

## DISTRIBUTION AND MIGRATION OF THE BLACK ROSY FINCH

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Since 1951, the alpine habitat of the Black Rosy Finch (*Leucosticte tephrocotis atrata*) has been visited in many mountain ranges for the purpose of determining the breeding range of this species. The distribution of this species has long been uncertain. Available information is scattered and some of it remains unpublished in the form of museum specimens. This report adds new findings and summarizes existing data on distribution.

Part of the work was conducted with sponsorship of the Jackson Hole Biological Station. Support from the New York Zoological Society and from the Frank M. Chapman Memorial Fund made much of this effort possible. Jean B. French aided in all phases of the investigation. William H. Behle gave freely of his time and advice and was extremely helpful and cooperative at all times. Specimens collected during this study have been added to the collection of the University of Utah Museum of Vertebrate Zoology (UU). I am indebted also to the following persons who furnished information or specimens from collections which were used in connection with this report: Lang Bailey, formerly with the Colorado Natural History Museum; R. M. de Schauensee, Philadelphia Academy of Natural Sciences; Herbert Friedmann, U. S. National Museum; H. K. Gloyd, Chicago Academy of Sciences; C. M. Greenhalgh, Utah State Fish and Game Department; J. C. Greenway, Museum of Comparative Zoology; L. M. Huey, San Diego Natural History Museum; J. B. Hurley, Yakima, Washington; A. H. Miller, Museum of Vertebrate Zoology (MVZ); R. C. Murphy, American Museum of Natural History; R. T. Orr, California Academy of Sciences; K. C. Parkes, Carnegie Museum; H. G. Rodeck, University of Colorado Museum; C. H. Rogers, Princeton Museum of Zoology; C. G. Sibley, Cornell University Laboratory of Ornithology; L. L. Snyder, Royal Ontario Museum of Zoology; K. E. Stager, Los Angeles County Museum; J. Van Tyne, University of Michigan Museum of Zoology; and P. L. Wright, Montana State University.

*Specific status of the rosy finch.*—The Black Rosy Finch, as suggested by Mewaldt (1950:239), was found to intergrade with the Gray-crowned Rosy Finch (*L. t. tephrocotis*) in the Bitterroot Mountains of the Montana-Idaho border. In 1953, specimens were collected on St. Joseph Peak, St. Mary Peak, and Trapper Peak. These include the northernmost and southernmost high peaks of the range, separated by a distance of nearly 50 miles. Twenty-one specimens were collected in August, of which seven were adults. The major difference between the two supposed species is in the color of the back and the entire ventral surface including the neck, throat, and sides of the head. These regions are sooty black in the Black Rosy Finch and cinnamon brown in the Gray-crowned Rosy Finch. Adult specimens from the Bitterroot Mountains vary from the nearly typical Black Rosy Finch condition to the nearly typical Gray-crowned Rosy Finch condition. This range of variation indicates that the "hybrids" reproduce and that body color is due to multiple factors. This would account for the gradation from one extreme to the other found in the Bitterroot population. A similar situation was found to exist in the Seven Devils Mountains of western Idaho. In July of 1957, 16 specimens were collected near He-Devil Mountain at approximately 8000 feet elevation. These exhibit the same range in body color as do the birds from the Bitterroot Mountains.

Figure 1 represents the range in coloration of the birds from the Seven Devils Mountains and the Bitterroot Mountains based on a score from one to 12. Each specimen was scored on the basis of the colors of three regions: the breast, the back, and the

sides of the head and neck. Each of the three areas was designated between zero and four, where zero represents the typical color for *atrata* and four the typical color for *tephrocotis*. If the color was exactly intermediate between the types, it was given a score of two. The scores for the three areas were summed to give a total score for the specimen. Therefore, a total score of zero would be given a specimen of typical *atrata* color-

