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TRICOLORED BLACKBIRD PROJECT 1994

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Throughout this report we refer to numbers of breeding birds observed at various localities. This report shows that Tricolored Blackbirds are itinerant breeders. I. e., some and perhaps all individuals nest more than once and at more than one place. Hence, summation of nesting attempts should not be confused with number of individuals comprising the global population. It is possible that there is an inverse relationship between quality of breeding conditions and number of birds sighted because failed breeders may show up again at additional locations each time their nests are destroyed.

We imply no precision when estimating that a colony seen only three or four times has 50,000 birds, as was so for the Tulare County silage colony. Nevertheless, to track numbers during numerous revisions, it has been easier to maintain exact summaries than to round off to the nearest 100 or 1000. Hence, we sum odds and ends including crude estimates such as the Tulare silage colony 50,000 bird estimate to exact numbers throughout.

One punch line of this report is that in spite of dramatic losses of reproductive effort by Tricolored Blackbirds to predation, weather, farming and flooding, this species appears to be at carrying capacity, at least throughout Northern California. This means that all existing habitats are occupied and that an increase in numbers through reproduction will be followed eventually by lowered reproductive success. It follows that protective measures such as intervention in agricultural operations will have no lasting effect upon the populations and such protective measures may be counterproductive even though populations are temporarily enhanced, inducing increased problems at dairies and elsewhere.

Populations obviously can be enhanced by creating additional habitat. This action, local enhancement of numbers and distribution, needs consideration. It is easy to create Tricolored Blackbird breeding habitat. Some artificial habitats may be counterproductive to the long term welfare of this species. Mitigation credit should not be offered for all actions resulting in the attraction of nesting Tricolored Blackbirds.

Three essential habitat features will attract nesting Tricolored Blackbirds within the geographic distribution of this species:

Nesting cover in the form of broad cattail edges or other vegetation surrounded by water, or spinous vegetation,

Open water, as a pond, stream or marsh, and,

Foraging habitat, in the form of ungrazed or lightly grazed range land, irrigated pasture or scrub.

The question is not how but whether and where to produce this habitat.

TABLES

FIGURES

APPENDICES

1. ABSTRACT:

1. The global population of Tricolored Blackbirds, Agelaius tricolor, initiates breeding mainly in the San Joaquin Valley of California. In 1994 we estimated that there were 324,621 (275,000 to 400,000) observed birds entering the breeding season. This estimate is based upon the number of birds identified as being at nesting colonies and unattached to colonies on or about April 23. There is an additional unmeasured population of birds not seen or inferred and thus not estimated then.

Initial spring breeding settlement occurs in late March and through April. Most April settlement in the San Joaquin Valley is associated with dairies and cattle feedlots. As nests fail due to predation, inclement weather and agricultural operations, disrupted individuals renest, both at established colonies and at new colonies at other locations. In May and June of 1992 and 1994 but not 1993 these additional locations included the Sacramento Valley north of Sacramento County. This unpredictable influx of Tricolored Blackbirds into the Sacramento Valley from the San Joaquin and the lower foothills on the east side of the Valley has been overlooked by some observers, who thus concluded that there had been precipitous local declines and extinctions.

2. In late March and throughout April the majority of the population depends heavily upon dairies and feedlots and their resources. Concentrations of nesting birds at dairies are vulnerable to mechanical losses from harvesting operations and blowdown. These birds are largely unwanted by dairymen.

3. Wetlands refuges and duck clubs provide cattail marsh nesting cover, both for first brood and, later in the season, in the vicinity of rice cultivation. These colonies are mostly unsuccessful and are identified by us as reproductive sinks based upon measured reproductive output. Reproductive losses are to predators which aggregate at these colony sites.

4. Himalaya berry colonies are found throughout the northern part of the state, from Merced County northward. Tricolored Blackbird colonies nesting in this substrate have on the average greater reproductive success than elsewhere.

5. Our previous (1992, 1993) and 1994 studies have emphasized analysis of nesting habitat selection. Nesting Tricolored Blackbirds saturate all suitable habitats within their area of geographic distribution. Local declines in numbers are entirely attributable to losses of suitable habitat, not to nesting failures.

6. Overall numbers of Tricolored Blackbirds are thus limited by density dependent competition for resources, especially foraging habitats near colonies. The main evidence for this conclusion is use of all suitable habitats as colony sites and the ubiquity of starvation of some chicks at almost all colonies.

Efforts and money used to manage Tricolored Blackbirds should be directed towards development of additional habitat. Development of more permanent habitat to sustain the current Tricolored Blackbird population and to secure easements to protect the most natural colonies is a viable long term alternative to protection of colonies faced with destruction by agricultural operations. Some of these colonies should be developed as educational demonstrations of the natural grandeur represented by this species.

Tricolored blackbird populations also may be enhanced by adding missing habitat features to environments not in the way of and potentially complementary to both development and agriculture. Failure to manage Tricolored Blackbirds will lead to unpredictable and potentially costly consequences.

7. It appears pointless to deal with agricultural and other direct impacts upon nesting colonies except as a policy issue. The policy question is: should colonies (of all species of birds) be protected? There is no other North American colonial bird species known to us whose colonies are not protected from deliberate destruction.

8. A population viability analysis (PVA) suggests that this species is not vulnerable to extinction unless there are major additional habitat losses. Local extinctions have occurred and others are likely because local habitats have been or can readily be eliminated. The best known example of local losses Yolo County, where there is a good historical record of Tricolored Blackbird abundance. Is local extinction only a local problem? How local?

9. Our study shows that analysis of a species can lead to general conclusions. As species wide information about other species is developed management plans can be made that accommodate an array of species and thus, in the aggregate, become plans to manage environments (habitats, ecosystems, biomes). We have not seen a top down management plan that will effectively accommodate Tricolored Blackbirds, perhaps because agricultural environments are often overlooked in such plans, perhaps because top down planning operates at a scale too coarse to identify Tricolored Blackbird habitats.

2. INTRODUCTION:

Here we summarize observations and suggest management implications of a three-year study of Tricolored Blackbirds, Agelaius tricolor. A 1991 petition to CF&G and USFWS (Beedy et al., 1991) to list Tricolored Blackbirds as endangered was based upon the conclusion that there had been major local extinctions and an overall collapse of populations throughout the distribution of this species. Losses of breeding effort by colonies due to herbicide application at colonies (Hosea, 1986) and selenium poisoning at Kesterson NWR (Beedy & Hayworth, 1992) were additional bases for the petition. California advanced the species as Candidate Endangered in 1992. The petition was withdrawn and the species status returned to that of "Species of Special Concern" following our (UCD Tricolored Blackbird research team) July 9, 1992, report summarizing 1992 breeding season evidence that there were 250,000 breeding Tricolored Blackbirds.

The primary reason for conducting this study was to determine the current status of Tricolored Blackbirds and to identify any imminent threats to this species. Reports of herbicide (Hosea, 1986) and selenium poisoning (Beedy & Hayworth, 1992) suggested that a sinister DDT-like scenario might be jeopardizing this species. The plausibility of this scenario was enhanced by the observation of numbers of young dead chicks on levees at Kesterson, some with elevated selenium levels in body tissues (Beedy & Hayworth, 1992) in 1986 and 1987 when selenium was identified as a cause of deformities in other water bird species there (Ohlendorf et al., 1986). When the petitions to list Tricolored Blackbirds as endangered were filed their numbers appeared to have collapsed (N = 35,000, Saunders, 1992) some time since the last active field survey was conducted by DeHaven et al. (1975a) between 1968 and 1972. The sum of the largest value determined for each county by DeHaven et al. (1975a) for all years is 345,015, a number exceeding the number of birds he located in any single year. It is not clear how the 750,000 bird estimate in the 1977 Audubon Field Guide (Udvardy) was made. In this report we develop a best estimate of minimum population size and distribution, spatially and through time.

To understand the status and population biology of Tricolored Blackbirds as a species, the objective of this study, required evaluation of the movements and reproductive activities of this species over large geographic areas during the breeding season. Unlike most other temperate region birds, Tricolored Blackbirds show limited philopatry (DeHaven et al., 1975b). Large breeding concentrations may shift from place to place throughout much of their area of distribution. To analyze this relationship, we synchronously canvassed the entire distribution of this species except for extreme Northern California and Oregon, some of the mountain valleys and the coast. Additional coverage was provided by a statewide survey by National Audubon Society (NAS) members, California Department of Fish and Game (CF&G) and U S Fish and Wildlife Service (USFWS) personnel. USFWS collaborators and CF&G biologists maintained a persistent watch for Tricolored Blackbirds during all three years of this study and reported current observations to us on an ongoing basis. Data so generated may be sufficient to identify patterns of movement during the breeding season and to roughly estimate numbers.

3. METHODS:

Methods used by Neff (1937) and DeHaven et al. (1975a, 1975b) and us (this study, 1992-1994) to locate birds were essentially the same but distribution and extent of effort differed. We followed many colonies throughout the season while other observers appear to have visited colonies less frequently. Neff (1937) had a smaller and less well dispersed network of observers and accessed a less adequate highway system (DeHaven et al., 1975a). He spent an uneven effort during six years in counties throughout the state while resident in Yuba County. DeHaven and his coworkers worked 45 man-days per year for 4 years and found 164 colonies. Their research emphasized a nestling banding program, a major undertaking. They had a smaller observer network than we did because birding was not as well developed in California when they made their survey. In 1994 we (Cook, Grey, Hamilton) were collectively in the field for more than 150 days.

Hosea (1986) made a minimal effort to locate colonies, especially in Colusa and Glenn Counties where he found no birds. Orians (1961) traveled widely throughout the Central Valley observing Tricolored Blackbirds from 1958-1960, but he made no attempt to assess overall abundance. Payne (1969), active between 1962 and 1964, also estimated the number of Tricolored Blackbirds using several colonies in the Sacramento Valley.

3A. Survey Methods

The survey method we used was to identify colonies and to revisit them each year throughout the breeding season. Thus, as **current** information developed, a greater and greater proportion of the total population came under observation. Access increased as we became known to correspondents and as we identified access points and limitations. Because a large proportion of the birds we observed were at locations where Tricolored Blackbirds had not been seen before, a survey relying solely upon rechecking of known previous colony locations would be insufficient to track overall numbers (Appendix 1).

Cook maintained a county-wide analysis of breeding Tricolored Blackbirds in Sacramento County from late 1991 throughout the entire seasons of 1992, 1993 and 1994. Hamilton and Grey followed up on all reports of Tricolored Blackbird sightings throughout the rest of the Central Valley in 1994, with emphasis upon Colusa, Glenn, Merced, Fresno, Kern and Kings Counties. They visited colonies wherever Tricolored Blackbirds settled, on a weekly basis if possible, regardless of location. In 1994 no attempt was made to visit the montane valleys or the coast except as our travels otherwise dictated. Grey surveyed Southern California in 1994. Analysis of the strongly weather influenced population along the upper Kern River was left to Steve Laymon, (Kern River Research Center) and associates. Richard Stallcup reported the atypical (compared with other California locations) August breeding of Tricolored Blackbirds along the Marin County coast (1993).

