



Tricolored Blackbird Habitat on California Department of Fish and Game Properties

An Assessment of Existing and Potential Habitat and Recommendations for
Habitat Improvement and Maintenance

By

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20 July 2011

Nongame Wildlife Program Report 2011-07

Final Report

To

State of California
Department of Fish and Game
Wildlife Branch
Nongame Wildlife Program and Lands Program
1812 9th Street
Sacramento, CA 95811

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INTRODUCTION

The Tricolored Blackbird (*Agelaius tricolor*) forms some of North America's largest breeding colonies and is almost exclusively found in California. Its designation as a species of special concern by the California Department of Fish and Game (DFG; Shuford and Gardali 2008) makes it one of the top conservation priorities in the state. Conservation of this declining species is a high priority for the DFG, which has contributed financial support for research, surveys and management of the Tricolored Blackbird. Additionally, lands managed by DFG provide important breeding and foraging habitats for this species and have the potential to become increasingly important for its conservation.

The Tricolored Blackbird population has declined by over 80% in the last 80 years and is facing increased pressure as a result of continued habitat loss and disturbance in colonies established in agricultural fields of the San Joaquin Valley. Currently, over 40% of the world's population nests in agricultural fields of the San Joaquin Valley, resulting in the failure of many breeding colonies each year due to farmers needing to harvest their crops (Kyle 2011). Lands managed by DFG in California have the potential to provide essential natural habitats and play a central role in stabilizing Tricolored Blackbird populations and reversing their losses, preventing the need for future listing as an endangered or threatened species. Establishing natural breeding and foraging areas on protected public lands is a key objective of the Tricolored Blackbird Working Group, a cooperative association of government, conservation organizations, researchers and industry.

DFG manages 240 wildlife areas and ecological reserves from Modoc County to the border with Mexico (CNDDDB 2011). Between 1990 and 2000, 12 DFG properties supported roughly 40 colonies (Table 1 and 3) that ranged in size from 20 to 7500 individuals totaling 33,500 birds. Over the last 10 years, there has been a marked decrease in Tricolored Blackbird use of DFG land; between 2000 and 2011 six DFG properties supported only ten colonies that varied from 35 to 10,000 individuals totaling 19,700 birds (Table 1 and 3). In addition, there are several DFG properties where no Tricolored Blackbird colonies have been observed despite being within their breeding range and some with potential nesting habitat.

Currently the majority of the wetland acreage on DFG properties is being managed to provide fall and winter habitat for waterfowl and shorebirds (Kyle, pers. comm.). In contrast, breeding Tricolored Blackbirds require flooded wetland habitat in the spring and summer surrounded by suitable natural or agricultural foraging habitat. There are, however, significant opportunities to enhance existing habitat and/or to create new breeding and foraging habitat on DFG lands to maximize their value to Tricolored Blackbirds. Creating habitat for Tricolored Blackbirds will require a shift in strategy to emphasize reverse cycle wetland management at locations where there is also suitable foraging habitat. Accommodating this species will also benefit a variety of other wetland breeding birds, including White-faced Ibis (*Plegadis chihi*) and Least Bittern (*Ixobrychus exilis*).

In some situations, changing the management of wetlands may prove to be too difficult given financial, legal, and capacity constraints. In those situations, providing upland breeding and foraging habitats suitable for Tricolored Blackbirds may be a suitable alternative (see APPENDIX A).

The DFG asked Audubon California to evaluate ways of increasing the number of Tricolored Blackbirds nesting and foraging opportunities on DFG fee-title properties. The following evaluation prioritizes several DFG properties and identifies specific sites that have the greatest potential to attract and benefit Tricolored Blackbirds.

METHODS

Identifying DFG Lands for Tricolored Blackbird Conservation

We focused our evaluation of DFG lands for Tricolored Blackbird conservation in the Sacramento Valley, San Joaquin Valley, and Los Angeles, Riverside, and San Diego Counties given that these areas encompass nearly all of the known Tricolored Blackbird colonies in the state. All DFG properties with historical Tricolored Blackbird colony sites or colonies within 5-miles of the property dating back to the 1930s were identified using data layers obtained from the Tricolored Blackbird Portal database (www.tricolor.ice.ucdavis.edu) and the DFG GIS clearinghouse (<http://www.dfg.ca.gov/biogeodata/gis/clearinghouse.asp>). We buffered sites by five miles based on the estimated distance Tricolored Blackbirds will fly from their breeding colonies to their foraging areas (Beedy & Hamilton 1997; Orians 1961). DFG sites within the 5-mile radius of current colony sites were assumed to have higher potential to be colonized by Tricolored Blackbirds if habitat was enhanced or created.

Many properties (97) were within five miles of a historical or active colony site, but most were not selected due to the nearby colony sites not being active for several years, lack of water or appropriate habitat on the site, or proximity to the Tricolor's core breeding areas. Some sites, such as the Mendota WA, that were not chosen for the initial assessment may be potential sites after the initial nine are considered.

We conducted site visits to nine of the high potential DFG properties to assess current habitat quality and potential for enhancement that would benefit Tricolored Blackbirds. All of the property sites were photographed and plotted on a GPS unit for future reference.

Site Prioritization

For each DFG property identified as high potential we ranked those sites according to their suitability for Tricolored Blackbird conservation based on the following criteria:

- Frequency of breeding activity
- Magnitude of breeding population
- Number of colonies within five miles
- Status of foraging areas (grassland, irrigated pasture, alfalfa, dairy farms)
- Land manager amenability
- Threat to current site

- Feasibility of habitat enhancement, creation, or preservation project
- Potential benefit of habitat project to Tricolored Blackbirds

This ranking system was developed by Dr. Jon Feenstra to rank Tricolored Blackbird colony sites in southern California (Feenstra 2010) and we modified it to better assess colony sites statewide (see APPENDIX B; Table 2).

RESULTS

Butte County

Gray Lodge Wildlife Area

Location: North side of Sutter Buttes, West off of Pennington Rd.

Size of habitat: 9,100 total acres with 23 acres of permanent pond

Size of recent colony: no colony on site; colonies nearby

Project Score/Priority: 3/Low

See Map 1

Notes: Gray Lodge WA has been managed extensively for fall and winter waterfowl habitat (Figures 1 and 2) and the vast majority of water is available through the fall and winter. Only approximately 23 acres are flooded throughout the summer as a brood pond (Figure 3). There is great potential to expand the amount of reverse cycle wetlands on this site that would enhance the property as a potential colony site. Tricolored Blackbirds have not used Gray Lodge WA as a breeding site most likely due to the lack of water and irrigated foraging areas that are found elsewhere in the vicinity (e.g. Delevan NWR). The cattails in the brood pond also need to be maintained regularly to remove senescent stalks and ensure that cattail patches are large enough (~2 acres) to be attractive to Tricolored Blackbirds. Gray Lodge WA has great enhancement potential. It not only could provide cattail patches in flooded ponds but also be managed to provide irrigated grassland habitat for foraging. The irrigation canals could also provide valuable habitat if they were managed to develop more cattails and tules. This should be done without compromising the capacity of the channels (Figure 4). The Sacramento Valley is largely devoid of quality Tricolored Blackbird foraging habitat due to the prevalence of rice (low value foraging habitat), and Gray Lodge could offer important new habitats as an alternative to the few other suitable sites, such as Delevan NWR, that unfortunately do not seem to have enough foraging habitat to support the large colonies that annually breed there.

Recommended Actions:

1. Expand acreage for reverse cycle wetlands – flood more ponds in the spring (April to July)
2. Manage large (2 acres or more) cattail patches within brood ponds and increase the amount of these ponds throughout the property
3. Irrigate wetland and grassland areas to produce insect prey items such as dragonflies, grasshoppers, and caterpillars
4. Incorporate Tricolored Blackbird habitat into the annual habitat management for Wildlife Area



Figure 1. Fall and Winter managed wetlands at Gray Lodge WA.
This is an example of the many ponds managed for overwintering waterfowl. Photos taken July 2010



Figure 2. Fall and Winter managed wetlands. These ponds are dried out in the spring to promote plant species preferred by overwintering waterfowl. The cattails patches maintained in these ponds are too small for Tricolor colonies.



Figure 3. Spring flooded pond totaling 23 acres along the auto tour loop.



Figure 4. Irrigation canals are potential Tricolor habitat if cattails are allowed to develop patches or wide linear swathes.

Yolo County

Yolo Bypass WA

Location: South of Interstate 80, west of Sacramento; marshes adjacent to causeway and newly constructed reverse cycle pond in southwest corner of property

Size of habitat: ≥ 50 acres of permanent cattail marsh

Size of recent colony: ~6,000 birds in 2010

Project Priority: 17/High

See Map 2

Notes: There are two areas within the Yolo Bypass that are identified as Tricolored Blackbird breeding habitat. The first is in the cattail marshes along I-80 west of the Causeway (Figure 5). The cattails in 2010 were tall and dense and held a colony of ~6,000 breeding individuals and will continue to be a high potential colony site as long as the cattails are disced or burned every 3 to 4 years to refresh their growth (Figure 6). Due to extensive flooding in the spring of 2011, cattail growth was delayed and hindered extensive use of this site. The second location is a newly constructed pond near the western border of the property where the south fork of Putah Creek enters the Bypass. The pond has been designated as Tricolored Blackbird habitat and being managed according to the Tricolored Blackbird Habitat Management Guide (Appendix A). One important potential improvement for this wildlife area will be to enhance foraging grounds on the property. Currently the majority of the bypass is being cultivated in rice, which is not a suitable forage crop where Tricolored Blackbirds can find abundant insects. Increasing the acreage of irrigated grasslands or pasture would increase the value of the Yolo Bypass as a foraging site, and most likely attract more breeding Tricolored Blackbirds to the Yolo Bypass Wildlife Area.



Figure 5. Cattail wetland along I-80 in the Yolo Bypass Wildlife Area. The cattails in these ponds form large patches that have attracted Tricolored Blackbird colonies despite the highway noise. Photos taken July 2010



Figure 6. The cattails in the Yolo Wildlife Bypass are mature and very dense. Conditions in 2010 were optimal for Tricolor colonies and will continue to be so if properly maintained according to the Tricolored Blackbird Habitat Management Guide.

Merced County

Los Banos WA

Location: South end of property, cattail marsh that crosses Henry Miller Rd

Size of habitat: 100 acres; available if spring water is applied

Size of recent colony: 9,000 in 2008

Project Priority: 11/Medium

See Map 3

Notes: Only a small portion of the Wildlife Area is consistently being managed for spring/summer water and the areas where Tricolored Blackbirds have previously nested naturally flood during the spring and are outlets for the Wildlife Area's flood water. There are many areas within the WA that, with properly timed irrigation, could provide high value breeding and forage habitat (Figures 7 and 8). Most of Los Banos is being managed as fall/winter waterfowl habitat; however, there are several ponds with mature cattail patches that would be excellent Tricolored

Blackbird breeding habitat (Figure 9). Coupling the irrigation or flooding of nearby uplands or grassland areas to provide insect prey with the breeding habitat sites would provide optimal Tricolored Blackbird habitat. Additionally, we recommend that Los Banos WA consider habitat improvements near the southern border of the property along Henry Miller Road and in close proximity to the adjacent horse ranch. Previous colonies have used the ranch extensively as a foraging area and seem to choose breeding sites as close to the ranch as possible, most likely indicating a lack of quality foraging grounds in the surrounding agriculture landscape.

Merced County had the greatest number of breeding birds in the state of California in 2008 and again in 2011 (Kelsey 2008; Kyle 2011) and it will continue to be an important area for breeding birds in the future. There is a great need for breeding sites and improved natural foraging areas in Merced County. Creating more attractive colony sites in parts of the Grasslands Ecological Area that Los Banos WA is a part of would reintroduce large numbers of Tricolored Blackbirds to an important historic breeding area that has not been used to its full capacity due to a lack of high quality breeding and forage habitat. Los Banos WA is in an ideal location to start the process of restoring Tricolored Blackbirds to the San Joaquin floodplain.