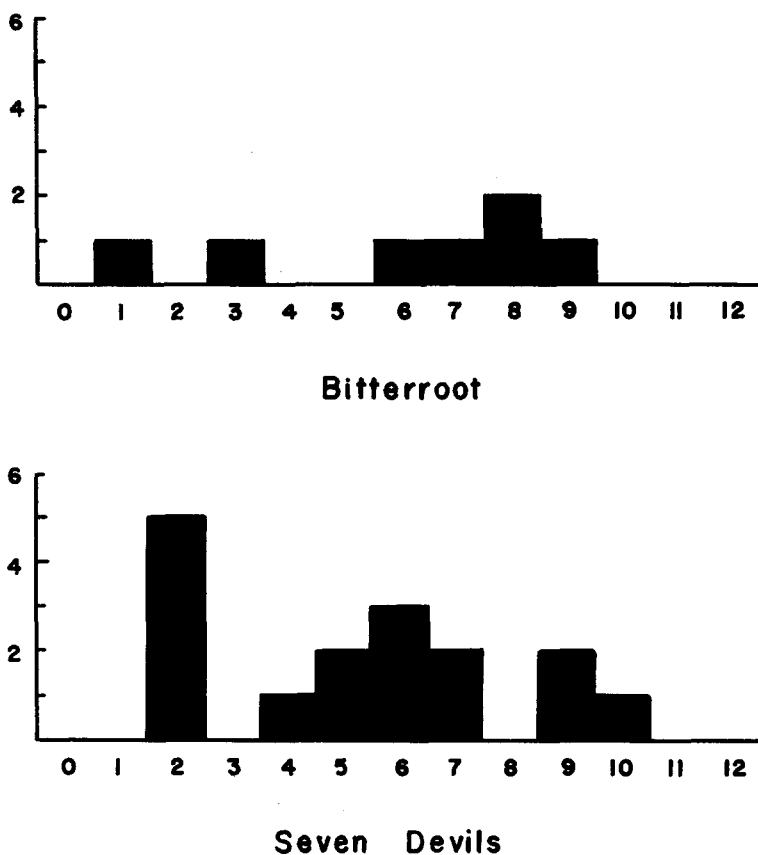


Fig. 1. Summation of scores for coloration of three body regions in specimens from two intergrade populations of rosy finches. 0 = typical *atrata*; 12 = typical *tephrocotis*; ordinate indicates number of specimens.

ation and a total of 12 to a specimen of typical *tephrocotis* coloration. Male specimens were compared with male *atrata* specimens from the Uinta Mountains of Utah and male *tephrocotis* specimens from Cascade County in Montana. Females were compared with females from the same localities. The results show considerable variation among the intermediate forms, but the birds from the Seven Devils Mountains tend slightly more toward the *atrata* condition, while those of the Bitterroot Mountains may be a little stronger on the *tephrocotis* side. Figure 2 shows a statistical comparison of measurements of males from the same populations represented in figure 1. The Bitterroot specimens are frequently nearer to the *atrata* condition whereas the Seven Devils specimens are more like *tephrocotis*.

These findings raise considerable doubt concerning the specific status of the Black

