

Winged-warblers

When to submit in eBird a bird as “pure” or as “hybrid”

July 10, 2019

Ian A. Worley
Professor Emeritus
University of Vermont

Steven Lamonde
Department of Environmental Studies
Antioch University New England

The Setting

At this writing in 2019 in the Champlain Valley of Vermont, there has been much recent discussion about the identity of “pure” species vs. hybrids among the so-called “winged-warblers”. Most of the discussion and consternation has been in regard to Golden-winged type birds, especially focused on wing ornamentation and breast color. The questions among birders go like this:

“I always thought that “pure” Golden-wingeds had to have a solid yellow wing patch, but now I hear that they can also have two yellow bars per wing. What’s going on?”

“I always understood that any yellow on the chest of a Golden-winged showed it to be a hybrid, but now someone tells me that new research says that isn’t a necessarily hybrid indicator. Is that true?”

Birders have been eager the last few years to search for and find Golden-winged Warblers, and to aid on-going research in the Champlain Valley that focuses on the status and future of Golden-winged Warblers in an environment where Blue-winged Warbler hybridization threatens the existence of Golden-winged Warblers. During these years many resident birders have become experts in finding winged-warblers, documenting their plumages in detail, photographing them, and fitting them into the eBird categories.

In this spring and early summer of 2019, birders in Vermont’s Champlain Valley lowlands submitted to eBird over 400 checklist reports of “winged-warblers.” The birders had six choices for the eBird submissions: the two species, two named hybrids, a catch-all category for hybrids, and a category for all other encounters from “heard only” to poorly-seen birds.

This article clarifies procedures for submitting winged-warbler observations to eBird regarding the distinction between species and hybrids, especially regarding wing ornamentation and breast color. What follows is an overview of the problem, the science behind the issue, and guidelines for submissions to eBird.

The Problem

A point of confusion emerged in early spring, as rumors spread of new criteria for classifying the birds by the six eBird categories. Birders started asking if they needed to change how they reported birds, and if they needed to go back and change previous records?

Quickly the focus centered on wing ornamentation and breast color, in particular with birds that otherwise fit descriptions of Golden-winged Warbler. And the core question became: “How do I tell a ‘pure’ Golden-winged from a hybrid? The rules seem to have be changed.” This confusion was especially vexing for birders seeking life-species, or adding species to seasonal and yearly lists.

It has long been known that Golden-winged and Blue-winged Warblers, and their many rampant hybrids, occupy similar ranges, habitats, and behaviors. This is quite unusual. Most birders have heard that “it is likely that all winged-warblers are actually hybrids.” If so, then how, if at all, does that affect submitting observations to eBird? Birders want hard-and-fast criteria for telling if a bird is a “pure species” or a hybrid. Descriptions such as “That bird is mostly a Golden-winged Warbler.” are not helpful to an eBirder.

Birders look to just a few widely used sources for assistance with identifications. Principal sources are Sibley, Peterson and Audubon field guides and the various resources from the Cornell Lab of Ornithology, including eBird. In all of these a prominent and primary distinction for Golden-winged Warbler is the ornamentation of the wing. The shape is described as a “patch”, “panel”, “broad-bar”, and/or “flash”. In those sources it is never described as “two bars per wing.” The color is described as “golden”, “yellow”, and “bright yellow”. By contrast Blue-winged Warblers are described as having two white (or sometimes “yellowish”) wing-bars per wing. There is no ambivalence in these published descriptions.

However, there are photographs of birds in the Macaulay Library that are listed as Golden-winged Warblers, that have the appearance of two yellow bars, one-and-a-half yellow bars, or a patch trending toward two bars. This would indicate that some birders, and some eBird reviewers, accept a broader range of shapes than is displayed and described in the field guides.

Meanwhile, there are researchers working independently from the common birding practices and the eBird taxonomy, who observe that the shape of the yellow wing area can have a variety of looks, while all the other visible characteristics add up to a Golden-winged Warbler. And these birds can and do end up in the research as “Golden-wingeds”.

All those same birder field guides and apps, do not show any yellow in the breast of a Golden-winged Warbler. *Birds of North America* describe females as having “color patterns similar to males but duller”; also noting that females may have a hint or tinge of yellow on the back or belly (but not throat).

The bottom line is that the resources commonly used by birders define “pure” Golden-winged Warblers quite consistently as having broad areas of yellow in the wing, in contrast with two bars, and always yellow. Moreover, males would not have any yellow in the breast or belly.

