

Winter Population Trends of the Starling in California

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*A difference in status between
northern and southern California
is discerned.*

INTRODUCTION

Since its initial introduction shortly before the turn of the century, the Starling (*Sturnus vulgaris*) has extended its range into nearly all of the continental United States, major parts of Canada and even into interior Alaska. The species arrived relatively recently in California; the first specimen was taken in 1942 (Jewett 1942). After the first recorded breeding in the state in 1949 (Ball and Koehler, 1959), the starling spread rapidly and is now common in most localities where suitable habitat exists.

Because Starlings damage many agricultural crops and cause problems at livestock feeding areas in California, an analysis of the species' present status and population trends is needed. I used the Christmas Bird Counts from *Audubon Field Notes* and *American Birds* for such an analysis.

METHODS

The 782 Christmas Bird Counts from California for the years 1949 through 1971 were analyzed. The number of Starlings, party-hours, and party-miles were recorded for each count. These data were converted to Starlings per party-hour and Starlings per party-mile for each year. Bock and Smith (1971) analyzed Colorado Christmas Bird Count trends for several species, including Starlings, by using birds per party-hour, whereas Brown (1971; 1973) described population trends in several species of hawks by using birds per party-mile. I used both

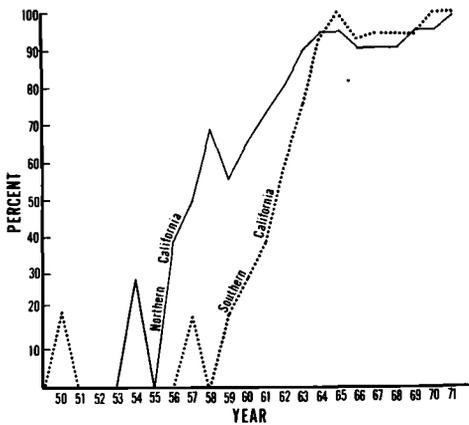
parameters to permit a more complete analysis of observed trends and to determine the better method for future analysis of starling trends from Christmas Bird Count data. To eliminate some of the bias in the trends as indicated by Stewart (1954), Hickey (1955), Kenaga (1965), and Arbib (1967), counts of roosts and counts made at one location for fewer than three consecutive years were omitted from the computations. I also omitted two locations (Drakes Bay and Tomales Bay) because of huge fluctuations in the annual counts that were probably caused by shifts in the location of a large Starling roost in and out of the census area (unpublished data, U.S. Bureau of Sport Fisheries and Wildlife files). Because Royall *et al.* (1972) showed that California Starling populations north and south of 35°N latitude are separate and have different migratory patterns, I computed count data for these two regions separately.

RESULTS AND DISCUSSION

Statewide Build-up. During the early counts, Starlings were recorded only sporadically. The first record was a single bird at Pasadena in 1950. Starlings were not reported in 1951, but five were reported at the Gray Lodge Wildlife Management Area in 1952. From 1953 through 1955, two to seven counts each year listed up to

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Figure 1. Percentage of Christmas Bird Counts recording Starlings in northern and southern California, 1950-1970.



several hundred Starlings. Beginning in 1956, when seven counts recorded a total of 2,416 Starlings, the number of counts including the species has increased each year. Since 1964, more than 90 per cent of the counts in northern and southern California have recorded Starlings (Figure 1). Only six of the 141 total state counts made in 1968-1970 failed to list at least one Starling; in 1971 all 54 state counts included the species.

Some of the unusual locations where Starlings have been counted include mountainous areas, such as Big Bear Lake, Lewiston, and Yosemite National Park, and desert areas, such as Joshua Tree and Death Valley National Monuments. Starlings have even been reported on recent (1968-71) counts on the Farallon Islands, nearly 20 miles off the central California coast. And off the coast of southern California, Starlings have been found on such islands as Santa Barbara, San Miguel (pers. comm., National Park Service, 1972) and San Clemente (Childs, 1966), although Christmas Bird Counts have not been made at these areas.

The Starlings' pattern of expansion within the state—a slow increase followed by a population explosion—follows that in other areas the species has invaded (Kessel, 1953; Howard, 1959). Apparently the first Starlings to enter the state were wandering young of the year (Thomas, 1934; Kessel, 1953) and resident breeding populations became established later.

