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Apparent Townsend's x Black-throated Green Warbler
(*Setophaga townsendi* x *virens*) hybrids in Kansas and Nebraska

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Introduction

The Townsend's Warbler (*Setophaga townsendi*), Hermit Warbler (*Setophaga occidentalis*), Golden-cheeked Warbler (*Setophaga chrysoparia*), and Black-throated Green Warbler (*Setophaga virens*) are similar in appearance and vocalizations. Evaluation of mtDNA suggests that these four species diverged about 1 million years ago during the mid-Pleistocene (Lovette et al. 2010), at which time glaciation separated ancestral forms thus allowing for speciation (Morse and Poole 2020). Under the environmental conditions prevalent today, however, the breeding distribution of Townsend's Warbler now overlaps to a limited extent with those of the Hermit and Black-throated Green Warblers, and hybridization occurs frequently in these contact zones. The contact zone between Townsend's and Hermit Warblers in Oregon and Washington has been studied extensively (Wright et al. 2020) and several hybrid individuals have even strayed to the southern Great Plains. Recently for example, Townsend's x Hermit Warblers were photographed in Hamilton Co., Kansas on 17 May 2014; Midland Co., Texas on 17 Sep 2017; Pueblo



Figure 1. Apparent Townsend's x Black-throated Green Warbler photographed at Shawnee Mission Park (Johnson Co., Kansas) on 30 Apr 2014. Photograph by Terry Swope.



Figure 2. Apparent Townsend's x Black-throated Green Warbler photographed at Elkhart (Morton Co., Kansas) on 3 May 2016. Kevin Groeneweg / Macauley Library at Cornell Lab of Ornithology (ML28101371).

Co., Colorado from 10-11 Sep 2020; and in Roosevelt Co., New Mexico between 26 Sep and 4 Oct 2020 (eBird 2021).

Hybridization between Townsend's and Black-throated Green Warblers has only recently been studied. Toews et al. (2011) identified a narrow-width (~60 km) zone of hybridization in northeast British Columbia where the boreal forest and Rocky Mountain forests interface. In this zone, 38% of individuals were determined to be hybrids or backcrosses. Importantly, most hybrids resembled one parental species or the other, and thus would not be easily recognized as hybrids under field conditions. Formation of this hybrid zone may be a recent phenomenon caused by westward expansion of the breeding distribution of the Black-throated Green Warbler in the boreal forest (Mlodinow et al. 2014). There are relatively few reports of Townsend's x Black-throated Green Warblers away from this contact zone,

probably owing to (1) resemblance of hybrids to one of their parental species, (2) the attention to detail required for detection of phenotypically intermediate hybrid individuals under field conditions, and (3) widespread lack of awareness among birders that these two species hybridize. Until recently, a specimen collected near Valemont, British Columbia on 17 Jun 1988 was apparently the only publicized record of this hybrid pairing (Rowher 1994). Then between 2009 and 2013, two apparent Townsend's x Black-throated Green Warblers were photographed in eastern Colorado; Mlodinow et al. (2014) reported on their occurrence and provided useful commentary on the identification of such hybrids, which is based on the presence of field marks intermediate between the parent species. A quick check of eBird (performed March 13, 2021) yielded almost 20 Townsend's x Black-throated Green Warbler records in total from the following countries: Costa Rica (n=4), Mexico (n=3), United States (n=10), and Canada (n=1). All of the 10 United States records were photographically documented.

Kansas and Nebraska Records

Here we report the occurrence of four apparent Townsend's x Black-throated Green Warblers in Kansas and Nebraska – the only such records known from these states. The first apparent Townsend's x Black-throated Green Warbler to be recognized as such was an adult male at Shawnee Mission Park (Johnson Co., Kansas) on 30 Apr 2014, discovered by Terry Swope (Figure 1). That individual was easily recognized by its Townsend's Warbler-like appearance, although it differed in several ways: its crown and auricular patch appeared lighter, its black throat and bib extended farther onto the anterior sides, and the yellow base coloration of the breast and flank region was less extensive. Moreover, its undertail coverts appeared mostly to completely unmarked, although that field mark is somewhat difficult to assess because of the angle of the photographs. Upon viewing photographs, Kimball Garrett (co-author of the *Peterson Field Guide to Warblers of North America*), suspected

Townsend's x Black-throated Green Warbler was the correct identification but expressed caution given the limited availability of specimens with molecular data proving their identity (K. Garrett, comm. with M. Robbins). Following from Garrett's advice, this record and the other three presented herein should be considered "apparent" for lack of genetic evidence to corroborate their identifications.