Figure 7. Tall cattail and tulle patches, if flooded at the right time (March-June), could provide valuable habitat for Tricolor breeding colonies. Photos taken August 2010



Figure 8. Uplands and some wetland areas, if irrigated, could provide high value foraging habitat on the Wildlife Area.



Figure 9. Cattail/Tule patches would require water in the spring to attract Tricolored Blackbirds to the Los Banos WA.

Volta WA

Location: 3/4 miles north of Volta on Ingomar Grade

Size of habitat: any of the ponds in 2,100 acres of managed wetland/alkali sink area

Size of recent colony: 1100 in 1971

Project Priority 1/Low

See Map 4

Notes: Similar to Los Banos WA, Volta WA is currently being managed for fall/winter waterfowl habitat and does not have extensive spring wetland available for Tricolored Blackbirds or other spring breeding birds. There are several key areas within Volta that should be considered for spring/summer flooding for Tricolored Blackbird colony sites. Ponds 1 - 8 are situated on the southeast side of the property in close proximity to a large dairy farm to the east (Figures 10). Establishing a colony site in these areas would allow Tricolored Blackbirds to take advantage of high insect abundance on the dairy farm and reduce the burden of providing foraging habitat on the wildlife area. Ponds 6 - 8 have the greatest potential to attract Tricolored Blackbirds given their mature stands of cattails and tules (Figures 11 and 12). The ponds would need to be flooded from March until June and the cattails mowed or disced every three to four years. Additionally, much of the uplands at Volta WA could be used as foraging habitat, and with minimal amount of irrigation these lands could promote insect production and become high value foraging habitat for nearby Tricolored Blackbird colonies (Figure 13). Similar to the Los Banos WA, Volta WA is in a position to attract large numbers of Tricolored Blackbirds back to a historic breeding location that is currently being underused due to lack of quality breeding habitat at the right time of year.



Figure 10. Ponds 1-8 are within view of a nearby dairy, which may attract Tricolors to this site in large numbers. Similar wetlands near dairies in Kern County consistently attract tens of thousands of Tricolors. Photos taken August 2010



Figure 11. Pond 6-8 have the potential to be excellent Tricolor breeding habitat and are within sight of high value foraging habitat on neighboring agricultural fields.



Figure 12. With the proper flooding regimen Ponds 6-8 could promote the growth of large cattail patches and also provide valuable brood water for waterfowl.



Figure 13. Much of the upland areas on Volta WA could be excellent Tricolor foraging habitat if small amounts of water were used to irrigate the plants and promote insect production in the early to mid-spring.

Kern County

Canebrake ER

Location: Fay Ranch Rd. in cattail marsh; old Bransford Ranch east on Rte 178

Size of habitat: 3.3 acres of wetland; 1.1 acres of Himalayan Blackberry

Size of recent colony: 150 in 2010

Project Priority: 11/ Medium

See Map 5

Notes: The Canebrake ER is representative of the diverse landscape of the Kern River Valley, consisting of riparian corridors, native and managed grasslands, wetland, and dry desert uplands. This diversity allows Tricolored Blackbirds to take advantage of both upland and wetland breeding sites and offers many different types of foraging habitats. The two major colony sites within the Canebrake ER are located on the old Bransford Ranch in large patches of Himalayan Blackberry (Figure 14 and 15) and along Fay Ranch Road (Photos 16 and 17) in a seasonal cattail marsh. The Bransford Ranch Himalayan Blackberry patches are intact and are under no threat of being destroyed. The cattle on the ranch keep the patches well defined but undisturbed and there are no trees encroaching on the patches that might make the Tricolored Blackbirds abandon the site. The presence of cattle also enhances very good foraging opportunities for the Tricolored Blackbirds by producing manure and maintaining short grass resulting in abundant insect populations. The site seems to be well-suited for Tricolored Blackbird breeding success. No actions are necessary on this site besides maintaining the current management regime.

The second site along Fay Ranch Road could be enhanced to encourage more Tricolored Blackbirds to use the area as a colony site. The cattail patch is reliant on seasonal water to keep the area flooded, and without any water management system in place to control the flow of water, the site will not be an optimal colony site every year. Currently there is a levee below the cattail marsh that could be used to help control water levels if a control structure was installed. This would help maintain a flooded marsh throughout the spring rather than the marsh drying out half way through the Tricolored Blackbird breeding season.

The foraging habitat at the Canebrake ER could be improved by managing the native grassland area adjacent to the cattail marsh colony site with either minor grazing or a controlled burn. The grassland consists of a highly diverse set of grasses and forbs that could create a high value foraging site if the Tricolored Blackbirds had better access to the insects that are proliferating at the site. Tricolored Blackbirds typically prefer foraging substrate to be less than fifteen inches high to allow good access to insects. The Fay Ranch Road site could be an important model of Tricolored Blackbird habitat for the Kern River Valley and with a few minor changes in management could be greatly enhanced and able to support more breeding birds.

Recommended Actions:

1. Refresh cattails in Fay Ranch Road marsh after 2011 breeding season by mowing or burning the site and every 3 – 4 years afterward.
2. Install a water control structure in the cut of the pond levee to better maintain water levels through the spring and keep the cattails flooded until the Tricolored Blackbirds finish nesting
3. Manage the native grasslands adjacent to the cattail marsh by reducing the height of the substrate to give the Tricolored Blackbirds better access to grasshoppers and caterpillars needed to feed nestlings. Establishing a light grazing regimen or an occasional burn (every 5 years) would enhance the site for Tricolor foraging.



Figure 14. Bransford Ranch Himalayan Blackberry patches. Canebrake Ecological Reserve, Kern River Valley. Photos taken August 2010



Figure 15. Bransford Ranch Himalayan Blackberry patches and example of cattle pasture used for foraging. Canebrake Ecological Reserve, Kern River Valley.



Figure 16. The cattail marsh on Fay Ranch Rd. is used consistently by Tricolors and could be enhanced if the water in the wetland could be better managed with a water control device.



Figure 17. The cattails at the Fay Ranch Rd. site are tall and dense and currently do not need to be managed other than to develop a better way of managing the water availability in the wetland. A better managed area will attract large colonies of Tricolored Blackbirds to nest there and allow them to be more successful.



Figure 18. Adjacent to the Fay Ranch Rd. wetland is a matrix of native grassland and pastureland that provides high value foraging habitat. A small intensification of grazing may provide the Tricolors with better access to the numerous insects inhabiting the grassland. Tricolors typically forage in grasses that are less than 15 inches tall.

Sacramento County

Cosumnes WA

Location: West Stockton Blvd. exit off of Rte. 99

Size of habitat: 98 acres of wetland habitat on the Valensin - Badger Creek property; 63 acres of wetland in the Kraus Ducks Unlimited and BLM properties

Size of recent colony: 500 within 2 miles of preserve in 2008

Site Priority: 9/Medium

See Map 6

Notes: The Cosumnes River Preserve (CRP) is a highly valuable mosaic of wetland areas in the heart of the Central Valley, and is strategically located in southern Sacramento County, an area that historically has supported large Tricolored Blackbird colonies. The CRP has not had any recent Tricolor colonies, most likely due to management of the properties for fall and winter waterfowl habitat as well as riparian forest restoration. One of the sites with potential for Tricolored Blackbird habitat is the Valensin – Badger Creek property, which is currently being managed for Giant Garter Snake habitat with a combination of cattails and open water (Figure 19). Tricolored Blackbirds and the Giant Garter Snake could both benefit from young, dense cattail stands and open water. The pond currently has mats of dried and senescent cattail stalks that, if managed differently, could attract Tricolored Blackbirds to nest in this potentially productive area. If the cattails are burned or disced in the fall and winter while the Garter Snakes are hibernating the disturbance to the cattails would not affect garter snakes and would allow for new cattail growth that would be attractive to both Giant Garter Snakes and Tricolored Blackbirds. The pond named “Snake Marsh” has water year-round except for dry years and would support Tricolored Blackbirds throughout their breeding season (Figure 20). The surrounding habitat is grazed grassland and pastures, with a dairy farm on Arno Road less than half a mile away. The area around “Snake Marsh” has optimal foraging grounds for Tricolored Blackbirds. One potential conflict is that the optimal size of cattail stands for Tricolored Blackbirds may not be best for Giant Garter Snakes. If the snakes do better with smaller

disbursed patches, this would not be attractive to large colonies of Tricolored Blackbirds and the birds would mostly likely continue to avoid the site.

Based on the need for large, continuous stands of cattails, the staff at the Consumes River Preserve recently agreed to convert 63 acres of managed marsh to spring and summer wetlands that could support Tricolored Blackbird colonies and waterfowl broods. The Kraus property is surrounded by irrigated pasture, alfalfa fields, and native grasslands, all highly valuable foraging areas for Tricolored Blackbirds. The Kraus property is not a DFG-owned site but should be very attractive to Tricolored Blackbirds emigrating from the San Joaquin Valley in late April and May. Both the Valensin and the Kraus properties can be considered for Tricolored Blackbird management since it is unclear which areas Tricolored Blackbirds may prefer given the lack of historical data for the CRP site. Managing both sites for Tricolored Blackbirds will increase the likelihood of them colonizing the CRP as well as provide insight to the feasibility of combining Tricolored Blackbird and Giant Garter Snake management areas and management practices.

Recommended Actions:

1. Consider, after consideration by DFG herpetologists, burning or discing the mats of cattails at the Valensin property while the Giant Garter Snakes are hibernating
2. Convert a portion of the Kraus property to a reverse cycle wetland that is flooded in the spring and summer. Manage the wetland for large (at least 100 feet in width) patches of cattails.
3. Maintain cattle grazing and current agricultural practices in surrounding upland areas to provide foraging grounds for potential colonies.



Figure 19. Large patches of cattails, open water, and water primrose currently make up the wetland on Valensin – Badger Creek Unit being managed for Giant Garter Snakes. Much of the cattails are senescent and matted. Removed the dead stalks will encourage new growth that will be valuable to both the snakes and Tricolored Blackbirds.

Photos taken November 2010



Figure 20. The wetland areas are flooded year-round and consist of large patches of cattails and tules. There are several areas within this wetland that would be attractive to Tricolored Blackbirds with slightly altered management of the site.



Figure 21. Surrounding the Valensin-Badger Creek Unit wetlands is grazed pastureland that would provide excellent foraging habitat and a dairy farm is nearby.

Riverside County

San Jacinto: Davis Unit

Location: 17050 Davis Road Lakeview, California 92567

Size of habitat: 30 to 100 acres of cattail marshland

Size of recent colony: 10,000 in 2005

Project Priority: 14/High

See Map 7

Notes: There are several ponds that currently have mature cattail and tule growth with high potential as nesting sites for current and future breeding colonies. Marsh A has the most mature and dense stands of cattails covering about 13 acres (Figure 22) and several other ponds also have mature cattail patches (Figure 23). San Jacinto has access to “gray” water from the Hemet Water Treatment facility to flood their wetlands year-round. Also there are several areas along

Davis Road that, with small amounts of engineering, could be converted to wetland areas on a spring/summer water cycle specifically for Tricolored Blackbirds. The Davis Unit could be a very good place to attract Tricolored Blackbirds with proper management of the wetland ponds. One of the major drawbacks for this site is access to nearby foraging grounds. The Wildlife Area is competing with nearby dairies when attracting Tricolor colonies. In order to be more attractive foraging grounds are going to need to be enhanced on upland areas or within some of the ponds managed for winter waterfowl.

Recommended Action:

1. Develop a Tricolored Blackbird habitat management plan with the land managers at San Jacinto to incorporate into current management plans for the property. Focus on habitat that will attract Tricolored Blackbirds away from nearby dairies with high quality breeding habitat in cattail marshes and foraging areas of grasses, alfalfa, and pasture.