However, researchers and others interested in the genetic relationship to plumage, and its use in defining a “pure” species, are likely to have a more complicated concept, a concept that might not fit with the available taxonomic categories in eBird.

The Science

Two perspectives are involved. One contrasts genetic variation with visual plumage variation. The second contrasts the “categorical” taxonomic system of eBird with a system of naming birds more conversationally and qualitatively, depicting various degrees of plumage gradients.

It has long been known that the winged-warblers are an unusual phenomenon. There are two distinctive plumaged species, and an abundance of diversely plumaged hybrids. Moreover, all the forms appear to be able to interactively breed and generally coexist. And, in spite of the hybridization and crossbreeding abilities, at least up until quite recent times both species have remained constant in appearance. Of late, there has been a widely documented demise of the Golden-winged Warbler with the Blue-winged Warbler maintaining its character and abundance.

What then do the genes show? Excellent insight comes from work by Toews et al. who demonstrate that 99.97% of the warblers’ genes are shared in all the winged-warblers, without regard to their visual appearance. Moreover, the hybrid genetic expressions are almost entirely restricted to plumage characteristics. Thus, unlike the circumstances with a great many hybrids in other bird species, the plumage characteristics of the winged-warblers reveal a lot about the hybrid genetics of the birds.

“In the warblers, the finding that so few genes are likely responsible for such dramatic differences in coloration across multiple feather tracts is both unexpected and exciting. . . . On one hand, the low and restricted genomic divergence between these taxa—likely resulting from extensive hybridization—makes their classification as distinct species less certain; on the other hand, these distinct phenotypes appear to have persisted despite this extreme genomic similarity and despite a protracted period of hybridization.” Toews et al.

Some other bird taxa, for example, have clearly distinct subspecies and/or hybridization revealed in their genetics, but whose phenotypes (the visual appearance used by birders to make IDs) show none of it . . . all the birds just look alike.

The winged-warblers, then, reveal the degree of hybridization and the proportional input from the two species, in the kind and abundance of a number of phenotypical features. Toews et al. have modified an early table from F.B. Gill which allows a “scoring” of 11 variable and discernable phenotypical features (<https://doi.org/10.5061/dryad.kb610>) to place any hybrid bird on a continuum scale from Blue-winged Warbler to a Golden-winged Warbler.

The table, with a minor correction, is included at the end of this article.

Each feature has a spread of numerical values from 0 to 3, 4, or 5 representing the various steps of the look of the feature. A zero means the characteristic is a defining feature for Blue-winged Warbler, and the max number for the feature is its expression as a defining feature for Golden-winged Warbler. Summing the numbers for the expression of each of the 11 features tells the degree of hybridization between the two species and “nearness” to either species.

Here are three scale examples from “pure” Blue-winged to “pure” Golden-winged.

Wing Bar color:

- 0 White
- 1 White with yellow edging
- 2 White with pronounced yellow
- 3 White and yellow
- 4 Yellow with pale base
- 5 Yellow

Wing Bar width:

- 0 Narrow and well separated
- 1 Broad and well separated
- 2 Broad and less separated
- 3 Broad and confluent

Breast color:

- 0 Yellow-green
- 1 Yellow-green with gray
- 2 Mixed gray and green
- 3 Gray or white with some yellow or yellow-green
- 4 Gray or white.

This scaling makes very clear that a specific feature does not in itself separate a species from a hybrid, **but combinations do**. The two endpoints of the continuum, Blue-winged Warbler and Golden-winged warbler are defined by the collective minimal or maximum expression, respectively, of each listed phenotypical expression. In birding language, then, the two species are defined specifically by the presence and absence of 11 different features all considered at the same time. An easy to use table below lays out the 11 field marks that define “pure” species individuals for the two species.

This works because the genetic knowledge of hybridization is essentially limited to genes affecting plumage. Also note that nowhere are songs or other vocalizations used as reliable features for the identification of species or hybrids.

Respected and highly used field guides have evolved over generations of input from very careful observation by birders. It is thus not surprising that their depictions of the two winged-warbler species are consistent one guide to another, and as well they are appropriate from the perspective of the genetic work reported by Toews et al.

The solution

Birders therefore, it seems to us, should continue to use the features and descriptions from the respected birding guides to place their observations in eBird checklists. The two species are clearly defined by a unique collection of plumage characteristics present or absent. These must be accounted for in observations. Any bird deviating from these is thus entered as a hybrid.

