# *Conservation Plan for the Tricolored Blackbird*

# *(Agelaius tricolor)*

Photo by William J. Hamilton III

***by***

**The Tricolored Blackbird Working Group**

***September 2007***

# *Dedication*

Bill Hamilton

This document is dedicated to the memory of William J. Hamilton III, an extraordinarily dedicated ecologist whose legacy and spirit will inspire our efforts for years to come.

# Acknowledgements

The Tricolored Blackbird Working Group is grateful for the persistence and hard work of many individuals, representing numerous agencies and organizations, who have dedicated considerable time and effort over many years to the conservation of this unique and important species. In particular, a hearty thanks goes out to the following participants for sharing their time, expertise, and ideas:

| | |
|---|---|
| Ted Beedy | Beedy Environmental |
| Ashley Boren | Sustainable Conservation |
| Paul Buttner | California Rice Commission |
| Graham Chisholm | Audubon California |
| Sarah Connick | Sustainable Conservation |
| Noelle Cremers | California Farm Bureau Federation |
| Alan Forkey | Natural Resources Conservation Service |
| Tom Gardali | PRBO Conservation Science |
| Bill Geyer | Resources Landowners Coalition |
| Michael Green | U.S. Fish and Wildlife Service |
| John Gustafson | California Department of Fish and Game |
| Bill Hamilton | University of California, Davis |
| Dave Hardt | U.S. Fish and Wildlife Service |
| Dean Kwasny | California Department of Fish and Game |
| Tim Kroeker | California Department of Fish and Game |
| Catrina Martin | U.S. Fish and Wildlife Service |
| Paul Martin | Western United Dairymen |
| John McCaull | Resources Landowners Coalition |
| Bob Meese | University of California, Davis |
| Robert Mesta | Sonoran Joint Venture |
| Gerry Miller | California Department of Food and Agriculture |
| Mike Miller | U.S. Geological Survey |
| Tom Moore | Natural Resources Conservation Service |
| Deb Schlafmann | U.S. Fish and Wildlife Service |
| Tracy Schohr | California Cattlemen's Association |
| Dale Steele | California Department of Fish and Game |
| Steve Wright | University of California Cooperative Extension |
| Julie Yee | U.S. Geological Survey |

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**Literature Citation Should Read as Follows:**
Tricolored Blackbird Working Group. 2007. Conservation Plan for the Tricolored Blackbird (*Agelaius tricolor)*. Susan Kester (ed.). Sustainable Conservation. San Francisco, CA.

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# Introduction

This Conservation Plan (Plan) was developed to promote and facilitate cooperative efforts to ensure the long-term persistence of the Tricolored Blackbird (*Agelaius tricolor*) (tricolor). This species has suffered an alarming population decline. Loss of native habitats, a habit of nesting in extremely large and dense colonies, and an attraction for nesting in croplands nearing harvest conspired against this species' survival in California's fertile valleys (see Biological Information in Appendix A). Concern over the future of the species united a diverse coalition of parties, the Tricolored Blackbird Working Group. This Plan is the work of that group and represents their commitment, and the other signatories to this document, to securing the future of tricolors. This work will be accomplished largely through voluntary, coordinated, and collaborative conservation actions of many interested stakeholders.

Signatories to the Memorandum of Agreement (MOA) associated with this Plan commit to support the implementation of: (1) habitat conservation projects to benefit the species; (2) a research program to more thoroughly understand the species' life history; (3) a monitoring program to effectively document population trends and distribution; and (4) an outreach and education program to enhance public and private landowner awareness, and to build public support for conservation. It is the intention of the signatories to develop, enhance, and implement comprehensive and collaborative conservation efforts to ensure the long-term survival of tricolors.

In recent years the several agency and non-agency groups that make up the Tricolored Blackbird Working Group have worked to accumulate and disseminate information on the population status of the species, identify and suggest management actions for land managers to improve conditions for the species, and develop short- and long-term conservation strategies. This Plan is a product of these efforts, and it is a working blueprint for conservation action. It takes advantage of information gathered through thousands of hours of field work by many individuals over the past 25 years, and represents the current understanding of tricolor's needs and identifies actions believed to most effectively increase and sustain their numbers. This is a living document that will be updated by the Tricolored Blackbird Working Group annually or as new information is learned about tricolors, and as new opportunities for conservation actions are recognized and implemented.

We categorized the steps for tricolor conservation into four areas: Conservation and Management, Research and Monitoring, Data Storage, and Education and Outreach. Within each section we describe specific *goals*, and *objectives* to reach the goals, and *tasks* to achieve the objectives. Background information on tricolor biology, history, status, and threats has been reviewed extensively in other documents, but is provided in Appendix A nonetheless. Appendix B is a summary of the goals, objectives, and tasks, likely points of contact, estimated budget and other information if known. As with other parts of this document, we expect that Appendix B will be updated annually by the Tricolored Blackbird Working Group.

This Plan represents the cooperative efforts of many agencies and individuals; however, the conservation of tricolors will require the efforts of many more interested participants. We welcome the participation of all entities concerned about the welfare of tricolors and other species that share their habitat to join us in achieving our mission.

## Mission Statement

> *The purpose of this Plan is to encourage and support actions by all stakeholders to safeguard the long-term welfare of tricolors by supporting secure breeding, foraging, and wintering populations and their associated habitats in California.*

To fulfill this purpose, it is the intent of this Plan to implement the following goals, objectives, and tasks to the fullest extent possible. This will require adequate funding for a coordinated mix of management, monitoring, research, and outreach activities implemented on both public and private lands. Irrespective of the specific actions employed, all management is adaptive and subject to modification as the best available scientific evidence is obtained.

The Conservation Plan for the Tricolored Blackbird is intended to be an effective, proactive way of addressing the conservation needs of species that have not been listed under the state or federal Endangered Species Acts, but face identifiable risks. Early conservation work preserves management options, minimizes the cost of recovery, and reduces the potential for restrictive land use policies in the future. Addressing the conservation needs of the tricolor before regulatory restrictions associated with listing come into play can allow greater management flexibility to stabilize or restore the species and its habitat.

## Cooperators

Audubon California

California Association of Resource Conservation Districts

California Farm Bureau Federation

California Cattlemen's Association

California Department of Fish and Game

California Department of Food and Agriculture

Central Valley Bird Club

Central Valley Joint Venture

Natural Resources Conservation Service

Pacific Gas and Electric Company

PRBO Conservation Science

Sonoran Joint Venture

Sustainable Conservation

University of California, Agriculture and Natural Resources

U.S. Fish and Wildlife Service

U.S. Geological Survey

Western United Dairymen

## Legal Status/Background

In considering California's avian species for inclusion on the first list of special concern sponsored by the Department of Fish and Game (DFG), Remsen (1978) recommended further study to determine whether the decline of the tricolor noted by DeHaven *et al.* (1975a) is continuing, "particularly since this species is virtually endemic to California and is a potentially vulnerable, colonial breeder". After further decline of population numbers in the 1980s, DFG added the Tricolor to its list of Bird Species of Special Concern in 1990. The Tricolor is proposed for similar status in the new Bird Species of Special Concern report now undergoing final review and publication. A new species account has been developed and peer reviewed by experts.

Species of Special Concern in California is an administrative designation intended to alert biologists, land managers, and others to a species declining status and encourages them to provide additional management considerations. The species is also included on the U. S. Fish and Wildlife Service (USFWS) informal list of Birds of Conservation Concern.

In 1991, based on concerns about the Tricolor's population status, the USFWS included this species as a candidate (Category 2) for federal listing as either threatened or endangered (59 Federal Register [219]:58990). USFWS policy changes in 1995 eliminated the Category 2 candidate designation nationwide. Under the Migratory Bird Treaty Act (16USC §703) and implementing regulations (under 50 CFR), nearly all birds in the United States, including the Tricolor and its eggs, feathers and nests, are protected from unintentional take, or unpermitted attempts to hunt, pursue, wound, possess, etc. Sections 3503 and 3513 of the Fish and Game Code also hold these protections.

In 1991, based on information indicating that the Tricolor'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 California Fish and Game Commission (Commission), to list the species as Endangered. After reviewing the document and other available information, DFG staff 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 Tricolor 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 wrote to the Commission, saying that "based on this [*sic*] new population data, we no longer believe that this species is in danger of extinction and we withdraw our petition" (Gustafson and Steele 2004). The Commission allowed the petition to be withdrawn, but urged DFG to work with interested persons and groups to develop conservation measures for the Tricolor. A working group already in existence was committed to this task, but only made limited progress in developing such measures. This group stopped meeting in the mid-1990s, however an expanded version of this group reconvened in 2000.

The blackbird was the subject of a 2004 petition to both the Commission and the USFWS for listing as endangered. In reviewing the petition and other available information, DFG found listing

may be warranted and recommended to the Commission it accept the petition and designate the tricolor as a Candidate species (Gustafson and Steele 2004). In 2005, the Commission chose to reject the petition, based on a finding of insufficient information presented in the petition but directed the DFG to work with interested groups to conserve the species. In 2006, USFWS rejected the petition to list the tricolor as threatened or endangered under the Federal Endangered Species Act. This finding was based on a 90-day review conducted by the USFWS, which determined that the scientific and commercial information presented in the petition did not warrant listing (USFWS 2006).

