

**Western Riverside County  
Multiple Species Habitat Conservation Plan  
Biological Monitoring Program**

**2017 Tricolored Blackbird (*Agelaius tricolor*)  
Survey Report**



**12 June 2018**

Revised 25 July 2018

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**NOTE TO READER:**

This report is an account of survey activities conducted by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. Reserve assembly is ongoing and is expected to take 20 or more years to complete. The Conservation Area includes lands acquired under the terms of the MSHCP and other lands that have conservation value in the Plan Area (called public or quasi-public lands in the MSHCP). In this report, the term “Conservation Area” refers to these lands as they were understood by the Monitoring Program at the time the surveys were conducted.

The Monitoring Program monitors the status and distribution of the 146 species covered by the MSHCP within the Conservation Area to provide information to Permittees, land managers, the public, and the Wildlife Agencies [i.e., the California Department of Fish and Wildlife (CDFW, formerly California Department of Fish and Game) and the U.S. Fish and Wildlife Service]. Monitoring Program activities are guided by defined conservation objectives for each Covered Species, other information needs identified in MSHCP Section 5.3 or elsewhere in the document, and the information needs of the Permittees. A list of the lands where data collection activities were conducted in 2017 is included in Section 7.0 of the Western Riverside County Regional Conservation Authority (RCA) Annual Report to the Wildlife Agencies.

The primary author of this report was the 2017 Tricolored Blackbird Project Lead, Rose Cook. This report should be cited as:

Biological Monitoring Program. 2018. Western Riverside County MSHCP Biological Monitoring Program 2017 Tricolored Blackbird (*Agelaius tricolor*) Survey Report. Prepared for the Western Riverside County Multiple Species Habitat Conservation Plan. Riverside, CA. Available online: <http://wrc-rca.org/about-rca/monitoring/monitoring-surveys/>.

While we have made every effort to accurately represent our data and results, it should be recognized that data management and analysis are ongoing activities. Any reader wishing to make further use of the information or data provided in this report should contact the Monitoring Program to ensure that they have access to the best available or most current data.

If there are any questions about the information provided in this report, please contact the Monitoring Program Administrator. If you have questions about the MSHCP, please contact the Executive Director of the RCA. Further information on the MSHCP and the RCA can be found at [www.wrc-rca.org](http://www.wrc-rca.org).

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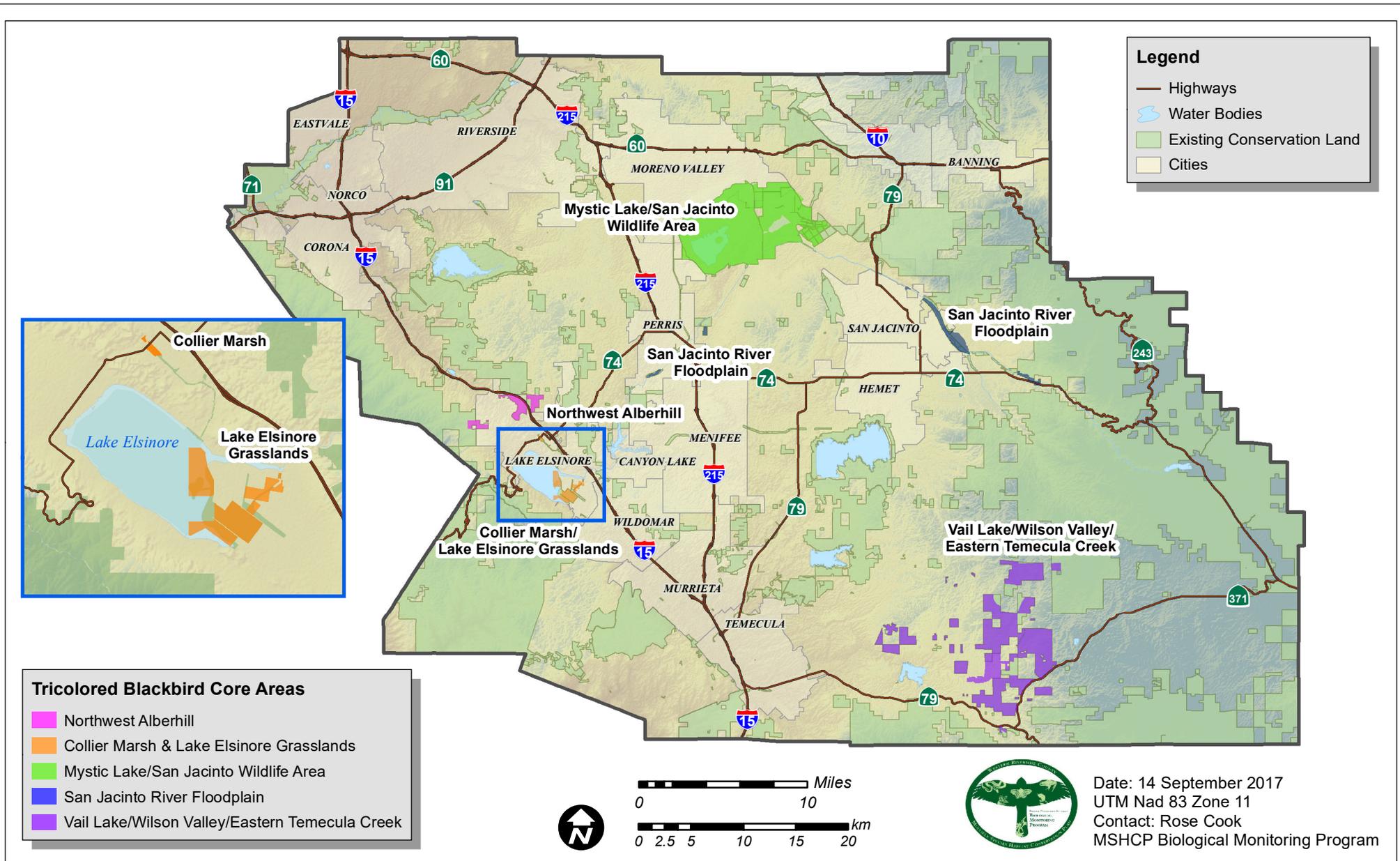
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## INTRODUCTION

The Tricolored Blackbird (*Agelaius tricolor*) is a medium-sized member of the songbird family Icteridae and a near-California endemic, with 95% of its historic breeding range within the state (Beedy et al. 2017). The species is one of 45 bird species covered by the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP; “Plan”) (Dudek & Associates 2003). Species-specific Core Areas designated by the Plan for the Tricolored Blackbird include Mystic Lake/San Jacinto Wildlife Area, San Jacinto River Floodplain, Collier Marsh/Lake Elsinore Grasslands, Northwest Alberhill, and Vail Lake/Wilson Valley/Eastern Temecula Creek (Fig. 1). The Plan also stipulates specific conservation objectives, among which are the continued use of, and successful reproduction in, at least one of these five Core Areas at least once every five years (Objective 4), and the protection of all known nesting locations on conserved lands (Objective 6). Core Areas include most historic breeding sites known at the time the MSHCP was developed.

