

Preface: Special Double Issue on the Tricolored Blackbird

If a flock of goldfinches is called a “charm,” and a flock of crows, a “murder,” what is a flock of Tricolored Blackbirds (*Agelaius tricolor*) called? Whatever the word, it could not possibly be adequate to describe the mind-boggling energy and excitement generated by a flock of over 50,000 Tricolors settling at a colony. Whether an avid birder or weekend naturalist, you can’t help but be amazed by this sight, for it is one of the Central Valley’s most spectacular natural phenomena.

Welcome to a special double issue of the CVBC Bulletin devoted primarily to a single species. No bird is more deserving than the Tricolored Blackbird. The fact that the Central Valley supports over 90% of the world’s Tricolored Blackbirds is reason enough for this distinction. However, the catalyst for this special publication is a concern shared by many regarding the species’ future due to serious population declines from its former abundance. Petitions to list the Tricolored Blackbird under the State and Federal Endangered Species Acts are currently being considered by the California Department of Fish and Game and the U.S. Fish and Wildlife Service.

Numerous surveys and studies have been stimulated recently out of concern for the Tricolored Blackbird. The results include some noteworthy contrasts: the species is evidently undergoing a steady population decline due principally to habitat loss, but it has also demonstrated promising adaptability to different breeding substrates; the species amasses during the nesting season, but locating and then accurately counting those masses is a vexing challenge.

Described herein are the results of a 2004 Tricolored Blackbird survey that was conducted to update existing information on large, historic nesting colonies. The success of this volunteer effort can be largely attributed to CVBC members and other survey participants who sacrificed all or part of an April weekend to search for colonies up and down the valley. In addition to the survey results, we include an analysis, by Bill Hamilton, of productivity by certain colonies in 2004 and some of his thoughts regarding important conservation steps that should be taken to reverse this decline. Debra Schlafmann and David Hardt describe the conservation history of a nesting site in Tulare County, known as the “Toledo Pit.” Julian Meisler discusses the potential for Land Trusts to help private landowners actively conserve Tricolored Blackbird habitat. Julie Yee and Michael Miller of the U.S. Geological Service discuss their partnership with the U.S. Fish and Wildlife Service to derive standardized, repeatable monitoring protocols for this species. Rich Stallcup provides insights into the needs of a small but important colony in Marin County and contrasts the timing of the Marin nesting season with that of various parts of the Central Valley.

We recognize that this would not have been possible without the CVBC and a journal devoted to the collection and dissemination of information about the avifauna of the Central Valley. We also recognize that this effort never would have materialized without the help of a talented group of authors, reviewers, and editors.

We hope that you enjoy this special double issue. More than that, we hope that it inspires you to learn more about this unique species and our opportunities to help ensure that it is protected adequately in the future. We encourage you to support Tricolored Blackbird conservation by participating in future surveys and other efforts that will increase public awareness of the need to protect one of our most fascinating and threatened birds, and secure forever the opportunity to witness the annual spectacle of 50,000, better yet, 100,000 birds, crowding the Central Valley sky.

Leo Edson, CVBC Conservation Committee Chair
Michael Green, US Fish and Wildlife Service

[Editor's Note: Edward C. Beedy, a member of the Editorial Board for the CVBC Bulletin and co-author of the Tricolored Blackbird species account for *The Birds of North America* Project, ably assisted as co-editor of this special issue, and his efforts are greatly appreciated. -- TM]

The 2004 Tricolored Blackbird April Survey

Michael Green, Nongame Landbird Program, U.S. Fish and Wildlife Service, 911
NE 11th Ave, Portland, OR 97232

Leo Edson, EDAW, Inc., 2022 J Street, Sacramento, CA 95814

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 ¹	Active colonies
Northern Counties					
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 ²	46	46	46	46	0
Shasta	2	0	0	0	0
Siskiyou ³	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
Southern Counties					
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 ³	4	2	7	7	4
Riverside ³	9	0	0	0	0
San Diego ³	0	0	3	3	2
San Joaquin	6	4	4	4	0
Santa Clara ³	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
Totals	216	184	234	251	33

- 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 ¹	4,500	24,500	Himalayan blackberry
Contra Costa	3,000	3,000	cattail
Fresno ²	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 ³	6,500	25,000	Himalayan blackberry
Merced	25,000	25,000	cattail
Merced	12,000	12,000	cattail
Merced ⁴	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 ⁵	100	1,200	cattail
Tulare ⁶	20,000	60,000	silage
Yolo	400	400	cattail?
Pre- and Post-Count Colonies			
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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Financial constraints often limit the ability of federal and state resources agencies to provide adequate funding for surveys and other actions related to the conservation of the species. The authors are optimistic that the outstanding response by volunteers asked to participate in this survey is indicative of the overall level of concern and desire to provide adequate protection for this species by the birding community. We thank Kevin Hunting, Bill Hamilton, and Ted Beedy for reviewing an earlier draft of this article. Financial support for this survey was provided by EDAW, Inc. and FWS.

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Management implications of the 2004 Central Valley Tricolored Blackbird Survey

William J. Hamilton III, Department of Environmental Science and Policy, University of California, Davis, California 95616

Introduction

In this article I compare the reproductive success of Tricolored Blackbirds (*Agelaius tricolor*) in alternative nesting habitats in 2004 and consider the application of these findings to further management actions that will favor this species. I use data from the 2004 survey (hereafter, Survey) of Tricolored Blackbird (hereafter, Tricolor) colonies in the Central Valley (Green and Edson 2004) and my own observations of all Tricolor colonies I could locate or knew about during the remainder of the 2004 breeding season. I followed the fate of some of the colonies reported by Survey participants during and after the nesting season. Without these observers, who covered a broad geographic area, this expanded analysis would have been impossible. Observations by Central Valley Bird Club (CVBC) members and others play an important role not only in the management of tricolors but also in the protection of environmental sites of ephemeral or enduring beauty and grandeur, treasured places where Tricolor colonies choose to regularly settle.

The 2004 Survey focused on agricultural destruction of nests in large colonies in silage fields. Colonies in silage fields, mainly near dairies in the San Joaquin Valley, usually are lost to harvesting operations (Hamilton et al. 1995). Since harvesting of silage fields occurs in April, the Survey provided an opportunity to estimate the impact of silage colony losses upon the overall Tricolor nesting effort.

Methods

Identification of colonies and their size

As noted by Green and Edson (2004) the collective search for colonies during the Survey was neither comprehensive nor random. Surveyors were directed to look at sites where large colonies were seen in the past. It is thus likely that this account, relying heavily on the Survey, under-represents small colonies compared with other survey years. Observers also located additional previously utilized colony sites that were unoccupied by Tricolors at the time of the Survey.

My observations included season-long observation of colonies at the Wind Wolves Conservancy in the California Coast Range foothills, Kern County. Prior experience shows that Tricolor nesting in the Central Valley

moves northward in May and June (Hamilton 1998). My search for colonies after the Survey was also nonrandom. I located all colonies reported to me but searched selectively in the Sacramento Valley in portions of Yolo, Colusa, Glenn, Sutter and Butte counties, including some western Coast Range foothill sites in Glenn and Colusa counties. There was no report of breeding colonies in Sacramento County, a former stronghold of the species (Neff 1937, Beedy et al. 1991, Beedy and Hamilton 1997), but in 2004 some Tricolors probably nested there in Himalayan blackberry (*Rubus discolor*) copses.