Present winter population trends depend upon the status of both migrant and resident populations; unfortunately, the proportions of these two groups in the California populations are unknown (Royall *et al.*, 1972).

Northern California Build-up. In northern California, rapid population expansion began in the mid 1950s (Figures 1 and 2). By 1958, about 6 birds/party-hour, or 2 birds/party-mile, were recorded, but this was followed by a decline in 1959. Then about 1961, the population explosion began, with the density finally reaching about 60 birds/party-hour or 16 birds/party-mile for the most recent count (1971). On the basis of these indexes, the population during the last 10 years has increased about 1600 per cent.

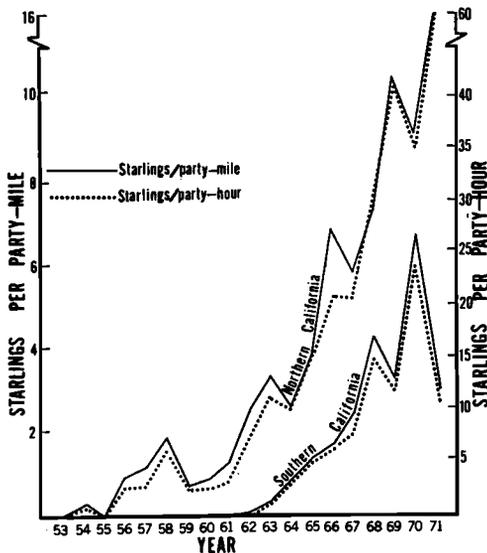
The population indexes for northern California dropped in 1964, 1967, and 1970, at 3-year intervals. Whether these drops are cyclic declines in the wintering population or merely artifacts due to the insensitivity of the measurement parameters is unknown. But if the population did decline in these years, one possible reason is the large kills of Starlings in California from extensive control operations at feed lots and other areas, especially in 1964 and 1967 (pers. comm., Calif. Dep. Agr., 1972).

The future trends for Starlings in northern California are difficult to predict, but to date there is no indication that the population has reached a peak or has begun to stabilize. The present (1971) population level is already about three times as dense as the peak winter population levels reported by Bock and Smith (1971) for Colorado Starlings.

Southern California Build-up. In southern California, the Starling build-up began several years later than in the northern part of the state. In particular, Starlings did not spread through southern California until about 1958 to 1964 (Figure 1), and the rapid increase in population density did not start until about 1963 (Figure 2). This delay probably resulted from the Starlings' later arrival in the southern part of the state. For example, whereas the species was taken in northern California at Tule Lake in 1942 (Jewett, 1942), the first published record in southern California was not until 1946 (Stager, 1947), and Banks (1965) states that Starlings did not reach San Diego County, in extreme southern California, until about 1948. The Tehachapi Mountains to the north and the Mojave Desert to the east may have hindered the starling invasion into southern California.

The population density in southern California peaked in 1970 at about 24 Starlings/party-hour or 6.5 Starlings/party-mile, then dropped sharply (more than 50 per cent) in 1971 (Figure 2). This large drop may be the result of a high mortality (from natural causes or control efforts), a winter population shift, a population crash because of peak density being reached, or merely insensitivity of the measurement parameters. If the drop is real, it puts the 1971 density at less than one-fourth the density in northern California for the same year. However, if whatever caused the 1971 decline does not continue to operate, then winter populations in southern California could expand for several years, perhaps eventually reaching a level similar to that in northern California.

Figure 2. Number of Starlings recorded on Christmas Bird Counts in northern and southern California, 1949-1970.



Measurement Parameters. The trend lines for the two Christmas Bird Count parameters—Starlings/party-hour and Starlings/party-mile—were essentially parallel for both northern and southern California (Figure 2). Thus, either method would appear satisfactory for analysis of future winter population trends of the Starling.

SUMMARY AND CONCLUSIONS

The Audubon Christmas Bird Counts from California (1949-71) were analyzed to determine winter population trends of the Starling. The count data showed a rapid expansion of the Starling population beginning in the mid-1950s in northern California and in the mid-1960s in southern California. Northern California showed a high population density, and through 1971 there was no indication of leveling off. Southern California showed a sharp drop in 1971, and possible causes are given. The future trends of populations in both areas (which depend on many factors) cannot be predicted. Two measurement parameters (birds/party-mile and birds/party-hour) used to analyze the population trends gave similar results, showing that either method could be used in such an analysis.

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