The Tricolored Blackbird has been classified as Globally Endangered by the International Union for Conservation of Nature (IUCN) Red List since 2008 (Birdlife International 2017). Following results of a statewide survey conducted in the spring of 2014, the species was granted an emergency listing under the California Endangered Species Act; however, this protection expired in June 2015. A petition for full listing was submitted in August 2015 and the species became a candidate the following December. In April 2018, the Tricolored Blackbird was listed as a Threatened Species in California. The U.S. Fish and Wildlife Service considers the Tricolored Blackbird a species of Conservation Concern. A federal petition for Endangered Species status is currently under review.

Tricolored Blackbirds are colonial breeding birds (Neff 1937). A single territory will include one male and one–three females, with an average sex ratio of 1:1.5 males to females (Payne 1969). Breeding occurs from March–June and can be itinerant (Hamilton 1998), whereby birds may nest multiple times during a season but in different parts of their range. Nests are built within small territories that usually occupy a few square meters within tight proximity to each other (Lack and Emlen 1939). Timing of nesting is highly synchronous and young fledge within a few days of each other, with juveniles often gathering together in flocks called crèches (Orians 1961). Only females build nests and incubate eggs but both sexes provision young (Neff 1937). Foraging is social, occurring away from the nest site (Orians 1961). In moderate to large colonies of 5,000–300,000 birds or more, foraging flocks can be made up of hundreds or thousands of individuals. Adults feed on grain and insects throughout the year (Beedy et al. 2017). Young up to nine days old depend entirely on insects that are gathered from fields of native and non-native forblands and grass/forbland mixtures, irrigated pasture, lightly grazed rangeland, dry season pools, mowed alfalfa (*Medicago sativa*) fields, and various scrub vegetation associations (Beedy et al. 2017). Foraging for invertebrate prey can occur up to 13 km from the nest site but is usually within 5 km (Orians 1961). However, adults feeding themselves rarely travel more than 3 km from colony sites (Hamilton and Meese 2006). Colonies often disperse after the breeding season and individuals may join mixed flocks of songbirds, primarily other species of blackbirds, European Starlings



**Figure 1.** Western Riverside County MSHCP Plan Area and MSHCP-defined Core Areas for the Tricolored Blackbird (*Agelaius tricolor*).

(*Sturnus vulgaris*), and Brown-headed Cowbirds (*Molothrus ater*) (Orians 1961; Payne 1969).

The MSHCP describes primary (nesting) habitat as marshlands and freshwater bodies within the Riverside Lowlands and Foothills Bioregions of the MSHCP Plan Area. Secondary habitat includes playa and vernal pools, grasslands, agricultural land, and riparian scrub. Approximately 60% of Tricolored Blackbird colonies observed within the Plan Area over the last three decades nested in freshwater marsh, and 40% were in undeveloped upland and agricultural areas (Biological Monitoring Program 2011). In marshes, nests are built over water in mature stands of cattail (*Typha* spp.) or bulrush (*Scirpus* spp.). In undeveloped upland areas, nesting substrates consist primarily of spiny, protective vegetation such as milk thistle (*Silybum marianum*), bull thistle (*Cirsium vulgare*), and stinging nettle (*Urtica dioica*). Grain grown as silage for dairy cows are frequently used in agricultural areas. In Riverside County, colonies are often located at or near dairy operations that provide an abundance of water, grain for adults, and insects for young, often collected from mature (two- or three-year-old) alfalfa fields (*R. Cook, personal observation*).

The MSHCP (Dudek & Associates 2003) outlines specific conservation goals and objectives for each of the 146 species covered by the Plan. These include six objectives for the Tricolored Blackbird. Of these, Objective 4 is subject to verification through the monitoring of the species population. This objective states:

“Within the MSHCP Conservation Area, maintain (once every 5 years) the continued use of, and successful reproduction within at least one of the identified Core Areas. Successful reproduction is defined as a nest which fledged at least one known young.”

Although this objective was met in 2016 (Biological Monitoring Program 2017), the first year of the current five-year monitoring period, we conduct annual surveys for this species due to its severe decline over the last two decades (Biological Monitoring Program 2011) and the need to obtain continuous data on population distribution and trend.

### **Goals and Objectives**

1. Document the breeding-season distribution of Tricolored Blackbirds within the MSHCP Plan Area.
  - a. Conduct targeted searches for breeding colonies at historic nesting sites and potential suitable habitat within the species’ five defined Core Areas and elsewhere over a three-day period in April.
2. Assess the size of the breeding population of Tricolored Blackbirds within the MSHCP Plan Area
  - a. Estimate the number of adult Tricolored Blackbirds present at occupied breeding sites.
3. Document reproductive success, defined as the successful fledging of at least one young, of Tricolored Blackbird colonies.

- a. Revisit occupied breeding sites and search for fledglings at weekly intervals.

## **METHODS**

### **Protocol Development**

We followed the protocol established by the Biological Monitoring Program in 2005, which includes visits to all known historic colony sites (Fig. 2), surveys of the species' five Core Areas, and other suitable breeding habitat within the species' range, time and accessibility permitted. The only historic colony site not visited was Lake Norconian due to a lack of documented occupancy since 1950 and sufficient foraging habitat.

