Monitoring of the Tricolored Blackbird, *Agelaius tricolor*, within and around Department of Fish & Game Lands in Western Merced County, 2008

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Abstract

The tricolored blackbird (*Agelaius tricolor*) is a species of special concern within the state of California, with a majority of its breeding range located in the Central Valley. This species has declined dramatically since the 1930's due to habitat loss and fragmentation, changes in agricultural practices, and urbanization. To monitor the population of tricolored blackbirds within California, statewide surveys have been conducted every three years since 1994. The California Department of Fish & Game has been monitoring tricolored blackbird colonies on state-owned and managed lands in Merced County since 1992. In April 2008, we participated in the statewide Tricolored Blackbird Survey by monitoring colony locations previously known from 2005, as well as any newly located colonies on or near state wildlife area lands within Merced County. Of the five colonies that existed in 2005, we found only one to be active this year; the Basalt Road colony. We discovered three new colonies, each within wetland habitat and all located along Henry Miller Road. Of the four active colonies found in 2008, we estimated a combined total of approximately 34,300 – 52,500 breeding tricolored blackbirds. Due to the tendency of tricolored blackbird colonies to move around from year to year, we recommend continuing to monitor for this species on state wildlife areas annually. We also recommend that wildlife area managers consider the habitat preferences of these blackbirds when making management decisions, in an effort to encourage colonies to expand onto the wildlife areas. Considerations should include such things as providing summer water, disking wetlands to encourage new vegetation growth, and managing upland areas to minimize the expansion of invasive weeds.

Keywords: tricolored blackbird, Agelaius tricolor, Merced County, colonial nesting

Introduction

The tricolored blackbird (*Agelaius tricolor*), hereafter tricolor, is a highly colonial, near-endemic passerine to California with over 99% of the population occurring in the state (Beedy and Hamilton 1999, Beedy 2008). It is listed by the California Department of Fish and Game (DFG) as a California species of special concern during the breeding season (Beedy 2008). The U.S. Fish and Wildlife Service (USFWS) also listed the tricolor as a bird species of conservation concern in 2002 (USFWS 2002). The breeding range of this species includes the Central Valley of California, Sierra Nevada foothills, coastal areas from Sonoma County to the Mexican border, as well as scattered sites in Oregon, western Nevada, central Washington and western coastal Baja California (Beedy and Hamilton 1999). Factors that influence the location of a tricolor breeding colony include nesting substrate, accessible water source and suitable nearby foraging habitat. Historically the nesting habitat of these birds was primarily freshwater

wetlands dominated by cattail (*Typha* spp.) or tule (*Schoenoplectus* spp.), with some nests found in willows (*Salix* spp.), blackberries (*Rubus* spp.), thistle (*Cirsium* spp.) and nettle (*Urtica* spp.) (Beedy and Hamilton 1999). The Tricolored Blackbird Working Group (TBWG), led by the non-governmental organization Sustainable Conservation and consisting of members from environmental, agricultural and governmental organizations (including Audubon California, California Department of Fish & Game, and the Central Valley Joint Venture) developed a Conservation Plan to aid in the recovery of the species. Within the Conservation Plan, TBWG has stated that in more recent years, there has been an increase in the number of colonies nesting in Himalayan blackberries (*Rubus discolor*), thistle, and silage fields (2007). Ideal foraging habitats include alfalfa fields, irrigated pastures, annual grasslands, cattle feedlots, and dairies (Beedy and Hamilton 1999, TBWG 2007). Breeding tricolors will typically forage within 5-6 km of the colony, forming long, continuous streams of blackbirds to and from a colony (Beedy and Hamilton 1999, TBWG 2007).

Numbers of tricolors have declined dramatically since the 1930's, and most of the breeding population is now located within the Central Valley. Statewide censuses showed a 37% decrease in population between 1994 and 1997 (Beedy and Hamilton 1997). This decline has been attributed primarily to habitat loss and fragmentation of both the breeding and foraging habitat (Beedy and Hamilton 1999). A major cause of this habitat loss comes from the reduction of wetland habitat throughout California. Other causes include urbanization, as well as a shift in agricultural practices from annual row crops to vineyards and orchards (TBWG 2007). Despite all of these variables, the most recent statewide survey in 2005 reported a population of about 260,000 tricolors in California, which suggests at least a stable population since 1997 (TBWG 2007).

Tricolor censuses have continued to be conducted statewide at approximately 3-year intervals since 1994, coordinated by a variety of organizations. Since that time, the Los Baños Wildlife Area Complex (Complex) staff has contributed to these surveys by monitoring lands within the Complex. Not only has Complex staff monitored tricolor activity during these official censuses, but it has also continued monitoring efforts on state lands annually. This year a new statewide Tricolored Blackbird Survey was

conducted, led by Audubon California and USFWS, to get an updated population count. Complex staff participated by observing all known tricolor colonies on or near state wildlife area lands within Merced County.

