

## The 2004 Tricolored Blackbird April Survey

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A survey of Tricolored Blackbirds (*Agelaius tricolor*) was conducted in the Central Valley of California from 16-19 April 2004. The goals of the survey were to visit all historical Central Valley breeding colonies where 2,000 or more birds had been previously documented, estimate the sizes of any colonies encountered, and document habitat status of historical sites.

Surveys for Tricolored Blackbirds date back to the 1930s, when Neff (1937) estimated over 700,000 in just 8 counties (see Beedy and Hamilton 1999 for a complete survey history). Recently, statewide April surveys were conducted in 1994, 1997, 1999, and 2000 (Beedy and Hamilton 1997, Hamilton et al. 1999, Hamilton 2000). Sponsored by the California Department of Fish and Game (DFG), U.S. Fish and Wildlife Service (FWS), and California Audubon, these surveys had the explicit goal of counting all Tricolored Blackbirds in California, with follow-up nest counts to better estimate colony densities, productivity, or both on many of the largest colonies. A DFG and FWS goal of conducting a statewide survey every three years had proven to be difficult to achieve due primarily to lack of funding and personnel shifts within the agencies. In the face of further reductions in agency funding in 2004, it was determined that a statewide census was not feasible and we decided to concentrate our effort on attempting to determine the status of Central Valley sites that historically held 2,000 or more birds.

Interest in conducting a 2004 Tricolored Blackbird survey originated with members of the Tricolored Blackbird Working Group. The informal working group includes representatives from resource management agencies, non-governmental organizations (NGOs), and non-agency Tricolor Blackbird experts whose overarching motivation is to stop the population decline of the species. While the working group addresses Tricolor Blackbird conservation on many fronts, one of its primary focuses is to re-establish a regular, systematic survey that would yield better estimates of population trend, conditions of historic nesting sites, patterns of habitat use, and productivity data.

### Methods

#### *Volunteers*

As with previous recent surveys, this effort relied almost entirely on volunteers to collect the data. A note seeking volunteers with prior experience surveying and identifying Tricolored Blackbirds went out via the CVBC internet listserv (i.e., CVBirds) on 25 March. Individuals that had participated in previous surveys were contacted directly by LE. Individuals

who responded to the request were assigned a specific geographic region of the Central Valley by LE based on stated surveyor preference and an attempt to ensure that the locations of previously reported colonies were covered. Survey participants were sent maps depicting the locations of historical colonies. An attempt was made to contact all volunteers by phone to ensure that they understood their assignment.

Volunteers were also sent survey instructions and an electronic form for recording the data. The instructions outlined the goals of the survey, dates of observation, and observer protocols. Observers were instructed to visit historical colony locations, respect private property by not trespassing, fill out the data sheet provided, and be watchful for new colony locations. The form includes 36 data fields that follow closely the format from previous years. It is available from the authors upon request. In the instructions, observers were asked to estimate colony sizes, and round estimates to 10s for small colonies (i.e., about 100 adults), to 100s for medium-sized colonies (i.e., about 1,000 adults), to 1,000s for large colonies (i.e., 10,000 or more adults), and 5,000 or even 10,000 for colonies over 25,000 adults.

### *Maps*

Maps were created from spatial data of historical colony sites that were documented in previous censuses and from incidental sightings of Tricolored Blackbird colonies dating back to 1980; the majority of the 1079 recorded colonies are from 1994 to 2000. Most of these data are housed in spatial form in the DFG Biogeographical Observation and Information System (BIOS). These data were augmented with records from the California Natural Diversity Database (NDDDB). The records were used by EDAW, Inc. to create maps of historical colonies with  $\geq 2,000$  birds, were produced as Adobe Acrobat (pdf) files and distributed to volunteers.

### *Reporting*

Nearly all data were entered on the electronic form and emailed back to LE. A few observers filled out their forms by hand or sent maps of new colony locations either by U.S. post, email or fax. All data were then transmitted to MG by the same methods. Data submitted on the electronic form were easily converted to text files and imported into Microsoft Excel. Data submitted in other formats were entered by hand. Final data will be stored in the DFG BIOS and NDDDB systems.