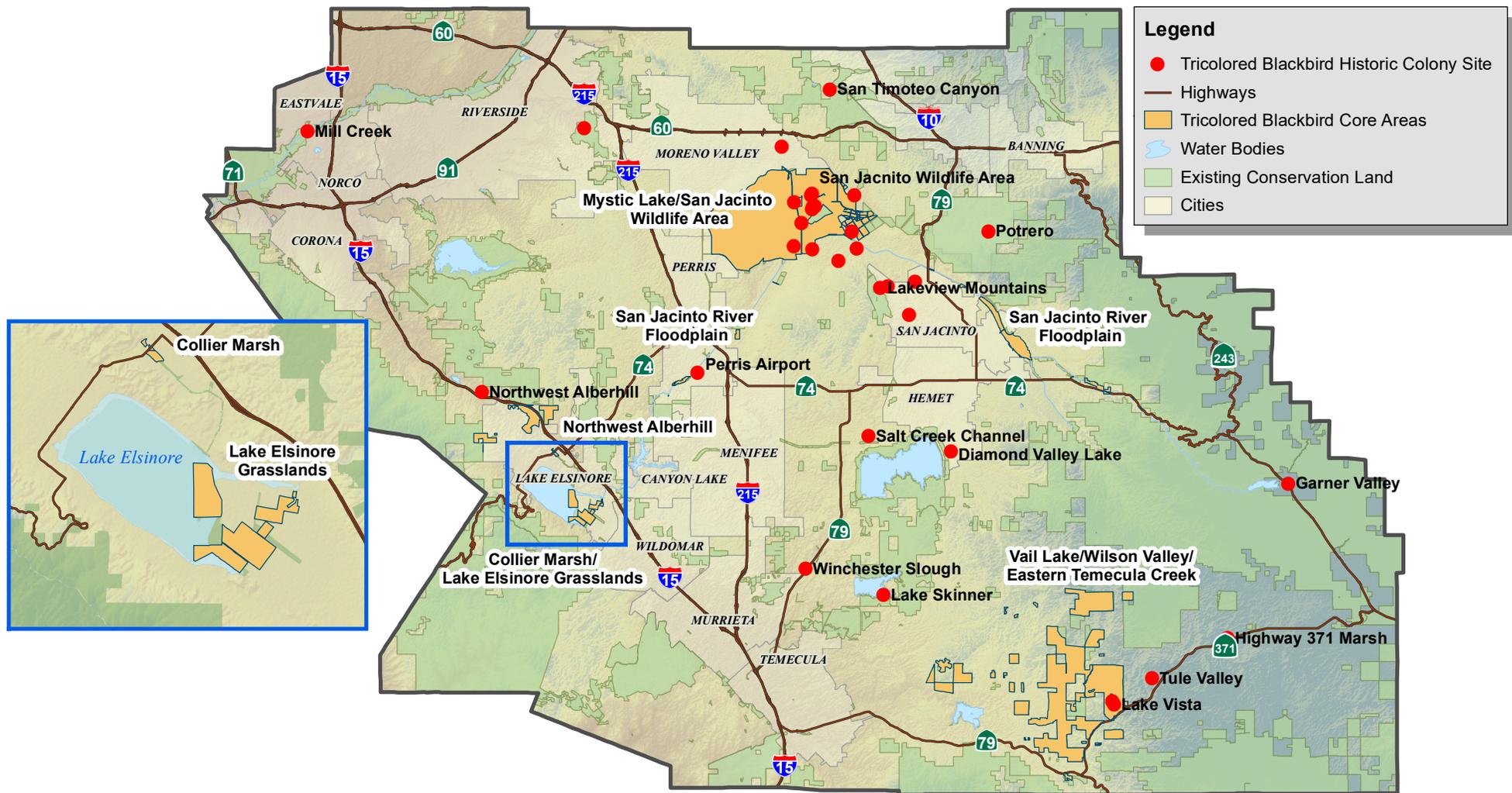
Our 2017 annual survey was conducted in collaboration with the triennial statewide Tricolored Blackbird survey organized by Dr. Robert Meese and his colleagues (University of California, Davis) and meets their data collection standards as well as our own. We acquired all necessary permissions from MSHCP Reserve Managers to access conserved lands before surveys began. Area searches outside of conserved lands, for the purposes of the annual statewide survey, consisted of driving public roadways and scanning the landscape for birds.

### **Survey Methods**

We conducted targeted searches for Tricolored Blackbird colonies from 5-7 April 2017. One colony site (Garner Valley) was surveyed by an independent volunteer on 8 April. The statewide survey was conducted a week earlier than prior triennial surveys of 2008, 2011, and 2014 due to observations that Tricolored Blackbirds appear to have begun nesting earlier in the Central Valley over the past three years (*Robert Meese, personal communication*). The short duration of the survey period is intended to prevent duplicate counting of birds that could occur if colony sites are abandoned by birds relocating and nesting in other areas (Hamilton 1998).

We recorded data for all breeding colonies, and for flocks of birds unassociated with breeding colonies, during the target survey and nest monitoring period. Data included the following: survey date; name of colony site or search area; names of observers; observation start and end times; geographic coordinates (if a new location); minimum, maximum, and best estimate of abundance of adult, fledgling, and juvenile birds; method of estimation; adult sex ratio; behavior; presence of nearby stored grains; dominant surrounding land use; distance to fresh water; fresh water source; primary and secondary nesting substrate; and spatial dimensions of occupied nesting substrate. We also included miles driven (for area searches), weather variables, ambient noise, and types and numbers of predator species observed.

We assessed the temporal stage of nesting by the behavior and activity level of adult birds (i.e., whether they were vocalizing or quiet, carrying nest material or food) and whether fledglings were detected visually or by sound. Survey methods are more completely described in the *Western Riverside County MSHCP Biological Monitoring Program Tricolored Blackbird Survey Protocol*, available from the Biological Monitoring Program.



**Legend**

- Tricolored Blackbird Historic Colony Site
- Highways
- Tricolored Blackbird Core Areas
- Water Bodies
- Existing Conservation Land
- Cities

0 10 Miles  
 0 2.5 5 10 15 20 km



Date: 14 September 2017  
 UTM Nad 83 Zone 11  
 Contact: Rose Cook  
 MSHCP Biological Monitoring Program

Figure 2. Tricolored Blackbird (*Agelaius tricolor*) 2017 historic colony sites.

We monitored colonies to assess reproductive success by revisiting colony sites at weekly intervals during the nesting cycle. We documented the presence of fledglings detected by sight and estimated the number of juvenile birds that had left the nest.

### **Training**

All field personnel were trained in the identification of Tricolored Blackbirds by sight and sound, and demonstrated an understanding of the field methods associated with the study. All surveyors had prior experience conducting Tricolored Blackbird surveys. All colonies detected were revisited and surveyed independently by the project lead.

### **Data Analysis and Management**

Data analysis consisted of mapping observations of Tricolored Blackbirds in a geographic information system (GIS) and assessing their distribution and reproductive success with respect to land ownership and conservation status, the species' Core Areas, and historic colony sites. All survey data are stored in the Biological Monitoring Program's central database. Paper data sheets and survey maps are retained in the program office in Riverside, CA. Data were also entered into the Tricolored Blackbird Portal, a website established under the Conservation Plan for the Tricolored Blackbird (Tricolored Blackbird Working Group 2009) and administered by the University of California Davis, Information Center for the Environment (<http://tricolor.ice.ucdavis.edu/>).

