

Trapping, banding, and color-banding of tricolored blackbirds  
(*Agelaius tricolor*) in the Central Valley in 2008

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## Introduction

The tricolored blackbird (*Agelaius tricolor*), hereafter "tricolor", is a North American songbird that is nearly endemic to California (Beedy and Hamilton, 1999). Due to large-scale losses of its breeding and foraging habitats, deliberate poisoning and shooting, and other factors, the numbers of tricolors dropped dramatically during the 20<sup>th</sup> Century (Neff, 1937; Beedy and Hamilton, 1999; Cook and Toft, 2005).

Several intensive investigations over several decades have revealed much about the natural history, especially the breeding biology, of the tricolor (reviewed in Beedy and Hamilton 1999), but relatively little attention has been paid to the movements of birds before, during, and after the breeding season. Individualized marking (banding and color-banding) of large numbers of birds can provide a population of birds that was banded at known times and locations and that can be relatively easily seen in the field. Records of recaptures (i.e. capturing and holding a marked bird in the hand subsequent to its original banding) and resightings (i.e. observations of color-marked birds in the field) provide numerous insights into the spatial and temporal movements of birds and help to answer many questions related to habitat use, site fidelity (for both breeding and winter roosting locations), and behavioral biology (reviewed by Calvo and Furness 1992). Previous researchers have banded large numbers of birds, however these efforts were limited to placing aluminum bands on nestlings in the 1930's (Neff 1942; DeHaven and Neff 1973) and again in the 1970's (DeHaven et al. 1975). The use of aluminum bands on nestlings has among its potential shortcomings the high mortality rate of nestlings as well as the requirement to have the bird in the hand to obtain useful information about the banded bird. In most cases, this will require the examination of a carcass of a dead bird (e.g., Neff 1942) or a re-trapping of a previously-banded bird, thus severely reducing the size of the sample from which data can be obtained, and hence, the amount of information on spatial and temporal movements (Lakhani and Newton 1983).

I attempted to increase the number of observations of banded birds by trapping and banding only adult and post-fledging birds, and by placing both aluminum USGS bands as well as plastic color bands on all birds captured. Much useful

information may then be provided by an observation (a “resighting”) of a color-banded bird in the field (i.e. the bird does not need to be captured to yield information on patterns of movement), and if the large number of birders in California is informed of and their assistance requested to report observations of color-banded birds, much essential information related to the movements of birds in space and time may be obtained. This enhanced understanding of the birds’ movements, behavioral patterns, and habitat requirements may lead to better management, including the conservation of essential resources.

This report is submitted pursuant to permit number SC-009330 and additional written permit obtained from the California Department of Fish & Game, Habitat Conservation Branch, and U.S. Fish & Wildlife Service contract in support of tricolored blackbird research and summarizes the methods and results of the 2008 color-banding program.

## Methods

*Trapping and Banding.* Previous experience in 2007 demonstrated that tricolors may effectively be caught in a “modified Australian crow trap” (e.g., <http://www.oznet.ksu.edu/library/wldlf2/c700.pdf>) baited with cracked corn (Figure 1).

In 2008, in addition to the modified crow trap I employed a walk-in “dove trap” at the

suggestion of Steve Simmons of Merced, California, as Steve has been trapping and banding birds for over 35 years, and the modified crow trap that was so effective in 2007 seemed to be less so at the first site where I trapped and banded in 2008. The dove traps that I employed were constructed of 1x2” welded steel wire and were of two sizes: one was shaped like an “L” approximately 18” wide, 4’ long, and 10” high (Figure 2) and the other was rectangular,

approximately 18” x 4’



Figure 1. Baited, open “modified Australian crow trap” used to capture tricolored blackbirds.



Figure 2. “L”-shaped dove trap baited with cracked corn.

x 10". The dove traps were also baited with cracked corn, but unlike the crow trap, the tricolors entered the dove traps from the ground and entered through one-way funnels that allowed entry but inhibited exit (Figure 2). The dove traps had a "gathering door" that was operated remotely by pulling on a string; this enabled us to "herd" all of the trapped birds to one end of the trap and then to pull on the string, raise the gathering door, and confine the birds to this section of the trap. The birds were removed from the trap and transferred to a 18x24" transport cage, also constructed of 1x2" welded steel wire, without handling by simultaneously opening same-size (15x8") doors on the trap and transport cage by pulling on strings attached to each.

