

Seasonal timing: Sparrows

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Some five years ago, I published a piece in this column on the use of seasonal timing as an aid to bird identification (Leukering 2014). That piece was focused on a suite of Colorado species – small, green flycatchers -- that presents among the most-difficult identification challenges in Colorado birding. While the reader can find that piece on the Colorado Field Ornithologists' website (see link provided in the Literature Cited section, below), some of the introductory material deserves repetition here (with some slight editing).

Amongst the most-used criteria brought to bear on bird identification by expert birders is likelihood. Not just likelihood as to whether one finds Species X swimming on lakes or Species Y occurring in the Northern Hemisphere, but the likelihood of occurrence of Species Z

at this place, and

ON. THIS. DATE.

Though many birders seem to think that migration is migration, that is far from the case. Even in spring migration, which is a phenomenon much more compressed in time than is fall migration for most bird species, different species move at different times, and the details – arrival, peak, completion – have been refined over and over through the millennia, with most of the outliers being culled from the breeding population. So, while individual birds do show up outside the typical migration seasons of their respective species, the percentage of individuals that do so is miniscule. The penalty for a bird that arrives too early in spring may well be dying of starvation – death of the individual. A migrant arriving too late may find all of the good territories and/or good mate choices taken – death of those genes that do not get passed on.

It is a well-known aphorism that any book that includes information on spatial or temporal occurrence of birds is out-of-date even before it is published. One of the driving forces in making that statement true is that organisms are constantly pushing the occurrence envelope, typically via variation in genetics; it is an evolutionary safeguard against changing conditions. Oh, such efforts do not always work – species do go extinct, but it can allow for alteration in any number of aspects of bird occurrence (e.g., habitat, wintering area, spring-migration timing), and there is a large body of published works on just such.

Though bird books, perforce, present out-of-date temporal-occurrence summations, as noted by Leukering (2014), eBird (www.ebird.org) presents up-to-date knowledge of spatial and temporal bird occurrence and I feel that it is greatly under-utilized by Colorado's – and the rest of the world's – birders, particularly as that facet that can inform on bird identification. The back cover of this issue presents temporal-occurrence graphs taken from eBird. These graphs point out how typical occurrence timing might inform on one's field-identification skills. **In fact, at least some skilled, experienced Colorado birders could figure the species involved solely from the occurrence parameters!**

—*Nota Bene*—

For those that are interested in developing their own data comparisons in eBird but that do not know how to go about it, I have written a post on the Colorado-Wyoming eBird blog (Leukering 2019). This post – Getting Information From eBird – uses a step-by-step process to obtain occurrence graphs such as those presented in this essay. The post can be accessed by entering this web address – <https://tinyurl.com/gettingeBirddata> – into your Internet browser.

THE USEFULNESS OF SEASONAL TIMING

First, a caveat: I do not encourage identification solely on likelihood, just as I do not encourage using a single plumage character or other appearance feature, as the basis of identifications. However, incorporating knowledge of what is typically found when will greatly assist in elevating the percentage of correct identifications.

Histograms (graphs): In the histograms used in this paper's figures, the x axis (horizontal) represents the calendar, with each month divided into four weeks beginning on the 1st, 8th, 15th, and 22nd, with the last "week" varying from 7.25 to 9 days long. The y axis is frequency – that is, the percentage of eBird checklists from that region during that time period that reported the presence of that species. When looking at larger regions (such



Brewer's Sparrow. North Park. 30 August 2009.
Photo by Peter Burke.

as counties or Colorado's plains), even common species rarely see frequencies in these presentations much above 20% (that is, occurrence on 1 in every 5 checklists). All histograms used here use all relevant public eBird data as of 15 February 2019.

Some histograms refer to the entire state of Colorado, while others refer to individual West Slope and eastern-plains subsets of counties. I selected a set of five counties to represent the West Slope: Delta, La Plata, Mesa, Montrose, and Routt. All five counties host a large elevational gradient (unlike counties such as San Juan that are strictly, or nearly so, montane) and cover the latitudinal breadth of the state. They are also, possibly, the five most-heavily birded counties on the West Slope with that large elevational gradient (thus ruling out Summit), resulting in a more-robust data set to analyze. I selected

nine counties to represent the eastern plains: Adams, Arapahoe, Logan, Morgan, Prowers, Sedgwick, Washington, Weld, and Yuma. I chose these counties primarily to exclude foothill and montane areas from consideration, as areas of topographic relief and the plains have quite different suites of breeding birds. I surmise that these are also the most heavily birded plains counties that lack even foothills.

