State of California
Department of Fish and Wildlife

Memorandum

Date: October 2, 2015

To: Sonke Mastrup
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: **Petition from the Center for Biological Diversity to list the Tricolored Blackbird as Endangered under the California Endangered Species Act**

The Department of Fish and Wildlife (Department) prepared the attached petition evaluation report in response to a petition, dated August 19, 2015, received by the Fish and Game Commission (Commission) on August 19, 2015 (Petition) from the Center for Biological Diversity to list the Tricolored blackbird (*Agelaius tricolor*) as an endangered species under the California Endangered Species Act (CESA). (See generally Fish and Game code §2073.5, subd. (a); Cal Code Regs., title 14, §670.1, subd. (d)(1).)

In accordance with CESA, the attached petition evaluation report delineates the categories of information required in a petition, evaluates the sufficiency of the information in the Petition, and incorporates additional relevant information that the Department possessed or received during the review period. Based upon the information contained in the Petition, the Department has determined that there is sufficient information to indicate that the petitioned action may be warranted. The Department recommends that the Petition be accepted.

If you have any questions or need additional information, please contact Dan Yparraguirre, Deputy Director of Wildlife and Fisheries Division at (916) 653-4673 or Eric Loft, Chief of Wildlife Branch at (916) 445-3555.

Attachment

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State of California
Natural Resources Agency
Department of Fish and Wildlife

REPORT TO THE FISH AND GAME COMMISSION

EVALUATION OF THE PETITION FROM THE CENTER FOR BIOLOGICAL DIVERSITY TO LIST TRICOLORED BLACKBIRD (*Agelaius tricolor*) AS ENDANGERED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

Prepared by
California Department of Fish and Wildlife

March 2015, Updated October 2015

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EVALUATION OF PETITION FROM CENTER FOR BIOLOGICAL DIVERSITY TO LIST THE TRICOLORED BLACKBIRD (*Agelaius tricolor*) AS ENDANGERED

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

EXECUTIVE SUMMARY

On October 8, 2014, the Center for Biological Diversity (Petitioner) submitted a petition (2014 Petition) seeking action by the California Fish and Game Commission (Commission) to list the tricolored blackbird (*Agelaius tricolor*) as endangered pursuant to the California Endangered Species Act (CESA) (Cal. Reg. Notice Register 2014, No. 44-Z, p. 1861; see also Cal. Code Regs., tit. 14, § 670.1, subd. (a); Fish & G. Code, § 2072.3). The Commission received the 2014 Petition on October 8, 2014 and referred it to the California Department of Fish and Wildlife (Department) for an initial evaluation on October 15, 2014. At its December 3, 2014 meeting in Van Nuys, California, the Commission voted to take emergency action to add tricolored blackbird to the list of endangered species pursuant to Fish and Game Code section 2076.5, with the related regulation as approved by the Office of Administrative Law taking effect for an initial term of six months beginning on December 29, 2014 (Cal. Reg. Notice Register 2015, No. 2-Z, p. 91).

At its meeting in Mammoth Lakes on June 11, 2015, the Commission voted to reject Petitioner's October 2014 petition. On June 30, 2015 the emergency regulation adopted in December 2014 expired by operation of law. On August 5, 2015, at its meeting in Fortuna, the Commission heard a request from Petitioner to reconsider its June action. On August 19, 2015, Petitioner submitted a new petition (Petition) seeking action by the Commission to list the tricolored blackbird as an endangered species pursuant to CESA (Cal. Reg. Notice Register 2015, No. 36-Z, p. 1514). The Commission received the Petition on August 19, 2015 and referred it to the Department for an initial evaluation on August 20, 2015.

This report presents the Department's initial scientific evaluation of the Petition as required by Fish and Game Code section 2073.5, with evaluation of the new information presented in the August 2015 Petition included as an addendum. (See also Cal. Code Regs., tit. 14, § 670.1, subd. (d).) Consistent with that authority, this report evaluates the scientific sufficiency of the Petition on its face and in relation to other relevant information the Department possesses or that it received during its review. To support the review, the Department gathered and reviewed the information referenced in the submitted Petition to the best of its ability. Not all references were available to the Department. In addition to the face value, and the material referenced in the Petition, the Department also considered other relevant information in its possession related to the tricolored blackbird populations. All sources of information considered by the Department in preparing this report, including those referenced in the Petition, are identified in the References Section. The Department's recommendation as to whether to make tricolored blackbird a candidate for listing under CESA is based on an assessment of whether the scientific information in the Petition is sufficient under the criteria prescribed by CESA to consider listing tricolored blackbird as endangered.

In completing its Petition Evaluation, the Department has determined there is sufficient scientific information to indicate that the petitioned action may be warranted. Therefore, the Department recommends that the Commission accept the Petition for further consideration under CESA. Such action by the Commission would convey candidacy protections to the tricolored blackbird pursuant to Fish and Game Code section 2074.2(a)(2), making adoption of an emergency regulation unnecessary.

Summary of Department's Evaluation of the Petition

A petition to list or delist a species under CESA must include information pursuant to Fish and Game Code section 2072.3 as follows:

- population trend;
- range;
- distribution;
- abundance;
- life history of a species;
- factors affecting the ability of the population to survive and reproduce;
- degree and immediacy of the threat;
- impact of existing management efforts, suggestions for future management;
- availability of and sources of information;
- habitat necessary for a species survival;
- detailed distribution map.

The Department finds that the Petition provides adequate information in the categories required by CESA and that the petitioned action may be warranted.

This report summarizes the Department's evaluation of the Petition and other available information. It follows the outline and summarizes relevant portions of the Department's 2004 evaluation of the petition to list the tricolored blackbird, which is incorporated by reference (Gustafson and Steele 2004).

The Department believes that the petitioned action may be warranted based on the degree and immediacy of the threats faced by the species which are addressed by the Petition, as follows:

> 1) Historical and continuing loss of nesting substrate, including wetlands, Himalayan blackberry (*Rubus discolor*) patches, upland weedy vegetation, and marsh vegetation in reservoirs and ponds.
>
> 2) Historical and continuing loss of uplands used for foraging.
>
> 3) Declines in tricolored blackbird populations in the past 80 years, including ongoing declines documented since 2008.
>
> 4) Significant, large-scale reproductive failures in tricolored blackbird colonies nesting in agricultural areas of the San Joaquin and Sacramento valleys.

5) Limited, inconsistent, and sometimes ineffective protection of colonies nesting in agricultural settings.

6) Ineffectiveness of existing regulatory mechanisms to protect tricolored blackbird breeding habitat and nesting colonies on privately-owned land.

7) Predation by the black-crowned night heron (*Nycticorax nycticorax*), cattle egret (*Bubulcus ibis*), common raven (*Corvus corax*), coyote (*Canis latrans*), and other predators, especially in areas in which predator populations may be artificially high due to concentrated food sources.

INTRODUCTION

Candidacy Evaluation

CESA sets forth a two-step process for listing a species as endangered. First, the Commission determines whether a species is a candidate for listing by determining whether "the petition provides sufficient information to indicate that the petitioned action may be warranted." (Fish & Game Code, § 2074.2, subd. (a)(2).) Within 10 days of receipt of a petition, the Commission must refer the petition to the Department for evaluation (Fish & Game Code, § 2073.) The Commission must also publish notice of receipt of the petition in the California Regulatory Notice Register. (Fish & Game Code, § 2073.3.) Within 90 days of receipt of the petition, the Department must evaluate the petition on its face and in relation to other relevant scientific information and submit to the Commission a written evaluation report with one of the following recommendations:

- Based upon the information contained in the petition, there is not sufficient information to indicate that the petitioned action may be warranted, and the petition should be rejected; or
- Based upon the information contained in the petition, there is sufficient information to indicate that the petitioned action may be warranted, and the petition should be accepted and considered.

(Fish & Game Code, § 2073.5, subd. (a)(1).)

If the petition is accepted for consideration, the second step requires the Commission to determine, after a year-long "scientific-based review of the subject species," whether listing as endangered is or is not actually warranted. (Fish & Game Code, § 2075.5.)

In *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal.App.4th 597, the California Court of Appeals addressed the parameters of the Commission's discretion in its application of the threshold candidacy test. The court began its discussion by describing the candidacy test previously set forth in *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal.App.4th 1104, 1114:

> As we explained in *Natural Resources Defense Council* [citation], "the term 'sufficient information' in section 2074.2 means that amount of information, when considered with the Department's written report and the comments received, that would lead a reasonable person to conclude the petitioned action may be warranted." The phrase

> "may be warranted" "is appropriately characterized as a 'substantial possibility that listing could occur.'" [citation] "Substantial possibility," in turn, means something more than the one-sided "reasonable possibility" test for an environmental impact report but does not require that listing be more likely than not.

(*Center for Biological Diversity*, at pp. 609-10.) The court acknowledged that "the Commission is the finder of fact in the first instance in evaluating the information in the record." (*Id.* at p. 611.) However, the court clarified:

> [T]he standard, at this threshold in the listing process, requires only that a substantial possibility of listing could be found by an objective, reasonable person. The Commission is not free to choose between conflicting inferences on subordinate issues and thereafter rely upon those choices in assessing how a reasonable person would view the listing decision. Its decision turns not on rationally based doubt about listing, but on the absence of any substantial possibility that the species could be listed after the requisite review of the status of the species by the Department[.]

(*Ibid*.)

Petition History

State Petitions Prior to 2014

In 1991, based on information indicating that the tricolored blackbird's breeding population had fallen to about 35,000 adults in the late 1980s, the Yolo chapter of the National Audubon Society submitted a petition to the Commission, to list the species as Endangered. After reviewing the document and other available information, the Department determined that the petitioned action might be warranted and recommended to the Commission that it accept and consider the petition. In March 1992, the Commission voted to accept the petition and designated the tricolored blackbird as a candidate for State listing. Researchers working during the 1992 breeding season discovered that the population might exceed 300,000 adults. The Yolo Audubon Society withdrew the petition based on the new population data. The Commission allowed the petition to be withdrawn, but urged the Department to work with interested persons and groups to develop conservation measures for the tricolored blackbird. The species was again petitioned to be listed under CESA in 2004. The petition evaluation report by the Department (Gustafson and Steele 2004) stated there was sufficient information to indicate the petitioned action may be warranted; the Commission voted to reject the petition (Fish and Game Commission meeting, Feb. 3, 2005).

Federal Petitions

In the late 1970s, the USFWS identified the tricolored blackbird as a candidate for federal listing. However, in the early 1990s, the USFWS eliminated its list of candidate species. In 1988, the USFWS contracted for a compilation of all historical information on distribution and abundance of the tricolored blackbird, resulting in the work of Beedy *et al.* (1991). In 1989, the USFWS modified two long-standing depredation orders, to prohibit killing the tricolored blackbird without a federal permit. The USFWS has

also provided funds for tricolored blackbird survey efforts in several years beginning in 1993. In 2006, the USFWS in response to a listing petition issued a 90-day finding that listing the tricolored blackbird was not warranted. In 2008, the USFWS updated its Birds of Conservation Concern 2008 report, identifying "species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973" (USFWS 2008). The tricolored blackbird was included on two Bird Conservation Region lists (9, 32), the USFWS Region 8 list (California and Nevada) and the National list. On February 3, 2015, the Center for Biological Diversity submitted a petition to the USFWS to list the tricolored blackbird as an endangered species under the federal endangered species act and to designate critical habitat concurrent with listing.