The tricolor is listed as a Bird of Conservation Concern regionally and nationally (USFWS 2002), a California Bird Species of Special Concern, and a Partners in Flight Watch List species (Rich et al. 2004). In 1991, based on concerns about the tricolor's population status, the U.S. Fish and Wildlife Service (USFWS) included this species as a candidate (Category 2) for federal listing as either threatened or endangered (59 Federal Register [219]:58990).

# Conservation and Management

The maintenance of a viable tricolor population distributed throughout the current range of the species, will require management activities implemented on both public and private lands. Public lands, particularly those lands designated for wildlife resources as state or federal wildlife refuges, can serve an important role in the conservation and management of this species. In the short-term, priority should be placed on identifying and conserving the largest and most vulnerable colonies nesting in silage on private property each year and working on public property to identify mechanisms for protecting and improving nesting and foraging habitats. In the long-term, priority should be placed on providing suitable alternative habitat away from silage fields on public and private land and identifying mechanisms for protecting and restoring habitats suitable for successful reproduction.

Primary conservation priorities for tricolor habitat conservation and management are to:

- Maintain, enhance, and protect existing habitat suitable for nesting, foraging, and wintering activities;
- Create and restore additional protected breeding habitats to support nesting and foraging;
- Identify mechanisms for protecting nesting and foraging habitats;
- To the extent allowable by law, survey private lands and identify largest and most vulnerable colonies;
- Encourage private landowners to protect active breeding colonies; and
- Encourage and enhance active breeding colonies on public lands.

## *Goal 1: Protect, create, restore, and manage habitats needed to support viable, self-sustaining populations of tricolors.*

**Objective 1.1:** Promote public land management practices and restoration projects that enhance and/or restore tricolor habitat.

**Task 1.1.1:** Hire a coordinator (plus a half position) to shepherd the implementation of this plan.
**Task 1.1.2:** Identify and pursue financial resources for public land managers to accomplish projects and practices that will protect enhance and/or restore habitat.
**Task 1.1.3:** Work with public land managers to incorporate conservation practices that benefit Tricolors into existing public lands management actions and plans.
**Task 1.1.4:** Identify and prioritize opportunities to integrate habitat protection, restoration and enhancements into wetland and upland projects on public lands.
**Task 1.1.5** Implement protection, restoration, and enhancements on identified priority project sites in wetlands and uplands on public lands.
**Task 1.1.6:** Create a forum for public land managers to discuss, share, and document results of management efforts and best practices designed to benefit tricolors.
**Task1.1.7:** Create an agency managers' guide to tricolor management to describe appropriate practices and articulate the important contribution of public land for ensuring the long-term viability of the species.
**Task 1.1.8:** Develop performance standards and appropriate measurements of success for habitat restoration and enhancement projects on public lands and annually evaluate all projects.

**Objective1.2:** Promote voluntary management practices and restoration projects on privately owned land that protect, create, enhance and/or restore tricolor habitat.

**Task 1.2.1:** On lands of interested private agricultural landowners and land managers, identify and prioritize opportunities to integrate habitat protection, restoration and enhancements into wetland and uplands projects that benefit nesting and withering populations.
**Task 1.2.2:** Assist private agricultural landowners and land managers to secure funding and technical assistance from government programs that support habitat protection, restoration and/or enhancement activities.
**Task 1.2.3:** Implement highest priority projects identified in Task 1.2.1.
**Task 1.2.4:** Develop performance standards and measurements of success for voluntary habitat restoration and enhancement projects on private lands and annually evaluate project outcomes.

**Objective 1.3**: Integrate tricolor conservation goals and objectives into existing conservation programs that support habitat protection, restoration, and/or enhancement on public and private lands including Habitat Conservation Plans and Natural Communities Conservation Plans.

**Task 1.3.1:** Work with managers of government conservation funding programs (e.g., Environmental Quality Incentives Program, Wildlife Habitat Incentive Program, and

other Farm Bill conservation programs, CDFG Landowner Incentive Program, USFWS Partners for Fish and Wildlife Program) to incorporate tricolor conservation and habitat needs into program selection criteria.

**Task 1.3.2:** Identify and pursue as appropriate opportunities to acknowledge and reward public land managers and private landowners for incorporating tricolor habitat protection, restoration, and/or enhancement activities into their land management activities and habitat development projects.

**Objective 1.4:** Promote conservation actions, research, and outreach specific to tricolors in southern California (see Appendix A for special conservation issues facing tricolors in southern California).

**Task 1.4.1:** Disseminate compiled list of historical colony and wintering locations to partners. Derive list from database (Goal 6).

**Task 1.4.2:** Develop a prioritization framework for conservation of southern California colonies/habitat complexes.

**Task 1.4.3** Develop and implement colony-specific conservation strategies.

**Task 1.4.4:** Collect and analyze samples (feather, blood or tissue) from multiple sites south of the Tehachapi Pass to determine population genetic structure of southern California tricolors and their connectivity to Central Valley populations.

**Task 1.4.5:** Develop a southern California monitoring program.

## *Goal 2: Protect silage-nesting tricolors until sufficient, permanent breeding habitat is available to maintain viable self-sustaining populations.*

**Objective 2.1:** Fully fund and implement silage buyout program to protect colonies of nesting tricolors.

**Task 2.1.1:** Improve the existing silage buyout program by developing a standardized, efficient, and effective silage buyout decision-making process involving industry and agency representatives.

**Task 2.1.2:** As part of monitoring efforts, deploy biologists early each growing season (i.e., mid-March through April) to identify and follow the fate of settlements of tricolors in silage nesting regions.

**Task 2.1.3:** Establish a revolving fund with a minimum of $100,000 per year for 10 years available for silage buyouts from government, industry, and other private sources.

**Task 2.1.4:** Carry out silage buyouts with willing private landowners.

**Objective 2.2:** In coordination with education and outreach efforts, raise awareness of tricolor nesting behavior and conservation options on ranch and farm lands, stressing the importance of protecting large silage nesting colonies.

**Task 2.2.1:** Identify an agricultural liaison to work closely with landowners in silage nesting regions.

**Task 2.2.2:** Develop an outreach program targeting agricultural producers—in Fresno, Madera, Merced, Kings, Tulare, Kern, and Riverside counties as well as counties in the Sacramento Valley—to inform them of tricolor conservation efforts, nesting behavior, opportunities for silage buyouts, and other land management information relating to the welfare of tricolor population status.

## Research and Monitoring

An effective research and monitoring program is an essential component of the Plan to conserve the tricolor. Insight gained from research and monitoring efforts will guide the identification and prioritization of management and research needs and meet agency responsibilities to track the status and trends of the species. All research and monitoring activities listed below are intended to further scientific understanding of the species with the ultimate goal of informing conservation activities. All Research and Monitoring activities will be conducted in a manner ensuring the highest quality collection data possible.

Conservation priorities for tricolor research and monitoring efforts are to:

- Develop regional objectives for populations and amounts of habitat to be protected, restored, and enhanced;
- Document the annual breeding, foraging, and wintering distribution and long-term population trends of the species;
- Monitor reproductive success and adult survivorship to more effectively assess population viability;
- Develop a strategic monitoring program using standardized methods that can be compared across time and geography, and adaptively changed for maximum effectiveness;
- Identify environmental characteristics associated with breeding success;
- Improve our understanding of population dynamics and add to existing scientific understanding of the species; and
- Support and facilitate management-oriented research on public and private land.

### *Goal 3: Establish biological objectives to inform habitat management and habitat restoration efforts described herein and to serve as standards for success.*

**Objective 3.1:** Using the best available information, determine population goals, and the amount, distribution and type of habitat needed to support these goals.

**Task 3.1.1:** Evaluate suitability of existing models for setting population and/or habitat goals for birds such as the North American Waterfowl Management Plan (NAWMP), 2006 Central Valley Joint Venture Implementation Plan, and Partners in Flight (PIF) (Rich et al., 2004).

**Task 3.1.2:** Evaluate the utility of dividing breeding and wintering habitat into management units or regions.

**Task 3.1.3:** Establish population and habitat targets by management regions for populations, if appropriate.

**Task 3.1.4:** Revise and update objectives as new information becomes available.

### *Goal 4: Improve understanding of tricolor population dynamics—including population trends, spatial patterns of abundance and movement, age structure, and annual survivorship—to inform habitat management and conservation efforts.*

**Objective 4.1:** Document spatial and temporal patterns of tricolor movements.

**Task 4.1.1:** Develop and implement a long-term color-banding program for tricolors in association with USFWS and other researchers. Inform all appropriate organizations (i.e., Audubon chapters, birding organizations and listserves, agency land managers, environmental consultants, and others) of the effort and how to report sightings of marked birds.

**Task 4.1.2:** Conduct telemetry studies of marked birds each year at specific colonies and associated foraging areas.

**Task 4.1.3:** Develop an informational, secure web site with interactive functionality for web based data entry.

**Objective 4.2:** Develop and implement a statistically valid, standardized protocol for the annual, long-term, range-wide monitoring of tricolor abundance.

**Task 4.2.1**: Establish the best technique for estimating the long-term population trend of tricolors

**Task 4.2.2:** Select, in consultation with statisticians, areas that represent the breeding distribution of tricolors and annually survey populations to estimate long-term population trends.

**Task 4.2.3**: Develop a method to reliably and efficiently organize and store occupancy and trend data.

**Task 4.2.4:** Analyze, in consultation with statisticians; trend data: summarize, synthesize, and publish results.

**Objective 4.3**: Continue statewide population census of tricolors once every three years to track the long-term population trend.

**Task 4.3.1**: Develop, in consultation with experienced field workers, a protocol for a tri-annual, statewide, volunteer-based tricolor survey.