To provide a consistent record, some observations by individuals other than us are not included in the tables of this report unless we observed the colony at some time during the season or visited the site after the breeding season to estimate colony size. The accounts of Mark Chichester from Kern County and Joe Engler at Kern NWR are included because they provided critical information in all years of this study and colonies observed by them and us (Hamilton) produced similar estimations of numbers. The reader is referred to

the results of the NAS-CF&G Survey (Appendix 2) for additional observations. At present there is no compilation of Survey reports except that included here. All reports of Tricolored Blackbirds received by us are included either in the text or in the appendices. We invite corrections and additions for the calendar year 1994 in particular but also for 1992 and 1993. The substantial Tricolored Blackbird population in the Sacramento area, including all of Sacramento County and portions of some neighboring counties, settles before that in the main rice growing districts of Yolo, Colusa and Glenn Counties. Thus, for analytical purposes, Sacramento County is distinguished here from the rest of the Sacramento Valley and our references to the Sacramento Valley are exclusive of the Sacramento County area. We recognize three breeding areas in the Central Valley on the basis of breeding schedule: the San Joaquin Valley, the Sacramento Valley and Sacramento County. These and all other locations north of the Tehachapis are referred to as Northern California while all locations to the south are Southern California (Figure 1).

3B. Estimates of Colony Sizes

To accurately estimate colony sizes we calibrated breeding season estimates of colonies with sampling of nests at selected colony sites after the breeding season (Table 1). More extensive sampling of this sort was done in 1991-1993.

Systematic calibration of nest numbers began in 1991 when Cook located and counted nests in the postbreeding season at several colony sites which had been observed when active by two observers. We used information about these colonies to assist us in estimating other colony sizes. We have further refined our capacity to estimate colony sizes by evaluating transects in selected colonies during and after the breeding season in each succeeding year. Transects in active colonies provided additional measurements of nest density from which colony sizes were estimated. On the basis of this successive set of measurements we have developed an ability to estimate colony sizes in a variety of nesting substrates.

The greatest source for estimation errors by observers occurs during settlement and incubation. Estimates at the time of settlement are usually overestimates and may include males who do not attract mates and who will leave the site without breeding. During incubation thousands of females may be unaccompanied by males during the day, remaining on their nests hidden from view from outside the colony. Colony sizes can not easily be estimated on the basis of acreage occupied because nest densities vary widely within and between colonies. Because of this variation, there is no convenient way to standardize colony size estimates without entering colonies during or after the breeding season to sample nest density. Colony sizes are best estimated during the provisioning stage when both parents are present and observable. However, because reductions in colony size can occur from the settlement stage onwards, and because provisioning at the colony may only last 3 weeks, approximately weekly observations are essential to estimate colony sizes (number of nests) accurately and to determine the fate of colonies (see Table 2).

We repeatedly visited most colonies and revised our estimates following each visit. This results on the average in higher estimations than would be made by an observer making a single visit to a colony some time during the breeding season because our final estimates are for the largest number of

settled nesting birds observed at each colony.

3C. Breeding Effort

We report numbers of nests rather than adults in some tables because nests are a more precise measure of breeding effort than number of settling birds. The problems associated with using males as a measure of breeding effort are demonstrated by examples given in Table 3. Some males fail to attract mates (nesting females). Colony sizes can be overestimated by observers who visit colonies early in the season because initial settlements may give the appearance of a much larger and denser colony than that which actually breeds at a particular location.

Colonies may remain active for two full months. Large colonies may be settled for several weeks by new recruits and by individuals renesting after nest failure. For example, local resettlement appears to have been a major feature of the San Luis Colony in 1994. Successful individuals may complete a breeding cycle in about 45 days.

It is necessary to inspect colony sites at least monthly throughout the breeding season (mid-April to mid-July in Central California) to adequately monitor colony progress and to identify failed colonies which may be present for short intervals (sometimes 2 wks). For example, the Capitol Outing Club Colony (COC) in Colusa County first settled on May 24 in 1994 (10,000). Another nesting colony (50,000) settled at a different location on the same 320 acre marsh on May 27. All 24 nests on a transect in the May 24 colony were empty by June 11 and by June 16 at the later colony. When marked, these were all active nests with eggs. Black Crowned Night Herons and possibly Least Bitterns actively preyed upon eggs and hatchlings at both of these colonies. By June 20 we could locate no Tricolored Blackbirds entering or leaving this colony. No accurate estimation of the extent or fate of these colonies would have been possible without at least weekly observations. **Failure to observe colonies declining to or nearly to zero will bias estimation of the reproductive success of the population, overestimating it.** Searches for colonies by tracking provisioning adults are likely to overlook colonies such as the COC colonies described above because no nests at those colonies survived to the stage of provisioning.

3D. Reproductive Success

Reproductive success was measured in two ways - by marking and repeatedly visiting transects and by entering unmarked colonies on as few as two occasions. These different methods provide different kinds of information (Table 3B). Marking transects involved identifying active nests early in the nesting cycle and following their fate. We used nest contents at eight days after hatching of the first chick as our measure of reproductive success. One or more visits were required to identify the first hatching date within a nest and thus to determine the 8th.

Late season visits to colonies serve a somewhat different purpose (Table 3a). These transects involve (1) determining the stage of reproduction within the colony and (2) entering the colony just before the 8th nestling day for the most advanced nests in the colony. During such transects some nests at younger ages will be observed. In addition, nests may be found which are empty. If, during the prior visit to the colony, the proportion of active

nests is determined, the later visit identifies the rate of nest loss and circumstantial evidence may identify its basis. Some of the criteria used to identify causes of losses are considered below.

3E. Desertion, Starvation or Predation?

The breeding biology of Tricolored Blackbirds remains poorly known and some fundamental features of life history remain undescribed. These unknowns have influenced interpretation of information in this report. In order to understand the causes of nest failure, the fate of nest contents must be monitored and described. The following are criteria we used to assign nest failures to predation, desertion, starvation or other causes:

Incomplete nests.

These are nests that failed to be completed either by females which deserted, were driven off or died. Incomplete nests are usually not mud lined and thus are readily detected. In compilations of RS we did not consider these to be failed nests. Their biological significance remains to be determined.

Complete and empty nests.

Signs of predation include:

1. Nests pulled down or strongly tipped, mostly due to mammalian predation,

2. Broken eggs, pecked by bills, some certainly Marsh Wrens, others possibly Tricolored Blackbirds,

3. Broken eggs or eggshell fragments larger than hatching fragments, or yolk stains, some due to Black Crowned Night Herons and Least Bitterns,

4. Nests observed earlier to have eggs or chicks but which no longer do so,

5. Nests with pipping fragments but no chicks in colony as old as 8 days. (Pipping fragments are typically found at the mud layer in nests.) Eight days is the last day a chick will usually stay in its nest when approached. Thus, until some individuals reach this age nests that had eggs or chicks but no longer do so can be assumed to have been preyed upon.

Ambiguous signs include:

1. Empty nests found following fledging in the colony often appear well worn with an excrement pile around the edge.

2. Nests found empty prior to fledging in the colony and with no signs of predation may have been deserted, preyed upon, or never laid in. We know, however, from observations at several colonies that most such nests were preyed upon because they were observed earlier when they contained eggs or chicks.

Starvation.

Signs of starvation include:

1. **Brood reduction.** Brood reduction was an almost universal feature of Tricolored Blackbird nesting in 1994. Its role was seldom ambiguous. Detailed information about the rate of weight gain of individual chicks will be presented in publication. We found that some chicks, usually the first to hatch, prosper while last hatched chicks seldom survive and some last hatchlings are never fed. However, starvation may occur even when there is only one chick. The role of starvation in that circumstance is only inferable from the context of one chick broods doing poorly throughout a colony.

2. **Low rate of weight gain and failure to fledge** by some or all chicks in a brood.

Deserted nests.

Signs of desertion include:

1. **Cold eggs.** Often some of the fine nest cup lining covers deserted egg(s), whereas this is seldom the case with actively incubated eggs.

2. **Dead or dying chicks.** We found no chicks deserted except when there was abundant evidence pointing to starvation or chilling from rainfall as a cause. This finding is not in agreement with existing literature and lore, suggesting that Tricolored Blackbirds may desert viable chicks.

Conclusions regarding nest contents:

1. The main ambiguities in interpreting failed nests come as a result of the actions of sloppy or interrupted predators. Predators, especially Black Crowned Night Herons, may leave behind one or more eggs. Sometimes the remaining egg(s) are incubated. Detection of predation loss is by observation or yolk stains on one or more of the remaining eggs.

2. The best record of events at a colony is a transect of marked nests observed on two or more occasions. We did so at 10 of the Sacramento County nests for which RS data are provided. In addition we did so at Laguna Seca (Monterey County), San Luis, two colonies at Los Banos state refuge, and three colonies at O'Neill Forebay (Merced County), the Pyle, COC I and COC II and Delevan in Colusa County, Producer's Dairy in Fresno County, Chrome I first nesting and Delevan Owen in Glenn County, Wildwood, Twisselman and Poso Creek in Kern County and Blackberry in Yuba County. Both COC colonies failed due to savage predation. The Poso Creek Colony was harvested before any birds fledged. In addition, the Tulare County Colony was also harvested before any birds fledged, rendering certain the fate of all nesting efforts by that colony.

Circumstances associated with those colonies followed sufficiently closely to evaluate reproductive success are given in Table 3B.

Thus, we sampled or exactly determined (Poso, Tulare, COC I, COC II, Marvin Owen, Howard Slough, Pyle) reproductive success at 29 colonies attended by 406,000 nesting individuals, or almost exactly 2/3 of the population we could locate.

Unless nestlings can be marked and followed after leaving the nest, the most valid information about the outcome of a nesting effort can be obtained just before the first nests produce jumping nestlings (nestlings typically will jump when disturbed at 9 days post hatching). At this time a maximum reproductive success value for the colony or a part of it can be determined. This value also serves as a relative measure of reproductive success that can be compared between colonies. We have used this surrogate measure of reproductive success as a measure of fledging success. **When a sample of nests at this stage throughout a colony is examined and few or no nests with nestlings are located, colony failure is confirmed.** Classical sampling theory and logic suggest that additional sampling (N >100) is unnecessary.

Observations made from within colonies involve tagging nests, determining their stage of development, and returning just before fledging to identify fledging success. Additional transects of unmarked nests through a colony are a valuable supplement to marked lines, and at the larger colonies we conducted several such transects. These additional transects, both during and after the breeding season, identify differences in rates of predation in different parts of colonies and may detect events such as adult female mortality on nests that would not be detected or quantified on shorter intensive transects. To resolve numerous ambiguities, continuous direct observation of nests is also necessary, but was beyond the scope of this study.