Methods for estimating the numbers of birds attending colonies are summarized by Green and Edson (2004). All data from the Survey and from subsequent reports forwarded to Michael Green are included. Some of these counts are modified here based upon (1) personal counts of the number of nests in a colony after the breeding season, (2) discussion with the observers who made observations during the Survey, (3) more exact measurements of the areas occupied by colonies at some later date and (4) inclusion of the largest number of birds present at any time during the season, estimates at the time of the survey notwithstanding. When there were differences between the Survey reports by more than one observer for a colony I contacted the observers and made an effort to determine the basis for the differences. At the silage colonies at Producers Dairy, Fresno County, and the TeVelde Ranch, Tulare County, transects through colonies at the end of the season provided estimates of the number of nests and thus the maximum number of nesting females present. Many females re-nest at some sites and post-season nest counts cannot estimate the actual number of females attending a colony.

Since each female Tricolor will on the average build more than two nests per breeding season the numbers in tables may suggest an exaggerated abundance of Tricolors. Observations reported here do not account for as many as the 162,000 Tricolors located during the 2000 survey. It is not the intent of this paper to evaluate the status of Tricolors. A more thorough survey proposed by the United States Fish and Wildlife Service (hereafter, USFWS) for 2005 should determine the trend in overall abundance.

Measurements of reproductive success

Since I determine reproductive success by examining active nests, the production of nestlings by a colony does not depend upon counting the number of birds attending it. An analysis of the productivity of colonies in different habitats depends upon estimating the probability that nests in those habitats will fledge nestlings. To determine the number of chicks fledging in successful nests (RSS = Reproductive Success of Successful nests), i.e., reaching eight days of age, nests with chicks 6-8 days old are counted and the number of nestlings per nest is averaged. The number of nestlings in successful nests (RSS) is multiplied by number of successful nests, and then divided by the total number of nests. This gives the estimate

of mean reproductive success (RS) of all nests. The estimate of the number of fledglings produced by a colony is the mean RS times the number of nests at that colony. Neither maximum RS nor RSS can be determined after nestlings in some marked nests have fledged.

Where possible, RS values for 2004 colonies were determined by direct measurement (see below). When there was no measurement for RS for a colony I applied average RS values previously determined during a 12-year interval for specific kinds of habitat. The Himalayan blackberry RS estimates in Center for Biological Diversity (2004) are used for this substrate except for those colonies where I measured RS. None of my measurements in 2004 were as great as 2.0 and it is possible that the value quoted in Center for Biological Diversity (2004) suffers from local pseudo-replication. The cattail RS value of 0.5 is based upon 20 colonies measured by me between 1997 and 2003. The Tamarisk value of 1.8 is based upon a single measurement in 1997 at the same site where the 2004 colony was observed.

Direct measurements of reproductive success

No colony was entered when male song chorus was in progress, up to two weeks. Since incubation lasts 11 days (Beedy and Hamilton 1999) an observer can expect to find nests with eggs or small chicks about two weeks after the main male chorus ends. At this brief entry into the colony the approximate schedule for potential jumping and fledging can be determined. The colony needs to be revisited only once more, to measure RS just before the first jumpers are expected. If there are older nestlings in that part of the colony examined they may jump from their nests in response to an observer. If a jumper was encountered, measurements of RS were ended for the season at that colony.

At the time of the final entry into the colony there are some empty nests in most colonies. If there are no jumpers I assume that empty nests and nests with cold eggs were lost to predation, weather, infertility, abandonment or death of females. The measurement so determined is maximum success because there are nests with several days of remaining exposure to predation in the colony, including the 8-day-olds who will not voluntarily fledge for several more days. Depending upon the synchronicity of a colony there may be nests with eggs beside others near fledging. It is for this reason that the accurate determination of RS depends upon marked nests whose fate is determined.

Foraging habitat

Foraging habitat was determined by observation or by discussions with others reporting colonies. The setting of colonies often determines the characteristics of foraging habitat. Some colonies established in cattail (*Typha latifolia*) ponds surrounded by dry rangeland may commute to irrigated agriculture and ignore the surrounding livestock range, a relationship not observed in 2004. Observers need to follow foragers to be sure they

Table 1. Nesting success of Tricolored Blackbirds in 2004 using different nest substrates, based upon direct measurement. These values are included in Tables 2 and 3, along with data for other colonies where the numbers of fledglings were estimated using habitat-specific estimates of RS (= mean reproductive success of all nests; see text for details).

NESTING HABITAT	LOCATION, COUNTY	BIRDS	RS	FLEDGLINGS
Cattail	Delevan NWR, Colusa Co.	136,000	1.07	97,733
	Toledo Pit, Tulare Co.	100	0.00	0
	Saucido Rocks, Santa Barbara Co.	20	0.00	0
	Merced NWR, Merced Co.	25,000	0.00	0
	Subtotals	161,120		97,733
Himalayan blackberry	Butte hunting club, Butte Co.	25,000	1.50	25,000
	Meridian (partial), Sutter Co.	4,000	0.00	0
	O'Neill Forebay, Merced Co.	7,500	0.04	200
	Bryant, Sutter Co.	1,000	0.00	0
	Subtotals	37,500		25,200
Nettle	Wind Wolves, Kern Co.	9,915	2.00	13,220
	Subtotals	9,915		13,220
Silage	Road 88, Kern Co.	5,000	0.00	0
	TeVelde, Tulare Co.	36,000	0.30	7,200
	Producers Dairy, 3rd settlement, Fresno Co.	14,000	0.00	0
	Subtotals	55,000		7,200
Sandbar willow	Meridian (partial), Sutter Co.	17,000	1.00	11,333
	Subtotals	17,000		11,333
California blackberry	Meridian (partial), Sutter Co.	4,000	0.00	0
	Subtotal	4,000		0
Tree willow	Meridian (partial), Sutter Co.	30	0.07	2
	Subtotal	30		2
Totals		284,565		154,688
Percent of all observations in Tables 2 and 3		71%		69%

have identified foraging habitat. This is a more difficult task than one might imagine. While there are often concentrations of birds foraging near colonies, provisioning adults may range up to six km (Hamilton 2003) from their breeding colonies.

Results

Data for analysis of productivity were based upon observations of nesting outcomes at known colonies (Table 1) and observations of colonies at other sites. Changes in the estimates made during the Survey to adjust for actual estimates of numbers of nests do not necessarily imply that errors were made in estimates of colony sizes. During the pre-breeding interval Tricolors may assemble at large dispersal centers in huge foraging flocks (on the order of tens of thousands of birds). This may account for the difference between what Scott Frazier (pers. comm.) found on the levees west of Corcoran Road in Kings County at the time of the Survey and the small number of nests found there after the breeding season. His post-season estimate of 400 nests (600 birds) contrasts with his April observation of about 10,000 birds. I use the nest count data here because I am evaluating reproductive success and estimated colony fledgling production, not the number of birds attending colonies.