**Task 4.3.2:** Develop a training program for volunteers.

**Task 4.3.3:** Carry out the census every three years commencing in 2008.

**Task 4.3.4**: Analyze survey data, summarize, synthesize, and publish results.

### *Goal 5: Improve understanding of the factors influencing tricolor reproductive success to inform habitat management and conservation efforts.*

**Objective 5.1:** Quantify factors believed to affect breeding colony success.

**Task 5.1.1:** Estimate annual productivity in colonies by methods established by Hamilton et al. (Hamilton, Cook, and Grey 995).

**Task 5.1.2:** In sample colonies, conduct plot or line-transect nest sampling after the breeding season to provide a quantitative estimate of the: number of nests built, number of breeding birds, and colony productivity.

**Task 5.1.3:** Identify practices that land managers can adopt to enhance breeding success and incorporate specific management recommendations into relevant sections of this document.

**Task 5.1.4:** Where time and access permit, identify and quantify: foraging substrates, relative abundance of insects, and mortality believed to be caused by predators and weather.

**Objective 5.2:** Develop a predictive model for breeding colony site selection.

**Task 5.2.1:** Identify and collect data on landcover attributes and other variables believed to influence colony site selection. Feed data into GIS database (Goal 6)

**Task 5.2.2**: Using the spatial database, quantify characteristics of breeding colonies to construct a predictive model for locating additional colonies.

**Task 5.2.3:** Compare known colony locations to locations predicted by model to evaluate model accuracy.

**Task 5.2.4:** Revise model as necessary to improve accuracy.

## Data Storage and Management

Documenting the current and historical distribution and abundance of tricolors is essential for enhancing scientific understanding of the species and informing applied conservation and management activities. Proper data storage and management is essential to long term conservation efforts and ensures effective interpretation and dissemination of information.

Primary priorities regarding data storage and management are to:

- Accumulate, manage, and disseminate data in a consistent manner
- Ensure data are generated using accepted and documented protocols
- Make appropriate data accessible to researchers, volunteers, and the general public

### *Goal 6: Create an information management system to accumulate, manage, and disseminate existing and future tricolor data.*

**Objective 6.1:** Compile all tricolor data in a format and location easily accessible to agency, academic, and qualified collaborators while protecting confidentiality of landowners with identified nesting sites on their lands**.**

**Task 6.1.1:** Evaluate and select agency or organization responsible for data entry, error checking, storage and dissemination and maintenance of a GIS database to contain historical and future tricolor colony, wintering, and other information.

**Task 6.1.2:** Build a GIS database to accommodate tricolor information specified in 6.1.3

**Task 6.1.3:** Populate the database (6.1.2) with all documented data on breeding colonies, population and breeding colony size, reproductive success, movements of marked birds, and location of associated nesting and foraging habitat.

**Task 6.1.4:** Summarize and map historical population estimates from published literature, existing databases, and reliable reports.

**Task 6.1.5:** Provide web-based download of all published tricolor reports.

**Objective 6.2:** Develop standardized data collection methods to support long-term research, evaluation, and database management.

**Task 6.2.1:** Standardize usage of names for all former and current tricolor colonies.

**Task 6.2.2**: Provide location information for breeding colonies, past and present, as well as for all reliable observations.

**Task 6.2.3:** Standardize the types of data to be collected, with reference to existing data and anticipated data needs.

**Task 6.2.4:** Standardize the methods by which data are accumulated, stored, and queried by field personnel and others to ensure data compatibility and to facilitate data entry.

# Education and Outreach

Paramount to the successful implementation of this Plan is the ability to foster awareness of importance of conservation efforts on public and private land, the long term population decline of tricolors, the opportunities for participating in species recovery, laws currently protecting the bird, landowner responsibilities if the bird is formally listed, and species habitat requirements. Target audiences for education and outreach efforts include private landowners, public land managers, policy makers, and the general public.

Our primary education and outreach goals include:

- Enhancing understanding of conservation opportunities on public and private land and encouraging stakeholder participation.
- Improving understanding among farmers and landowners regarding the bird's history, the importance of conservation on private property, legal protections currently in place, habitat requirements, and opportunities for increased involvement.
- Improving understanding among public land managers regarding the critical role of creating and maintaining habitat on public land for the long-term recovery of the species, and techniques for achieving this goal.
- Promoting the progress made on the Conservation Plan and gaining support and funding for ongoing efforts.
- Publicizing the Tricolored Blackbird Working Group's efforts as a model for conserving species at risk that are not formally listed by a state or federal agency.

### *Goal 7: Enhance public understanding and support for conservation goals for the tricolor.*

**Objective 7.1:** Build on existing education efforts targeting private landowners, public land managers, and policy makers regarding the tricolor's legal status and conservation needs, and opportunities for participation in species conservation.

**Task 7.1.1:** Develop an outreach program targeting affected agricultural producers, public land managers, resource specialists, funding agencies, and policy makers**.** Create and distribute written materials, videos, and presentations tailored to reach each group. Emphasize biological and legal differences between tricolors and similar species, and ongoing conservation efforts and land management information relating to the status and welfare of tricolors.

**Task 7.1.2:** Identify and attend conventions, meetings, trade shows and the like with opportunities to distribute educational materials and/or make presentations. Examples include County Agriculture Commissioners, Farm Bureau, Association of California Water Agencies, California Cattlemen's Association, Ducks Unlimited, California Waterfowl Association, and Central Valley Bird Club.

**Task 7.1.3:** Create a tricolor web site with general natural history information and identification aids as well as a description of legal status and current conservation efforts. Provide links to related web sites and published reports.

### *Goal 8: By 2010, develop white papers and other outreach materials described in the following tasks to distribute electronically via the webpage and also hard copies to hand out.*

**Task 8.1.1:** Highlight successful conservation efforts that demonstrate benefits of group collaboration including restoration projects on public and private property, ongoing research, and silage buyouts.

**Task 8.1.2:** Conduct outreach to private landowners emphasizing tricolor biology, habitat requirements and opportunities for voluntary participation in conservation. Stress legal protections conveyed to the species through formal listing,

**Task 8.1.3:** Conduct outreach to promote reporting all observations of banded tricolors among bird-watchers, duck hunters, and land and water management agencies.

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# Appendix A: Tricolored Blackbird Biology

# General Biology

## Status and Distribution of Tricolors

Ninety-five percent of the world's population of tricolors occur in California, where the bird is listed as a state species of special concern (CDFG 1992). The tricolor is North America's most colonial land bird and is largely endemic to California (Beedy and Hamilton 1999). Its current abundance is greatest in the Central Valley and vicinity, but also occurs in the foothills surrounding the valley. In addition, the species now occurs in relatively lower abundance in southern and coastal California and sporadically in Oregon, northwestern Baja California, and western Nevada (Dawson 1923, Neff 1937, Grinnell, 1898, Grinnell and Miller 1944, DeHaven et al. 1975a, Hamilton et al. 1995) (Figure 1). Recent surveys combined with historical information indicate that Tricolors have undergone a long-term population decline, primarily due to losses of breeding and foraging habitats to urban and agricultural land conversions, and water diversions (Beedy and Hamilton 1997, Hamilton et al. 1999, Hamilton 2000).

The current and future status of tricolors is of particular concern because the species colonial behavior makes it especially vulnerable to large-scale nesting failures and its population abundance is now limited compared to historical conditions (DeHaven et al. 1975a, DeHaven 2000, Beedy and Hamilton 1999, Unitt 2004). Local declines and extirpations of this species have been confirmed (Neff 1937, DeHaven et al. 1975a, Beedy and Hamilton 1997 and 1999) and many other recent surveys have shown that the overall population is greatly reduced from that observed by Neff (1937) during the 1930s when he was assigned to investigate the relationship of blackbirds to rice in the Sacramento Valley.

The tricolor diverged over 3 million years ago from its nearest relative and most common bird in North America, the Red-winged Blackbird (*Agelaius phoeniceus*) (Yasukawa and Searcy 1995). North of the Tehachapi Mountains, tricolors are found almost exclusively in California's Central Valley, with small and intermittent groupings north to southern Oregon and Washington, and east to western Nevada; in recent years more than 75% of the global breeding population has occurred within the Central Valley. Birds in Southern California occur from Riverside County down through coastal San Diego County and into northern Baja California (Baird 1870, Collier 1968, Neff 1937, Beedy and Hamilton 1999).

Precise global population estimates have been difficult to derive due to the size of the range of the species, constraints on access to survey private land, and the nomadic nature of tricolors (Hamilton 1998). As early as 1853, Heermann described fall flocks of thousands of tricolors in the Shasta region and saw a wintering flock in the Suisun Valley of Solano County, "…numbering so many thousands as to darken the sky for some distance by their masses". According to the notes of J.C. Cooper, the tricolor was "the most abundant species near San Diego and Los Angeles, and not rare at Santa Barbara" (Baird 1870).