There are additional ways to identify the success and failure of colonies. At some colonies such as the Winton Marsh colony on San Luis NWR and the Acer Farm (1993) and COC (1994) colonies, virtually all nests were preyed upon. At these locations **we examined hundreds of nests at the end of the nesting season but before any nests fledged.** These observations show that most or all nests were preyed upon.

Weather related events can also savage the reproductive efforts of a colony. In the 1994 season there was considerable weather related loss of nestlings and in all years some adult female mortality at nests appears to have been induced by cold and rainy weather. At all colonies this kind of mortality was readily identified because **dead and dying nestlings remain in wet nests** and some nests are unaffected.

3F. Density

Nest densities were determined by sampling numbers of nests per unit area at several locations within a colony, then multiplying by the total area. Especially in marshes where nest densities typically varied significantly throughout the colony, several transects were necessary to determine colony density.

It has been common practice to multiply the number of nests found by 1.5 to estimate the number of adults attending a colony. This follows from limited observations by Orians (1961) and Payne (1969) suggesting that this is the degree of polygyny in Tricolored Blackbirds. We use this figure for consistency to convert the number of nests to the number of breeding adults

within a colony. But our observations, especially this year at San Luis NWR, suggest that in some places and under some conditions, virtual parity (1 male, 1 female) prevails. In other cases a high level of Tricolored Blackbird polygyny is observable or inferable so we cannot recommend any particular revision of the 1.5 factor. Our overall population estimate is based upon numbers of nests multiplied by 1.5. This procedure leaves one year old males and nonbreeding males, an estimated 25% of the global population, unaccounted for. Some of these males attend colonies and may breed (Payne, 1968). Despite this and other problems associated with use of the 1.5 adjustment factor, there is considerable utility to maintaining traditional schemes for accounting, and we do so here.

3G. Landowner Status of Colonies and Foraging Areas

Landowners were approached and ownership status determined from people encountered in the vicinity of colonies (Tables 4A, 4B; Appendix 3). Usually some local resident was able to supply information about all relevant properties and their status including information about whom to contact for access permission. We entered no property in 1994 without gaining permission to do so from an owner or an operator. In all but one case we were eventually able to enter sites we targeted, but in practice development of permission often imposed severe time constraints upon an operation already severely limited by time and distance. The solution to this limitation is expansion of the manpower base, not accelerated encounters with landowners.

Water districts are treated as private land in the compilation of land ownership. But, in practice we found that most of these lands were treated by local residents as commons and we did not seek permission to travel within them.

4. POPULATIONS AND MOVEMENTS:

4A. The National Audubon Society - CF&G Survey

Observations by us in Southern California (Appendix 4) and throughout Northern California north of the Tehachapis from mid March throughout the season and the NAS-April 23 Survey (Appendix 2) were evaluated to estimate minimum global numbers. That estimate is 324,621 adults, the minimum number of birds entering the 1994 breeding season (Table 5). It is based upon all birds we located at colonies (settled) prior to the Survey or found by USFWS cooperators and all unattached birds found at different localities between April 22-24.

The point of the survey and the intensive field surveys before and immediately after that date was to identify the number of birds were simultaneously nesting then. All birds nesting on April 23 would have been at their first nest. Thus, the figures in Table 5 are our best estimate of the known adult Tricolored Blackbird population.

A survey on April 22 and again in late May is planned for the 1995 breeding season.

The NAS/CF&G participants were provided with our long term (Appendix 5) and current information about the location of colonies prior to the Survey. Thus, they were given the results of the long term and within season data we generated through daily surveys in Sacramento County and other searches throughout the state. This was also the case in 1992 when a hasty survey was conducted by CF&G using location information provided by us. The 1992 CF&G Survey was completed in about two weeks in early July following the near completion of our 3-month survey, with CF&G results closely matching our results for that interval. Short term surveys can corroborate distribution and occurrence information obtained by a season long survey, but cannot effectively substitute for long term and in depth monitoring.

The Survey total includes:

1. the sum of birds seen at colonies before April 23 if those colonies remained active after April 23,

2. birds observed between April 22-24 not associated with a colony.

3. birds found after April 23 that, as a result of estimated age of nest contents and egg hatching dates (Table 6, Appendix 6) must have been present at colonies we did not locate by April 23.

All colonies determined to have been active on April 23 were included in the overall population estimate. Inclusion was based upon the schedule of activity at nests (See Table 6, Appendix 6, Figure 2) plus reports from Survey personnel. Based upon these criteria 324,621 birds entered the 1994 breeding season. Our estimate would be lower if only birds actually observed on April 23 were included. A larger number would have been recorded if a more substantial survey had been organized. The greater the effort, the greater the fraction of the global population that will be located. A minimal effort, as was the case for the 1994 Survey, will identify some unknown fraction of the global population.

Colonies seen before and after the Survey were counted at their maximum number of nests. The amount of the differences between before and after April 23 was not great at any large colony. However several notable examples significantly complicated estimation of the total Tricolored Blackbird population size. The Alameda quarry colonies were never entered and, viewed from a distance, were difficult to estimate. Nests at these colonies were being incubated at the time of the Survey, accounting for low estimates by the Survey staff on April 23. The status of the growing San Luis colony on April 23 is problematic for we had limited access to this colony. Because this colony was such a substantial part of the global population observed at this time we have included the basis for our estimation of it in Appendix 7.

How many Tricolored Blackbirds were there that neither we nor the NAS-CF&G Survey located? Only a substantially expanded effort can tell.

4B. The Population of Colonies

We located or followed up on reports for a total of 74 colonies in 1994 and the NAS/CF&G Survey located 100 possible colonies. All of the 74 colonies visited by us are included in the NAS/CF&G Survey because we were a part of

that event and provided our data to them (Lyanne Comrack). Some of the latter were small, containing less than 100 birds. Small colonies require more effort than large colonies to locate and a number of small colonies were probably overlooked by us (Table 8). To minimize this effect we eliminated colonies of less than 100 birds from the Table 8 comparisons.

The 10 largest of the colonies visited by us included 60.5% of all breeding individuals we could locate in a full breeding season of active searching (Table 7). This result emphasizes the importance of locating and protecting large breeding colonies if maintenance or increase in Tricolored Blackbird abundance is an objective.

The 74 Tricolored Blackbird colonies we observed were primarily in three substrates: cattail marshes (43.2%), Himalaya blackberry thickets (35.8%) and grain and silage (6.8%) fields (T = 85.8%; Table 6). Additional colonies, located by the NAS-CF&G Survey on April 23, were found in similar habitats but included more tules and nettles as nesting substrates.

Number of colonies has been used to measure Tricolored Blackbird distribution and trends in their abundance (e.g, DeHaven et al., 1975a, Beedy et al., 1991). A decline in mean size of colonies was noted in the petition to list Tricolored Blackbirds as endangered (Beedy et al., 1991). The proportion of colonies by size is summarized in Table 8.

Neff (1937) reported data for 256 colonies located during 6 field years. It is not clear from Neff's account whether or not he identified colonies at the same place or in the same general location as a different colony contributing to his 256 colony total. Beedy et al. (1991), who closely analyzed all historic reports including those by Neff (1937), show Neff's localities. From this analysis of Neff's reports, there appears to be some overlap, especially when applying DeHaven's criterion for one mile separation before a colony is considered to be distinct. But, while many of Neff's colonies are clustered, as, for example, near Maxwell and Willows, they all appear to have been in distinct locations. Based on his own criterion that distinct colonies be separated by at least one mile (1.6km), DeHaven found 156 colonies in 4 field years. Sixty eight of the 74 colonies we observed satisfied DeHaven's criterion. In the case of our observations we found 19 of 72 (26%) colonies at the same locations in all three years of this study. An additional 11 (15%) colonies in 1994 repeated in either their 1992 or 1993 location but not both, and 28 colonies seen in 1994 were not sufficiently well observed in prior years to be certain about their repeat status. Forty colonies were seen in only one year that would have been discovered had they been present in either of the other years. These data, derived from Appendix 5, show a modest degree of site tenacity and also demonstrate the difficulties associated with protecting and managing Tricolored Blackbird habitat. They also show that unless Neff found repeats also, there has been a change in the pattern of between year settlement, perhaps occasioned by a reduction in the number and extent of prospective breeding places.

In 1994, 35 colony sites were added to those previously observed, in part because we extended observations to Southern California and in part because of new contacts established through NAS/CF&G Survey reports. Between 1992 and 1994 we observed colonies at 111 different locations. Of the 35 colonies added in 1994 10 were found in novel locations which, had they been present, would have been detected in 1992 or 1993. Inclusion of all NAS/CF&G Survey

colonies adds about 46 colonies to our running total. We can thus account for 157 recent colonies (76 in 1992 and 1993, 35 added in 1994, plus 46 NAS/CF&G Survey colonies). This is not, however, how Neff found 256 colonies. The clusters of colonies he observed in the Sacramento Valley in particular make clear that he was dealing with patterns of varying annual distribution that no longer exists there, nor elsewhere with the possible exception of the region near the NWRs in Merced County.

One striking feature of these comparisons is the absence of colonies larger than 100,000 birds between 1960 and 1994. Orians reported four colonies larger than 100,000 birds in the Sacramento Valley in 1959 and 1960, all in the rice growing districts of Colusa and Yolo Counties. Aerial applications of insecticides (Figure 2) was already common practice by then (Willson, 1979) and direct effects of insecticide application is not an explanation for the striking difference between abundance then and now, as, for example, at the Capitol Outing Club (Table 9).

The Survey coverage was broad and included many peripheral sites at the limits of distribution of the species. Thus many colonies, especially those in nettle patches, also contributed to the large number of small colonies reported by the Survey. In addition to the 68 colonies with more than 100 birds the Survey reported 32 smaller colonies. It is likely that the relatively large proportion of reports of smaller colonies by the Survey reflects the composition of reporting groups and individuals more than changes in the abundance and habits of birds. The 1930s, 1968-1972 and 1992-1994 surveys were all done by a crew of from one to three individuals working for at least three years throughout breeding seasons to determine the status of Tricolored Blackbirds. Beedy et al. (1991) compiled reports from <u>all</u> sources, including birders. The NAS-CF&G 1994 Survey report is also a birder-based account, and contains reports by all interested parties, with a preponderance of reports for April 23.

The large number of small colonies detected by the NAS-CF&G Survey has several additional possible explanations. Survey observers were familiar with many local sites that had supported Tricolored Blackbird breeding in earlier years. The Survey was largely a one-day effort early in the season before some settlement was complete, and some colonies reported by the Survey are known to have increased in size. Because incubation was in progress at many colonies on April 23, our final colony size estimates in some cases differ significantly from those reported by Survey participants.

<u>Creches</u>. Some late season reports of small colonies may confuse creches with colonies. Creches are groups of fledglings capable of extended weak flight that have moved with their parents from natal colonies to other locations. These are groups of from 10 to 100 or more individuals begging vigorously and being provisioned. To the uninitiated these aggregations give the appearance of being small colonies. We had the frequent experience throughout this study of finding groups of fledglings being provisioned which appeared to be colonies but, upon entering attendance sites, were found not to be so. Unless nests are found or a colony is observed on successive occasions, later season (30 or more days after nest building is initiated in the local area) groups of birds being provisioned should not be identified as colonies. Clusters of small colonies with loudly begging fledglings in the vicinity of a large colony are almost certainly creches. A single large colony may produce 30 or more creches residing at least as far as 5 km from

the colony where they originated. Single creches may also include several thousand fledglings.

