Evidence of Flock Fidelity in Common Redpolls and Pine Siskins

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ABSTRACT

To seek evidence for winter flock fidelity in Common Redpolls (Carduelis flammea) and Pine Siskins (C. pinus), I analyzed re-encounter data from the Bird Banding Laboratory for these two species. I tabulated the number of pairs of birds banded at the same station during the winter (October through April) which were re-encountered at some other station later in the same winter. The results indicated that 35% of Common Redpolls and 43% of Pine Siskins could be paired with at least one other individual consistent with flock fidelity. Courtship begins in the latter part of winter for both species and mate fidelity could explain some of the examples of fidelity.

INTRODUCTION

The Common Redpoll (*Carduelis flammea*) and Pine Siskin (*C. pinus*) are two members of a group of fringillids often referred to as northern finches (Bock and Lepthien 1976). These finches are well known for their irruptive behavior, often staging massive movements well to the south of their northern breeding grounds during winters (Larson and Bock 1986). These irruptions are thought to be triggered by low seed production of shrubs and trees at high latitudes, forcing the finches to move southward to find adequate food for the winter (Koenig 2001, Koenig and Knops 2001). Both species occur in flocks that may exceed 50 birds (Dawson 1997, Knox and Lowther 2000).

The patterns and extent of redpoll and siskin irruptions are well documented by banding data, Christmas Bird Count data, records of state and local ornithological societies and Project FeederWatch (Bock and Lepthien 1976, Kennard

1976, Hochachka et al. 1999, Wilson 1999). Despite the understanding of population movements, little information is available on the movements of individual birds. In particular, no comprehensive information is available on flock fidelity in these two species. In this contribution, I analyze band re-encounter data for Common Redpoll and Pine Siskin to determine the prevalence of flock fidelity. Although recaptures of several birds at a banding station may suggest flock fidelity, those birds may be induced to linger by the provision of food rather than by any social bond. More compelling data for flock fidelity are the re-encounter of birds at one banding station within a winter that were banded during the same winter at a different banding station. Birds banded on or near the same date and re-encountered on or near the same date provide the strongest evidence for flock fidelity, particularly when the re-encounter station is located some distance from the banding station.

MATERIALS AND METHODS

Re-encounter data for Common Redpolls and Pine Siskins were obtained from the Bird Banding Laboratory of the United States Geological Survey for birds banded through 2003. This dataset includes 717 re-encounters for Common Redpolls and 2,276 re-encounters for Pine Siskins. However, I restricted the analysis to birds banded and re-encountered during the same winter. For purposes of this paper, I consider winter to be the period between October and April of the following year. Irruptive behavior begins for both species in October and nesting does not commence until May for Common Redpoll (Knox and Lowther 2000) and the middle of April for Pine Siskin (Dawson 1997). The restricted dataset comprised 291 records for Common Redpoll and 833 records for Pine Siskin.

For each record, I calculated the distance between the banding station and the re-encounter station using a Great Distance Calculator (http://www.gb3pi.org.uk/great.html). I searched through the dataset to find all possible pairs of individuals,

banded at the same station and re-encountered at the same station, that could have traveled together to the re-encounter station. For instance, a bird banded on 21 Nov and re-encountered at a second station on 2 Apr could have been in the same flock as an individual banded on 15 Dec at the first station and re-encountered on 28 Mar at the re-encounter station.

For some flocks of birds, more than two individuals banded at the same site were re-encountered together later. For the analysis, all possible pair-wise combinations of such birds were made. As an example, four birds banded and re-encountered together can be combined into six different pairs. Thus, the number of pairs reported can be higher than expected if a bird were paired only a single time.

For any pair of birds, I classified the interval between the times each bird was banded (0-1 week, 1-2 weeks, 2-4 weeks) as well as the interval between the dates each bird was re-encountered at the second station.

To distinguish between flock fidelity and mate fidelity, I wished to examine the gender relationships of each pair of re-encountered birds. Unfortunately, Pine Siskins cannot be sexed reliably based on plumage alone (Dawson 1997) although a combination of plumage, age and morphometrics allow about a third of males to be sexed (Dawson 1997, Pyle 1997, Yunick 2005). Nevertheless, most banders reported the sex of their Pine Siskins as unknown. Although Common Redpolls can be aged and sexed by plumage (Pyle 1997), most banded birds were reported as unknown sex.