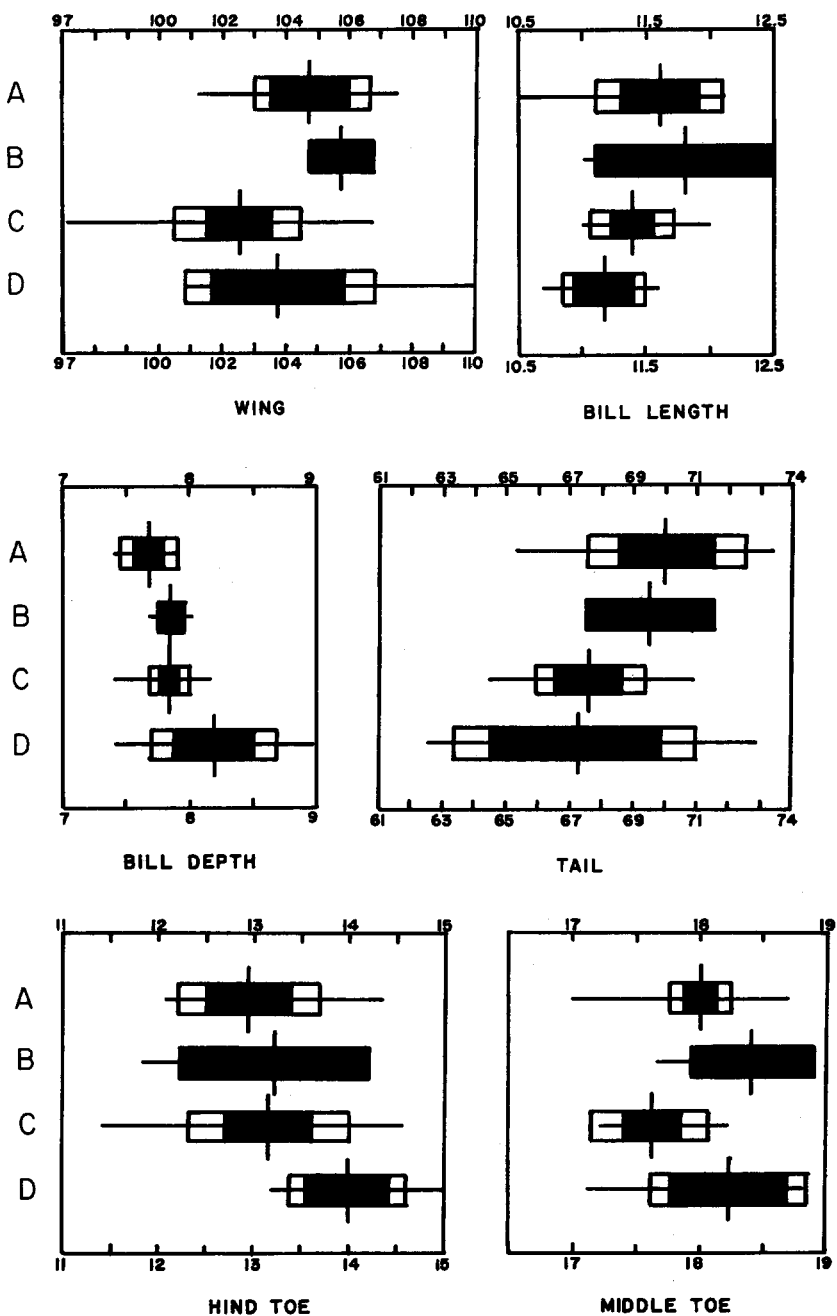


Fig. 2. Statistical analysis of measurements of male rosy finches from different populations; A = *atrata*, B = Bitterroot, C = Seven Devils, D = *tephrocotis*. Horizontal lines represent range; rectangles mark standard deviation with solid black showing twice the standard error of the mean.

Rosy Finch. Some authors have questioned the designation of *atrata* and related forms as separate species (Mayr, 1942:165, 229). A question is also raised concerning the rosy finch population in the Wallowa Mountains of eastern Oregon named *L. t. wallowa* by Miller (1939). This subspecies is duller and sootier in coloration than the typical Gray-crowned Rosy Finch. When Jewett (1924:78) first obtained rosy finches from the Wallowa Mountains, he also found a single male Black Rosy Finch there, although it was not in breeding condition. The specimens obtained recently from the Seven Devils Mountains came from a location no more than 40 miles distant from the Wallowa Mountains. A specimen (no. 27361) in the San Diego Natural History Museum taken in the Wallowa Mountains appears similar to some Bitterroot specimens and is suspected of having hybrid ancestry. Two others in the same collection (nos. 27359 and 27360) show this condition to a lesser extent, being more like dark *L. t. tephrocotis*. Specimens of *L. t. wallowa* in the MVZ collection were found to compare very favorably with certain intergrades from the Bitterroots, especially ♂ UU 13087 among males and ♀♀ UU 13079 and 13088 among females.

It is evident that there has been in the past occasional genetic interchange in these mountains similar to that which occurs in the Bitterroot and Seven Devils mountains but on a smaller scale. The duller and sootier coloration of the Wallowa birds may be accounted for by a slight influx in the past of genes producing characteristics of the Black Rosy Finch. These genes seem to be rather uniformly dispersed throughout the Wallowa population, indicating a greater stability here than in the populations of the Seven Devils and Bitterroots, or a more ancient zone of contact between the two forms of birds. Henceforth, the black form should be referred to as *Leucosticte tephrocotis atrata*. It follows that the population breeding in the mountains of Colorado may best be referred to as *Leucosticte tephrocotis australis*, although the habitat barrier isolating the breeding range of the latter form seems to be complete.

*Breeding range.*—Localities from which breeding Black Rosy Finches are known are shown in figure 3A. In addition to the Bitterroot Mountains, there are other localities in Montana where the Black Rosy Finch is known to breed. A single juvenal specimen, apparently *L. t. atrata*, from southern Granite County is in the Montana State University collection. A specimen in the Museum of Vertebrate Zoology comes from 23 miles northwest of Dillon, in Beaverhead County, and two others were taken near Cook in Park County. To this list may be added the Crazy Mountains in Sweetgrass County where, on July 22, 1954, three female Black Rosy Finches were collected near Conical Peak. Judging by the condition of the gular sacs (see French, 1954:83), these were feeding young. In July, 1957, breeding specimens were collected in the Madison Range in Gallatin County. In July, 1958, a pair of breeding specimens was collected in the Anaconda Range, 12 miles west of Anaconda, Montana. The male showed slight signs of intergradation with *tephrocotis*, and further collecting in this area is expected to reveal the presence of another intergrade population.