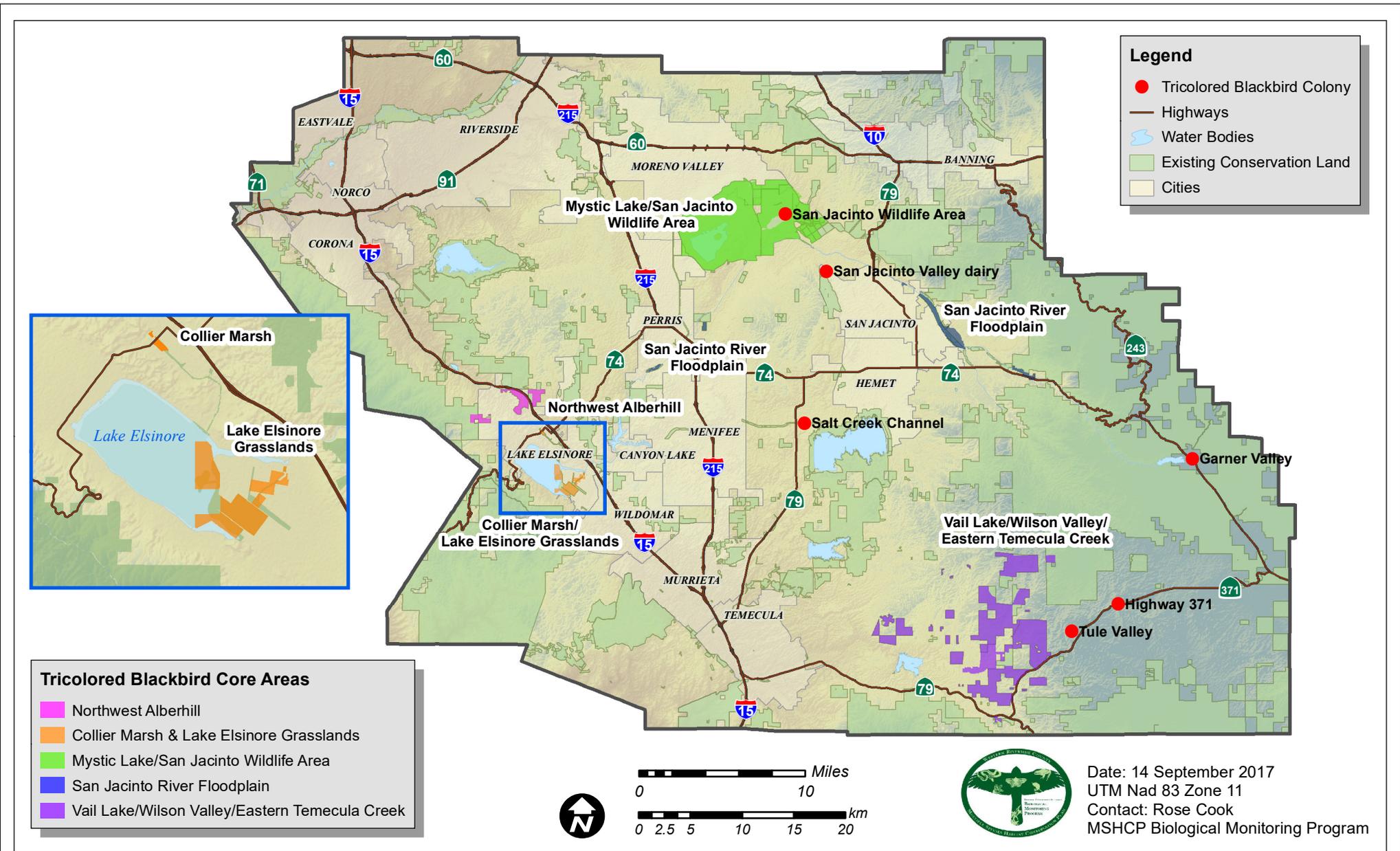
## **RESULTS**

### **Core Areas**

Tricolored Blackbirds nested in one of the five Core Areas in 2017, Mystic Lake/San Jacinto Wildlife Area (Fig. 3). On the date of the annual survey, we observed approximately 6300 birds at a single location in the Wildlife Area, a site known as the Walker Ponds, and we observed a flock of approximately 200 birds at a site in the San Jacinto River Floodplain Core Area. We continued to monitor the population at the Wildlife Area through 22 June with 15 revisits. Nesting began after the annual survey period. Nesting attempts were made at three locations: The B Ponds in the northwestern part of the Wildlife Area, the Walker Ponds in the central area, and Bridge Street Pond near the eastern boundary. Young fledged successfully at two of these sites (Walker Ponds and Bridge Street Pond (Fig. 4).

Approximately 100 birds began nest building in the B Ponds between 20 and 27 April; however, all activity ceased by 11 May. It appears that this site had been abandoned before the provisioning of young began.

Approximately 3000 birds had settled at the Walker Ponds between 27 April and 2 May and many birds were in the process of nest building. Nesting substrate consisted of hardstem bulrush (*Schoenoplectus acutus*) marsh distributed over numerous small islands of 50-200 m<sup>2</sup> each. By 6 May, the colony had been reduced to approximately 2,000 birds. Five days later, only about 120 remained and were actively provisioning young. By 18 May, two weeks later, only about 20 nests were still active. All nesting activity finished by 1 June.



**Legend**

- Tricolored Blackbird Colony
- Highways
- Water Bodies
- Existing Conservation Land
- Cities