RESULTS

For Common Redpolls, 104 of the 291 birds used in the analysis could be paired with at least one other bird, banded and re-encountered at the same stations, and hence supportive of flock fidelity. Table 1 provides a summary of the data. Most of the pairs of Common Redpolls were re-encountered at a station within 50 km of the banding station. For 36 pairs of redpolls, each member of the pair was banded within a week of

each other and re-encountered at another station. Fifteen of those pairs were re-encountered within a week of each other. Because some birds could be paired with more than one flock member, the number of pairs in Table 1 (56) is greater than the 52 pairs expected if each of the 104 individuals analyzed was paired only once.

Table 1. Frequency of Common Redpolls pair-wise re-encounters consistent with winter flock fidelity. Each pair is classified by the interval separating the banding of each bird at the same banding station and by the interval separating the re-encounter of each bird at a different banding station. Each pair is further classified by the distance of the re-encounter station from the banding station. Data are restricted to birds banded and re-encountered between October and April of the following year. The data are based on re-encounters of 104 different birds.

Temporal Comparison of Birds		Distance Between Banding and Re-encounter Station		
Weeks Between Banding	Weeks Between Re-encountering	8-50 km	51-100 km	>100 km
0-1	0-1	14	1	0
0-1	1-2	16	1	0
0-1	2-4	4	0	0
1-2	0-1	8	0	0
1-2	1-2	1	0	0
1-2	2-4	2	0	0
2-4	0-1	4	0	0
2-4	1-2	1	0	1
2-4	2-4	3	0	0

The probability of two birds banded at one station appearing independently at a second station declines with distance. Two pairs were re-encountered more than 50 km from the original site. Both individuals of one pair were banded on 20 Feb and re-encountered at a site 57 km away on 2 Apr and 8 Apr, respectively. The sex of neither bird was identified. A second pair was re-encountered at a station 299 km away. One bird was banded on 2 Mar and re-encountered on 19 Apr and the second was banded on 29 Mar and re-encountered on 12 Apr. The gender of neither was reported.

The sex of 19 of the 104 redpolls analyzed was reported: seven females and 12 males. Ten male-female pairs, 13 male-male pairs and two female pairs could be formed. Note that the 25 pairs from only 19 birds results from some birds being used as a partner in more than one pair. A frequency of 0.63 males and 0.37 males in this small subset of the data should yield the following proportions: 0.13 female-female pairs, 0.25 male-male pairs and 0.46 male-female pairs based on conditional probability. This proportion based on random assortment does not differ from the observed proportions ($\chi^2 = 3.66$, $P = 0.20$).

For Pine Siskins, 362 of the 833 birds in the dataset could be paired with at least one other bird consistent with flock fidelity (both banded at the same station and then both re-encountered at a second banding station after the last banding date). Table 2 provides a summary of the data. The strongest data come from the first line of data in the table, where 275 pairs were banded within a week of each other at the same station and re-encountered at a distant station within a week of each other. The strongest data are the 22 pairs re-encountered at a distance in excess of 100 km from the banding site. These birds included four individuals (combined into six pairs) that were banded 18-23 Feb were re-encountered at a station 144 km away on 25-26 Feb. Five individuals (combined into 10 pairs) banded on 21-22 Dec were re-encountered 188 km away on 17-18 Apr. A pair banded on 4 Apr and re-encountered 482 km away on 18 Apr and 27 Apr, respectively, provides another example. This last example may have been a mated pair but gender was not reported for either bird.
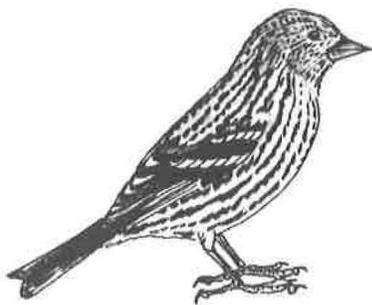
Pine Siskin
by George West

Table 2. Frequence of Pine Siskins pair-wise re-encounters consistent with winter flock fidelity. Each pair is classified by the interval separating the banding of each bird at the same banding station and by the interval separating the re-encounter of each bird at a different banding station. Each pair is further classified by the distance of the re-encounter station from the banding station. Data are restricted to birds banded and re-encountered between October and April of the following year. The data are based on the re-encounteres of 362 birds.