INFORMATION PROVIDED IN THE PETITION AND ADDITIONAL INFORMATION GATHERED BY THE DEPARTMENT OF FISH AND WILDLIFE

Population Trend (termed "Population Status and Trend" in the Petition, beginning on page 6)

The Petition states that based on extensive historical and recent statewide surveys, the tricolored blackbird "has experienced and is continuing to experience a precipitous population decline." The Petition includes data from the various statewide surveys through the 2014 survey. Several major studies as well as smaller studies and summaries, beginning in the 1930s, have documented numbers and breeding colonies of the tricolored blackbird (Neff 1937, DeHaven *et al.* 1975a, Hosea 1986, Beedy *et al.* 1991, Hamilton *et al*. 1992, Hamilton 1993, Hamilton *et al*. 1995, Beedy and Hamilton 1997, Hamilton *et al.* 1999, Hamilton 2000, DeHaven 2000a, Humple and Churchwell 2002, Hamilton 2004, Green and Edson 2004, Cook and Toft 2005, Kelsey 2008, Meese 2009a, Meese 2010, Kyle and Kelsey 2011, Meese 2011, and Meese 2014). As noted in the Petition, survey effort, methods, coverage, and participants have varied over the years. Thus, it is difficult to compare total number of birds observed or population estimates across many of the survey years.

The Petition describes a decline in numbers of the tricolored blackbird since the 1930s, particularly for the Central Valley of California. Early research on the tricolored blackbird was carried out by Neff and colleagues in the 1930s (Neff 1937). Over a period of six years (1931-1936), Neff surveyed tricolored blackbird colonies across California and suggested that the species numbered in the millions. Neff located several breeding colonies of more than 100,000 nests in the Sacramento Valley, with the largest composed of greater than 200,000 nests (corresponding to approximately 300,000 adult tricolored blackbirds). Breeding colonies were located throughout the Central Valley and in a few additional locations in California and southern Oregon; however, Neff's surveys focused on the Sacramento Valley in most years. An effort to cover the entire known range of the species was attempted by Neff in only one year (1932), with most areas outside the Sacramento Valley covered incidentally as "cooperators drove up or down the State in the performance of routine duties". The highest concentration of colonies and breeding birds were located in the Sacramento Valley; the degree to which this was the result of increased effort there is not known. Based on his somewhat geographically limited efforts, Neff (1937)

reported nesting birds in 26 California counties in the period of 1931-36. Working alone in 1934, Neff (1937) observed an estimated 491,250 nests, almost all of which were in the Sacramento Valley. As reported in the Petition, Beedy and Hamilton (1997) interpreted this to represent about 736,500 breeding adults. The presence of birds in the San Joaquin Valley and southern California was noted in the same year, but no effort was made to estimate numbers. Neff's work in the 1930s, as interpreted by Hamilton *et al.* (1995), yielded an estimated maximum annual abundance of over 1,100,000 adult tricolored blackbirds in the Central Valley.

The Petition states that a history of market hunting and massive loss of native marshland habitat had drastically reduced the population of tricolored blackbirds by the mid-twentieth century. However, Neff (1937) concluded: "Destruction of the birds by man, of nesting sites through drainage or reclamation, of nests by predators or by the elements, and other factors, have played their part. All combined, however, they have made only fractional inroads on this species during the period covered by this report [1931-1936]". Neff (1937) was not convinced that the population size in the 1930s was less than that during "pioneer times". Being that the next comprehensive effort to survey tricolored blackbirds did not occur until the 1970s (DeHaven *et al*. 1975a), it is not known to what degree the population had been reduced by the mid-twentieth century. However, the estimate by Hamilton *et al.* (1995) of 1,100,000 tricolored blackbirds in the 1930s is subject to high uncertainty and the Department acknowledges that because of the relatively limited effort during the surveys of the 1930s, the number of birds present at that time could have been much higher. Also, there is evidence that the species had experienced declines in a large portion of its range in southern California, even by the 1930s (see discussion of distribution and abundance below).

From 1969-1972, DeHaven *et al.* (1975a) attempted to survey the entire range of the tricolored blackbird to document the distribution of the species and to compare estimates of abundance to those provided by Neff (1937). The surveys were carried out by a few individuals surveying vast areas by road, and were limited to one or two drives through each county where tricolored blackbirds were known to occur in California and southern Oregon. Still, the search effort was at least as extensive as that carried out by Neff in the 1930s, and included the benefit of improved transportation and an increased number of roads. In many counties the survey consisted of driving county roads with little knowledge of historical colony sites, but this was an improvement over much of the effort of the 1930s, when counties were considered covered if visited incidentally to other activities. Despite a greater search effort, all measures of abundance indicated a decline: number of colonies detected declined from 256 to 164; non-breeding birds encountered declined from >50,000 in a single year to <15,000 over four years; maximum colony size declined from hundreds of thousands to tens of thousands; number of birds observed per year within the study period declined from about 375,000 per year to about 133,000 per year (DeHaven *et al.* 1975a). Although no population estimate could be obtained from these surveys, the authors suggested that the population may have declined by more than 50% in 35 years. The distribution of colonies was similar to that in Neff (1937). The Petition states that DeHaven *et al.* (1975a) concluded that the downward trajectory of the population was continuing in the 1970s, however Dehaven *et al.* (1975a) expressed uncertainty about this, and recommended further research to determine whether the decline they observed was ongoing.

Since 1994, ten tricolored blackbird surveys have been conducted. However, as mentioned above, the survey effort, methods, coverage, and participants have varied (Kelsey 2008, Meese 2014) making it difficult to compare total population estimates across many of the survey years. Because of this, in evaluating the 2004 petition the Department used the largest detected colony size in any given year as an indicator of population status. This was based on the assumption that the largest colonies are most likely to be detected and largest colony size is correlated with total population size (Gustafson and Steele 2004). The Department also evaluated Christmas Bird Count data to evaluate trends in the non-breeding season. Based on these sources of data, the Department found an apparent downward trend in the tricolored blackbird's breeding population from the 1930s to the 1970s, and again from the 1970s until 2004. At that time, the Department concluded that the extent of the decline between 1994 and 2004 was not clear.

Of the ten annual surveys conducted since 1994, two groups of survey years have been reported to be most comparable across years (years 1994, 1997, 2000; and years 2008, 2011, 2014) (Beedy and Hamilton 1997, Hamilton et al. 2000, Kyle and Kelsey 2011, Meese 2014). The degree to which these two groups of survey years are comparable to each other is not clear, although differences in methodology and effort between the groups suggest caution is warranted in making comparisons. Hamilton (2000) reported that statewide survey efforts in 1994, 1997, and 2000 followed similar methods in order to locate and survey as many colonies as possible. At the time, these three surveys had used the most consistent methods to date and focused the survey on a short time period in order to avoid double counting of birds. Compared to the surveys of the 1930s and 1970s, these surveys employed many more volunteer surveyors in order to cover as much of the state and known colonies as possible. Hamilton (2000) reported that "Serious amateur and professional birders located most of all birds recorded". Most large (>10,000 birds) and many smaller colonies reported during these survey years were revisited by tricolored blackbird experts. That said, inconsistencies in effort still occurred with the 1997 survey using fewer observers to visit fewer sites in fewer counties than the 1994 survey, and the 2000 survey using more observers to visit more sites than the other two survey years, but searching in fewer counties. These inconsistencies led the Department to conclude that the extent of decline during the period was unclear. Hamilton (2000) however, concluded:

> "The central conclusion of the Census and survey is that tricolors [tricolored blackbirds] are continuing to decline precipitously in numbers, from millions in the 1930s (Neff 1937) to an estimated…162,000 in this account for 2000. The conclusion that tricolor numbers are plummeting is based not only upon these data, but also on the collective experience of local experts throughout California who have observed tricolors over long intervals."
>
> "…the method of the Census and the survey, to reinvestigate all known breeding places and to search for new ones, has become an increasingly complete assessment of Tricolored Blackbird distribution and abundance. The 2000 Census probably located a greater proportion of the entire population than did censuses in previous years."

Based on their analysis of annual results from statewide surveys, Cook and Toft (2005) reported that the tricolored blackbird population had declined by approximately 56% between 1994 and 2000. They also

determined that colony sizes were smaller on average in 2000 than in 1994, which they attributed to a declining overall population for the species.

It is possible that the size of the largest colony does not have a strong correlation with population size, especially over long periods of time when the population has shifted breeding distribution and choice of primary nesting substrate for large colonies (e.g. use of agricultural crops, particularly triticale (*Triticale hexaploide*) fields beginning sometime after the 1970s). The average of the largest several colonies (three, five, and ten have been reported in the literature) might be a better correlate to population size, but it is important to compare colony size only for sites that are estimated during the same time period each year. Colony size can vary across the breeding season and therefore using different dates would likely obscure the relationship. In reports available to the Department, it is often unclear which data have been used to develop estimates of average colony sizes; this warrants additional work to evaluate trends presented by Hamilton (2000), Cook and Toft (2005), and those included in the Petition for the period of 1994-2000.

Following the 2000 survey, triennial statewide surveys were reestablished in 2005. However, a rigorous and consistent methodology has been used only since 2008 (see Kelsey 2008, Kyle and Kelsey 2011, Meese 2014). These recent surveys employ hundreds of volunteers over a three day period in an attempt to visit and estimate numbers of tricolored blackbirds at all known historical and current colony sites. The effort in each county was coordinated by a county coordinator in 2008 and 2014, with a statewide coordinator overseeing the entire effort in all years. In each of the three most recent survey years (2008, 2011, and 2014), volunteers have been provided with training in tricolored blackbird identification, estimation of colony size, use of maps on online tools, and a standard survey protocol. Many of the participants, especially those coordinating county efforts, have been knowledgeable observers with experience participating in multiple survey years. The Department acknowledges that the lack of error estimation in the census method makes it difficult to assess the accuracy of results for any given year, however the increase in knowledge in recent years on historical and current colony sites, along with consistent methodology and increased participation and effort has likely resulted in an increased ability to detect a downward trend over the past six year period. The statewide survey protocol is available at http://tricolor.ice.ucdavis.edu/content/2014-statewide-survey.

In the most recent years, the number of birds observed on statewide surveys declined 63% from 395,000 birds in 2008 to about 145,000 birds in 2014. In this same time period, maximum colony size has declined from 80,000 to less than 30,000 birds (Kelsey 2008, Kyle and Kelsey 2011, Meese 2014). Although not a statistical estimate of population size, the census provides an index of population size by attempting to visit all known sites, including new sites that are established by colony movement. This effort to visit all known sites, along with a continual increase in knowledge about historical and current colony sites has resulted in an increase in survey effort with each statewide survey. For example, more counties were surveyed in 2014 than on any previous survey and the number of observers participating on the 2014 survey (143) was exceeded on only one previous survey (155 observers in 2008). Perhaps most importantly, the number of colony sites visited in 2014 far exceeded any other survey, with a large increase in sites visited each survey year since 2008 (Figure 1); this reflects not only a sharp increase in

knowledge of colony sites, but also an enormous effort to visit as many as possible during the count period. The number of birds observed has declined despite the increase in effort.

Small breeding colonies are likely missed during each survey, especially in areas where small colonies might occur distant from any known colony site, and therefore are not located within the focused search area. Because tricolored blackbird colonies are extremely conspicuous leading up to and throughout most of the nesting cycle, most large colonies that would contribute substantially to the overall statewide estimate are likely to be observed during the three day search window. Given the concentration of birds in relatively few large colonies and within a few well known and well surveyed portions of their range (especially the San Joaquin Valley), Kelsey (2008) concluded that "it is unlikely that large numbers of Tricolored Blackbirds go undetected during the statewide surveys". Additionally, in areas of the state where most of the population breeds early in the nesting season (San Joaquin Valley), extensive pre-survey scouting occurs in an attempt to locate colonies, both for survey purposes and to initiate colony protection efforts where colonies occur on agricultural fields. Even if a colony site is not visible from a road, large colonies can be detected and identified by the species' diagnostic feeding flights as they move between the colony location and foraging habitat. The density of roads may limit observation of some portion of the landscape; this is a limitation common to all survey years.