**Tricolored Blackbird Core Areas**

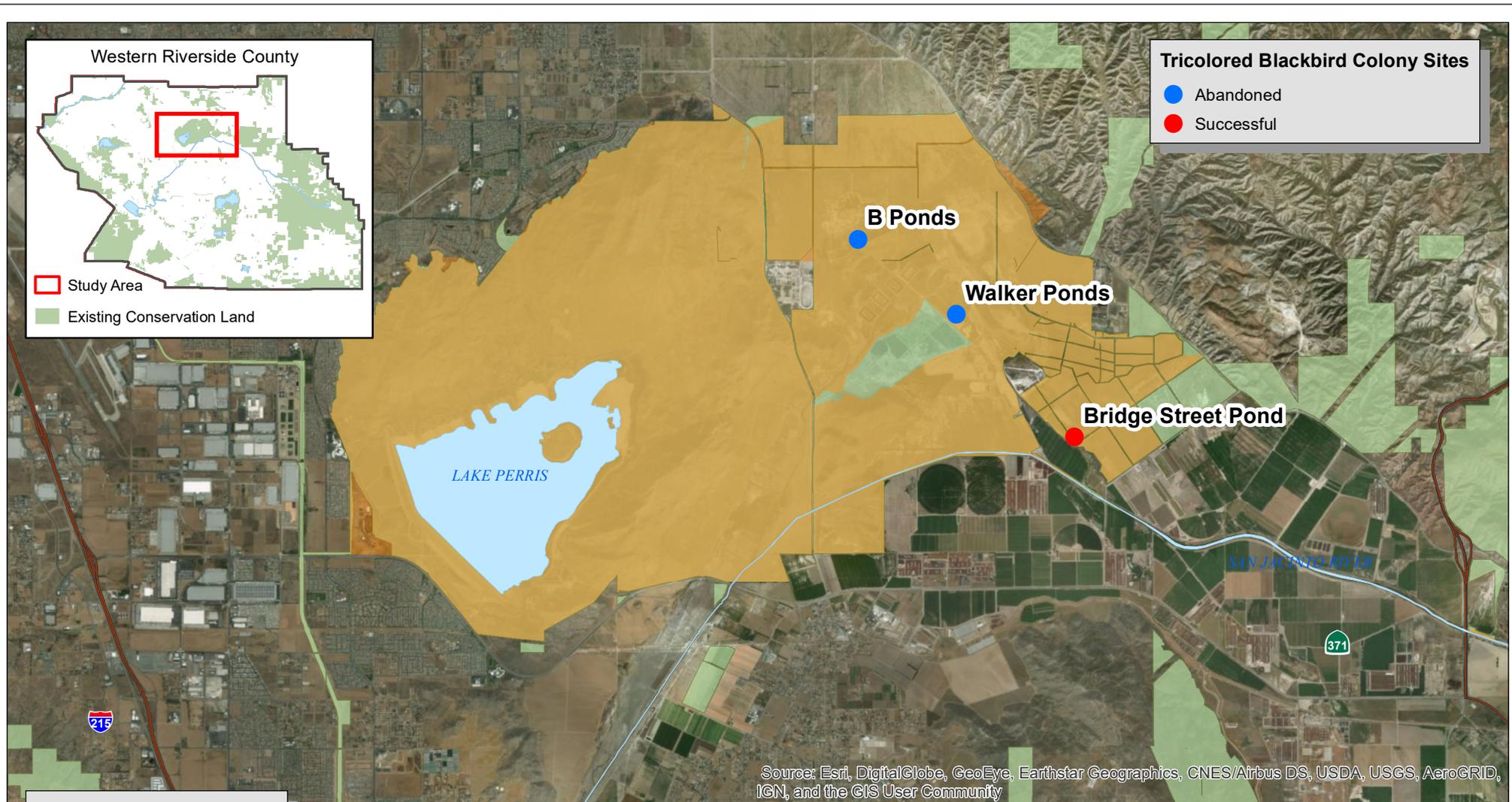
- Northwest Alberhill
- Collier Marsh & Lake Elsinore Grasslands
- Mystic Lake/San Jacinto Wildlife Area
- San Jacinto River Floodplain
- Vail Lake/Wilson Valley/Eastern Temecula Creek

0 10 Miles  
 0 2.5 5 10 15 20 km



Date: 14 September 2017  
 UTM Nad 83 Zone 11  
 Contact: Rose Cook  
 MSHCP Biological Monitoring Program

**Figure 3.** Locations of Tricolored Blackbird (*Agelaius tricolor*) breeding colonies in the Western Riverside County MSHCP Plan Area during spring 2017.



**Legend**

- Highways
- Water Bodies
- Existing Conservation Land

Miles

0 2

km

0 0.5 1 2 3 4

N



Date: 14 September 2017  
 UTM Nad 83 Zone 11  
 Contact: Rose Cook  
 MSHCP Biological Monitoring Program

**Figure 4.** Locations of 2017 Tricolored Blackbird (*Agelaius tricolor*) breeding locations in the Mystic Lake/San Jacinto Wildlife Area Core Area during the spring of 2017.

Another 3000 birds settled and initiated nesting activity at the Bridge Street Pond site between 5 and 14 April. The colony was distributed over an area of about 12 ha. Nesting substrate varied by location within this area and included triticale (*Triticale* sp.); flooded stems of five-hook bassia (*Bassia hyssopifolia*), curly dock (*Rumex crispus*), cattail, and mixed patches of wild lettuce (*Lactuca serriola*); rocket mustard (*Sisymbrium irio*); curly dock; and rabbitsfoot grass (*Polypogon monspeliensis*). We first observed provisioning on 27 April. The colony remained stable in size until the week of 2 May, by which time it had declined to approximately 1000 birds. We observed approximately 300 juveniles and 75 adults at the site on 25 May. Nesting appeared to be complete by 15 June, at which time we estimated a total production of approximately 350 birds from this site.

### **Other Locations**

We detected an additional 1870 birds in five colonies during the annual survey period, on lands outside of the species' Core Areas and the MSHCP Conservation Area. These included the following.

- A dairy farm in the San Jacinto Valley. This colony established in early March and included approximately 650 birds on the date of the annual survey. Nesting substrate consisted of triticale and Cheeseweed mallow (*Malva parviflora*) in a field 16 ha in size. Vegetation height exceeded 1 m with cover of 100%. We made five additional visits to this site through 11 May. The colony declined in size to approximately 300 birds by 27 April and remained at this size until nesting was complete. We estimated a production of approximately 200 juveniles.
- The Salt Creek stream channel, on Riverside County Flood Control property 0.5 km north of Diamond Valley Lake. The colony consisted of approximately 290 birds, in the nest building stage. The occupied area included three adjacent patches of cattail with a total combined area of 0.2 ha. We revisited this site on three more occasions through 27 April when nesting was nearly complete and only 15 birds remained tending nests. We observed 12 fledglings and 12 juveniles on that date. We were not able to estimate total productivity although it was evident that the colony had experienced heavy predation by coyotes. The pool of water present under the cattails early in the season had dried completely, allowing access by ground predators. We observed a large number of coyote tracks circling and entering the cattail stands, torn down nests, and multiple piles of feathers from nestling birds both inside the cattail stands and nearby in the channel.
- The Tule Valley historic colony site, a private lakeside community surrounded by open space and cattle pasture. The colony consisted of approximately 610 birds, some of which were in the process of nest building while others were provisioning nestlings. Nesting substrate consisted of cattail and bulrush distributed in patches along the southern shore of the lake. We revisited this site one time, on 28 April. We observed approximately 25 fledgling and 100 juvenile birds on the shoreline and heard the vocalizations of many nestlings in the cattails. We did not obtain a final estimate of productivity.

- The Highway 371 historic colony site in the Tule Valley. This colony included approximately 170 birds which were in the nest building stage. Nesting substrate consisted of hardstem bulrush that covered an area of approximately 7.5 ha. We revisited this site once, on 27 April. At this time the creek was dry and the site had been abandoned.
- Lake Hemet historic in the Garner Valley. This colony consisted of approximately 150 birds which were actively provisioning nestlings. Nesting substrate consisted of hardstem bulrush along the inlet channel to the Lake. We were not able to obtain an estimate of productivity at this site but did observe approximately 30 juvenile birds in the vicinity of the nest site on 28 April.

## DISCUSSION

Results of the current survey did not produce a new finding with respect to meeting Conservation Objective 4 for the Tricolored Blackbird, defined above in the Introduction, since this objective was met in 2016 for the current five-year monitoring interval (Biological Monitoring Program 2017).

