

# How to Prepare a Winter Range Map from Christmas Bird Count Data

Danny Bystrak

The eighty cooperators who have volunteered to derive early winter range maps for more than 200 species of North American birds have had a number of questions concerning the proper methods of computing and preparing their maps. Unfortunately the sample map, showing the 1970-71 distribution of the Red-cockaded Woodpecker (*Am. Birds*: 25: 514) was intended merely to illustrate the announcement of the project, and not to set a pattern for other maps. Instructions sent earlier in the year to cooperators proved to leave unanswered a number of questions. It soon appeared that, as a result, there would be a considerable lack of uniformity in the maps that were submitted.

It seems advisable, however, that a standard set of instructions be promulgated — both in the interests of simplicity and the cause of uniformity. [The author is the chief cartographer for the Migratory Bird Population Station's Breeding Bird Survey project, whose publications of breeding range maps are familiar to many readers. — Ed.]

The first step in the preparation of the range map is the plotting of Christmas Bird Count (C B C) data onto a preliminary work map. Each cooperator has been provided a five-section computerized master map locating almost all the C B C center points by means of state-or-province-exclusive two letter keys, located on the map grid within half degrees of exact latitude and longitude. These maps will aid in quickly locating C B C centers on work maps.

To plot C B C data onto the work map, it is merely necessary to identify each C B C on which the subject species was recorded, dividing the total number of individuals recorded by the total number of party-hours reported, and then multiplying that result by 10. The product will be the number of individuals recorded per 10 party-hours, which is the basic standard, and the figure to be plotted on the work map at the Count location. This plotting is continued until

all C B Cs reporting the subject species are represented on the work map by figures representing individuals/10 party-hours.

The next, and most important step, is to draw on the work map, the lines of demarcation between areas of average, greater and lesser abundance. This is a critical process, and one on which the value and accuracy of the map depends, and it relies to some extent on the judgment and skill of the mapper. There will rarely be clear-cut divisions between areas of abundance — least, average, greater, and greatest — but lines of demarcation must, of course, be clear-cut.

Standard cut-off points (between zones of abundance) have been agreed upon. It had been hoped to allow more freedom of choice, but it seems necessary to have as much uniformity as possible, considering the number of cooperators. Three abundance scales will be used, and the mapper will choose whichever seems most appropriate to his data.

Table 1. Birds per 10 party-hours

Scale I	Scale II	Scale III
Less than 0.1	Less than 1	Less than 10
0.1 – 0.5	1 – 5	10 – 50
0.5 – 2.0	5 – 20	50 – 200
More than 2.0	20 plus	More than 200

The three scales are exactly alike, except that II is ten times Scale I, and III is 10 times Scale II. Obviously, only one scale can be used per species, throughout each map.

Any brand of commercial shading papers may be used for this purpose; two with which we are familiar are Zip-a-tone and Letratone, which are most easily cut with a needle or pin and lifted from the backing sheet and stuck to the final map by pressure, applied in a rubbing motion. If Zip-a-tone is used, sheets 275-20,

275-40, 275-70, and black will give the proper contrasts.

For species showing only scattered and disjunct distribution, where area demarcation would be meaningless or misleading, dots and other symbols should be substituted for shaded areas. Sheets of Letraset (No. 553) are obtainable, which supply open and filled circles, triangles, and squares of appropriate sizes. Only one size should be used per map, with the numerical scale keyed to figure shapes and not sizes. These sheets are of the rub-off type, unlike the shading sheets.

Species which are largely coastal in distribution should be shown by narrow strips of shading, applied according to habitat. For example, a bay and ocean species such as Double-crested Cormorant might show a slight overlap on both sides of the coastline. Ocean-side birds (pelagics, etc.) would show shading only outside the coastline, while shoreside species, as Ipswich Sparrow, would show shading inside the coastline.

Where a species exhibits extralimital occurrences — outside any shaded abundance zones — dots and other symbols should not be used, but circles cut from the appropriate shading sheets should be applied. (See Fig. 3).

Although most maps will be limited to the single year 1970-71, maps of irruptive or very rare species may show more than one year by the use of symbols rather than shading.

In an ideal bird population there would be an area of greatest abundance centrally located and from which the density decreases in all directions, forming a large occupied range that gets progressively less dense toward its limits. This trend should be kept in mind when drawing lines of demarcation, especially in areas where few, if any, C B Cs are reported.

Habitat is a very important factor to remember in the making of these maps. For a species that requires sagebrush desert, for instance, areas where forest is the dominant habitat should be avoided. Elevation and topography should be considered similarly, although these two factors usually coincide with habitat changes fairly well. Any one of several vegetation maps of the continent can be very helpful in assigning densities to areas where Christmas Counts are lacking. For example, in Figure 1, western Arizona and eastern California lack Counts; but since this area is largely desert and similar throughout, and since the counts on the edges of it recorded 5 to 20 Cactus Wrens, and are of the same habitat, it is logical to assume that the area not sampled is also of that approximate density. Habitat can cause abrupt

density changes defying the gradual decrease defined above. The Black Hills of South Dakota and Wyoming, for instance, are a largely forested area in the middle of the Great Plains. A plains bird could be very abundant (dark gray or black) right up to the Black Hills and yet completely lacking in the Black Hills. Similar situations are possible at most any habitat break.

Another aid in classifying areas is past counts which were not run in 1970. The Del Rio Texas count had 5 (in box-Fig. 1) birds per party hour in a recent past year. This has affected the line connecting the trans-Pecos with South Texas. Also, if a count is in one category but very close to another, this should affect the location of the line. The line in West Texas between 1-5 and 5-20 could have fallen anywhere between the 7.8 and 11.9 and the 4.1. Since 7.8 and 11.9 are well over 5 and 4.1 is very close to 5, the line was shifted in the direction of the 4.1.