In late May I began to bait birds with cracked corn at the Crane Ranch, a private cattle ranch in Merced County, with permission from the owner, Bert Crane Jr. A large colony of 30,000 birds + had recently established there. I prebaited the traps by providing cracked corn in three sections of the access road on the eastern edge of this colony. Following procedures developed in 2007, the crow trap was placed on-site, with the door open and roof panels removed, and baited inside and around the perimeter two days before the first day of trapping in order to habituate the birds to the trap and to feeding on the cracked corn (Figure 1).

The trap was left open and baited with cracked corn during the intervals between banding bouts, allowing the birds free access to the bait and further habituating them to the trap. I would typically begin a trapping and banding bout before 8 am, when I would arrive, rebait the trap, replace the roof panels, and close the door. I would then retreat a short distance (10-50 m) and wait. Birds would typically enter the trap within seconds of my retreat, often when I was no more than 10 m from the trap, and I would wait for, in most cases, 15-30 minutes before returning to the trap to remove birds that had been captured.

Birds captured in the crow trap were manually removed and transferred to the transport cage: I would enter the trap, close the door behind me, and place 20-30 tricolors within the 18x24" transport cage specifically designed and constructed for this project. I would release any remaining trapped birds, replace the roof panels and close the door, and transport the caged birds to a nearby table for banding.

Birds captured in the dove traps were transferred to the transport cage without handling, as doors in both the dove trap and the transport cage could be operated remotely by pulling on strings. The transport cage was placed up against the gathering end of the dove trap, the gathering door was closed, then the trap and transport cage doors were opened simultaneously by pulling on the strings. The birds would see the opening leading to the transport cage, rush in to the transport cage, and I would close the door behind them by releasing the

string. The birds were then carried in the transport cage to the nearby table for banding.

Birds were removed from the transport cage via a hatch in the top, handled individually and two plastic (“Darvic”) color bands and one USGS aluminum band were attached to each bird.

I repeated this process of capturing and banding birds throughout the day if the daytime temperatures were less than 90°F (Crane Ranch site), or until late morning if the daytime temperature exceeded 90°F, i.e. was high enough that I was concerned about the effects of the additional stress on the health of the birds (Willow Slough and Plumas Arboga sites).

*Color Band Scheme.* I placed the required USGS aluminum band on the left tarsus and two additional color bands (Darvic<sup>®</sup> 4 mm) as follows: if the bird was an adult, a yellow color band was placed on the left tarsus above the USGS band to denote year (2008) and a second color band was placed on the right tarsus to denote location of banding, with red denoting Crane Ranch (Merced county), green denoting Willow Slough (Yolo county), and blue denoting Plumas-Arboga (Yuba county; Figure 3). If the bird to be banded was a fledgling, both color bands were placed on the right tarsus. This scheme enables the discrimination of birds banded as fledglings (year and place of birth known) to those banded as adults (year and place of birth unknown).

Color bands were sealed with a small 25 watt electric soldering iron powered by a car battery to which I had attached an inverter to provide 110 AC electricity. The color bands must be sealed to prevent their removal by the birds, as tricolored blackbirds are known to be able to remove plastic color bands from their legs (W.J. Hamilton III and Tom Gardali, pers. comm.).

Unfortunately, the supplier of the yellow Darvic<sup>®</sup> color bands (Avinet, Inc.) ran out of the yellow color in the size required and its supplier was not able to replenish its stock, so only the birds at the Crane Ranch and some of the birds banded at Willow Slough received both color bands. The majority of birds at Willow Slough and all of the birds banded at Plumas Arboga received only one color band (green at Willow Slough, blue at Plumas



Figure 3: Color-banded female tricolored blackbird.

Arboga).

All banding data were entered into Bandit, banding data management software developed by the USGS, and returned to the USGS Bird Banding Laboratory in Laurel, Maryland.

*Trapping and Banding Locations.* Birds were banded at three locations, as summarized below. All three of these locations were on private property, and in all cases permission to access the property, to erect and maintain traps, and to trap and band birds was obtained from the landowners.

Site 1: Crane Ranch, Merced County: Winton USGS Quad, SW ¼ Section 10, T6S R13E, 37.4233, -120.5369 (NAD83)

Site 2: Willow Slough, Yolo County: Grays Bend USGS Quad, NE ¼ Section 11, T9N R2E, 38.6427, -121.7255 (NAD83)

Site 3: Plumas Arboga, Yuba County: USGS Olivehurst Quad, SW ¼ Section 16, T14N R4E, 39.0297, -121.537 (NAD83)

## Results

*Banding.* A total of 5,174 birds was banded at three sites, as summarized below. In addition, 6 bands were lost. The specific days banded, and the number of birds banded on each date, are provided in Appendix I.