Data applying direct measurements of RS for 2004 colonies (Table 1) were supplemented with average RS data. Table 2 includes all data from Table 1 plus means for RS from other years applied to all other 2004 data. Sixty-seven percent of all birds and 70% of all fledgling production values identified in Table 2 are based upon measurements made in 2004 (Table 1).

The number of fledglings in the totals in Tables 2 and 3 were not observed to actually fledge and are estimates of relative fledging success. They are estimates of the relative productivity of colonies observed in 2004. When fledging success is measured, it is measured prematurely to avoid excessive disturbance to older nestlings. Therefore, especially in colonies being preyed upon by coyotes, additional losses to predation undoubtedly were sustained before fledging was completed. At the TeVelde colony starvation strongly reduced fledgling cohorts. Most (72%) nests there during the final colony search contained only a single nestling and the only 8-day-old nestling found was dead.

In Table 3, data from Table 2 are summarized by land use, nesting substrates, foraging habitat types and other criteria. At many of the colonies foraging occurs on more than one category of foraging habitat. The allocation of colonies in Table 3 is to the most heavily utilized habitat in each case. The categorization of foraging habitats identifies Central Valley agricultural lands as pulsed wetlands, watered intermittently according to crop needs. Tricolors foraging from colonies often follow flooding in agricultural and natural settings.

Foraging habitat of the large colony at Delevan National Wildlife

Refuge (hereafter, NWR), Colusa County, could not be precisely determined during several visits to the colony. We (USFWS biologists and the author) saw large numbers of Tricolors from this colony foraging on the refuge in dry shallow seasonal pools, in dry grassy vegetation and off refuge in rice fields. In Table 3 this entire colony is allocated to rice foraging because rice fields surround the refuge in a pattern similar to that at other rice dependent colonies.

The huge reproductive output of the cattail colony at Delevan NWR (Table 1) biased the overall results towards cattail marsh success. This has not been the usual result in previous years, when predation losses reduced RS to a relatively low average value.

One striking feature of results summarized in Table 3 is that mean colony size of the 21 dry-land colonies was less than 2,000 (1,974). Colonies using wetland foraging habitats were on average much larger: four at dairies held 22,125 birds; eight near rice held 24,429 birds; and six in Central Valley agricultural areas held 12,233 birds. Nevertheless, we found more dry-land colonies and their measured and estimated productivity per breeding bird was greater than that of Tricolors using other foraging habitats.

Discussion

All of the relationships between foraging habitat and productivity and other differences between geographic regions are biased by the large number of failed or relatively unsuccessful birds in silage and the huge colony at Delevan NWR. These effects emphasize the importance of finding and measuring the productivity of the large colonies. It is possible that large colonies were not found in 2004 or were found and not reported. The analysis here is intended to summarize what was found and reported in 2004 and to suggest a pattern of analysis that can be applied to a more complete survey in the future, hopefully 2005.

Weather in the spring of 2004 in the San Joaquin Valley and in southern California was exceptionally dry (D. Clendennen, pers. comm.), impacting Tricolor settlement because access to nearby open water is an essential Tricolor habitat requirement. The dryness of the season limited the abundance and vigor of thistle (*Cirsium* spp.) and mustard (*Brassica* spp.) patches throughout California. The weak development of these habitats in 2004 may have concentrated birds at irrigated agricultural sites in the Central Valley. For example, the decline in the number of Tricolors at the Wind Wolves study area is entirely accounted for by the absence of spring water to fill a cattail pond (Sag Pond). In 2001, 4,000 Tricolors nested at this pond but it lacked water and Tricolors in 2004.

Cattails

In 2004, no Tricolors nested in the complex of duck clubs located adjacent to rice fields near Williams, Colusa County. A large Tricolor colony

Table 2. Estimated distribution of a sample of nesting Tricolored Blackbirds and fledglings they produced in 2004 by nesting habitat based upon direct measurement (71% of birds, 69% of fledglings) and estimation (*) from measurements of reproductive success (= RS) in the same kind of nesting habitat in other years.

NESTING HABITAT	FORAGING HABITAT+	LOCATION#	BIRDS	RS	FLEDGLINGS
Cattail					
	REF, RICE	Delevan NWR	136,000	1.07	97,013
	CVAG	Gun Club Rd.	25,000	0.50*	8,333*
	CVAG	Meadowlark	25,000	0.00	0
	CVAG	Glory Hole	12,000	0.50*	4,000*
	DRY	Potter Valley (1)	400	0.50*	133*
	DRY	Marsh Creek	3,000	0.50*	1,000*
	RICE	Sunsweet	400	0.50*	133*
	DAIRY	Toledo Pit	100	0.00	0
	DRY	Saucido Rocks	20	0.00	0
	UNK	Kern	2,000	0.50*	667*
	RICE	Conaway Ranch	2,000	0.50*	667*
Subtotals			205,920		111,946*
(% of total)			(51)		(50)
Himalayan blackberry					
	RICE	Butte h.c.	25,000	1.50	25,000
	DRY	Milton	17,500	2.00*	20,000*
	CVAG	O'Neill Forebay	7,500	0.04	200
	DRY	Potter Valley (2)	300	2.00*	400*
	CVAG	Highway 140	3,000	2.00*	4,000*
	CVAG	Highway 165	900	2.00*	1,200*
	RICE	Colusa Drain	3,000	2.00*	4,000*
	RICE	Roads P and 60	500	2.00*	667*
	RICE	Harter Land Co.	2,500	2.00*	3,333*
	RICE	Bryant	1,000	0.00	0
	UNK	Yreka (2 broods)	150	2.00*	200*
	RICE	Meridian (partial)	4,000	0.00	0
Subtotals			65,350		59,000*
(% of total)			(16)		(26)
Nettle					
	DRY	Wind Wolves (7)	9,915	2.00	13,220
	DRY	Wind Wolves (1)	100	2.00*	133*
	DRY	Santiago Springs	6,750	2.00*	9,000*
	DRY	Maricopa W. B.	2,000	2.00*	2,667*
	DRY	Klipstein Canyon	50	2.00*	67*
	UNK	Klamath	350	2.00*	467*
	UNK	Kern 4/8	100	2.00*	133*
Subtotals			19,265		25,687*
(% of total)			(5)		(12)

Table 2. (cont.)

NESTING HABITAT	FORAGING HABITAT+	LOCATION#	BIRDS	RS	FLEDGLINGS
Silage					
	DAIRY	Road 88	5,000	0.00	0
	DAIRY	TeVelde	36,000	0.30	7,200
	DAIRY	Producers Dairy (two fields)	33,500	0.30*	6,600*
	DAIRY	Producers Dairy (third settlement)	14,000	0.00	0
	Subtotals (% of total)		88,500 (22)		13,80* (6)
Willow					
	RICE	Meridian (partial)	17,000	1.00	11,333
	(% of total)		(4)		(5)
California blackberry					
	RICE	Meridian (partial)	4,000	0.00	
	(% of total)		(1)		
Tamarisk					
	UNK	Corcoran Rd	600	1.80*	720*
Bulrush					
	DRY	Monterey (1)	200	0.50*	67*
	DRY	Monterey (2)	600	0.50*	200*
	DRY	Solano	300	0.50*	100*
	Subtotals		1,100		367*
Desert olive					
	DRY	Monterey (3)	300	1.00*	200*
	DRY	Monterey (4)	20	1.00*	14*
	Subtotals		320		214*
Tree willow					
		Meridian (partial)	30	0.07	2
TOTAL			402,085		223,069

+ = Foraging habitats are primary habitat; rice fields (RICE), Central Valley irrigated agriculture (CVAG) exclusive of fields near dairies (DAIRY) and dry rangeland (DRY). REF is the dry complex of vegetation at Delevan NWR. UNK is unknown to the author. # = See appendix for further information on colonies, including county.