Figure 22. Marsh A has excellent Tricolor breeding habitat with dense cattails patches and spring water available. This is an ideal site to focus conservation efforts on the San Jacinto WA. Photos taken November 2010



Figure 23. Pond B also has excellent cattail growth and is flooded in the spring. Marsh A and Pond B could be managed to provide alternative habitat to nearby dairy colonies.

San Jacinto: Potrero Unit

Location: End of Circle C Road off of Highland Springs Rd. Beaumont, CA
Size of Habitat: 2 acres of cattails in old stock pond currently surrounded by encroaching willows
Size of Recent Colony: 180 in 2009
Project Priority: 12/High
See Map 7

Notes: The stock ponds on the Potrero Unit are owned by Lockheed Martin, which is currently cleaning ground contaminants from their historic testing areas. They will eventually sell the land to DFG, which presently holds an easement on the property. The ponds are in need of management as the cattails are senescent and maturing willow trees are encroaching on the wetland (Figures 24 and 25). The pond is fed by an artesian well that could be improved to bring more water to it with a small solar powered pump (Figure 26). This site shows little signs of being managed yet the surrounding ungrazed grasslands are ideal foraging areas for Tricolored Blackbirds (Figure 27). In the spring the grasslands become wet meadows with small vernal pools and high densities of insects. Any management on this site would have to be done with Lockheed Martin’s consent.

Recommended Action:

1. Discuss with the San Jacinto management team the feasibility of managing the Potrero ponds for Tricolored Blackbirds and the likelihood of Lockheed’s cooperation.
2. Refresh cattails and remove several trees from pond edges, and install small pump to bring more water to the ponds, especially in spring and summer.



Figure 24. The stock ponds wetlands in the San Jacinto-Potrero Unit are being encroached by surrounding willow and cottonwood trees. Thinning or removing many of these trees will open the wetland up and be more attractive to Tricolored Blackbirds. Photos taken August 2010



Figure 25. Through a lack of management many trees and shrubs have begun to encroach in on the ponds at the Potrero Unit. This pond has supported almost 200 birds before the cattails began to dry out and the trees became too dense.



Figure 26. An artisan well supplies water to the stock ponds. This well should be enhanced with a solar pump to supply a more consistent amount of water to the ponds and wetlands the Tricolors rely upon.



Figure 27. Excellent foraging habitat surrounds the small stock ponds. Most of the area is native grassland or scrublands ideal for Tricolored Blackbirds foraging for insects.

San Diego County

Rancho Jamul Ecological Reserve

Location: 2.5 miles east of Jamul of Route 94

Size of habitat: 1.6 acre pond with large patches of cattails along shoreline

Recent colony size: 80 in 2011

Project Priority: 15/High

See Map 8

Notes: The Rancho Jamul pond is situated among large areas of river bottom grassland that is ideal foraging habitat for Tricolored Blackbirds (Figure 28). The pond is lined with wide patches of cattails and tules that could support several hundred breeding birds. Willows and cottonwoods have begun to encroach into the cattail patches and form a thick over story, which may be discouraging more Tricolored Blackbirds from nesting here (Figures 29 and 30). Contrastingly, Least Bell's Vireos are known to nest at the Ecological Reserve, and should vireo-friendly habitat should be assessed to minimize impacts to this focal species. The cattails will need to be managed next year with mowing, discing, or burning. The pond has a relatively reliable water source from the fire fighting reservoir that is upslope. Also there is a second pond on the property that has potential to hold Tricolored Blackbirds with some additional enhancement. Currently the second pond is spring fed, although the spring has recently been diverted unintentionally during some road maintenance projects. The foraging area could support several hundred to over a thousand Tricolored Blackbirds given adequate nesting habitat and a second pond would allow for Rancho Jamul to keep one pond dry for maintenance and still have habitat available in any given year.

Recommended Actions:

1. After assessing impacts to Least Bell's Vireo habitat, thin the encroaching willow trees surrounding pond #1 and regulate the water depth so that cattails are submerged during breeding season.
2. Assess feasibility of second pond being maintained for Tricolored Blackbirds and determine how to restore spring water to the pond.
3. Maintain foraging grounds to maximize grasshopper production by keeping fields wet and occasionally mowed throughout the spring and summer.



Figure 28. Native and non-native grasslands are abundant through Rancho Jamul ER creating excellent foraging habitat adjacent to the breeding pond. The grasslands are also being managed for Grasshopper Sparrow (*Ammodramus savannarum*) and should pose no conflict with the needs of the Tricolored Blackbirds. Photos taken November 2010



Figure 29. The stock pond on Rancho Jamul ER that has large patches of cattails was used by Tricolors in 2011 although maintenance of the cattails to promote new growth and removal of several encroaching trees will make the site attractive to larger numbers of Tricolors.



Figure 30. Encroaching trees and aging cattails may be limiting the number of Tricolors willing to use this site. Given the excellent foraging nearby and the available habitat. This site is being under utilized by Tricolors. With a small amount of management to the breeding pond, this site could attract more Tricolors.

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TABLES

Table 1 Department of Fish and Game properties that have supported Tricolored Blackbird colonies since 1992 to 2011. Gray squares indicate properties with colonies.

DFG Property	County	Acres	Colonies on DFG Lands	
			1992-2000	2000-2010
Calhoun Cut ER	SOLANO	234	■	
Canebrake ER	KERN	6,491	■	■
Honey Lake WA	LASSEN	4,727	■	
Los Banos WA	MERCED	6,078	■	■
Mendota WA	FRESNO	3,553	■	
Napa-Sonoma Marshes WA	NAPA	13,545	■	
North Grasslands WA	MERCED	4,681	■	■
Rancho Jamul ER	SAN DIEGO	5,028	■	■
San Jacinto WA	RIVERSIDE	16,201	■	■
Shasta Valley WA	SISKIYOU	4,721	■	
Upper Butte Basin WA	BUTTE	2,093	■	■
Yolo Bypass WA	YOLO	1,653	■	■

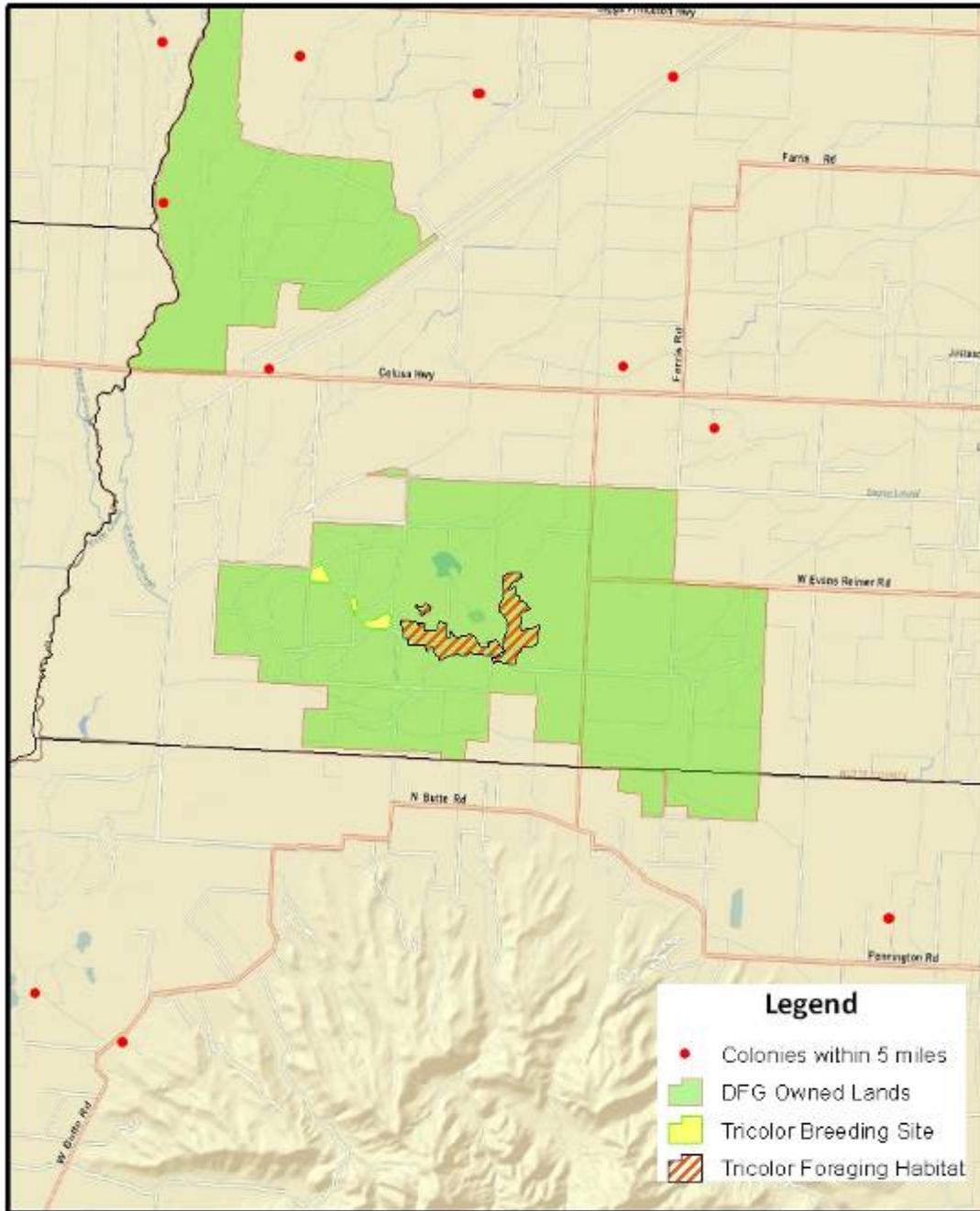
Table 2 Results of the DFG property assessments for Tricolored Blackbird habitat. Sites that scored 14 and above are designated high priority sites, Between 10 and 14 are medium priority, and under 10 are low priority (See Appendix B for detailed description of ranking criteria and scoring).

Property	Frequency	Sites w/in 5 miles	Magnitude	Forage	Landowner	Threat	Project	Benefit	Total
Yolo Bypass WA	2	2	3	3	2	0	1	4	17
Rancho Jamul ER	2	1	2	3	2	0	1	4	15
San Jacinto: Davis Unit	1	3	3	3	2	0	-1	3	14
San Jacinto: Potrero Unit	2	1	2	4	2	0	-2	3	12
Canebrake ER	2	1	0	4	1	0	-1	4	11
Los Banos WA	1	2	2	3	1	0	-1	3	11
Cosumnes WA	-1	3	-1	3	2	0	1	2	9
Gray Lodge WA	-1	1	-1	4	2	0	-2	1	4
Volta WA	-1	1	-1	3	0	0	-2	1	1

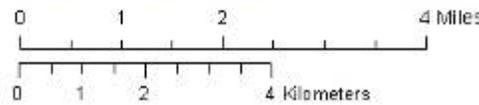
Table 3 List of colonies on DFG properties since 1992

