Atlas of the Breeding Birds of Ontario, 2001–2005

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Atlas of the Breeding Birds of Ontario, 2001–2005.—M. D. Cadman, D. A. Sutherland, G. G. Beck, D. Lepage, and A. R. Couturier, Eds. 2007. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, Ontario. xxii + 706 pp. ISBN 978-896059-15-0. Laminated hardback, $92.50 Canadian.—Any review of this book ought to begin by saying that it is a marvel. The well-conceived project was well supported by government and nonprofit organizations and also by individuals—there were, for example, 3,000 volunteer observers, 156 photographers submitted images for possible use, and Margaret Atwood and Robert Bateman, among others, provided blurbs. It is a big, heavy book: 9 × 12 × 2 inches and more than 7 pounds. There is color everywhere, on the attractive cover and on almost every page. It is sound—good field work, good analysis, good writing, good editing. Furthermore, the publishers used "green" production methods, and net profits from sales will go to bird conservation projects in Ontario.

The original Ontario breeding bird atlas (field work 1981–1985, published 1987) was one of the first North American atlases to reach print, beaten only by Vermont (1985) and tied by Maine. Beginning around 20 years after their first atlas projects, some 17 states and provinces have undertaken second atlases. The Ontario atlas (field work 2001–2005, published 2007) is the first to make it into print.

Two things need to be understood about Ontario as the subject for a breeding-bird atlas: it is large, and the northwestern four-fifths is uninhabited—well, sparsely inhabited. By large, I mean 1.1 million km^2, with the bottom at Detroit and Niagara Falls (around 42°N) and the top at Hudson Bay (>56°N). The front endpapers of the new atlas have a base map of the southeast one-fifth, and the back endpapers have a map of the northwest four-fifths at about half the scale.

A bird atlas is intrinsically two dimensional, a set of dot maps. The dots are given different colors or shapes to distinguish records of possible, probable, or confirmed nesting. This attribute is not another dimension of the data, but simply indicates the likelihood that the species is correctly regarded as nesting in the indicated square or block.

Most atlases would like to represent other dimensions of the occurrence of the various species. The new Manx bird atlas (Sharpe 2007), another handsome book but of a region of only 572 km^2, used a professional crew to survey the whole island in summer and winter. The Manx atlas, hence, added a second dimension—season—by means of separate summer and winter maps.

The third dimension that most breeding-bird atlases would especially like to include is abundance. The first breeding-bird atlas of Michigan (Brewer et al. 1991) used data from 73 U.S. Fish and Wildlife Service Breeding Bird Survey (BBS) routes to produce contour maps of individuals per route as a measure of abundance. Midpoints of the routes were taken as the data points, and maps for 95 species were produced using MACGRIDZO software.

The new Ontario atlas pursued a similar course but measured abundance by 5-min point counts. A BBS route could be thought of as a string of 3-min point counts each separated by half a mile. Nearly 62,000 point counts (roughly equivalent to 1,200 BBS routes) were produced by volunteers and paid staff. Three-fourths of the counts were in the southeastern one-fifth of the province. For persons wanting to produce contour maps of abundance, useful comments are provided on Ontario's tests of various techniques for interpolating between data points (pages 653–654). At the risk of spoiling the plot, "ordinary kriging" was the answer.

Included in 54 pages of introductory material are methods, a discussion of the biogeography of Ontario with special reference to birds, a short summary of coverage and results, 17 pages on changes in bird distribution between the two atlases, and a short section on how to read the species accounts. Following 576 pages devoted to 286 species accounts are nine useful appendices, a Literature Cited list, and an index to bird names in English, French, and Latin.

Each species account occupies two facing pages. Authors are indicated by bylines. Ninety-four authors, 140 reviewers, and 13 species-account editors were involved. All accounts consist of an introductory paragraph followed by three sections: Distribution and Population Status, Breeding Biology, and Abundance.

The Distribution and Population Status section is the heart of the account, describing the historical status of the species, stating the Ontario distribution based on the findings of the second atlas, and comparing that distribution with the results of the first atlas. The Breeding Biology sections are capsule summaries, most of which rely heavily on the accounts from *The Birds of America*. Their main use is to evaluate life history and behavior as factors that potentially affect the accuracy of atlas surveys. The Abundance sections mostly describe regions of higher and lower abundance using the contour maps and underlying point-count data.

For a few species, the Abundance section includes a population estimate for the whole province. In Appendix 6, these figures are given for 124 species, calculated from the point-count data using methods developed for the Partners in Flight landbird conservation program. Nashville Warbler (*Vermivora ruficapilla*) is elected the most abundant bird in Ontario, with a total population of ~15 million birds. Readers are cautioned that the estimates are "rough ballpark figures only." Six species were tied for the second through seventh places, at 12 million individuals.