In construction of the data filters that are the backbone of eBird data quality, I used the frequency value of 1% as a guideline indicating "rarity" -- that is, less than 1 of 100 eBird checklists recording that species in that area in that week. Here I use that same guideline to suggest that particular care should be made in identifying that species at that time and at that location.

I present, in two sets of four species each, the occurrence parameters in Colorado of eight sparrow species, seven of which breed in the state: Chipping and Brewer's (*Spizella passerina* and *breweri*, respectively), Vesper (*Pooecetes gramineus*), Savannah (*Passerculus sandwichensis*), Song and Lincoln's (*Melospiza melodia* and *lincolni*, respectively), and White-crowned (*Zonotrichia leucophrys*). The first of these sets is those lacking significant streaking on the underparts (here termed "unstreaked"), though I divide it into two subsets: Chipping and American Tree (*Spizelloides arborea*) sparrows and Brewer's and White-crowned sparrows. I make that further split of species to highlight the very strong differences in occurrence parameters between the two species of the first subset, as birders frequently confuse the two. The second set houses sparrows that are generally more or less heavily streaked below ("streaked"): Savannah, Vesper, Song, and Lincoln's sparrows.

With the above, though, there are further caveats. **All Colorado-occurring sparrows are streaked below as juveniles** (including juncos and towhees). However, with one important exception, **virtually all individuals of all eight species molt out of most of their juvenile plumage before migrating**. While there are partial exceptions to this "rule" among species not discussed here (e.g., White-throated and Swamp sparrows), juvenile Chipping Sparrows breeding in western North America usually move long distances in post-breeding dispersal and migration wearing all or much of their juvenile plumage (Pyle 1997 pg. 557, Floyd 2011). In fact, some are still sporting obviously streaked underparts into October! For those with even a little interest in learning more about molt in birds, I suggest (and cannot praise more highly) Steve Howell's very accessible treatment of the subject (Howell 2010).

Sparrow Occurrence Patterns – The Passerellidae (New World sparrows; formerly considered part of the mostly Old World family, Emberizidae) houses many species, the predominant color of most being brown, and these species cause many birders identification consternation. While this essay is not the venue for detailed discussion of differentiating the various Colorado species, gross aspects of size; shape; relative tail length; and extent, color, and definition of any streaking below can quickly winnow the choices. Do not forget leg color; most sparrows have pink legs (Leukering 2015), but some have dark legs. Throw in location and date, and one is often left with only one or two options.

I present histograms of temporal occurrence for eight sparrow species of relatively common and widespread occurrence in Colorado; Figures 1-3 on this issue's back cover and Figures 4-8 placed in the body of the text. Of these, all but one breed in the state: Note that the occurrence parameters of White-crowned Sparrow are complicated by the fact that the breeding subspecies, *oriantha* (called Mountain White-crowned Sparrow), is replaced in winter by the taiga-breeding *gambelii* (Gambel's White-crowned Sparrow). I do not here treat the two subspecies' differences in occurrence in the state (though see Leukering and Mlodinow 2017), instead, presenting parameters at the species level. American Tree Sparrow is the eighth species and differs from all the others in that it occurs in Colorado only in the colder months.

UNSTREAked SPARROWS, SUBSET 1: CHIPPING SPARROW VS. AMERICAN TREE SPARROW

While Chipping and American Tree sparrows share quite a few plumage features (including gray rump and upper-tail coverts), there are many differentiating factors in color of soft parts (Leukering 2015) and plumage parts (bill, eyeline, upper sides, and legs are just a few). However, perhaps the most distinctive difference between the two is that there is, essentially, very little overlap in the two species' temporal occurrence in Colorado (Figures 1-3 on back cover).

Figures 1, 2 (Back Cover). Frequency of detection on Colorado eBird checklists of Chipping and American Tree sparrows presented in two fashions. See Histogram text for explanation of "weeks."