Location	Count	Year	County	Substrate
7 Mile Lane at Nelson Road	2	1994	Butte	unknown
Fay Ranch Road	300	1992	Kern	cattails (Typha spp.)
Glide Tule Ranch	100	2005	Yolo	tule (Schoenoplectus spp.)
Glide Tule Ranch #2	100	2005	Yolo	other (note in Comments)
Honey Lake Wildlife Area - Fleming Unit	200	1996	Lassen	cattails (Typha spp.)
Huichica Creek at Buchli Station Road	300	1995	Napa	cattails (Typha spp.)
Huichica Creek Pond	250	1992	Napa	cattails (Typha spp.)
Huichica Creek Pond	200	1993	Napa	cattails (Typha spp.)
Little Dry Creek #2	35	2000	Butte	willows (Salix spp.)
Los Banos Wildlife Area 16	1,200	1996	Merced	cattails (Typha spp.)
Los Banos Wildlife Area 30	250	1997	Merced	cattails (Typha spp.)
Los Banos Wildlife Area 40	60	1996	Merced	cattails (Typha spp.)
Los Banos Wildlife Area 42	500	1997	Merced	cattails (Typha spp.)
Los Banos Wildlife Area 42	9,000	2008	Merced	cattails (Typha spp.)
Los Banos Wildlife Area 57	200	1996	Merced	cattails (Typha spp.)
Los Banos Wildlife Area 63A	500	1993	Merced	cattails (Typha spp.)
Los Banos Wildlife Area 63A	1,000	1997	Merced	cattails (Typha spp.)
Los Banos Wildlife Area 63C	7,000	1997	Merced	cattails (Typha spp.)
Los Banos Wildlife Area 64-Slough	500	1996	Merced	cattails (Typha spp.)
Mendota Wildlife Area	7,500	1992	Fresno	cattails (Typha spp.)
Mendota Wildlife Area Field 47:Cell 1	1,000	1995	Fresno	cattails (Typha spp.)
North Grasslands Wildlife Area - China Island Unit	200	2005	Merced	milk thistle (Silybum marianum)
North Grasslands Wildlife Area - Salt Slough Unit	100	2005	Merced	milk thistle (Silybum marianum)
Rancho Jamul Ecological Reserve Pond	161	2008	San Diego	cattails (Typha spp.)
Rio Dixon Road	4	1994	Solano	tule (Schoenoplectus spp.)
Rio Dixon Road	1	1995	Solano	tule (Schoenoplectus spp.)
San Jacinto WA: Davis Road	200	1993	Riverside	cattails (Typha spp.)
San Jacinto WA: Davis Unit	300	1994	Riverside	cattails (Typha spp.)
San Jacinto WA: Davis Unit	2,500	1996	Riverside	cattails (Typha spp.)
San Jacinto WA: Davis Unit	400	1997	Riverside	cattails (Typha spp.)
San Jacinto WA: Davis Unit	1,000	1999	Riverside	cattails (Typha spp.)
San Jacinto WA: Davis Unit	10,000	2005	Riverside	cattails (Typha spp.)
San Jacinto WA: Marsh A	5,000	1992	Riverside	cattails (Typha spp.)
San Jacinto WA: Marsh A	400	1994	Riverside	cattails (Typha spp.)
San Jacinto WA: Marsh A	750	1996	Riverside	cattails (Typha spp.)
San Jacinto WA: Marsh A	350	1997	Riverside	cattails (Typha spp.)
San Jacinto WA: Reclaimed Water Reservoir	125	1996	Riverside	cattails (Typha spp.)
Shasta Valley WA	500	1994	Siskiyou	Barley
Sprague Ranch	400	1993	Kern	cattails (Typha spp.)
Sprague Ranch	600	1999	Kern	cattails (Typha spp.)
Rancho Jamul Ecological Reserve Pond	80	2011	San Diego	cattails (Typha spp.)

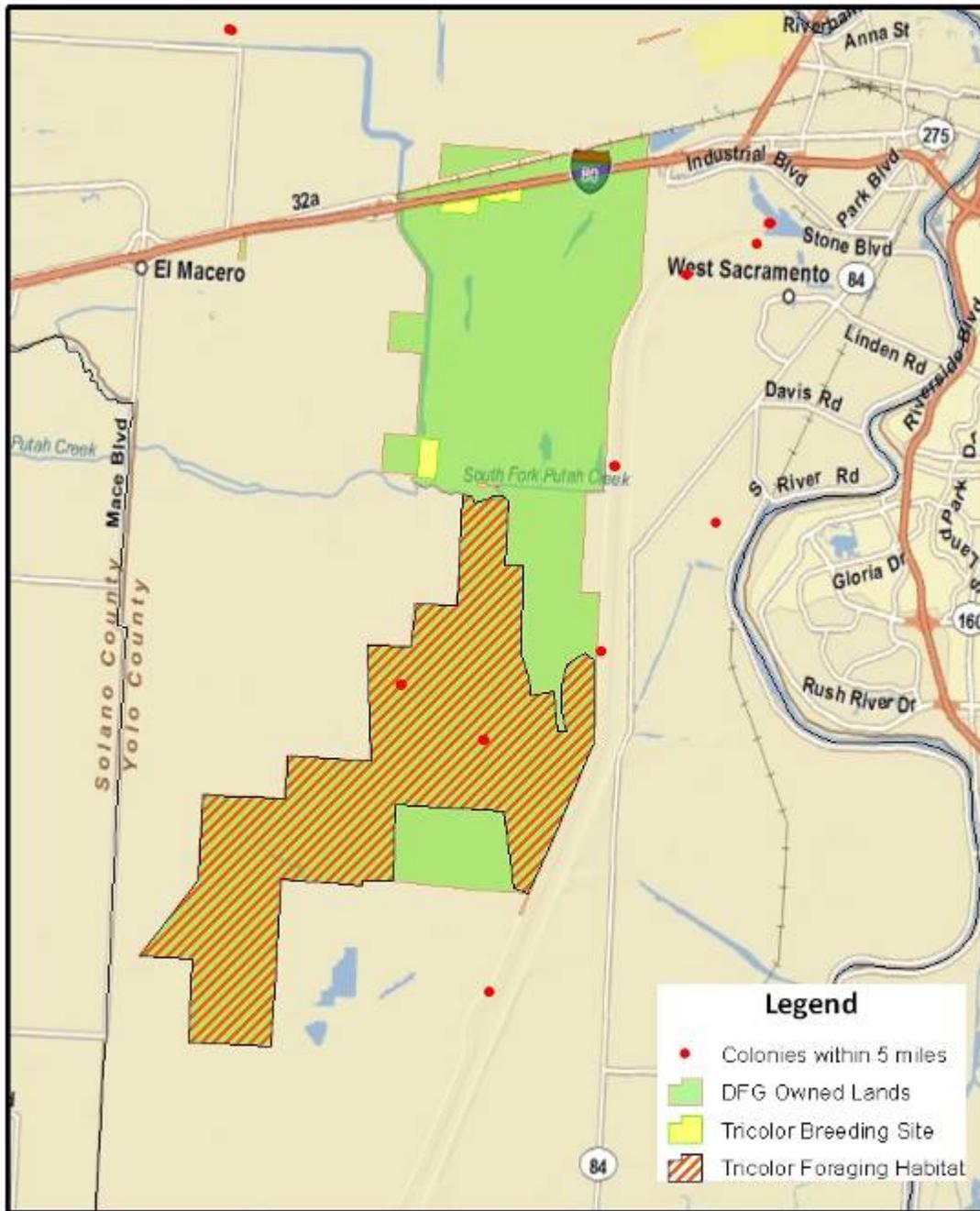
Maps



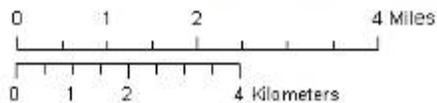
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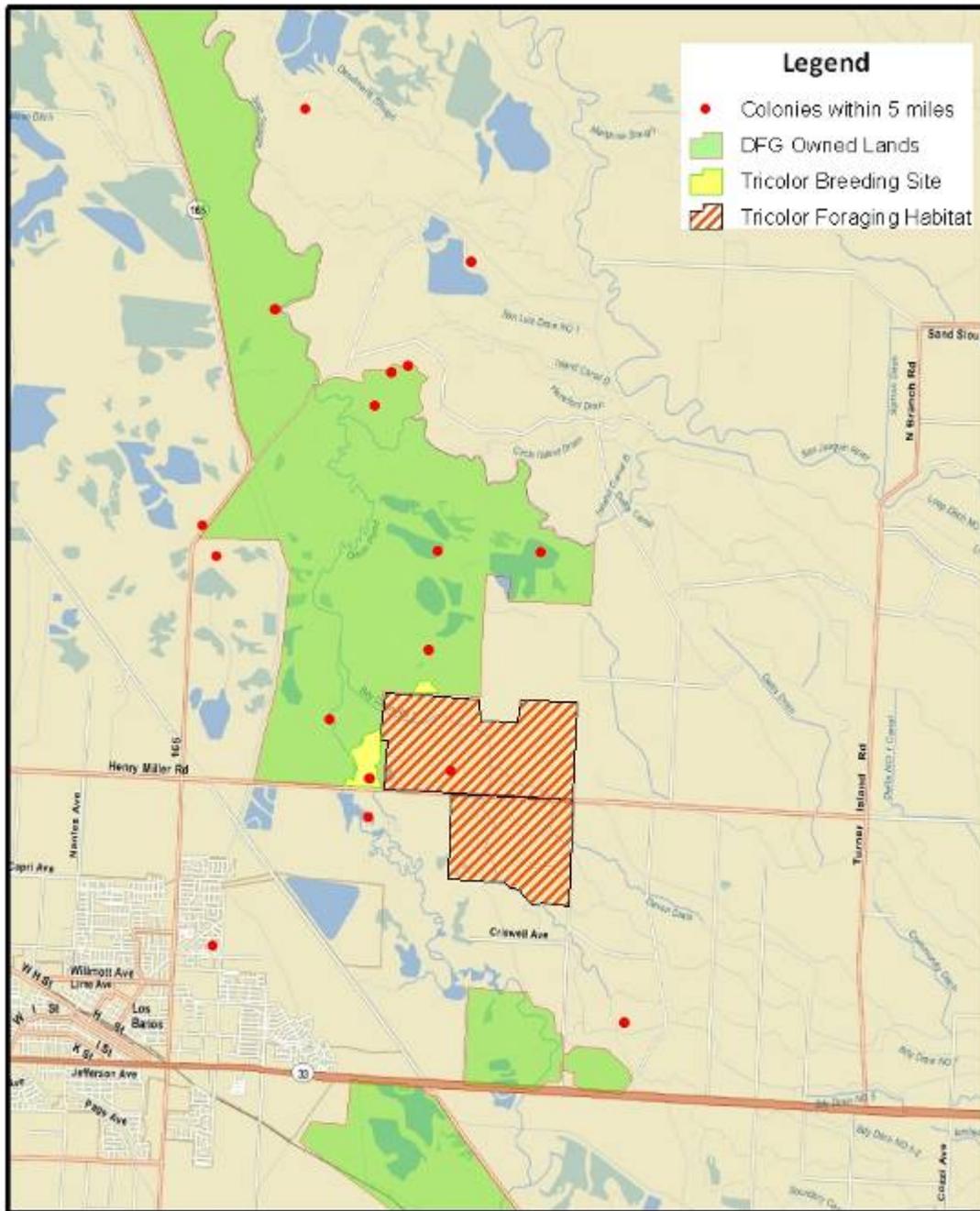
Map 1 Gray Lodge Wildlife Area