Each species account includes one to three color photographs. Most were obtained in response to widely circulated public requests for Ontario photos of bird, nest, and breeding habitat. The 6,000 photos submitted were winnowed to 400 (56 photographers) for the book. Each photograph has a byline.

Several of the photographs are stunning examples of bird photography. Some that are not unusual from a technical or artistic standpoint are nonetheless highly interesting biologically. The photo of a female White-winged Crossbill (*Loxia leucoptera*) on the nest gives us an idea of just how snug a structure it is. It also shows us how cryptic the whole system of female and nest is; if not for the highlight in her eye, we would be hard put to know that we were looking at anything other than a spruce branch. A photo of another species, the Whip-poor-will (*Caprimulgus vociferus*), makes exactly this point. Its eye seems to be open slightly but lacks a highlight, and the bird could just as well be the top of a tree stub.

The bottom half of the first page of each account and the top half of many second pages are given over to maps. For most species, the first page has two maps, a largish one showing breeding evidence for southeast Ontario and a second, miniature "all-Ontario" map showing breeding evidence for the whole province. On the first map, breeding evidence is given for squares 10 km on a side. For the metrically challenged, one such square is 38.6 square miles, or a little more than the typical U.S. township. The all-Ontario map shows breeding evidence for 130 blocks measuring 100 km on a side. Each one of these, therefore, consists of 100 of the 10-km squares and measures 3,860 square miles.

Coverage in the southeastern section of the province aimed at 20 h of field work in 100% of the 10-km squares. For reasons of practicality, coverage was more dilute northward. For the large, mostly roadless region north of about 51°N, the aim was 20 h of coverage in two squares per block (that is, 2%) as a part of 50 h total in the block.

Nearly half the species have one or more contour maps showing relative abundance as number of birds recorded per 25 point counts. Unlike most topographic maps (and the Michigan breeding-bird atlas), the differences are indicated by areas of different colors rather than lines connecting points of equal value.

In a perfect world, the breeding-evidence maps would be larger; they are the most important feature of the book. However, for detailed analyses, investigators can potentially obtain summarized or raw data sets. Conditions, rules for online requests, and charges are spelled out in the database of the Atlas of the Breeding Birds of Ontario (www.birdsontario.org/atlas/aboutdata.jsp?lang=en).

The functions of the breeding-evidence maps are to convey (1) the current level of breeding evidence in each adequately covered survey unit (square or block) and (2) whether the species was recorded in the square or block in the first atlas, the second, both, or neither. I was able to learn to interpret these maps pretty quickly; I judge that they serve their purpose well enough.

A word about the colors of the maps: like nearly 10% of males in the United States (a similar prevalence in Canada, I suspect), I have red–green color blindness. Though it may seem unfair that maps and other color-coded graphics should be designed with 10% of one-half of the human population in mind, I suggest that it is unwise to design materials that will be unintelligible or at best ambiguous for this segment of the population. My wife, like 99% of the female population, has good color vision. She informs me that the breeding-evidence maps use the following colors: gold, orange, red, yellow, and dark gray (plus white). I can separate all these colors, whether I can identify them or not.

I have more trouble with the relative-abundance maps; they use white, yellow, gold, light orange, orange, and red. In areas where the abundance level marches in orderly progression from low to high, I can pretty much distinguish the six abundance classes. But an isolated blob might require considerable study in very good light.

At least these maps do not intermix red and green. Some of the maps in the front sections do, and add a variety of other colors. The map Percentage of Forest Cover (fig. 2-7) has seven colors: medium orange, light orange, really light orange, tan, light sage green, medium sage green, and dark sage green, occurring as small pixels. The map does get across to me the point that the forest cover is low in far southern Ontario, where all the people are, high in the boreal forest belt, and declining the closer the approach to tundra. Perhaps that is as much as one is expected to get out of the map.

The most important justification for a second atlas is to show changes, so comparability of the two samples is essential. The method used here (derivation outlined on pages 7–8) was to express data as the probability that the species would be found in a square after 20 h of effort. Each species account has a bar graph showing these values for the two atlases, for Ontario as a whole and also for the five atlas regions.

Overall, for the whole province including all habitats and all regions, 74 species showed significant increases and 39 showed significant decreases from the first atlas to the second. Eighty percent of the species (309 of 386) showed significant changes in at least one atlas region.

Probably each of the top 25 among the increasing species (shown in fig 4.1) has one or a few specific circumstances that might plausibly be invoked as explaining its increased distribution, but some broader generalizations may also be available. For example, 5 of the top 10 increasers are big birds (>1,800 g), from Canada Goose (*Branta canadensis*) at number 1 to Sandhill Crane (*Grus canadensis*) at number 10. Furthermore, of Ontario's dozen largest birds, 11 showed increases. Only the Great Blue Heron (*Ardea herodias*) decreased.