Number of days of banding: 38

First day: 4/30/08 at Crane Ranch, Merced County

Last day: 7/25/08 at Plumas Arboga, Yuba County

No. birds banded: 5,174

No. adults banded: 5,159

No. juveniles banded: 15

No. females banded: 4,199 (81%)

No. males banded: 960 (18%)

No. unknown/unrecorded sex banded: 15

No. birds banded at Crane Ranch: 2066 in 5 banding days; red and yellow

No. birds banded at Willow Slough: 920 in 7 banding days; green and yellow

No. birds banded at Plumas-Arboga: 2188 in 26 banding days; blue (yellow not available)

Mist nets were not used to attempt to capture birds this year because no large crèches formed in any of the sites where banding was attempted, and mist nets

were deemed relatively inefficient capture devices when compared to the traps utilized. The efficacy of mist nests at capturing recently-fledged young remains to be evaluated.

*Collections of Brood-reduced Young, Eggs, and Carcasses of Adults.* I did not collect brood-reduced young around the margins of colonies as I had during the 2007 field season as Andy Engilis, the curator of the WFCB Museum at the University of California, Davis informed me that he had enough carcass of nestlings of tricolored blackbird in his collection and staff at the University of California, Los Angeles who are performing genetic analyses of tricolors informed me that they had enough genetic material for their work.

In rare instances, and despite an abundance of caution, adults died apparently as a consequence of increased stress during handling associated with banding operations. A total of 18 birds died during banding operations (0.35% of the total banded). When an adult died, its carcass was collected, chilled at 2-3<sup>0</sup> C and then frozen within 8 hours. In all cases, frozen carcasses were transferred to the Department of Wildlife, Fisheries, and Conservation Biology Museum at the University of California, Davis for deposit, curation, and addition to its collections.

The collection of carcasses deposited in the WFCB Museum at U.C. Davis is summarized in Table 1, below.

**Table 1:** Summary of carcasses collected.

Colony	Date	What Collected	Number	Comments
Crane Ranch	4/30/08	Adult females	2	Died after banding
Crane Ranch	5/07/08	Adult females	2	Died after banding
Willow Slough	5/29/08	Adult females	2	Died after banding
Willow Slough	6/07/08	Adult male	1	Died after banding
Plumas Arboga	6/12/08	Adult female	1	Died after banding
Plumas Arboga	6/18/08	Adult female	1	Died after banding
Plumas Arboga	6/19/08	Adult female	1	Died after banding
Plumas Arboga	6/20/08	Adults	5	2 males, 3 females died after banding
Plumas-Arboga	6/21/08	Adult male	1	Died after banding
Plumas-Arboga	6/25/08	Adult females	2	Died after banding
Total			18	

*Recaptures.* A total of 30 birds was recaptured during trapping and banding operations in 2008 (Table 2). One of these was recaptured twice, so a total of 29 unique individuals was recaptured. Of these, 20 were originally banded by me in 2007 and 6 were originally banded by me in 2008 at a different location than where they were subsequently recaptured. One bird was originally banded on April 8, 2001 in California, but the bander and site of original banding are not

known. The dates and locations of the original bandings of two individuals are unknown.

*Resightings.* Color-banded birds were resighted at several locations. At the Los Banos Wildlife Area in Merced County, four birds banded at Plumas Arboga in Yuba County in 2007 were observed nesting in April and May, 2008. Two birds were observed in Kern County in April, one at ECLA Pond and the other at El Cinco Duck Club, but only the white color band, indicating 2007 as the year of banding, was observed. However, no birds were banded in the San Joaquin Valley in 2007, so we know that both of these birds were banded in Sacramento Valley locations in 2007 and then bred in San Joaquin Valley locations in spring, 2008.