The breeding range of the Black Rosy Finch includes all of the major mountain ranges in northwestern and north-central Wyoming. The birds have been reported breeding in Yellowstone Park (Bailey, 1930:208-214), the Teton, Wind River, and Absaroka mountains (Cary, 1917:51) the Big Horn Mountains (Mengel and Mengel, 1952:61), and the Gros Ventre Mountains, lying between the Teton and Wind River ranges (Fuller and Bole, 1930, and a specimen in the University of Michigan collection, from Flat Creek divide). All of these have been verified during this study by collections and observations. In August, 1953, and again in July, 1954, I visited Medicine Mountain on the northern periphery of the Big Horn Mountains, the locality from which Mengel

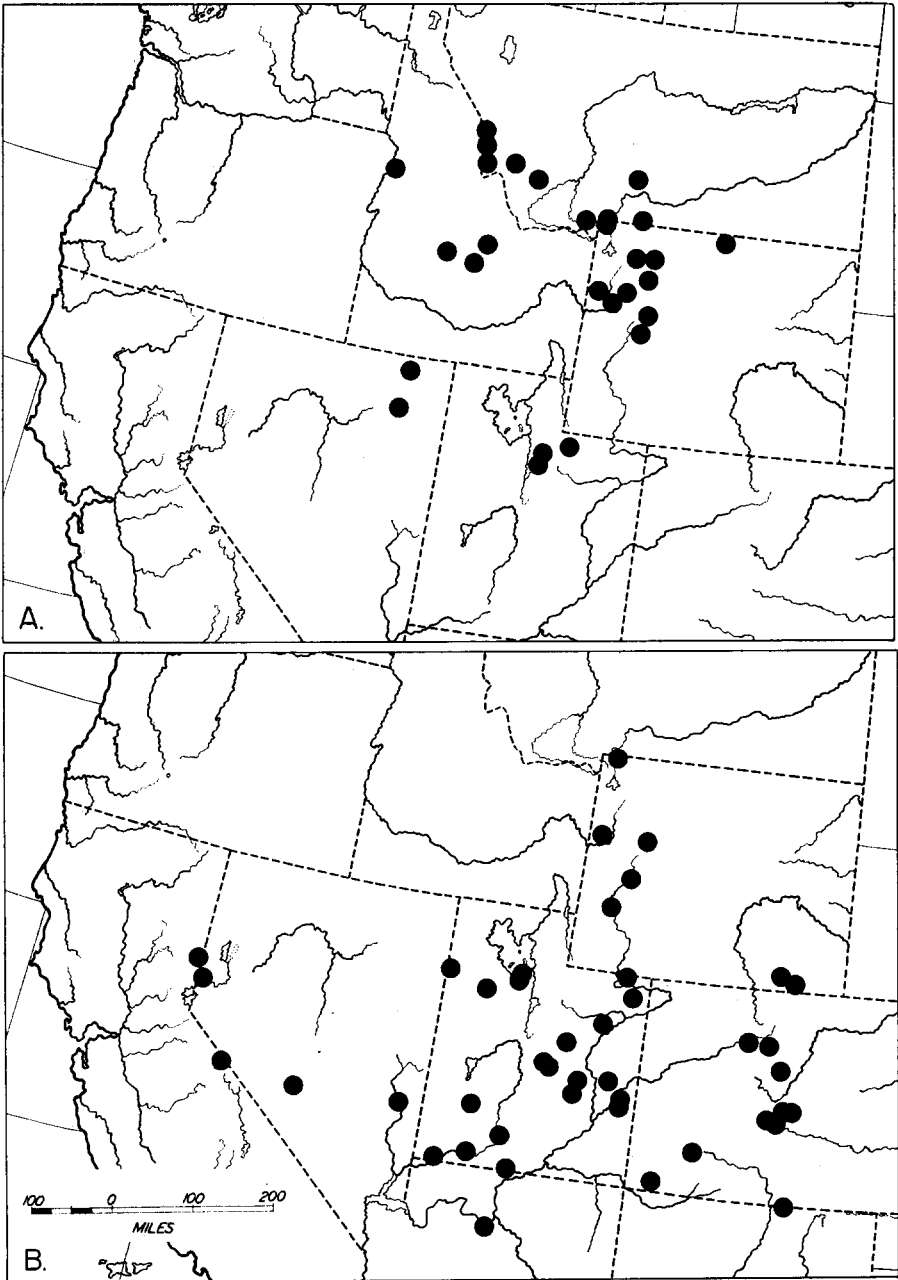


Fig. 3. A, breeding localities of the Black Rosy Finch; B, winter records of the Black Rosy Finch.

and Mengel (*loc. cit.*) reported adult and young Black Rosy Finches. The site was found to be barely high enough (9956 feet) to provide rosy finch habitat and this was separated by a distance of several miles from the main high peaks of the range. None of the birds could be found. In July, 1956, an effort was made to attain the higher regions of this range, and five male and three female Black Rosy Finches were collected at a point 5 miles north and 7 miles east of Cloud Peak, at an elevation of 11,300 feet.

