"Ideal Model" Christmas Bird Counts: a start in 1982-83

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IN AMERICAN BIRDS 35(4) 353, the Editor summarized a paper he had presented at a symposium on the estimating of terrestrial birds, held at Asilomar, California, in October, 1980. The paper, and the summary, suggested that since Christmas Bird Count data are being increasingly used in scientific analyses of winter bird distribution, it behooves us to see whether these data can be improved in ways that will increase their usefulness and credibility. The paper, entitled "The Christmas Bird Count: constructing an 'Ideal Model' ", did, in fact, suggest twelve ways in which our present procedures might be improved or in which adherence to our regulations might be strengthened. It proposed that as a test, a certain small number of "Ideal Model" counts be authorized and their results be compared carefully both with similar counts taken in traditional ways, and the same counts as taken in previous years.

Following is the original paper, as published in the Proceedings of the conference (Studies in Avian Biology 6:30-33, 1981), somewhat condensed, revised, and updated for present purposes. It is published in this issue to give time for planning and consultation to those counts that might wish to volunteer to test the "Ideal Model" in the coming (1982-83) count season.

IT IS NOW APPARENT that increasing use in scientific studies is being made of the long-neglected mountains of distributional data provided by the annual Audubon Christmas Bird Count (CBC). This field-work phenomenon is now in its 82nd year, and in 1980-81 involved 33,802 named participants in 1358 published counts, of which 1332 were located in continental North America north of Mexico. These studies have proved the general validity of the CBC data in spite of, or in ignorance, of certain weaknesses and flaws in CBC practices both in the field and in the reporting procedure. This paper will explore ways in which both can be improved to provide the researcher not only with more accurate and more reliable raw data, but even afford new areas of analysis.

The refinements suggested will be incorporated in a limited "Ideal Model" for CBC procedures, limited because it recognizes that this proposal must accommodate the real world—with strong traditions of competition, recreation, amateur involvement, and social interaction. It should be recognized, however, that many counts have, historically, practiced methods already very close to our suggested model.

THE IDEAL MODEL

IN THIS PAPER I will consider those current problems that may affect the presentation and understanding of raw data. I am not concerned here with censusing *techniques* or their relative effectiveness, or the effectiveness of the human being as a receptor of bird registrations. The problems I consider are intrinsic to the CBC process. Some are presently of minor statistical significance, others of *potential* import, but some are of major importance. Twelve specific areas will be considered.

1. *Count circle adherence.*—I believe from personal knowledge that boundary stretching is widespread; it biases all totals, but until now is ignored. Ideal Model compilers will be required to verify that the count boundary was not violated nor the count circle opportunistically shifted.

2. *Overlapping count circles.*—A 1979-80 study shows that of 576 eastern United States counts 57, or 10%, have overlaps from 5% to 80% of their areas. Researchers have ignored or are unaware of this source of error. Compilers would be required to verify that no overlap occurred, or to segregate overlap and non-overlap totals.

3. *Habitat analysis.*—The data reporting the percentages of various habitat types are not widely used, but if refined have great potential for habitat/population studies. The present error involves the reporting of the actual habitat percentages in an area rather than *the actual percentages covered in that area* (Table 1). If practical a national or universal habitat classification would be provided each count, to foster uniformity of definitions.

Table 1. Fictitious Typical Example of Potential Error in Habitat Analysis Reporting

Habitat type	*Reported*	*Covered*	*Actual*
Woodland	40%	50%	27 8%
Fields	30	80	33 3
Roadsides	10	100	13 9
Residential	20	90	25 0
Totals	100%		100%

4. *Elevation.*—Only high and low map elevations for the count circle are now required. Compilers will be asked to give altitudinal high, low, and means of the CBC area actually *covered.* Of potential research value only and not presently of frequent use.

5. *Weather.*—The effects of weather on bird presence, detectability, and on observer effort are real and important variables, but difficult to quantify. Long-term, they may average out. However, better information can be furnished than is now published. It would be informative if counts rated Count Day weather on a subjective scale of 1 (worst) to 10 (best) as to its effect on bird finding and observer effort The "Ideal Model" count would also report, using the same subjective scale, on weather factors for 1) the week preceding Count Day, and 2) the 3-week period prior to that week

6 *Party-hours and party-miles* —Since most studies today are based on the factors birds per 1, 10, or 100 party-hours or party-miles, improved calculating and reporting of these data would be required. The "Ideal Model" accounting would not only assess miles and hours logged by basic parties, but *calculate miles and hours added by split parties*. Basic parties which divide part-time shall be considered multiple parties for that time, if they are counting different birds. Correcting this badly flawed factor may be the most significant contribution of the Ideal Model. I suggest that many of the papers based on the assumption of accuracy of party-hour and party-mile statistics heretofore published may be in substantial error, on the low side for party-hour totals, high for birds/party-hour.