### *Analyses*

Colony estimates were summed by MG. Multiple counts of the same colony by different observers yielded low and high estimates for those colonies. Many of these sites were revisited by one or two experienced surveyors who collected additional data that led to refined colony size estimates. As these data were collected outside of the survey period, they

will be reported elsewhere (Hamilton 2004). The four-day survey period followed a survey tradition for this species and was designed to minimize double-counting individuals that might be traveling between colony sites, or that attempted nesting at multiple locations during the season.

## Results

### *Volunteers and Coverage*

Twenty-nine volunteers searched for Tricolored Blackbirds during the four-day count period; two additional volunteers contributed data from five small colonies on 12 May, 22 days later, in Kern Co. (see Acknowledgements). Nearly all observers submitted their data within a week of the count.

There were 201 colony sites in the Central Valley that numbered 2,000 or more birds at some point in the past (Table 1). During the survey, 182 of those 201 (90%) were visited. An additional 15 sites historically numbering  $\geq 2,000$  birds exist in four counties outside of the Central Valley (Siskiyou, Santa Clara, Monterey, and Riverside); two of those 15 were visited (in Monterey Co.). Of the 216 sites that historically numbered  $\geq 2,000$  birds, 81 were in northern counties (Solano and Sacramento counties northward), and 135 were in southern counties. In northern counties 78 of 81 (96%) were visited during the survey period. In southern counties 106 of 135 (79%) sites were visited. In sum, 184 (85%) of the 216 historical colony sites were surveyed. An additional 17 historical colony sites with  $< 2,000$  birds and 11 known colony sites not documented as part of past survey efforts were surveyed during the survey period. In total, 244 sites were visited during the survey period. Seven sites were visited before or after the four-day period, and approximately 25 sites were visited two or more times by experienced surveyors during the survey period.

### *Active Colonies*

Twenty-eight of the 184 visited sites supported active colonies (Table 1). An additional five colonies (in Kern County) were found outside the survey period; these were presumed, based on nesting stage, to have been active during the survey period and were added to the total, summing to 33 active colonies. Thirty-one of these were in counties located in the southern portion of the state. Single colonies were documented in Yolo and Solano counties. Six were outside the Central Valley in Monterey or San Diego counties.

Colony size estimates ranged from 5 to 102,000 adults (Table 2). At six colonies, multiple counts by various methods resulted in low and high estimates. Colonies surveyed outside the count period but assumed to be in existence at the time of the count period totaled 380 birds. Thirteen (39%) of the 33 colonies held  $\geq 2,000$  birds each. Six to seven colonies held  $\geq 10,000$  birds each.

Fifteen colonies were considered protected because they were on lands

Table 1. Survey effort for 2004 Tricolored Blackbird survey.

Counties	Historical colonies $\geq 2,000$ birds in NDDB	Historical colonies $\geq 2,000$ birds surveyed	Historical colonies surveyed regardless of size	Total colonies surveyed <sup>1</sup>	Active colonies
<b>Northern Counties</b>					
Butte	4	4	4	4	0
Colusa	16	16	28	28	0
Glenn	3	3	3	3	0
Placer	4	4	4	4	0
Sacramento <sup>2</sup>	46	46	46	46	0
Shasta	2	0	0	0	0
Siskiyou <sup>3</sup>	1	0	0	0	0
Solano	0	0	0	1	1
Sutter	1	1	3	3	0
Tehama	1	1	1	1	0
Yolo	2	2	5	6	1
Yuba	1	1	3	3	0
N.Co. totals	81	78	97	99	2
<b>Southern Counties</b>					
Alameda	0	0	1	1	0
Calaveras	2	2	4	4	0
Contra Costa	1	1	1	1	1
Fresno	10	8	11	13	1
Kern	34	31	41	44	9
Kings	8	7	7	8	1
Madera	0	0	0	0	0
Merced	40	40	45	47	5
Monterey <sup>3</sup>	4	2	7	7	4
Riverside <sup>3</sup>	9	0	0	0	0
San Diego <sup>3</sup>	0	0	3	3	2
San Joaquin	6	4	4	4	0
Santa Clara <sup>3</sup>	1	0	0	0	0
Stanislaus	5	3	3	4	1
Tulare	15	8	9	9	2
S.Co. totals	135	106	136	145	26
CV totals	201	182	223	234	22
Survey totals	216	184	233	244	28
Visited outside Survey Period		0	1	7	5
<b>Totals</b>	<b>216</b>	<b>184</b>	<b>234</b>	<b>251</b>	<b>33</b>

- 1 – Includes historical sites, sites discovered this survey and sites used previously but not in the CDFG Natural Diversity Database.
- 2 – Number of sites visited in Sacramento County is an estimate, however coverage was assumed complete.
- 3 – County outside Central Valley.