Temporal Comparison of Birds		Distance Between Banding and Re-encounter Station		
Weeks Between Banding	Weeks Between Re-encountering	8-50 km	51-100 km	>100 km
0-1	0-1	241	12	22
0-1	1-2	80	10	7
0-1	2-4	68	2	0
1-2	0-1	59	11	5
1-2	1-2	36	4	3
1-2	2-4	63	2	0
2-4	0-1	24	16	6
2-4	1-2	33	3	1
2-4	2-4	145	4	0

DISCUSSION

This analysis provides the first comprehensive search for winter flock fidelity in Common Redpolls and Pine Siskins. Although winter movements of these irruptive species are well known, the integrity of winter flocks is poorly known. Analysis of winter banding/re-encounter records provides many pairs of both redpolls and siskins whose winter movements are consistent with flock fidelity (Tables 1 and 2).

Interpretation of the data is constrained by the limitations of banding and re-encounter data. The distribution of banding stations is not uniform across the range of these two species. Furthermore, temporal changes in banding activity within and between banding stations add further complexity. It is, therefore, difficult to establish a null hypothesis of the number of expected pairs of co-migrating birds that would occur randomly. Thus, quantitative inferences must be drawn with caution.

Nonetheless, the present analysis presents compelling evidence for flock fidelity, at least among some individuals. For Common Redpolls, 35% of the 291 birds analyzed show banding and re-encounter dates consistent with flock fidelity with at least one other bird. For Pine Siskin, 43% of the birds could be paired with at least one other bird in support of flock fidelity.

The data from Tables 1 and 2 collectively present a strong case for flock fidelity. The most compelling data come from individuals banded around the same date and re-encountered around the same date at a distant site.

Movement of mating pairs could conceivably offer competing explanations for the results. Common Redpolls begin courtship behavior in early April in captive populations in New York (Dilger 1960). Courtship behavior in Pine Siskins occurs as early as March (Messineo 1985). However, I believe that mate fidelity is much less important in explaining these data. First, many of the banding and re-encounter records occurred between November and February before any courtship or pair-bonding would have occurred. Second, many of the pairs generated in Tables 1 and 2 came from three or more birds that were banded and re-encountered at the same stations. Third, capture and re-encounter of both individuals in a mated pair would seem to require an extraordinary banding effort if no flock fidelity were occurring. It is much more likely to recapture any two individuals from a flock than two particular individuals (the mated pair). After all, over a third of all the individuals of both species had banding/re-encounter dates consistent with fidelity to another bird. Finally, the limited data for Common Redpolls in which the sex of both members of a pair of re-encountered birds was known indicates that same-sex pairs are equally as common as mixed pairs.

In conclusion, this analysis indicates that flock fidelity does occur in both Common Redpoll and Pine Siskins. The relatively large percentage of birds whose banding/re-encounter dates are consistent with flock fidelity suggests that this social phenomenon is relatively strong. Given the temporal and spatial variation in banding effort, I am reluctant to attempt any quantitative estimate of flock fidelity in either species or to compare the relative strength of flock fidelity between the two species.

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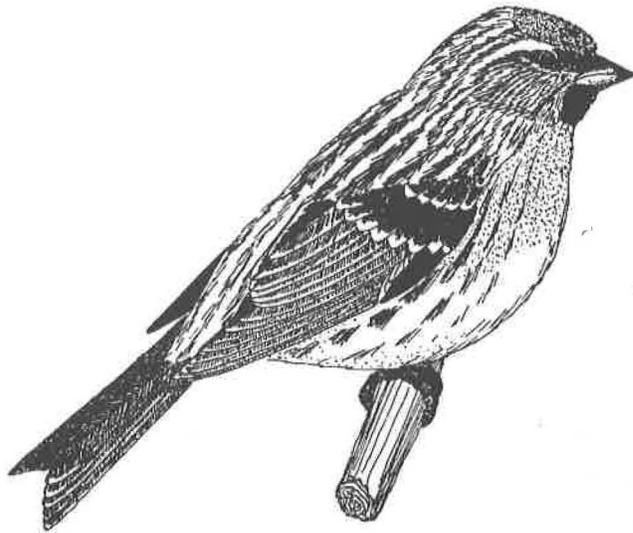
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