Has Invasion by the Eurasian Collared-Dove Affected Wintering Mourning Dove Populations in the Central Valley?

Edward R. Pandolfino, 1328 49th Street, Sacramento, CA 95819.
erpfromca@aol.com

The stunningly rapid expansion of the Eurasian Collared-Dove (*Streptopelia decaocto*) across North America since it first arrived has been well-documented. The species' conquest of the continent is believed to have begun with a release of caged birds in the Bahamas in the mid-1970s (Smith 1987), with birds first verified in southern Florida in 1986 (Smith and Kale 1986). From there, this highly adaptable dove spread west and north (Romagosa and Labisky 2000, Romagosa and McEneaney 2000, Sullivan et al. 2009). It reached California in the first years of this century and has continued expanding rapidly through the Central Valley (CV) and the rest of the state (Hampton 2006, Pandolfino 2010, Pandolfino 2011).

One of the primary tenants of ecology is that coexisting species occupy different ecological niches (Smith 1966). Therefore, when a new species suddenly arrives and demonstrates the sort of rapid increase that the Eurasian Collared-Dove (hereafter Collared-Dove) has shown, it raises concern as to whether it may have a negative impact on similar native species. I investigated whether recent expansion of the Collared-Dove into the CV has affected the Mourning Dove (*Zenaida macroura*), a species with broadly overlapping habitats and food sources (Otis et al. 2008, Romagosa 2012). I reviewed Christmas Bird Count (CBC) data from the CV from count year 108 (winter 2007-08) through count year 116 (winter 2015-2016) to look for any correlations between increases in Collared-Doves and changes in Mourning Dove populations.

DATA SOURCES AND METHODS

I obtained CBC data on Collared-Dove and Mourning Dove abundance from the National Audubon Society (2010). I used data from 21 CV CBC circles (Figure 1) from 2007-2016, a period during which Collared-Dove numbers in the CV increased by more than 24-fold (see RESULTS and DISCUSSION). All CBC data were normalized for relative effort using the number of birds observed per party hour.

I used regression analysis to look for correlations between population trends (based on the slope of linear regression trendlines) of Collared-Doves and Mourning Doves at three different geographic scales: 1) the CV as a whole (combining data from all 21 circles); 2) within individual CBC circles; and