* = RS values based upon average performance in other years. RS values for colonies with no asterisk were measured (Table 1).

Table 3. Estimated distribution of a sample of nesting Tricolored Blackbirds and fledglings they produced in 2004 based upon direct measurement (71% of all birds) and estimation from measurements of reproductive success in other years (29%).

CATEGORICAL DIVISIONS		
OF ALL OBSERVATIONS	BIRDS(%)	FLEDGLINGS(%)
By foraging habitat		
Wetlands and irrigated lands		
Foraging in rice and on Delevan NWR near rice	195,430 (49)	142,148 (64)
Agricultural, pulsed irrigated wetland Pulsed irrigated wetland near dairies and silage	73,400 (18)	17,733 (8)
Dryland foraging, grasslands, mostly cattle rangeland	88,600 (22)	13,800 (6)
Unknown	41,455 (10)	47,068 (21)
	3,200 (1)	2,187 (1)
By primary foraging habitat origin		
Native plants	0	0
Exotic plants	402,085 (100)	222,936 (100)
By nesting habitat origin		
Native plants, mainly emergent marsh vegetation	247,645 (62)	149,416 (67)
Introduced plants	154,440 (38)	73,520 (33)
By ownership of colony site		
Private	221,535 (55)	121,656 (55)
Public	180,550 (45)	101,280 (45)
National Wildlife Refuges and State Wildlife Areas		
NWRs	173,000 (43)	101,013 (45)
California State Wildlife Areas	7,500 (2)	200 (<1)
Other	221,585 (55)	121,723 (55)
Sacramento, San Joaquin valleys		
Sacramento Valley	195,430 (49)	142,148 (64)
San Joaquin Valley	164,600 (41)	32,920 (15)
Mountain foothills, San Joaquin Valley	36,315 (9)	45,554 (20)
Other	5,740 (1)	2,314 (1)
Totals, within each category	402,085	222,936

historically settles this site but usually fails to produce substantial numbers of fledglings due to diurnal predation by Black-crowned Night-Herons (*Nycticorax nycticorax*). Due to management changes in individual marshes, the large cattail marsh site at the Capitol Outing Club was drained at the usual time of Tricolor settlement in May and June. Dry cattail marshes are not colonized by Tricolors. However, the Delevan NWR colony is only 7 km north of this site.

Himalayan blackberry

Himalayan blackberries are exotic invasive plants particularly difficult to control in riparian settings. Himalayan blackberries were a commonly used nesting substrate adjacent to rice fields in 2004 (Table 2). In 1994 we found over 119,000 Tricolors foraging in rice settings, but only 7,250 of them were based in Himalayan blackberry colonies (Hamilton et al. 1995). The difference between these years may be a response to overwhelming Black-crowned Night-Heron predation in cattail marshes, losses of cattail substrates or increases in the distribution and robustness of Himalayan blackberry thickets. Specific cattail sites where 90,000 Tricolors nested in 1994 were either not maintained or were destroyed by 2004.

The 36,000 estimated Tricolors found in six colonies nesting in Himalayan blackberries in the midst of rice included one highly successful colony as well as several smaller colonies that lost nestlings to night-herons. Some of the difference between colonies in susceptibility to night-heron predation may be stochastic, but differences may also be attributed to variations in blackberry copse configuration. Tricolors tend to select dense broad blackberry thickets cascading into canals (pers. obs., Sacramento Valley). This configuration supported the largest successful colony (Table 2) and other colonies where RS was not measured. The blackberry component of one large blackberry-willow colony (Table 2) was completely destroyed by night-herons that stood on these brambles and probed to extract eggs and small chicks (pers. obs., May 2004). The portion of this colony in limber sandbar-type willows (*Salix* sp.) successfully fledged chicks. Only one of 30 nests in a tree-type willow at this colony was successful (Tables 2, 3).

The silage issue

Hamilton (2003) showed that saving silage colonies had no demonstrable effect upon the rapid decline of the global Tricolor population and suggested that habitat losses might be more destructive to Tricolor populations than catastrophic nesting mortality. An alternative hypothesis, represented by the petition to list Tricolors as endangered (Center for Biological Diversity 2004), is that silage colony nest losses are a sink (e.g., Pulliam 1988), destroying enough nests to induce global population decline and create the potential for imminent extinction. Supporters of both alternatives agree that a steady and rapid population decline is in progress.

So the issue is not whether or not to emphasize protection or management of Tricolors. Instead, alternative population regulation hypotheses suggest alternative management priorities. If silage colonies are sinking the global Tricolor population a concerted effort needs to be made to find and protect all such colonies, and there may not be resources to do anything else. If habitat loss is eroding populations it is essential to identify all actual and potential habitat and to protect it from loss.

Silage nesting was initiated as early as March 25 (Kern County) and as late as April 20 (TeVelde, Tulare County). Within large colonies nesting may be initiated for up to three weeks. If conditions within a colony are favorable, re-nesting may occur, extending the interval protection is required to protect nests. This broad range means that any program to protect silage colonies cannot rely upon a one-weekend survey. A group of observers would be needed to hunt for colonies from late March throughout April.

The TeVelde colony was observed to produce low RS (0.3, Table 1) and the Producers Dairy is presumed also to have failed based upon predator trails and the small number of fledglings seen there (Table 2).

Rice

Rice is unavailable as a habitat at the beginning of the San Joaquin Valley breeding season in late March through April (Hamilton 1998) and is therefore not an alternative to silage nesting. Rice nesting cannot be observed by a survey conducted in April. In 1994 we noted that "rice habitat Tricolored Blackbirds were 19.2% of all Tricolored Blackbirds observed nesting in 1994" (Hamilton et al. 1995, p. 27). This is certainly an underestimate of the proportion of all nests made in the vicinity of rice because nesting in the rice areas came late in the season in the Sacramento Valley and we could not "generate the kind of coverage we put into the San Joaquin Valley" (Hamilton et al. 1995, p. 27). The comparable figure for the far *more* limited search for rice colonies in 2004 is 49% of a substantially smaller and less randomly acquired sample. Despite these caveats, it is possible that rice now is providing half of all breeding Tricolor foraging habitat (Table 3). It will take a season-long survey to make a reliable estimate.

Rice is a favorable habitat for Tricolor management because impacts of nesting Tricolors upon the crop are light compared with silage. Damage to rice is primarily loss of seeds and germinated seedlings when water is drawn down early in the cultivation cycle. Throughout the Sacramento Valley a few Tricolors may forage on rice fields soon after flooding but they do not arrive *en masse* to nest for several weeks. In this analysis I found an estimated 64% of all fledglings produced in colonies adjacent to rice cultivation, with 44% of that total attributable to a single cattail colony on Delevan NWR. This site, dried and re-contoured after the 2000 breeding season, is maintained as a permanent wetland until August after other wetlands on the refuge are drained from mid-March through May (Mike

Wolder, USFWS, pers. comm.).