Each big bird species has taken its own route to increased range and numbers, a route that may include such events as reintroduction or natural reoccupation of former range, restriction of persistent pesticides, return of suitable habitat, and climatic changes. The common factor for the big birds is that all were extirpated or greatly reduced in numbers in historical time. In Michigan, adjacent to Ontario on the west, the list of species that were extirpated or brought to the verge of extinction by the early 1800s was likewise disproportionately among the larger birds (Brewer 1991). Overhunting (including market hunting) and recreational shooting were prominent factors in most of the declines. It is understandable that recent decades have seen increases in big birds, tracking what the Ontario atlas refers to as our changed societal relationship with wildlife.

The front section on changes between atlases is full of other provocative findings arranged by habitat and by "other categories," such as aerial foragers, short-distance migrants, and spruce budworm species. Attempts were also made to assess range changes in relation to predictions based on global warming. Although we might expect the second generation of atlases to provide good data for such tests, the results here are equivocal. Several southern species (15 of 22) at their northern breeding limits showed significant northward shifts in range, in accordance with expectations. However, among northern-breeding species with their southern range boundary in Ontario, 8 showed significant northward shifts, as was predicted, but 18 showed significant shifts south.

The atlas suggests that, for these species, increased forest cover (including maturing conifer plantations) in the south trumps deteriorating (warming) climate. It also seems likely that some seemingly northern species that are extending their ranges and representation southward may be returning to areas they once occupied prior to early deforestation and land drainage. This is certainly true of Common Raven (*Corvus corax*). Among other possibilities are Red-breasted Nuthatch (*Sitta canadensis*), Magnolia Warbler (*Dendroica magnolia*), and Blackburnian Warbler (*D. fusca*).

It may be that using atlas data to test range expansion related to global climate change will require advance planning that includes preselection of species to be used for testing. The species ought to be ones for which confounding causes will not be operating, as far as can be anticipated. In practice, this may not be very far.

Is the Ontario atlas a model for other second-generation breeding-bird atlases? Any project that took it as a model—and could afford it—would have a fine product. But in hard times, it may be worth thinking about what a logical minimum might be. A second-generation atlas needs to provide current distributional results and to point out changes that have occurred between the two atlas periods. Causes for the changes should be suggested and the available evidence laid out.

The practical justification for the atlas will usually be the conservation value of the data: What species have declined, and where? Why the decline? What is to be done? Here is where estimates of abundance are most important. They provide justification for declaring a species imperiled, whereas detailed distribution data suggest sites where conservation efforts can be focused.

And, of course, basic housekeeping and logistical information will need to be included. But the second atlas should be able to eliminate or drastically shorten much of the introductory material included in the first atlas and could probably shorten the species accounts.

Beyond the minimum requirements, each project could include anything else it chooses, on the basis of needs and means. I wish that every atlas would have a classification of ecosystems or vegetation types to be used by field observers to accumulate habitat data by species (as in Brewer et al. [1991], or better). Although the habitat occurrence of most North American bird species as a capsule description ("open woodlands") is fairly well known, details, including amplitude, are often lacking. Quantitatively documented differences in habitat distribution from different parts of the range of a species might help pinpoint the features on which its habitat selection is based. Or they might instead lead us to genetically based differences among populations.

Knowledge of the range of habitats over which a species occurs could also be of conservation value. "Wet sedge meadows" is a good description of the habitat of the Sedge Wren (*Cistothorus platensis*), but the species also occurs in mesic prairie. Preserving sedge meadows and restoring mesic prairies are good things. But the knowledge that Sedge Wrens also do fairly well in unmowed stands of cool-season hay grasses such as Smooth Brome (*Bromus inermis*) might show us a path to Sedge Wren conservation that could be, at a minimum, supplementary to preservation of natural areas.

Conducting point counts by vegetation type or ecosystem, or at least sorting them that way, could also lead to an alternative and probably more satisfactory estimate of population size, by calculating habitat-specific numbers and summing them regionally and province- (or state-) wide. Also needed, of course, would be cover maps that used the right classification and scale.

What form should a second-generation atlas take? Almost any new atlas is going to have a substantial web component. Will all have a print component? Once an atlas project has basic website competence, putting an atlas online (or on a disk) could almost certainly be done faster and more cheaply than a print version. I like books, and I think that a printed and bound atlas brings advantages and amenities that a cyberspace version lacks. Still, the website approach has other strengths beyond speed and cost. Data from current and previous atlases can be stored along with other sorts of geographically organized information, and potentially all this (perhaps combined with one's own data) can be accessed in ways that will allow immediately useful comparisons. Perhaps there need be no third-generation atlases; an ongoing stream of breeding evidence from a cadre of field observers could produce an online bird atlas that was up-to-date every day.

But websites may turn out to have additional problems, too. The most evident is durability. The atlas as website will be a commitment to perpetual maintenance. Books have already proved to have useful lives of many centuries. Will electronic data have the same longevity? Fortunately, I am not required to decide any of these questions for a real-life atlas, or for this review.

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