Study Area

The study area consisted of several DFG-owned and managed lands, California State Parks (Parks) land, and private property visible from public roads within western Merced County, California (Figure 1). DFG property included the Los Baños, Volta, and O'Neill Forebay Wildlife Areas, as well as the Salt Slough and China Island units of the North Grasslands Wildlife Area. The Los Baños and Volta Wildlife Areas, and Salt Slough and China Island units are comprised of seasonal wetlands, annual grasslands, mixed-willow riparian habitat, and shrublands. The O'Neill Forebay Wildlife Area is composed of annual grasslands, small ponds, and mixed willow riparian areas. Parks property included the Basalt and San Luis Creek Areas of the San Luis Reservoir State Recreation Area. These areas, located along the San Luis Reservoir and O'Neill Forebay respectively, are composed of annual grasslands, mixed willow riparian and wetlands. Private property included any wetlands or dairies visible from public roads along the survey route.

The climate of western Merced County is characterized by hot, dry summers and cool, wet winters. Precipitation averages 21 cm per year and occurs primarily between November and March (California Department of Fish & Game unpublished data 1970-2000). The terrain of areas we surveyed varies from flat on the valley floor, ranging in elevation from 29 to 33 m, to rolling hills near the Reservoir that can reach up to 300 m.

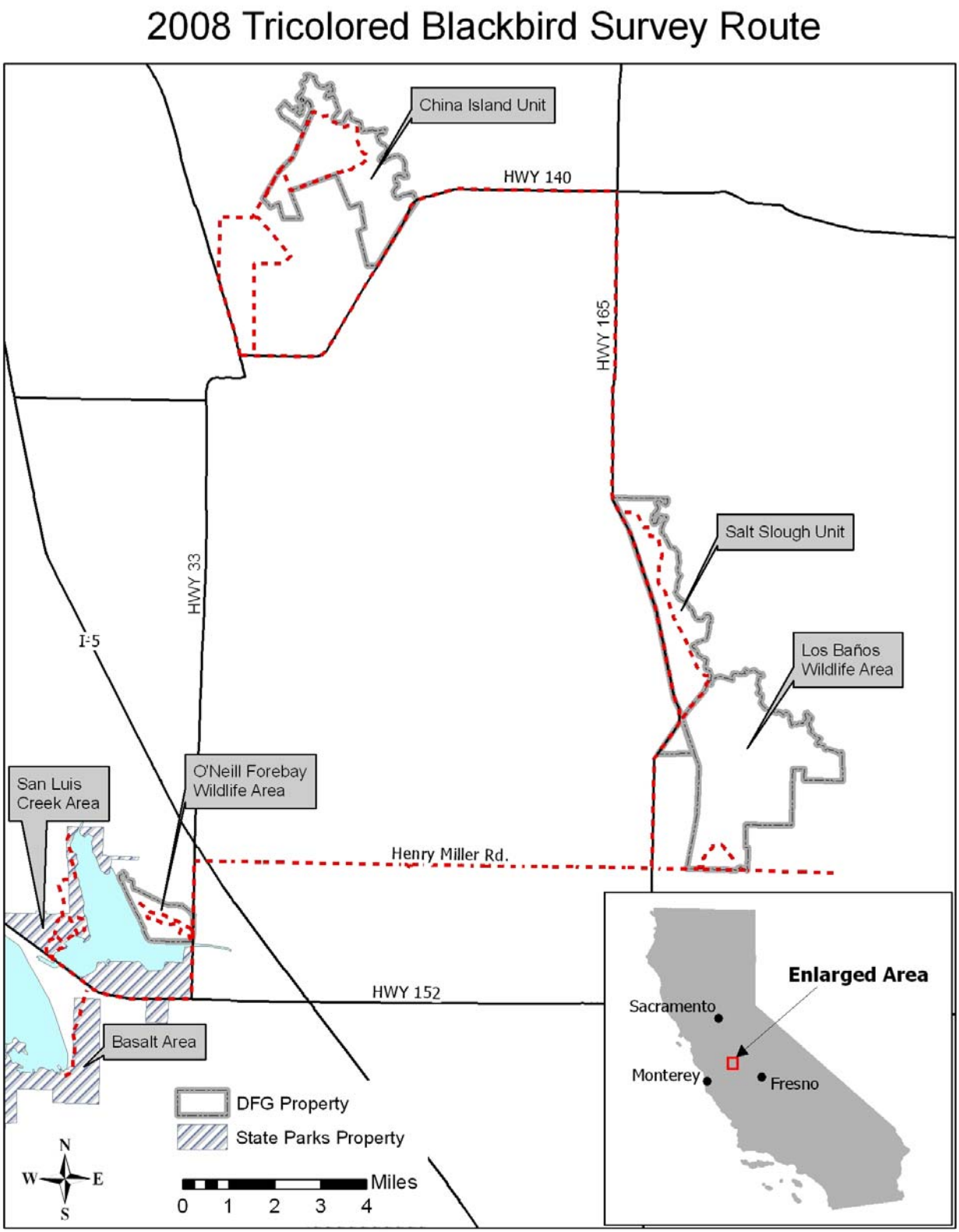

Figure 1. 2008 Tricolored Blackbird Survey route, western Merced County, California.