The extent to which rice-related colonies should be managed may depend upon the status of the global population and what we find in 2005 and subsequent years to be the importance of rice to the overall Tricolor population. The only current limitation to use of rice by Tricolors seems to be the absence of suitable nesting sites in the immediate vicinity of rice fields. The principal deterrent to Tricolor productivity in the rice nesting areas is predation by Black-crowned Night-Herons.

Dry-land habitats

The estimate that 22% of Tricolors in 2004 fledged in colonies where dry rangeland provided the primary foraging habitat is a particularly hopeful discovery. Development of these sites, particularly in the foothills of the San Joaquin Valley, may be more cost effective than attempting to create suitable habitats near dairies. However Beedy (pers. comm.), reading this account, noted that there are "large areas in the foothills (e.g., Yuba County) where extensive Himalayan blackberries, canals, and wet pastures appear to provide highly suitable breeding and foraging habitat but where colonies have not been reported." There was a 13,500-bird colony in Yuba County in 1994 (Hamilton et al. 1995).

Since 2000, ongoing management of the San Emigdio Ranch, Kern County, by the Wind Wolves Conservancy has enhanced its Tricolor breeding productivity. In 2004 it produced 8% of all observed and estimated Tricolor productivity (Tables 2 and 3). Actions favoring Tricolors there include livestock exclusion from core wetland vegetation at some springs, ponds, and narrow gully riparian watercourses vegetated with cattails and nettles (*Urtica holosericea*). Livestock gain access to water downstream from springs. Similar management could be implemented on private ranchlands lining both sides of the Central Valley.

Conclusions

Absence of Tricolors from any fully suitable habitat within the geographic distribution of this species is a matter of concern. Are suitable habitats unused because overall numbers are suppressed, e.g., because of breeding colony failures? A better resolution of this question requires a full season intensive search. Large colonies may develop and fail in less than three weeks, leaving the impression to anyone observing at any other time that no birds attempted to nest there.

Active colonies settled in silage need to be protected, but the implication that the ongoing decline of Tricolor populations is mostly due to harvesting of silage fields by dairy farmers (Center for Biological Diversity 2004) is not based upon a comprehensive analysis of existing data. Important conservation priorities of Tricolors are not limited to protection of the silage field nesting colonies in the San Joaquin Valley.

Opportunities to manage, create, and maintain Tricolors throughout their distribution are being overlooked. We need to respond to the collapse of the southern California (Unitt 2001) and Sacramento County (Beedy and Hamilton 1997) populations. There is a loss of colony nesting sites and foraging habitats in progress throughout most of the distribution of the species (Hamilton 2003). This persisting loss of habitat needs to be identified and places where Tricolors can reproduce successfully need to be maintained. Numbers in this report suggest Tricolored Blackbird reproductive success can be supported with a variety of proactive management practices throughout the distribution of the species. Private ranchlands lining both sides of the valley have the potential to benefit Tricolors and other declining bird species. A vast expanse of suitable foraging habitat is also present in the millions of acres of California rice fields. The National Wildlife Refuges are a source of core support for Tricolor populations. In some cases colony production at these sites can be increased if the species is identified as a management priority. Declaration of Tricolor habitat as a priority is also necessary to get planning agencies in southern California to commit to habitat development.

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APPENDIX. Colonies listed in Table 2 are as follows: Delevan NWR = Delevan National Wildlife Refuge, Colusa County; Gun Club Rd. = site in Merced County; Meadowlark = site on Merced National Wildlife Refuge, Merced County; Glory Hole = site on Merced National Wildlife Refuge, Merced County; Potter Valley (1) = cattail marsh in Potter Valley, Mendocino County; Marsh Creek = site in Contra Costa County; Sunsweet = site in Yolo County; Toledo Pit = Toledo Pit storage basin of the Lower Tule Irrigation District, Tulare County; Saucido Rocks = site in Santa Barbara County; Kern = a site reported in Kern County; Conoway Ranch = site in Yolo County; Butte h. c. = Butte hunting club in Butte County; Milton = Rock Creek, Milton, Tehama County; O'Neill Forebay = site in Merced County; Potter Valley (2) = site in Mendocino County; Highway 140 = a site along this highway in Merced County; Highway 165 = a site along this highway in Merced County; Colusa Drain = site in Colusa County; Road P and 60 = intersection these roads in Glenn County; Harter Land Co. = Harter Land Company, Glenn County; Bryant = a site in Sutter County; Yreka = a site along Interstate 5 south of Yreka in Siskiyou County; Meridian = site in Sutter County; Wind Wolves (7) = sum of seven colonies at Wind Wolves Conservancy, San Emigdio Ranch, Kern County, where RS was measured in 2004; Wind Wolves (1) = one colony at Wind Wolves where RS was not measured; Santiago Springs = site in Kern County; Maricopa W. B. = Maricopa Water Bank, Kern County; Klipstein Canyon = site in Kern County; Klamath = site in Klamath County (OR); Kern 4/8 = a site in Kern County; Road 88 = site in Kern County; TeVelde = site in Tulare County; Producers Dairy = site in Fresno County; Corcoran Road = TLDD levee, Kings County; Banks (1 through 4) = four sites surveyed by James Banks in Monterey County; Solano = site in Solano County.

Land Trusts and Tricolored Blackbird Conservation

Julian Meisler, Conservation Planner, Solano Land Trust, 1001 Texas St., Suite C, Fairfield, CA 94533. (julian@solanolandtrust.org)

Land trusts are an increasingly effective force in protecting important biological resources and farmlands throughout the United States. In California there are at least 255 land trusts and 23 in the Central Valley alone. Perhaps the most important ingredient for their success is an established local presence. Land trusts are staffed by local community members who are dedicated to that region. Landowners recognize this and are often more comfortable working within the community than with government agencies.

A principal tool of land trusts is the conservation easement, a voluntary legal agreement between a landowner and a conservation organization in which the landowner is compensated for placing restrictions over their land in order to protect a valued resource such as farmland, habitat for rare species, or both. Land use restrictions often include limitations on construction of new buildings but may be far more specific. Conservation easements are in perpetuity and run with the land so all future owners are bound by the terms.

The Solano Land Trust (SLT) focuses its attention on Solano County, the gateway between the Bay Area and the Central Valley. Solano County is experiencing tremendous growth accompanied by a regular and alarming loss of farmland and habitat.

Over the last 18 years, SLT has protected over 11,000 acres of farmlands, open spaces and important habitats. Roughly 4,500 acres are protected with conservation easements. To date the purpose of most of our easements has been to preserve agricultural values by preventing the conversion of farmland to urban development. When biological resources are the primary conservation value of a property, we have typically opted to purchase the land to enable maximum flexibility in management. Because protection of farmland and habitat are not mutually exclusive, we maintain agricultural practices at some level on all of our lands. For example, managed grazing in vernal pool grasslands is essential in controlling invasive species. All of our land acquisitions are made from willing sellers only.