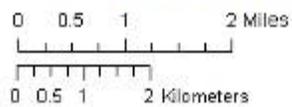
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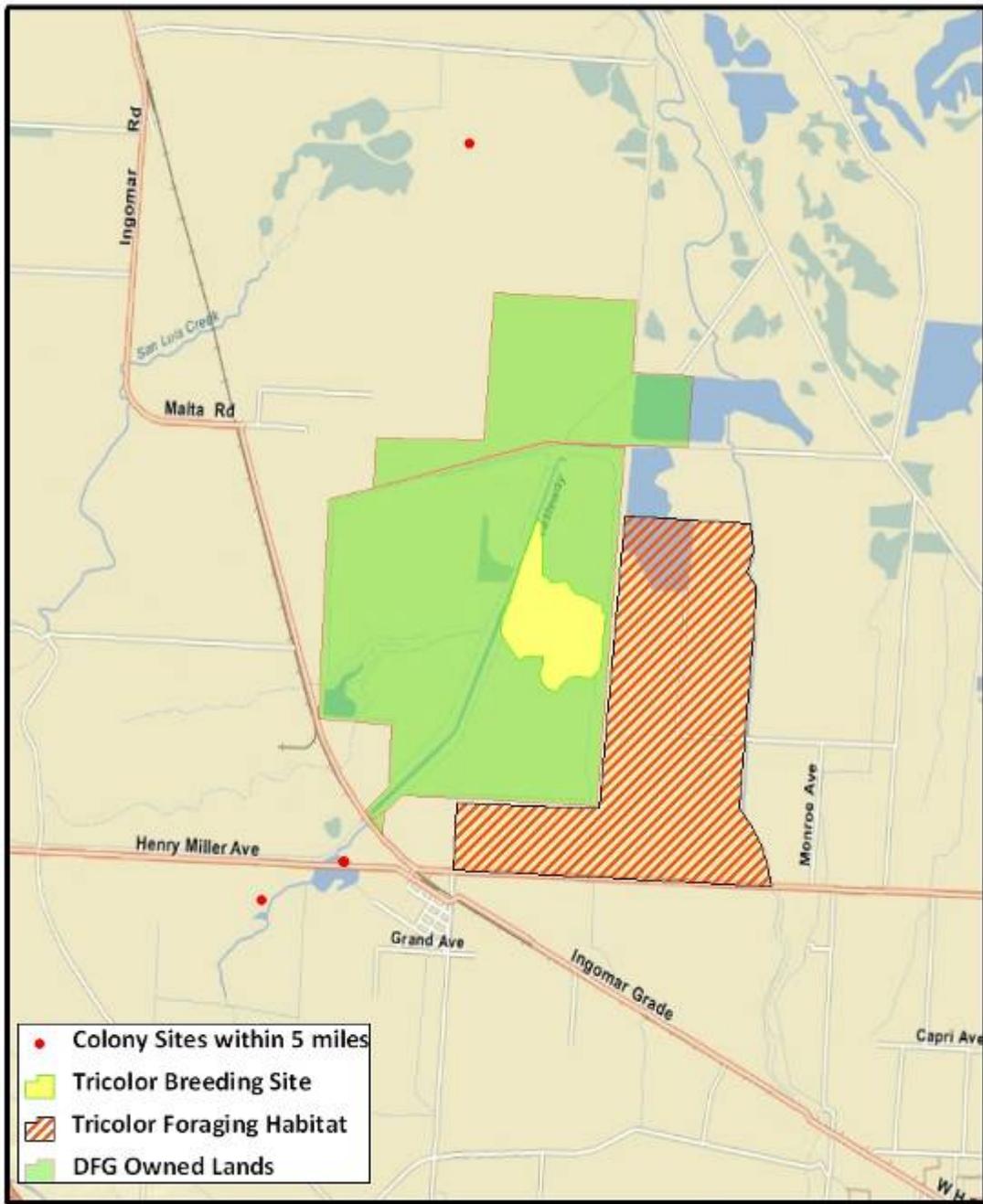
Map 2 Yolo Bypass Wildlife Area



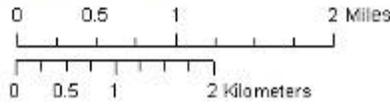
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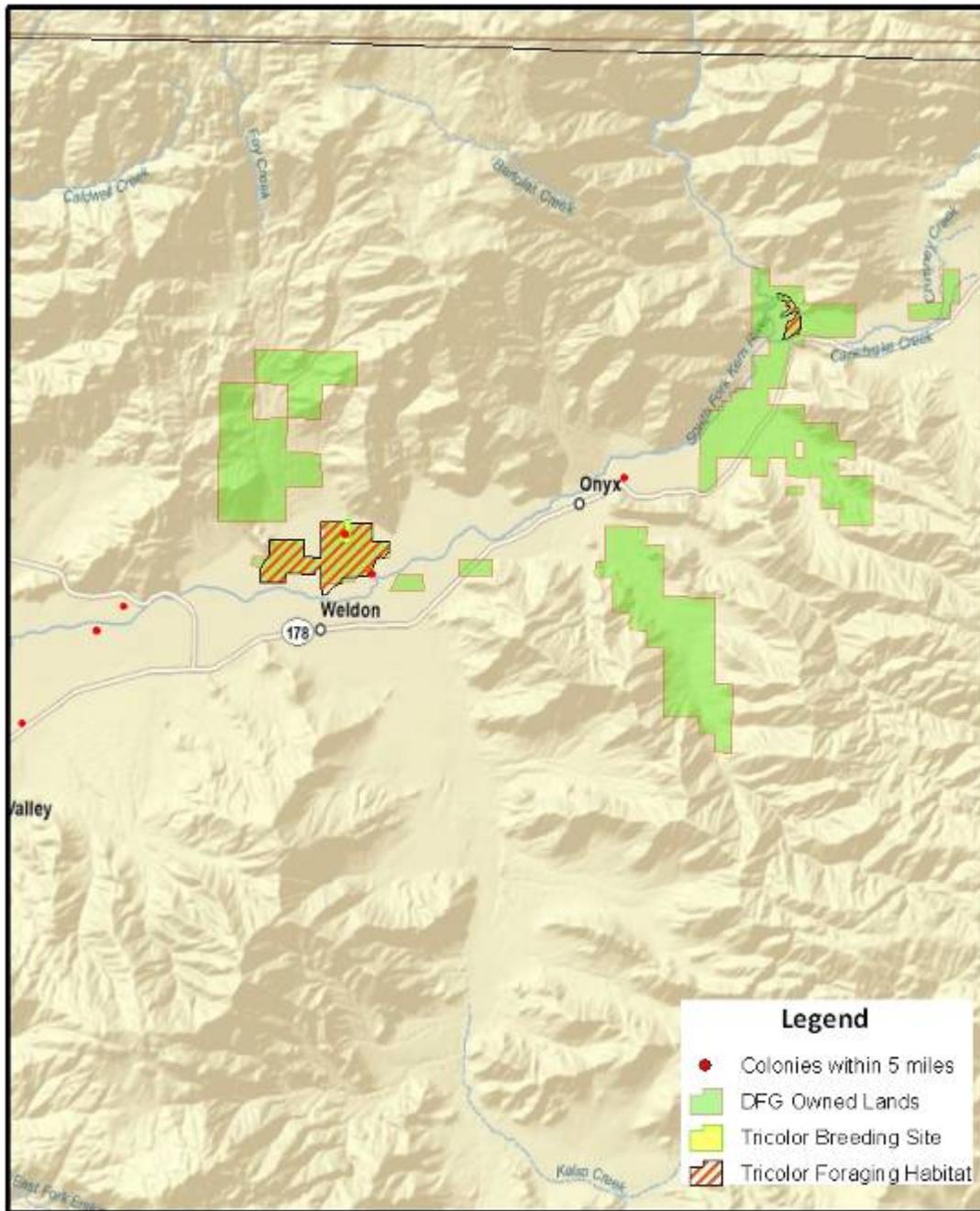
Map 3 Los Banos Wildlife Area



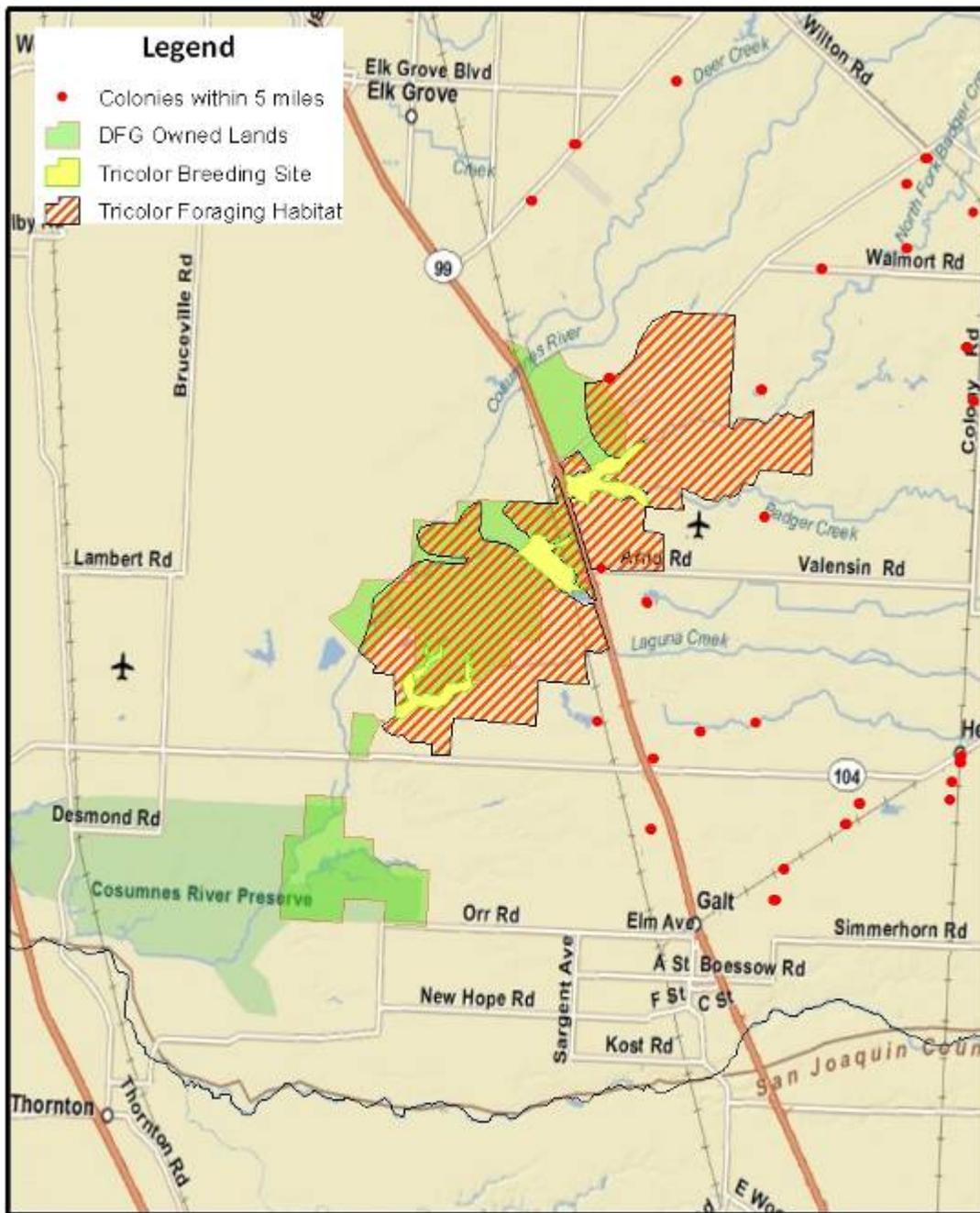
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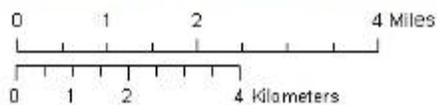
Map 4 Volta Wildlife Area



