

Trapping and Banding of Tricolored Blackbirds (*Agelaius tricolor*)
in 2011

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Acknowledgments

Funding for banding tricolored blackbirds in 2011 was provided by the Jiji Foundation. I thank the U.S.G.S. Bird Banding Laboratory, the U.S. Fish & Wildlife Service, the California Department of Fish and Game, and the University of California I.A.C.U.C. for providing the permits necessary to capture and band tricolored blackbirds in California.

The success of the 2011 banding effort could not have been achieved without the dedication and hard work of numerous landowners, volunteers, and agency collaborators. I thank Mike Stockton, Refuge Manager at Bitter Creek National Wildlife Refuge, Dennis Woolington, Rich Albers, Greg Jackson and Boomer Fipps of San Luis National Wildlife Refuge, and Mike Wolder, Mike Carpenter, and Rich Pence of Sacramento National Wildlife Refuge for supporting trapping and banding efforts by, among other activities, preparing trapping and banding locations, rebaiting the traps with cracked corn, and assisting with trapping and banding. I thank my banding assistants, Joan Gunterman, Steve Simmons, and Lucy Meese. To all I am grateful.

INTRODUCTION

The tricolored blackbird (*Agelaius tricolor*), hereafter "tricolor", is a North American songbird that is nearly endemic to California (Beedy and Hamilton 1999). Tricolor abundance has been reduced by approximately 90% in the past century due to several factors, including losses of its breeding and foraging habitats to agriculture and urbanization, deliberate poisoning and shooting, and harvest of its silage grain nesting substrate while eggs and young are still in the nests (Neff 1937, Beedy and Hamilton 1999, Cook and Toft 2005). Since 2006, severe losses in Tulare County in the southern San Joaquin Valley to predation by cattle egrets have reduced to near-zero the productivity of several large colonies (Meese 2008, 2010). Most recently, the tricolor population has been reduced by 35% from 2008 to 2011 due to chronic reproductive failures beginning in 2007 (Meese 2011).

Despite several decades of field work, relatively little is known about the movements of birds within and among years, nor have basic life history traits (age-specific rate of mortality, life expectancy) been quantitatively estimated. Although large numbers of tricolors have previously been banded, previous investigators relied upon the banding of nestlings and movement data were obtained by shooting banded birds at their breeding colonies (Neff 1942, DeHaven and Neff 1973). The use of aluminum bands on nestlings has among its potential shortcomings the high mortality rate of nestlings, with consequent reduction in the rate of recapture or recovery (Lakhani and Newton 1983). The individualized marking and subsequent recapture of large numbers of adult and fledgling birds may provide information on movements, life history attributes, age structure, site fidelity, and longevity (Calvo and Furness 1992, Lebreton et al. 1992) and provide essential guidance to conservation actions.

This report describes the results of the fifth year of a multi-year study that is attempting to most efficiently trap and band birds by: 1) trapping and banding only adult and recently fledged birds, 2) trapping in multiple locations from the southern San Joaquin Valley to the central Sacramento Valley, and 3) using only federal aluminum bands to maximize the number of birds banded in a field season. These methods are intended to most efficiently accumulate information on patterns of movements and life history attributes.

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 summarizes the methods and results of the 2011 trapping and banding effort.

METHODS

Trapping

Previous experience (Meese 2007, 2008, 2009, 2010) demonstrated that tricolors may effectively be caught in two kinds of traps baited with cracked corn: 1) blackbird traps and 2) dove traps.

Blackbird Traps. I developed blackbird traps from modified Australian crow traps (Meese 2007). Each blackbird trap consisted of 2 4x4' side panels and 2 V-shaped 4x4' end panels of 1x2" galvanized steel mesh set within a 2x2" wooden frame held together by 2 1/2" galvanized steel lag screws. The wire is set within 1/2" deep slots (dados) to reduce abrasion and the risk of injury to trapped birds. Two 30x48" roof panels rest upon 3x48" wooden slats that form a gap through which birds may enter but not escape. One eave has a 7x14" hole cut out of the wire that matches the dimensions of the door to a transport cage (see below) that is suspended from one eave with 2 galvanized hooks (Figure 1). Two small hooks ("S hooks") are attached to monofilament line and secured to the wire frame to hold the door to the transport cage open while trapping. The monofilament line is released to close the door to the transport cage, confining the birds inside, when the birds are removed from the trap and transported to the banding station.