The observed nesting of Tricolored Blackbirds (Tricolors) in silage fields on large dairies in Fresno, Kern, Kings, Madera and Tulare counties has relevance to Solano County because this industry is growing here; one large dairy is already operational and others have been proposed. A few small colonies of Tricolors have been reported in freshwater marshes from Solano County in the last ten years (California Department of Fish and Game, Natural Diversity Data Base). So far SLT is unaware of Tricolors nesting in

grain fields in Solano County, however, the pattern of nesting in dairy silage fields may soon occur. The question should then be asked how to best protect the bird on private agricultural lands while maintaining a viable operation.

Answering this question requires 1) determining of the conservation objective, 2) outlining the action required to meet that objective, and finally 3) identifying the tools that could be used to implement these actions.

The biggest threat to Tricolor nesting success on these agricultural lands is harvesting of crops before the nesting season is complete, which can result in heavy mortality for hatchlings. Therefore the objective is to preserve agricultural lands that provide nesting habitat and to maintain land uses that promote nesting success.

Meeting this objective requires thinking of the Tricolors as a crop of sorts and the farmer is paid for his crop. A logical method might be to pay the farmer to delay harvest until the nesting season is complete. The amount paid would be equal to the market value of the crop. Alternatively, the farmer could be paid the difference between the value of the crop during nesting season, when it has its highest nutritional and market value, and the value of the crop after nesting season when it is harvested. The farmer could then harvest and sell the reduced value crop after the nesting season. However, this approach does not come without significant challenges to the farmer.

For example, most farmers that harvest silage or hay follow their harvest with a second planting such as corn. If the silage harvest is delayed to accommodate the birds, the timing of the second crop is thrown off and may, therefore, require an additional payment to offset lost income. Furthermore, if a grain crop is left standing beyond the typical harvest time, it will go to seed. These seeds then create problems when they begin to grow amongst the new crop.

These issues require negotiation but are not insurmountable. Bigger challenges arise in considering the best tool to accomplish this conservation action. As mentioned, the principal tools are the purchase of a conservation easement or purchase of the land. When land is protected to maintain its agricultural value, conservation easements are the tool of choice. But when the crop is Tricolored Blackbirds, it becomes more complicated.

Typically the conservation easement process begins with an appraisal of the value of the development rights and concludes with a payment to extinguish those rights. This payment happens only once. Therein lays the most common concern expressed by landowners, one payment in exchange for perpetual restrictions. However, this is frequently overcome by inserting language in the conservation easement that permits limited development so long as it does not affect the agricultural value of the property. There are no restrictions on how the land is farmed.

But when farming for Tricolors, an annual payment as described above must supplement the one time payment to compensate the farmer for lost

income when nesting occurs. While there are a variety of sources for funding for the purchase of a conservation easement, funding sources for a recurring payment are probably limited to state or federal government. This would likely to require a separate agreement between the land trust, the landowner, and the government. This agreement could be renewed annually, every ten years, or any other time increment.

But what if the birds do not nest there in a given season? Many farmers have to arrange for the sale of their crop during the previous fall. Accordingly, the payment would have to be made not just in those years when Tricolors nest in the protected fields, but every year. With this comes a certain degree of uncertainty for the Tricolors; government funding is not reliable over the long term. Still, the conservation easement protects the land in perpetuity and therefore outright destruction of the habitat is ruled out.

The alternative to a conservation easement is to purchase the land if the owner is willing to sell. Because land acquisition by federal and state agencies is often regarded with suspicion and resistance, local land trusts such as SLT may be better suited to fill this role. As the owner, the trust could lease the land for agricultural use but would maintain control over the agricultural practices.

Yet any land trust is limited in the amount of land it can acquire by funds and by public perception. If the land trust is perceived as taking opportunity away from local farmers, its efforts are unlikely to succeed. Based on this, a combination of conservation easements and land acquisition may be the best approach. In this way, the land trust could create a mosaic of land with varying degrees of protection for Tricolors. While the easement land may not always provide ideal nesting habitat, it will never be paved over. Its juxtaposition to fee owned land could act as a buffer against more urbanized land uses. On the fee owned land, the land trust could implement measures to attract the Tricolors such as planting blackberries or developing cattails for nesting, alfalfa or other fields for foraging, and controlling the type and timing of harvests of other cropland that might be used by Tricolors.

Ultimately, local action by local groups will be a key element of Tricolored Blackbird conservation in the Central Valley. Land trusts are ideal to fill this role because of their experience in complex conservation transactions and their local presence. Many trusts have boards that include farmers and ranchers, which grants another tier of credibility within the agricultural community and may be the key to success. Creative solutions that include the larger community are likely to be the most successful.

For Future Reference



This female Tricolored Blackbird (*Agelaius tricolor*) is denying food to her fledgling. Parental Tricolors stop provisioning nestlings at some colonies and lure the fledglings to sites away from the colony, then resume provisioning. These crèches, up to five or more kilometers from colonies may give the false impression that they are nesting sites. Crèches may account for all reports of Tricolors nesting in spineless or otherwise unarmored vegetation not over water. Oleanders, California walnuts (*Juglans californica*) and many other shrubby plants are bases for crèches but not nests. Photo taken at Sag Pond, Wind Wolves Preserve, Kern County, California.

photo and text by William Hamilton III (wjhamilton@ucdavis.edu)

Late nesting Tricolored Blackbirds in western Marin County, California

— Since my earliest actual surveys of Tricolored Blackbirds (*Agelaius tricolor*) on outermost Point Reyes in 1982, the winter population has ranged from 4,500 to 11,000 individuals. In most years the number has been in the 9,000 to 11,000 range, perhaps 8-10% of the world population. Winter birds forage at dairy ranches on the outer point and roost in freshwater cattail (*Typhus* spp.) marshes and introduced Monterey Cypress (*Cupressus macrocarpa*) groves. Numbers begin to dwindle by late February and by early April the species is virtually absent. There are none present for most of April and May.

In late May small groups begin to arrive joining to form larger forces by mid-July. There is singing and pairing, but breeding initiation seems to be delayed until the last Red-winged Blackbirds (*Agelaius phoeniceus*) fledge. Tricolored nesting typically *begins* in late July and adults are often still feeding young in late September. These, the many family groups, form the core of the large wintering population.

Habitat selection for colonies varies opportunistically. Most years, the colonies are in freshwater marshes (usually at the large pond behind Drake's Beach parking lot) but other habitats have been used. In 1989 about 1,800 pairs successfully fledged chicks in a dense forest of old stalks (left over from the previous year) of Milk Thistle (*Silybum marianum*) on the Hall Ranch less than .5 mi from the Drake's Beach marsh. Into the early 1990s another colony (about 300 pairs) were present at the Cypress Grove Preserve in Marshall on the eastern shore of Tomales Bay. Most nests were in blackberry (*Rubus* spp.) brambles with others in short, dense willows (*Salix* spp.).

Nesting from July to September is contrary to what is known for Tricolored Blackbirds elsewhere. Because west Marin breeders do not begin to arrive until the last week of May, it seems likely that they have nested elsewhere (or attempted to do so) in April and early May. Tricolored Blackbirds often choose crop fields as colonial nesting sites in parts of the Central Valley. Sadly, these crops usually mature before the young birds and (unless there is human intervention), the pre-fledglings are mowed. Possibly, the Point Reyes birds are refugees from such failed attempts elsewhere.