4C. Timing of Breeding

Tricolored Blackbirds initiated breeding in late March (Tables 10, 11, Figure 3) and most birds were settled at nesting sites by late April. Additional major settlements, such as the late part (first egg May 9) of the settlement at San Luis NWR, may have been birds who lost nests to agricultural operations such as silage barley fields where many birds were nesting in mid April. Both blowdown and harvest affected success of these colonies.

Initiation of breeding in the Sacramento County area has been about a week later than that in the San Joaquin for each of the years 1992, 1993 and 1994.

The Survey of the Sacramento Valley was less intense than that conducted in the San Joaquin and in Sacramento County. Therefore, numbers for this valley is a limited sample of a possibly substantially larger breeding population. We estimate that we observed less than half of all Tricolored Blackbirds nesting in California north of Yolo and Sacramento Counties in 1994 based upon observations of birds we did not pinpoint to a colony location. Missed nesting colonies include two large colonies in Glenn County we could not reach because of access limitations. The search in the Sacramento Valley was relatively complete early, and a more thorough late search may have resulted in a greater difference between the Sacramento and San Joaquin Valleys than that reported here.

Little breeding was observed in the rest of the Sacramento Valley until May (Tables 10 & 11) and additional settlements occurred throughout the first half of June. Sacramento Valley nesting overall is underreported both by us and by the NAS-CF&G Survey because breeding in the Sacramento Valley occurred later in the season (June and July - Figure 3) when a network of collaborators was unavailable.

4D. Non-breeding Birds During the Breeding Season

Identification of the nonbreeding segment of avian population dynamics is a critical part of the study of their population dynamics, but is difficult to evaluate effectively if there are no banded birds. Tricolored Blackbirds unattached to colonies are found during the breeding season either in the vicinity of breeding colonies as all male groups waiting for eggs to hatch or provisioning chicks at creches. In his study Neff (1937) found over 50,000 nonbreeding birds during the breeding season. DeHaven et al. (1975a) found fewer than 15,000. We saw 15,000 nonbreeders in a single flock at the Delevan Overpass in May, 1992. We are reasonably confident that these were birds en route to breeding sites. At the San Luis 1994 Colony 20,000 nonbreeding birds were about following a storm that blew down silage and caused failure of tens of thousands of nests at that colony. A renesting effort of about this magnitude at that colony may have returned these birds to breeding status. Unless concentrations of nonbreeding birds persist for prolonged intervals (several weeks) during the breeding season, they are probably birds on their way to alternate breeding sites.

4E. Itinerant Breeding

Itinerant breeding - reproduction by adults who have already nested at another geographic location - is an uncommon avian trait (Benkman, 1987, 1990). We identified the possibility of itinerant breeding by Tricolored Blackbirds in 1992 and have developed additional evidence in 1993 and 1994. We were substantially assisted in finalizing this evidence by the NAS-CF&G Survey. Classical itinerant breeding exemplified by the paradigm of the red crossbill (Benkman, 1987, 1990) may not closely agree with the Tricolored Blackbird. Neff had the impression that "colonies nesting early in the season may subsequently change their habitat, and some of them may nest again in different localities." (Neff, 1937, p. 77). We know from Payne's (1969) observation that a female Tricolored Blackbird can lay again at a second location only 14 days after losing her nest with eggs. In this case the second nest was a short distance away, but it demonstrates the potential for prompt renesting at a second location. Sometimes within breeding season Tricolored Blackbird movements are spectacular, with few or no Tricolored Blackbirds about one day - as late as early June - and settlement and nest building commencing the next. There is no substantial breeding season population unassociated with colonies that can account for these settlements. We assume these breeding efforts are renesting breeders who were previously occupied by nesting efforts elsewhere.

The initial breeding effort begins throughout California within the distribution of Tricolored Blackbirds except for the Marin coast. Nests are initiated over about a one month interval, with a much higher degree of synchrony within most smaller colonies than in some large colonies. The bulk of this initial breeding effort is in the San Joaquin Valley and in the Central Valley near Sacramento. Breeding, including provisioning of weakly flying juveniles, takes about 50 days when successful. However, many nesting efforts are unsuccessful because of cold or rainy weather, predation and agricultural operations during April, especially various forms of haying. These failed breeders may renest promptly in the immediate vicinity of the failure or elsewhere in the San Joaquin. About 50 days after the initial settlement a new wave of initial settlements occurs - mostly in the Sacramento Valley. Since there are no nonbreeding Tricolored Blackbirds during the breeding season except at Tricolored Blackbird colonies and their vicinity it seems likely that these later settling individuals are birds that have previously attempted to nest in San Joaquin Valley and Sacramento County areas.

The evidence for this conclusion is as follows:

1. Few (between 25 and 35 thousand) birds were found on April 23 except in association with colonies. The largest concentration of birds not settled at colonies was 15,000 on Arena Plains (Mike Peters, Merced County) and 10,000 in a barley field in Fresno County. If we assume our coverage early in the season was as good as later, the only way to account for the additional later nesting birds is to assume that they were associated with nesting colonies elsewhere earlier in the season.

2. In 1992 and 1994 large numbers of breeding birds initiated nesting in the Sacramento Valley during May and June (Figure 3) but not in 1993. The observed 1994 population cannot be derived from that seen in 1993. A more dispersed incompletely detected population in 1993 is implicated. Despite

intensive search in 1993 we missed some segment of the population and would have concluded that a decline had occurred. Some of the missing birds nested in Coast Range habitats in mustard and other forbs during 1993 (Betty Wentzel, personal communication). These observations emphasize the need to utilize an extensive network of birders and others who can provide timely reports of the details of distribution and numbers.

3. The progression of breeding in Sacramento County was closely followed. There, some colonies were losing nests to predation and rainy weather. New colonies were established on April 27 and April 30. These birds were not counted as part of the estimated April 23 population.

4. We estimate the number of breeding birds, including repeats, observed by us, i.e, exclusive of the Survey, throughout the season to be 608,530. In the Central Valley we detected 307,300 birds nesting in April and 221,571 in May and June. The timing of late season breeding adults (119,000) in the Sacramento Valley followed by approximately 50 days the initial main breeding effort in the San Joaquin Valley. Fifty days is the interval required for a successful breeding effort.

5. Birds arriving at colonies in Colusa and Glenn Counties (Sacramento Valley) were associated with nonbreeding settlements but not colonies in days immediately preceding settlement of breeding colonies (I-5 Delevan overpass, 1992). These settlements behave as if they were colonies in the sense that large numbers of birds (15,000 at Delevan Overpass) use the site as a central place during the day, with foraging parties extending from them. The breeding birds colonizing the Owen quarry first arrived from the south in a steady procession on June 8, 1994 (Steve Owen, personal communication). Males preceded females in the forenoon and were followed by females by evening. Courtship and nest building were underway by nightfall. These birds may have come from the failing colonies at the Capitol Outing Club, 24.6 miles (39.6 km) to the SE.

The itinerant breeding concept explains observations otherwise difficult to interpret. Where do groups of birds, as many as 50,000 (COC, May 31, 1994) come from? Neff (1937) found relatively few Tricolored Blackbirds in the San Joaquin Valley and large numbers of birds in Glenn County and elsewhere in the Sacramento Valley (Table 12). Hosea found virtually no Tricolored Blackbirds in the Sacramento Valley counties he visited. We attribute Hosea's result to his limited searching effort and thus do not enter his estimates into Table 12. We found few Tricolored Blackbirds in the Sacramento Valley in 1993, a year when breeding was delayed by 10 days in San Joaquin and Sacramento County areas. If breeding in the San Joaquin and Sacramento valleys at these alternative locations is interdependent, retardation of breeding in the San Joaquin would retard or eliminate breeding in the Sacramento Valley.

4F. Trends in Regional and Overall Abundance

Table 12 shows that contemporary breeding by Tricolored Blackbirds in the Sacramento Valley is about 27% of that reported by Neff (1937) while the San Joaquin Valley population is 230% greater than that observed by him. Since these populations are interdependent (this study, DeHaven et al., 1975b), interpretation of their status is complex, but at the very least we suggest that massive breeding failures in either region will adversely effect populations in the other and, because of the size of these subpopulations, the

species.

The total statistic - 1,105,100 individuals species wide for Neff compares with our estimate of 632,690 (57% of Neff) and, because we had far greater mobility, these data suggest an approximate halving of Tricolored Blackbird abundance in the last 60 years (Table 12). A more important finding, however, is that there have been major shifts in habitat selection, including selection of exotic plants as nest building substrates and use of agricultural operations as reproductive habitat mainstays.

While the implications of these observations is considered separately by crop category, the general conclusion is that some habitats are sources and others are sinks. If sources decline due to habitat loss or is sinks increase and are not avoided by these birds, a downward spiral in numbers is possible.

5. REPRODUCTIVE SUCCESS:

5A. Colony Nesting Substrates and Dates of Initial Egg Laying

Nesting substrate is defined as the plant species where the majority of nests in a colony were placed. A few colonies included more than one major substrate type, accounting for our use of fractional colonies in Table 6.

Cattails, the preferred native plant nesting substrate, are a sink. Cattail marsh colonies in the Central Valley and elsewhere accommodate 29% of all breeding adults we observed in 1994 (Table 6a). Most cattail colonies suffered severe (>90%) losses of nest contents to predation. Cattails are the most extensive nesting habitat available at the national and state wildlife refuges. Reproductive success in most cattail marshes in the Central Valley is so poor that these cattail colonies bear a sink relationship (Lidicker, 1975) to overall Tricolored Blackbird numbers. However, many of the largest cattail colonies are repeat efforts.

23% of all colonies were in Himalaya berries, an exotic plant deliberately introduced into California by Luther Burbank. These blackberry colonies were typically far more successful than those in cattails. Blackberry colonies, especially in Sacramento County, were population sources for Tricolored Blackbirds in all years of this study. Other upland habitats, including some agricultural fields of silage, grain and weeds, also produced substantial fledgling cohorts.

40.5% of the observed 1994 Tricolored Blackbird breeding adults nested in agricultural fields and were potentially subject to destruction by routine agricultural operations. An estimated 41,067 nests were lost in this way in 1994. We (UCD, CF&G, USFWS) intervened to encourage withholding of harvest actions during all years of this project. Intervention saved large numbers of nests and fledglings in 1994. But since density-dependent mortality was characteristic of most colonies, our protective actions of agricultural colonies in this and prior years may have little or no lasting consequence.

