TRICOLORED BLACKBIRD
Agelaius tricolor

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Management Status: Federal: USFWS Species of Concern
California: Species of Special Concern (CDFG, 1998)

General Distribution:

Tricolored Blackbirds have one of the smallest ranges of any bird species in North America (AOU, 1998). Almost the entire population is limited year round to cismontane California, and the Central Valley supports the largest population. Small numbers occur in transmontane California (i.e., deserts and Great Basin), Oregon, western Nevada, Washington state, and northern Baja California (Beedy and Hamilton 1999). Grinnell and Miller (1944) cited records as high as 4400 feet (1340 meters) in the Great Basin, but this species is largely a bird of lowland areas, below 3000 feet (Gaines, 1988; pers. obs.).

The species is known to make predictable seasonal movements, but the occupancy of individual colony sites is often unpredictable (Neff, 1937; Payne, 1969; DeHaven et al., 1975; Beedy et al., 1991). Studies over the last 30 years have indicated that this may be a natural, adaptive response to variable annual spatial patterns in the species' food supplies, especially insects. Interestingly, despite such movements, all banding returns for the species in southern California are of birds banded there (n=13), while none of the birds banded in the Central Valley, and eventually recovered, were found in southern California (n=136; Neff, 1942; DeHaven and Neff, 1973). This may indicate that there are two distinct metapopulations, and Beedy and Hamilton (1997) recommend investigation to determine whether the separation may be significant at genetic and/or taxonomic levels.

Distribution in the West Mojave Planning Area:

Based on the available information compiled for this report (see map) along with information provided in Garrett and Dunn (1981), a clear peak in Tricolored Blackbird records in desert areas occurs in spring, especially April and May, with a smaller peak in September and October, with small numbers of birds through the winter. Occasional strays can occur at nearly any wetland or irrigated grassy area (e.g., golf courses and cemeteries) that attracts wildlife, and flocks and individuals often associate with other blackbirds and European Starlings (*Sturnus vulgaris*) in the nonbreeding season.

Within the Mojave Desert (including the WMPA), the species appears to be most frequent toward the western edges. In the Antelope Valley, it breeds in several small colonies, "but appears to mostly withdraw in late summer and early fall," and, "has probably declined" (K. Garrett, pers. comm.). The species also breeds along the Mohave River near Interstate 15, and may do so at sewage treatment ponds in Barstow (S. Myers, pers. comm.). There are apparently no historical or current breeding records for this species in Inyo County (Beedy et al., 1991). A few small colonies are likely undiscovered, and changes in land use, such as new sewage treatment plants or wetlands restoration, have the potential to establish new colonies. The largest recent colony in southern California (c. 35,000 individuals) occurred at newly restored wetlands

at a sewage treatment facility near Hemet in western Riverside County, but recent changes in vegetation management have made the facility unsuitable for Tricolored Blackbird breeding (E. Beedy, pers. comm.).

Natural History:

Tricolored Blackbirds are a rather poorly studied species, probably due to their limited range and their close taxonomic affinity (and presumed similarity) with the widespread and heavily studied Red-winged Blackbird (*Agelaius phoeniceus*). A review indicates that just over half of 50 scientific papers and reports addressing Tricoloreds have been published since 1970. There are apparently no published studies addressing the species in desert areas. Thus the information that follows is based on cismontane studies. Few significant changes to the species' biology in desert regions are anticipated, beyond a greater restriction of available habitat for both foraging and nesting. The recent and thorough summary of status and management by Beedy and Hamilton (1997) is very useful, and a comprehensive summary of the biology and natural history of the species has been provided in the upcoming account for the Birds of North America series (Beedy and Hamilton, 1999).

As might be expected for a species with such a small range and extensive individual movement, there are no described subspecies, and no published information indicating significant geographic variation (AOU, 1957; Pyle, 1997). However there has also apparently been no modern analysis of geographic variation, morphologically or genetically.