The Department finds the Petitioner submitted sufficient information to demonstrate or create a reasonable inference that tricolored blackbirds have experienced historic declines and may continue to do so.

Range and Distribution (beginning on page 17)

The Petition provides a description of the tricolored blackbird's range. The Petition also provides information on the species' distribution throughout portions of its range and states that historical distribution and population abundance of tricolored blackbirds prior to widespread loss of their native wetland and grassland habitats are unknown..

The Petition provides the following information regarding the tricolored blackbird range. The Petition characterizes the geographic range of the tricolored blackbird as "largely restricted to southernmost Oregon and the Modoc Plateau of northeastern California south through the lowlands of California west of the Sierra Nevada to northwestern Baja California" with rare reports of tricolored blackbird from Nevada and Washington. Overall, the range of the tricolored blackbird has not appreciably changed since the mid-1930s (Meese *et al.* 2014). The Petition states that the tricolored blackbird has been found from sea level up to 4,200 feet (1280 meters) at Klamath Lake. Grinnell and Miller (1944) included a record of 4,400 feet on the "South Fork of the Pit River" in Modoc County.

Grinnell and Miller (1944) wrote that the tricolored blackbird is "resident within [California], but partly migratory within Sacramento-San Joaquin drainage system; all populations are in some degree nomadic and in fall and winter normally leave the immediate vicinity of the nesting colonies". DeHaven *et al.* (1975a) reported that 78% of colonies located between 1968 and 1972 were in the Central Valley. Counties where most colonies were found in a single season during this time period were Sacramento, Merced, Stanislaus, Glenn, and Colusa. According to Beedy (2008), since 1980, active breeding colonies

have been observed in 46 California counties. Colonies are typically largest in the Central Valley and are patchily distributed throughout but particularly in the Coast Ranges and on the coastal slope.

In all statewide surveys conducted since 1994, the majority (≥90% in all years but 1997) of the population has occurred in the Central Valley counties during the April breeding season, with much of the population and the largest colonies in agricultural fields (see below).

During the winter, the tricolored blackbird withdraws from those portions of its summer range in California outside of the Central Valley, from Santa Barbara County, and from eastern San Diego County (Meese *et al.* 2014). Although the tricolored blackbird is a year-round resident of the remainder of its summer range in California, "it largely withdraws in winter from [the southern] San Joaquin Valley and [northern] Sacramento Valley ([becoming] rare in Sacramento Valley north of Sacramento Co.), concentrating in and around Sacramento-San Joaquin River Delta and coastal areas, including Monterey and Marin Cos. [*sic*]. Small flocks may appear at other coastal locations from Sonoma Co. south to San Diego County and sporadically north to Del Norte Co." (Unitt 2004, Meese *et al.* 2014). This is consistent with the winter distribution reported by Grinnell and Miller (1944): "Many individuals move northwestward in San Joaquin Valley and south in Sacramento Valley to form concentrations in the delta [of the Sacramento and San Joaquin rivers] regions and in vicinities of Suisun, San Pablo, and San Francisco bays". Wintering flocks numbering 12,000-14,000 assemble near dairies on Point Reyes Peninsula, Marin Co., by mid-October. Some individuals also winter in central and [southern] San Joaquin Valley (Meese *et al*. 2014).

The Petition presents evidence that tricolored blackbirds have declined or disappeared from portions of their range including portions of the Central Valley where the species was once abundant. The species no longer occurs at many historical sites in coastal southern California, including Los Angeles and San Diego where the tricolored blackbird was once described as the most abundant species. Additional assessment of distributional changes and shifts in centers of abundance is warranted.

While the Department finds minor inconsistencies in the Petition's assessment of Range and Distribution, the Department nonetheless concludes that Petitioners have submitted sufficient information to demonstrate or create a reasonable inference that the tricolored blackbird has experienced a reduction in distribution in a portion of its range in California and may continue to do so.

Abundance (termed "Population Status and Trends" in the Petition, beginning on page 6 and "Abundance" in the Petition, beginning on page 23)

Grinnell and Miller (1944) described the status of the tricolored blackbird as "common to abundant locally" but noted a general decrease in southern California. Dawson (1923) reported the species as "locally abundant…in the San Diegan district…" The species was considered "not rare" in Santa Barbara County, abundant near Los Angeles, and the most abundant species near San Diego (Cooper 1870, Baird 1870 and Baird *et al.* 1874 *in* Beedy 2008). Neff (1937), in the first major work on the tricolored blackbird, did not estimate the overall breeding population in the Central Valley. However, in just eight counties in 1934, he estimated the abundance of tricolored blackbirds in California at 252 colonies, many of which were quite large, and that there were more than 700,000 adults per year. Orians (1961a)

reported that, in 1959 and 1960, there were four tricolored blackbird colonies larger than 100,000 adults. All were in the rice-growing area in Colusa and Yolo counties. By the late 1970s, the tricolored blackbird was characterized as a local resident in the southern California coastal district and the Antelope Valley, generally common where they occurred (Garrett and Dunn 1981). Meese (2014) documented 12,386 birds for the southern California region as compared to fewer than 6,000 in 2011 as reported by Kyle and Kelsey (2011).

The largest reported colony in the 1970s was one in Colusa County comprising an estimated 30,000 adults (Beedy and Hayworth 1992). DeHaven *et al.* (1975a) located 168 breeding colonies, about 78% of which were in the Central Valley. In the 1980s, the largest reported colony was one at Kesterson Reservoir in 1986, with an estimated 47,000 adults (Beedy and Hayworth 1992). Beedy *et al.* (1991) stated that the "average [tricolored blackbird] colony size has declined dramatically since the 1930s". In 1994, Hamilton *et al.* (1995) found that the largest colony, at San Luis National Wildlife Refuge (NWR), numbered about 105,000 adult tricolored blackbirds. In 1997, Beedy and Hamilton (1997) reported the largest colony to contain about 80,000 adults. By 2000, surveyors found that the largest colony comprised about 30,000 birds (Hamilton 2000). Since 2008, the population estimate declined 63% from 395,000 birds in 2008 to about 145,000 birds in 2014 (Kelsey 2008, Kyle and Kelsey 2011).

The Petitioner has described many relevant sources of information on historical and recent abundance to adequately describe much of the historical and recent work on population abundance. As discussed in the population trends section, issues of comparability across survey years and the degree to which surveys produce accurate rangewide population estimates warrant further evaluation.

Life History (in the Petition, beginning on page 25)

The Department found the Petition provided sufficient information to demonstrate or create a reasonable inference that some tricolored blackbird life history traits render them particularly vulnerable to natural and anthropogenic threats. Additional information is provided by the Department under the select subheadings, as follows.

Taxonomy and Genetics

The tricolored blackbird is a species in the avian family Icteridae (blackbirds, cowbirds, grackles, meadowlarks, and orioles). No subspecies are recognized (AOU 1957).

Although Berg *et al.* (2010) found no significant population structuring between southern and northern California populations of tricolored blackbirds, they found higher allelic diversity in the southern population. This suggests the southern population is an important genetic reservoir for the species.

Habitat Requirements

According to Grinnell and Miller (1944), tricolored blackbird habitat in the nesting season was found in the "vicinity of fresh water, especially marshy areas. The most favored sites for colonies are heavy growths of cattails and tules, but even when these are available, other vegetation may be resorted to for

nesting: sedges, nettles, willows, thistles, mustard, blackberry, wild rose, foxtail grass, barley, etc." Meese *et al.* 2014 summarized tricolored blackbird breeding habitat requirements as a nesting substrate that is relatively impenetrable or is flooded, is adjacent to water, and is within a few kilometers of foraging areas such as rangeland, alfalfa or cut hay, or irrigated pasture, with adequate insect prey. Tricolored blackbird nesting in cereal crops and dairy silage was not known until after the 1970s.

In winter, tricolored blackbirds often congregate with other species of icterids and European starlings (*Sturnus vulgaris*) that forage in grasslands, agricultural fields with low-growing vegetation, and at dairies and feedlots (Beedy 2008, Meese *et al.* 2014). Meese *et al.* (2014) wrote that the tricolored blackbird's preferred winter roosting sites included "cattail and bulrush marshes near suitable foraging areas in pasturelands, recently cultivated croplands, and livestock feedstores".

Colonial Breeding

The tricolored blackbird is the most highly colonial of North American passerine birds (Neff 1937, Lack and Emlen 1939, Meese *et al*. 2014). Bent (1958) found that the tricolored blackbird "nests in enormous, most densely populated colonies, the nests being placed more closely together than in any other colonies of marsh-nesting blackbirds". Grinnell and Miller (1944) stated that "one essential would seem to be provision at the site of the colony for a large number of individuals. Nests apparently must be close together and pairs usually [must be] in excess of 50 in order to meet the instinctive requirements of the species". Meese *et al.* (2014) wrote that the status of the tricolored blackbird is of concern, "because its population has declined and its colonial nesting behavior makes it vulnerable to nesting failures affecting thousands of nests at a single colony".

Breeding and Post-Breeding Behavior

The tricolored blackbird is highly nomadic (Neff 1937, 1942; DeHaven and Neff 1973). A flock of tricolored blackbirds can appear in an area in which it has been absent for months and begin to form a nesting colony (Orians 1961b). Orians (1961a) interpreted fluctuations in numbers of tricolored blackbirds during the breeding season to be responses to local abundance of insects. Hamilton (1998) suggested that these fluctuations are due to "itinerant breeding", describing the possibility that "variable local abundance between years is the result of itinerant breeding movements during the breeding season after predators, agricultural operations, and adverse weather destroyed colonies". Itinerant breeding applies to those individuals "nesting at more than one geographic location in the same year" (Hamilton 1993). A noted pattern is for individuals to move northward after their first nesting efforts in the San Joaquin Valley and in Sacramento County into the Sacramento Valley, northeastern California, and southern Oregon (Beedy and Hamilton 1997). In the spring, the tricolored blackbird vacates its wintering areas and arrives at nesting locations in Sacramento County and the San Joaquin Valley in the period from early March to early April (DeHaven *et al.* 1975b). In the Sacramento Valley, the largest colonies are formed during May and early June (Meese *et al.* 2014). In southern California, the tricolored blackbird may nest anytime throughout April and June (Unitt 2004). Orians (1960) reported successful autumnal breeding in the tricolored blackbird in colonies in the Sacramento Valley. Payne (1969) believed that autumnal nesting was related to rainfall and abundance of insect food

and/or abundance of rice. Hamilton *et al.* (1995) reported tricolored blackbirds breeding in August 1993 "along the Marin coast". DeHaven *et al.* (1975b) found that the tricolored blackbird exhibits a major postbreeding-season movement into the Sacramento Valley. In winter, tricolored blackbird numbers decline in the Sacramento Valley and increase in the delta of the Sacramento and San Joaquin rivers (Neff 1937, Orians 1961b, DeHaven *et al.* 1975b). Nonbreeding flocks can consist of only tricolored blackbirds in either mixed-sex or single-sex groups, or they can be tricolored blackbirds mixed with the red-winged blackbird (*Agelaius phoeniceus)*, Brewer's blackbird (*Euphagus cyanocephalus*), and European starling, and other species (Meese *et al.* 2014).