In addition to the previously mentioned area of intergradation with the Gray-crowned Rosy Finch, two localities in central Idaho were found to be inhabited by the Black Rosy Finch. In July, 1955, specimens were collected on Snowsides Peak in the Sawtooth Mountains and on Borah Peak in the Lost River Range, both in Custer County. In early September, 1956, adults and young were observed slightly south of Hyndman Peak in the southern Sawtooth Mountains. Heretofore, references to this state have designated the Salmon River Mountains as the breeding habitat of the Black Rosy Finch, presumably on the authority of Merriam (1891:102). Most maps indicate the Salmon River Mountains as a vast region, sometimes including all of the mountainous country south of the main stream of the Salmon River and embracing nearly one-third of the State of Idaho. I have been unable to determine from his description of the region the exact location of Merriam's specimens.

Central Idaho is of particular interest because it lies between the breeding ranges of Black and Gray-crowned rosy finches. With the exception of the two locations where intergradation occurs, this region provides an effective barrier between the two forms. In the area between the Seven Devils on the west and the Bitterroot Mountains on the east, are low mountains that do not provide the alpine habitat required by breeding rosy finches. This region is to the north of the Salmon River, which nearly traverses the state from east to west approximately in line with the Seven Devils Mountains. South from the river one begins to find higher and more massive mountains which, when investigated, will probably be found to harbor breeding Black Rosy Finches.

The southern limits of the breeding range are found in Utah and Nevada. Black Rosy Finches have long been known to breed in the Uinta Mountains of northeastern Utah. The first record, a single specimen, was obtained in these mountains by a member of the Hayden Party on September 20, 1870. It was first referred to as the young of *L. t. tephrocotis*, although doubt was expressed at the time, and it remained for winter birds to be collected in Colorado before the original description of *L. t. atrata* was written (Ridgway, 1874). In the summer of 1953, rosy finches were observed continuously in the Uinta Mountains and found nesting in the vicinity of Bald Mountain and Mirror Lake, near the western end of this range.

Black Rosy Finches have been known to occur also in the Wasatch Mountains, slightly to the south and west of the Uinta Mountains and forming the eastern boundary of the valley of the Great Salt Lake. Breeding of the birds was established when adults and young were collected (Behle and Selander, 1952:31). In the fall of 1952, several trips to observe the autumnal behavior of the birds were made to Mount Timpanogos, where they were abundant.

Black Rosy Finches have been reported breeding in the Jarbidge Mountains in northeastern Nevada (Miller, 1955:306). In the Ruby Mountains south of Wells, Elko County, Nevada, in June, 1956, a party from the Museum of Vertebrate Zoology collected a series of 14 breeding Black Rosy Finches at Lamaille Creek, 9500 feet elevation, and Thomas Creek, 9000 feet elevation. In July, 1957, at 10,000 feet in the East Humboldt Range, a northward extension of the Rubies, I observed the species and collected one male in breeding condition at a location near Angel Lake, 13 miles south of Wells.

*Altitudinal limits.*—At the northern extremity of their breeding range Black Rosy Finches were found at elevations of 9300 feet and 9400 feet on St. Mary Peak and St. Joseph Peak, respectively, in the Bitterroot Mountains. Fifty miles to the south, on Trapper Peak in the same range of mountains, the birds were found only above an elevation of 10,000 feet. At each of these three localities rosy finches occurred at or near the summit of the mountain. In the Seven Devils Mountains of western Idaho, they were collected at 8000 feet. In central Idaho, Black Rosy Finches were found at 12,000 feet elevation in the Lost River Range and at 9500 feet elevation in the Sawtooth Mountains. At the southern extremity of their breeding range, in the mountains of northern Utah, they are rarely found below an elevation of 10,500 feet. In the Ruby Mountains of Nevada the birds occurred at approximately 9000 to 10,000 feet.

There seems to be no upward limit to the distribution of Black Rosy Finches in the mountains inhabited by them. If they are present in a particular range of mountains, they will be found near the summits of the highest peaks. This is to be expected when it is considered that related species of this genus occur at elevations of 17,000 and 20,000 feet in the mountains of central Asia. The minimum elevation which the Black Rosy Finch is known to inhabit is 9000 feet at the southern extremity and 8000 feet at the northern extremity of its range. These two localities are 300 miles apart. If the structure of the mountains is such that barren, rocky conditions exist at lower elevations, if they have an edaphic timberline, as in the Sawtooth Mountains, the lower altitudinal limit of the birds will move downward correspondingly.