In lumping together counts of like density (eg. 5-20), a single higher or lower count can be overlooked. Only if several adjacent counts are lower or higher do they warrant being put in a different category. In southwestern California a 1.0 and two 0's have been thus overlooked in Figure 1, as has a .6 in west central Texas.

Counts with no birds of a species are extremely important and should be included on the work maps. Single zeros among counts with numbers should be overlooked, but near the limit of the range they are useful in deciding where to put your line as can be seen in California in Figure 1. If there is a great distance between a zero and the nearest count with a number on the edge of a range, if the species was seen during the Christmas Count Period or on the previous year's count (be careful on species that fluctuate from year to year), the line of least density should be brought closer but not quite to this point.

Keeping the ideal bird population in mind when making your maps, remember that any one tone should be adjacent to the next darker tone on one side and the next lighter on the other. It is also important to remember that this rule has exceptions such as those caused by habitat.

It is important to remember above all that this is not an attempt to show the absolute winter range of birds. This is merely an attempt to map the relative abundance of wintering birds. The limits of the winter range are available in several sources. The Turkey Vulture, for instance, is known to winter across the Southwest from Texas to California. Yet it is very

rare in this area and hence shows up as only a few isolated dots in this area (Fig. 3). It also winters rarely throughout much of the Midwest where the situation is the same.

Finally, for species with a distribution re-

stricted to only a portion of the continent, a sectional map may be used, provided an open space is left into which the legend (publication set) may be printed.

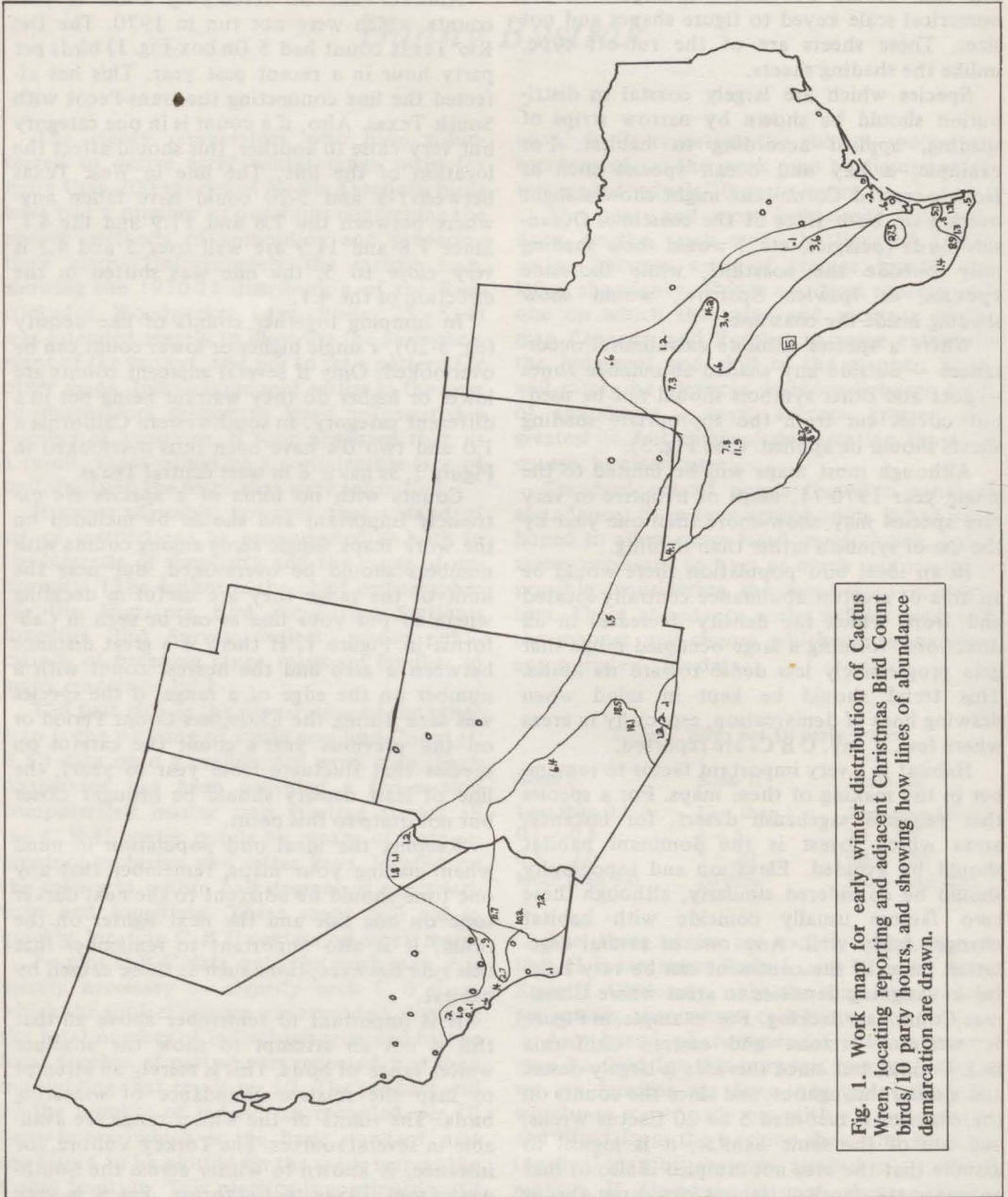


Fig. 1. Work map for early winter distribution of Cactus Wren, locating reporting and adjacent Christmas Bird Count birds/10 party hours, and showing how lines of abundance demarcation are drawn.