The number of Tricolored Blackbirds observed during this survey exceeded that of the 2016 survey (Biological Monitoring Program 2017) by approximately 3380 birds. The apparent increase is likely due to one or more of the following reasons: error in estimation of actual numbers, a net shift in abundance from other areas of southern California, or a net increase in population size through local reproduction. It is difficult to determine how much error could be present in the estimation of numbers; however, the statewide survey initiated a paired observer protocol in 2015 and an assessment may be forthcoming. We are also unable to compare field counts in Riverside County with other counties in southern California in 2016 and 2017 because complete data are only available from other counties during years of the triennial statewide survey. It is clear that a larger number of birds occupied the San Jacinto Wildlife Area in the spring of 2017 (6300) than 2016 (2600) and it is possible that the overall increase in the Riverside population was due at least in part to the high level of productivity at the San Jacinto Wildlife Area in 2015 (Biological Monitoring Program 2016). The numbers of birds nesting at all five of the sites outside of Conservation were equal to or smaller in 2017 than 2016 but not enough to account for the difference observed at the Wildlife Area alone. Overall, the southern California population remains critically low and is still only about 25% of the size it was 20 years ago when the first efforts of recent decades were made to assess the population (Biological Monitoring Program 2011).

Curly dock seed provided a significant source of food for adult nesting Tricolored Blackbirds at the Bridge Street Pond site, as it had in 2015 (Cook 2016), and this year we observed male birds collecting mouthfuls of seed and ferrying it to nest sites in adjacent fields. We presume that the males were feeding incubating females. To our knowledge, such behavior has been observed rarely by other researchers. We reported earlier (Cook 2016) on the use of a mixture of curly dock and other plant species as nesting substrate. However, the use of pure stands of curly dock and five-hook bassia are, to our knowledge, novel observations. The numbers of nests were not large (i.e., about 30 in the curly dock and about 75 in bassia). Water levels were maintained at a minimum of 15 cm

under the curly dock and 30 cm under the bassia. Nests in bassia sustained high levels of predation (nests torn down, broken eggs) with only about 25 remaining intact. We monitored the nests in curly dock closely, and although we frequently observed striped skunks (*Mephitis mephitis*) foraging around the edges of the vegetation, it appeared that young fledged from most of the nests.

### **Core Areas**

Although the San Jacinto Wildlife Area supported the largest number of Tricolored Blackbirds during the breeding season, only about 300-400 remained to complete a nesting cycle. Productivity was well below a sustainable level, as it had also been in 2016. The reason is not clear. The most likely explanations are an insufficient food supply, either for nestlings or adults or both, or predation pressure. Abandonment occurred at the Walker Ponds as it had in 2016. However, we observed little evidence of predation. We observed one pair of Black-crowned Night-Herons (*Nycticorax nycticorax*) at the Bridge Street Pond site on two occasions but witnessed harassment of these individuals by Red-winged Blackbirds which were also nesting in the area. What is clear is that nesting began later this year (April) than it had between 2014 and 2016 (late February to mid-March). The spring of 2017 was marked by periods of below average temperatures and above average rainfall, and it is possible that the delay in nesting resulted from a delay in emergence of insects and other terrestrial arthropods, and that subsequent abandonment resulted from an insufficient production of insects during the season. Given the timing of events, it is highly unlikely that re-nesting occurred outside of the Wildlife Area.

### **Other Locations**

The abundance of Tricolored Blackbirds was heavily concentrated in the San Jacinto Valley, and in the Tule and Anza Valley areas in the southeastern portion of the Plan Area. This pattern has been consistent over the past decade. The Salt Creek colony, discovered in 2016, was the first new site discovered outside of the San Jacinto Valley since 2012. Nesting in the San Jacinto Valley, outside of conserved lands, usually occurs either at the San Jacinto Wastewater Treatment Plant or at one of the region's dairy farms, as it did in 2006, 2011, 2013, 2016 and 2017. The Salt Creek site is owned by the Riverside County Flood Control District.

### **Recommendations**

#### *Future Surveys*

Our results underscore the importance of surveying historic breeding sites on an annual basis except where suitable habitat no longer exists. These surveys should be scheduled for the second week in April to provide data comparable with those of the annual and triennial statewide surveys. The small number of new colony sites encountered during our surveys of potentially suitable breeding habitat from 2011–2013 suggests that annual monitoring of known breeding sites should be adequate to assess population status in years when larger scale efforts are not possible. Because Tricolored Blackbirds concentrate their breeding effort in only a few sites each year, and because occupancy may vary across sites between years, area searches are probably the most efficient method for locating new colony sites. We therefore recommend that area

searches for Tricolored Blackbirds be made in conjunction with survey efforts for riparian, marsh, coastal sage scrub, and grassland bird species. These surveys generally occur during the breeding season and cover much of the habitat suitable for Tricolored Blackbirds.

More information is needed on patterns of movement and winter habitat use within the MSHCP Plan Area. For the first time, Audubon California launched a winter statewide survey for Tricolored Blackbirds in 2017. The Biological Monitoring Program participated in the survey which was carried out from 17-20 November. Prior to the survey, we identified areas to search by analyzing records of observations made between the months of October and February over the past 20 years from the Biological Monitoring Program's database, the online eBird database, and the University of California, Riverside's Center for Conservation Biology database. Areas included the San Jacinto Valley, Anza and Tule Valleys, Garner Valley, Lake Mathews, Lake Elsinore, Santa Rosa Plateau, French Valley, Lake Skinner, Domenigoni Valley and Winchester Valley. We detected Tricolored Blackbirds in five of these areas; the San Jacinto Valley, Tule Valley, Domenigoni Valley, Glenoak Valley east of Lake Skinner, and at the El Sobrante Landfill south of Lake Mathews. In the first three of those areas Tricolored Blackbirds occurred at the same locations where they have nested in the last two years. We recommend repeating this survey on an annual basis and, if possible, expanding the distribution of search areas.

#### *Conservation and Management*

Tricolored Blackbirds continue to depend heavily on managed habitats, and the persistence of the local population will likely require active management. Management must aim for rapid restoration of population numbers and multiple breeding colonies of  $\geq 5000$  birds. The Davis Unit of the San Jacinto Wildlife Area remains the most important site for the restoration of the population in Riverside County and southern California as a whole. In previous reports, we proposed food limitation for nestling birds to be the principle factor impacting site occupancy, reproductive success, and juvenile recruitment at this location, and that management to enhance the production of caterpillars, grasshoppers, and other invertebrates during the breeding season could be a significant benefit to the population. Results of efforts to enhance breeding habitat through the production of forage crops and irrigation of natural grass/forblands (Cook 2016) are encouraging and we advocate the continuation of these efforts. The need to conserve and enhance habitat for foraging cannot be overemphasized. In addition to improvements that can be made on lands currently in conservation, we recommend that additional foraging habitat in the vicinity of the Davis Unit, particularly the grasslands north of Mystic Lake, be considered high priority for acquisition or other forms of long-term protection and management. Greater efforts to ensure annual availability of emergent vegetation and sufficient foraging habitat at the Potrero Unit of the San Jacinto Wildlife Area are also needed.