Figure 3 (Back Cover). Frequency of detection on eBird checklists of Chipping and American Tree sparrows in nine eastern-plains Colorado counties (see text for enumeration of counties). See Histogram text for explanation of "weeks."



Song Sparrow. Morrison County. 25 February 2013. Photo by Peter Burke.

The line graph in Figure 1 (back cover) presents eBird data from Colorado and indicate that the only time in the year in which neither species is rare (rare defined as <1% frequency) at the same time is the last two weeks of October. More specifically, American Tree Sparrow Colorado-occurrence frequency drops below 1% in spring before Chipping Sparrow frequency rises to or above 1%, so there is essentially no spring overlap of the two species. In fact, in the first week of April – where the two species' frequency curves cross heading in opposite directions, those frequency values represent totals of only 185 Chipping and 111 American Tree sparrows... in all of Colorado and in all years combined (eBird 2019). Compare those values to the individual peaks of abundance

– 58,572 Chipping Sparrows in the second week of May and 15,113 American Tree Sparrows in the last week of December – and one can readily see the insignificance of those first-week-of-April totals. Additionally, note that the respective peak-number weeks are only two weeks from being exactly six months apart! I have included the bar graph of Figure 2 (back cover) as another representation of the data set involved in Figure 1 (back cover); some readers may understand the difference in seasonal-occurrence timing of the two species better in this histogram (the top bar graph represents Chipping Sparrow).

Figure 3 (back cover) presents a comparison of frequency histograms of these same two species, but only in eastern-plains counties. Note that the Chipping Sparrow histogram is more complex than the one using data from the whole state. The difference is that Chipping Sparrow is essentially absent from the plains as a breeding species; note the two confirmed breeding reports from Weld Co. (Ortega 2016). Thus, except for the much-lower frequency of Chipping in June and early July, the parameters of the graph in Figure 3 (back cover) are essentially the same as those of the statewide graph, with frequency curves crossing in the same weeks and with both species' frequency values being $\geq 1\%$ at the same time only in the last two weeks of October.

UNSTREAked SPARROWS, SUBSET 2: BREWER'S AND WHITE-CROWNED SPARROWS

Unlike the two species in the first subset of unstreaked sparrows, birders probably only rarely confuse Brewer's and White-crowned sparrows each for the other; highlighting the two species in the first subset results in this dichotomy. Two features are obvious in Figure 4, the first being the higher detection rate of White-crowned Sparrow over nearly the entire year and the second that Brewer's Sparrow is not present during the colder months (contra White-crowned Sparrow). One confounding aspect of the first feature is probably birders' preference for visiting the generally higher-elevation habitats of White-crowned Sparrow in summer, rather than Brewer's Sparrow's favored sagebrush flats. There are certainly other confounding factors, as I believe that Brewer's Sparrow has a higher (much higher?) overall breeding abundance in Colorado than does White-crowned Sparrow, considering the huge swaths of the state that host breeding Brewer's Sparrow, while White-crowned Sparrow has a relatively narrow (figuratively and literally) choice of breeding habitats. In fact, the most-recent Colorado Breeding Bird Atlas (CBAP 2016) found Brewer's Sparrow in 484 atlas blocks and White-crowned Sparrow in just 348 (Magee 2016, Opler 2016).

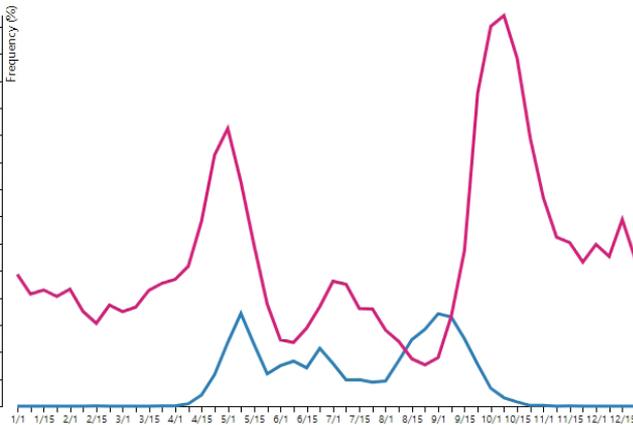


Figure 4. Frequency of detection on Colorado eBird checklists of Brewer's and White-crowned sparrows. See Histogram text concerning explanation of "weeks."