7 *Observer numbers and effort*.—Total participants listed and total parties afield relate strongly to the adequacy of count-area coverage and the discovery of birds. A wide spectrum exists in CBC participation (Table 2). In 1979-80, participants per count varied from one (10 counts) to 213 (one count).

Table 2. Observers per Count, 1979-80 CBCs

Observers	*Counts*	*Per Cent*
1	10	0.8%
2-4	83	6.3
5-9	222	16.8
10-24	552	41.8
25-49	332	25.2
50-99	102	7.7
100+	19	1.4

An analysis of 83 counts taken in California (1979-80) shows an increase in species totals with increases in observers and parties (Tables 3 and 4). However, there is no optimum to the number of parties afield if maximum species (and individual totals) are sought.

Table 3. Species Totals Related to Observer Numbers, California, 1979-80.

Observers	*Counts*	*Species/Count*
1-19	27	76.0
20-49	30	126.7
50-99	21	158.8
100+	5	190.8

While optimum numbers of participants and parties for meaningful data will vary with the type, access and topography of the terrain, except for special situations (ferry transects, pelagic counts, desert areas with oases, etc.), the great majority of present CBCs do not adequately cover their 176.6 mi^2 (457.4 km^2) circles.

To qualify, Ideal Model Counts would be required to meet individually specified minima for observer and party coverage In 1979-80, less than 9.2% of all counts fielded 50 or more observers and 12 or more parties.

A further, unrecognized bias is introduced by compilers who incorrectly report participant totals, adjusting party-miles and party-hours accordingly. Circumstantial evidence strongly suggests that this practice may be widespread, and for some counts participants and parties may be understated by 50% or more. This bias can be eliminated if, for Ideal Model Counts, the participant fee is reduced or waived.

8 *Observer credibility*.—To improve the credibility of observers' reports, heretofore the single most questioned of

Table 4. Species Totals Related to Party Numbers, California, 1979-80

Parties	*Counts*	*Species/Count*	*Species/Party*
1-5	19	69.4	19.7
6-11	24	100.4	13.1
12-19	17	134.4	9.5
20-29	14	144.0	5.8
30-39	6	172.0	4.9
59-74	2	180.5	2.7

CBC data reliability factors, a method for assessing observer reliability must be developed. At present we rely on three review stages and documentary evidence for questionable reports. The Ideal Model would propose to strengthen the process by advancing an observer "Reliability Index" as a rough gauge for measuring observer experience, to help balance party composition.

The following formula, while imperfect, has the advantage of being easy to calculate, applicable to all, and of giving scores which seem to test out surprisingly well. The formula is calculated as follows:

Each observer estimates the number of hours afield birding per year during the last 5 years (a measure of experience) and multiplies this total by the percentage of his state's (or province's) currently accepted living bird list (a measure of expertise) and (for convenience only) divides by 100. Results in the normal range will be between 0.5 and 40. Three examples

Calculating the Reliability Index

A. *Infrequent birder*
12 days per year. 6 hours afield each.
45% of state list.
$12 \times 6 \times 5 \times .45 \times .01$ = R.I. of 1.62

B. *Average birder*
26 days per year. 7 hours afield each.
70% of state list.
$26 \times 7 \times 5 \times .70 \times .01$ = 6.37 R.I.

C. *Keen, dedicated birder*
50 days per year. 9 hours afield each.
86% of state list.
$50 \times 9 \times 5 \times .86 \times .01$ = 19.35 R.I.

[Since the publication of the original paper, we have heard from some birders whose R.I.s were, by this measure, either unfairly low, or wildly high. The former might happen if an experienced observer had recently moved to a new state (the state of his longest-term residence could then apply) or birded far more frequently than our C-type above. If birder C above spent 150 days afield (not unusual) instead of 50, his R.I. jumps to 58.05. Either way he should be well qualified to lead a party in the field! Meanwhile, however, we will be searching for better ways to evaluate observer reliability] Obviously, any arbitrary index of credibility must be evaluated by the compiler, who may waive the rule on low R.I 's owing to unusual factors. But the Ideal Model proposes *no parties afield* without at least one participant with a 5.0 or better rating.