Relative to the questions from birders that came up this spring, a “pure” Golden-winged Warbler will have a wing ornamentation that has a shape where terms such as “patch”, “broad”, and “panel” are warranted, and a bird otherwise looking like a Golden-winged Warbler but has other than a “broad and confluent” bar should be entered as a hybrid.

Similarly, a wash of yellow on the breast of a bird otherwise looking like a Golden-winged Warbler, should be entered as a hybrid. However, females might have hints or tinges of yellow on the belly.

In the practical world of eBird, it is valuable to note that eBird is designed as a “citizen science” activity. As such, there is no expectation that birders seek out or understand the scientific literature. There is, however, the expectation that birders will use respected field guides and websites specifically written and presented for the birding public. In this particular situation, in the light of Toews et al. there is agreement on the status of the phenotypic features.

Thanks to Mark LaBarr, Audubon Vermont; and Kent McFarland, Vermont Center for Ecostudies for their assistance.

Citations

Gill Frank B. Historical Aspects of Hybridization between Blue-winged and Golden-Winged Warblers. *The Auk*, Vol. 97 No. 1 (Jan. 1981) pp 1-18.

Toews DPL, Taylor SA, Vallender R, Brelsford A, Butcher BG, Messer PW, Lovette IJ (2016) Plumage Genes and Little Else Distinguish the Genomes of Hybridizing Warblers. *Current Biology* 26(17): 2313-2318. <https://doi.org/10.1016/j.cub.2016.06.034>

The “Plumage Scoring Criteria” table is found here:

Toews DPL, Taylor SA, Vallender R, Brelsford A, Butcher BG, Messer PW, Lovette IJ (2016) Data from: Plumage genes and little else distinguish the genomes of hybridizing warblers. Dryad Digital Repository. <https://doi.org/10.5061/dryad.kb610>

Continue to next page --

Plumage characteristics for “pure” species. Adapted from the Toews et al. “Plumage Scoring Criteria” table.

Golden-winged Warbler plumage

Throat – Black
Wing-bar width – Broad and confluent
Wing-bar color – Yellow
Nape – Gray or white
Back – Gray or white with some yellow or yellow-green
Rump – Gray or white
Breast – Gray or white
Belly – Gray or white
Mask – Full mask
Eye-line – White
Moustache – White

Blue-winged Warbler plumage

Throat – No black
Wing-bar width – Narrow and well separated
Wing-bar color – White
Nape – Yellow-green
Back – Yellow-green
Rump – Yellow-green
Breast – Yellow-green
Belly – Yellow-green
Mask – Line (no mask)
Eye-line – Fully yellow
Moustache – Fully yellow

Continue to next page for the complete Toews et al. “Plumage Scoring Criteria” table.

Plumage scoring criteria adapted from Gill (1980). We added three additional characters: mask, eye-line, and moustache. *indicates feather tracts that differ in the extent of yellow and were combined additively to create the “sum yellow” score.

Plumage Character	Range and Criteria (0 = Blue-winged, 38 = Golden-winged)
Throat	0 – No black 1 – Black with white on chin 2 – Black
Wing-bar width	0 – Narrow and well separated 1 – Broad and well separated 2 – Broad and less separated 3 – Broad and confluent
Wing-bar color*	0 – White 1 – Yellow edging 2 – White with pronounced yellow 3 – White and yellow 4 – Yellow with pale base 5 – Yellow
Nape*	0 – Yellow-green 1 – Yellow-green with gray 2 – Mixed gray and green 3 – Gray or white with some yellow or yellow-green 4 – Gray or white
Back*	0 – Yellow-green 1 – Yellow-green with gray 2 – Mixed gray and green 3 – Gray or white with some yellow or yellow-green 4 – Gray or white
Rump*	0 – Yellow-green 1 – Yellow-green with gray 2 – Mixed gray and green 3 – Gray or white with some yellow or yellow-green 4 – Gray or white
Breast*	0 – Yellow-green 1 – Yellow-green with gray 2 – Mixed gray and green 3 – Gray or white with some yellow or yellow-green 4 – Gray or white
Belly*	0 – Yellow-green 1 – Yellow-green with gray 2 – Mixed gray and green 3 – Gray or white with some yellow or yellow-green 4 – Gray or white
Mask	0 – Line (no mask) 1 – Intermediate 2 – Full mask
Eye-line*	0 – Fully yellow 1 – More yellow 2 – Hint of Yellow 3 – White
Moustache*	0 – Fully yellow 1 – More yellow 2 – Hint of Yellow 3 – White