Figure 1. Blackbird trap used in 2011 showing transport cage hanging from far left eave.

See Meese and Simmons (2010) for additional information on blackbird trap design.

Dove Traps. I constructed two additional large 4'x8'x10" dove traps by using plastic clips ("Kwik-klips"; Bass Equipment Co., Monett, MO) to hold together 2 4'x4'x10" sections of 1x2" welded steel wire. Each section had a 14"x7" opening that matched the opening on a transport cage (see below) and two funnels located 22" from the end and 4" from each transport cage (Figure 2). I placed 2 transport cages, one at each end of the trap, against the wall of the trap containing the two openings to form a U-shaped trap with an alcove that was baited with cracked corn. The doors of the transport cages were held open with S hooks attached to monofilament lines. Birds entered the modified dove traps through the two one-way funnels set in the wall just inside the transport cages (Figure 2).



Figure 2. Dove trap baited with cracked corn. Note that 2 transport cages are integrated into the trap and that birds enter the trap through 2 funnels just inside of the transport cages.

Transport Cages. I moved birds from the traps into 18x24x10" transport cages constructed of 1x1" welded steel wire, and carried the birds from the traps to the

banding station in transport cages. Transport cages had same-size (14x7") doors as those on the blackbird and dove traps. A 6" diameter cuff made of elk hide was bolted to the roof of the transport cage through a 10" diameter frame. The cuff provides access into the transport cage for the banders while preventing the escape of birds (Figures 3 and 5).



Figure 3. Transport cage on stand.

I moved birds out of the dove traps and into the transport cages by slowly approaching the dove trap from a position opposite the side with the transport cages, causing the majority of the birds to flee into the far transport cage. I would release the monofilament line to confine the birds to the transport cage. Any remaining birds would flee into the opposite transport cage as I released the monofilament line for the first transport cage. I released the second monofilament line and confined any remaining birds to the second transport cage. Both transport cages were then replaced with empty transport cages and their doors were held open by the S hooks on the monofilament lines.

Both trap designs allowed me to move birds out of the traps and into the transport cages for banding without handling the trapped birds, greatly reducing handling-induced stress to the birds.

See Meese and Simmons (2010) for additional information on traps and trapping methods.



Figure 4. Banding station at Delevan NWR.

Banding

Banding Station. The banding station consisted of a 6' long table and 4 plastic chairs set under a 15x15' nylon shade structure (Coleman GeoSport; Figure 4). Transport cages with birds to be banded were placed on to a 17x23x15" high $\frac{3}{4}$ " PVC pipe support to facilitate handling (Figure 3). A transport cage containing birds was placed between two banders and they would band birds simultaneously. If more than one transport cage containing birds was brought to the banding station, the additional transport cages containing birds were placed on the ground under the shade structure and covered with nylon shade cloth to reduce stress to the birds prior to banding.

Banding began in late April at the Bitter Creek National Wildlife Refuge, southwest Kern County. I habituated the birds to the cracked corn by providing cracked corn for 1 day prior to trapping. Banding continued through mid-July and followed the progression of colonies northward to Delevan NWR, Colusa County.

The blackbird trap was left open with roof panels removed 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. Dove traps were removed from the trapping sites and stored upside-down a few feet away between banding bouts. Both blackbird traps and dove traps were used simultaneously at Delevan T45.1 in an attempt to maximize the capture rate as well as to assess the relative efficiency of the two trap types. Only the dove traps were used at Bitter Creek NWR, Merced NWR, and Delevan NWR T17.1.

Trapping typically began between 0600 and 0700, when I would arrive, rebait the traps, replace the roof panels on the blackbird traps, and reset the dove traps. I would then retreat a short distance (30-100 yards) to the banding station. Birds would typically enter the trap within seconds of my retreat, and I would wait for, in most cases, 15-30 minutes before returning to the trap to remove birds that had been captured.



Figure 5. Removing birds from a transport cage for banding.

Birds were removed from the transport cage via an elk-lined cuff in the top (Figure 5), handled individually, and banded.

The trapping and banding of birds continued until the temperature approached 85°F, when banding activities ceased in an effort to minimize stress to the trapped birds.

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

Trapping and Banding Locations. Birds were banded at 4 locations, as summarized below. All 4 locations were on National Wildlife Refuges.