The only time during the year that Brewer's Sparrow detection rate climbs higher than that of White-crowned Sparrow in the state is in the four weeks from the second week of August through the first week of September. I believe that a cause of this shift in relative detection rates of the two species is a change in birder focus. In early fall, a large percentage of eastern Colorado birders (which greatly outnumber western Colorado birders) moves from a stronger-than-usual focus on foothill and montane birding to a strong focus on migration on the plains, particularly the migration of shorebirds (pers. obs.). The lack of White-crowned Sparrows among the hordes of migrant sparrows on the plains in that period (Figure 5) probably accounts for at least some of the change in statewide relative detection rates (Figure 4). However, looking at West Slope data (Figure 6), we can see that Brewer's Sparrow detection frequency is also higher there during early fall, but with only three weeks in that period (as compared to the state-level four-week period). So, either White-crowned Sparrows get really secretive in early fall (possibly due to molting at that time; see discussion below) or West Slope birders also concentrate on low-elevation habitats in early fall; perhaps both are true.

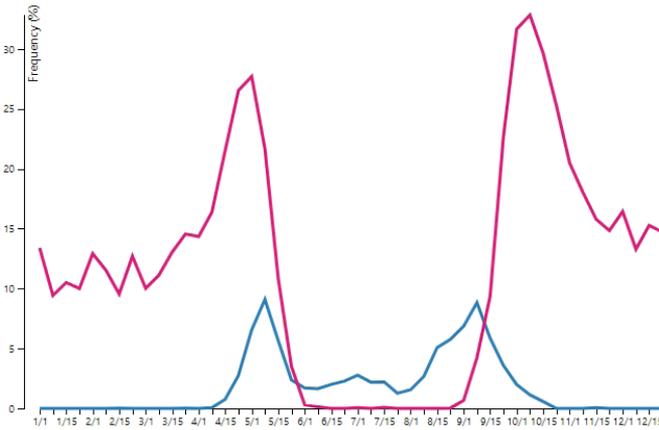


Figure 5. Frequency of detection on eBird checklists of Brewer's and White-crowned sparrows in nine eastern-plains Colorado counties (see text for enumeration of counties). See Histogram text for explanation of "weeks."

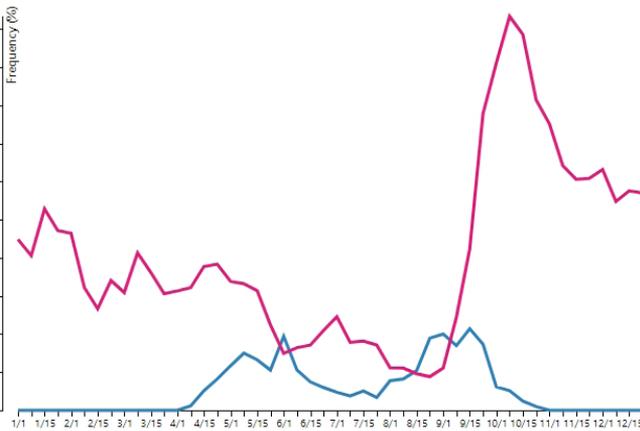


Figure 6. Frequency of detection on eBird checklists of Brewer's and White-crowned sparrows in five West Slope Colorado counties (see text for enumeration of counties). See Histogram text for explanation of "weeks."

STREAKED SPARROWS

These four sparrow species – Savannah, Vesper, Song, and Lincoln's -- are the cause of many identification headaches, with all being confused with each other by many birders at various times. Lincoln's is something of the odd-man-out species here, though, as its underparts streaking is always laid over buff coloration; the streaking of the other three is mostly or entirely laid over white or whitish on non-juvenile-plumaged individuals. Though various structure differences (e.g., bill shape, head shape, tail length and shape) are quite useful identification cues, these differentiating features require fairly extensive experience with all species in order to use them reliably.

During the breeding season, habitat is a powerful identification predictor, though where preferred habitats abut, one can encounter more than one species in proximity. Additionally, Song and Lincoln's sparrows occupy similar riparian habitat (though Lincoln's also breeds on brushy hillsides with seeps; pers. obs.), but are, for the most part, elevational replacements of each other, with Song Sparrow being found at lower elevations. That Song Sparrows are very strongly tied to shrubby riparian habitat as breeders in Colorado (and throughout the West) causes Eastern birders problems, as the species is nearly ubiquitous in shrubby habitat within the core of the eastern breeding range. Song Sparrow does not typically breed in Colorado in drier shrub-dominated habitats (e.g., Four-winged Saltbush, Gambel Oak, or Mountain Mahogany) (Henwood 2016).