*Winter range.*—In winter Black Rosy Finches are found mainly in Utah, Colorado, Nevada, and the southern half of Wyoming (fig. 3B). The northernmost record of regular winter concentrations of these birds is that of Bailey (*loc. cit.*) for Yellowstone Park. Joe and Mary Back of Dubois, Wyoming, reported that the birds are present in their area in winter. I have observed winter flocks including Black Rosy Finches near Jackson in western Wyoming. In addition, Haecker (1946) mentions Pinedale in Sublette County and La Barge in Lincoln County, and Knight (1902) says the first specimens known from Wyoming were taken at Sherman, which is the Union Pacific Railroad designation of the summit where their line crosses the Laramie Mountains between Laramie and Cheyenne. McCreary and Mickey (1935:130) consider this species casual or rare in southeastern Wyoming.

Records and specimens from central Colorado are numerous. The birds have been found regularly there throughout the winter roosting in caves and buildings in company with the Brown-capped Rosy Finch (*L. t. australis*) and other members of the *L. tephrocotis* group. In southwestern Colorado specimens have come from Mesa Verde in Montezuma County (Colorado Natural History Museum) and one from San Juan County (Princeton Museum of Zoology). Bailey (1928:697) records this species from New Mexico, very near the Colorado border (Vermejo Park).

In Utah records and specimens of the Black Rosy Finch come from nearly all parts of the state. They were found regularly in winter roosting in buildings and other structures west of Salt Lake City (see Behle, 1944:207). Many were banded here, as well as other specimens of *L. tephrocotis*, in the winters of 1952–53 and 1953–54. R. D. Porter, while studying at the University of Utah, obtained specimens as far west as Wendover, Utah. The southernmost records come from St. George (Fisher, 1893:83), near Zion National Park (U. of Michigan collection), and the Paria River near the Arizona border (U. of Utah collection).

A single observation of this form has been made in Arizona, at Grand Canyon (Townsend, 1925:178). The records from extreme southern Utah also support the view

that the Black Rosy Finch is a winter resident of northern Arizona. Specimens will probably be taken there when winter collecting is done in this area.

A specimen of the Black Rosy Finch from Tonopah, Nevada, is in the California Academy of Sciences collection. A winter observation of this form was made near Pioche in eastern Nevada (Gullion, 1957:71), and it was seen regularly at a winter roost near Reno (Johnson, 1956:151). Black Rosy Finches have been found at two localities in California, one at Bodie in Mono County (Swarth, 1928) and two in southern Lassen County (Miller and Twining, 1943).

Wintering flocks of rosy finches observed in southeastern Idaho during the last three years have never included *atrata*. On the basis of this, it is doubtful that Idaho can be considered as part of the regular winter range of this form, as indicated in the 5th edition of the A.O.U. Check-list (1957).

*Migration.*—The seasonal migration of the Black Rosy Finch is both latitudinal and altitudinal. In winter they descend to lower valleys considerably lower in elevation (4000 to 7000 feet) than their summer habitat.

The linear distance traveled in migration by these birds, when compared to other fringillid birds, is not great. Considering this distance as that from the southernmost breeding localities to the most southern localities where the birds are known to be common in winter (that is, northwestern or north-central Wyoming to southern Colorado, northern Utah to southern Utah and Colorado), it measures approximately 300 miles.

Flocks of rosy finches were studied during two winters in the vicinity of Salt Lake City. Banding records and field observations give indications of the forms present in the winter flocks. In both, the groups were considered as random samples of the entire local population and were used as an indication of the proportions of each of the three forms present. Figure 4 shows the percentage composition of the flocks by months for the winters of 1952–53 and 1953–54. There are three bars for each month. The height of each bar indicates the relative abundance of the species for the particular month. The three bars for any one month total 100 per cent.

Some interesting considerations about migration and winter movements are brought out by the graphs. The winter of 1952–53 was unusually mild in that area. Temperatures were generally above normal and precipitation was low. The winter of 1953–54 was nearer normal. The graphs (fig. 4) for the mild winter months of 1952–53 show that the Black Rosy Finch remained by far the most abundant form in the area throughout the winter. For the months of December through March it comprised 69, 80, 81, and 81 per cent of the population. In the normal winter of 1953–54, Black Rosy Finches were considerably outnumbered by individuals of one or both of the other forms, the Gray-crowned (*L. t. tephrocotis*) and Hepburn's (*L. t. littoralis*). The indication is that climatic conditions during a single winter can affect the distribution or winter range of the birds. Normally the center of the winter range of the Black Rosy Finch is farther south than Salt Lake City. In a mild winter, however, the winter range of the birds may shift slightly to the north. The opposite would probably be true during a hard winter. This interpretation is made without regard to possible cyclic fluctuations in population numbers. In order to establish the correlation with climatic conditions, continued observation would be required or simultaneous observation of winter roosts at different latitudes.