5B. Measured Reproductive Success at Sample Colonies

The meaning of reproductive success (RS) data. Statewide RS was low in 1994, primarily due to storms sweeping across the state in April and May. Density independent mortality struck colonies from Kern County (Joe Engler report, our observations at Wildwood Road) to Sacramento County (Cook, see Table 13) and included heavy losses at many colonies.

Table 13 gives the reproductive success of Tricolored Blackbird colonies sampled during 1994 (see the Methods section for details) exclusive of areas where rice is cultivated. This material is incomplete for 1994 and conclusions here are based in part upon observations in 1992 and 1993. We expect to summarize additional information obtained in 1994 and to present this material for publication.

5C. Starvation and Brood Reduction

The concepts of brood reduction, starvation and density-dependence are pivotal to our interpretation of the contemporary distribution and abundance of Tricolored Blackbirds. Unless data relevant to these processes is available and considered, the dynamics of Tricolored Blackbird colony life appear chaotic.

Starvation. Tricolored Blackbird eggs hatch asynchronously on successive days. The interval between hatching has not been precisely measured but hatching of a 4-egg clutch takes at least 3 days. In the vast majority of cases we observed the last hatched chick never caught up with its nestmates and starved. Development of broods in a colony provide a bioassay of accessibility of resources suitable for parental Tricolored Blackbirds provisioning nestlings. Active nests contain 1, 2, 3 or 4 nestlings. Both rate of weight gain and especially mean number of nestlings identify the adequacy of food resources available to parents attending nestlings.

Most Tricolored Blackbird females lay 3 or 4 eggs, but relatively few of them raise 3 or 4 nestlings. The difference between number of eggs hatched and number of nestlings fledged is, in successful nests, almost entirely the consequence of starvation. Some predators may take part of the contents of a brood, but the usual result of an attack by a predator is that all nest contents are lost.

Female Tricolored Blackbirds respond to food shortages by reducing the ration to the smallest chick and in some cases by evicting runt chick(s) from the nest. Weights of chicks in a nest thus provide an ongoing measure of the adequacy of food material, mainly insects, within effective foraging distance from a colony. In the absence of marked individuals or continuous observations of individual nests it is not feasible to determine the adequacy of material being brought to colonies. Colonies where all active nests have been reduced to a single nestling give the appearance of bustling enterprises with each parent returning to nests with one or more large insects. Thus, even though most chicks have starved, there is no loss of diligence by parents and we have not seen adults abandon colonies when any live chicks remained in nests.

5D. Desertion and Predation Upon Nest Contents

There has been considerable discussion by several field workers of the relative importance of desertion and predation at Tricolored Blackbird colonies. Some authors (e.g., Neff, 1937; Payne, 1969) concluded that they had observed colony desertion. Furthermore, some authors feel that desertion of part or all of colonies was caused by them (Hosea, 1986; Beedy and Hayworth, 1992). Our experience is that nests with chicks are not abandoned unless food has become so sparse that not even a single chick can be adequately provided for. Incubating birds return to their eggs promptly once observers leave their part of a colony. Entry into a colony during egg laying, however, may be highly disruptive and can be expected to produce substantial losses including desertion. This undesirable outcome should nevertheless be distinguished from wholesale desertion of colonies, which we have not observed with the possible exception of the small (<1000 adults) Sacramento NWR colony in 1992.

Catastrophic losses of Tricolored Blackbird nestlings and eggs to native predators are commonplace. Predators probably congregate and have greater impacts upon colonies in agricultural settings than in more natural areas. In Sweden predation on ground nesting birds is greater in urban and intensively farmed areas than in more pristine landscapes (Angelstam, 1986). But a record of major losses of nest contents at Tricolored Blackbird colonies extends to the earliest studies (Heerman, 1853; Maillard, 1900; Neff, 1937) of Tricolored Blackbird breeding biology, and contemporary colony failures should not necessarily be viewed as a threat to their overall viability. The success rate necessary to maintain numbers depends upon annual survivorship, an unknown value (see p. 30, monitoring recommendations).

An array of predators upon Tricolored Blackbird nests were identified (Table 14). Causes of nest contents losses were, in order of relative numbers, (1) predation, (2) starvation, (3) chilling from rainfall and cold weather and (4) destruction of nests by agricultural operations (Table 15). We found less than 20 nests (of thousands examined in the course of three years) with cowbird eggs, none of which hatched. (In 1994 D. Follansbee found one Tricolored Blackbird nest in Siskiyou County with two cowbird eggs, both of which hatched. She did not, however, report the fate of these chicks.) We observed no nest anywhere intentionally vandalized by humans, and many landowners were highly protective of colonies using their properties. Table 15, while not a completed analysis, gives the general result of colony losses.

Coyote predation upon Tricolored Blackbird colonies has not previously been reported. A social group of coyotes including dependent puppies inhabited the barley field hosting the San Luis colony in 1994 and preyed heavily upon nestlings. The Mid-America Dairy colony also was attacked by coyotes, as evidenced by scats laden with egg shell fragments and nestling residues. A young coyote was seen entering the colony on Wildwood Road in Kern County.

Coyotes appear to be increasing in abundance in the Central Valley, and may be a major threat to colonies not over water.

5E. Habitat Saturation and Density Dependent Nestling Mortality

Some colonies contained birds in the same part of the colony at completely different stages of reproduction (e.g., the Tulare barley and New Cuyama colonies). We presume these are birds nesting in areas where insufficient nesting sites are available to accommodate the nesting population. Information about these nests is included in Appendix 1. This summary table shows that, of 30 colonies examined, 26 occupied sites where further expansion of nesting at the periphery of colonies could have occurred. At three colonies this was not so and at four of them (New Cuyama, Tulare, Scott Marsh and parts of San Luis, and only at these four colonies, oversettlement occurred. I.e., at these locations there was asynchronous settlement following and overlaying established settled and active nests. For an earlier description of this situation, see Orians (1961), who did not describe a relationship between oversettlement and habitat saturation.

Lack of oversettlement at 26 of 30 colonies investigated is not evidence of lack of habitat saturation. There are two places saturation could occur - at nesting sites and relative to foraging arenas. Both could also be so heavily settled that competitive interactions reduce nesting effectiveness.

Evidence in this and earlier reports show that most or all suitable breeding habitats within the geographic distribution of Tricolored Blackbirds are saturated. Evidence supporting this conclusion is:

(1) Most habitats with suitable nesting sites, open water and foraging areas (ungrazed grasslands or the equivalent) are occupied by nesting colonies at some time during the breeding season,

(2) With minor exception, some nestlings in all nests starve or are dismissed by their parents,

(3) At some colonies RS increases as nests are lost to predation, reducing the number of competitors using that colony.

The density dependent mortality evidence is extensive and, even if presented in detail, will not satisfy all reviewers. We plan to present this material as publications are developed.

If there is substantial density dependent mortality of Tricolored Blackbirds throughout the state it follows that their numbers can be increased substantially **only** by creating additional habitat. The need to experiment to determine how to create habitat, a high priority recommendation by us in earlier reports, no longer seems so desirable because we have identified suitable habitat created by various agricultural and water management practices. The success of these human activities in attracting and providing for Tricolored Blackbirds is the equivalent of experimentally developing additional habitat. Additional habitat can be created and the local distribution and abundance of Tricolored Blackbirds increased.

Tara Zimmerman (USFWS) has asked that we identify suitable habitat in detail. We have written a draft of a paper on habitat selection by Tricolored Blackbirds. This extensive document addresses the issue of habitat selection by them. We summarize our observations here.

There are three components to Tricolored Blackbird breeding habitat, nesting substrate, foraging arena and open water.

Water. The water requirement is that there be access to free water in the vicinity of a colony site. This requirement is filled by drainage ditches, canals, live and intermittent streams with pools remaining during the breeding season, golf course ponds, other ponds, whether natural or manmade, refuge impoundments, reservoirs and rivers. Open water must be available within a few hundred meters of the colony site. It is not clear why Tricolored Blackbirds require this resource while redwings do not, but we know of no Tricolored Blackbird colony not associated with a water source within 500 m.

Nesting substrate. For settlement Tricolored Blackbirds require either an insular (surrounded by water) site or a stinging or spinous plant cluster. The statistical nature of this conclusion requires presentation of tabular material to be presented in forthcoming publication. For the current report, note the categories of substrates reported in Appendix 6. Our conclusions were determined in 1992 after the breeding season and have been modified only to accommodate the field nesting colonies, which in some cases (beardless barley) do not fit prediction. Barley and hay colonies may be desperation settlements or they may be triggered by spinous weeds in these fields. To produce Tricolored Blackbird colonies in fields, include thistle, mustard (for structure) and oats (because oats in milk are an important prenesting and incubation food).

To be adequate to support a colony a copse of vegetation should occupy several (>2) acres. While some nettle colonies are linear, most linear habitats less than 4 m wide are avoided. Some colonies in flooded woody vegetation may be only a single plant wide.

Some blackberry thickets are inadequate for nesting, apparently because they are too thin to protect nests from racoons and other predators. The most favored Himalaya berry thickets are tall and actively growing.

Foraging arena. We found that ungrazed grassland, especially that released from grazing within the year, is ideal foraging habitat. Irrigated pastures and seasonal pools are also selected. Heavily grazed and overgrown grasslands, especially those with dry star thistle residue, are avoided. Our analysis of these relationships including their quantitative treatment is beyond the scope of this report.

Tricolored Blackbirds foraging away from active nesting colonies select a great variety of substrates, including bare ground and sometimes row crops such a sugar beets. Nevertheless, when we observe Tricolored Blackbirds foraging where choices are possible, ungrazed grassland, scrub and weedy fields are preferred and, together with irrigated pasture, comprise the bulk of all foraging activity by nesting Tricolored Blackbirds.

6. TRICOLORED BLACKBIRDS AND LAND USE PRACTICES:

A preponderance of Tricolored Blackbird breeding colonies settle and depend upon privately owned agricultural lands. Some of these colonies are highly successful, others fail.

6A. Landowner Status of Tricolored Blackbird Breeding Habitats

The landowner status of all habitats we inspected is summarized in Tables 4A and 4B and Appendix 3. The latter two summarize the details. About 70% of all colonies and all birds are on private land. And over 85% of all foraging takes place on private land. These data show that management plans for Tricolored Blackbirds must either incorporate plans to manage on private land or shift a substantial part of the population to public land.

6B. Losses and Averted Losses at Agricultural Operations

In all three years of this study (1992-1994) we and others have intervened to prevent destruction of Tricolored Blackbird colonies by agricultural operations and by flooding behind various impoundments. These actions may be responsible for the presence of over 75,000 adult Tricolored Blackbirds in 1995, about 25% of the known population.

Silage nesting (Table 16) was more extensive than observed in previous (1992, 1993) years, possibly because of the dryness of the spring and thus the absence of some breeding sites in the foothills and along seasonal watercourses. For example, Little Panoche Creek did not flow either above or below Little Panoche Reservoir after March 1 and all of the four colonies along Little Panoche Creek (Fresno County) and the two at the reservoir observed in 1993 were absent in 1994. There was an increase in the number of breeding Tricolored Blackbirds depending upon irrigation canals for water. A total of 246,600 birds nested in five silage and one wheat field at the start of the season (before May 10) leaving only 172,755 birds known to be nesting or to have attempted nesting in all other habitats by that date.