Factors Affecting Ability of Population to Survive and Reproduce (in the Petition, beginning on page 36)

The Petition addresses the loss of nesting and foraging habitat throughout the breeding distribution of the species including the destruction of native wetland and suitable upland breeding habitats, and nesting colony destruction by agricultural activities during the breeding season that results in direct mortality of nestlings. The Petition also describes early market-hunting and poisoning of tricolored blackbirds and provides information on predation and on mortality due to contaminants. The Petition also lists causes of mortality such as exposure to inclement weather, predation (under Life History section in the Petition, page 30), starvation of young, and possible removal of live young from nests by female tricolored blackbirds. The Petition also asserts that "the Tricolored Blackbird is not protected by existing regulatory mechanisms".

Habitat Loss

Neff (1937), observing that "the destruction of [tricolored blackbird] nesting habitats by man is of most importance", cited "reclamation and drainage" as key factors in the loss of many favorable sites, along with "dredging or cleaning of reservoirs, marshes, and canals in order to destroy the growths of cattails and tules". Subsequent workers have documented or commented upon habitat loss continuing through the present (Beedy *et al.* 1991, Hamilton 1993, Hamilton *et al.* 1999, Meese *et al.* 2014, DeHaven 2000a, Humple and Churchwell 2002, Beedy 2008). In the year 2000, DeHaven (2000a) observed widespread habitat loss due to urban expansion and agricultural conversions relative to the 1970s when he and others conducted tricolored blackbird research. Survey participants in recent years continue to document changes in the landscape at or around tricolored blackbird colony sites, with both nesting and foraging habitat being removed or converted to other uses. Meese *et al.* (2014) stated that the "greatest effects of human activity [affecting the tricolored blackbird] are related to habitat loss and alteration". The Department believes breeding and foraging habitat loss represents a threat to tricolored blackbird populations.

Agricultural Activities

The Petition describes the use of grain silage fields for nesting by tricolored blackbirds and the fact that normal harvesting activities typically coincide with the breeding season. Harvesting of fields that contain nesting colonies results in nest destruction and direct tricolored blackbird mortality. Table 4 and Figure 4

in the Petition summarize at least some of the losses of colonies due to harvesting thought to have occurred between 1993 and 2013. Entire tricolored blackbird colonies (up to thousands of nests) in cereal crops and silage have been destroyed by harvesting and plowing of agricultural lands (Meese *et al.* 2014). The Department believes that harvesting of fields containing tricolored blackbird colonies continues to occur and is a threat to tricolored blackbird populations.

Low Reproductive Success

Meese (2013) found widespread reproductive failures at tricolored blackbird colonies in the Central Valley from 2006 to 2011. Relatively high reproductive success was observed only when nearby foraging areas supported high insect abundance, suggesting that many tricolored blackbird colonies may be food limited. Cook and Toft (2005) noted that between 1992 and 2003, "Reproductive success was significantly higher in upland non-native vegetation (primarily Himalayan blackberry *Rubus discolor*) than in native emergent cattail *Typha* spp. and bulrush *Scirpus* spp. marshes", and concluded that low reproductive success had contributed to recent declines.

Predation

Various workers provided evidence for predation on tricolored blackbirds, their eggs or nestlings by gopher snake (*Pituophis catenifer*), king snake (*Lampropeltis* sp.), black-crowned night-heron, Cooper's hawk (*Accipiter cooperii*), Swainson's hawk (*Buteo swainsoni*), merlin (*Falco columbarius*), burrowing owl (*Athene cunicularia*), northern harrier (*Circus cyaneus*), barn owl (*Tyto alba*), short-eared owl (*Asio flammeus*), yellow-billed magpie (*Pica nuttalli*), American crow (*Corvus brachyrhynchos*), coyote, wolf (*Canis lupus*), gray fox (*Urocyon cinereoargenteus*), and possibly mink (*Mustela vison*) and raccoon (*Procyon lotor*), and feral domestic cat (*Felis catus*), showing that predation on breeding tricolored blackbirds by a diverse set of predators has occurred throughout the historical record (Mailliard 1900, Neff 1937, Payne 1969, Beedy and Hamilton 1997, Meese *et al.* 2014). Beedy and Hamilton (1997) reported that more recently, black-crowned night-herons have eliminated all or most nests at several freshwater marsh breeding colonies. Meese (2012) described the increasing pressure on tricolored blackbird colonies by cattle egrets. The Department believes that predation poses a threat to the success of some tricolored blackbird nesting colonies and that the type of nesting substrate can influence vulnerability to predation. Predation is a natural occurrence, but there has been a steady increase in population sizes of several major avian predators in California (black-crowned night heron, cattle egret, American crow, and common raven) over the last 40 years (Sauer *et al*. 2008 as cited in Kelsey 2008). The Department recognizes that small areas of native vegetation are especially vulnerable to predation, especially if they are near sites at which predator populations are at artificially-high levels due to the availability of augmented food sources from human activities. The drastic reduction in extent of spring and summer wetlands in California may have also concentrated predator populations in the remaining wetlands more than was true historically (Cook and Toft 2005).

Agricultural Contaminants

The Petition provides a summary of pesticide use in Sacramento, San Joaquin, Merced, Fresno, and Tulare counties under the heading Poisons and Contaminants (beginning page 45); information provided in the Petition is from year 2002 California Department of Pesticide Regulation data. Much of the discussion previously appeared in the 2004 petition to the State to list the tricolored blackbird (CBD 2004). The Department's earlier evaluation of the information (Gustafson and Steele 2004) is relevant and excerpted below:

> "The loss of Tricolor [tricolored blackbird] breeding effort due to application of herbicides at colony sites has been documented (Hosea 1986, Hamilton *et al.* 1995, Beedy and Hamilton 1999). Hosea (1986) reported that two colonies in Colusa and Sacramento counties near rice fields were oversprayed during aerial application of herbicides resulting in the poisoning of almost all the nestlings. However, Hamilton *et al.* (1995) stated, "Despite the limited evidence that Tricolored Blackbirds are suffering some mortality as a result of patterns of chemical use in agricultural areas, poisons do not appear to be inducing a serious population problem for Tricolored Blackbirds".
>
> The petition does not analyze the data available in the pesticide-use reporting database of the California Department of Pesticide Regulation. The database contains types and quantities of pesticides applied to crops utilized by the Tricolor. The petition does not evaluate pesticide-use patterns in relation to historical locations of Tricolor nesting colonies. Instead, the petition's focus is on individual pesticides that have high use rates or that are toxic to birds. The assessment is not representative of the risk posed by pesticides to the Tricolor. The majority of the pesticides cited in Table 5 of the petition are not expected to have a significant impact on the species. The use of the following chemicals listed in the petition, if they are applied as required, may not pose a significant risk to the Tricolor: methyl bromide, metam-sodium, aluminum phosphide, oryzalin copper sulfate, chlorophacinone, diphacinone, strychnine, zinc phosphide, and petroleum oil.
>
> The petition, citing Beedy and Hayworth (1992), describes the effects of possible selenium toxicosis on a Tricolor colony. Hamilton (2000) knew of "no evidence that toxic contaminants have adversely affected" the Tricolor since the work of Beedy and Hayworth (1992). Beedy and Hayworth (1992), working in the Central Valley in 1987, compared the reproductive success of the Tricolor colony at Kesterson Reservoir in Merced County, which had a history of selenium contamination, with the success at four other colonies. Although Beedy and Hayworth (1992) noted nesting failure at colonies in addition to the one at Kesterson, they concluded that "further research is needed to determine whether the nesting failures observed were isolated phenomena or indicative of a more widespread general decline of this species". The deformities observed in Tricolor chicks in the nesting colonies at Kesterson, which have been attributed to selenium, occurred in the 1980s prior to the cleanup of the area and prior to cessation of the use of selenium-laden agricultural drain water to maintain the wetlands at Kesterson. Since that

time, no impact of contaminants such as selenium on Tricolor nesting success has been documented.

The petition reports that a biologist observed a colony sprayed by mosquito abatement operators in Kern County and that all sprayed eggs failed to hatch. The Department does not know whether any eggs from this colony were tested to determine a cause for the failure to hatch. We also are unaware of whether the spraying equipment disturbed the colony to the extent that adult birds abandoned their nests. In any case, we do not know whether application of mosquito larvicides or adulticides poses a direct threat to the Tricolor. The potential impact of these chemicals on other invertebrates that make up much of the food sources of Tricolors is apparently not known. In addition, the physical disturbance resulting from applications of mosquito-control pesticides in the immediate vicinity of a nesting colony may result in the abandonment of the colony. The Tricolor is quite sensitive to disturbance during certain phases of the breeding cycle and will readily abandon an established colony, even with young in the nests. Additional impacts to the Tricolor could result from increased spraying and physical disturbance activities undertaken to control the spread of the West Nile virus.

Among the pesticides discussed in the petition is phosmet, a chemical said by the petition to be "highly toxic" in red-winged blackbirds. Phosmet is one of the organophosphate insecticides, which are moderately to highly toxic to birds. In California, the primary application of phosmet is in orchards and vineyards. The flocking behavior, choice of nesting habitat, and typical choice of feeding areas appears to minimize the risk of exposure to the Tricolor of agricultural applications of these insecticides during the nesting season. Because the Tricolor forages in mixed-species flocks with the European starling and other species of blackbirds in the non-breeding season, and because these flocks forage at dairies and/or feed lots, the Tricolor may be exposed to avicides intended to control nuisance and depredating flocks of blackbirds.

Due to the lack of specific information on the effect of agricultural contaminants, the Department cannot judge whether these chemicals pose a local or population-level threat to the Tricolor. This is an area requiring more attention."

Weather Events

The Petition includes a section entitled Storms and Droughts (beginning page 44). Hamilton *et al.* (1995) stated that high mortality of tricolored blackbird nestlings can result from severe or prolonged storms and that some observed reproductive failure may be the result of chilling of adult and nestling tricolors. Also, "some adult female mortality at nests appears to have been induced by cold and rainy weather" (Hamilton *et al.* 1995). A recent exercise by Department staff to evaluate drought risk for 358 special status taxa (species or subspecies that are listed under the federal Endangered Species Act or CESA, proposed or candidates for listing, fully protected species, or species of special concern) found the tricolored blackbird to be among those at most risk due to the ongoing drought.

Disease

The Petition includes a section on "Disease or Predation" (page 42). The Petition does not discuss any known or potential disease issues for the species. Meese *et al*. (2014) stated that no diseases have been reported for the tricolored blackbird but that in some years many nestlings have mites. Avian pox is prevalent in tricolored blackbirds in the Sacramento Valley, much less so in the San Joaquin Valley (Meese *et al*. 2014). Nationwide, blackbirds, orioles and grackles including the tricolored blackbird have been confirmed as being susceptible to West Nile Virus (WNV; www.cdc.gov/westnile/resources/pdfs/Bird%20Species%201999-2012.pdf). Adult tricolored blackbirds tested positive for WNV antibodies in 2009 but did not show symptoms of the disease (Meese *et al.* 2014). The impact of disease and parasites on breeding or wintering tricolored blackbirds is unknown. The Department recognizes the potential for these factors to significantly affect local populations of this highly-social species.

Competition from Other Species

The Department is aware that the great-tailed grackle (*Quiscalus mexicanus*) has experienced a population expansion in California, a phenomenon which ultimately could negatively influence success of tricolored blackbird. Meese *et al*. (2014) reported that grackles may be aggressive towards nesting tricolored blackbirds but did not consider the impacts severe. White-faced ibis (*Plegadis chihi*) may destroy tricolored blackbird nests when in the process of constructing their own nests. Additionally, they are known to prey on eggs of the tricolored blackbird (Meese *et al*. 2014). Marsh wren (*Cistothorus palustris*) may destroy eggs in tricolored blackbird nests if the nest is in proximity to its own nest (Meese *et al*. 2014).