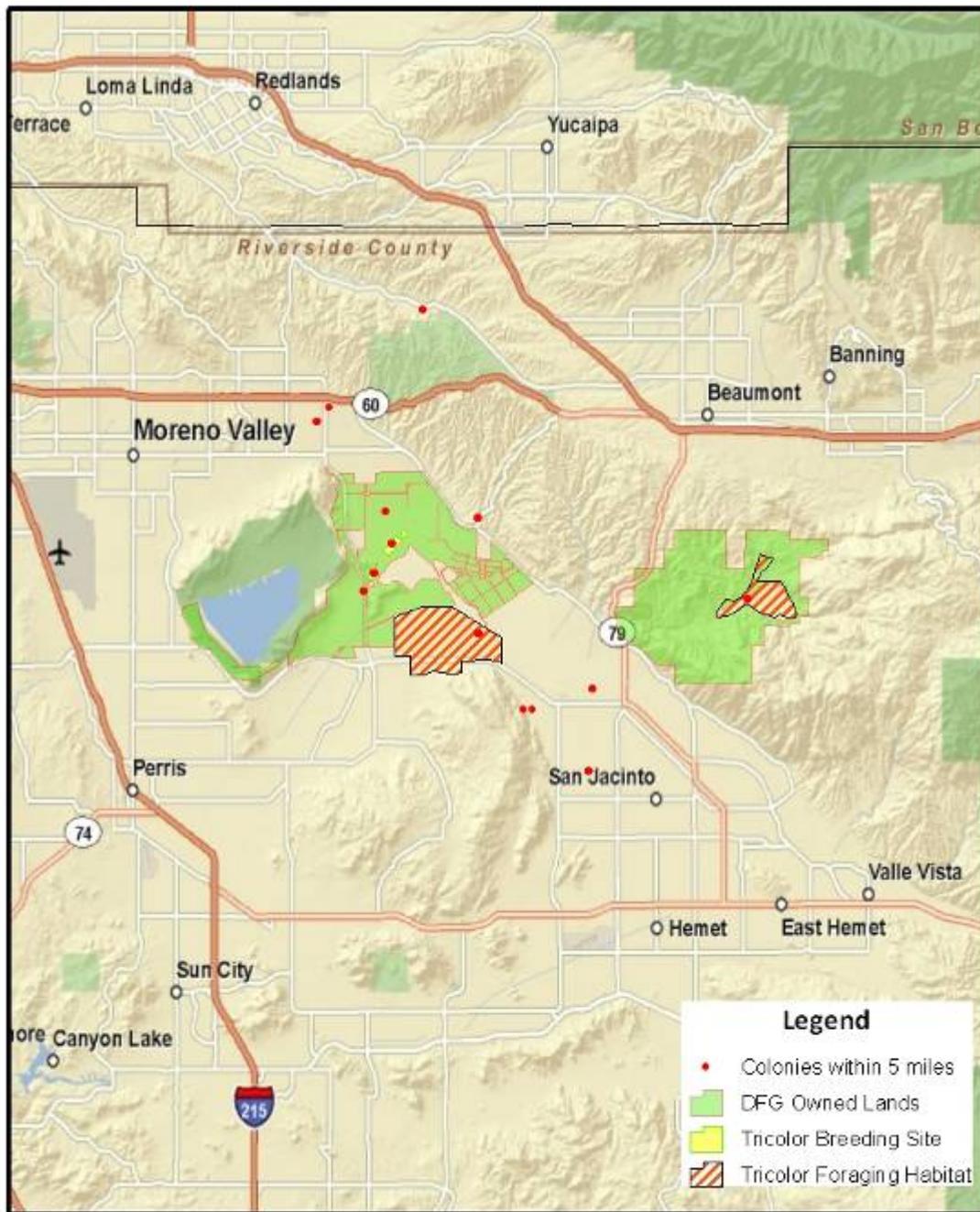
Map 5 Canebrake Ecological Reserve



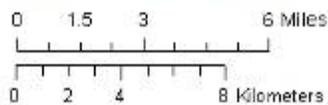
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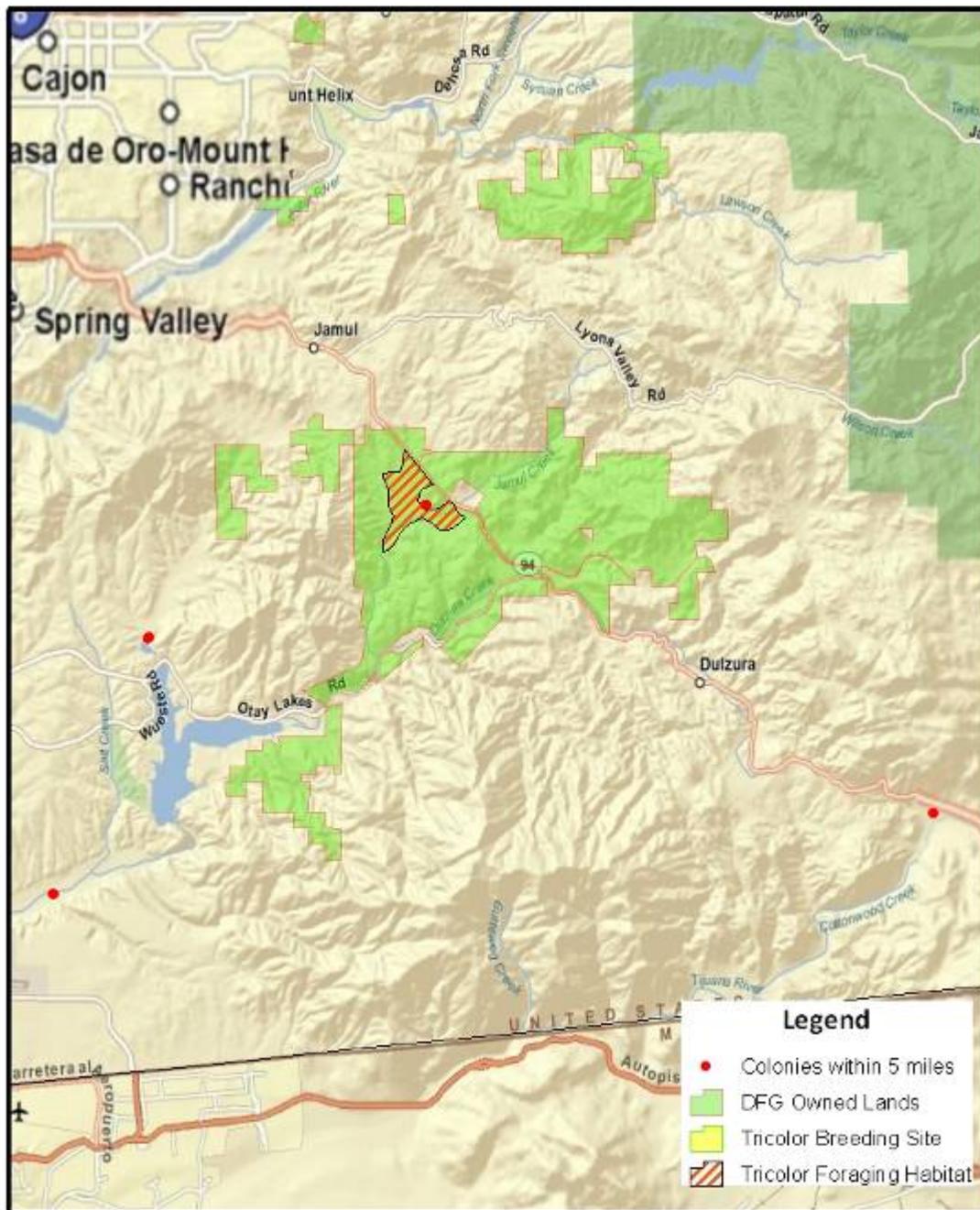
Map 6 Cosumnes River Preserve



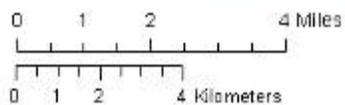
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Map 7 San Jacinto: Davis and Potrero Units



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Map 8 Rancho Jamul Ecological Reserve

APPENDIX A

Managing for Tricolored Blackbirds Guidelines for Private Landowners and Agency Land Managers

So far Tricolored Blackbirds have not benefited from generalized habitat restoration plans because the necessary spatial grouping of habitat components is not incorporated into plans.

--Bill Hamilton (2003)

Introduction

The Tricolored Blackbird (*Agelaius tricolor*) is a near endemic with at least 95% of the population restricted to California and smaller breeding colonies occurring in Nevada, Oregon, Washington, and Baja California, Mexico. Tricolored Blackbirds are also the most colonial terrestrial bird in North America (Orians 1961, Beedy and Hamilton 1999). This combination of narrow geographic range and highly colonial breeding make Tricolored Blackbirds particularly susceptible to disturbance and habitat loss. As a result, the population has declined dramatically over the last 80 years

(DeHaven et al. 1975, Beedy and Hamilton 1997, 1999, Graves et al, in prep), from an estimated millions of birds in the 1930's (Neff 1937) to approximately 400,000 birds in 2008 (Kelsey 2008), making them one of the top conservation priority birds in California.

A central challenge for the conservation of this species is that Tricolored Blackbirds now concentrate at breeding colonies in agricultural fields of the San Joaquin Valley, especially in Triticale grain fields associated with dairies. Fifty percent of the breeding Tricolored Blackbirds in California in 2008 were observed nesting in grain silage fields (Kelsey 2008). Over the last 15 years public agencies and Audubon California have used public funds for silage buyouts that paid landowners to delay harvest so that the Tricolored Blackbirds could finish nesting. So far this has resulted in protection of 600,000 nests and resulted in approximately 410,025 Tricolored Blackbird fledglings. However, public funds for silage buyouts are being phased out and this conservation measure is only a short-term



Figure 1 Tricolored Blackbirds are colonial breeders nesting in wetlands and in Triticale fields. Tens of thousands of birds can nest in the same 10 acre area. Photo taken by Bob Meese



Figure 2 Tricolor males help to feed insects to nestlings. Large colonies of Tricolored Blackbirds can be excellent pest control. Photo taken by Morgan Ball

solution. Conservation of this species will depend on reestablishing enough suitable natural habitat that this species does not rely so heavily on agricultural habitats where disturbance minimizes breeding success. The Tricolored Blackbird Working Group has set a long-term population target of increasing the population to 750,000 birds and meeting this goal will depend on substantial efforts to create new and enhance existing breeding colony sites on public and private lands across California.

The following guidelines provide background on the habitat requirements of Tricolored Blackbirds, including guidance for public land managers and private landowners to create and manage suitable breeding and foraging habitats. The focus is on creating and managing wetland and natural upland breeding habitat with suitable foraging habitat nearby. Given the reality that Tricolored Blackbirds will continue to use agricultural and weedy fallow fields for some time while habitat creation efforts are implemented, we also provide guidance on managing these agricultural habitats to maximize their value for Tricolored Blackbirds. All of this information has been compiled from the significant time and effort put forth by researchers and Federal and State land managers.

Breeding Habitat – Wetlands

Freshwater marsh with dense, emergent cattails and bulrush was, historically, the most common habitat for Tricolored Blackbird nesting colonies. Marshes were created by spring flooding along the Central Valley and coastal rivers forming large tracts of ideal breeding habitat for large Tricolor colonies. The Central Valley alone consisted of 4 million acres of wetlands in 1850 (Framer et al. 1989) and several million Tricolored Blackbirds (Neff 1937), but with the damming and channelizing of California rivers, the spring and summer marsh habitat has largely disappeared. Most of the wetlands in California have been lost, only 7% remain in the Central Valley (Framer et al. 1989), and those that remain are typically not managed in a way that maintains their value as breeding habitat for this species. The majority of the wetland areas in the state are currently being managed to support waterfowl populations that are overwintering or migrating and are mainly flooded in the fall and winter months. Permanent wetland areas are quite rare and thus Tricolored Blackbirds have adapted to the lack of available wetland habitat by using alternative substrates such as upland and agriculture areas. Creating and managing spring flooded wetland sites may help to reverse the trend of declining spring wetland availability and move major Tricolor colonies back into native habitat and away from agricultural fields where there is a significant possibility of the colony being destroyed when farmers harvest their fields.

Additionally, creating and maintaining spring wetland areas has a significant benefit for many other species that also rely on wetlands to breed and for protection. Species such as the Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*), White-faced Ibis (*Plegadis chihi*), Least Bittern (*Ixobrychus exilis*), Northern Harrier (*Circus cyaneus*), California Red-legged Frog (*Rana draytonii*), and the Giant Garter snake (*Thamnophis elegans terrestris*) would all benefit from spring wetland habitat and most would breed there. Moreover, the habitat type required by Tricolored Blackbird is also quite compatible with the habitat needs for these other sensitive or endangered species.

Habitat Characteristics – Wetlands

Tricolored Blackbirds are attracted to specific conditions within a wetland when they are choosing a nesting site. Cultivating the right vegetation, reaching a minimum height and density, and the proper depth of water are all important factors in creating attractive Tricolor habitat.