Table 2. 2008 Tricolored Blackbird Recaptures

Recap Date	Prefix	Suffix	Age	Sex	Recap Site	County	Band Date	Band Site	County
05/07/2008	1232	76662	AHY	F	Crane Ranch	Merced	06/01/2007	Conaway Ranch	Yolo
05/09/2008	1232	77218	AHY	F	Crane Ranch	Merced	06/21/2007	Plumas Arboga	Yuba
05/09/2008	1232	77615	AHY	F	Crane Ranch	Merced	06/26/2007	Plumas Arboga	Yuba
05/23/2008	1232	77286	AHY	F	Willow Slough	Yolo	06/21/2007	Plumas Arboga	Yuba
05/23/2008	1232	77314	AHY	F	Willow Slough	Yolo	06/22/2007	Pioneer Duck Club	Colusa
05/23/2008	1232	76624	AHY	F	Willow Slough	Yolo	06/01/2007	Conaway Ranch	Yolo
05/29/2008	1232	76974	AHY	M	Willow Slough	Yolo	06/08/2007	Conaway Ranch	Yolo
06/01/2008	1232	76515	AHY	F	Willow Slough	Yolo	05/29/2007	Conaway Ranch	Yolo
06/01/2008	1242	08053	AHY	F	Willow Slough	Yolo	unknown	unknown	
06/03/2008	1272	77952	AHY	F	Willow Slough	Yolo	unknown	unknown	
06/05/2008	1232	77314	AHY	F	Willow Slough	Yolo	06/22/2007	Pioneer Duck Club	Colusa
06/10/2008	1232	77110	AHY	F	Plumas Arboga	Yuba	06/19/2007	Plumas Arboga	Yuba
06/12/2008	752	17853	AHY	F	Plumas Arboga	Yuba	04/08/2001	California	
06/12/2008	1232	77697	AHY	F	Plumas Arboga	Yuba	06/28/2007	Plumas Arboga	Yuba
06/18/2008	1232	77351	AHY	F	Plumas Arboga	Yuba	06/23/2007	Plumas Arboga	Yuba
06/18/2008	1232	78003	AHY	F	Plumas Arboga	Yuba	07/01/2007	Plumas Arboga	Yuba
06/19/2008	1232	77685	AHY	F	Plumas Arboga	Yuba	06/28/2007	Plumas Arboga	Yuba
06/20/2008	1232	76683	AHY	F	Plumas Arboga	Yuba	06/01/2007	Conaway Ranch	Yolo
06/21/2008	1272	36066	AHY	F	Plumas Arboga	Yuba	05/07/2008	Crane Ranch	Merced
06/21/2008	1232	77372	AHY	F	Plumas Arboga	Yuba	06/23/2007	Plumas Arboga	Yuba
06/22/2008	1272	36874	AHY	F	Plumas Arboga	Yuba	05/09/2008	Crane Ranch	Merced
06/22/2008	1232	77479	AHY	F	Plumas Arboga	Yuba	06/25/2007	Plumas Arboga	Yuba
06/26/2008	1232	78035	AHY	F	Plumas Arboga	Yuba	07/01/2007	Plumas Arboga	Yuba
06/26/2008	1232	77932	AHY	F	Plumas Arboga	Yuba	07/01/2007	Plumas Arboga	Yuba
07/10/2008	1272	34570	AHY	F	Plumas Arboga	Yuba	05/23/2008	Willow Slough	Yolo
07/12/2008	1232	77324	AHY	F	Plumas Arboga	Yuba	06/22/2007	Pioneer Duck Club	Colusa
07/12/2008	1272	34570	AHY	F	Plumas Arboga	Yuba	05/23/2008	Willow Slough	Yolo
07/14/2008	1272	36241	AHY	F	Plumas Arboga	Yuba	05/07/2008	Crane Ranch	Merced
07/14/2008	1232	77600	AHY	M	Plumas Arboga	Yuba	06/26/2007	Plumas Arboga	Yuba
07/16/2008	1272	36911	AHY	F	Plumas Arboga	Yuba	05/09/2008	Crane Ranch	Merced

## Discussion

Both the modified Australian crow traps and dove traps were very effective at capturing tricolored blackbirds when baited with cracked corn, were easily transported, and rapidly set up. They effectively trapped the birds while permitting a minimum of escapees. Also, the traps were especially gentle on the birds, and were not known to have caused abrasions or other injuries nor to have directly caused any mortality. The relatively small number of adults (18, 0.35% of the total) that died after banding is a concern, as these birds appeared to have died as a consequence of the additional stress caused by banding. However, all methods used, from the initial capture of the birds to their release following banding, were designed to avoid injuring the birds and to minimize stress. All trapping and banding activities ceased when temperatures rose above 90°F, and the days when birds died were not conspicuously warmer than were other days, so temperature alone is not believed responsible for the observed mortality. In an attempt to reduce further the already low rate of mortality, the crow trap was modified late in the season to enable me to move captured birds into the transport cage without handling them, in much the same way that birds captured in the dove traps could be moved into the transport cages without handling. It is hoped that these additional improvements to reduce to a minimum the handling of the birds will reduce stress and mortality.