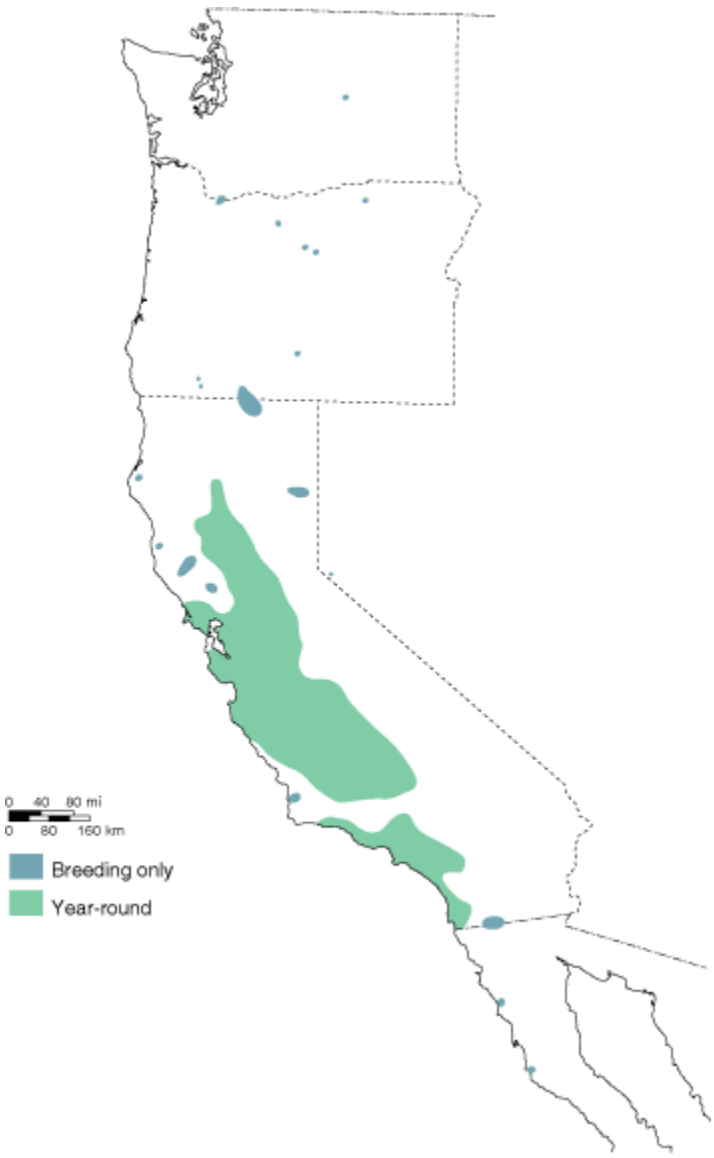


Figure 1: Distribution of tricolors (Beedy and Hamilton 1999)

The earliest large-scale population estimates date to the 1930s with the work of Johnson A. Neff, a biologist with the U.S. Bureau of Biological Survey (a forerunner to today's USFWS) and members from the predecessor of the California Department of Food and Agriculture and County Agricultural Commissioner's Offices. From 1930 to 1936, Neff and his contingent of county, state and federal wildlife and agricultural biologists studied the distribution, population, economic status and control of the tricolors throughout the San Joaquin and Sacramento Valleys and their relationship with the emerging rice industry. This work is especially significant because of the specific focus on tricolors and because population estimates were based upon nest

counts in colonies during and following the breeding season, not solely on visual estimates made during the breeding season. In 1934, Neff concentrated his efforts on seven Sacramento Valley counties and estimated 491,000 nests (approximately 736,500 birds) in this region alone. From 1931 to 1936, he found 252 colonies in 26 California counties. He observed single colonies consisting of over 200,000 nests (about 300,000 adults) in Glenn County and a single roost in Sacramento County, in the present-day Lake Natoma, estimated at nearly half a million birds (Neff 1937). Most of the large colonies observed by Neff were associated with freshwater emergent wetlands in rice-growing areas of the Sacramento Valley.

Recent coordinated surveys conducted by species experts with volunteers have occurred at approximately 3-year intervals beginning in 1994. While not statistically rigorous in design these surveys have nonetheless provided population benchmarks for tricolors. The most recent statewide census, in 2005, indicated a California population of approximately 260,000 tricolors. This estimate is unquestionably lower than Neff's estimates in the 1930s, but higher than estimates from surveys in 1997, 2000, or 2004, suggesting at least a stable, perhaps increasing short-term trend.

## Tricolors in Southern California

There is some evidence that the Tehachapi Pass might serve as a dispersal barrier for tricolors (Neff 1942, DeHaven 1975b). Additionally, Southern California birds can be resident, rather than itinerant (Unitt 2004). DNA analyses are required to determine whether there are also genetic differences between northern and southern sites and or between sites within southern California. The status of the Southern California tricolor population is of great concern as both the number of breeding colonies and the numbers of breeding birds have shown steep declines (Hamilton 2004, Unitt 2004). The status in San Diego County recently has been thoroughly described by Unitt (2004) and may serve to illustrate the situation in southern California more generally. Unitt (2004) shows that the tricolor has gone from the most numerous bird in the San Diego County in the mid-to-late 1800s (J.G. Cooper in Baird 1870) to a total county population of no more than 8,000 birds in 2004. Unitt attributes the species' steady decline primarily to losses of nesting substrate and surrounding foraging habitats to urbanization, and considers the tricolor to pose one of the most serious conservation problems of all North American birds. Urbanization poses similar problems to tricolors in Los Angeles and Riverside Counties, where similar sustained, countywide population declines have been documented (Kimball Garrett and Tom Paulek, pers. comm.). As an example, a breeding colony in Riverside County in 1997 held an estimated 34,000 birds (Hamilton 2000) while the largest breeding colony in 2006 was estimated by nest transect counts at 8,000 (Meese, in prep.; Paulek, pers. comm.).

## Nesting and Foraging

The species' basic requirements for breeding sites are open accessible water, a secure substrate in which to place their nests, and suitable nearby foraging areas that provide adequate food sources (Beedy and Hamilton 1999). If any one of these required elements is missing, tricolors will not select that location for breeding and will move to another location that is suitable (Beedy and Hamilton 1999). Historically, most colonies were located in freshwater marshes dominated by cattails (*Typha spp.)* or tules (*Schoenoplectus* spp.), but some were in nettles (*Urtica* spp.),

thistles (*Cirsium* spp.), and willows (*Salix* spp.) (Neff 1937). Since the 1970s, an increasing percentage of colonies have been reported in Himalayan blackberries (*Rubus discolor*) and thistles (DeHaven et al. 1975b, Cook 1996). In the last five years, however, silage fields in the southern San Joaquin Valley have hosted nearly half of all known breeding birds. Other less commonly used nesting substrates include safflower (*Carthamus tinctorius*), tamarisk (*Tamarix* spp.), elderberry/poison oak (*Sambucus* spp. and *Toxicodendron diversilobum*), giant reed (*Arundo donax*), and riparian scrublands and forests (e.g., *Salix* spp., *Populus* spp., *Fraxinus* spp.) (Beedy and Hamilton 1999).

Tricolor nesting in the San Joaquin Valley was widespread in the 1930s (Neff 1937), but their nesting in silage fields was not observed during a four-year statewide review of their breeding status in the early 1970s (DeHaven et al.1975a). Thus, silage nesting appears to be a relatively recent phenomenon. Silage nesting is correlated with the relocation of Southern California dairies to the southern San Joaquin Valley during recent decades. Triticale, a vigorous wheat and rye hybrid grown to feed the dairy cows, has become an important nesting substrate accounting for nearly half of all early-season nesting and breeding sites, and more than half of all known reproduction in 2005 (Hamilton and Meese 2006).

Ideal foraging conditions for tricolors are created when shallow flood-irrigation, mowing, or grazing keeps the vegetation at an optimal height (<15 cm). With the loss of a natural flooding cycle and most native wetland and upland habitats in the Central Valley, breeding tricolors now forage primarily in managed habitats. Preferred foraging habitats include agricultural crops such as rice, alfalfa, irrigated pastures, and ripening or cut grain fields (e.g., oats wheat, silage, and rice), as well as annual grasslands, cattle feedlots, and dairies. Tricolors also forage in remnant native habitats, including wet and dry vernal pools and other seasonal wetlands, riparian scrub habitats, and open marsh borders.

Most breeding tricolors forage within 5-6 km of their colony sites, although on rare occasions they have been observed foraging up to 13 km from their colony sites (Orians 1961; Beedy and Hamilton 1997). Proximity to suitable foraging habitat appears to be extremely important for the establishment of colony sites. Tricolors usually forage, at least initially, in the field containing the colony site (Cook 1996), however, often only a minor fraction of the area within the commuting range of a colony provides suitable foraging habitat (Beedy and Hamilton 1999, Hamilton and Meese 2006).

Among the most important prey for adults provisioning nestlings include Coleopterans (beetles), Orthopterans (grasshoppers, locusts), Hemipterans (true bugs), larval Lepidoptera (caterpillars) other larval insects, and Arachnids (spiders and allies) (Crase and DeHaven 1977). Tricolors exhibit “itinerant breeding” whereby individuals may attempt to nest at two or more colonies in different locations in the course of the breeding season (Hamilton 1998). Many birds seemingly exhibit this behavior by breeding first in the San Joaquin Valley early in the nesting season, and then moving north to the rice growing areas in the Sacramento Valley to nest again, often nesting in wetlands, and foraging in rice paddies on insect larvae and rice.

## Associated Species

Settling tricolors are both aggressively and passively dominant to—and often displace—sympatric marsh nesting species, including Red-winged and Yellow-headed Blackbirds (*Xanthocephalus xanthocepalus*) (Orians and Collier 1963, Payne 1969). Freshwater marshes supporting tricolor colonies often provide habitat for other special-status species including White-faced Ibis (*Plegadis chihi*), Least Bittern (*Ixobrychus exilis*), Redhead (*Aythya Americana*), and Modesto Song Sparrow (*Melospiza melodia*) (CDFG 2005), in addition to a diversity of breeding waterfowl, herons, egrets, and songbirds.