The fall migration from the mountains to the valleys took place in the latter part of October or early November. In the fall of 1952, the birds were regularly observed at higher elevations throughout October and as late as November 2. The first flock of rosy finches seen in Salt Lake Valley was on November 16. In 1953, the birds were first seen at Saltair, a regular winter roost of the rosy finches, on October 31.



In 1953, the return migration to the breeding grounds took place before the end of March. On the afternoon of March 28, two Black Rosy Finches were located only after considerable search at Saltair, where they had been numerous throughout the winter. On April 5 birds of this subspecies were observed at an elevation of 11,000 feet on Sugarloaf Peak in the Wasatch Mountains. Bleak winter conditions still prevailed at

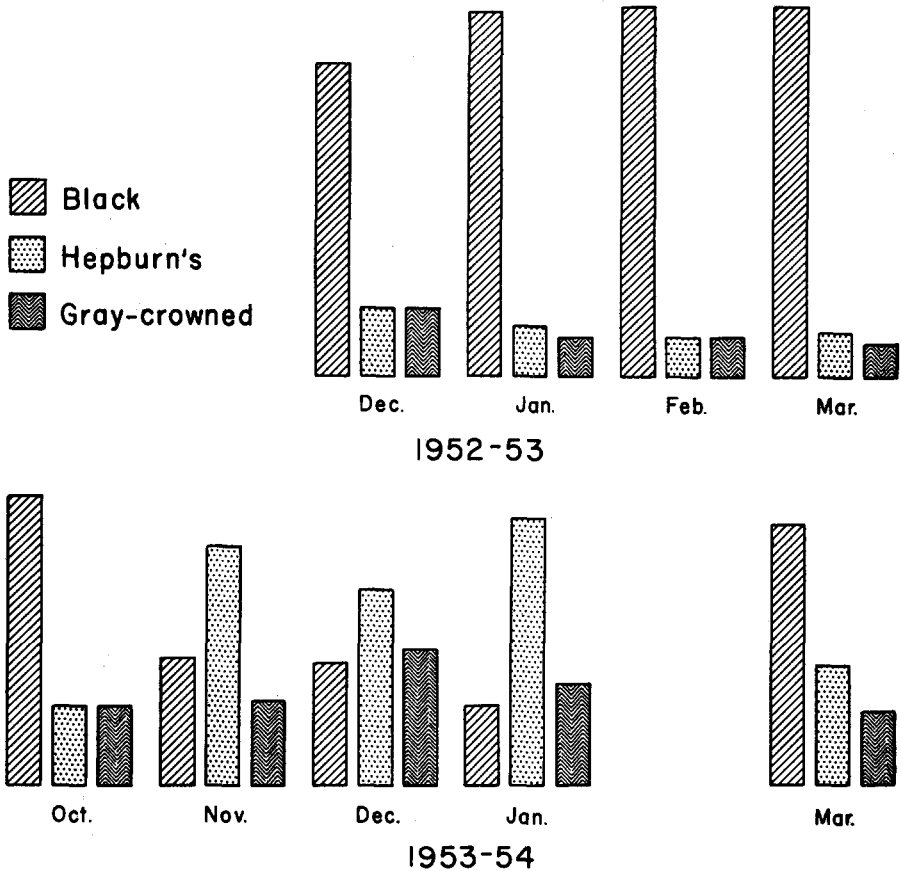


Fig. 4. Percentage composition of rosy finch flocks in northern Utah during the winter months of 1952-53 and 1953-54.

this elevation, although there was evidence of water having collected in small depressions and frozen again. After a week of stormy weather, the area was revisited. Areas that had been blown clear of snow before were covered with a heavy layer of new snow. Both the food and water supply of the birds had been temporarily removed, and no birds were found. Further evidence of the importance of water supply was the great affinity for moist gullies shown by flocks of rosy finches on several occasions in the fall when the lakes and streams at high elevations remained frozen during the day.

The assumption is that the lack of free water at high elevations is the critical factor which forces rosy finches to lower elevations. The early migration back to the breeding grounds is a result of internal physiological changes. Frequent spells of bad weather at that time of year may freeze all standing water or cover the food supply, periodically and temporarily forcing the birds back to lower elevations.

*Barriers to dispersal.*—Black Rosy Finches were always found associated with extensive tundra and open park-like areas above or near timberline in the mountains. In addition there must be extensive rocky cliffs and precipices where quantities of snow accumulate in the winter and where some of it is sheltered throughout the summer. The birds utilize the snow banks as well as the tundra and open areas for feeding and the cliffs for nesting and roosting. The composition of the rock seems to be unimportant to the birds so long as the cliffs are high, steep and broken enough to provide cracks and small openings for shelter.