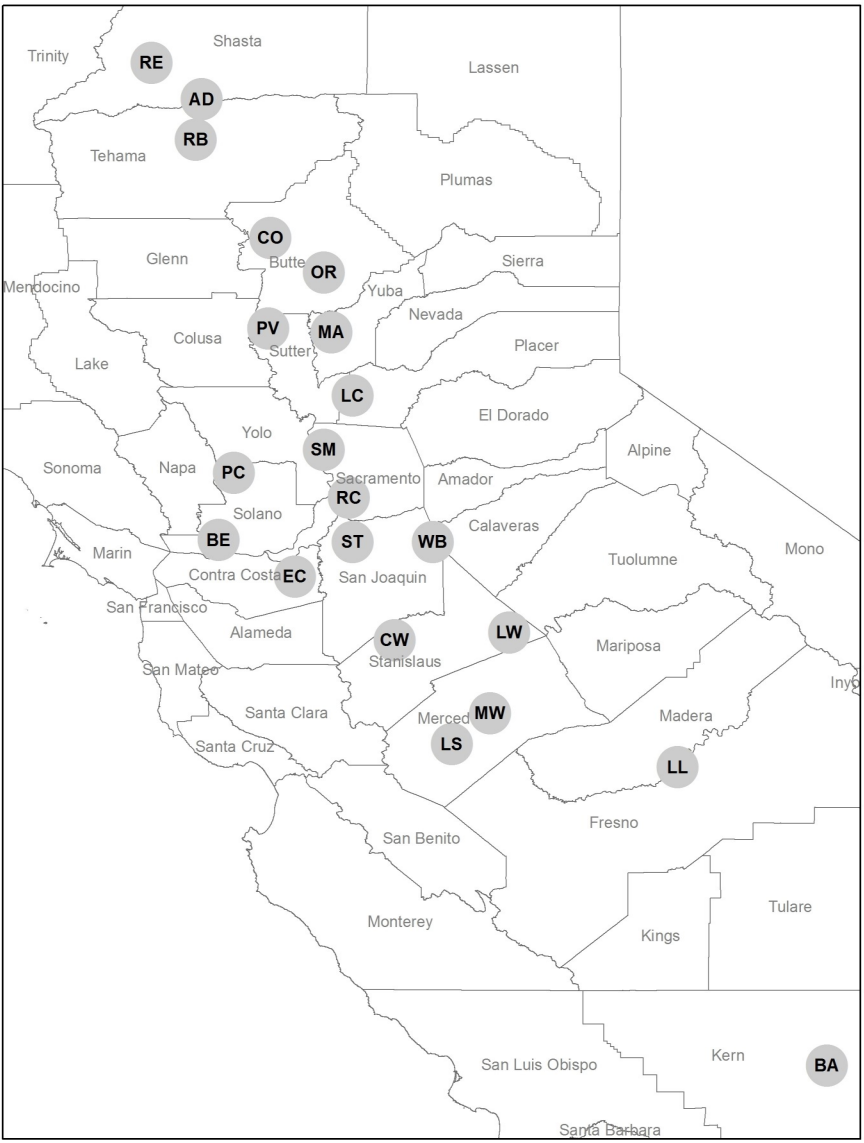


Figure 1. The 21 Central Valley CBC circles used. Count circles are approximately to scale. From north to south they are: Redding (RE), Anderson (AD), Red Bluff (RB), Chico (CO), Oroville (OR), Peace Valley (PV), Marysville (MA), Lincoln (LC), Sacramento (SM), Rio Cosumnes (RC), Putah Creek (PC), Benicia (BE), Stockton (ST), Wallace-Bellota (WB), East Contra Costa (EC), Caswell-Westley (CW), La Grange-Waterford (LW), Merced NWR (MW), Los Banos (LS), Lost Lake-Fresno (LL), and Bakersfield (BA).

3) within CBC circle sub-areas, where these data were available (Benicia, Caswell-Westley, Lincoln, LaGrange-Waterford, Marysville, Putah Creek, and Rio Cosumnes).

I looked for correlations between the population trend for Mourning Doves at each geographic scale in relation to two variables: 1) the population trend for Collared-Doves from that circle, and 2) the average abundance of Collared-Doves in that circle over the past five years (count years 112-116). My use of the second variable was based on the possibility that there may be a threshold local abundance of Collared-Doves required to cause a negative impact on Mourning Doves.

RESULTS AND DISCUSSION

The population trends for Mourning Doves and Collared-Doves from count year 108 (winter 2007-08) through count year 116 (winter 2015-16) using data from all 21 CV CBC circles are shown in Figure 2. Mourning Dove numbers have fluctuated widely during this period. Although the linear trendline suggests a decline, at least for count years 108-115, the overall trend is not statistically significant ($p = 0.17$) and the line is a poor fit for a linear trend ($r^2 = 0.25$).