Brood Parasitism

The Petition does not include information about impacts of brood parasitism on the tricolored blackbird. The brown-headed cowbird (*Molothrus ater*) is known to rarely parasitize nests of tricolored blackbirds (Meese *et al.* 2014). The Department does not consider brood parasitism to be a major threat to the tricolored blackbird.

Killing of Blackbirds to Protect Crops

Meese (2009, 2014) discussed shooting of blackbirds to protect agricultural crops as a potential threat to the tricolored blackbird. The Petition discusses the historical lethal control of blackbirds to protect crops and considers historical poisoning and shooting of tricolored blackbirds to have contributed to the long-term decline of the species. The Petition states that continued killing of blackbirds to protect ripening rice in the Sacramento Valley is a known but unquantified source of mortality. The Department agrees that an unknown number of tricolored blackbirds are likely killed each year due to activities that are implemented to protect agricultural crops. Meese (2009) reported on the shooting of two tricolored blackbirds by a rice farmer in Butte County. A depredation order under the federal Migratory Bird Treaty Act allows for the control of several species of blackbirds and corvids in agricultural situations without a permit from the U.S. Fish and Wildlife Service (USFWS) (when birds are causing serious injuries to

agricultural or horticultural crops or to livestock feed;50 CFR 21.43). Although tricolored blackbird is not covered by the depredation order, it is possible that misidentification of tricolored blackbirds when they occur in mixed flocks in the fall and winter leads to unintentional mortality of the species. The number of tricolored blackbirds killed annually is unknown. Landowners are required to report on activities and on the number of birds captured or killed under the depredation order, and a recent revision to the depredation order requires expanded reporting on non-target species (50 CFR 21.43, Nov 5, 2014). This may lead to an increase in knowledge upon which an assessment of impacts to non-target species, including tricolored blackbird, can be based.

While the Department disagrees with portions of the Petitioner's assessment of the factors affecting the tricolored blackbird's ability to survive and reproduce, the Department nonetheless concludes that the Petitioner has submitted sufficient information to demonstrate or create a reasonable inference that tricolored blackbirds are subject to numerous threats that may have the potential to adversely affect their ability to maintain self-sustaining populations within California.

Degree and Immediacy of Threat (termed "Degree and Immediacy of Threat and Request for Emergency Action" in the Petition, beginning on page 49; also covered, in part, under the heading "Factors Affecting the Ability to Survive and Reproduce", in the Petition, beginning on page 36)

The Petition provides adequate information regarding degree and immediacy of threat under two headings as indicated above. The Department finds the following key factors pose serious threats to the tricolored blackbird:

Breeding Habitat Loss and Fragmentation: The Department believes that habitat loss and fragmentation have resulted in a decline in the population of the tricolored blackbird since the 1930s, and continues to affect the species. DeHaven (2000a) stated that, "as measured by their breeding abundance, Tricolored Blackbirds have experienced a long-term population decline which continues today. Much of this decline stems from losses of breeding habitat to urban expansion and changes in agricultural land uses. Conversions of pasturelands, both irrigated and non-irrigated, and hay crops (alfalfa and others) to vineyards and orchards has been, and will likely continue to be, one of the most damaging forms of land-use change [to the tricolored blackbird]. Because of the severe losses of habitat, which are likely irreversible, there is little likelihood that any historic population level - or indeed, even a more recent level can ever be restored and maintained". Nesting substrate at known breeding colony sites continues to be lost on a regular basis; statewide survey participants regularly report on loss of nesting substrate when visiting historical breeding locations.

Loss of Upland Foraging Habitat: Because of their colonial breeding nature, foraging habitats that support highly productive insect populations are required for successful reproduction. For much of the year, adult tricolored blackbirds feed mainly on grains and other plant seeds (Crase and DeHaven 1978). However, females require large amounts of insect prey for egg production and both sexes provision young with insects during at least the first nine days of development (Crase and DeHaven 1977). Colonies consisting of many thousands of birds require an immense amount of insect prey during short

windows of time, putting a large burden on the landscape surrounding the colony. Habitats that can support high insect production include grasslands, pasture, and certain agricultural crops. These land cover types are regularly converted to incompatible land cover types such as orchards, vineyards, and urban development as agricultural practices evolve and cities continue to expand in the Central Valley. With regular loss of breeding substrate and foraging habitat, the co-occurrence of these essential habitat requirements across the landscape becomes less and less common, resulting in limited places where tricolored blackbirds can successfully breed.

The Department was not able to thoroughly examine information on conversion of suitable breeding and foraging habitat to unsuitable land cover types. The degree to which urbanization and conversion of compatible agricultural land to incompatible crop types continues to impact the species has not been assessed. This area requires additional review and analysis.

Loss of Reproduction to Triticale Harvest: The Department believes that the use by the tricolored blackbird of agricultural fields, where reproduction often fails due to human activities and to increased predation, may be contributing to the population decline. When other habitat is unavailable, agricultural fields may provide attractive alternative habitats for breeding and/or foraging. DeHaven (2000b) wrote, "Today, a new phenomenon – [tricolored blackbird] nesting in grain silage fields of dairies – has emerged. Unfortunately, such fields are often subject to harvest (done in relation to moisture content of the forage) while nesting tricolored blackbirds are still present. This may cause both nest destruction and direct mortality". The tricolored blackbird experiences "losses [of reproductive effort] to crop-harvesting activities and insufficient insect food and suffer habitat losses to land conversions from rangeland to vineyards, orchards, other agricultural crops and urban development" (Meese *et al*. 2014). In the 2000 survey, Hamilton (2000) found that over 90% of all tricolored blackbird observed foraging activity was on private property. Hamilton (2003) wrote that his "measurements of reproductive success (mean number of fledglings per successful nest, per colony) reveal huge population sinks that may be depleting tricolor numbers. Massive reproductive failures in the agricultural fields of the San Joaquin Valley in particular suggest that the reproductive potential of this species may be swamped by losses to agricultural harvesting practices. This relationship is exacerbated by the attractiveness of productive agricultural habitats to breeding tricolors despite repeated reproductive failures". Cook and Toft (2005) found that reproductive success varied among nesting substrates and that significantly more offspring were fledged per nest in non-native Himalayan blackberry and that many occupied sites have been lost in recent years. They concluded that silage colonies, when not destroyed by harvest, fledge more young per nest than do native marsh habitat and that this recruitment could be considerable and play a large role in stabilizing the population.

Of the nesting substrates used by tricolored blackbirds, triticale is unique in that it is available in abundance each year in the San Joaquin Valley, and in recent years, many of the largest colonies have occurred on triticale fields. The increase in dairies in the San Joaquin Valley and the associated expansion of triticale fields may have contributed to a shift in the center of population abundance from the Sacramento Valley to the San Joaquin Valley over the last few decades. The breeding season corresponds to the period of harvest for the triticale crop, and many colonies are disturbed each year due to the harvest of the nesting substrate before the nesting cycle is completed. Harvesting destroys

the nests and any eggs or young present in the nests, often resulting in zero productivity for the nesting effort. Fifty percent of the breeding tricolored blackbirds detected in California in 2008 were observed nesting in triticale fields during the 2008 statewide survey (Kelsey 2008).

Low Reproductive Success: Recent research has shown that most of the larger tricolored blackbird colonies in the Central Valley exhibited chronically low reproductive success from 2006 to 2011 (Meese 2013), even at sites not harvested during the breeding period. Incidental observations in 2012 and 2013 suggest that this trend has continued. Meese (2013) linked reproductive success at Central Valley colonies to relative abundance of insect prey at foraging sites. Insect prey availability may be suppressed by drought, changes in surrounding vegetation, or by application of pesticides. Regardless of cause, low insect abundance near colonies in the Central Valley appears to have resulted in very little reproductive output from the largest colonies in the state, at least in recent years. The limited reproduction at the largest colonies over a seven year period has likely resulted in an age structure skewed toward older adults. The maximum life span observed in tricolored blackbirds is 12 years (Meese *et al.* 2014), and much of the current population may be approaching or exceeding the average life span.

Predation: The Department believes that predation is a threat to the success of some tricolored blackbird nesting colonies. Small areas of native vegetation are recognized to be especially vulnerable to predation, especially if they are near sites at which predator populations are at artificially-high levels due to the availability of augmented food sources from human activities.

While the Department disagrees with portions of the Petitioner's assessment of the relative degree and immediacy of threats to the tricolored blackbird, the Department nonetheless concludes that the Petitioner has submitted sufficient information to demonstrate or create a reasonable inference that the threats tricolored blackbirds are subject to have the potential to adversely affect their ability to maintain self-sustaining populations within California.

Impact of Existing Management Efforts (in the Petition, beginning on page 50)

The Petition presents information on existing efforts as well as past attempts to manage or conserve the tricolored blackbird.

Silage Buy-outs and harvest delays

The Petition states that the existing but intermittent practice by the USFWS and the Department, to purchase agricultural crops in which the tricolored blackbird is nesting, is not adequate to prevent the loss of tricolored blackbird colonies. The USFWS has contributed funding for crop payment in several years. The first such purchases were in 1993 and 1994, preserving several large colonies in Fresno, Kings, and Tulare counties. Earlier, in 1992, interested persons intervened to prevent destruction of tricolored blackbird colonies by agricultural operators. Hamilton *et al.* (1995) calculated that interventions in 1992, 1993, and 1994 may have been responsible "for the presence of over 75,000 adult Tricolored Blackbirds in 1995 [which had been nestlings in the three previous years], about 25% of the known population". One or both of the wildlife agencies and/or the Natural Resources Conservation Service (through the

Delayed Silage Harvest EQIP program in 2012-2014) have contributed to crop purchases/harvest delay in each year from 1999 through 2014. In 2004, silage purchases by the Department and USFWS protected three colonies totaling over 100,000 adult tricolored blackbirds. From 2005-2009, silage buy-out and/or harvest delay contributed to the productivity of the species, varying annually. During this time period, 11 breeding colonies consisting of 546,000 birds subsequently produced 396,025 young through this process (Meese 2009b).

DeHaven (2000a) questioned the biological value (to the tricolored blackbird) of having State and federal agencies pay dairies to delay or forgo silage harvesting in fields in which the tricolored blackbird is nesting. DeHaven (2000b) commented that providing monetary payments to dairies "sets an undesirable precedent". He recommended that tricolored blackbirds be lured away from nesting in grain and silage fields through "making key San Joaquin Valley dairy silage fields less attractive to breeding tricolored blackbirds; and providing alternative, low-risk nesting substrates in these areas" (DeHaven 2000b).

Tricolored Blackbird Working Group

Following the 1991 petition to list the tricolored blackbird under CESA, the Department committed to participation on a multi-stakeholder working group to plan for and implement conservation actions. This resulted in the first of many statewide surveys, the first silage buyout to protect a breeding colony, and ongoing research. However, the working group made limited progress in developing comprehensive conservation measures for the tricolored blackbird and eventually dissolved in the mid-1990s. In 1997, a status update and management guidelines for the tricolored blackbird was completed as per Department and USFWS guidance (see Beedy and Hamilton 1997). The species was again petitioned to be listed under CESA in 2004. The petition evaluation report by the Department stated there was sufficient information to indicate the petitioned action may be warranted; the Commission voted to reject the petition (Fish and Game Commission meeting, Feb. 3, 2005). A new multi-stakeholder Tricolored Blackbird Working Group was formed in 2005 and the group released a conservation plan in 2007 detailing the conservation and management, research and monitoring, data management, and education and outreach goals for the species (TBWG 2007). Working group members, including the Department, signed a Memorandum of Understanding (agreeing to implement the actions in the conservation plan. Most of the goals and objectives in the plan are still relevant today. Progress toward meeting objectives by Department, USFWS, and partners on the working group have focused on expanding knowledge through research and protecting large breeding colonies that are threatened by harvest of triticale fields. New information gathered during many years of research can inform the modification of specific tasks, but the broader goals in the conservation plan remain relevant. The tricolored blackbird has been a high priority California Species of Special Concern since the list was revised in 2008 and the Department has continued to pursue conservation actions for the species.