Table 2. Colony size estimates (# of adults) for the 2004 Tricolored Blackbird survey.

County	Low Estimate	High Estimate	Primary Habitat
Calaveras/Stanislaus <sup>1</sup>	4,500	24,500	Himalayan blackberry
Contra Costa	3,000	3,000	cattail
Fresno <sup>2</sup>	11,000	102,000	silage
Kern	1,500	1,500	nettle
Kern	400	400	nettle
Kern	5	5	nettle
Kern	6,700	7,500	nettle
Kern	400	400	nettle
Kern	10	10	nettle
Kern	50	50	nettle
Kern	2,000	2,000	nettle
Kern	2,000	2,000	cattail
Kings	10,000	10,000	tamarisk
Merced	3,000	3,000	Himalayan blackberry
Merced <sup>3</sup>	6,500	25,000	Himalayan blackberry
Merced	25,000	25,000	cattail
Merced	12,000	12,000	cattail
Merced <sup>4</sup>	25,000	30,000	cattail
Monterey	200	200	bulrush
Monterey	300	300	desert olive
Monterey	600	600	bulrush
Monterey	20	20	desert olive
San Diego	250	250	Himalayan blackberry
San Diego	150	150	bulrush
Solano	300	1,000	bulrush
Tulare <sup>5</sup>	100	1,200	cattail
Tulare <sup>6</sup>	20,000	60,000	silage
Yolo	400	400	cattail?
<b>Pre- and Post-Count Colonies</b>			
Kern - 5/12/2004	40	40	thistle
Kern - 5/12/2004	30	30	thistle
Kern - 5/12/2004	80	80	thistle
Kern - 5/12/2004	130	130	thistle
Kern - 4/8/2004	100	100	nettle

1 - 3 independent observers of 3 colony sites spanning 2 mi. straddling county border.

2 - Variously considered from 1 to 3 colonies on a dairy, 3 independent observers.

3 - A single colony at O'Neill Forebay Wildlife Area, 3 independent observers.

4 - Single colony, 2 independent observers.

5 - Single colony, 2 independent observers.

6 - Single colony on a dairy, 3 independent observers.

owned either by the FWS, the State of California, a private conservation land trust, or on Toledo Pit (a storage basin owned by Lower Tule Irrigation District, see Schlafmann and Hardt 2004). The two largest colonies were in silage (which usually is a wheat [*Triticum* spp.] or barley [*Hordeum* spp.] crop often intermixed with non-native weedy plants). Marsh habitats dominated by cattail (*Typha* spp.) and bulrush (*Scirpus* spp.), supported the most colonies, 11. A total of four colonies were in Himalayan blackberry (*Rubus discolor*) thickets. The remaining 16 colonies were in habitats dominated by thistle (*Cirsium* and *Centaurea* spp.), desert olive (*Forestiera neomexicana*), nettle (*Urtica* spp.), or tamarisk (*Tamarisk* sp.).

No observers reported permanent habitat conversion of historical sites to development, but some reported modified habitat (e.g., mown blackberry thickets or dry marshes that previously supported active colonies).

## Discussion

### *Volunteers and Coverage*

Volunteers collected data for 90% of the colonies known to support  $\geq$  2,000 birds during the survey period. It is likely that some additional sites were checked but not documented by surveyors or were known to be unsuitable, and were therefore, not visited. The instructions did not state explicitly that surveyors should fill out survey forms for sites where no birds were found. We still encourage that information on historical colony sites that have been permanently altered be sent to the authors.

Participants were not given much lead time, only about six weeks between the announcement and the survey. The level of coverage and number of participants recruited on short notice is likely an indication of the interest birders have in Tricolored Blackbird conservation and a reflection of how effective e-mail and internet listserves can be as tools in coordinating large volunteer survey efforts for monitoring declining bird species.

