). About 150 Red Crossbills were reported eating mortar "on the wall of a very dilapidated two storey house" in Yugoslavia (Susic 1981). Nuttall (1907) wrote in 1891 that Red Crossbills in North America were "observed even to pick off the clay from the logs of the house". Baynes (1915) even claimed that Red Crossbills would come to the hand for pounded dried mortar!

The mortar and cement of chimneys hold a special attraction for crossbills. Scottish Crossbills have been reported feeding on the mortar of chimney-stacks (Nethersole-Thompson 1975, Bartlett 1976). Parrot Crossbills and Common Redpolls were often seen eating mortar from chimneys during a study in northeastern Lapland (Pulliainen et al. 1978). William Brewster (1938) described numbers of Red Crossbills coming early on October mornings to

cling to the sides, and cluster about the top, of a brick chimney in the Lake Umbagog region of Maine. Lawrence (1949), reporting on Red Crossbills at Pimisi Bay, Ontario, noted that they were often "seen clinging to our cobble stone chimney, pecking and eating the mortar".

Red Crossbills consuming mortar and cement have been observed on numerous occasions in Algonquin Park. The most frequently used site (Figure 1) is the Turtle Club on Lake Travers, White Township, where five stone chimneys are all that remains of a log building erected in 1933 (Runtz 1993). Red Crossbills appear to have eaten away patches of material on these chimneys to a depth of more than 2 cm in some places (Figure 2). Typical of sightings there were eight birds on 19 April 1988, and 30 birds on 14 April 1989, reported by Michael Runtz. Similarly, I observed nine Red Crossbills eating mortar from a wall of the "stonehouse" at Achray on Grand Lake, Stratton Township, on 3 May 1983. Red Crossbills allow a very close approach when eating mortar or cement, indicating their strong motivation to feed on this material.

Conclusion

A wide variety of unusual Red Crossbill feeding activities have been documented in the literature, and many of these have been observed in Algonquin Park. These behaviours appear to involve an attraction to minerals such as sodium and calcium, perhaps related to dietary deficiencies. In contrast, I did not find reports of White-winged Crossbills undertaking such activities, apart from feeding at salted road sand (Benkman 1992). Could these apparent behavioural differences reflect dietary differences between these two crossbill species? That and other questions will have to await further study.

I would be interested in hearing about any unusual crossbill feeding activities which readers may have observed or noted in the literature. I hope this article will serve to encourage birders to learn more about unusual aspects of behaviour among bird species that may otherwise seem quite "familiar" to us. It can be a rewarding experience.

Acknowledgements

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Literature cited

Aldrich, E.C. 1939. Notes on the salt-feeding habits of the Red Crossbill. Condor 41: 172-173.

Baily, A.L. 1953. The Red Crossbills in Colorado. Part 2. 1952 observations of the Red Crossbills. Denver Museum of Natural History Pictorial No. 9: 33-63.

Bartlett, E. 1976. Crossbills feeding at chimney-stacks. British Birds 69: 312-313.

Baynes, E.H. 1915. Wild Bird Guests. E.P. Dutton, New York.

Benkman, C.W. 1992. White-winged Crossbill. *In* A. Poole, P. Stettenheim, and F. Gill (Editors). The Birds of North America. No. 27. Academy of Natural Sciences, Philadelphia; and American Ornithologists' Union, Washington, D.C.

Bent, A.C. (and collaborators). 1968. Life Histories of North American Cardinals, Grosbeaks, Buntings, Towhees, Finches, Sparrows and Allies. Part 1. United States National Museum Bulletin 237. Washington, D.C.

Brewster, W. 1938. The birds of the Lake Umbagog region of Maine, compiled from the diaries and journals of William Brewster by Ludlow Griscom. Bulletin of the Museum of Comparative Zoology 66(4): 525-620.

Dawson, W.R., V.H. Shoemaker, H.B. Tordoff and A. Borut. 1965. Observations on metabolism of sodium chloride in the Red Crossbill. Auk 82: 606-623.

des Lauriers, J.R. 1994. Hummingbirds eating ashes. Auk 111: 755-756.

Ehrlich, P.R., D.S. Dobkin and D. Wheye. 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Simon & Schuster, New York.

Ficken, M.S. 1989. Boreal Chickadees eat ash high in calcium. Wilson Bulletin 101: 349-351.

Fisher, W.H. 1888. The American Crossbill, as to some of its habits and its fondness for salt. Journal of the Cincinnati Society of Natural History 10: 203-204.

Fraser, D. 1980. Moose and salt: a review of recent research in Ontario. Proceedings of the North American Moose Conference and Workshop 16: 51-68.

Fraser, D. 1985. Mammals, birds, and butterflies at sodium sources in northern Ontario forests. Canadian Field-Naturalist 99: 365-367.

Fraser, D., D. Arthur, J.K. Morton and B.K. Thompson. 1980. Aquatic feeding by moose *Alces alces* in a Canadian lake. Holarctic Ecology 3: 218-223.

Lawrence, L. de K. 1949. The Red Crossbill at Pimisi Bay, Ontario. Canadian Field-Naturalist 63: 147-160.

Lawrence, L. de K. 1982. A dash of salt. Nature Canada 11(4): 28-32.

Marshall, W.H. 1940. More notes on salt-feeding of Red Crossbills. Condor 42: 218-219.

Meade, G.M. 1942. Calcium chloride - a death lure for crossbills. Auk 59: 439-440.

Nethersole-Thompson, D. 1975. Pine Crossbills. T. and A.D. Poyser, Berkhamsted, England.

Nuttall, T. 1907. A Popular Handbook of the Birds of Canada and the United States. Musson, Toronto.

Otis, G.W. 1994. Butterflies of Algonquin Provincial Park. The Friends of Algonquin Park, Whitney, Ontario.

Pulliainen, E. 1972. Summer nutrition of crossbills (*Loxia pytyopsittacus, L. curvirostra* and *L. leucoptera*) in northeastern Lapland in 1971. Annalen Zoologici Fennici 9: 28-31.

Pulliainen, E., T. Kallio and A.-M. Hallaksela. 1978. Eating of wood by Parrot Crossbills, *Loxia pytyopsittacus*, and Redpolls, *Carduelis flammea*. Aquilo Ser. Zool. 18: 23-27.

Runtz, M.W.P. 1993. The Explorer's Guide to Algonquin Park. Stoddart, Toronto.

Sainsbury, M. 1978. Crossbills "feeding" on soil. British Birds 71: 540-541.

Seastedt, T.R. and S.F. MacLean, Jr. 1971. Calcium supplements in the diet of nestling Lapland Longspurs *Calcarius lapponicus* near Barrow, Alaska. Ibis 119: 531-533.

Speirs, J.M. 1985. Birds of Ontario. Volume 2. Natural Heritage, Toronto.

Susic, G. 1981. Red Crossbill (*Loxia curvirostra* L. 1758) feeding on mortar in a wall. Larus 33-35: 197-200.

Terres, J.K. 1982. The Audubon Society Encyclopedia of North American Birds. Alfred A. Knopf, New York.

Watson, A. 1955. Crossbills breeding in Aberdeenshire. Scottish Naturalist 67: 121-122.

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