Average mass is 2.39 ounces (68.2 g.) for males, and 1.72 ounces (49.2 g.) for females (Dunning, 1993). Thus males outweigh females by about 39%, compared with a figure of about 53% for the same measure in Red-winged Blackbirds (Dunning, 1993). Male Tricolored Blackbirds outweigh male Red-winged Blackbirds modestly, and females outweigh their counterparts substantially, though this is partly obscured by the considerable geographic variation in Red-winged Blackbird (Dunning, 1993). Adult specimens average 8.31 inches (211.1 mm; n=9) in total length, and female specimens 7.41 inches (188.2 mm; n=10; Ridgway, 1902). No studies of annual survivorship have been published, but available banding studies (Neff, 1942; DeHaven and Neff, 1973) indicated ages of at least 13 years have been achieved in non-captive birds.

Tricolored Blackbirds are one of the most colonial of all North American species (Bent, 1958; Orians, 1980; Beedy and Hamilton, 1999), perhaps second only to the extinct Passenger Pigeon (*Ectopistes migratorius*). Nesting colonies with over 200,000 nests have been documented (Neff, 1937), and as recently as 1994, colonies estimated at 70,000 nests have been found (Beedy and Hamilton, 1997). During 1997 statewide surveys, 75% of all adult Tricoloreds counted in late April were in the largest ten colonies (Beedy and Hamilton, 1997). As discussed under Threats Analysis, smaller colonies may fledge proportionately fewer young than large colonies. They may thus act as population sinks, with productivity rates lower than mortality rates.

This species is regularly polygamous, with a typical ratio of two females for every male nesting in a colony (occasionally as much as 1:1); females typically breed at one year, and males at two (Lack and Emlen, 1939; Payne,, 1969; Beedy and Hamilton, 1999). Nesting colonies in the San Joaquin Valley form in late March and is widespread by early April (Beedy and Hamilton, 1999). Nest are constructed by the females, generally 6.6 feet (2 m) or less above the ground or water (rarely on the ground) in a wide variety of plant species; occasional colonies in tree

canopies have nests located considerably higher. The rather solidly built nest consists of an outer woven layer, often with stems and leaves sticking out; a middle mud, algal strand, or fine fiber layer; and an inner layer of fine, downy plant material (Payne, 1969; Beedy and Hamilton, 1997; 1999). Rather uniform in size, typically 7.6 cm high by 7.6 cm wide (Beedy and Hamilton, 1999).

Typical clutch size is 3-4 eggs (Bent, 1958; Payne, 1969). Females will renest after loss of the first nest, and are known to do so both within a colony, and after relocating to another colony. There is apparently no proof of successful multiple brooding, though itinerant breeding suggests it (Hamilton, 1998). Young achieve independence from parents at about 24 days, with a full nesting effort requiring about 41-45 days, about ten days less than for Red-winged Blackbird; both sexes of Tricoloreds provision nestlings (Payne, 1969; Beedy and Hamilton, 1997). Tricolored Blackbirds have low natal site fidelity; among recaptured birds originally banded as fledglings, only 39% were found within 10 miles (16 km) of their natal colonies (n=33; DeHaven et al., 1975). Seasonal movements and dispersal of adults appear to be complex, with low breeding site fidelity of individuals, but fairly high site fidelity by colonies (Beedy and Hamilton, 1997). Aggregation of many or most individuals occurs in early fall, with birds moving into portions of the Sacramento Valley in very high concentrations (DeHaven et al., 1975). Regular fall movements in late fall are also documented into both the Sacramento Valley and northern San Joaquin Valley (Beedy and Hamilton, 1997). As mentioned under General Distribution, there is some evidence that birds in southern California are isolated from birds in the Central Valley and elsewhere in central and northern California; seasonal movement patterns in southern California remain unclear.

Beedy and Hamilton (1997, 1999) summarized diet information, reporting that animal matter (almost entirely adult and larval insects) composed about 91% of the food volume of nestlings and fledglings, 56% of the food volume of adult females, and 28% of that of adult males. Collier (1968, cited in Beedy and Hamilton 1999) concluded in coastal southern California that diet of Tricolored Blackbird during the breeding season is no more specialized than is that of Red-winged Blackbird, though they may rely more heavily on relatively abundant sources. According to Crase and DeHaven (1978), greater than 88% of winter food is plant matter, especially rice (*Oryza sativa*) and other grains, and weed seeds. Despite the size disparity between sexes, there is apparently no established difference in their diets outside the breeding season, although some foraging flocks at that time are strongly sexually segregated (Beedy and Hamilton, 1999; pers. obs.).