These are not total population numbers and do not include NAS-CF&G Survey birds, but they identify a relatively large proportion of the total observed 1994 population (40.5%) in harms way in grain and silage (Table 16). We probably missed as many birds in silage as in other habitats, and possibly more. There have been some spectacular colonies in silage and grain seen by few knowledgeable biologists or bird watchers. The 1992 Kings County colony bordered a major interstate highway (I-5) but was never reported to us or CF&G by any other party. Few observers know that major colonies may enter and nest in agricultural fields. It is possible that one or more large colonies seen by no reporting observer in all years of this study.

Chronic catastrophic losses of reproductive effort to mowing must result in a population decline. Hay mowing has contributed to declines in bobolinks (another blackbird) and other grassland birds in the eastern United States (Bollinger et al., 1990). Henslow's Sparrows require large (>100 ha) unmowed fields to breed (Herkert, 1994) and Tricolored Blackbirds also choose ungrazed and unmowed substrates. However, some bird species require mowed or grazed land as nesting habitat (Huber and Steuter, 1984), and there is a grazing intensity continuum correlated with a counterpart avifauna (Wiens, 1969; Owens and Myers, 1973; Skinner, 1975; Kantrud & Kologiski, 1983) utilizing the full range of grazing and mowing conditions.

The net potential result of protecting Tricolored Blackbirds from mowing and other intrusions during the three plus years of this study is summarized in Table 17. We cannot identify the effect of not protecting habitat and

colonies because we do not know annual survivorship either of fledglings or of adults. If a decline in Tricolored Blackbird abundance is detected at some future date and remedial actions are initiated the first undertaking to consider is protection of large breeding colonies. Figures in Table 17 are hypothetical and may be overestimates or the consequences of our services to Tricolored Blackbirds because density dependent mortality may be enhanced by increasing the number of birds entering breeding seasons.

6C. Tricolored Blackbirds and Rice Cultivation

We evaluated the relationship of rice cultivation to Tricolored Blackbird nesting in parts of Butte, Colusa, and Glenn Counties. Colonies we observed and some salient features of their reproduction are identified in Table 18.

The rice habitat Tricolored Blackbirds were 19.2% of all Tricolored Blackbirds observed nesting in 1994. This is certainly an underestimate of the proportion of all nests attempted in the vicinity of rice because nesting in the rice areas came late in the season in the Sacramento Valley and we could not generate the kind of coverage we put into the San Joaquin Valley.

Most rice habitat Tricolored Blackbird nesting observed by us in the three years of this study produced relatively few fledglings and some were spectacular failures. The summed 165,217 females observed nesting in areas where the principal surrounding foraging habitat was cultivated rice produced an estimated 64,395 fledglings, a success rate of **0.33 fledglings per nest completed and laid in.** When Mid-America Dairy data are subtracted from these data (see footnote, Table 18), the more reliable numbers (because the colony at Mid-America Dairy was crudely estimated and because this colony was at the edge of the valley and also had access to grasslands) are 148,550 nests, 49,395 fledglings and an RS value of 0.31.

Adults forage in rice paddies for dragonfly nymphs and in grassland for grasshoppers. The **RS of successful nests in rice habitats in 1994 was about 1.95 and was about 2.0 in other years.** This is an important observation because it demonstrates the potential for rice habitat colonies to succeed. The Mid-America Dairy further demonstrated this potential. Unusual conditions at this colony include enclosure by chain link fence, a fairly uniform substrate depth and the absence of least bitterns and night herons as locally breeding birds.

These numbers for RS compare with a mean **RS of 0.80 in blackberries in Sacramento County in 1994** (Table 13), a weighted average. This is the lowest of the three years measurement of Sacramento County RS in blackberries.

Cattails and predation failures covary. The significance of rice to Tricolored Blackbird populations depends upon how the case for itinerant breeding is viewed and what options Tricolored Blackbirds have when rice district breeding is initiated. If Tricolored Blackbirds would do better elsewhere when they breed in rice then rice is a **sink.** Such a determination is beyond the scope of this study. The close association of rice and cattail nesting substrates means that losses in rice habitats are positively associated with cattails and rice. But we know that the foraging substrate in rice habitats is suitable for production of fledglings. Hence, the damaging relationship is predation.

The relatively uniform RS of successful nests only in the rice growing districts, 1.9 to 2.3 for all colonies in all three years, shows that food resources are available to sustain reproduction. Further interpretation is confounded by the small numbers of nests actually producing fledglings. It is possible that the high observed RS of successful nests depends upon the small number of birds being fledged in the colony, and that if there were more successful nests they would on the average fledge fewer birds.

6D. Tricolored Blackbirds, Dairies and Cattle Feedlots

Tricolored Blackbirds are constantly shifting from place to place, probably following seasonal foci of food resources. A major finding of this study is that about half the breeding population statewide depends heavily upon the dairy and cattle industry during the breeding season. The pattern of dependence can be summarized by identifying the seasonal sequence of interaction with agriculture:

Late winter, spring (March). Tricolored Blackbirds become increasingly numerous at feedlots (dairy and cattle) in the vicinity of potential nesting areas. Scaring devices are used to deter some Tricolored Blackbirds from "high grading" livestock rations.

Nesting (April - June). Relatively large (Table 19) nesting colonies settle within 2-3 miles from dairies and often on the premises. During provisioning of nestlings exclusively insect materials are fed to chicks for at least a week. Then some cracked corn and other ration fragments may be provisioned. Insect gathering may take place entirely on agricultural lands, especially in alfalfa.

Throughout the breeding season grain and rice may be consumed, especially in the "milk" stage. This can result in major losses in the value of these crops. However, throughout the season Tricolored Blackbirds also prey upon insects, and certain crops such as seed alfalfa are enormously benefited by the presence of a Tricolored Blackbird colony.

Post-breeding (May - July). Decreased dependence upon dairies. Birds shift to areas where rice is being planted.

6E. Tricolored Blackbirds and Water Level Management

The management strategy for Tricolored Blackbirds we recommend should include management of water levels to accommodate their reproduction, on private land insofar as owners and managers are willing and certainly as policy on lands managed by the State and Federal agencies. Table 20 demonstrates the consequences of deliberate and incidental water level changes upon Tricolored Blackbirds.

7. MONITORING SUGGESTIONS:

1. To maintain an understanding of what is happening to Tricolored Blackbird populations persistent monitoring is necessary. One of the highest monitoring priorities would be to determine annual survivorship because the quantitative value of that parameter will influence how we treat observed nest and juvenile mortality. Survivorship can be determined by persistently monitoring local populations with traps. Sacramento NWR, Colusa NWR and San Luis NWR are ideal locations for a standardized trapping program. The state refuges at Los Banos, Greylodge and elsewhere are also well suited to this potential activity.

2. A substantial source for error in estimating global population numbers is observer estimates. We feel our estimates are accurate to within 15% of actual numbers, as suggested in the methods section, above. It will be an important refinement of conservation strategy to allow several observers to see colonies and to participate in estimating them prior to examination and direct nest counts and thus arrive at more accurate estimates at seasons end. End of season assessments of colonies is a labor intensive activity but, done especially soon after colony abandonment, will provide an enormous improvement in accuracy. Our advice to those pursuing estimates of breeding Tricolored Blackbird numbers is to make some within colony observations during the breeding season, preferably late in the nesting cycle but before any chicks jump (8 da) and to follow up with more extensive measurement of colonies after the breeding season.

3. Colonies are most difficult to quantify during colony settlement and incubation. Settlement measures are usually overestimates and may include males who do not attract mates and who will leave the site without breeding. During incubation thousands of females may be unaccompanied by males during the day, remaining on their nests hidden from the view of observers outside the colony leading to underestimates of numbers.

4. Colony sizes can not easily be estimated on the basis of area occupied because nest densities vary widely within and between colonies. This variation means that there is no convenient way to standardize colony size estimates without entering colonies during or after the breeding season to measure nest density. Colony sizes are best estimated during the provisioning stage when both parents are present and observable. However, because reductions in colony size can occur from the settlement stage onwards, and because provisioning at the colony may only last 3 weeks, approximately weekly observations are essential to estimate colony sizes accurately and to determine their fate.

5. Some late season reports of small colonies confuse creches with colonies (personal observations). Creches are groups of fledglings capable of extended weak flight that have moved with their parents from natal colonies to other locations. These are often groups of from 10 to 100 or more individuals begging vigorously and being provisioned. To the uninitiated these aggregations give every appearance of being colonies. Unless nests are found, nest building is observed or a colony is observed to be active on successive occasions separated by two or more weeks, later season (30 or more days after nest building is initiated in the local area) groups of birds being provisioned can not accurately be identified as colonies. Clusters of small

colonies with loudly begging fledglings in the vicinity of a large colony are almost certainly creches. A single large colony may produce 30 or more creches residing at least as far as 4 km from the colony of origin. Single creches may include several thousand fledglings.

8. RECOMMENDATIONS:

8A. Public Awareness

Community awareness of Tricolored Blackbirds and their unique relationship to the California landscape needs emphasis in any nongame conservation program. Few Californians I met, including those living on the land in the midst of Tricolored Blackbird nesting activities, know this bird or anything about its life history.

Some of the responsibility for low public awareness of Tricolored Blackbirds results from the unfortunate common name. Many confuse redwings with Tricolored Blackbirds and are certain, because they have seen blackbirds with three colors (black, red and yellow) that they know this species. I would change its name to the Colonial or California Blackbird.

8B. Mitigation

We have found a few Tricolored Blackbird colonies that stand out like jewels in a sea of otherwise rather ordinary places. Heritage colonies need to be defined by consensus of a group of citizens representing all interest values. A consensus may be readily arrived at if participants become familiar with several colonies in the field and their different circumstances. A first priority for management action should be to secure some of these places, first by recognizing their existence, then if necessary by securing easements to insure their perpetuation. Easements to protect heritage colonies should be secured as mitigation exchanges and funding become available. Easement development to provide for Tricolored Blackbirds should include management of the areas where Tricolored Blackbirds forage during the breeding season.

It is also possible to create attractive temporary Tricolored Blackbird breeding habitat. If these habitats are not self sustaining they will have no obvious value to this species. Easement credit should not be provided for creation of this kind of habitat. However, some impoundments in foothill areas suggest ways to develop self sustaining Tricolored Blackbird breeding habitats.

8C. Is Management Necessary?

As a basic premise unmanaged slippage of the status of Tricolored Blackbirds should be avoided. If left unmanaged, situations will continue to prevail where a substantial proportion of Tricolored Blackbirds nest will be unproductive and habitat will continue to be lost. The net result will be a steady erosion of distribution and abundance. We cannot assume that serendipitous management (i.e., "natural" or unmanaged) Central Valley environments will result in a favorable outcome for Tricolored Blackbirds. There are source and sink (Pulliam, 1988; Pulliam & Danielson, 1991) colonies and there is no evidence that Tricolored Blackbirds can or do distinguish the difference. If Tricolored Blackbirds make no such distinction, a steady and

unending erosion of populations is possible because the best source colony areas (e.g., southern Sacramento County) are steadily losing foraging areas to urban development.