Seasonal timing can also inform on these species' identification. Figure 7 presents Colorado-wide eBird frequency data for these four sparrow species; some aspects of the various species curves differ in obvious ways. One is that Song Sparrow weekly frequency values are all higher than all Savannah Sparrow frequency values (though, again, beware of the local habitat during the breeding season). In fact, except for a small number of weeks of the year, Song Sparrow is consistently the most frequently detected sparrow of this species suite. The other obvious take-home message is that Song Sparrow is found commonly throughout the year (that is, frequency values are always >1%). Savannah, Vesper, and Lincoln's are all rare in the state in winter, with Vesper being particularly rare. Interestingly, and also obvious in Figure 7, by the time that Song Sparrow has reached its fall frequency peak in Colorado (in the last week of October), the other species have, essentially, left the state.

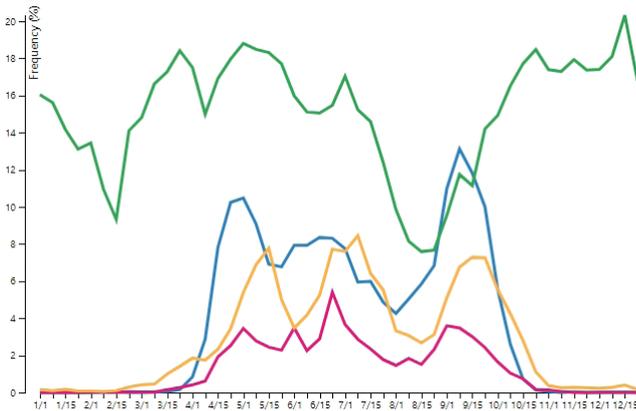


Figure 7. Frequency of detection on Colorado eBird checklists of Savannah, Vesper, Song, and Lincoln's sparrows. See Histogram text for explanation of "weeks."

Another interesting aspect of Figure 7 is the strong August dip in frequency of detection of Song Sparrow, similar to that of White-crowned Sparrow (Figures 4, 6) and Vesper and Lincoln's sparrows (Figure 7). One's first reaction to that dip might be that there are, for some reason, many fewer Song Sparrows in the state in August. However, detection frequency is not necessarily equal to actual presence. In fact, that equivalency is virtually never true, for a large variety of reasons, some having to do with the birds, themselves (e.g., vocalization rate, behavior, habitat selection), and some with the observers (e.g., hearing and vision capability, skill and experience levels). In fact, this "post-breeding frequency dip" is a feature of detection curves of many bird species (Best 1981, eBird 2019) and is partly due to the cessation of or decline in singing activity (pers. obs.). Molt, also, probably

plays into this detection dip, as adults of many bird species (but nowhere near all) initiate replacement of their plumage around the time that any progeny achieve independence. Especially when such birds are replacing flight feathers (primaries, secondaries, rectrices), their flight capabilities are somewhat reduced, hence birds may become more secretive during the process (Vega Rivera et al. 1998). Additionally, birds may move into or spend a higher proportion of time in denser habitats than earlier in the breeding season, again reducing the chance that birders detect their presence (McClure and Hill 2012). However, changing focus of eBirders in late summer and early fall may also have some impact on this frequency dip. The result of the departure of Savannah, Vesper, Lincoln’s – and of Lark Bunting and Fox Sparrow – means that Song Sparrow is the default streaked sparrow in the state during most of the colder portion of the year.

As summary, Table 1 provides various parameters of seasonal occurrence of seven of the eight species treated in this essay. Finally, Figure 8 provides the weekly sample sizes of public eBird checklists for the state of Colorado (as of 22 February 2019).

TABLE 1. Temporal occurrence parameters in Colorado of seven breeding sparrow species, as presented by public data at eBird (2019).