Habitat Requirements:

Habitats utilized appear to have changed significantly over the years, though this has not been quantified. Changes are probably a response to how and where the required food, shelter and nest substrate resources may be obtained, as a result in turn of steady conversion of the landscape to more intensive human uses such as intensive crop farming, sheep and cattle grazing, introduction of nonnative plants and, more recently, expansion of vineyards, orchards, and urban development (Beedy and Hamilton, 1997, 1999). Habitat use in the early part of the 20th century, when agriculture was already widespread but not intensive in the core range of the species, is well summarized by Grinnell and Miller (1944):

> "In nesting season, vicinity of fresh water, especially marshy areas. The most favored sites for colonies are heavy growths of cattails and tules, but even when these are available, other vegetation may be resorted to for nesting: sedges, nettles,

willows, thistles, mustard, blackberry, wild rose, foxtail grass, barley, etc. . . . One essential would seem to be provision at the site of the colony for a large number of individuals. Nests apparently must be close together and pairs usually in excess of 50 in order to meet the instinctive requirements of the species. Foraging grounds about the colony may be utilized even if several miles distant. Flooded lands, margins of ponds, and grassy fields, in summer and winter, constitute typical foraging terrain."

Beedy and Hamilton (1997) provide an accurate summary of habitat requirements in the context of the species' behavior and changing environment:

"The Tricolor's highly synchronized and colonial breeding system may have adapted to exploit a rapidly changing environment where the locations of secure nesting habitat and rich insect food supplies were ephemeral and likely to change each year (Orians, 1961; Orians and Collier, 1963; Collier, 1968; Payne, 1969).

"Tricolors have three basic requirements for selecting their breeding colony sites: (1) open accessible water; (2) a protected nesting substrate, which is usually either flooded or thorny or spiny vegetation; and (3) a suitable foraging space providing adequate insect prey within a few kilometers of the nesting colony (Beedy, 1989; Hamilton et al., 1995).

"Almost 93% of the 252 Tricolor breeding colonies reported by Neff (1937) were in freshwater marshes dominated by tules (*Scirpus* sp.) and cattails (*Typha* sp.). The remaining colonies in Neff's study were in willows (*Salix* spp.), blackberries (*Rubus* sp.), thistles (*Cirsium* and *Centaurea* spp.), or nettles (*Urtica* sp.). In contrast, only 53% of the colonies reported during the 1970's were in cattails and tules (DeHaven et al., 1975).

"An increasing percentage of Tricolor colonies in the 1980s and 1990s were reported in Himalaya berries (*Rubus discolor*) [a non-native], and some of the largest recent colonies are in silage and grain fields (Hamilton et al., 1995). Other substrates where Tricolors have been observed nesting include Giant Cane (*Arundo donax*), Safflower (*Carthamus tinctorius*; DeHaven et. al. 1975), tamarisk trees (*Tamarix* spp.), and Poison-oak (*Toxicodendron diversilobum*). In addition, they have been found in habitats that include riparian scrublands (e.g., *Salix*, *Populus*, *Fraxinus*) and forests and a lemon orchard (American Birds file data).

"Tricolor foraging habitats in all seasons include pastures, dry seasonal pools, agricultural fields (such as large tracts of alfalfa with continuous mowing schedules), rice fields, feedlots, and dairies. Tricolors also forage occasionally in riparian scrub, saltbush (*Atriplex* spp.) scrub, marsh borders, and grassland habitats. Weed free row crops and intensively managed orchards and vineyards do not serve as regular foraging sites.

> "During nesting, Tricolors forage away from their nest sites, often well out of sight of the colony. Most Tricolors forage within 5 km [3.1 miles] of their colony sites (Orians, 1961), but commute distances of up to 13 km [8.1 miles] have been reported (Hamilton pers. obs.). Short-distance foraging (i.e., within sight of the colony) for nesting provisioning also is common."