A second apparent Townsend's x Black-throated Green Warbler was discovered in Kansas at Elkhart (Morton Co.) on 3 May 2016 by Kevin Groeneweg and Pete Janzen (Figure 2). Identification was based upon the presence of characteristics intermediate between the parent species. Relative to an adult male Black-throated Green Warbler – which it most closely resembled – its crown and auricular patch appeared darker than expected and the dark throat coloration was more limited in extent and did not bleed into the anterior side region. The third apparent Townsend's x Black-throated Green Warbler known from Kansas was photographed in Wichita (Sedgwick Co.) on 19 May 2011. Photos of that male which showed intermediate characteristics (i.e., the dark crown and auricular patch of Townsend's Warbler with mostly to entirely whitish underparts of Black-throated Green Warbler) resurfaced years later (P. Griffin, pers. comm.). Most recently, Ed and Mark Brogie,



Figure 3. Apparent Townsend's x Black-throated Green Warbler photographed at Wildcat Hills Nature Center (Scotts Bluff Co., Nebraska) on 31 Aug 2018. Mark Brogie / Macauley Library at Cornell Lab of Ornithology (ML113476851).

Sharla Meester, and Dave Stage discovered Nebraska's first apparent Townsend's x Black-throated Green Warbler at Wildcat Hills Nature Center (Scotts Bluff Co.) on 31 Aug 2018 (Figure 3). That individual – which was an adult male – resembled Townsend's Warbler upon first glance. However, its auricular patch was lighter than expected and its underbelly was entirely whitish indicating Black-throated Green Warbler influence.

Table 1. Records of apparent Townsend's x Black-throated Green Warbler in the United States. Records were obtained by searching the eBird (2021) database and from Mlodinow et al. (2014). All records listed herein were photographically documented. Three eBird records documented with photographs (noted as pending below) are awaiting approval by regional reviewers at the time of writing. Another record with photographs accepted as a Townsend's x Black-throated Green Warbler was excluded due to concerns about its identification.

Date	County, State	Reference(s)
8 May 2009	Larimer, CO	Mlodinow et al. 2014
20-21 Apr 2011	Galveston, TX	eBird 2021
19 May 2011	Sedgwick, KS	n/a
4 Jun 2011	Harney, OR	eBird 2021
11 May 2013	Baca, CO	Mlodinow et al. 2014, eBird 2021
30 Apr 2014	Johnson, KS	King 2014
21 May 2014	Pueblo, CO	eBird 2021
2-5 Sep 2015	Weld, CO	eBird 2021
19 Apr 2016	Cameron, TX	eBird 2021
3 May 2016	Morton, KS	eBird 2021 (pending)
5 Sep 2016	Weld, CO	eBird 2021
28 Apr 2018	Texas, OK	eBird 2021 (pending)
31 Aug 2018	Scotts Bluff, NE	eBird 2021 (pending)
19 Sep 2018	Los Angeles, CA	eBird 2021
7 May 2019	Pueblo, CO	eBird 2021
5 Sep 2020	Cook, IL	eBird 2021

Conclusion

The four records of apparent Townsend's x Black-throated Green Warblers described herein bring the total number of publicized United States records to 16, barring any we are unaware of (Table 1). The majority of these records (13 of 16) are from Colorado, Kansas, Nebraska, Oklahoma, and Texas, suggesting that the passage of Townsend's x Black-throated Green Warblers is largely through the central states, as expected, since this trajectory is intermediate between the migration routes used by the parent species. Given the relative obscurity of this hybrid pair and the difficulties of its identification, the frequency of occurrence of Townsend's x Black-throated Green Warbler in the Great Plains would seem to be far greater than these 11 documented records from Colorado, Kansas, Oklahoma, and Nebraska would suggest.

Interestingly, a cursory review of eBird photos of Townsend's Warbler and Black-throated Green Warbler in the Great Plains revealed several additional occurrences of apparent hybrids that went unrecognized in the northern Great Plains. If hybridization between Townsend's and Black-throated Green Warblers is increasing as the breeding distribution of the Black-throated Green Warbler advances westward, these hybrids may become more frequent in the Great Plains (Mlodinow et al. 2014). We recommend that observers carefully scrutinize Townsend's and Black-throated Green Warblers and attempt to photograph any suspected hybrids; doing so can help to characterize the non-breeding distribution of this hybrid pairing, for which there is little data.

Acknowledgements

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