The San Jacinto River Floodplain Core Area largely lacks suitable breeding habitat for Tricolored Blackbirds at the present time. The eastern arm of the Core Area is surrounded by urban development and lacks sufficient foraging habitat, a condition that is unlikely to be improved by management. Although the western arm is predominantly

agricultural, suitable habitat is absent except for a section of the river and surrounding grasslands near the Perris Airport where a colony was observed during our 2005 surveys. Proper management in this area could potentially benefit the species in the future. Acquisition of additional lands and restoration of hydrological processes in this area should be considered a priority which would help mitigate the current and future losses to urbanization of high quality agricultural habitat in the San Jacinto Valley.

Conservation Objective 6 for the Tricolored Blackbird (Dudek et al. 2003 Volume II, Section V) states that Reserve Managers will conserve and protect from disturbance a 100-m buffer around any known nesting locations. The timely reporting of the locations of breeding colonies to managers will help ensure this objective is met. Protection must include both nesting substrate and foraging habitat. The low rate at which we have discovered new colony sites underscores the importance of meeting this objective.

All historic colony sites within the Conservation Area should be evaluated for their value as breeding habitat, including nesting and foraging, and improvements made as soon as possible. These include the following:

- Davis Unit of the San Jacinto Wildlife Area
- Potrero Unit of the San Jacinto Wildlife Area
- Jackrabbit Trail
- Lakeview Mountains
- Lake Skinner
- Sycamore Canyon
- Mill Creek and the Santa Ana River Corridor
- Lake Vista Road in the Wilson Valley

Suitable breeding habitat includes upland and wetland habitat located within 0.5 km of a water source and 1–5 km from quality foraging habitat. Wetlands large enough to support only a few hundred to a few thousand birds could be beneficial if they lack sufficient roost or nest sites for avian predators such as Black-crowned Night-Herons and Cattle Egrets (*Bubulcus ibis*), which can be destructive if their breeding colonies establish in or near those of Tricolored Blackbirds.

The value of upland nesting substrates should not be overlooked. Within California as a whole, these consist of dense stands of primarily non-native species such as Himalayan blackberry (*Rubus armeniacus*), triticale (at dairy farms), bull thistle, and milk thistle. In western Riverside County, we have documented the use of triticale, cheeseweed mallow, wild lettuce, curly dock, stinging nettle, bull thistle, wild rose (*Rosa californica*), and other forbs. Ideal locations of nest sites are within 0.5–1.0 km of large forbland or grass/forbland vegetation communities that produce an abundance of invertebrate prey. Management could evaluate the lands under their care for future potential habitat and consider propagating or cultivating pure or mixed stands of these species in habitat which is otherwise suitable. At the very least, the tolerance of localized stands of non-native plants favored by Tricolored Blackbirds in suitable habitat might be considered. The current concentration of nesting colonies in only two locations in the Plan Area leaves them vulnerable to stochastic events such as variation in rainfall and

insect production. The development of suitable nesting habitat in five or more locations distributed across the Plan Area could help ensure the persistence of this species.

Between 2005 and 2014, and in 2016, the majority of the western Riverside County population nested on private property which is vulnerable to disturbance. Where birds nest in agricultural fields, harvest often occurs before young have fledged, resulting in total reproductive failure (Cook and Toft 2005). This happened in the San Jacinto Valley in 2013. Through a program launched in 2011, landowners may be eligible for reimbursement for harvest delays to protect nesting Tricolored Blackbirds through the Tricolored Blackbird Conservation Initiative or the Declining Species Wildlife Habitat Fund of the Natural Resource Conservation Service's Environmental Quality Incentives Program (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/ca/programs/financial/eqip/>). As of March 2015, any colonies found in agricultural fields should be reported immediately through the proper channels (Appendix).

In some cases, Tricolored Blackbird colonies utilize resources that occur on both private and conserved lands, and protection will require collaborative conservation and management. For example, birds that nest at the San Jacinto Wildlife Area frequently utilize neighboring dairy farms as a source of grain and possibly insects. Similarly, the San Timoteo Canyon colony site is privately owned, but colonies observed in 2008 (Kelsey 2008) and in 2010 and 2012 by the Biological Monitoring Program provisioned nestlings with insects collected primarily from surrounding grasslands, much of which are managed by the Riverside County Parks and Open Space District. The created wetlands at the San Jacinto Wastewater Treatment Plant have also provided important nesting habitat in past years (Hamilton et al. 1994; Hamilton 1997) and might again in the future; however, this will depend not only on the management of nesting habitat within the wetlands but on the use of nearby lands, some of which are within the MSHCP Criteria Area.

Observations of Tricolored Blackbirds made by Monitoring Program biologists during winter months over the past 13 years, and the results of the 2017 winter survey suggest that the San Jacinto Valley, specifically the San Jacinto Wildlife Area, and Tule Valley (the Tule Valley historic colony site) consistently provide winter habitat, which underscore the critical importance of conserving habitat year-round in both of these locations.

#### *Core Area Definitions*

At least 12 colony sites active since 2004 are located outside the Conservation Area, and most of these are not within a defined Core Area for the species. We have detected breeding colonies in only three of five designated Core Areas (Mystic Lake/San Jacinto Wildlife Area, San Jacinto River Floodplain, and Temecula Creek/Vail Lake/Wilson Valley) but in seven areas not defined as Core habitat. Of the occupied Core Areas, only one, Mystic Lake/San Jacinto Wildlife Area, has been occupied in more than two years since 2004. We therefore make the following recommendations for the reasons given:

1. Remove the Core Area designations of Northwest Alberhill and Collier Marsh/Lake Elsinore Grasslands due to lack of suitable or sufficient habitat for breeding in terms of both nesting and foraging habitat.
2. Replace the Vail Lake/Wilson Valley/Eastern Temecula Creek Core Area with a Core Area composed of the Wilson Valley and Tule Valley areas. All breeding activity detected in the southeastern part of Plan Area since 2005 has been limited to this region. Temecula Creek is generally lacking in suitable habitat. We have not conducted surveys in the Vail Lake area due to access restrictions; however, it is unlikely that suitable habitat currently exists there either.
3. Define the Potrero Unit of the San Jacinto Wildlife Area as a Core Area. The Potrero colony site has been occupied in most years since 2005. Recommended habitat improvements at Potrero include: mowing or burning of old-growth cattails every 3–5 years on a rotational basis during the fall to stimulate new growth; removal of tamarisk and willow growth in the pond; and addition of groundwater to maintain water levels of 30–45 cm in the pond. Opportunities for establishing additional nesting substrate in other parts of this reserve could be considered as well.
4. Define Garner Valley and the San Jacinto Valley south of the San Jacinto Wildlife Area as Core Areas. Tricolored Blackbird colonies have been detected in the Garner Valley in seven years since 2005, and in the San Jacinto Valley area outside of the Wildlife Area in six years during that time period. Both areas currently constitute important breeding habitat. The Garner Valley area, due to its elevation, could potentially become even more important in the future due to climate change.
5. Consider defining Domenigoni Valley and San Timoteo Canyon as Core Areas. Both have supported breeding colonies in three of the last 13 years. One site in the Domenigoni Valley has been occupied by a successful colony for the last two years. Much of the San Timoteo Canyon area is in Conservation and there appears to exist substantial potential for habitat enhancement.