There is no detailed information on habitat use specifically in desert areas. Garrett and Dunn (1981) describe habitat for southern California as a whole: "Tricolored Blackbirds breed in dense colonies in extensive reed beds. Like other blackbirds they congregate (in either mixed-species flocks or pure flocks) in agricultural areas outside of the breeding season. Even in the breeding season most foraging takes place in agricultural areas or on open lawns (golf courses, cemeteries, etc.)."

Within the Mojave Desert, potentially positive habitat changes from natural conditions include local increases in irrigation of crops and lawns for parks, cemeteries and golf courses as well as some creation of artificial lakes, reservoirs and sewage treatment facilities, depending on available resources. Negative habitat changes include loss of riparian and other natural wetland habitats.

Population Status:

Survey data for the species' overall range in California indicate a strong, continuing decline in total population. Focused surveys for Tricolored Blackbirds in 1997 documented 37% fewer birds than found in comparable statewide counts in 1994 (Beedy and Hamilton, 1997). Population declines were said to be most apparent in historical strongholds of the species' range in the Central Valley including Sacramento, Fresno, Kern, and Merced counties.

There are no available data on total population size or trends within the Mojave Desert or the WMPA, and no careful counts indicating trends across years at specific locales therein. There is anecdotal information indicating declines, such as the statement that the species, "has largely ceased nesting at extensive *Scirpus* marshes at Piute Ponds, Edwards AFB, in late 1990's, perhaps because of decline in alfalfa farming in areas to south, southeast, and west" (K.L. Garrett, pers. comm.). Based on the available information (see Garrett and Dunn, 1981) and observations gathered for this report, no definite pattern is evident in population trends, but based on known losses of wetland habitats and population declines elsewhere, it appears likely that there has been a significant decrease in the total number of Tricolored Blackbirds in the WMPA over the last several decades.

Threats Analysis:

Beedy and Hamilton (1999) summarize published and unpublished data documenting 21 species of known avian, mammalian, and reptilian predators of adults and/or nestlings; many others are likely. The authors considered predation a major source of mortality. Black-crowned Night Heron are considered, "perhaps the worst Tricolored Blackbird predators of all" (E.C. Beedy, pers. comm.). All of the predators listed by Beedy and Hamilton are native except Virginia Opossum (*Didelphis virginiana*) and feral cats (*Felis cattus*), although others, such as Common Raven (*Corvus corax*) have increased due to man. Most of the species listed are present in the WMPA. Extreme weather events, including severe storms, cold, and hail, can cause

catastrophic destruction in nesting colonies (Beedy and Hamilton, 1997). Brown-headed Cowbirds are known to place eggs in this species' nests, though it is rare, and it is unclear whether cowbirds are successful and whether host brood reduction occurs (Beedy and Hamilton, 1999; Hamilton et al., 1995).

Most threats to Tricolored Blackbirds are directly or indirectly related to human activities, though natural predation can also be considerable. In order of suspected importance, these anthropogenic threats include:

(1) Degradation and loss of habitat. Rangewide, most potential natural nesting and foraging habitats have been developed into agricultural, residential, and other uses for man's benefit during the last 150 years (Frayer et al., 1989; Wilen and Frayer, 1990; both cited in Beedy and Hamilton, 1999). While some of the converted areas, such as sewage treatment plants, can support Tricolored Blackbirds, most cannot. Indeed some, such as certain crop fields, lure colonies to nest, with the crop being harvested before young can fledge (Beedy and Hamilton, 1999). Recent and ongoing changes in agricultural practices in the Central Valley, such as widespread conversion to vineyards and orchards from grain and silage crops, have exacerbated the loss of potential nesting and feeding areas. In addition, remaining natural potential habitats are invaded to varying degrees by non-native plants, vertebrates, and invertebrates, which change the ecosystem balance, potentially decreasing productivity for this species in a variety of ways. In desert areas, the species is likely to be highly dependent on resources intensively used by humans, such as natural and artificial desert wetlands and irrigated crops, magnifying the consequences of any habitat changes.