Species	Spring arrival ¹	Spring peak	Fall peak	Fall departure ²
Chipping Sparrow	2nd week of Apr	2nd week of May	2nd week of Sep	1st week of Nov
Brewer’s Sparrow	3rd week of Apr	2nd week of May	1st week of Sep	2nd week of Oct
White-crowned Sparrow ³	N/A	1st week of May	2nd week of Oct	N/A
Vesper Sparrow	2nd week of Apr	1st week of May	2nd week of Sep	3rd week of Oct
Savannah Sparrow	3rd week of Apr	1st week of May	1st week of Sep	3rd week of Oct
Song Sparrow ⁴	N/A	1st week of May	4th week of Oct	N/A
Lincoln’s Sparrow	2nd week of Mar ⁵	2nd week of May	1st week of Sep	1st week of Nov

¹ Indicated by eBird checklist frequency in Colorado rising to at least 1%

² Indicated by eBird checklist frequency in Colorado falling below 1%

³ Though the species is present year-round in Colorado, differing subspecies account for breeding and wintering birds.

⁴ The species is present year-round in Colorado. Though the spring peak of frequency is in May, probably few are migrating then.

⁵ As of writing, the eBird checklist frequency in Colorado for the 2nd week of Mar is 0.99%, so not truly different from 1%.

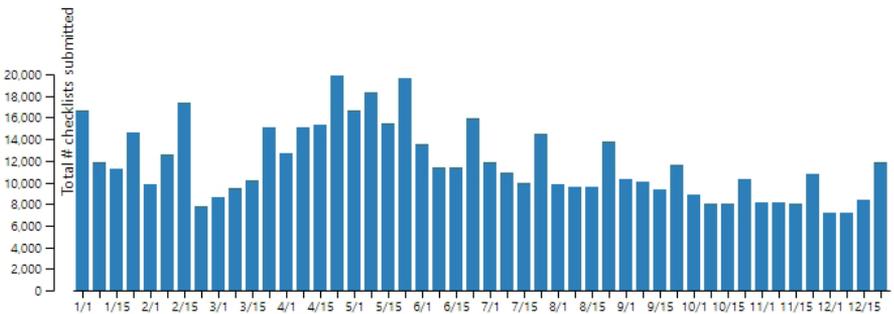


Figure 8. Weekly sample size of Colorado eBird checklists (as of 22 February 2019). See Histogram text for explanation of “weeks.”

ACKNOWLEDGMENTS

I greatly appreciate Ted Floyd’s thorough review of an earlier draft of this essay. Any remaining mistakes are certainly mine.

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Three presentations of all public Colorado eBird data for two species of sparrows (as of 22 Feb 2019). Do you know which species are represented? See page 87 for the individual figure captions (Figures 1-3).

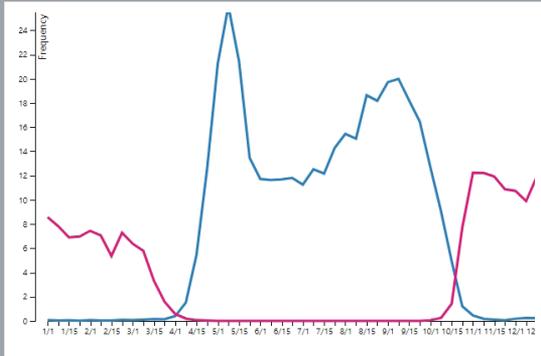


Figure 1

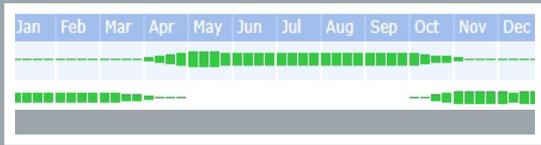


Figure 2

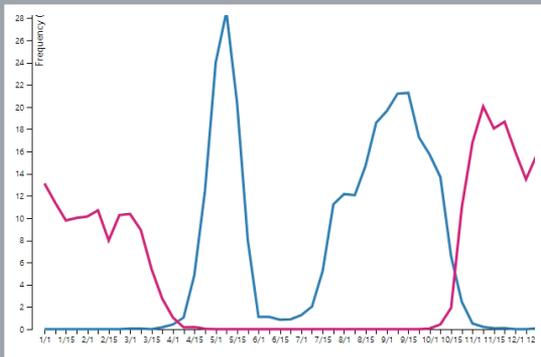


Figure 3