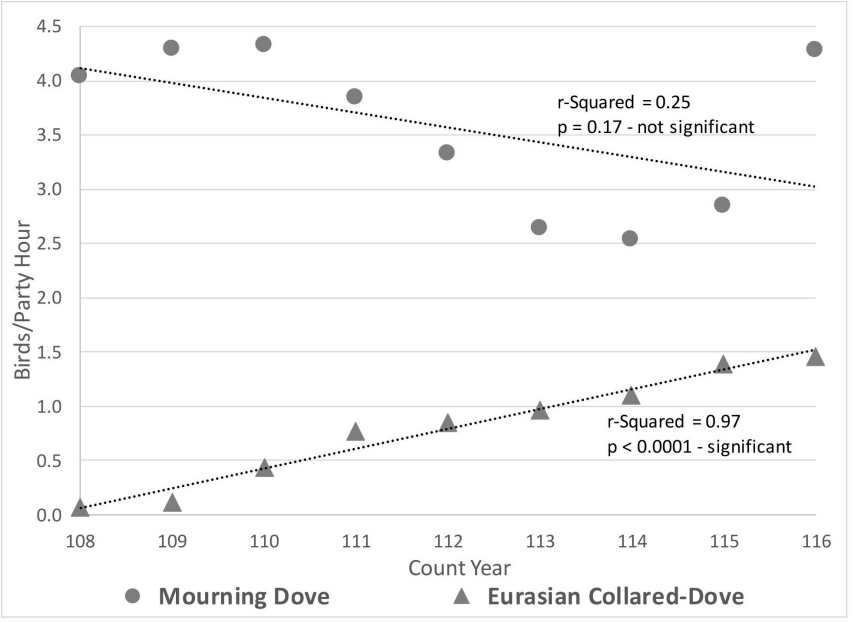
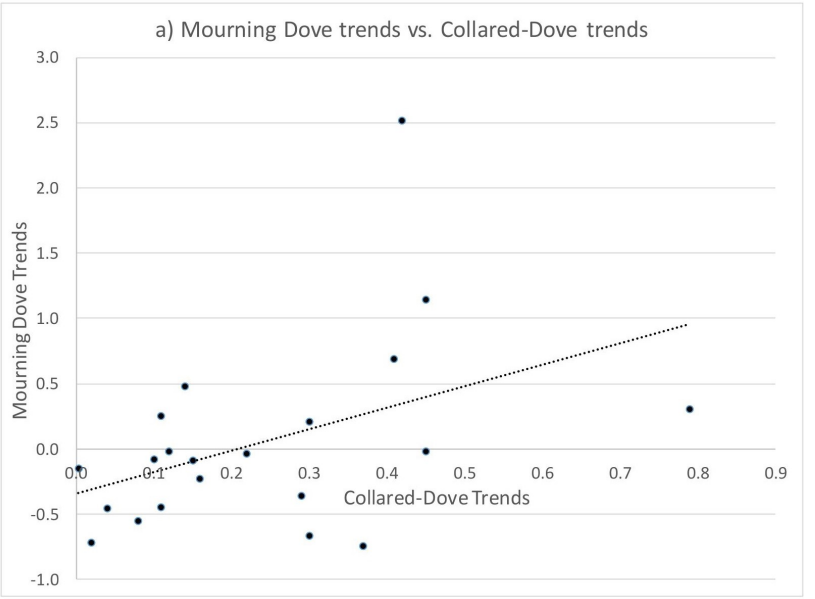


Figure 2. Abundance by year for Mourning Doves and Eurasian Collared Dove abundance based on data from 21 CV CBC Circles count years 108-116. Trendlines based on linear regression.



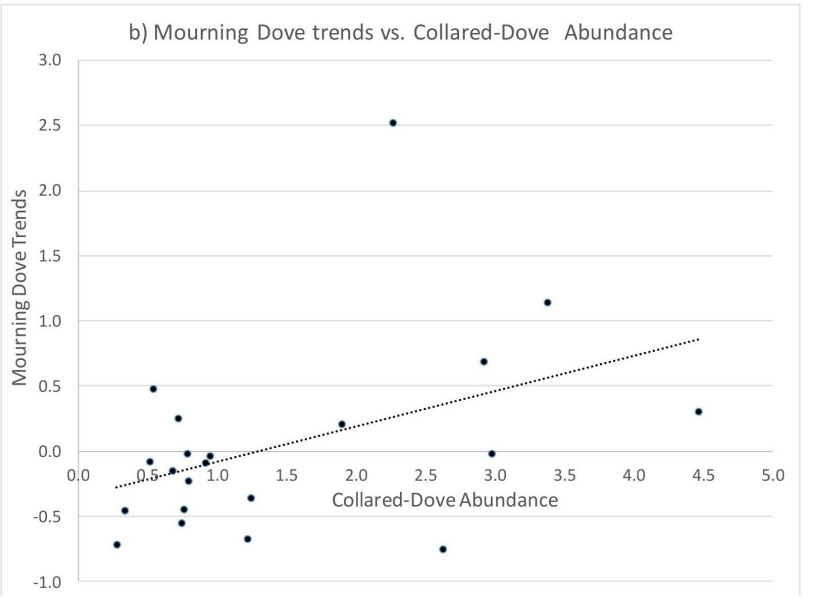


Figure 3. a) Relationship between Mourning Dove trends from each circle (Y axis) and Eurasian Collared-Dove trends (X axis) count years 108-116. b) Relationship between Mourning Dove trends from each circle (Y axis) count years 108-116 and Eurasian Collared-Dove average abundance for the most recent five years (X axis). Trendlines and statistical values based on linear regression.