Site 1: Bitter Creek National Wildlife Refuge, Kern County: Ballinger Canyon USGS Quad, T10N R24W; 34.95941, -119.36219 (NAD83)

Site 2: Merced National Wildlife Refuge, Merced County: USGS Turner Ranch Quad, T9S R12E Section 2; 37.1775,-120.6265 (NAD83)

Site 3: Delevan National Wildlife Refuge Tract 45.1, Colusa County: USGS Maxwell Quad, Section 22, T17N R3W; 39.3054, -122.1843 (NAD83)

Site 4: Delevan National Wildlife Refuge Tract 17.1, Colusa County: Moulton Weir USGS Quad, Section 20, T17N R2W; 39.3192, -122.1035 (NAD83)

RESULTS

Banding

A total of 6920 birds was banded at 4 sites (Table 1). The specific days banded, the number of hours of trapping, and the number and sexes of birds banded on each date are provided in Appendix I.

Table 1. Summary of 2011 banding results.

Site	Days Banding	Hours Banding	Number of Birds Banded	Males	Females	Hatch Year (HY)
Bitter Creek NWR	3	21	175	38	137	0
Merced NWR	7	48.5	3667	397	3280	0
Delevan NWR T45.1	7	36.5	2839	243	2596	0
Delevan NWR T17.1	2	7.5	239	11	228	
Column Totals	19	113.5	6920 (61 birds per hour)	689 (10%)	6241 (90%)	0

First day of banding: 4/20/11 at Bitter Creek N.W.R., Kern County

Last day of banding: 7/13/11 at Delevan NWR T17.1, Colusa County

I also captured and banded 8 yellow-headed blackbirds (*Xanthocephalus xanthocephalus*) and 1 red-winged blackbird (*Agelaius tricolor*).

All birds were captured in either blackbird or dove traps. Unlike the previous 4 years, no fledglings were captured nor banded.

Mortality. In rare instances, and despite an abundance of caution, adults died apparently as a consequence of increased stress associated with trapping and/or the handling associated with banding. A total of 3 birds, all female adults, died during or shortly after being banded (0.04% of the total banded). When an adult died, its carcass was collected, chilled at 2-3⁰ C, and then frozen within 8 hours. Frozen carcasses were deposited into the collections at the Department of Wildlife, Fisheries, and Conservation Biology Museum at the University of California, Davis.

Recaptures. A total of 332 birds, representing 263 unique individuals, was recaptured during trapping and banding operations in 2011. A total of 29 birds was recaptured more than once, at different locations, and 1 individual was recaptured 3 times, each time at a different location. Of the 263 unique recaptures, 7 were originally banded by me in 2007, 14 were originally banded by me in 2008, 117 were banded by me in 2009, 100 were originally banded by me in 2010, and 13 were originally banded by me at locations different than the recapture site earlier in 2011. In addition, 12 were banded by a colleague, Steve Simmons, at sites in Merced County.

Resightings. A color-banded bird was observed and photographed in Madera County by a biological consultant. His report of the bird subsequently led to the documentation of 5 previously unknown Madera County breeding colony locations.

Recoveries. The BBL reported to me the recoveries of 7 banded birds: 5 were banded in 2009 and 2 were banded in 2010. All but 1 were recovered in Colusa County: 1 carcass was recovered in Sacramento County. Five of the birds were banded at Delevan T43, 1 was banded at Yolo Bypass Wildlife Area, 1 was banded at Plumas Arboga (Yuba County), and 1 was banded at Conaway Ranch (Yolo County).

DISCUSSION

The overall very low reproductive success of tricolor colonies and absence of colonies in locations where they are typically found limited the number banding opportunities and the number of birds banded in 2011. The addition of banding at Bitter Creek National Wildlife Refuge, the southernmost site where I have banded birds, may offer additional opportunities for gaining insights into patterns of tricolor movements and site fidelity. Bitter Creek differs from previous banding location because it is outside the Central Valley and is surrounded by largely intact native grasslands.

The relatively small number (3, 0.04% of the total captured) of adults that died after being trapped suggests that our methods are generally safe, but any mortality is a concern. I have designed the traps and transport cages to reduce stress to captured birds to the minimum, and all trapping and banding activities ceased when temperatures rose above 85°F. I have designed the traps and transport cages to be as safe as possible, and it is likely that this year's mortality rate is about as low as can be attained. Both trap designs eliminate the handling of captured birds until banding, and it is likely due to the reduction in handling and the associated reduction in stress that mortality was nearly eliminated.