Among the conservation and management goals in the 2007 Conservation Plan for the Tricolored Blackbird, the goal to "*Protect silage-nesting tricolors until sufficient, permanent breeding habitat is available to maintain viable self-sustaining populations*" is considered to be a near-term need until adequate natural habitats can be protected or restored and tricolored blackbirds are no longer

dependent on silage crops. With the declining population and the continued use of triticale by large colonies, this goal remains a high priority. The state and federal governments have provided funding to implement voluntary efforts to compensate willing farmers for delaying harvest until after the breeding season. These efforts have resulted in the protection of several large colonies, but colonies continue to be lost to harvest. Although protection of breeding colonies does not represent a permanent solution to the loss of colonies to harvest, it has resulted in the protection of hundreds of thousands of nests. Without these protective measures, the population likely would have experienced even more dramatic declines in recent years.

The long-term goal to "*Protect, create, restore, and manage habitats needed to support viable, self-sustaining populations of tricolors*" is considered to be of highest priority for species conservation (N. Clipperton, pers. comm., based on priority setting exercise at May, 2014 Tricolored Blackbird Working Group meeting). Some progress has been made on implementing this goal, including an assessment of opportunities for enhancing habitat on Department-owned lands, incorporating the needs of multiple species, including tricolored blackbirds, into habitat incentive programs for private lands, and management of wetland habitat on Department and National Wildlife Refuge lands to benefit nesting tricolored blackbirds. Until more extensive habitat restoration and protection of both nesting substrate and high quality foraging habitat can be achieved, the population will likely remain small and ongoing efforts to protect colonies on agricultural fields will likely need to be continued.

Species of Special Concern

The Department issued the first Bird Species of Special Concern in California report in 1978 (Remsen 1978). Although the tricolored blackbird was not included on the special concern list, it was recommended for further study to determine whether the decline of the tricolored blackbird noted by DeHaven *et al.* (1975a) was continuing. After further decline of population numbers in the 1980s, the Department added the tricolored blackbird to its list of Bird Species of Special Concern in 1990. The most recent revision of the list found the tricolored blackbird merited inclusion in the highest conservation category (Shuford and Gardali 2008).

While the Department questions portions of the Petitioner's assessment of the impacts of existing management efforts, the Department nonetheless concludes that the Petitioner has submitted sufficient information to demonstrate or create a reasonable inference that those management efforts may not be adequate to maintain self-sustaining populations in California.

Suggestions for Future Management (in the Petition termed "Recommended Management and Recovery Actions", beginning on page 54)

The Petition contains specific suggestions for the future management of the tricolored blackbird (Beedy 2014, Meese 2014). The Department believes these recommendations and others (e.g., Beedy and Hamilton 1997, Hamilton *et al.* 1999, DeHaven 2000a, DeHaven 2000b, Hamilton 2003, TBWG 2007, Beedy 2008) should be carefully considered, evaluated for efficacy and prioritized for implementation.

The Tricolored Blackbird Conservation Plan (TBWG 2007) included many of the following management and research recommendations:

1. Incorporate population and habitat conservation actions for the Tricolored Blackbird in habitat conservation plans, natural community conservation plans, and other multispecies conservation plans and in ongoing private land agricultural and conservation easement programs.
2. Restore habitat by promoting the growth of secure nesting substrates (e.g., nettles, thistles, and other naturally armored native plants) near productive foraging habitats to increase the potential carrying capacity for this species. Restored nesting habitats should be situated on protected public and private lands, especially in agricultural areas of the Central Valley and surrounding foothills.
3. On refuges and other public lands that support Tricolored Blackbird colonies in irrigated pastures, manage irrigation to permit a sequential flooding regime in adjacent land parcels at the time they are breeding to enhance insect productivity. Incorporate carefully managed grazing of these parcels to maintain an average vegetation height of 15 cm to provide optimal Tricolored Blackbird foraging habitat.
4. Lure nesting Tricolored Blackbirds, when possible, away from dairies and other agricultural operations to secure habitats where they are more likely to succeed; where colonies establish, defer harvest of grain and silage crops, if feasible, until after the breeding season.
5. Investigate predator-prey relationships, especially the ongoing effects of black-crowned night-herons and coyotes and the responses of individuals and colonies to predators.
6. Perform demographic research to determine whether reproductive success of freshwater marsh colonies varies with respect to wetland size and spatial relationships with other wetlands.
7. Analyze depletion of food resources by blackbirds near breeding colonies and quantify the extent and character of foraging habitats near colonies.
8. Evaluate habitat selection mechanisms and the relative value of alternative foraging habitats to breeding birds.
9. Use banding and radiotelemetry to measure adult and juvenile dispersal from several colonies.
10. Evaluate the distribution, resource utilization, and survival of wintering birds.

Finally, spatial analyses to estimate losses in nesting substrate or foraging habitat have not been conducted. Data have not been systematically collected, but incidental observations during species surveys are available and could inform an analysis of recent changes in extent and distribution of nesting substrate. Agriculture land use data for the Central Valley could be used to estimate changes in foraging habitat over time (e.g. DWR land use data; http://www.water.ca.gov/landwateruse/lusrvymain.cfm).

Habitat Necessary for Survival ("Kind of Habitat Necessary for Survival" in the Petition, beginning on page 30)

The Petition describes the existing situation in which the tricolored blackbird nests in native vegetation, introduced vegetation, and crops. For successful breeding, tricolored blackbirds require nesting substrate, a water source, and an extremely abundant insect food source in proximity to the breeding colony. Historically, tricolored blackbirds nested in natural wetlands of the Central Valley and in a few

native upland plant species; early declines in the population most likely resulted from declines in this natural habitat. As extensive wetlands and other native substrates were lost, tricolored blackbirds expanded use to alternative nest substrates, including nonnative upland plants such as Himalayan blackberry, milk thistle (*Silybum marianum*), and the agricultural crop triticale, which is grown as a food source for dairy cattle. Historically, most colonies were in freshwater marshes. Meese *et al.* (2014) wrote that, historically, "almost 93% of 252 breeding colonies observed in the Sacramento Valley, from 1931 to 1936, were in freshwater marshes dominated by cattails (*Typha* spp.) or bulrushes (*Schoenoplectus* spp.); remaining colonies were in willows (*Salix* spp.), blackberries (*Rubus* spp.), thistles (*Cirsium* and *Centaurea* spp.), and nettles (*Urtica* sp). By the 1970s, DeHaven *et al.* (1975a) found that only 53% of colonies in the Sacramento and San Joaquin valleys were in cattails and bulrushes. Since at least the 1970s, the breeding habitat of the tricolored blackbird has included upland and agricultural areas (DeHaven *et al.* 1975a, Beedy *et al.* 1991). Hamilton (2003), citing Kreissman (1991 - not examined), wrote that "most Central Valley grasslands are now gone, lost to cattle rangeland, irrigated crops (pasture, row crops, orchards, rice , grapes) and development. Modern tricolor habitats are agricultural land, especially rice and nearby duck club cattail and bulrush marshes, dairies and their associated hay fields and cattle rangeland wherever there is suitable nesting habitat and water". Hamilton (2003) stated that "Tricolored blackbird colony sites require nesting substrates offering protection from predation. These include emergent marsh vegetation (cattails, *Typha latifolia*, less frequently *T. angstifolia*), bulrushes (*Schoenoplectus californicus, S. acutus*) and Himalayan blackberries (*Rubus discolor*) thickets, thistle, and nettles. Tricolored blackbirds do not settle in grain, hay, silage, or cut-feed fields before grain forms seed awns or spiny or prickly weeds develop in them. We assume that grain fields are identified as spiny vegetation by tricolors".

The Department concludes that the Petitioner has submitted sufficient information to describe the habitat needs for tricolored blackbird.

Distribution Map

The distribution map included in the Petition on page 61 contains a sufficient illustration of the California breeding and winter ranges of the tricolored blackbird. The Department further recommends assessment and incorporation of other existing data sets (e.g., eBird, California Natural Diversity Database, Christmas Bird Count, Breeding Bird Survey) which may have additional tricolored blackbird records into the distribution map.

Availability and Sources of Information (in the Petition, beginning on page 57)

The Petition includes most of the major references on the tricolored blackbird.

CONCLUSIONS

The tricolored blackbird is the most colonial land bird in North America and nearly is endemic to California, with more than 99% of the total breeding population in the State. As a colonial breeder, the tricolored blackbird nests in a small number of larger colonies comprising a significant proportion of the population. The concentration of a high proportion of the total population at a few sites increases the

risk of a catastrophic effect on the species as a whole, due to nesting failure in, or destruction of, a single large colony.

At least three major factors have operated, and continue to operate, to reduce the population of the tricolored blackbird. These major threats to the tricolored blackbird are as follows:

Loss and Fragmentation of Habitat: This factor appears to be the most serious one threatening the tricolored blackbird. The availability of suitable nesting and foraging habitat, including food resources, appears to limit the population. Local declines across the range of this species over time apparently have cumulatively resulted in the decline in tricolored blackbird numbers since the 1930s. The loss of habitat continues, both in the Central Valley and in southern California. As the amount of habitat is reduced through human activities, the tricolored blackbird population likely will continue to decline.

Agricultural Operations: The shift in breeding habitat use by the tricolored blackbird from native habitats to silage and grain fields makes these colonies vulnerable to destruction during crop harvest. Nest abandonment also can result from the disturbance of nearby human activities.

Predation: Predators attack colonies of any size but are especially effective in reducing or eliminating the reproductive effort of small colonies in remnant native vegetation such as cattails. Predation can have a significant effect on the reproductive success of tricolored blackbird breeding colonies.

Having reviewed and evaluated relevant information, including the material referenced in the Petition and other information in the Department's possession, the Department believes there is sufficient scientific information available at this time to indicate that the petitioned action may be warranted. (See Fish & G. Code, § 2073.5, subd. (a)(2); Cal. Code Regs. tit. 14, § 670.1, subd. (d).)

Preparers

Prepared by Neil Clipperton and Lyann A. Comrack, Wildlife Branch, California Department of Fish and Wildlife, Sacramento. March 2015.