Methods

We conducted surveys following the 2008 Tricolored Blackbird Survey Protocol (Appendix A) during the 25 – 27 April survey period (Audubon California 2008). Emphasis was placed on locations where tricolor breeding colonies had been found during the 2005 statewide survey (Table 1). We established driving survey routes to incorporate these known locations, as well as any new locations in suitable habitat along roads driven between properties (Figure 1). We drove routes slowly while looking for signs of tricolor activity. At locations that were known to have been colonized in 2005, we stopped to monitor the area for a longer period of time to determine if there was an active colony.

Table 1. Active tricolored blackbird colonies in 2005 on and near state-owned and managed properties, Merced County, California.

Colony Code	Colony Name	Property Location[a]	Latitude	Longitude
MERBARO01	Basalt Road	SLRSRA	37.03750	-121.06300
MERONFO01	O'Neill Forebay	OFWA	37.07930	-121.02300
MEROXBO01	Oxbow	Private	37.10240	-120.78500
MERNGSS42	Salt Slough Field 42	NGWA	37.17000	-120.82100
MERNGCI01	China Island Field 01	NGWA	37.31100	-120.98900

[a] SLRSRA = San Luis Reservoir State Recreation Area, OFWA = O'Neill Forebay Wildlife Area, NGWA = North Grasslands Wildlife Area

Once we determined an area had an active colony, we exited the vehicle and viewed the colony using binoculars and spotting scopes. We estimated colony size while scanning birds within the colony itself, as well as counting birds flying to or from the colony. We would record the minimum and maximum number of birds observed, as well as a "best estimate" number of birds for each colony. An approximate sex ratio of males to females was also recorded. We recorded colony characteristics, which included primary and secondary nest substrate, presence of nearby stored grains, distance to water, and the length and width of each colony. We also recorded behavior and colony status such as observation of any singing, carrying of nesting material or food, or the presence of fledglings. We recorded all information on a data sheet (Appendix B) for each active colony, as well as previous years' colonies that were no

longer active. We marked locations of active colonies using a global positioning system (GPS) and recorded the coordinates on the data sheet.

We entered data into the Tricolored Blackbird Data Portal (http://tricolor.ice.ucdavis.edu) and submitted hard copies of data sheets to the survey coordinator at Audubon California. Geographic information system (GIS) software was used to create maps of individual colony locations. We also submitted data on active colonies to the California Natural Diversity Database (CNDDB).

Results

We conducted surveys on all properties along the survey route on 25 April 2008. Of the five colonies from 2005 (Table 1), only one was found to be active; the Basalt Road colony. We estimated this colony to be between 300 – 500 birds and observed adults feeding nestlings. This small colony was found within an approximately 2,600 m^2 stinging nettle (*Urtica dioica*) patch along the side of Basalt Road (Figure 2).

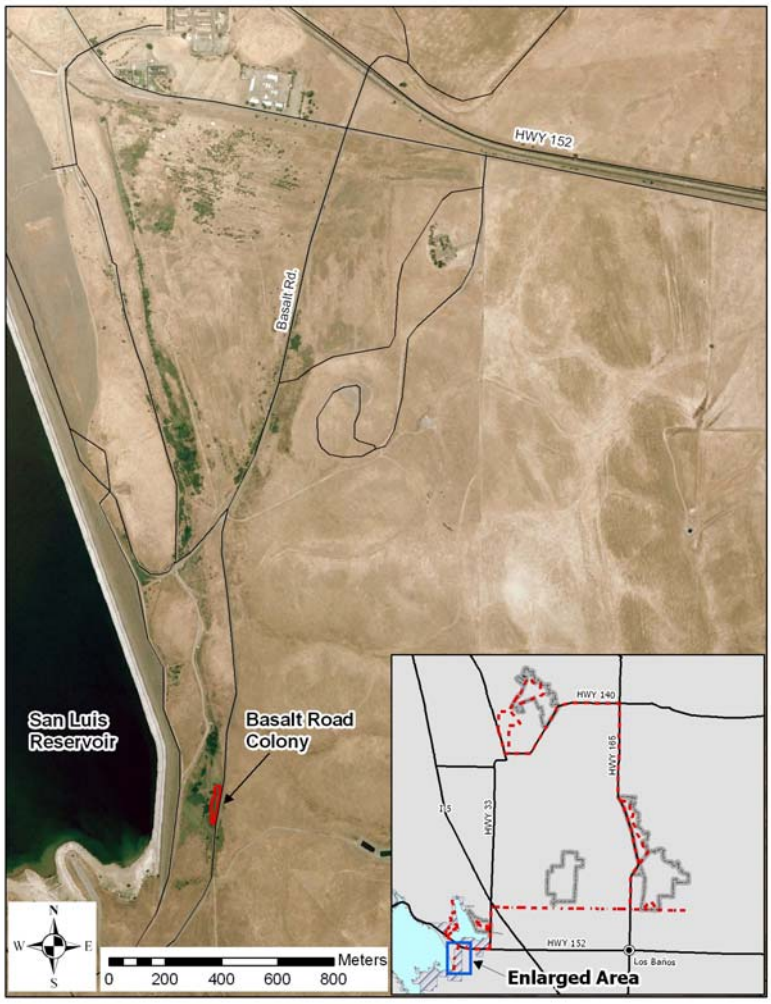

Figure 2. Basalt Road triclored blackbird colony, San Luis Reservoir State Recreation Area, Merced County, California, April 2008.