Wintering tricolors often congregate in huge, mixed-species flocks that forage in grasslands and agricultural fields with low-growing vegetation, and at dairies and feedlots. Preferred roosting sites are large, heavily vegetated freshwater marshes. Communal roosts may contain hundreds of thousands of individuals including Red-winged Blackbirds (*Agelaius phoeniceus*), Brewer's Blackbirds (*Euphagus cyanocephalus*), Brown-headed Cowbirds (*Molothrus ater*), and European Starlings (*Sturnus vulgaris*). In February, tricolors usually segregate into pure flocks, which may subdivide further into age- and sex-specific flocks (Hamilton 1998). At this time, foraging flocks roam across the landscape until they find a suitable nesting substrate.

## Threats and Potential Threats to Tricolors

Most researchers agree that historical tricolor populations have declined primarily due to losses of both breeding and foraging habitat resulting from water diversions, and large-scale agricultural and urban land conversions (Beedy and Hamilton 1997, Hamilton et al. 1999, Hamilton 2000). Many large colony locations are seemingly chosen by the birds because of the proximity to excellent foraging opportunities in nearby agricultural fields from nesting vegetation. Losses of formerly productive foraging habitats to perennial, woody crops (primarily almonds and grapes) and to urbanization are serious threats to tricolors. In addition, untimely harvesting of silage grains in locations where colonies have settled causes complete breeding failure of many thousands of birds for at least one breeding attempt, and has led some to speculate that losses due to silage harvest may be as important as breeding and foraging habitat losses (Cook and Toft 2005). Other research supports the assertion that these losses can be relatively unimportant if sufficient, permanent habitat is maintained (Hamilton pers. email comm.).

More specifically, tricolor population declines have been attributed to a combination of causes including:

### 1. Habitat Loss and Fragmentation

The historical and preferred breeding habitat for tricolors is fresh water emergent wetland vegetation (Neff 1937, DeHaven et al. 1975a, Beedy and Hamilton 1999). Most researchers consider losses of breeding and foraging habitats to be the most important causes of the documented population declines.

A small percentage of California's original fresh water wetlands remain, and where they do exist, they often occur in small isolated patches that also support high densities of tricolor predators. The loss of freshwater marshes in the San Joaquin Valley may help explain the apparent shift of birds from marsh-nesting to silage-nesting, similar to the way the production of rice has been used to help explain the apparent shift of tricolors from the San Joaquin to the Sacramento Valley in the 1930s (Neff 1937). Breeding habitat loss and fragmentation has occurred due to urbanization, especially in southern California. Today, California's Central Valley is California's most rapidly developing region (GVC 2005).

Tricolors require foraging habitat within a 5-6 km radius of a breeding colony site (Beedy and Hamilton 1997, Hamilton and Meese 2006). Thus, the land uses within 6 km of breeding colony sites may determine colony occupation and productivity, and losses of foraging habitat within 6 km of breeding habitat likely exacerbate the effects of breeding habitat loss. For example, more than 99% of the native perennial grasslands that used to encircle Central Valley wetlands and in the surrounding foothills, which provided tricolor foraging habitat, have been converted into other uses (Beedy and Hamilton 1997). Many of the annual (e.g., sunflowers) or perennial (e.g., alfalfa) agricultural crops that replaced the perennial grasses provided sufficient food for foraging tricolors. In the last 20 years, however, much of the agricultural practices in the Central Valley has shifted from annual row crops, to perennial vines (primarily grapes), and nut trees, which are not utilized by foraging tricolors. Currently, many tricolor colonies have been located in close proximity to stored grains (Beedy and Hamilton 1999, Cook and Toft 2005), and adult tricolors have fed extensively on these grains during the breeding season.

### 2. Water Management

A number of freshwater marshes in the Central Valley are managed intensively to provide habitat for marsh-dependent species. If the managed marshes supporting tricolor colonies are to be sustained through the breeding season, the management of water levels must take into account the heights of the tricolor nests. Water levels need to be kept deep enough to deter predators but not so deep that nests are flooded. The loss of at least four tricolor colonies, each consisting of 1,000 or more adults, occurred due to flooding in Lake Isabella (Kern County) in 2005 (Ted Beedy, personal communication). Another common failure of managed ponds is to allow water levels to fall, providing relatively easy access to mammalian predators, especially raccoons (Bill Hamilton, pers. comm.).

### 3. Breeding Season Disturbances

Due to the declines in the abundance of tricolors, nest predation has been identified as a serious threat to tricolor's reproductive success. Two significant predators can eliminate the reproductive output of colonies. The coyote (*Canis latrans*) is known to have caused significant losses of eggs and nestlings in some upland breeding colonies. The Black-crowned Night-Heron (*Nycticorax nycticorax*) often causes significant losses of eggs and nestlings in colonies located in emergent wetland vegetation (Beedy and Hayworth 1992, Beedy and Hamilton 1999). Thus, although losses of adults to predators may be modest, predators may eliminate the reproductive output of entire colonies, causing an overall reduction of reproductive success. Other predators such as Common Ravens (*Coryus corax*), Cooper's hawks (*Accipiter cooperii*), and Northern

Harriers (*Circus cyaneus*) are known to prey on tricolors; and raccoon (*Procyon lotor*) are suspected of causing large losses of eggs and nestlings in some poorly-managed wetland sites (Beedy and Hamilton 1999).

Tricolors are easily disturbed, especially during the settlement, egg-laying, and early incubation stages (Neff 1937, Beedy and Hamilton 1999). Frequent disturbances by predators may cause mass desertion of breeding colonies if they occur at these stages. Human observers entering a colony during settlement and egg-laying, can easily disturb birds and cause nest abandonment.

**4. Silage Harvest**

Nesting in grain fields associated with dairies was not observed until after the 1970s (DeHaven 2000). Today silage-nesting is considered to be a threat to tricolors since the silage matures and is ready for harvest at the same time most nests contain eggs and/or young. If the silage is harvested at this time, the harvest causes nest destruction and direct mortality (Hamilton 2000). Such breeding losses are considered by some to currently be the most serious factor causing the decline in tricolor numbers (Cook and Toft 2005).

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# Appendix B: Conservation Actions to be Implemented and Conservation Actions Completed

# Appendix B:
# Conservation Actions to be Implemented and Completed (Full descriptions of Tasks above)

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Cost Estimate Total | Cost Estimate Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| | | CONSERVATION & MANAGEMENT | | | | | | |
| **1. Goal: Protect, create, restore, and manage habitats needed to support viable, self-sustaining populations of tricolors.** | | | | | | | | |
| ***1.1*** | ***Objective:*** *Promote public land management practices and restoration projects that enhance and/or restore tricolor habitat.* | | | | | | | |
| High | 1.1.1 | Hire a coordinator (plus a half position) to shepherd the implementation of this plan. | **NFWF, *FWS, CDFG*** | | $200K | $1M | 5 years | |
| High | 1.1.2 | Identify and pursue financial resources for public land managers to accomplish projects and practices that will protect enhance and/or restore habitat. | AC, BOR, CDFG, CVJV, FWS, SJV, SC, UC | 1.1.1 – Coordinator's role | $0 | $0 | | |
| High | 1.1.3 | Work with public land managers to incorporate conservation practices that benefit Tricolors into existing public lands management actions and plans | CDFG, FWS, CAPIF | 1.1.1 – Coordinator's role | $0 | $0 | | |
| High | 1.1.4 | Identify and prioritize opportunities to integrate habitat protection, restoration, and enhancements into wetland and upland projects on public lands | | 1.1.1 – Coordinator's role; 1.2.1 | $0 | $0 | | |
| High | 1.1.5 | Implement protection, restoration, and enhancements on identified priority project sites in wetlands and uplands on public lands. | CAPIF, WCB, Joint Ventures, **NFWF, CDFA, *NRCS*, FSA, *FWS*, *CDFG*, *BOR*, Land Trusts, corporations, utilities, many others** | 1.1.1 – Coordinator's role; 1.2.3 | $300K/ yr – 3, 40ac wetlands/yr | | | |

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Cost Estimate Total | Cost Estimate Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| Medium | 1.1.6 | Create a forum for public land managers to discuss, share, and document results of management efforts and best practices designed to benefit tricolors. | CAPIF, SC, ***FWS, CDFG*** | 1.1.1 – Coordinator's role | $1K | | | Annual meeting |
| Medium | 1.1.7 | Create an agency managers' guide to tricolor management to describe appropriate practices and articulate the important contribution of public land for ensuring the long-term viability of the species. | CAPIF, ***FWS, CDFG,*** | 1.1.1 – Coordinator's role | $0- 5K | | | Use previous drafts as starting point |
| Medium | 1.1.8 | Develop performance standards and appropriate measurements of success for habitat restoration and enhancement projects on public lands and annually evaluate all projects. | PRBO, SC, USGS, UCD, FWS, CDFG | 1.2.5, Goal 3. Incorporate into every project. | $0 | $0 | | |
| | | ***1.2 Objective:*** *Promote voluntary management practices and restoration projects on privately owned land that protect, create, enhance and/or restore tricolor habitat.* | | | | | | |
| High | 1.2.1 | On lands of interested private agricultural landowners and land managers, identify and prioritize opportunities to integrate habitat protection, restoration, and enhancements into wetland and uplands projects that benefit nesting and wintering populations. | CFBF, NRCS, SC, WCB, CDFA, ***FWS, CDFG, AC,*** **NFWF** | 1.1.1 – Coordinator's role, or additional seasonal through FWS for private lands work | $30K | $150K | 5 years | |
| High | 1.2.2 | Assist private agricultural landowners and land managers to secure funding and technical assistance from government programs that support habitat protection, restoration and/or enhancement activities | AC, CCA, CFBF, CDFG, FWS, NRCS, WUD | 1.1.1 – Coordinator's role, or seasonal FWS private lands employee | $0 | | | |