The relatively large number of recaptures in only the second year of banding illustrates both the kind and the quantity of information that can be derived from an ambitious banding program. Of the 29 unique recaptures this year, 20 were from 2007, when only 1772 birds were banded; thus, nearly 1.1% of the birds banded last year were recaptured this year. This rate of recapture suggests that an annual banding program is likely to pay big dividends in terms of knowledge gained of spatial and temporal movements of tricolors.

There have been only two observations of color-banded birds reported by volunteer observers: three birds banded at Conaway Ranch in Yolo county in June, 2007 were seen in late October, 2007 at Pt. Reyes National Seashore by Rich Stallcup, and a bird banded at the Crane Ranch in Merced county in early May, 2008 was seen in late May at a small colony in northern Sacramento county by a private consultant. This small number of resightings suggests a need for additional education and outreach efforts, as birds, especially those in breeding colonies, are often perched with tarsi (and color bands) clearly visible. Resightings of birds in the non-breeding season would be especially helpful, as there are significant gaps in our knowledge of the non-breeding distribution and habitat affinities of tricolors.

It is too early to draw any firm conclusions about movement patterns from only one year of observations of banded birds, but some initial impressions are possible:

- The resighting of 4 birds that were originally banded at Plumas Arboga, Yuba county in 2007 at Los Banos Wildlife Area, Merced county in 2008 suggests that there is at least a tendency for birds that bred together in one location to subsequently breed together again in a different location, i.e. some suggestion of colony cohesion, rather than a complete re-assorting of birds following a breeding bout. These observations may also contradict Neff (1942), who did not find any evidence of post-breeding northward movements to new breeding locations in the Sacramento Valley among his 93 band recoveries (this assumes that the birds observed at the Los Banos Wildlife Area in April would move north to breed again, perhaps at the Plumas Arboga site in Yuba county).
- The recapture of 4 birds originally banded on the Crane Ranch in Merced county in 2008 at the Plumas Arboga colony in Yuba county directly contradicts Neff (1942), who concluded that any northward movement of birds after breeding in Merced county was to their wintering areas.
- The recapture of 9 of 999 (0.9%) birds banded at Plumas Arboga in 2007 at Plumas Arboga in 2008 suggests that birds are breeding site faithful, and that birds that breed in a location one year are likely to return to the same location the following year

These initial banding results are suggestive of the kinds of insights and patterns that only observations of banded birds, both resightings and recaptures, can provide. In an attempt to increase the number of reports of observations of banded birds, I have posted messages to the Central Valley Birds and Cal Birds Yahoo Groups and sent email requests for assistance to collaborators, including state and federal government agency biologists and NGO (Audubon California) staff. In addition, the Tricolored Blackbird Portal (<http://tricolor.ice.ucdavis.edu/>) has been enhanced to allow users to input records of their observations of color-banded birds.

It is hoped that a vigorous annual banding effort will further document patterns of tricolor movements and be integrated into long-term conservation efforts.

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Appendix I. Daily Banding results. Bert Crane Ranch is in Merced county, Willow Slough is in Yolo county, and Plumas Arboga is in Yuba county.

Site	Date	No. Birds Banded
Bert Crane Ranch	04/30/2008	52
Bert Crane Ranch	05/01/2008	286
Bert Crane Ranch	05/07/2008	664
Bert Crane Ranch	05/09/2008	812
Bert Crane Ranch	05/30/2008	252
Willow Slough	05/23/2008	301
Willow Slough	05/28/2008	119
Willow Slough	05/29/2008	160
Willow Slough	06/01/2008	38
Willow Slough	06/03/2008	112
Willow Slough	06/05/2008	123
Willow Slough	06/07/2008	72
Plumas Arboga	06/10/2008	60
Plumas Arboga	06/12/2008	200
Plumas Arboga	06/18/2008	121
Plumas Arboga	06/19/2008	180
Plumas Arboga	06/20/2008	197
Plumas Arboga	06/21/2008	145
Plumas Arboga	06/22/2008	87
Plumas Arboga	06/24/2008	3
Plumas Arboga	06/25/2008	161
Plumas Arboga	06/26/2008	182
Plumas Arboga	07/6/2008	3
Plumas Arboga	07/09/2008	1
Plumas Arboga	07/10/2008	52
Plumas Arboga	07/11/2008	90
Plumas Arboga	07/12/2008	243
Plumas Arboga	07/13/2008	61
Plumas Arboga	07/14/2008	238
Plumas Arboga	07/15/2008	10
Plumas Arboga	07/16/2008	27
Plumas Arboga	07/17/2008	15
Plumas Arboga	07/18/2008	12
Plumas Arboga	07/21/2008	5