Prior to the official surveying period, we discovered three new colonies along Henry Miller Road (Table 2). These locations were surveyed along with our 2005 colonies. The Honey Lake colony, found within a private cattle/duck club on the south side of Henry Miller Road, was the largest colony surveyed this year. We estimated its size to be between 25,000 – 40,000 birds within a cattail and tule wetland (Figure 3). We observed the adults carrying both nesting material and food for nestlings. The Los Baños Field 42 colony was located approximately 150 m north of the Honey Lake colony, within a tule and cattail wetland partly on private land, and partly on the Los Baños Wildlife Area (Figure 3). We observed approximately 8,000 – 10,000 blackbirds at this colony, continually carrying food for nestlings. We located the Volta Lake Marsh colony along Henry Miller Road approximately 9.5 km west of Highway 165. The colony

was within a cattail wetland on the north side of the road, and just north of Volta Lake (Figure 4). We estimated approximately 1,000 – 2,000 birds at this colony. We observed adults carrying food and witnessed a few fledglings sitting within the cattails.

Table 2. New tricolored blackbird colonies found in 2008, Merced County, California.

Colony Code	Colony Name	Property Location[a]	Latitude	Longitude
MERHOLA01	Honey Lake	Private	37.09924	-120.79804
MERLBWA42	Los Baños Field 42	LBWA / Private	37.09985	-120.79914
MERVOLM01	Volta Lake Marsh	Private	37.10026	-120.93881

[a] LBWA = Los Baños Wildlife Area

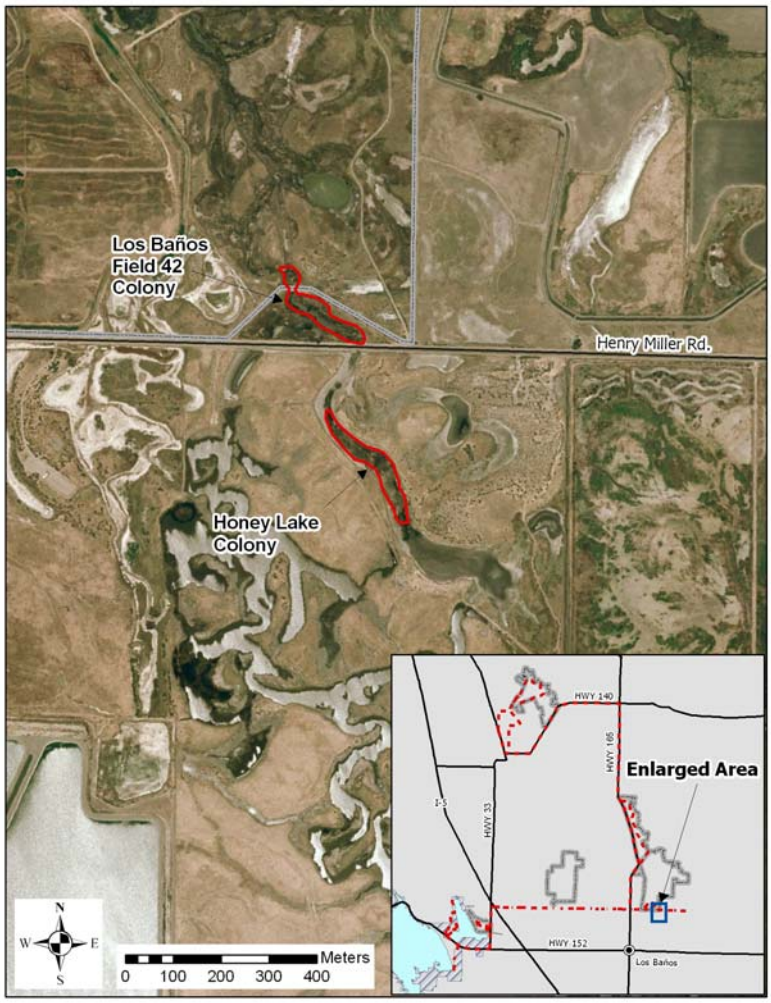

Figure 3. Honey Lake and Los Baños Field 42 triclored blackbird colonies along Henry Miller Road, Merced County, California, April 2008.

Figure 4. Volta Lake Marsh triclored blackbird colony along Henry Miller Road, Merced County, California, April 2008.