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Total | Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| High | 1.2.3 | Implement highest priority projects identified in Task 1.2.1 | Joint ventures, BOR, FWS, CDFG, **NFWF, *NRCS*, FSA, FWS, Land Trusts, many partner**s | 2 wetlands/yr | $300K/ yr | | | |
| Medium | 1.2.4 | Develop performance standards and measurements of success for voluntary habitat restoration and enhancement projects on private lands and annually evaluate project outcomes | SC, RLC, FWS, CDFG, Land Trust, Cal PIF, RHJV, CVJV, SJV, UCD, AC, Tricolor Coordinator | | | | | |
| | | | | | $0 | | | |
| ***1.3*** | ***Objective****: Integrate tricolor conservation goals and objectives into existing conservation programs that support habitat protection, restoration, and/or enhancement.* | | | | | | | |
| Medium | 1.3.1 | Work with managers of government conservation funding programs (e.g., EQIP, WHIP, CDFG LIP, USFWS Partners, etc.) to incorporate tricolor conservation and habitat needs into program selection criteria. | FWS, CDFG, CA PIF, Joint Ventures, Land Trusts, | 1.1.1 – Coordinator's role | $0 | | | |
| Medium | 1.3.2 | Identify and pursue as appropriate opportunities to acknowledge and reward public land managers and private landowners for incorporating habitat protection, restoration, and/or enhancement activities into their land management activities and habitat development projects. | All partners, **FWS, CDFG, AC** | 1.1.1 – Coordinator's role, or additional seasonal through FWS for private lands work | $0 - 1K | $0 - 5K | 5 years | |
| ***1.4*** | ***Objective:*** *Promote conservation actions, research, and outreach specific to tricolors in southern California.* | | | | | | | |
| High | 1.4.1 | Disseminate compiled list of historical colony and wintering locations to partners. Derive list from database (Goal 6). | AC, CDFG, FWS, PRBO, RLC, UCD, USGS | Goal 6; 1.1.1 – Coordinator role | $0 | | | |

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Cost Estimate Total | Cost Estimate Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| High | 1.4.2 | Develop a prioritization framework for conservation of southern California colonies/habitat complexes. | AC, RLC, UCD, SDNHM, LANHM, ***FWS, CDFG*** | 1.1.1 – Coordinator role | $0-20K | | | |
| High | 1.4.3 | Develop and implement colony-specific conservation strategies. | SJV, UCD, ***FWS, CDFG,*** **AC** | 1.1.1 – Coordinator role; CDFG; UCD | $5K | $25K | 5 years | |
| Medium | 1.4.4 | Collect and analyze samples (feather, blood or tissue) from multiple sites south of the Tehachapi Pass to determine population genetic structure of southern California tricolors and their connectivity to Central Valley populations. | UCLA, PRBO, ***FWS, CDFG, AC*** | | $35K | | | |
| High | 1.4.5 | Develop and implement a southern California monitoring program. | AC, PRBO, UCD, USGS, Counties (HCP implementation), Tricolor Working Group, ***FWS, Counties,*** **CDFG** | 4.2, 4.3, Goal 6; 1.1.1 – Coordinator would organize | $50K | $750K | 15 years | |

**2. Goal: Protect silage-nesting tricolors until sufficient, permanent breeding habitat is available to maintain viable self-sustaining populations.**

***2.1*** ***Objective****: Fully fund and implement silage buyout program to protect colonies of nesting tricolors.*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| High | 2.1.1 | Improve the existing silage buyout program by developing a standardized, efficient, and effective silage buyout decision-making process involving industry and agency representatives. | AC, CDFA, CDFG, FWS, PG&E, SC, UCD,WUD, | | $0 | | | Developed in 2007; needs refining? |
| High | 2.1.2 | As part of monitoring efforts, deploy biologists early each growing season (i.e., mid-March through May) to identify and follow fate of settlements of Tricolors in silage nesting regions. | CDFA, UCD, **NFWF, *FWS, CDFG*** | | $70K/yr | | | 2004-2006 |

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Cost Estimate Total | Cost Estimate Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| High | 2.1.3 | Establish a fund with a minimum of $100,000 per year available for silage buyouts from government, industry, and other private sources. 10 years. | AC, CDFA, PG&E, SC, UCD, **NFWF, Congress, *FWS, CDFG*** | | $150K | $1.5M | 10 years | |
| High | 2.1.4 | Carry out silage buyouts with willing private landowners. | AC, CARCD, CDFA, SC, ***FWS, CDFG*** | 1.1.1 – Coordinator's role with UC, CDFA, & FWS/CDFG private lands coordinators | $0-30K/yr | $0-300K | 10 years | Annual. (Successfully negotiated to save large colonies in 2003-2006) |
| | | | | | | | | |
| ***2.2*** ***Objective****: In coordination with education and outreach efforts, raise awareness of tricolor nesting behavior and conservation options on ranch and farm lands, stressing the importance of protecting large silage nesting colonies.* | | | | | | | | |
| Medium | 2.2.1 | Identify an agricultural liaison to work one-on-one with landowners in silage nesting regions. | CARCD, SC, **?** | 1.1.1; 2.1.4; 1.1.1 – could be Coordinator role or shared with FWS/CDFG partners coordinators | $0-100K | $0-500K | 5 years? | |
| High | 2.2.2 | Develop an outreach program targeting agricultural producers to inform them of tricolor conservation efforts including: nesting behavior, opportunities for silage buyouts, and other land management information relating to the welfare of tricolor population status. | CDFA, CFBF, CDFG, , NRCS, FWS, SC, UCD WUD | 8.1.1; 8.1.2; 1.1.1 – Coordinator role | $0 | | | |

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Cost Estimate Total | Cost Estimate Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| | | | RESEARCH AND MONITORING | | | | | |
| **3. Goal: Establish biological objectives to inform habitat management and habitat restoration efforts described herein and to serve as standards for success.** | | | | | | | | |
| ***3.1*** | ***Objective:*** *Using the best available information, determine population goals, and the amount, distribution and type of habitat needed to support these goals.* | | | | | | | |
| High | 3.1.1 | Evaluate suitability of existing models for setting population and/or habitat goals for birds such as the North American Waterfowl Management Plan (NAWMP), 2006 CVJV Implementation Plan and Partners in Flight (PIF) (Rich et al., 2004). | PRBO, UCD, ***FWS, CDFG*** | 1.1.7, 1.2.6, Goal 6 | $40K | | | |
| High | 3.1.2 | Evaluate utility of dividing breeding and wintering habitat into management units or regions | FWS, PRBO, UCD, CDFG | 3.1.1 | $0 | | | |
| High | 3.1.3 | Establish population and habitat targets by management regions for populations, if appropriate. | FWS, PRBO, UCD, CDFG | 3.1.1, 3.1.2 | $0 | | | |
| High | 3.1.4 | Revise and update objectives as new information becomes available. | FWS, PRBO, UCD, CDFG | 3.1.1, 3.1.2, 3.1.3 | $0 | | | |
| **4. Goal: Improve understanding of tricolor population dynamics—including population trends, spatial patterns of abundance and movement, age structure, and annual survivorship—to inform habitat management and conservation efforts.** | | | | | | | | |
| ***4.1*** | ***Objective:*** *Document spatial and temporal patterns of tricolor movements.* | | | | | | | |
| High | 4.1.1 | Develop and implement a long-term color-banding program for tricolors in association with USFWS and other researchers. | UCD, PRBO, ***FWS, CDFG,*** **RLC, other** | Goal 6 | $20K | $100K | 5 years | Began in 2007 |
| High | 4.1.2 | Conduct telemetry studies of marked birds each year at specific colonies and associated foraging areas. | PRBO, USGS, FWS, grants? | | $150K | | | |

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Total | Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| High | 4.1.3 | Develop an informational secure website with interactive functionality for web based data entry. | UCD, **FWS, USGS** | Goal 6 | $20-60K | | | |
| | | | | | | | | |
| ***4.2*** | ***Objective:*** *Develop and implement a statistically valid, standardized protocol for the annual, long-term, rang-wide monitoring of tricolor abundance.* | | | | | | | |
| High | 4.2.1 | Establish the best technique for estimating the long-term population trend of tricolors | UCD, USGS | Goal 6 | $0 | | | Working with USGS currently |
| High | 4.2.2 | Select, in consultation with a statistician, areas that represent the breeding distribution and annually survey to estimate long-term population trends. | UCD, **FWS, *USGS*** | | $40K | | | |
| High | 4.2.3 | Develop a method to reliably and efficiently organize and store occupancy and trend data. See Goal 6. | UCD, USGS | Goal 6 | $0 | | | under task description delete see goal 6 |
| Medium | 4.2.4 | Analyze, in consultation with statisticians; trend data: summarize, synthesize, and publish results. | CDFG, USGS, Contractor, ***FWS*** | Goal 6; 4.3.3 | $20K | | | |
| | | | | | | | | |
| ***4.3*** | ***Objective****: Continue statewide population census of tricolors every three years to track the long-term population trend.* | | | | | | | |
| High | 4.3.1 | Develop, in consultation with experienced field workers, a protocol for a tri-annual statewide, volunteer-based tricolor Survey. | AC, PRBO, USGS, UCD, ***FWS,*** **CDFG** | Goal 6 | $45K for all survey tasks. | $135K | 3 years | FWS Contracting with AC for 2008 survey |
| High | 4.3.2 | Develop a training program for volunteers | Contractor | Goal 6 | See 4.3.1 | | | |