Most foraging for parent birds from the Drake's Beach marsh colony (1982-2001) took place at nearby Holstein dairies (Figure 1). In descending order of importance those were: the Spaletta Dairy (C Ranch); the Hall/Horick Dairy (D Ranch); the Mendoza Dairy (B Ranch) and the Nunes Dairy (A Ranch).

In the fall of 2000 the Hall/Horick Dairy folded, the land went to Point Reyes National Seashore, the cows were removed and the dairy shut down.

This significant reduction in foraging opportunities may have and have had a serious impact on the size of the colony which has dropped from about 1,500 nests in 2000 to less than 650 in 2003. This change may also be within the range of natural fluctuation. If the breeding colony continues to decline it will not be a surprise to see proportional drops in the wintering population. — *Rich Stallcup, Box 36, Inverness, California 9493.*

[ADDENDUM: For the first time in many years, Tricolored Blackbirds are not now (August 2004) nesting in Point Reyes National Seashore. This condition is probably due to reduced foraging opportunities. —RS]



Figure 1. Tricolored Blackbirds (*Agelaius Tricolor*) from a breeding colony at Drake's Beach marsh foraging near a dairy cow on the Mendoza Ranch, Point Reyes, Marin Co., September 2002.

photo by Rich Stallcup



Toledo Pit, aka the Toledo Basin Tricolored Blackbird enhancement —

Toledo Pit is a storage basin owned by the Lower Tule Irrigation District in Tulare County, California. The Irrigation District allowed cattails (*Typhus* spp.) to flourish in Toledo Pit and, as a result, Tricolored Blackbirds (*Agelaius tricolor*) have successfully nested in the habitat. The 40 acre cell provided nesting habitat for approximately over 20,000 birds in the year 2000. In 2001 local biologists realized that the storage basin was not holding water during the critical nesting period. Tricolored Blackbirds were either selecting other sites or unsuccessfully attempting to nest in Toledo Pit. The U. S. Fish and Wildlife Service together with the Bureau of Reclamation, California Department of Fish and Game, and the Tule Irrigation District created a cooperative agreement, signed in April 2002, to develop a well next to the storage basin. The well is supposed to deliver enough water to flood the 40 acre basin to the average depth of 6 to 12 inches, between February 15 and June 30, for 25 years or the life of the well – expressly for growing cattails for the benefit of nesting Tricolored Blackbirds. Management of the site is the duty of the Irrigation District, but in coordination with the U.S. Fish and Wildlife Service.

Water delivery in 2003 was too late for sufficient cattail growth. Proper management began in 2004, but cattail growth was sufficient to attract only 1000 birds. This, however, was considered a successful first step that hopefully will build quickly in the coming years to accommodate a sizable colony of Tricolored Blackbirds once again. Toledo Pit promises to provide nesting habitat in wet or dry years when wetlands are scarce. The future looks bright on this small site for the birds where habitat is guaranteed.—*Debra Schlafmann, U.S. Fish and Wildlife Service, 2800 Cottage Way, Sacramento, CA 95825; and David Hardt, Kern and Pixley National Wildlife Refuge Complex, Manager, 10811 Corcoran Rd., Delano, CA 93215.*



sketch by Tim Manolis

Central Valley Bird Highlights: December 2003 through February 2004

John Sterling, 26 Palm Ave, Woodland, CA 95965

WATERBIRDS

A **Pacific Loon** on the Calaveras County side of Camanche Reservoir on 24 January (TE) was an overdue first county record. A **Cattle Egret** along Wise Road was barely within the Placer County line for only the third or fourth county record in late December (TE) and five were found there on 31 December (EP). A flock of 14 **White-faced Ibis** flying north of Hwy 12 in western Calaveras County on 4 January (DW) was the sixth record for the county. An immature **Tundra Swan** near Ione in Amador County on 2 January (FS) was only the second county record and was thought for a few days to be an immature Trumpeter Swan. A bunch of us learned a great deal about swan identification—basically don't bother with silent immatures! Also at that site were **Cackling Geese** with the **Canada Geese** and a **Eurasian Green-winged Teal** (first Amador record) on 3 January (JS). Another **Eurasian Green-winged Teal** on 19 January (EH) was in the Yolo Bypass. About 500 **Blue-winged Teal** were counted at Los Banos Wildlife Area by state biologists on 27 December and 93 were counted on the Los Banos CBC on 29 December. These are not only extremely high counts for Merced County but for the entire state. A male **Tufted Duck** along with **Barrow's Goldeneye** and **Greater Scaup** were along West Butte Road in Sutter County on 30 December (BW). These are all rare in Sutter County and the Tufted Duck was only the second county record. Another male **Tufted Duck** at San Luis NWR from 13 February (LY) was perhaps the first Merced County record away from the O'Neill Forebay. Another **Tufted Duck** in the Yolo Bypass on 18 January (SA) was the third record for Yolo County. The Calaveras County **Barrow's Goldeneyes** found in November at the Valley Springs sewage ponds were still present through the end of February (CM). A **Long-tailed Duck** at the Winters sewage ponds on 15 December was the third record for Yolo County (CBC). Three **Red-breasted Mergansers** along the Sacramento River in Redding on 31 January (AD+) was a high count for Shasta County and the Central Valley. Another was in Fresno on 11-12 January (JD). A rare wintering **Sanderling** was at the Modesto Sewage Pond, Stanislaus County from 19-22 December (JG) and another **Sanderling** along with two **Snowy Plovers** were at the Los Banos Sewage Ponds, Merced County on 29 December (CBC). A **Ruff** at the Thermalito Afterbay on 30 December (SK) was one of few records for Butte County. A rare winter **Wilson's Phalarope** was at the Yolo Basin on 30 December (CBC). **Mew Gulls** made news with one at Redding 10 February (B&C Y) seen on prior dates at Kutrass Lake and the sewage ponds for one of few Shasta County

records, another in Marysville on 17 December (TM) for a second record for Yuba County, an adult at Woodward Park on 4 January (JD) for one of few Fresno County records, and one at Camanche Reservoir on 9 January (TE) for a first Amador County record. A **Thayer's Gull** (first winter) at Fresno Groundwater Recharge Ponds on 15 December (JD) was first Fresno County record followed by two more at the Fresno sewage ponds on 21 December (JD). Another first winter **Thayer's Gull** was on Camanche Reservoir on 12 January (JS, JLu) for a first record for Calaveras County. A first winter **Glaucous-winged Gull** at the Sacramento NWR on 5 February (BD) was one of few records for Glenn County. Three on Camanche Reservoir on 9-12 January (TE, JLu) was the second for both Amador and Calaveras counties. An adult **Western Gull** there on 12 January (JS, JLu) was a first for Calaveras County (it did not fly into Amador).