Discussion

We noticed many of the tricolored blackbird colonies found in 2005 on state-owned and managed properties were not active. The habitat conditions of these sites were not conducive to breeding tricolors. The ponds at the O'Neill Forebay Wildlife Area, where tricolors have been known to nest for many years, were either dry or did not hold water into the summer due to extreme fluctuations in the O'Neill Forebay. The area where tricolors have nested within Himalayan blackberry was also not ideal as there was no water near this patch. The colony we found on the Salt Slough Unit in 2005 was located within a patch of milk thistle (*Silybum marianum*). This year, that patch no longer exists and is now dominated by perennial pepperweed (*Lepidium latifolium*). The 2005 China Island Unit colony also nested within a small patch of milk

thistle, however this year there was very little thistle or any other vertical plant structure in this area. Much of the changes from 2005 to 2008 could be explained by the dry year and less water being available, causing the tricolors to move to more suitable habitats. Though historically, tricolor colonies have been found to move around from year to year; from highly scattered, smaller colonies one year to more restricted, larger colonies the next (Neff 1937). Meese (2007) has found that tricolors tend to favor young, rapidly-growing vegetation for nesting, which may explain the tricolors movement between years. All three of the new colonies we found this year were within cattail or tule marshes. By comparing aerial photographs taken in 2005 and then again in 2007, it appears that the cattails have expanded within the marshes of the Los Baños Field 42 and Honey Lake colonies (Figure 5). The presence of younger cattail habitat, along with accessible open water and available foraging sites most likely encouraged the formation of colonies at these sites.

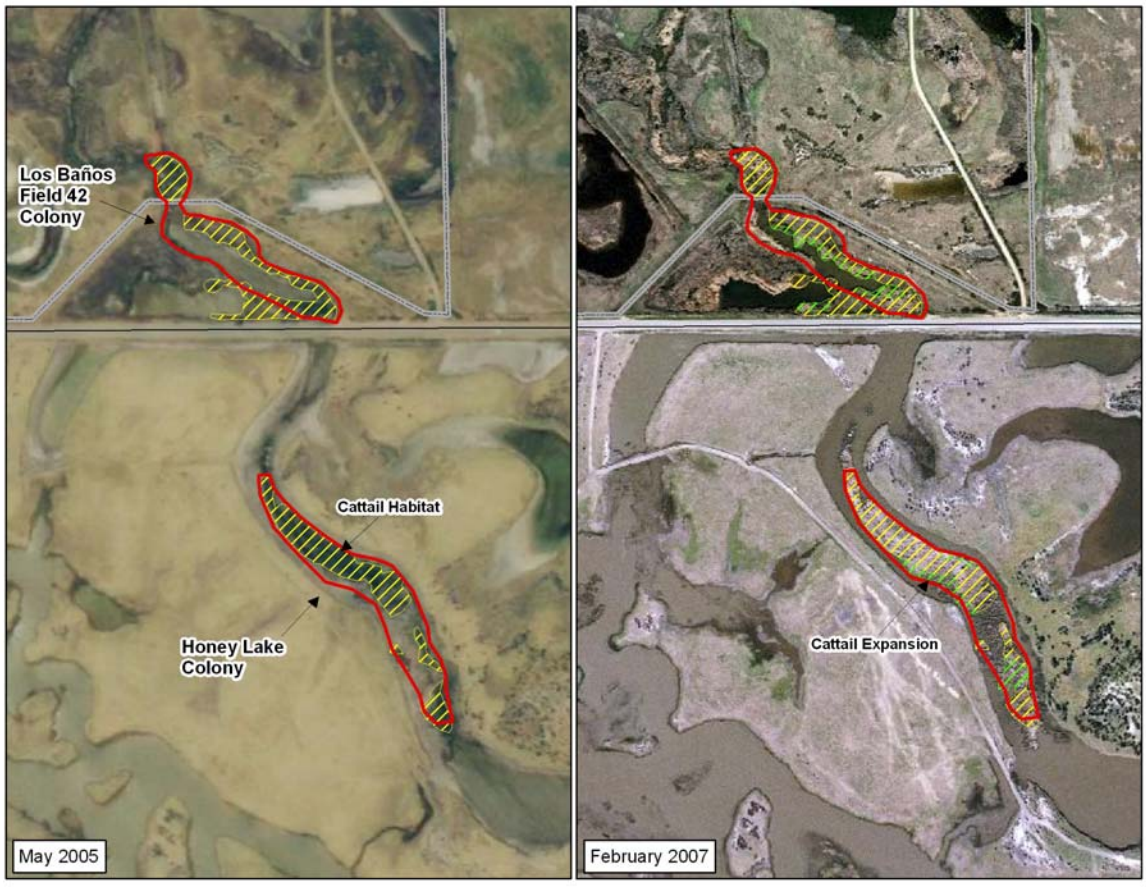

Figure 5. Los Baños Field 42 and Honey Lake tricolored blackbird colony locations, Merced County, California. Aerials taken in May 2005 and February 2007.

Due to the tendency for tricolor colonies to move around from year to year, it is recommended that surveys be continued on an annual basis on both the Los Baños and North Grasslands Wildlife Area Complexes; and as time and funding permit, be expanded into the private lands of the Grassland wetland management area. We also recommend that surveyors continue to follow statewide protocols to remain consistent with others gathering data on tricolors. Data on tricolor colonies found during non-statewide survey years can also be entered into the Tricolored Blackbird Data Portal, thus we will continue to share our data annually.