9. *Numerical estimation*.—The Ideal Model will propose more stringent accuracy in counting and estimating based on expanded training and testing of participants. Parties will be instructed to keep running counts of scatter-type species, instead of end-of-day estimates. For flock counting, training workshops and tests would be programmed. A simplified and

proven training method for improving one's estimation of numbers was published in *American Birds* 26 (4) 706-712 (reprints available) but almost any CBC group can copy the method advanced, using both group quizzes based on a series of slides showing varying numbers of birds, and random tabletop "flocks" of coffee beans, rice grains, etc., the latter a useful home practice exercise. With adequate training and practice, errors in large-numbers estimation can be reduced to 5% or less. Further, observers can discover *their own* habitual counting bias and compensate for it. Compilers will be urged to carefully evaluate party routes and bird lists to avoid possible duplication.

10. *Feeding station counts.*—Species totals at feeding stations would be segregated from those afield, removing an ignored biasing factor. Where several feeders are so closely spaced that their patrons circulate between them, averages—not totals—will be presented.

11. *Linear or other transects.*—Carefully *censused* tracts based either on straight transects, point counts, or following topographic features such as streambeds, trails or roads, might be incorporated into the CBC format in certain Ideal Model counts. These might serve as more accurate sampling yardsticks for comparing year-to-year numbers. But it would be wholly unrealistic to expect any present CBC group to base its statistics solely on transects. The Ideal Model may suggest but will not require counts to experiment with various forms of census sampling techniques.

12. *Summary statistics.*—Ideal Model Counts will expand the information presently given in the summary, to give added dimension to the data presented. The present accounting is: "Total: 135 species, 101,450 individuals." The Ideal Model accounting (abbreviated in print) would give further insights, for example: **Totals:** 135 species, 10-year average 128 species, cumulative total (26 years) 201 species; species per party hour 1.61, 10-year average 1.52; 101,450 individuals, 10-year average 123,456; 1207 per party hour, 10-year average 1469 per party-hour.

We propose to test an Ideal Model, refined from this outline, this coming (1982-83) season. It would be limited at first to counts fielding statistically significant numbers of observers and basic parties, meeting all other stated conditions, with observers of high R.I.'s and dedicated compilers We would encourage a sampling from various latitude belts both coastal and inland. We would be pleased to have 25 CBCs run on Ideal Model lines the first year. A long-term goal might be 100 per year. But every count of any size could and should comply with most of the Ideal Model reporting procedures.

Two problems suggest themselves. An Ideal Model count obviously demands greater effort and care by every participant, especially by compilers. Moreover the editing and publishing of Ideal Model Counts would require more time, effort, and funds.

Two possible solutions to these problems offer themselves. Various direct incentives will be offered Ideal Model counts: forgiveness of 50% of participant fees, the honorary designation of "Elite Counts." The incentives of pride in leadership, of pioneering into new frontiers, of acquiring reputations of superiority are powerful motivating forces As for the publishing problem, experience will determine whether special funding is required.

Compilers or club presidents wishing to experiment with an Ideal Model count this coming year, and willing to accept the added work and responsibility, are invited to write the Editor, offering evidence that the Ideal Model regulations will be complied with. We will select and notify the Elite Counts for 1982-83 by September 15.

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CONTINENTAL ANALYSIS

The Changing Seasons

Autumn 1981—a season in which bird invaders seemed to sweep the continent

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THE FALL 1981 migration generally was considered dull by those who chase rarities, study the influence of meteorological phenomena on migration or search for new patterns of avian distribution. This is an accurate assessment. True, readers of these pages will find numerous rarities, scattered weather-related ornithological phenomena and a few new discoveries in avian biogeography, but the number and variety of these events are small compared to those of many autumn seasons. Two Regional reports stand out as exceptions: see the Ontario Region for a new look at the avifauna of James Bay, and the Hawaii Region for good news about a 'vanished' bird.

THE METEOROLOGICAL SETTING

THE SUMMER 1981 left much of North America dry. This trend generally continued into the early fall. The Far West began to receive exceptionally heavy rainfall in October and November. Precipitation in the central and northeastern interior of the continent during September and October tended to bring annual precipitation totals close to their long-term averages. The Southeast remained dry.

There were few major frontal systems to ground migrants. A minor frontal system that crossed the Midwest in early September was associated with a kill of about 800 birds at a Springfield, Illinois, TV tower the nights of September 2 and 3. The next frontal system crossed the