LANDBIRDS

A **Yellow-bellied Sapsucker** at Lake Solano on 20 December (KG) was in an area where there have been a few records in recent years. A **Red-naped Sapsucker** at the swan location near Ione on 4-19 January (KG) was a first for Amador County. Also at this location was an *Empidonax* flycatcher thought to be a **Dusky** or a **Hammond's Flycatcher** on 1 February (KG). The bird was silent and several characteristics point towards Dusky. In California, winter records for Hammond's far outnumber those of Dusky. To the west of Lodi along Turner Road, an immature male **Vermilion Flycatcher** was found on 20 December and was seen by many through February and another was at the Los Banos Wildlife Area in Merced County on 27-31 December (GG, KVV). A highlight for many birders this winter was the **Scissor-tailed Flycatcher** first found at UC Davis on 12 December (SW), then not refound until 16 January (AK) where it was seen daily through the period on campus in Yolo County and across Hwy 80 at the sewage ponds in Solano County for first county records. **Barn Swallows** were once again found in December with a high count of 72 at the Los Banos CBC on 29 December. The Peace Valley CBC had its first ever **Barn Swallow** on 30 December. This may be the highest winter total ever for the Central Valley. A **Northern Rough-winged Swallow** was a greater surprise for winter at the Yolo Basin on 30 December (CBC) for a second winter record for Yolo County. An immature **Northern Shrike** at the Davis Wetlands from 9-21 February (JH) was the only one reported in the Central Valley this winter. A **Cassin's Vireo** was along Pleasant's Valley Road near Putah Creek in Solano County on 15 December (LE). A flock of 187 **Mountain Bluebirds** west of Hwy 505 in northern Yolo County on 10 January (TC) was one of the largest flocks that I have heard of in the Central Valley.

Woodbridge Regional Park in Lodi, San Joaquin County was this season's prime example of the "Patagonia Rest Stop Effect" where a **Brown Thrasher** wintered that attracted dozens of birders who also found a

Yellow-bellied Sapsucker on 18 December (JLu) and refound on 5 February (JK) for the second county record, a **Long-eared Owl** on 4 January (EG), and several **White-throated Sparrows**.

A rare wintering **Yellow Warbler** was found near the above-mentioned Scissor-tailed Flycatcher at the sewage ponds on 1 February (JH). A **Clay-colored Sparrow** near Putah Creek on 15 December (JH) was the fourth record for Yolo County. At least 10 **Chestnut-collared Longspurs** were found at Rd 16 just west of I-505 on 22 December (SH) and a few were seen in the general area through the winter. Another near the Davis Landfill on 6 January (SH) was only the eighth record for Yolo County. Very rarely reported in the Central Valley, a **Snow Bunting** at the Clifton Court Forebay from 27 February to mid-March (AS) was the second record for Contra Costa



County. A possible **Pink-sided Junco** was convincingly described from Sacramento on 26 December (DS, SW) and to their credit the observers were cautious in their assessment. There are few valid records of this form in Northern California and great care should be taken to rule out other forms of juncos.

Figure 1. Snow Bunting (*Plectrophenax nivalis*) at Clifton Court Forebay, Contra Costa Co., March 2004.

photo by Todd Easterla

(CBC) = Christmas Bird Count, observers not identified in reports.

* Pending endorsement by the Sacramento Bird Records Committee

I greatly appreciate the summaries of bird sightings generously provided by Steve Hampton, Waldo Holt and Chris Conard. Additional Observers: Steve Abbott, Terry Colborn, Jeff Davis, Al DeMartini, Bruce Deuel, Todd Easterla, Leo Edson, Greg Gerstenberg, Ed Greaves, Kevin Guse, Ed Harper, Joan Humphrey, Alison Kent, Jon King, Sandy Koonce, John Luther, Tim Manolis, Ed Pandolfino, Don Schmoldt, Akira So, John Sterling, Fritz Steuer, Kent Van Vuren, Dave Wagner, Sally Walters, Bruce Webb, Lowell Young, and Bob and Carol Yutzy.

Central Valley Bird Highlights: March through May 2004

John Sterling, 26 Palm Ave, Woodland, CA 95965

WATERBIRDS

A singing **Black Rail** * at Consumnes Preserve on 24 April (JT) was one of few records for Sacramento County. A **Pacific Golden-Plover** at the South Wilbur Flood Area, a **Ruddy Turnstone** and a breeding plumaged male **Ruff** at the Kent Avenue Ponds, a **Semipalmated Sandpiper** and a **Franklin's Gull** on 2 May (GH, RH, JSe, LC) were the highlights for a record-breaking Big Day of 145 species in Kings County. **Solitary Sandpipers** at the Colusa NWR on 18 April (2 individuals) (JL) and 1 May, (CM) in Colusa County, another at Mendota Wildlife Area on 17 April (BB) in Fresno County, and another near Vacaville on 19 April (RM) in Solano County. Two **Red Knots** were at the Kent Avenue ponds on 8 & 9 May (GL, JSL) in Kings County where somewhat regular in spring, along with a **Baird's Sandpiper** on 8 May (GL) that is considerably rarer during spring migration than fall west of the Sierra Nevada/Cascade divide. Another **Baird's** was at the Redding Sewage Ponds on 10 April (RM) in Shasta County, and these ponds continued to harbor rarities with six locally-rare **Willetts** and up to 4 **Solitary Sandpipers** on 20 April (RM, BD) and a **Red Knot** on 20 April (BD) that was first found at Kutras Lake in Redding on 19 April with two locally-rare **Marbled Godwits** (RS) and two **Willetts** on 20 April (RB). Three **Stilt Sandpipers** at the Fresno Sewage Ponds on 8 May (GL) was probably a high county for Fresno County of this scarce migrant/wintering species. A **Franklin's Gull** at Bravo Lake on 2 May (GH) was a first for Tulare County.

LANDBIRDS

A pair of nesting **Swainson's Hawks** along the American River Parkway found on 5 April (EH) was perhaps the first nesting at that location in Sacramento County (at least in recent decades since urbanization). A **Steller's Jay** at Lodi from 21-29 May (BM) was unusual in the lowlands this late in the spring and a rare find in San Joaquin County. A singing **Red-eyed Vireo** * in north Davis on 28 May (SH) was an excellent find that was seen by many for the first Yolo County record. A singing **Northern Parula** * at the Consumnes Preserve on 9 May (CC) and another at the Bufferlands on 23 May (CC) in Sacramento County were the only vagrant warblers reported this spring from the Central Valley. A singing **Grasshopper Sparrow** along Peterson Road near Sites in western Colusa County on 10 May (JLx) was one of few county records of a species that is easily overlooked. A male **Great-tailed Grackle** at the Valley West shopping center in Calaveras County on 10 April (CM) was the second record for that location and the third record for the county. Another in Yuba County in April (BW) was an apparent first

county record. A pair of **Great-tailed Grackles** near Fairfield were discovered nesting in mid-May (JW) for the first breeding record for Solano County. A male **Yellow-headed Blackbird** along Hwy 12 just inside the Calaveras County line near Camanche Dam on 8 & 9 April (KF) was perhaps only the third county record.

* Pending endorsement by the Sacramento Bird Records Committee

Observers: Bev Brock, Ray Bruun, Luke Cole, Chris Conard, Bruce Deuel, Kasey Foley, Rob Hansen, Ed Harper, Gjon Hazard, Gary Linqest, Jim Lomax (JLx), John S. Luther, Curt Medlock (CMe), Bonnie Meyer, Red Modeen, Clyde Morris, Roger Muscat, Rob Santry, Jeff Seay, John Trochet and Jim Walsh, Brian Williams.