Management Implications

As we have seen this year, much of the previously utilized habitat for nesting tricolors was not maintained in a manner ideal for this species. Since tricolors are a species of special concern, and suitable nesting habitat seems to be decreasing in the Central Valley, we recommend that DFG keep this species in mind when making management decisions. Controlling invasive plant species, such as perennial pepperweed within upland habitats that may also contain milk thistle patches, may give tricolors additional nesting opportunities on state wildlife areas. Another management tool that can be used on the O'Neill Forebay Wildlife Area to attract breeding tricolor colonies is to provide areas with summer water. A minimum number of breeding habitat acres should be maintained by rotating summer water across the property allowing managers to maintain wetland productivity while insuring adequate tricolor habitat each year. Not only will this provide a water supply for breeding tricolors, it may also encourage the development of young wetland habitat each year. Encouraging young wetland growth on other wildlife areas, such as Los Baños and Volta, may also attract colonies to these areas and away from nearby silage fields, which have the potential of being harvested prior to the fledging of tricolor nestlings. Continued monitoring of both active colonies and changing habitat conditions will help us make educated management decisions for this species in years to come.

Acknowledgements

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Appendix A. 2008 Tricolored Blackbird Survey Protocol.

Survey Protocol

Thank you for volunteering to participate in the 2008 Tricolored Blackbird Survey. This survey is conducted every three years in order to estimate population size and track changes in the status of the Tricolored Blackbird population. This information is critical for guiding our conservation efforts and could not be accomplished without your help and the extensive efforts of other citizen scientists across the state. The following protocol outlines the methods to be used during the survey and how to report your observations.

Our goal is to develop the best estimate of the statewide population as possible. The more areas that are surveyed where the presence and number (or absence) of Tricolored Blackbirds is recorded, the better the estimate will be.

I. Scouting

It is very useful to check on nearby sites and search the surroundings before the dates of the official survey. This will streamline the survey and allow you to spend more time at the colonies that require the most effort to observe and count. By April 1 most colonies will be active for their first round of breeding. In the more southerly colonies some nests will already have hatched young. It appears that 2008 is an 'early' year for Tricolors. Estimating the colony size and observing the behavior and habits of the Tricolored Blackbirds at this point is interesting and good practice.

II. Timing

The 2008 survey window is April 25th to 27th. All observations that will be reported as part of the 2008 survey should be carried out on one or more days between April 25 and 27. Tricolored Blackbirds and colonies can shift locations over relatively short periods of time during the breeding season. Making sure that a comprehensive count is made in a narrow time window helps ensure we are not counting the same birds more than once.

Subsequent observations at any future date should also be noted and can be submitted vai the Tricolored Blackbird Portal (http://tricolor.ice.ucdavis.edu).

III. Survey Locations and Priorities

Breeding colony locations are on maps provided to you were all discovered on previous censuses dating back to the early 1990's, or incidentally discovered and documented at other times. Some sites were found during the last statewide census in 2005. Each volunteer team has been asked to survey a specific area within their county and, in most cases, to visit specific colony sites that were reported in 2005. The following are the areas that should be surveyed in priority order:

> Priority One: visit and document the number (or absence) of Tricolored Blackbirds at assigned colonies and in the immediate vicinity of those colonies. These are those 2005 colony sites that you have been specifically asked to survey and are l*abeled with the colony name and and asterisk* on the maps that have been provided.

Appendix A continued. 2008 Tricolored Blackbird Survey Protocol.

Priority Two: survey suitable habitat in areas around assigned colonies and in areas where Tricolored Blackbirds have been reported or seen before, as indicated by the unlabeled points on the maps provided and/or based on observations by you and/or other local experts. The unlabeled points on the maps provided are those for which we have no absolutely confirmed the location, but in many cases are correct and may be colonies that you know of and can help us confirm.

Priority Three: survey other areas in the county where there is suitable habitat.

Ideally you are already familiar with these former colony locations, but if not, the locations of 2005 colonies and other reported sites should be easy to find from the maps we provide.

IV. Survey Protocol

Viewing the colony

In general, it is best to avoid any disturbance of nesting birds, as the disturbance can cause nest failure. This is especially true for Tricolored Blackbirds and other colony nesting species, since pairs are in close proximity to each other, and single disturbance can cause the failure of many nests. Under no circumstances should volunteers enter the colony. Colonies should be surveyed from a distance at which the birds are unaffected by the surveyor's presence. Since colonies may be located in a variety of contexts, it is up to the observer to determine how close is too close. Under most circumstances, colonies can be surveyed from just outside the boundaries of the vegetation in which the birds are nesting. The majority of sites will be readily viewable from public roads and allow close and thorough study. Sometimes roadsides provide an elevated view of a colony, and thus a better perspective from which to estimate colony dimensions and numbers of birds.

Private property should also be respected. Do not enter private property unless you have received permission. A Fact Sheet about the survey has been prepared and is available for you to give interested landowners (or others) to inform them about the survey.