It has already been mentioned that the barrier to the north of the breeding range is incomplete. Extensive low regions separate the Black Rosy Finches in northwestern Wyoming from the Brown-capped Rosy Finches in the mountains of southeastern Wyoming. A similar situation exists between the birds of the Uinta Mountains and those in the mountains of Colorado. The southward and westward spread of Black Rosy Finches in Utah and Nevada is also prevented by extensive low areas broken only here and there by isolated mountain ranges, some of which attain elevations required for the existence of tundra. When it is considered that these areas are well within the winter range of the species the question arises as to why some individuals have not become established there. The limiting factors seem to be aridity, area, and lack of rock outcrops for nesting. The latter may be dependent upon the former, since glacial action is primarily responsible for steep rugged mountain peaks.

Behle (1955:29) did not find Black Rosy Finches in the Deep Creek Mountains of western Utah. I inspected this range in June, 1956, and found what appeared to be good rosy finch habitat about the highest peaks, but no rosy finches were found. Since these mountains are at nearly the same latitude as the Wasatch Mountains and since they are high enough and apparently have abundant cliffs, one explanation for the lack of breeding rosy finches seems to be the limited size of the area. An individual rosy finch will cover considerable area in its breeding habitat. In a single flight, a bird frequently travels well over a mile and perhaps much farther. If the bird cannot make several such flights in succession it may very well be crowded. The area required by an individual would be multiplied many times by a breeding population.

The second factor, that of aridity, may also enter into the situation in the Deep Creek Mountains. There are probably seasons when the snow does not remain on the high ridges throughout the summer and fall. If all available water disappeared at the end of the breeding season when the young are out of the nest, are most demanding of the environment, and are most susceptible to enemies, the resulting mortality would seriously reduce or even nearly exterminate the breeding population. Since drainage away from the alpine region is rapid, unless water is stored in lakes and ponds, there may be drought between the melting of the last snow and the autumn rain or snow. Lakes and ponds generally seem to be numerous only in the more extensive mountain areas. Rosy finches are known to utilize the water from melting snow almost exclusively in some localities. It has already been suggested that available free water may have a great deal to do with the fall migration to lower elevations.

The La Sal Mountains in southeastern Utah were expected to harbor breeding rosy finches, especially since these mountains are within sight of the massive San Juan Mountains in Colorado where the Brown-capped Rosy Finch is known to breed (G. Alexander, personal communication). The La Sal Mountains have peaks of 13,000 feet elevation, few of which have cliffs suitable for nesting. As in the case of the Deep Creek Mountains, aridity may also be influential in preventing the establishment of a rosy finch population in these mountains.

The most noticeable avifaunal difference between the high La Sal Mountains and areas where rosy finches occur is the abundance of White-throated Swifts (*Aëronautes saxatalis*) around the mountain tops. Ordinarily the swifts are found at rather low elevations compared to those frequented by the rosy finches. There would be only intermittent competition for food if the two species occurred together but they nest in similar situations and hence the two could conceivably compete for space. Whether this is the case, or whether the presence of the swifts indicates some other fundamental difference in habitat, is not clear.

It is doubtful that climatic conditions have any direct limiting effect on the distribution of the Black Rosy Finch other than upon the seasonal movements of the form. The birds seem to thrive under the most extreme conditions of temperature and weather and under such circumstances are particularly adept at sheltering or protecting themselves. It is likewise doubtful that food may be a limiting factor. In known habitat there are not enough birds to fill the available space and to take full advantage of the existing food supply. Rearing birds in captivity has shown that they will accept almost any kind of seed so long as it is of the proper size and not too hard to be crushed in the bill.

#### SUMMARY

The Black Rosy Finch (*Leucosticte tephrocotis atrata*) was found to intergrade with the Gray-crowned Rosy Finch (*L. t. tephrocotis*) in the Bitterroot Mountains of the Montana-Idaho border, and the Seven Devils Mountains on the Idaho-Oregon border. It is believed that the dark *wallowa* population of *L. tephrocotis* is a result of similar intergradation and that *atrata* and *australis* should be considered as subspecies of *L. tephrocotis*. The breeding range of the Black Rosy Finch includes the high mountains of southwestern Montana, northwestern and north-central Wyoming, central Idaho, northeastern Utah and northeastern Nevada. In winter it is found primarily in Utah, Nevada, Colorado and the southern half of Wyoming. Black Rosy Finches migrate to lower elevations in winter and at least 300 miles southward. The movement to lower elevations may be stimulated by a lack of water in the alpine habitat. Lack of habitat ensures the separation of breeding Black Rosy Finches from breeding Brown-capped Rosy Finches (*L. t. australis*) in Colorado and southeastern Wyoming. Aridity, small area of available habitat, or lack of precipitous cliffs for nesting seem to prevent the birds from populating the several isolated mountainous areas farther south and west of their breeding range.

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