Monitoring. The only way to avoid incorrect assessment of Tricolor Blackbird status is to continue to monitor their breeding distribution and numbers. This activity is cheap insurance that will help avoid a potentially expensive problem. The long term impact of the complex threats to Tricolored Blackbird persistence - changed predator-prey relationships, spatial arrangements of habitats, agricultural practices, real estate developments and pest control practices - cannot be predicted.

A decline in numbers of Tricolored Blackbirds to lower numbers will prompt action including habitat construction, enforcement, policy implementation and negotiation that is a familiar circumstance. Hence, the cautious choice of enforcing laws and policies to protect colonies is probably far more expensive and more likely to fail than is monitoring, which can identify acceptable losses based upon the performance of the population. Monitoring may avoid this expense, especially if coupled with a steady habitat development program.

Water level management. The main function of managing water levels is to develop local understanding of the relationship of large colonies to the dynamic processes associated with manmade water management.

The piecemeal management strategy for Tricolored Blackbirds we recommend should include management of water levels to accommodate their reproduction, on private land insofar as owners and managers are willing and as policy on lands managed by the State and Federal agencies. Table 20 demonstrates some consequences of deliberate and incidental water level changes upon Tricolored Blackbird reproductive success. All of these situations were or could have been managed simply to gain a favorable outcome for Tricolored Blackbird nesting. When Tricolored Blackbirds settle to nest on refuges the height of nests should be determined after egg laying has been completed and water levels should be maintained to prevent stranding (no water, vulnerable to predation) or flooding of nests.

Management of colonies on private lands. We should protect larger breeding colonies, whether on public or private land, if cost effective arrangements can be made with property owners to do so. Ignoring mass destruction of major colonies of an endemic bird species sends an undesirable message about the value of nongame wildlife, regardless of its status. Nevertheless, this study suggests but does not prove that it may be possible to sustain these losses without losses in overall population viability. Cost effective analysis should also consider the cost of losing the support of agricultural and development interests.

The refuge system is too small to accommodate the current Tricolored Blackbird population of several hundred thousand birds. Habitat features that will bring additional colonies into production should be created outside refuges. Possibilities for such development includes establishment of cattail and blackberry copses on Caltrans properties because small colony sites can exploit large foraging arenas. Some cattail colonies away from the deep water marshes are quite successful. Other possibilities for colony sites include water district corridors for the same reason and because they often have

access to water. We should identify ways to develop and protect colony sites on various private lands because most of the landscape suitable for settlement by Tricolored Blackbirds is privately owned.

Management in the vicinity of dairies. Enhancement of alternative habitats should be encouraged to reduce overall dependence of Tricolored Blackbirds upon dairies. Dairy dependence will continue to reduce the appeal of this species to the public and to agricultural interests in particular. Barley and thistle colonies on refuges are better than colonies dependent upon these plants at dairies where they probably will fail. But artificial substrates such as barley need to be reduced in overall importance by development of large colonies or large numbers of small colonies out of harms way. We emphasize that these developments of alternatives are relatively inexpensive and far less costly than listing and litigation.

As a point of information, barley and oat colonies with weeds - thistles and mustard - are more likely to be selected as colony sites than are clean stands. Where other conditions - availability of open water and suitable foraging habitat - are available and no weedy fields are present, clean fields may be selected for settlement.

Management on public lands. Given the habitat relationships to reproductive success noted in this report it is inappropriate to make concessions to Tricolored Blackbirds on state and federal wildlife reserves if these actions adversely effect wintering waterfowl populations. An active program developing sink habitats is counterproductive and should be avoided.

Management of doomed colonies. Doomed colonies, whether behind reservoirs, in crops, or under immediate threat of destruction, should be eliminated as soon as possible. Our observations show that Tricolored Blackbirds enthusiastically renest following loss of their nests. The more time lost to a nest that will be destroyed, the less time and energy is available for a renesting effort. As a rule of thumb, the earlier a colony that will not have enough time to produce fledglings can be terminated, the better.

8D. Source-sink Relationships

Since cattail marshes in the heart of the Central Valley are sinks, they should not be multiplied when the goal is development of Tricolored Blackbird habitat. Nor should the California parks system and the USFWS NWRs with cattail habitat be further developed for Tricolored Blackbirds unless additional management of predators is also implemented. We do not recommend predator management because of the complex unstudied effects upon systems which will follow. Predator management is also a risky public relations activity.

8E. Necessary Aesthetic Considerations

One goal should be to create and maintain natural settings (e.g, nettles) suitable for settlement by Tricolored Blackbirds. To do so the NWRs and other public nature reserves should emphasize management of Tricolored Blackbirds in natural settings. Creation of temporary habitats with exotics such as mustard, barley and thistles should be done only to distract settlement from these same plant species on private land. At current population numbers

development of artificial colonies based upon settlement in exotic plant species, especially grains, thistles and mustard, is unnecessary and could be counterproductive.

8F. Habitat Creation

The evaluation of success of human activities in attracting and providing for Tricolored Blackbirds is the equivalent of experimentally developing additional habitat. The desirability of increasing Tricolored Blackbird distribution and abundance is at present a natural landscape management matter, not an extinction avoidance issue.

Himalaya blackberry colonies. Further development of dependence of the global Tricolored Blackbird population upon Himalaya berries, an exotic, by NWRs or as mitigation for habitat loss by private parties should not be accepted. A fundamental outcome of our 3-year study is the discovery that planting Himalaya berries will result in a global increase in the abundance of this species. In many riparian settings these berry bushes are invasive and highly persistent. We should not at present further commit Tricolored Blackbirds to a relationship with an exotic plant, especially on the NWRs and state refuges and reserves. The use of blackberries to enhance Tricolored Blackbird population size should therefore be reserved as a parachute option should the species suffer significant decline in the future.

Utility of artificial colony habitats. Colonies at quarries, farm ponds, sewage treatment ponds, milk processing plants not physically associated with dairies, waste disposal plants and reservoirs should be encouraged and managed. Management at its most basic simply involves managing water levels to avoid stranding or flooding nests.

9. RESEARCH RECOMMENDATIONS:

9A. Additional Surveys

Any further future effort to expand surveys geographically should concentrate upon completing exploration of the San Joaquin Valley. San Joaquin Valley and Sierra foothill areas such as the Sacramento County area host early season colonies. A much smaller number of birds initiate the breeding season in the Sacramento Valley. Some birds that have failed or successfully completed nesting in the San Joaquin Valley and Sacramento County area appear to proceed to the Sacramento Valley. Thus, determination of the number of birds present in Sacramento County and the San Joaquin Valley by May 1 will provide one measure of overall annual Tricolored Blackbird abundance. However, the distribution of birds at all seasons in any particular year will depend in part upon local rainfall patterns and water conditions.

Further analysis of Southern California Tricolored Blackbird populations is a high priority.

9B. Interspecies Interactions.

The relationship of Tricolored Blackbirds to other animal species needs further evaluation. Black-crowned Night Herons are a major and devastating predator upon Tricolored Blackbird colonies, especially in the large Central

Valley cattail marshes, but current management practices disproportionately favor them.

We found no evidence suggesting that Red-winged Blackbirds are serious nesting competitors with Tricolored Blackbirds. However, their abundance of in winter suggests the unevaluated possibility that overwinter competition by Red-winged Blackbirds may adversely effect Tricolored Blackbirds.

10. CONCLUSIONS:

Tricolored Blackbirds have disappeared from some regions where they were once numerous (Beedy et al., 1991). For example, Yolo County, intermittently monitored since 1931 and continuously in recent years, is no longer a regular breeding place for large colonies of breeding Tricolored Blackbirds (Table 9). Some of the colony locations Orians (1961) observed were still active during our study and direct comparisons are possible (Table 21).

Evidence contained in this report suggests that without management a substantial proportion of the Tricolored Blackbird population will not reproduce successfully. The relationship of failures of breeding colonies to overall species survival is uncertain. We do not know overwinter survival and cannot, therefore, determine how successful breeding must be to maintain populations. In our simulations to establish PVA values we used estimated values from Red winged Blackbird studies. These may be far from appropriate.

10A. Are Tricolored Blackbirds at Carrying Capacity (K)?

The evidence for this conclusion is that:

1. Tricolored Blackbirds, at least those outside Southern California, are highly mobile, in some cases occupying habitats soon after they become available (e.g., Sunol, 1991).

2. Nestling starvation occurred at all colonies observed (N = 19) except New Cuyama (Santa Barbara County, montane) in 1994.

3. There is no location within the geographic distribution of Tricolored Blackbirds that had all three critical habitat features - open water, nesting substrate and foraging habitat - that was not occupied by Tricolored Blackbirds in 1994.

Our conclusion is that Tricolored Blackbirds were at carrying capacity in 1994. Condition changes between years may change carrying capacity, but in all three years of this study we found that suitable habitats were occupied.

Tricolored Blackbird populations today are heavily dependent upon agricultural activities. Nesting in native plants has shifted to exotic species, and colonies supported by the combination of natural vegetation and natural water flows are uncommon. Foraging activities of Tricolored Blackbirds at many colonies depend upon crops such as alfalfa. Nesting Tricolored Blackbirds sometimes obtain major supplements from feedlot and dairy rations. While these colonies in agricultural areas can contribute strongly to Tricolored Blackbird numbers they are often at high risk from routine agricultural operations such as harvesting.

We and the NAS-CF&G Survey identified 324,621 adult Tricolored Blackbirds on April 23 (Table 5). This or 275,000 to 400,000 to account for missed birds and all possible estimation errors may be cited as the current global estimate of Tricolored Blackbird numbers located early in the 1994 breeding season, i.e., before any fledglings were produced. This estimate does not consider unlocated birds, which cannot be estimated but whose numbers are substantial. The value of the April 23 estimate is to provide a minimum and a modestly useful comparison with estimates at other times.

Collaborating observers may overlook agricultural field colonies. The 1992 prickly lettuce colony on I-5, by far the largest colony in the state that year, was missed by all others in spite of its location next to a heavily traveled interstate highway and recent well publicized efforts in ornithological news media then to gain reports of Tricolored Blackbirds. The Tulare Silage colony in 1994 (50,000) was seen by only one person and the Poso Creek Colony was pointed out by a landowner and never seen by anyone other than our team. These and other examples suggest that survey staff must have these agricultural hayfield-type colonies demonstrated to them before being sent off to find colonies in regional surveys. We may collectively have overlooked substantial numbers of Tricolored Blackbirds in agriculture fields in all years of this study.