The relationship between Mourning Dove trends and both Collared-Dove trends and five-year abundance do not show any evidence for a negative impact of Collared-Doves on Mourning Doves (Figure 3). The linear correlations for both species approach significance (both near $p = 0.05$) with a positive relationship between Mourning Dove trends and Collared-Dove trends and Collared-Dove recent abundance. This suggests that, if anything, circles with the greatest increases in Collared-Doves were more likely to have also experienced an increase in Mourning Doves.

Collared-Doves are largely restricted to rural, rural-residential, and some suburban areas (Hampton 2006, Bonter et al. 2010, Fujisaki et al. 2010, Veech et al. 2010, Romagosa 2012). In contrast, Mourning Doves are habitat generalists that completely overlap with the habitats occupied by Collared-Doves, as well occurring in open grassland, large open agricultural areas, dense suburban and urban habitats not used by Collared-Doves. Therefore, it is possible that Collared-Doves are having a negative impact on Mourning Doves within those shared habitats, limiting Mourning Doves to habitats not used by Collared-Doves, and thereby masking the local impacts at the scale of a full CBC circle. However, linear regression analyses of data from 63 CBC sub-areas showed no correlation between Mourning Dove trends and Collared-Dove trends ($p = 0.22$) or Collared-Dove abundance over the past five years ($p = 0.20$).

Peaceful Coexistence?

Some authors have noted aggressive behavior by Collared-Doves toward Mourning Doves (and vice versa), as well as toward other species (Romagosa and Labisky 2000, Kasner et al. 2016). Garrett and Walker 2001 speculated that Collared-Doves may have a negative impact on already declining populations of introduced Spotted Doves (*Streptopelia chinensis*) in southern California. However, studies in Florida and Alabama (Duncan 2004, Bonter et al. 2010), where Collared-Doves have been present for more than 30 years, showed no evidence that Collared-Doves had any negative impact on Mourning Doves or other dove species. In fact, Bonter et al. 2010 found that local increases in Collared-Doves were correlated with increases in other dove species, similar to my results from CV CBC circles for Mourning Doves (see Figure 3).

There is a rich literature on the coexistence of species with overlapping food habits within shared habitats (Gill 2006). This phenomenon has been, perhaps, most well-studied in migratory shorebirds where several species share migratory stopover sites and birds can be easily observed and captured (see Choi et al. 2017 and citations within). Coexistence among species can be based on selection of different food items, different sizes of the same types of food items, or different foraging methods or strategies. Alternatively, in habitats where there is a super-abundance of food, coexistence can occur without variation in food selection or foraging.

The food habits of both doves are similar, with both species primarily eating seed. Extensive research shows that Mourning Doves are almost exclusively seed-eaters (Otis et al. 2008). Diets of Collared-Doves are not as well-studied, and may include more fruits and other plant matter (Romagosa 2016). Both species are highly opportunistic and will feed on nearly any type of seed including those of wild plants and agricultural crops. Both species readily take advantage of anthropomorphic sources such as waste grain from agriculture, seeds provided for livestock, or bird feeder seeds. Both forage primarily on the ground. Experiments with captive birds showed that, although there was a large degree of dietary overlap, Collared-Doves displayed no competitive advantage over Mourning Doves (Poling and Hayslette 2006). Hayslette (2006) found that these species may be able to coexist because Collared-Doves tended to select seeds that were broader and thicker than those selected by Mourning Doves. It may also be that the human-altered habitats in which Collared-Doves are found have a super-abundance of food that permits both species to coexist.

It is still possible that Collared-Doves are affecting Mourning Doves in localized areas and that this and other studies have not collected data at a fine enough scale to detect these impacts. However, all indications are that the Collared-Dove has not, and likely will not, have a significant negative impact on the overall abundance of the Mourning Dove in the CV.

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