Create tall tule marsh

Firstly, it is very important to have thick, newly growing stand of cattails (*Typha latifolia*), tules (*Scirpus acutus*), and bulrush (*Schoenoplectus californicus*) that are at least 4 to 6 ft tall because the birds need the vegetation height as protection and camouflage for their nests. The cattails or tules need to be green and new because Tricolored Blackbirds will weave a grass nest between several stalks and older cattails that are brittle tend to break under the weight of the nest or in heavy wind. Dry or senescent cattails do not provide optimal nesting habitat and should be either burned, disced, or both in order to encourage new growth every 2 to 5 years.



Figure 3 Wetlands need to be flooded throughout the breeding season and clusters of cattails away from the shoreline are ideal nesting sites. Photo taken by Keiller Kyle

Keep tules flooded

Colonies also tend to form in wetlands when there is water underneath the cattail patches. Standing water of 8 to 12 inches discourages predators such as foxes, raccoons, and skunks from entering the colony site. Additionally, water underneath the nests helps to keep the nestlings cooler during hot spring days, giving them a better chance of fledging.

Large patches for protection

Nests can be very densely packed with some wetland colonies having 4 nests/m² although the typical spacing is .5 nests/m². To protect a densely packed colony, it is important to make the cattail patch large enough to provide adequate space to breed with a buffer area to keep predators out. The best strategy is to create large and continuous patches of cattails with the width of a stand being at least 10-15 meters wide. There is a better chance of attracting Tricolored Blackbirds if the breeding habitat is large, so the wetland area and the cattail patches should be as consolidated as possible. Create islands of cattails surrounded by open water to discourage predators, and cattails along shorelines should be in large swathes to avoid predators from entering the colony.

If choosing between growing cattails or tules, several researchers and federal land managers have commented that cattails tend to hold denser, larger colonies than tule marshes. The theory is that cattails are denser and grow vertically while tules tend to bend and cross, limiting the amount of nests that can be woven between stalks. We recommend maintaining a mixture of cattail and tule with the dominant vegetation being cattails.

Habitat Maintenance – Wetlands

To maintain a healthy wetland for Tricolored Blackbirds and other species, the area should be flooded from late January to June or July. Early flooding of the site allows the cattails to be tall and mature by the time the birds begin establishing colony sites in late March to early April in the San Joaquin Valley and Southern California. Colonies do not typically begin to form in the Sacramento Valley until late April to Mid-May. These are rough dates and the breeding schedule of the Tricolored Blackbird can vary widely based on weather conditions. If the cattails are not tall enough or are too sparse, the birds will not use the site, thus applying water at the right time is crucial to promote vegetation growth. The most effective way to encourage dense stands of cattails and tules is to have fluctuating water levels between two inches and one foot. Since cattails can aggressively take over a pond, it is recommended that deeper channels be cut between cattail patches to ensure the easy flow of water through the pond. The deeper channels can be used by other target species such as brooding waterfowl, sora, herons, and ibis. A 50:50 or 60:40 ratio of cattail to open water is desired for most sites allowing for larger stands of cattails with some waterways between stands (Fig 4). Using a waterfowl brood pond for Tricolor habitat can be ideal situation given the limited amount or cost of spring and summer water. The brood pond can be managed as a summer water pond (October – July), a reverse cycle wetland (February – July), a seasonal wetland – summer water combination (All year), or an upland – summer water combination (February – July). There are several options for how and when to apply water for spring/summer flooding with the ideal flooding regimes for Tricolored Blackbirds being either a reverse cycle wetland, or a large summer water pond. Also, the recommended configuration of cattail patches for Tricolor habitat differs from a typical brood pond. Brood ponds usually have small islands interspersed throughout the pond to maximize surface area of the cattail patches. Tricolored Blackbirds do not use small patches of cattails and so it is important to manage cattail patches to be large and continuous, maximizing the internal area of patches, and to keep water on the site long enough into the summer for the Tricolored Blackbirds to finish nesting (end of July). Cattail stands should be at least 10 meters wide to protect colonies from predators.

- **Create wetland habitat: cattails or bulrush flooded March – July to 1 ft. depth**
 - Flood wetland early (i.e. Jan – Feb) with fluctuating water levels for best growth
 - Burn or disc marsh vegetation every 2-5 years. Tricolored Blackbirds mainly use young emergent marsh.
- **Create upland habitat: Dense, tall thickets of California blackberry, nettles, thistles, Triticale, California rose, or willows.**
 - Irrigate upland habitats by April to create good structure – approximately 4-foot high dense vegetation.
- **Make it impenetrable to predators – flooded, spiny, or stinging vegetation.**
- **Make it available in time: March for southern and coastal California, April for Sacramento Valley**
- **Make sure there is foraging habitat nearby.**

Depending on the summer flooding regime chosen for the pond, maintenance will have to be performed on different cycles. Reverse cycle wetlands will need fall vegetation control every 1 to 2 years while summer water ponds will be maintained every 3-4 years to restore the ratio of cattails to open water to 50:50 and keep deep channels open and flowing. Burning dead, dry cattails is a good way to reset the growth cycle of the wetland, but it should be done carefully so as not to burn too hot and destroy the tubers and seedbed in the soil. If the cattail tubers are burned, the cattails will not recover as quickly and might not be ready for Tricolor colonies. Burning should be done in the late fall or early winter to ensure enough time for new growth to

emerge by Tricolor nesting season. Another successful method is to burn the cattails when the area is flooded with 2 to 3 inches of water. This method is typically done in mid-winter and is ideal for keeping the fire from burning too hot and hampering quick regrowth. Flooding the area also helps minimize the potential for the fire to get out of control since there are natural fire breaks between cattail patches. This method should be used to clean out dead vegetation, but it will not help to open up choked channels or reset the cattail to water ratio. If planning on burning your site, please consult local, professional wetland managers at the U.S. Fish and Wildlife Service, NRCS, or California Department of Fish and Game for their expert guidance.

Discing the area accomplishes a similar management goal as burning and can more effectively setback the expansion of cattails into water channels. Discing may be easier to do if acquiring a burn permit is difficult. Depending on the density of the vegetation, a disc can knock down old growth and turn over the soil 4 to 6 inches in depth. If the vegetation is too dense for the disc to penetrate the soil, mowing the vegetation first can help open up the patches to then be disced. Several passes might be necessary to break up the soil and expose the tubers to dry out. A good test is to pick up newly turned vegetation and see if can be pulled up without large chunks of soil attached. If the plant comes up easily and no soil is attached, the discing was successful. To eradicate cattails from certain parts of the pond, the upturned tubers will need to bake in the late summer sun and dry out for several weeks (2-3 weeks). If encouraging new cattail growth is desired, irrigating soon after discing will help the cattails rebound quickly (Figure 5). Burning or discing should be done when the wetland site is dry making it easier to use machinery, allow the disc to penetrate deep enough and dry out the tubers, and avoid getting stuck. Most maintenance should be done in the late summer, early fall to take advantage of the dry, hot weather to reestablish channels, dry out tubers, and still flood up in the fall if desired.



Figure 4 ECLA Pond, Kern County. Left photo taken April 2, 2008 showing area after discing with minimal new growth surrounded by old, dried stems. Right photo taken April 29, 2008 showing disced area with sparse green growth surrounded by old stems. Cattails can grow quickly but ensure enough time for them to mature and become dense for Tricolor nesting season. Photo taken by Bob Meese.

Standing water should be maintained underneath the nests to prevent predation. The site should be flooded with 8 to 12 inches of water, and it should be maintained throughout the nesting season. Tricolored Blackbirds will continue to nest in areas if the water dries up but the chance of predation is increased. Managing the water depth can be done by pumping from a well or a water district or choosing soil types that retain standing water until June or July. San Joaquin colonies tend to finish nesting in mid-May while Sacramento colonies start later and thus finish

later. Therefore it is important to leave water on wetland sites later into July in the Sacramento Valley to allow the birds to fledge. The standard day to pull the irrigation boards is July 15th; however we recommend waiting until July 30th to pull the boards if a Tricolor colony is present. These dates are only averages and depending on weather conditions, colonies may decide to nest a second time in the same location thus extending the breeding season another 45 days. Make decisions about maintaining water depth based on the bird's breeding stage in your colony and be prepared to extend the flooding if the colony decides to stay. A second nesting in the same site means you are providing optimal habitat, well done!

Breeding Habitat – Uplands

Upland habitat has been used historically by Tricolored Blackbirds and has recently become a more important habitat type with the disappearance of wetlands in the Central Valley. Historically, upland colony sites were found in spiny, thorny, thick substrate such as California Blackberry (*Rubus ursinus*), Prickly Lettuce (*Lactuca serriola*), Nettles (*Urtica dioica*), California Rose (*Rosa californica*), Sandbar Willow (*Salix exigua*), and Mugwort (*Artemisia douglasiana*). With the introduction of Himalayan Blackberry (*Rubus armeniacus*) and Milk Thistle (*Silybum marianum*), which are more thick and spiny than native varieties, nesting success has increased in upland colony sites. Upland breeding habitat will continue to be important for the success of the species and creating or maintaining ideal upland habitat is easier and less expensive than creating or maintaining wetland areas.

Native Plant List:

- a. **Mugwort (*Artemisia douglasiana*)**
- b. **Stinging Nettle (*Urtica dioica*)**
- c. **Wild Rose (*Rosa californica*)**
- d. **Sand Bar Willow (*Salix exigua*)**
- e. **California Blackberry (*Rubus ursinus*)**
- f. **Prickly Lettuce (*Lactuca serriola*)**

Non-Native Plant List:

- a. **Himalayan Blackberry (*Rubus armeniacus*)**
- b. **Milk Thistle (*Silybum marianum*)**

Habitat Characteristics – Uplands

Tricolored Blackbirds prefer very dense clusters of the above upland plant species and use the thorns and spines as protection against predators. Despite some of the blackberry or thistle patches being a relatively small amount of acres, several thousand birds will colonize them. The upland patches typically have a height of 4 to 10 ft and are difficult to penetrate. The patches can be a mixture of plant species as long as adequate overall density is maintained. It is important to maintain clusters of blackberry, thistle, and rose varieties and not to disturb them until after the nesting season for any pruning or mowing purposes.



Figure 5 Fallow fields of Milk Thistle and Fiddleneck ferns can be excellent nesting areas if left undisturbed. Ideally the plants should be ~4ft high to provide optimal habitat. Photo taken by Bob Meese.

Maintaining Habitat – Uplands

Upland habitat is relatively easy to create and maintain but it is important to have water and foraging resources nearby. Most of the preferred upland plant varieties maintain themselves if left undisturbed, but if thickets of thistle or blackberry need to be trimmed or mowed make sure it is done after the breeding season concludes in June or July. Plantings of California Blackberry and California Rose may take a few years to mature into a patch large enough for Tricolored Blackbirds to use, but even small patches can hold several thousand nesting birds. It is also important that patches of Blackberry or Thistle do not become overgrown by trees or large shrubs. Make sure the patches remain in the open to reduce predation risk since many predators use the trees as cover. Irrigating the upland area in the spring (March-April) can help increase the density and height of the plants, especially if the winter has been dry. Large amounts of water are not usually necessary, especially to establish nettle or mugwort patches.

Foraging Habitat and Water Sources

No Tricolor colony can succeed, even with ideal breeding habitat, without robust and healthy foraging grounds and a water source. During the breeding season, Tricolored Blackbirds rely almost exclusively on insects, especially grasshoppers, caterpillars and dragonflies, to produce eggs and feed their growing nestlings. Having adequate foraging areas and a reliable water source near breeding sites should be one of the initial considerations before encouraging Tricolored Blackbirds to breed at your site.