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Cost Estimate Total | Cost Estimate Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| High | 4.3.3 | Carry out the census every three years commencing in 2008. | Contractor | Goal 6 | See 4.3.1 | | | |
| High | 4.3.4 | Analyze Survey data, summarize, synthesize, and publish results. | Contractor | Goal 6 | See 4.3.1 | | | |
| **5. Goal: Improve understanding of the factors influencing reproductive success to inform habitat management and conservation efforts.** | | | | | | | | |
| ***5.1*** | ***Objective:*** *Quantify factors that affect breeding colony success.* | | | | | | | |
| High | 5.1.1 | Estimate annual productivity in colonies by methods established by Hamilton et al. (Hamilton, Cook, and Grey 1995). | UCD, ***FWS*, CDFG, other** | 2.1.2; Goal 6 | $70K/yr annually | | | annual |
| High | 5.1.2 | In sample colonies, conduct plot or line-transect nest sampling after the breeding season to provide a quantitative estimate of the: number of nests built, number of breeding birds, and colony productivity. | UCD | 5.1.1 | $0 – incorporated into above task 5.1.1 | | | |
| Medium | 5.1.3 | Identify practices that land managers can adopt to enhance breeding success and incorporate specific management recommendations into relevant sections of this document. | UCD | 1.1.1 – Coordinator role in concert with UCD | $0 | | | |
| Low | 5.1.4 | | UCD, ***FWS*, CDFG, other** | Goal 6 | $30K | $300K | 10 years | |

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Cost Estimate Total | Cost Estimate Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| ***5.2*** ***Objective:*** *Develop a predictive model for breeding colony site.* | | | | | | | | |
| Medium | 5.2.1 | Identify and collect data on landcover attributes and other variables believed to influence colony site selection. Feed data into GIS database (Goal 6) | PRBO, UCD, **USGS, *FWS, CDFG*** | Goal 6 | $50K | | | |
| Medium | 5.2.2 | Using the spatial database, quantify characteristics of breeding colonies to construct a predictive model for locating additional colonies. | CDFG, FWS, PRBO, UCD, USGS | Goal 6 | $40K | | | (Has been done by PRBO but could be improved.) |
| Medium | 5.2.3 | Compare known colony locations to locations predicted by model to evaluate model accuracy. | CDFG, FWS, PRBO, UCD, USGS | Goal 6 | $30K | | | |
| Medium | 5.2.4 | Revise model as necessary to improve accuracy. | CDFG, FWS, PRBO, UCD, USGS | | $20K | | | |

## DATA STORAGE AND MANAGEMENT

**6. Goal: Create an information management system to accumulate, manage, and disseminate existing and future tricolor data.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ***6.1*** ***Objective:*** *Compile all tricolor data in a format and location easily accessible to agency, academic, and qualified collaborators, while providing confidentiality to landowners.* | | | | | | | | |
| High | 6.1.1 | Evaluate and select agency or organization responsible for data entry, error checking, storage and dissemination, and maintenance of a GIS database to contain historical and future tricolor colony, wintering, and other information. | UCD, AKN (PRBO), FWS, CDFG | | $5-10K | | | |
| High | 6.1.2 | Build a GIS database to accommodate Tricolor information specified in 6.1.3 | CDFG, AKN (PRBO), CA PIF, UCD, ***FWS,*** **USGS** | | $40K | | | FWS will contract for beginning this in 2008 |

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Cost Estimate Total | Cost Estimate Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| High | 6.1.3 | Populate the database (6.1.2) with all documented data on breeding colonies, population and breeding colony size, reproductive success, movements of marked birds, and location of associated nesting and foraging habitat. | UCD, AKN (PRBO), CDFG, ***FWS*, USGS** | | $10K | | | FWS will contract for beginning this in 2008 |
| High | 6.1.4 | Summarize and map historical population estimates from published literature, existing databases, and reliable reports. | UCD, AKN (PRBO), ***FWS*, USGS** | | $10K | | | |
| High | 6.1.5 | Provide web-based download of all published tricolor reports. | UCD, AKN (PRBO), ***FWS*, USGS** | | $5K | | | |
| | | | | | | | | |
| ***6.2. Objective:*** *Develop standardized data collection methods to support long-term research, evaluation, and database management.* | | | | | | | | |
| High | 6.2.1 | Standardize usage of names for all former and current tricolor colonies. | | 1.4, 3.1.2, 4.1, 4.2, 4.3, 5.1, 5.2 | $0 | | | all these are part of 2008 survey? |
| High | 6.2.2 | Provide location information for breeding colonies, past and present, as well as for all reliable observations. | | 1.4, 3.1.2, 4.1, 4.2, 4.3, 5.1, 5.2 | $0 | | | |
| High | 6.2.3 | Standardize the types of data to be collected, with reference to existing data and anticipated data needs. | | 1.4.1., 1.4.4, 1.4.5, 3.1, 4, 5 | $0 | | | |
| High | 6.2.4 | Standardize the methods by which data are accumulated, stored, and queried by field personnel and others to ensure data compatibility and to facilitate data entry. | | | $0 | | | |

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Cost Estimate Total | Cost Estimate Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| | | | EDUCATION AND OUTREACH | | | | | |
| **7. Goal: Enhance public understanding and support for conservation goals for the tricolor.** | | | | | | | | |
| ***7.1*** ***Objective:*** *Build on existing education efforts targeting private landowners, public land managers, and policy makers regarding the tricolor's legal status and conservation needs, and opportunities for participation in species conservation.* | | | | | | | | |
| High | 7.1.1 | Develop outreach program targeting affected agricultural producers, public land managers, resource specialists, funding agencies, and policy makers**.** Create and distribute written materials, videos, and presentations tailored to each group emphasizing: biological and legal differences between tricolors and similar species, ongoing conservation efforts and land management | AC, CAFIF, SC, UCD, ***CFBF, CCA,*** **CARCD,** ***PG&E*** | 2.2.2; H.8 | $10K | | | |
| High | 7.1.2 | Identify and attend conventions, meetings, trade shows, etc. with opportunities to distribute educational materials and/or make presentations. E.g. County Agriculture Commissioners, Farm Bureau, Association of California Water Agencies, California Cattlemen's Association, Ducks Unlimited, California Waterfowl Association, & Central Valley Bird Club. | AC, CAFIF, CCA, CFBF, UCD | | $5K | | FWS, AC | |
| Medium | 7.1.3 | | AC, CCA, CFBF, UCD, ***FWS , USGS*** | Goal 6 and Task 4.1.3 | ? | | | Possibly to be completed in 2008 through NBII link |

| Priority | Task No. | Task Description | Key Partners, **Potential $ Source, or *both*** | Related Tasks | Cost Estimate per Year | Cost Estimate Total | Cost Estimate Duration | Completed? |
|---|---|---|---|---|---|---|---|---|
| **8. Goal: Using the activities of the tricolor Working Group as an example, raise public awareness about opportunities for conservation of non-listed species.** | | | | | | | | |
| ***8.1*** ***Objective:*** *By 2010, develop white papers and other outreach materials described in the following tasks to distribute electronically via the webpage and also hard copies to hand out.* | | | | | | | | |
| High | 8.1.1 | Highlight successful conservation efforts that demonstrate benefits of group collaboration including restoration projects on public and private property, ongoing research, and silage buyouts. | AC, CCA, CDFA, CFBF, NRCS, SC, UCD, Joint Ventures | 2.2.2;7.1 (wrap into contractor responsib. And job of Tricolor Working Group) | $0 | | | annual |
| High | 8.1.2 | Conduct outreach to private landowners emphasizing tricolor biology, habitat requirements and opportunities for voluntary participation in conservation. Stress legal protections conveyed to the species through formal listing. | AC, CCA, CFBF, CDFA, PG&E, SC, NRCS, UCD | 1.1.1 – Coordinator Role; 2.2.2;7.1 | $0 | | | annual |
| High | 8.1.3 | Conduct outreach to promote the reporting all observations of banded tricolors among bird-watchers, duck hunters, and land and water management agencies. | AC, CCA, CFBF, SC, UCD, | Goal 6; 4.1.1; 1.1.1 – Coordinator Role; Working Group role | $0 | | | For life of marking project |

**Abbreviations Used in Lead Entity & Partners Column**

AC = Audubon California
AKN (PRBO) = Avian Knowledge Network via PRBO Conservation Science
BOR = U.S. Bureau of Reclamation
CAPIF = California Partners in Flight
CARCD = California Association of Resource Conservation Districts
CFBF = California Farm Bureau Federation
CCA = California Cattlemen's Association
CDFG = California Department of Fish and Game
CDFA = California Department of Food and Agriculture
CVBC = Central Valley Birding Club
CVJV = Central Valley Joint Venture
NRCS = Natural Resources Conservation Service
PG&E = Pacific Gas and Electric Company