(2) Pollutants and Biocides. Pollutants, such as selenium buildup in portions of the Central Valley (Beedy and Hamilton 1999), are a serious problem at a local scale. Application of biocides, such as insecticides, has a negative effect on the local food base for many colonies, as well as simply making food supplies unreliable for Tricolored Blackbird colonies. The potential for direct, negative effects is also present (Beedy and Hamilton, 1999). Beedy and Hamilton (1997) state that, "at the present time chemical threats to Tricolors are a far less serious problem than are habitat losses." However they also cite aerial spraying for mosquitoes as having caused at least one colony failure, and this issue should not be overlooked in other pest management actions.

(3) Human disturbance. Direct human disturbance is a potentially important problem for any highly colonial species. Beedy and Hamilton (1999) specifically discuss the potential for impacts from researchers and land managers, but other factors, including unleashed dogs (*Canis familiaris*), power boats, or noise from off-road or other vehicles, are among potential disturbances in desert colonies and foraging areas. Intentional destruction of large numbers of blackbirds in response to crop depredation, nuisance issues, and even as a food source was a serious threat in the past but not today (E.C. Beedy, pers. comm.). See McCabe (1932); Neff (1937) and Bent (1958) for historical accounts of mass slaughter, and DeHaven et al. (1971) and Schafer and Brunton (1971) for examples of more recent methods.

In many regards, Tricolored Blackbird problems may be relatively amenable to management, in comparison to less colonial birds whose declines appear to be largely a function of broad landscape or regional land use changes (e.g., Loggerhead Shrike, *Lanius ludovicianus*; California Gnatcatcher, *Polioptila californica*). This is due to: (1) the relatively high level of current protection for wetland habitats; (2) the tendency for a relatively small number of sites to produce a relatively high fraction of the young in a given year; and (3) restoration methods for

wetlands are relatively sophisticated, compared with that for many other habitats. However there are also relatively intractable management issues for this species, including: (1) many of the potential predators (e.g., Common Ravens) are difficult to control, and are increasing on a broad scale (Boarman and Berry, 1995); (2) nesting sites must be both high quality, and within perhaps 3.1 miles (5 km) of high quality feeding areas (Beedy and Hamilton, 1997); (3) the species' erratic distribution may be an adaptation to conditions we do not yet fully understand, or which might be difficult to manage, such as large-scale, cyclic arthropod population fluctuations, or parasite or disease epidemiology.

Biological Standards:

Minimum management requirements in the WMPA should include the following five steps: (1) protect and enhance wetland and riparian systems, including non-native trees unless replaced by suitable natives, as they may provide nesting sites and foraging habitat; (2) prohibit use of biocides and other toxins as well as shooting or other removal for pest control; (3) BLM-approved biological evaluations for projects and planning changes (e.g., road or other construction, changing land use such as grazing) should include, as relevant, an evaluation of the impacts or benefits to this species, including cumulative impacts; (4) insofar as possible, limit disturbance including vehicles, boats and off-road vehicle use in areas of potential habitat; and (5) maintain an ongoing database of sensitive species information for the WMPA, made available upon request by researchers.

Survey methods for this species are provided in Hamilton et al. (1995) and Beedy and Hamilton (1997), with important cautions provided in Hamilton (1998), and these should be followed by researchers assessing and monitoring colonies. Beedy and Hamilton (1997) provide six top priority research recommendations which are potentially important to the biology and management of the species within the WMPA: (1) investigate land uses near colonies; (2) evaluate predator - prey relationships; (3) investigate itinerant breeding; (4) inventory and analyze peripheral colonies; (5) monitor demography; and (6) determine taxonomic and genetic status of southern California Tricolored Blackbirds.

In the short term, the primary conservation needs for Tricolored Blackbird in the WMPA are to: (1) determine whether numbers are declining, stable or increasing; (2) halt or offset degradation of nesting and foraging habitat as a result of land use changes; and (3) address suspected mortality factors such as increased predation. Though this species does irregularly use artificially created sites, it is important to recognize that mitigation for loss occupied habitat cannot be assured at this time simply through creation of wetlands, even when similar plants are used. In the longer term, it is vital to protect and properly manage the species' habitat through acquisition of sound information as a basis for sound land management decisions.

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