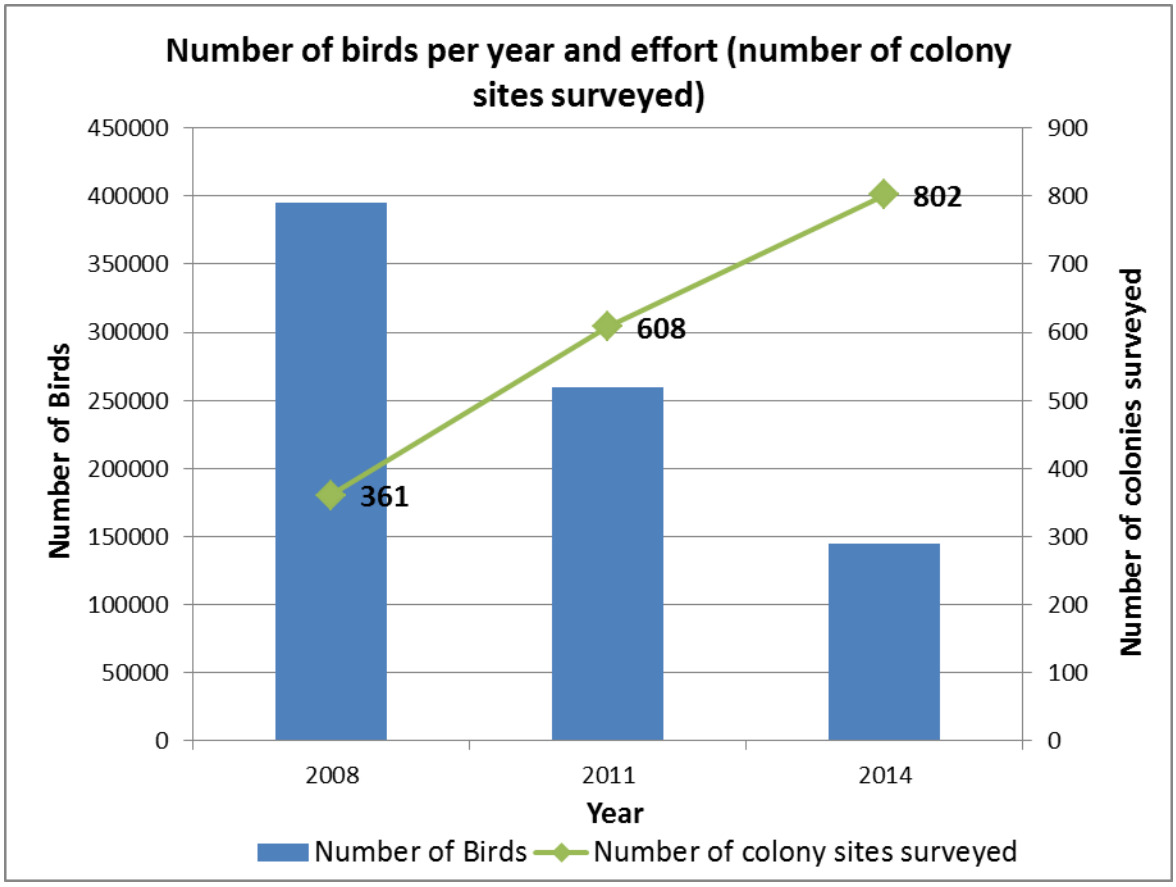

Figure 1. Number of birds detected per year during statewide surveys, and number of colony sites surveyed during each survey.

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Addendum to the California Department of Fish and Wildlife March 2015 evaluation of the petition from the Center for Biological Diversity to list the Tricolored Blackbird (*Agelaius tricolor*) as endangered under the California Endangered Species Act

October 2, 2015

A petition from the Center for Biological Diversity (CBD) to list the Tricolored Blackbird as endangered under the California Endangered Species Act was submitted to the California Fish and Game Commission (Commission) on August 19, 2015. The petition is largely the same as the petition submitted to the Commission by CBD on October 8, 2014, with the addition of an addendum composed of two new relevant studies on the Tricolored Blackbird. Of these studies, the addendum made the following statement, "Holyoak et al. (2014) analyzed declines in breeding success of the Tricolored Blackbird and Meese (2015) reviews and evaluates efforts to document the status of the Tricolored Blackbird since 1931".

This addendum to the California Department of Fish and Wildlife's (Department) evaluation of the petition discusses these references, along with additional references and information that the Department has received since the previous petition evaluation of March 2015. This new information is presented as addenda to selected sections of the petition evaluation, with a short summary on each section. The review of the new information does not change the Department's previous recommendation. The Department has determined there is sufficient information to indicate that the petitioned action may be warranted, and the petition should be accepted and considered.

Population Trend

Graves et al. (2013) performed the first statistical evaluation of trends in the average size of Tricolored Blackbird colonies using data that was compiled from a variety of sources from 1907-2009. Average colony size, rather than total abundance, was used as the metric to evaluate trends in order to account for the effects of sampling effort on total abundance counts. Graves et al. (2013) found a significant decline in the average colony size from 1935-1975, with the average colony size declining by more than 60% during this time period. Despite large amounts of data on colony sizes from the 1980s onward, no significant decline was detected in average colony size from 1980-2009. The finding of a decline from 1935-1975 supports the conclusion in the petition that a large population decline occurred between the 1930s and 1970s. The second finding is counter to reports of declines in the literature which are cited in the petition for portions of the 1980-2009 time period (e.g. Beedy et al. 1991, Hamilton 2000, Meese 2014). However, the statistical evaluation conducted by Graves et al. (2013) used data only through 2009, and so does not include much of the time period during which a recent population decline has been asserted (2008-2014).

The trends in average colony size are interpreted by Graves et al. (2013) to reflect changes in the total population size, which requires important assumptions. First, the various levels of sampling effort over the years 1907-2009 have been sufficient to produce estimates of average colony size that are reflective of all colonies across the range of the species in a given year. Second, the average colony size is related

to the total population size of the Tricolored Blackbird. The first assumption is difficult to evaluate for data collected using a variety of approaches over a very long time period with unknown levels of precision, although Graves et al. (2013) provided some support for the assumption in that average colony size was not strongly related to the total number of sites sampled. The second assumption is often made in reports of Tricolored Blackbird population trends, but the Department is not aware of a thorough evaluation of the assumption. There is reason to question the second assumption, at least over a long time period during which the species has possibly shifted its center of abundance during the breeding season from the Sacramento to the San Joaquin Valley, and began making use of a novel and abundant nesting substrate (triticale and other grain crops) which have supported extremely large colonies (40 times larger than colonies in other habitats during the last 20 years; Graves et al. 2013). Therefore, it is not surprising that a decline in average colony size would not be detected during the 1980-2009 time period, regardless of any trend in the total population size.

Holyoak et al. (2014) found a rapid decline in breeding site occupancy using data collected from 2005-2011. This is a period during which statewide surveys indicated a decline in total population abundance. Occupancy rates are a balance between rates of site colonization (establishment of new colony sites or recolonization of existing but recently unoccupied sites) and the rate at which colony sites cease being used. Holyoak et al. (2014) found that use ceased at 66% of existing sites each year, compared with 21% of sites being colonized. This is consistent with a declining population, but Holyoak et al. (2014) acknowledged that a reduction in occupancy could also result from an under-recording of site colonizations.

Meese (2015) discusses many of the same studies on population status that were included in the petition and discussed in the Department's petition evaluation. Meese (2015) emphasized the same two groups of statewide surveys that were considered in the Department's petition evaluation (1994, 1997, and 2000; 2008, 2011, and 2014), although Meese also discussed the 2005 statewide survey with the earlier group of survey years. The Department's petition evaluation did not discuss the 2005 survey effort because no report was produced describing the survey and its results; there does not appear to be any record of the amount of effort or scope of the 2005 survey (e.g. number of participants, number of sites visited, type of training provided) because the only record is a spreadsheet of occupied sites with estimates of colony size. The petition states that "surveys conducted in 1994, 1997, and 2000 were similar enough in scope and effort to enable the detection of a significant downward trend", which is supported by statements by the researcher who helped lead these surveys (Hamilton 2000). In contrast, Meese (2015) states that the results of these surveys are not directly comparable because of differences in methodology, level of effort, geographic completeness, and differences in data management and documentation. Meese (2015) contrasts these inconsistencies with the more consistent methods used during surveys of 2008, 2011, and 2014. As stated in the Department's petition evaluation, a fuller assessment of the available data from all survey years would be conducted during a status review to determine the degree to which each survey can inform the status of the Tricolored Blackbird.

Meese (2015) also presented regional trends in populations for recent years. The San Joaquin Valley experienced the second largest estimated proportional decline, declining 78% from 2008-2014. The San Joaquin Valley also had by far the largest decline in total number of Tricolored Blackbirds observed,

dropping by more than 260,000 birds over this time period. Numbers of birds observed in other regions varied, with modest net increases observed in three regions during the 2008-2014 time period. The total net increase observed in these three regions was less than 19,000 birds.

Summary: These additional studies have demonstrated that average colony size has declined since the 1930s, that breeding site occupancy has declined from 2005-2011, that large declines have recently occurred in the center of breeding abundance in the San Joaquin Valley, and have provided additional support for a statewide population decline since 2008. These studies collectively support the Department's previous conclusion that the Tricolored Blackbird population has experienced a long-term decline and that declines may have continued in recent years.

Response to selected public comments on population trend data received by the Commission

The Department is aware of disagreement expressed to the Commission through public comment regarding interpretation of existing survey data. Selected comments on this topic are summarized below, followed by responses.

Comment: While declines in numbers have been recorded in some areas of the state, increases have been recorded in other areas.
Although it is true that trends in abundance do not indicate recent declines in all regions of the state, as discussed above, a large decline was observed in the center of abundance for the species in the San Joaquin Valley, with an estimated decline of more than 260,000 Tricolored Blackbirds in this region from 2008-2014. A net decline of more than 6,000 birds was observed in one additional region. Modest net increases in three regions of the state do not offset these declines, with a total increase in those regions of less than 19,000 birds.

Comment: The Department failed to report that throughout the survey area the number of sites occupied by the Tricolored Blackbird in 2008, 2011, and 2014 were similar.
It is true that the number of occupied sites during the last three statewide surveys has been relatively stable, and the Department did not report this information in the March 2015 petition evaluation. However, this was observed despite the fact that there was a substantial increase in the number of sites visited during each successive survey in order to locate as many occupied sites as possible. While the number of sites surveyed increased, this did not result in an increase in the number of occupied sites observed as would be expected. A historical relationship between number of occupied sites and number of sites surveyed is supported by the number of occupied sites observed (≤ 71) during statewide surveys conducted in 1994, 1997, and 2000 when the total number of sites visited did not exceed 206, compared to a larger number of occupied sites observed (138-155) during recent surveys as the number of sites surveyed increased from 361 to 802 (Meese 2015). While the number of occupied sites remained relatively stable during the most recent three statewide surveys, the average size of colonies declined dramatically over this period, reflecting a decrease in the total number of birds observed in all known occupied sites. Reporting the number of occupied sites alone, without considering the number of birds at each site, does not provide an assessment of population trend.

Comment: The Department dismissed pre-2008 abundance data and focused on a purported decline in census numbers from 2008-2014.

The Department's petition evaluation discussed the major efforts to assess the status of the Tricolored Blackbird in the 1930s and the 1970s. The Department also stated that ten Tricolored Blackbird surveys had been conducted since 1994, while also pointing out that methodology, including survey effort, geographic coverage, and number of participants, had varied across surveys making it difficult to directly compare results from many of the survey years. The Department pointed out that two groups of survey years are generally described as being most consistent and therefore more comparable among years (1994, 1997, and 2000; 2008, 2011, and 2014), while also acknowledging some inconsistencies between the earlier group of survey years. The Department did not dismiss data from surveys conducted pre-2008, but rather evaluated the data to determine whether the available data suggest that a decline had occurred, and whether a decline may be ongoing. The Department concludes that there is enough information to indicate that a population decline has occurred and may be ongoing, and to warrant a fuller assessment of the available data from all survey years during a status review.

Comment: Statewide surveys have covered only a portion of the range of the species and exclude large areas known to be occupied. Siskiyou and Imperial counties were provided as examples of areas of the species breeding range that was overlooked.