Colony Name

Use the colony name given in the list of 2005 colonies that you have been provided and that are used to label the colony on the maps (if you have been assigned to specific colonies). If this is a new colony (not already entered in the online database and not in the list of colonies provided, then please give the site a logical name. Be sure to not use the name of the private landowner unless you have permission. Also, please provide directions to the site (if this is a new colony), with enough detail that another observer could get to that location.

Latitude and Longitude

If this is a known colony that you have been assigned to visit, no need to record the site coordinates. For new colony sites, if you have a GPS unit, please use it to collect and record the latitude and longitude of the site during the survey. Record the datum used by the GPS unit (the default for most GPS units is WGS84, but in some cases they may be set to NAD83). If you do not have a GPS unit there are two ways to identify and record the coordinates. First, when entering your new location on the Tricolored Blackbird Data Portal, you can use the built-in Google Maps tool to zoom in and place a marker at the location. The latitude and longitude will automatically be entered when you do this. Alternatively, you can use Google Earth, an extremely useful and user friendly, free global mapping tool. Search for and zoom into the location in Google Earth. Insert a placemark at the location (be sure to move the marker to the actual spot) and the latitude and longitude will be recorded in the "Properties" of that marker.

Appendix A continued. 2008 Tricolored Blackbird Survey Protocol.

Duration
Be sure to record the start and stop time you spend at each colony site (including those where there are no Tricolored Blackbirds this year). Use this to enter total time spent when entering data online. Spend as much time at each colony as you need to get your best estimate of the number of birds. If after 10 to 15 minutes at a known colony site you have not seen any Tricolored Blackbirds, move on to survey new sites or areas. If Tricolored Blackbirds are present, use your own judgment about how much time to spend at the colony. In general, prolonged viewing of a colony will improve your estimate and the larger the colony the more time should be spent. This is particularly true for very large colonies (> 10,000) where it may take some time to evaluate the number of birds. With such large colonies, the more time you spend at the colony, the more the apparent chaos will give way to a semblance of order, enabling you to better estimate the size of the colony and gather observations of singing males, nest-building females, adults feeding chicks, or fledglings.

However, the time spent at one colony is at the expense of visiting more areas and documenting additional colonies. Do not spend too much time at small colonies where you can estimate the number of birds quickly. In this case, finding and counting new birds will be more valuable for the statewide estimate.

Colony Size
A Tricolored Blackbird colony can range from 20 birds to 100,000 or more birds. For this survey, all estimates will be based on visual counts of the birds at a colony. For small colonies, precise counts can be made, but in larger colonies a visual estimate will be necessary. The method used should be indicated on the data sheet.

Precise Counts
For small colonies (approximately less than 200 birds), a precise count of the number of birds will usually be feasible. With care, this should provide a very precise estimate of the number of birds present.

Scanning Surveys
When large numbers of birds are streaming by, dropping into vegetation, and are otherwise extremely active, precise counts will be impossible.

To estimate the number of birds in large groups during this survey there are two ways to estimate number depending on whether birds are flying by or within the colony.

1) *Within the colony*: for birds that are perched or flying around within the colony, it is effective to count the number of birds that fill a specific, repeatable field of view, such as the field of view in your binoculars. Within this field of view, either count precisely or by fives or tens for more dense concentrations, to obtain a reasonable estimate of the number of birds within that view. Then, multiply that number by the number of fields of view that comprise the entire flock or colony.

2) *Flying in Transit*: Depending on the time of day and colony status, there may be streams of birds flying between the colony and an off-colony food or water source. In this case, the number of birds in these flight paths can be estimated by counting the number of birds that move by in a given amount of time and multiplying this by the total time it takes for the flock to pass.

Appendix A continued. 2008 Tricolored Blackbird Survey Protocol.

In many cases observers will need to employ both strategies. Position yourself somewhere with good visibility and use a timed count of the flying birds as they leave the colony. Once the flow of leaving birds has dropped off, then conduct a scanning count of the visible birds remaining within the colony itself. The scanning count of the colony should be repeated a few times to improve the estimate. Add the estimate of birds flying away from the colony to the count of birds within the colony. There is space on the data sheet to record your best estimate of birds, as well as what you think the minimum and maximum number of birds are at the colony. These minimum and maximum estimates will give us some sense of how accurate you feel your best estimate is.

Estimating the size of large colonies can be very challenging, and for some, frustrating. Remember that you are providing us with an approximation of colony size and not an exact count. All large colonies that you find will be revisited by one or more experts, regardless.

Sex Ratio

The accuracy of the count will also depend on the sex ratio of birds observed and this depends on activity at the colony. Some colonies that are just forming will have both males and females active so that most individuals can be seen. Once incubation begins however, it will be mostly males that are seen. *This information is critical to record.* The data sheet includes space for specifying the ratio of males to females seen and whether the colony is active but quiet (indicating incubation may have begun). Tricolored Blackbird flocks often separate into groups of males and females. A quick estimation of the numbers in each sub-flock can be used to determine an overall sex ratio. Estimate the ratio of males to females in several sub-flocks or fields of view and average them to come up with an estimate.