Habitat Characteristics – Foraging and Water

Tricolored Blackbirds tend to forage in pastureland, rangeland, at dairy farms, and in some cropland that is being irrigated such as unsprayed alfalfa and silage. Tricolored Blackbirds rely on insects and require a large area to satisfy a colony's needs through fledging. Healthy pastureland and rangeland are great for foraging and irrigated fields attract birds to the emerging insects. For farmers, having a large colony of Tricolored Blackbirds looking for insects to eat can be an effective and inexpensive source of pest control and could reduce the amount of pesticides needed to control insects. Grapes, orchards, and urban development represent permanent habitat losses, and most row crops, such as corn, tomatoes, peppers, melons, etc. do not meet the Tricolor nesting colony foraging habitat requirement although alfalfa, rice, and silage fields are known to be good foraging sites. Foraging sites should be located no further than 3 miles from a colony site.

Water is very important for the formation of a colony and should be located within 500m of the colony site. The ideal water source would have a shallow bank for the birds to access the water. Ponds, marshes, canals, stock ponds, and streams are all used by Tricolored Blackbirds.

Maintaining Habitat – Foraging and Water

Grasslands and pasturelands should be grazed regularly to maintain short substrate (below 15 in) to give the Tricolored Blackbirds access to insects in the undergrowth. Irrigated pastureland produces many insects during flood up and Tricolor take advantage of the temporally available resource. Alfalfa is also heavily used by Tricolored Blackbirds, especially if the crop goes unsprayed. It is recommended that farmers leave some waste material post-harvest to sustain alfalfa and silage crop foraging sites. It is currently unclear the amount of foraging area needed to support different sized colonies. Large colonies (ex. 20,000 to 60,000) will require numerous sources of insects and therefore plan a spraying regimen for your hay and silage fields that factor in the insects that Tricolored Blackbirds could take out of the field. Tricolored Blackbirds could be a natural insect control for your fields at the same time the farmer is providing valuable food for growing nestlings. Farmers should plan on leaving as much ground unsprayed and designated for Tricolor foraging as possible.

Maintaining a water source is relatively simple, especially if it is a natural vernal pool. If the water source is controlled by irrigation, ensure that the area retains water throughout the breeding season (March-July). If the birds are nesting in a wetland area, make sure water is maintained at 8 to 12 inches for the duration of the breeding season to reduce predation risk. The water in the wetland will also be used as a drinking source.

Nesting Habitat – Crops

Crop fields are starting to be heavily used by Tricolor colonies as other historical nesting habitats have diminished. Even though crop fields are not a recommended nesting substrate due to conflicts with farmers' schedules and finances, the immediate situation requires that the Tricolored Blackbirds be accommodated and protected while the transition to more traditional habitats is made. Most likely due to their resemblance to cattail marsh and strong stems, Tricolored Blackbirds seem to prefer small grain crops, especially Triticale for its rigid stems and height. Nearly 50% of the population nested in triticale in 2008. Since most of the grain crops are being managed by private landowners, it is imperative to engage and inform them of different methods of protecting the colony while still allowing them to effectively grow and harvest their crops. The long-term goal is to create enough native upland and wetland habitat to move Tricolor colony out of crop fields, but in the meantime while native habitat capacity is being built up, crop fields will continue to be essential to the success of the species

- **Maintain or create foraging habitat nearby: Tricolors feed their young insects and other small invertebrates. Foraging habitat within 1- 2 miles of colony site is best.**
- **Healthy grasslands, irrigated pasture, and forage crops (e.g. alfalfa) all provide abundant insects and seeds.**
- **Irrigate fields when adults are feeding chicks (April – June). Birds eat insects and other invertebrates. *Good for pest control!***
- **Make sure water is nearby**
- **Colonies need open water to be within about 1/3 of a mile.**
- **Ponds, marshes, canals, stock ponds, and streams are all used by Tricolored Blackbirds.**
- **Make water available throughout the breeding season (March – July).**

Habitat Characteristics – Crops

Crop fields, especially Triticale, are preferred nesting habitat when the crop is tall and dense. Ensure that the fields are getting appropriate irrigation so the crop is at least 4ft tall by early April. Avoid spraying pesticides on the crop from April onward and avoid disturbing the colony by entering the field with tractors or on foot. Large colonies typically establish in triticale and can take up to 40 acres or more and contain several tens of thousands of birds.

Maintaining Habitat - Crops

Triticale is an important nesting substrate for Tricolored Blackbirds and colonies need to be protected from early harvesting of the crop for silage. Tricolored Blackbirds take 45 days to complete nesting and fledging and can sometimes postpone a harvest of the colony field until mid-June. Most delays are only a few days to a few weeks. Harvest delays might be necessary to allow nestlings time to leave the nest. Any farmer who has Tricolored Blackbird colonies in their fields should contact the U.S. Fish and Wildlife Service, California Department of Fish and Game officials or Audubon California. There are funding sources available that can potentially compensate farmers if a delaying a harvest for a Tricolored Blackbird colony is necessary.



Figure 6 Most Tricolored Blackbirds are now nesting in Triticale fields and need to be protected until the babies have left the nest. Farmers should consult FWS or Audubon California if Tricolored Blackbirds are nesting in their fields. Photo taken by Keiller Kyle

Report Known Colonies

- If you have a colony, please use the Tricolored Blackbird Portal (<http://Tricolor.ice.ucdavis.edu>) to report its location and to enter the number of birds each year.
- Or, contact Audubon California's Tricolored Blackbird Conservation Coordinator, Keiller Kyle, at kkyle@audubon.org or (916) 649-7600.

Project Funding Sources

There are several funding sources within the state and federal governments that can help offset some of the costs of building or maintaining wildlife habitat on your property. Here is a list of funding sources for both agriculture and wetland landowners:

Ag-lands:

- National Resources Conservation Service (NRCS)
 - EQUIP – Environmental Quality Incentive Program
 - WHIP- Wildlife Habitat Incentive Program
 - CSP- Conservation Stewardship Program
 - CIG – Conservation Innovation Grant
 - WRP – Wetlands Reserve Program
- US Fish and Wildlife Service (USFWS)
 - Partners for Fish and Wildlife Program
- CA Department of Fish and Game (CADFG)
 - Landowner Incentive Program (LIP)

Wetlands:

- National Resources Conservation Service (NRCS)
 - WHIP- Wildlife Habitat Incentive Program
 - CIG – Conservation Innovation Grant
 - WRP – Wetlands Reserve Program
- US Fish and Wildlife Service (USFWS)
 - Partners for Fish and Wildlife Program
- CA Department of Fish and Game (CADFG)
 - Landowner Incentive Program (LIP)
 - Presley Program

Conclusion

Establishing and maintaining Tricolored Blackbird breeding and forage habitat can be complex, involving many factors and the correct timing of water and maintenance. The effort can be quite rewarding when a large colony decides to settle and raise their young at your site. Many of the requirements of Tricolored Blackbirds are minor additions or changes to an already functioning habitat such as reverse cycle wetland sites being used as brood ponds for waterfowl. In working lands, such as triticale fields, the important factor in these instances is recognizing the species and knowing how to manage for the species to allow the chance for a successful breeding season. If you are interested in creating new habitat for Tricolored Blackbirds, whether it is a new wetland or upland site, we encourage you to consider current or historical colony sites when determining your location. These areas will have the best chance of being used by Tricolored Blackbirds and will be the safest place to invest in the future of the species. Please contact U.S. Fish and Wildlife, NRCS, or California Dept. of Fish and Game agencies or Audubon California if you are interested in a habitat project for Tricolored Blackbirds.

Contact info:

Audubon California – Keiller Kyle 916-649-7600 ext 114 email: kkyle@audubon.org

CA Dept. of Fish and Game – Lyann Cormack 916-341-6981 email: lcomrack@dfg.ca.gov
NRCS – Dean Kwasny 530 792-5648 email: dean.kwasny@ca.usda.gov
U.S. Fish and Wildlife Service – Dave Hardt 661 725 2767 email: dave_hardt@r1.fws.gov

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APPENDIX B

Site Ranking and Prioritization Criteria

Frequency of breeding activity: how often within the last five years Tricolored Blackbirds have bred at a specific site. Higher values are awarded to sites that have more consistent usage as it is assumed to be valuable, reliable habitat for Tricolor colonies.

- 2: Occupied during at least two breeding seasons within the past 5 years
- 1: Occupied during one breeding season within the past 5 years
- 0: Data incomplete
- 1: Site not known to have had a colony nesting in the past 5 years

Magnitude of breeding population: number of breeding birds found at a colony within a single breeding season. Records for the last 10 years will be evaluated and the maximum population will be used. Higher points are awarded for large populations.

- 3: >10,000 birds
- 2: 2,501 – 10,000 birds
- 1: 0 – 2,500 birds
- 0: Data incomplete
- 1: 0 birds

Number of colonies within 5 miles: The number of colonies on DFG lands does not account for the potential impact that altering the habitat could have on Tricolored Blackbirds. We identified the number of colonies in surrounding lands to assess the possible impact changing the conditions on DFG land could have on the local Tricolor population. We took into account the number of colonies that are within a 5-mile radius of DFG lands in the last 20 years given that Tricolored Blackbirds are known to travel up to 5 miles to forage. These would be the colonies that could immediately benefit from improved habitat on DFG lands. More points are given to more Tricolor activity and established colonies in the surrounding landscape.

- 3: 21 and greater colonies
- 2: 11 to 20 colonies
- 1: 1 to 10 colonies

Status of foraging areas: Since Tricolored Blackbirds use a diversity of foraging substrates in which to find insects, this is a difficult field to rank. Tricolored Blackbirds will typically use foraging grounds within 5 miles of their colony, and therefore the highest ranking will be awarded to those sites that have the closest, easily identifiable, and consistent foraging areas.

- 4: Natural forage, adjacent to colony site
- 3: Agricultural forage, adjacent to colony
- 2: Natural forage, within 5 miles of colony
- 1: Agricultural forage, within 5 miles of colony
- 0: Incomplete data

-1: No productive forage nearby

Land Manager Amenability: The willingness of a landowner to implement Tricolored Blackbird conservation efforts is a major factor in the long-term persistence of the species. Those landowners amenable to conservation efforts for Tricolored Blackbirds are ranked highly, especially if they have historical or current colonies on their property.

- 2: Outreach welcome
- 1: Limited consent or more work needed
- 0: Owner unknown/unreachable
- 1: Currently not willing to cooperate

Threat to current site: Colony sites are exposed to a variety of threats both natural and human facilitated. Some areas may be facing a high threat level and immediate action will be necessary. These are given the highest scores for threat.

- 4: Critical - If decisive action is not taken immediately (before completion of the upcoming breeding season) the colony will fail and be unsuitable for breeding TRBLs permanently.
- 3: Endangered - The site faces a continuing risk of being made permanently unsuitable for TRBLs; its demise is eventually certain without intervention.
- 2: Threatened - The site is susceptible to events that will render it temporarily unsuitable for TRBL breeding.
- 1: Watch List - Events at these sites are unpredictable or unknown, but negative impacts on the breeding population are likely and/or expected.
- 0: Stable or unknown - No immediate threats to the condition of the colony are observed

Project feasibility and magnitude: This field evaluates the possible response to the threats perceived for each site and the ease of enacting a project of conservation, restoration, and/or management. Both the scope of the conservation plan (planning, implementation, funding) and the readiness of the plan to be enacted are factors. Unless a project has been attempted or proposed, this field may not be possible to evaluate.

- 2: Stable, no effort required
- 1: Minimal effort required
- 0: Unknown
- 1: Moderate effort
- 2: Large-scale project

Potential benefit of habitat project for Tricolor Projects: Some habitat projects could have significant impacts on increasing the reproductive success of Tricolored Blackbirds or secure a habitat site for decades. The projects that have potential to affect long-term Tricolor persistence will be highly ranked.

- 4: Immediate increase in breeding population and reproductive success of currently active site, and long-term preservation of the site
- 3: Immediate increase in breeding population and reproductive success of previously used site
- 2: Projected increase in breeding population in new area with high quality habitat
- 1: Projected increase in breeding population in new area with medium to low quality habitat
- 0: Unknown benefit to Tricolor breeding population