While true that attempts at a complete census of the Tricolored Blackbird population in California during statewide surveys has not and cannot be fully achieved, the 2008-2014 surveys included coverage of most of the range and thorough coverage of those areas that have always supported the majority of the Tricolored Blackbird breeding population. Although the results of the statewide surveys can therefore not be interpreted as the total number of Tricolored Blackbirds in the state, the consistent effort and thorough coverage allows for a reasonable index of abundance with which to track trends in the population. In statewide surveys in which Siskiyou County was included, it has held only 0-0.2% of the total estimate of birds observed. The Department is not aware of any confirmed breeding records for Imperial County. The Department found that the recent statewide surveys have sampled a large portion of the range, and found no evidence suggesting that large areas of the range supporting a large portion of the population have been excluded from recent statewide surveys.

Comment: Fifty years of survey data indicate that overall Tricolored Blackbird numbers have been relatively stable.

This conclusion was reached through an invalid comparison of data collected over long time periods using dramatically different approaches and covering highly variable portions of the Tricolored Blackbird breeding range. Data from surveys conducted in many years from 1969-2014 were plotted on a single graph and used to suggest a conclusion that the Tricolored Blackbird population has been relatively stable over the past 50 years. This presentation of data and conclusion fails to acknowledge the variability in survey approaches and areas covered. Examples of data discussed in public comment and displayed graphically to support the conclusion of long-term population stability include:

- Surveys conducted by DeHaven et al. (1975) from 1969-1972 which were conducted by a small number of individuals and included limited coverage of the range of the species.

- Surveys conducted in the 1980s that consisted of intensive observation at only seven colonies, and irregular trips to only seven counties to search for breeding colonies.
- A survey conducted in 1999 which was stated to be incomplete by the researcher who helped organize the survey.
- A survey conducted in 2001 which followed a completely different method than other statewide surveys (e.g. only 48 sites were surveyed and sites were visited throughout the breeding season instead of being restricted to narrow time period).
- A survey conducted in 2004 in which only colony sites were visited that had historically supported more than 2,000 birds, only sites in the Central Valley were visited, and for which no training was provided.

Due to the high variability in the methods and scope of these surveys, the resulting number of Tricolored Blackbirds observed in each year cannot be expected to collectively represent an accurate trend in the population size over the last 50 years. Therefore, the conclusion reached by the commenter is not supported by these data. As stated above, a fuller assessment of the available data from all survey years is warranted, and the Department would carry out this assessment during a status review.

Comment: Estimation of the number of Tricolored Blackbirds at breeding colonies is subject to large margins of error.

It is true that the estimates of colony sizes collected during statewide surveys are subject to some amount of error, and that the census approach used for statewide surveys has not provided an estimate of that error. The potential for error in colony size estimation has been acknowledged by those that developed survey protocols, and the protocols have incorporated measures that attempt to limit the error in estimation. These measures include training provided to survey participants, use of the same survey participants from year to year when possible, and estimation at large colonies by species experts with experience estimating the size of large colonies. This said, the error at each colony site and the overall error in each census number are unknown, and ongoing efforts to develop a statistical sampling scheme for monitoring the Tricolored Blackbird population will incorporate methods to produce error estimates (Meese et al. 2015). Nevertheless, the results of statewide surveys conducted between 2008 and 2014 provide the best available information with which to evaluate population trend in recent years.

Comment: The Department's statement that a rigorous and consistent methodology has been used since 2008 is false. This comment states that the survey protocol was altered between 2011 and 2014, that precise locations were not recorded at all sites surveyed, and that the requirement to survey each site for at least 15 minutes was not met.

Modifications to the survey protocol prior to the 2014 statewide survey were intended to provide additional background information and to clarify survey requirements. No substantial changes to the methods were made. The request that each site be visited for at least 15 minutes was one of the changes made prior to the 2014 survey. This change was added considering that novice observers might not be aware that breeding colonies can sometimes be less conspicuous (i.e. during incubation) and to ensure sufficient observation time to determine whether a site is occupied. In practice, this requirement

was often unnecessary because colony sites are often very near public roads or nesting habitat may no longer be present, allowing for a quick assessment of site occupancy. Regardless, survey times of less than 15 minutes at a site are not inconsistent with pre-2014 survey years. The criticism that site locations were not recorded at all sites is incorrect. All colony sites included in the statewide survey occur at known locations and coordinates for the locations are included in the Tricolored Blackbird data portal. Minor modifications to the survey protocol document were made between 2011 and 2014 and these modifications were not reported in the Department's March 2015 petition evaluation; however, these modifications did not result in an inconsistent survey approach.

Comment: The Department's statement that the number of colony sites visited in 2014 far exceeds any other survey is inaccurate because of invalid colony sites.
The commenter suggests that many of the sites surveyed have never been occupied by Tricolored Blackbird breeding colonies. This is not accurate; all colony sites in the Tricolored Blackbird portal have supported colonies. The suggestion that all sites added to a survey must be occupied during that survey year in order to qualify as a valid breeding site indicates a misunderstanding of the statewide survey and of the Tricolored Blackbird's dynamic breeding behavior.

The commenter points out a number of instances where historical Tricolored Blackbird colony sites are reported to no longer support suitable nesting habitat and uses these observations to suggest that the increase in number of sites visited from 2008-2014 (361-802 sites) does not represent a true increase in survey effort. In every statewide survey, a number of colony sites have been discovered that do not support suitable habitat, reflecting the ongoing conversion of breeding habitat. In many cases, a site might be unsuitable in a given year but may become suitable again in subsequent years (e.g. through regrowth of marsh vegetation or reestablishment of blackberry copses or weedy fields). The protocol for the statewide survey has continued to ensure as complete a census as possible by attempting to visit all sites that historically supported Tricolored Blackbird colonies. There are many sites that have been permanently converted through urban development or more intensive agricultural practices, and future database and survey protocol updates will need to determine how to deal with cases of permanent habitat loss. Regardless, the increase in number of sites visited does represent a more thorough search of the Tricolored Blackbird range in surveys conducted from 2008-2014. A closer evaluation of sites included in statewide surveys would be conducted by the Department during a status review.

Life History

Habitat Requirements

Holyoak et al. (2014) modeled occupancy rates in the most common nesting habitat types in recent years (2006-2011) and considered data on abundance, reproductive success, and frequency of use for each nesting habitat type to determine the net contribution of different nesting habitats to the Tricolored Blackbird population over time. Holyoak et al. (2014) found differences in occupancy rates across nesting habitat types, as well as in each of the factors that may influence average reproductive output (total predicted production of young for an average size colony in each habitat type) resulting in variation in the importance of habitats to Tricolored Blackbird reproduction. Four nesting habitat types

had sufficient sample size to make strong conclusions about average reproductive output, including Himalayan blackberry, nettles, marsh, and grain fields. Himalayan blackberry and nettle colonies exhibited higher than average reproductive output. High overall reproductive output for nettle colonies is a little unexpected given that there are very few colonies, which are of average size, in this nesting substrate. However, high rates of occupancy and reproductive success result in high overall reproductive output for nettle colonies. Himalayan Blackberry colonies exhibit average occupancy rates and size, but high reproductive success and the large number of colonies in this nesting substrate (second most frequent colony type after marshes) lead to high overall reproductive output. Grain field colonies exhibit average overall reproductive output, despite having low occupancy rates, low reproductive success, and a small number of colonies on grain fields each year; the very large size of grain field colonies increases the overall reproductive output. Of the four nesting habitat types assessed, marshes remain the most common nesting habitat used by breeding Tricolored Blackbird colonies in recent years. Despite this, average levels of occupancy, reproductive success, and size of marsh colonies have led to the lowest overall contribution to reproductive output among the four nesting habitat types.

Summary: The modeling work by Holyoak et al. (2014) provides valuable new information on the relative contribution of different breeding habitats to reproductive output, but does not consider the potential contribution of foraging habitat to reproductive success or occupancy. It is possible that nesting substrates reflect differences in foraging landscapes and insect abundance, which has been shown to influence reproductive success of Tricolored Blackbird colonies (Meese 2013). For example, Himalayan blackberry or nettle colonies may occur predominantly in areas that support high quality foraging habitat such as grasslands or pastures, which may contribute to the observed high reproductive output for these nesting habitat types. These possible relationships have not been fully explored.

Factors Affecting Ability of Population to Survive and Reproduce

Habitat Loss

The petition presents information on a long-term decline in California's native grasslands and several sources of anecdotal observations on foraging habitat loss. Citing Beedy and Hamilton (1997), the petition states that "native perennial grasslands—prime tricolor foraging habitat—have been reduced by more than 99% in the Central Valley and surrounding foothills". The degree to which this historical conversion of native grasslands to an agricultural landscape and non-native grasslands has impacted Tricolored Blackbirds is unclear. Richard DeHaven, the lead researcher on Tricolored Blackbird research conducted in the 1970s, participated in the statewide survey of 2000 and after surveying areas that he had surveyed 30 years prior stated that "[e]vidence of habitat loss, from urban expansion and agricultural conversions from such high-value (for Tricolors) uses as livestock forage production, to low- or no-value uses such as vineyards and orchards, was widespread" (DeHaven 2000). The petition states that conversions of pastures and grasslands to vineyards in the Central Valley has resulted in the recent loss of several large colonies and the elimination of extensive areas of suitable foraging habitat, but no quantification of this loss was provided. In addition to losses of foraging habitat, displacement of

colonies due to losses of breeding habitat at formerly occupied colony sites are reported regularly and several of these reports were included in the petition.

Two recent papers provide quantitative assessments of change in potential foraging habitat for Tricolored Blackbird during recent decades. Soulard and Wilson (2015) used Landsat satellite data to analyze land-use and land-cover change in the Central Valley from 2000-2010. This analysis was used to extend existing land-based monitoring to produce land change estimates from 1973-2010. Four dominant land classes included in the analysis were agriculture, grassland/shrubland, developed, and wetland. The largest trends in recent years from 2000-2010 were in the grassland/shrubland (decreasing trend) and developed (increasing trend) land cover classes. During this 10 year period, an estimated ~69,200 acres of grassland/shrubland were lost and ~90,500 acres of developed land were gained in the Central Valley. Most of this change occurred before 2007 when the global economic downturn slowed the rate of development. The agriculture land class experienced both increases (with inverse influence on grassland/shrubland) and decreases (loss to development) while experiencing a smaller net decline.

Over the larger time period from 1973-2010, Soulard and Wilson (2015) reported a grassland/shrubland decline of 22% (~476,900 acres), due mainly to increases in agriculture and development. However, losses of agriculture to development resulted in relatively little net change in area of agriculture in the Central Valley from 1973-2010.

Cameron et al. (2014) analyzed time series land cover data from the California Farmlands Mapping and Monitoring Program collected between 1984 and 2008 to evaluate rangeland habitat (grassland, shrubland, and woodland) conversion throughout California. About 483,000 acres of rangelands were converted during this time period, with urban and rural development and conversion to more intensive agricultural uses accounting for most (~89%) of the rangeland loss. The San Joaquin Valley region, which in recent decades has been the center of abundance for breeding Tricolored Blackbirds, experienced the largest amount of rangeland conversion.

Summary: These more recent quantitative assessments of loss since the 1970s and 1980s show an overall decline in habitat for Tricolored Blackbirds in recent decades, with declines continuing into recent years. Additional information on the type of agricultural crops that have replaced grasslands and rangelands, types and extent of conversions between agricultural crops in the Central Valley landscape over time, and a more focused assessment of change adjacent to known Tricolored Blackbird breeding colony sites, would provide a more complete idea of the effect on Tricolored Blackbird foraging habitat.

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