PRBO = PRBO Conservation Science
RLC = Resource Landowners Coalition
SJV = Sonoran Joint Venture
SC = Sustainable Conservation
UCD = UC Davis
UCCE = UC Cooperative Extension
FWS = U.S. Fish and Wildlife Service
USGS = U.S. Geologic Survey
WCB= Wildlife Conservation Board
WUD = Western United Dairymen

**Key for Priority Column**
High = years 1-3
Medium = years 3-6
Long = years 6 and beyond

# Attachment A:  Memorandum of Agreement (MOA) to Implement the Conservation Plan

# Memorandum of Agreement

## Among

*Audubon California*

*California Association of Resource Conservation Districts*

*California Farm Bureau Federation*

*California Cattlemen's Association*

*California Department of Fish and Game*

*California Department of Food and Agriculture*

*Central Valley Bird Club*

*Central Valley Joint Venture*

*Natural Resources Conservation Service*

*Pacific Gas and Electric Company*

*PRBO Conservation Science*

*Sonoran Joint Venture*

*Sustainable Conservation*

*University of California, Agriculture and Natural Resources*

*US Fish and Wildlife Service*

*Western United Dairymen*

## to Implement the Conservation Plan

## for the Tricolored Blackbird *(Agelaius tricolor)*

## September 2007

## I. PURPOSE

This Memorandum of Agreement ("MOA") establishes a general framework for cooperation and participation among the signatories in order to implement the May 2007 Tricolored Blackbird Conservation Plan ("Plan" attached) and subsequent revisions.

All signatories support the conservation actions outlined in the Plan, acknowledging that if carried out they will help reverse the long-term decline of the Tricolored Blackbird within its range.

## II. OBJECTIVES

This MOA supports the implementation of the actions cited in the Plan including:

1. Habitat conservation projects to benefit the species;

2. A research program to more thoroughly understand the species' life history;

3. A monitoring program to effectively document population trends and distribution;

4. An outreach and education program to enhance public and affective landowner awareness; and

5. Building public understanding and support for cooperative conservation of non-listed species.

## III. AUTHORITY

WHEREAS, the California Cattlemen's Association, has formally agreed to endorse the MOA which is consistent with the organization's policies to support the viability of California's cattle industry and enhance the business environment for cattle producers; and

WHEREAS, California Department of Food and Agriculture enters into this MOA under the general authority of California Food and Agriculture Code Section 561; and

WHEREAS, California Department of Fish and Game enters into this MOA as the trustee agency for fish and wildlife in California under general authority of Fish and Game Code Section 1802, the California Endangered Species Act (CESA) and other applicable provisions of law; and

WHEREAS, the California Farm Bureau Federation, representing more than 91,500 members, whose purpose is to protect and promote agricultural interests throughout the State of California and supports the voluntary conservation of California's wildlife where it is consistent with agricultural operations; and

WHEREAS, the mission of the Central Valley Joint Venture is to work collaboratively through diverse partnerships to protect restore and enhance wetlands and associated habitats for waterfowl, shorebirds, waterbirds, and riparian songbirds in accordance with biologically based conservation actions identified in its Implementation Plan; and

WHEREAS, Natural Resources Conservation Service enters into this MOA under the authorities of the 6 USC 3837.3837F, 7CFR Part 1467 for the Wetlands Reserve Program, 16 USC 38339aa-3839aa-8, 3841, 7CFR Part 1466 for the Environmental Quality Incentives Program, and 19USC 3830 et.seq.,7CFR Part 636 for the Wildlife Habitat Incentives Program; and

WHEREAS, Pacific Gas and Electric Company, has formally agreed to endorse the MOA which is consistent with the organization's environmental policy and commitment to safely produce, deliver and use energy as sustainably, responsibly, and efficiently as possible.

WHEREAS, the Sonoran Joint Venture, has determined that supporting the implementation of the MOA is consistent with its mission to conserve all birds and their habitats within the boundaries of the Sonoran Joint Venture; and

WHEREAS, Sustainable Conservation, partners with business, agriculture and government to find practical ways to protect clean air, clean water and healthy ecosystems and has determined the implementation this MOA is consistent with its mission; and

WHEREAS, the U.S. Bureau of Reclamation enters into this MOA under the general authority of the Endangered Species Act, the Central Valley Project Improvement Act, in support of the Central Valley Habitat Joint Venture and Fish and Wildlife Coordination Act: Title 16, U.S. Code Sec. 661; and

WHEREAS, US Fish and Wildlife Service enters into this MOA under the general authority of the Federal Endangered Species Act (ESA) and the Fish and Wildlife Coordination Act of 1965.

NOW THEREFORE, in consideration of the above premises the signatories enter into this MOA to support its purpose and objectives.

## IV. STATEMENT OF AGREEMENT

It is mutually agreed and understood that upon approval of the Plan, the signatories to the best of their abilities, hereby agree to:

A. Collaborate on the implementation of the Conservation Plan, making necessary adaptive management changes as the primary mechanism for the conservation of the Tricolored Blackbird;

B. Subject to the availability of funds, make a good faith effort to support to the implementation of the actions prescribed in the Plan in a timely manner;

C. To the extent authorized by law make a good faith effort to locate and secure and leverage funding from federal, state, local and private sources to support the implementation of the actions prescribed in the Plan;

D. Subject to the mutual agreement of the signatories and in consultation with the Tricolored Blackbird Working Group, periodically update and revise the Plan to promote adaptive management;

E. See that the conservation and preservation measures in the Plan are implemented in compliance with the National Environmental Policy Act ("NEPA"), the California Environmental Quality Act ("CEQA") and other applicable regulations and policies as needed.

F. As necessary, jointly review and provide comments on any proposed or ongoing research or management activities that may affect the Tricolored Blackbird to ensure the scientific validity, consistency and compatibility of such activities with the Plan.

G. As able, monitor the status of Tricolored Blackbird populations and habitat through:

1. Implementation of the research and monitoring goals, objectives, and tasks outlined in the Plan.

2. Preparation of periodic summary reports, documenting monitoring results and population status and trends.

3. Incorporation of new information and adaptive changes into the Plan as appropriate.

H. As budget allows participate in at least one annual Tricolored Blackbird Working Group (Group) meeting and relevant subcommittee meetings. At such meetings, participants shall:

1. Identify and review new tasks completed or initiated that address the goals and objectives prescribed in the Plan;

2. Present any new Tricolored Blackbird research, management or monitoring information to the Group;

3. Present actions scheduled for implementation in the upcoming year;

4. Prioritize actions (tasks) needed to address both the short and long-term goals of the Plan;

5. Identify available funds and discuss funding needed to support the implementation of high priority conservation actions; and

6. Review the goals and objectives of the Plan and, if appropriate, recommend revisions and updates.

7. Engage new organizations and individuals concerned with the welfare of Tricolored Blackbirds as signatories, partners, and/or collaborators;

8. Foster the conservation of the Tricolored Blackbird through the facilitation, participation and initiation of public involvement, input, support and education through any necessary public meetings, publications, media events and other educational activities.

## V. INTERPRETATION

A. Nothing in this MOA should be interpreted to abrogate, reassign, or delegate any of the legal responsibilities of any signatory.

B. The terms of this MOA are contingent upon sufficient resources being available to the signatories for the performance of this MOA.

C. Nothing in this MOA obligates a signatory to expend appropriations and/or enter into any contract or other obligations.

D. In order to meet the present and/or future needs of the Tricolored Blackbird this MOA will be amended to facilitate additional signatories.

E. Any signatory to this MOA may terminate their participation and agrees to provide other signatories written notice of intent to terminate at least 30 days in advance of the intended termination date.

F. This MOA may be amended through written mutual consent of the parties.

G. In the event of a material conflict between the terms of this MOA and the terms of the Plan, the Plan shall prevail.

## VI. DURATION

The duration of this MOA shall be fifteen (15) years after execution by all the signatories. Such duration may be extended as determined to be necessary by mutual agreement of the signatories.

## VII. ADOPTION

The foregoing MOA has been adopted by each of the agencies and organizations as attested by the signatures affixed below.

Glenn Olson, Executive Director — Date: 30 May 2007
Audubon California

Bruce Hafenfeld, President — Date: 6/11/07
California Cattlemen's Association

Tacy Currey, Executive Director — Date: 6/1/07
California Association of Resource Conservation Districts

L. Ryan Broddrick, Director — Date: 31 MAY 2007
California Department of Fish and Game

George Gomes, Undersecretary — Date: 5-5-07
California Department of Food and Agriculture

Doug Mosebar, President — Date: 6/29/07
California Farm Bureau Federation

John Sterling, President — Date: 5/26/2007
Central Valley Bird Club

Fritz Reid, Chairperson — Date: 21 June 07
Central Valley Joint Venture

Lincoln E. Burton, — Date: 6/12/07
State Conservationist
Natural Resources Conservation Service

Wendy Pulling, Director — Date: May 29, 2007
Environmental Policy
Pacific Gas and Electric Company

5/29/07

Ellie Cohen, Executive Director Date
PRBO Conservation Science

5/31/07

Duane L. Shroufe, Chairperson Date
Sonoran Joint Venture

5/24/07

Ashley Boren, Executive Director Date
Sustainable Conservation

6/08/2007

Steve Thompson Date
Manager of CA-NE Operations Office
United States Fish and Wildlife Service

5/31/01

Richard B. Standiford Date
Associate Vice President
Agriculture and Natural Resources
University of California Cooperative Extension

6/19/07

Mike Marsh Date
Chief Executive Officer
Western United Dairymen