Additional conservation lands are also required for this species, most urgently in the agricultural areas of the San Jacinto Valley. Other important areas include Tule Valley, Garner Valley, and Domenigoni Valley.

### *Species Objectives*

Objectives 1 and 3 define primary and secondary habitat, respectively, for Tricolored Blackbird colonies. Objective 1 states: “Include within the MSHCP Conservation Area at least 420 acres of suitable primary Habitat for the tricolored blackbird including freshwater marsh and cismontane alkali marsh Habitats within the Riverside Lowlands and Foothills Bioregions.” Objective 3 states: “Include within the MSHCP Conservation Area at least 66,510 acres of secondary Habitat for the tricolored blackbird including playa and vernal pool, grasslands, agriculture land, and riparian scrub, woodland, and forest within the Riverside Lowlands and Foothills Bioregions.” Combined, they fail to emphasize the spatial linkages between natural community types

that constitute quality nesting habitat. Marshes provide a place for breeding colonies to establish nests, whereas playas and vernal pools, grasslands, and certain types of agricultural lands provide essential food resources for raising young and are, therefore, an essential component of primary habitat. These resources should be located as close as possible but no more than 5 km [the range within which most foraging activity occurs (Orians 1961, Hamilton and Meese 2006)] from colony sites. Grassland or playa community types could also support colonies in the absence of nearby emergent vegetation, if sufficient upland vegetation suitable for nesting is available.

We highly recommend that Objective 1 be re-written to include primary nesting and foraging habitat, and the essential linkages between the two. This modification would require additional acres be added to primary habitat conservation goals and leave only riparian scrub, woodland, and forest defined as secondary habitat by Objective 3. However, Tricolored Blackbirds are not known to use these community types for nesting in southern California. We therefore recommend that Objective 3 be removed and all acres identified in Objective 3 be transferred to Objective 1.

The prescription for managing “this species in order to maintain (once every five years) the continued use of, and successful reproduction within at least one of the identified Core Areas” (Dudek & Associates 2003), as stated in Objective 4, is insufficient for a rapidly declining species that is dependent on patchy and unpredictable breeding habitats that are rapidly being lost throughout the Plan Area. A minimum viable population size (MVP) has not yet been determined for the Tricolored Blackbird although efforts are underway by the Tricolored Blackbird Working Group. Some authors have attempted to define universal rules of thumb for such estimates where data for a particular species are unavailable. Reed et al. (2002) calculated MVPs for 102 species of vertebrates that included birds, mammals, and reptiles, and fish with MVP defined as a 99% probability of persistence over 40 generations. Mean and median estimates were 7316 and 5816 adults, respectively. Other authors (e.g., Flather et al. 2011) have noted flaws in these assessments and claim a lack of scientific basis for a universal MVP. Furthermore, MVPs for highly colonial species are likely to be much higher than those for other species with otherwise similar life histories and geographic range (e.g., Cook and Toft 2005). We recommend that Objective 4 be re-written to include a minimum breeding population of 10,000 birds, until such time as a more precise estimate is available. We also recommend the demonstration of successful reproduction every year within at least one Core Area.

Finally, Objective 6 states: “Include within the MSHCP Conservation Area and establish a 100-meter buffer around any known nesting locations.” We recommend that this objective be modified to also include protection and management of foraging habitat within 5 km of known nesting locations.

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## **Appendix. Tricolored Blackbird Silage Colony Response Plan 2017 Dairy Outreach for NRCS Program Offering**

1. Researchers, field technicians, and volunteers survey public roads in Central Valley for Tricolored Blackbird colonies. Bob Meese, under contract with CDFW, and an Audubon field technician will be conducting surveys.

2. If a colony is located in an agricultural field, the field person should note the location, approximate colony size (# of birds), and colony acreage. Try to identify the farm's name, dairy cooperative, and creamery membership if there is visible signage at the entrance. Do not trespass.

3. Call one of the following point people AND send a joint email to all four people. Include the farm's name and dairy cooperative or creamery membership if identified, location, and estimate of colony size.

Paul Sousa, Western United Dairymen  
psousawud@yahoo.com or (209)-527-6453

Noelle Cremers, California Farm Bureau  
ncremers@cfbf.com or (916)-601-5357

Samantha Arthur, Audubon California  
sarthur@audubon.org or (916)-737-5707 ext 115

Jesse Bahm, Natural Resource Conservation Service  
jesse.bahm@ca.usda.gov or (559)-252-2191 ext 105

4. If Paul, Noelle, Samantha, and Jesse are unresponsive, contact the Western United Dairymen field rep and/or County Farm Bureau (see contact information below).

5. Depending on the dairy's membership, either Paul or Noelle will call the dairy to make the first contact. They will explain the species' protected status and the resources available through NRCS. Dairies will be encouraged to contact their local NRCS office and Jesse Bahm to enroll in the delayed harvest incentive program. Farmers should expect to be paid approximately \$600/acre for harvest delay. Harvest delay is only needed on the portion of the field with Tricolored Blackbirds, including a small buffer zone.

6. If the colony is initially reported by a non-expert, then experts in the field will coordinate to confirm the Tricolored Blackbird colony.

7. If the farmer does not want to participate in the NRCS program, but birds are at risk, then Dairy Cares will outreach to appropriate creameries.

8. Jesse and Samantha will visit the enrolled site over the course of several weeks to outline the field area to be enrolled in the program and give a harvest date based on the developmental stage of the colony.

9. Jesse will visit the site at the harvest date to monitor and ensure harvest was delayed to the identified date.

10. NRCS pays compensation directly to farmers. Payment can take 2-3 weeks.

If Paul, Noelle, Samantha, or Jesse cannot be reached, then field reps from Western United Dairymen or Farm Bureau should be called.

California Farm Bureau Kern and Riverside Counties: Rachael Johnson (909) 556-2266

All Other San Joaquin Valley Counties: Andrew Genasci (209) 670-4390