The recapture rate suggests that a trapping and banding program operating at multiple locations throughout the breeding season is an appropriate strategy for documenting the spatial and temporal movements of tricolors and will enable us, with a few more years of data, to estimate for the first time essential parameters such as life expectancy, age distribution, and mortality rates.

Color-banding was discontinued after 2009 due to the relative lack of resightings of color-banded birds but the observation of the color-banded bird in Madera County this year illustrates how significant even a single observation can be in informing us of tricolor movements. The bird observed in Madera County in April was banded at Delevan National Wildlife Refuge in 2009 and helped to document previously unknown linkages between Central Valley and Sierran foothill locations. This observation proved again that resighting data are unique for they may:

- 1) derive from volunteers who are not formally involved with tricolor conservation efforts,
- 2) occur far from trapping and banding locations, and
- 3) not require the bird to be in the hand in order to obtain useful information. As birds with only aluminum bands must be in the hand or recovered as carcasses to provide information, information is typically restricted to only those locations where banding occurs and is provided only by those directly involved in trapping and banding operations.

This year's recaptures serve to confirm tentative conclusions about movement patterns and suggest new breeding patterns in adult tricolors:

- 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; colony cohesion may have genetic effects, as if birds prefer to mate with the same or familiar individuals, rates of outbreeding would be reduced
- I found additional evidence for breeding site fidelity – to date 249 of 825 recaptures (30%) have occurred at the original banding sites
- the recaptures of 7 birds twice in the same year, once in June and again in July at different locations, provides additional support for the suggestion that some birds try to breed three times per season, as both recaptures occurred in the Sacramento Valley, where birds occur following an initial breeding attempt in the San Joaquin Valley.

But perhaps the greatest surprise, and of most significance scientifically, was the recapture of the same individual 3 times, each in a different location, in 2011. This female, banded originally on July 4, 2010 at the Conaway Ranch in Yolo County was subsequently recaptured in May at Merced N.W.R., in June at Delevan T45.1, and in July at Delevan T17.1. The recapture of the same female at 3 different breeding colonies strongly suggests that some females are triple-brooded, or at least attempt to breed 3 times in 1 year, as previous banding has lead me to suspect (Meese 2010).

It is hoped that the relative success of the banding effort to date will justify a vigorous annual banding effort that will further document patterns of tricolor movements, help

us to understand sources of mortality and relative rates of survivorship, and help to inform a long-term conservation strategy.

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Appendix I. Daily Banding Results. The portion of Bitter Creek National Wildlife Refuge occupied by nesting tricolors is in Kern County, Merced National Wildlife Refuge is in Merced County, and Delevan T45.1 and T17.1 are parts of Sacramento National Wildlife Refuge in Colusa County.

Site	Date	Hours Banding	Total Birds	Males	Females	HY
Bitter Creek NWR	4/20/11	7	65	8	57	-
Bitter Creek NWR	4/21/11	7	81	24	57	-
Bitter Creek NWR	4/22/11	7	29	6	23	-
Merced NWR	4/28/11	7	689	105	584	-
Merced NWR	4/29/11	7	886	149	737	-
Merced NWR	5/1/11	6.5	862	29	833	-
Merced NWR	5/2/11	7	317	13	314	-
Merced NWR	5/3/11	7	423	40	383	-
Merced NWR	5/4/11	7	274	33	241	-
Merced NWR	5/5/11	7	216	28	188	-
Delevan T45.1	6/1/11	5	260	35	225	-
Delevan T45.1	6/2/11	6.5	1017	147	870	-
Delevan T45.1	6/7/11	5	744	10	734	-
Delevan T45.1	6/8/11	5	488	24	464	-
Delevan T45.1	6/9/11	5.5	150	3	147	-
Delevan T45.1	6/13/11	5	89	14	75	-
Delevan T45.1	6/14/11	4.5	91	10	81	-
Delevan T17.1	7/12/11	4.5	216	9	207	-
Delevan T17.1	7/13/11	3	23	2	21	-
4 sites	19 banding days	113.5 hours	6,920 (61 birds/hour)	689 (10%)	6241 (90%)	0