Colony Observations

Locating new colonies and estimating colony sizes are the primary goals of the survey; however, the characteristics of colonies, the surrounding environment, and the behavior of the birds are all valuable for assessing the status and health of colonies.

Nest Substrate

Observers should record the nesting substrate of observed colonies. There is space on the data sheet to record both primary (dominant) and secondary substrates. Tricolored Blackbird native habitat consists of young, freshwater marsh dominated by tules or cattails, but they also nest in a variety of other vegetation types that provide enough structure and cover to build nests. In addition, they also now regularly nest in grain crops, particularly triticale fields in association with dairy farms. Likely substrate plants are: bulrush/tule, cattails, blackberry, milk thistle, nettle, and grains like triticale, wheat and barley. Other substrates include: willows, cottonwood, *Arundo*, desert olive, mustard, prickly lettuce, mule fat, coyote brush, raspberry, rice, tamarisk, and poison hemlock.

Colony Surroundings

In addition to locating and viewing the colony, it is useful to describe the surroundings. In addition to nesting substrate, Tricolored Blackbirds also require a source of open water and suitable foraging areas (e.g. upland pasture, grassland, alfalfa). They can fly several miles to sources of abundant food (like farms with stored grains). Knowing about these locations will assist in future surveys and may help observers find additional breeding colonies as birds move between various nesting sites and a centralized food source. **Any stream of blackbirds is worth following!** On the data sheet, if source of water or stored grains are identified, please

Appendix A continued. 2008 Tricolored Blackbird Survey Protocol.

record the presence of stored grains nearby and the distance to water. Also, note the dominant land use surrounding the colony (type of agricultural crop, natural vegetation type, etc).

Colony Area

Observers should try to record the approximate length and width of the breeding substrate within the colony. These measures will be used to calculate the total area of the colony. Since breeding substrate often occurs in patches over a larger area, size estimation is approximate. Colony area will be used with what is known about the average nest density within Tricolored Blackbird colonies to develop a secondary estimate of the number of birds in the colony.

- *Measuring Width and Length:* Where possible, observers should pace out two sides of the colony, using strides that approximate one meter. Record the number of meters for these two sides on the data sheet.

- *Aerial Photos*: Using satellite photos that are provided, observers can highlight the boundaries of the colony being used. These marked-up photos should be sent in with paper copies of datasheets following the surveys. These will provide a means for mapping the extent and calculating the total area of colonies observed.

- *Google Earth*: Using Google Earth, you can zoom into a location and use the ruler tool to calculate the length of each side of a colony. These measurements can be recorded on the data sheet after the survey and then entered via the website.

Behavior and Colony Status

Behavior of birds at a colony and the current activity at the colony are also important sources of information for understanding the seasonal timing of breeding and success of particular colonies. Important observations to record on the datasheet include:

- *Singing*: pronounced chorus of males heard singing at a colony
- *Carrying Nest Material*: females observed carrying nest material (e.g. grass)
- *Carrying Food*: adults observed carrying food (usually insects protruding from bill)
- *Colony Quiet*: if the colony is relatively quiet (no singing or large groups of males and females moving about) and primarily males are visible, this may indicate that incubation has begun and females are on nests.
- *Fledglings*: observed young birds in association with adults.

Mapping New Colonies

In order to better ensure that we record the location of new colonies accurately, please use the street and colony maps provided (or another map you have available and can copy) to mark the location of new colonies you find and visit. These will be stored and used later for data quality checking.

Survey Routes

Using the maps provided or other maps you have available to indicate the routes taken during the survey by highlighting the roads and areas surveyed. These should be sent in with the datasheets and aerial photos following the survey.

Total Survey Time and Mileage

Please record the total time, number of observers in your team, and miles you drove for the survey. These can be recorded separately and emailed to Rodd Kelsey (rkelsey@audubon.org)

Appendix B. 2008 Tricolored Blackbird Survey Report Form.

2008 Tricolored Blackbird Survey Report Form

Visit Information

Date: _____ Start Time: _____ Stop Time: _____

Observer Name: _____

Telephone _____ Email: _____

Colony Information

Colony Name: _____

County Name: _____ Landowner/Contact: _____

Directions: _____

_____

Latitude _____ Longitude _____ Datum _____

Colony Size

Minimum # Birds _____ Type of Estimate: **Visual**

Best Estimate # Birds _____ Precision of Estimate: Scanning / Precise Count (circle one)

Maximum # Birds _____ Approximate Sex Ratio (Males/Females): _____

Colony Observations

Primary Nest Substrate: _____ Secondary Nest Substrate: _____

Nearby Stored Grains: Yes / No Dominant Surrounding Landuse: _____

Distance to water: _____ meters / feet (or N/A) Type of water: _____

Colony Width: _____ meters / feet Colony Length: _____ meters / feet

Carrying nest material Yes / No Singing Yes / No

Carrying Food Yes / No Colony Quiet Yes / No

Fledglings Yes / No

Notes

Date Entered in Tricolored Data Portal: Yes / No