### *Active Colonies*

In general, Tricolored Blackbirds breed first in the southern San Joaquin Valley then again in the northern Central Valley after failure or success of their first attempt; thus, they are "itinerant" breeders (Hamilton 1998). The dearth of active colonies in northern counties found during this and other April surveys provides evidence of this phenomenon. Data collection by Bill Hamilton, by agency personnel on wildlife refuges continued across the State in 2004, after the survey, to further document additional and later colony locations, successes and failures of particular colonies, and habitat use patterns. A better picture of the 2004 breeding season will only emerge upon analyses of these more complete data sets.

A reasonably accurate statewide population estimate for this itinerant-breeding species (see Hamilton 1998, 2004) requires, at a minimum, that all major and most minor colonies are found and censused with reasonable

accuracy. However, locating, and especially counting Tricolored Blackbird colonies are challenging propositions. Larger colonies in often-used locations are relatively easy to locate, however, small colonies tucked away in foothill canyons, or obscure wetlands on private property, can be difficult to find or to access. Many birders who have attempted to track flocks of Tricolored Blackbirds streaming across the sky between nesting and foraging areas have experienced the disappointment of the quest ending at a locked gate or no trespassing sign. Once found, a colony's size is traditionally estimated in one of two ways, by direct observation, or by delimiting the nesting area, multiplying by a nest density estimate, and correcting for an assumed rate of polygyny (Lack and Emlen 1939, Payne 1969, Hamilton 1998). Inevitably, direct observation of colonies results in large discrepancies (e.g., tens of thousands) between independent estimates, due in part to observer experience, but also to rapid changes in the activity levels of colonies from colony initiation, through nest building, incubation, feeding, to fledging (Hamilton et al. 1995); activity at nesting colonies can even vary significantly within a matter of hours. Settling colonies are often overestimated because of swarming males that fail to secure a territory and later leave. Thus, in past large-scale surveys as well as in this one, a few experienced individuals revisited larger colonies to reassess colony estimates, make nest density transects, or otherwise check initial estimates through multiple visits. Monitoring methods continue to evolve (Yee and Miller 2004) but locating and counting flocks of Tricolored Blackbirds will undoubtedly continue to present challenges for birders and researchers for the foreseeable future. Pre-count training, as was conducted before the 2000 survey, will help minimize future discrepancies (Hamilton 2000).

### *Comparison with Other Surveys*

This survey departed in significant ways from April surveys in 1994, 1997, 1999, and 2000. The aims of those surveys were to locate all Tricolored Blackbird colonies, estimate their numbers, and determine nesting outcomes where possible. With the possible exception of 1999, the results of these surveys are considered to have had roughly equal effort; they used the same methods, are thought to have found all the large colonies, and thus to have counted the majority of birds (Hamilton 2000). They are the best existing population estimates, and point to an alarming population decline over the past decade (Hamilton 2000). In contrast, this survey was designed only to revisit Central Valley colony sites that numbered 2,000 or more birds in the past, count colonies found, document the location and size of new colonies, and document the condition of sites used historically.

Despite considerably fewer observers in 2004 than in the four previous survey years, about 25% more total sites were surveyed. The express purpose of this survey, however, was to visit historical Central Valley sites, so this difference is perhaps not surprising as survey effort was concen-

trated in a smaller area than in previous years. The number of active colonies was low compared to previous years (33 in 2004 versus 72 in 2000, for example), but many sites in southern California were not visited, and many small, historical colonies were not visited, thus perhaps accounting for some of the discrepancies. Small colonies make up the bulk of all colonies every year. In 2000, for example, 50 of the 72 active colonies found during the survey had fewer than 2,000 birds each (Hamilton 2000). Comparing the number of counties surveyed in 2004 is not direct either, as the aims of the participants during the survey, and thus the way counties were surveyed differed between 2004 and previous years; in addition, the focus of this survey was the Central Valley. Nonetheless, we obtained at least some coverage across a wide swath of the State in 2004.

We reiterate, that the results of this survey were not intended to be used to estimate the statewide or even valley-wide Tricolored Blackbird population. A more accurate estimate would require more surveyors covering more potential Tricolored Blackbird nesting habitat over more of the breeding season, or using new methods combining intensive area sampling and double-observer methods (Yee and Miller 2004). Although the results cannot support conclusions related to trend of the overall population, they do provide valuable information on the current status of many of the known colony sites in the southern part of the Central Valley.

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