This report does not identify any short term trend in species wide abundance. Despite the full time effort of three field persons in 1994, two in 1993 and two and sometimes three in 1992, we cannot claim a complete survey of all Tricolored Blackbird colonies. A continuing survey focussing on identification of breeding birds at colonies specified in this report and search for large colonies in agricultural lands (silage, grain, overgrown weeds) should eventually identify both local and statewide Tricolored Blackbird abundance. Systematic ongoing monitoring will be more effective and less costly than later high cost surveys without substantial knowledge of colony sites and local access conditions.

Predation by avian predators has a major impact upon reproductive success at many colonies. Predation destroyed more than 50% of all nests at 2 of 6 Himalaya berry colonies and all 8 cattail colonies where observations were sufficiently intense to monitor predation. Only 1 of 8 colonies in other habitats (grain fields, nettles) were this heavily impacted by avian predation.

What is the relationship between starvation and predation in the regulation of Tricolored Blackbird numbers? Many Tricolored Blackbirds leave colonies when their nests are lost and, as competition is relieved, reproductive success by the remainder often increases. Since most adults escape from predators when their nests are lost, they join a pool of individuals recovering from the effort of egg laying and nest building and are soon available for renesting. The interval required for this recovery and the energetics of the recovery curve are unknown. We need to know this information for management reasons, as for example, to evaluate the wisdom of hazing at various stages of the reproductive cycle. At present the best and a useful estimate is number of days lost. Thus, nest building takes 4 days and egg laying four days. Incubation takes 12 days and nests lost at hatching have lost, including a 10 day recovery interval, about 30 days of a 60 day nest initiation season (April 10 - June 10).

The cost of nest loss must vary depending upon investment. Time available to renest shortens as the breeding season progresses and, according to our evidence from 1993, is sometimes insufficient for the vast majority of the population to renest.

There appear to be only one or two separate Tricolored Blackbird populations. These are the Northern California and the Southern California populations. Because of the extreme mobility of all Northern California Tricolored Blackbirds, a threat to any geographic area is a threat to all. At present loss of colony reproductive performance in hay and grain fields and losses to predators appear to be major challenges to this species. Population regulation by starvation at most colonies suggests that these effects have not reduced Tricolored Blackbird reproductive effectiveness to the point where these impacts will result in population declines.

10B. Changes in Abundance and Distribution

We did a Population Viability Analysis (PVA) for Tricolored Blackbirds in 1993 (Cook et al., 1993). It showed that, given the stated assumptions, (1) there is no net habitat loss and (2) no human-induced catastrophic mortality, Tricolored Blackbirds would survive indefinitely. But, we continue to document habitat loss. Tricolored Blackbirds are a bioassay of one feature of habitat change. This evaluation shows that at present all colonies with minor exception are short of food for nestlings, leading to nestling starvation or brood reduction by parents.

Sacramento County has been closely surveyed in all three years of this study. The historical record for Sacramento County in earlier years is inadequate for comparisons, but the three year (1992 - 1994) comparison shows no indication of a catastrophic decline (Table 22). We emphasize that a major decline may have occurred. Major habitat shifts have also taken place in the Sacramento County area, especially from cattails to blackberries. These data and their significance will be considered by Cook in subsequent publications.

In addition, complete loss of the breeding effort of several large colonies (Table 23) occurred or would have occurred had we (UCD, USFWS, CF&G) not intervened. If late winter rain supports full development of rangeland vegetation Tricolored Blackbirds nest in dispersed colonies. If, as happened in 1994, rain and runoff are minimal (classic dry year) nesting will be concentrated in agricultural fields. No protection at such sites could lead to a potentially catastrophic decline in numbers. My own conclusion (Hamilton) is that this is not happening because of density dependent reproductive compensation. However, three other scientists closely associated with recent Tricolored Blackbird studies (Beedy, Bowen, Cook) all feel that protection of large colonies is a necessary activity. The minimum action required is to determine age structure, survivorship and colony size and distribution.

The Tulare silage field colony occupied a 320 acre field and nesting birds occurred in large patches throughout much of it. The 50,000 bird estimate there was never substantiated by anything more than transects during the breeding season because the barley in which the colony nested was harvested for silage about May 1. There may have been substantially more than 50,000 birds nesting there.

All other matters notwithstanding, all evidence points towards habitat limitation as a constraint upon the distribution and abundance of Tricolored Blackbirds. This limitation can be bypassed by modest habitat modification activities. Elimination of habitat is an ongoing problem for Central Valley wildlife. This process has resulted in the local elimination of some Tricolored Blackbirds and will, if not dealt with, further reduce the distribution and abundance of this species.

10C. Protection of Heritage Colonies

Few colonies located during the three years of this study were situated in natural environments, i.e., based upon native plants and rain-induced water flows. There are **source** and **sink** (Pulliam, 1988; Pulliam & Danielson, 1991) colonies and there is no evidence that Tricolored Blackbirds can or do distinguish the difference. If Tricolored Blackbirds make no such distinction, a steady and unending erosion of populations is possible because the best **source** colony areas (e.g., southern Sacramento County) are steadily losing foraging areas to urban development. A healthy **source** population needs to be maintained, and it is premature to dismiss protection of large colonies in agricultural fields as unnecessary.

Some colonies (e.g., Producers Dairy, Pond Road) were dependent upon irrigation based agriculture for all aspects of their breeding biology. Case by case protection for colonies on agricultural lands is a stop gap measure that may produce a negative response to wildlife management activities in agricultural communities. However, it is hard to accept losses of major portions of the known world breeding effort, especially to accommodate harvest. We cannot assume that serendipitous management (i.e., "natural" or unmanaged) of Central Valley environments will result in a favorable outcome for Tricolored Blackbirds.

Erratic patterns of Tricolored Blackbird breeding settlement (Bent, 1958) make it difficult to accommodate Tricolored Blackbirds with traditional management schemes focussing upon specific geographic localities and properties. We conclude, nevertheless, that one important management strategy is to protect localities that have been traditional long term breeding sites, especially those in relatively natural settings. A suitable management plan should also evaluate ways to encourage settlement of Tricolored Blackbirds in more natural settings (Appendix 7) and develop suitable breeding habitats at sites not subject to the vagaries of agricultural operations.

10D. Toxic Chemicals

Dead chicks at colonies are a natural product of Tricolored Blackbird reproductive efficiency. While Beedy and Hayworth (1992) conclude that the Kesterson colony in 1986, known to contain nestlings with high selenium levels and to have selenium induced deformities, had a sufficiency of food, we have routinely found throughout the area of distribution of this species including the Kesterson area, that nestlings in excess of the current capacity of parents to provide for them are not provisioned and may be jettisoned from nests alive or after they have starved.

We found evidence of chemical-induced mortality, from mosquito abatement operations in rural Kern County, and from what appears to Mike Fry to be a

dicofol-like abnormality in eggs, also in Kern County. Unusually thin eggs salvaged from San Antonio Reservoir (Alameda County) flooding were submitted to Lloyd Kiff at the Western Foundation in 1992 but remain unanalyzed. We need the capacity to obtain timely analysis of suspicious materials.

Despite the limited evidence that Tricolored Blackbirds are suffering some mortality as a result of patterns of chemical use in agricultural areas, poisons do not appear to be inducing a serious population problem for Tricolored Blackbirds. Nor is there evidence that the demonstrated losses of Tricolored Blackbirds to this category of problem in the past depressed their numbers below carrying capacity in any year.

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PERSONNEL:

Liz Cook. A graduate student at UCD, Cook has completed thesis work emphasizing Tricolored Blackbird conservation biology. She led the PVA analysis and developed methods for precisely measuring the size and RS of Tricolored Blackbird colonies. She has extensive experience in Sacramento County evaluating land use changes and their effects upon biological systems. She received a 1/2 time salary for 3 months in 1994.

Richard Grey. Grey graduated from UCD in 1993. His major was Environmental Biology. He was responsible for the field survey of Southern California and several additional sections of this report. We all spent most days of the breeding season, 1994, in the field. He received a half time salary for 3.5 months in 1994.

William Hamilton. He was an active Professor of ecology, the first year of this study (1992). He retired in 1993 and has subsequently spent full time on this project. He is a Certified Senior Ecologist of the Ecological Society of America. He received no salary or fee from any source during this study.

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TABLES

Table 1. Estimates of two colonies in 1994 and actual numbers based upon sampling following entry into these colonies by observers. Number of birds is determined by multiplying number of nests times 1.5.

	Original Estimate	Estimate After Entry
Poso Creek	10,000	11,600
San Luis	70,000	70,476

Table 2. Examples of differences in numbers of Tricolored Blackbirds estimated in 1994 to be resident in colonies by different observers and the possible basis for differences between estimates. Number of birds is determined by multiplying number of nests times 1.5 in the case of our (Grey, Hamilton, Cook) observations, and observations by others are also in this format or have been adjusted to this format.

COLONY	ESTIMATE A	ESTIMATE B	BASIS FOR DIFFERENCE
	NUMBER DATE OBSERVER	NUMBER DATE OBSERVER	
Scott Marsh	1,000+ 4/23 Fregian/Swinehart	4,000 4/20,27 Cook	incubating birds were on nests on all of these dates, first egg hatched 5/2
Kern Twisselman	4,000 4/23 Engler	2,000 May Grey, Hamilton	higher estimate at early settlement
Monterey,Laguna Seca	1,200 4/22 Roberson	2,500 season Grey, Hamilton	lower estimate based upon a single visit - during incubation? Higher estimate based on later additional settlement
Merced, San Luis	20,000+ 4/22 Woolington	105,000 season Grey/Hamilton/Cook	lower est. at early settlement, incomplete

Table 3. Some examples of more males than females settling at colony sites. These males failed to attract mates (nesting females). The lower estimates for each of these colonies is the one used in our survey analyses. Number of birds is determined by multiplying number of nests times 1.5 in the case of our (Hamilton, Cook, Grey) observations.

COUNTY COLONY	ORIGINAL ESTIMATE	ESTIMATE AT FINAL SETTLEMENT	OBSERVER
	1992		
COLUSA:*			
Lurline	2,000	18	Bill Hamilton
MERCED:			
Merced NWR	5,000	500	Liz Cook
	1994		
BUTTE:			
Owen, Marvin	10,000	1,500	Chris Grecco
FRESNO:			
Mendota	2,000	200	Steve Bruggemann
KERN:			
Kern NWR	3,000	400	Joe Engler
Kern NWR	7,500	1,125	
MERCED:			
Los Banos, Old Salt Slough	10,000	600	
O'Neill Forebay	5,000	1,000	Richard Grey
SACRAMENTO:			
Rancho Seco	30,000	20,000	Liz Cook
Eagles Nest	20,000	1,000	
Latrobe	15,000	4,000	
Davis	10,000	1,000	
1994 Totals	**112,500**	**30,825**	

*The birds in this colony settled in cattails and were active for several days. However, 21 days later there were no nests in these cattails and we could locate only 12 nests elsewhere, all in a cane (Arundo) fringe at the edge of the main settlement cattails.

**Disturbances by agricultural operations, Roundup spraying and settlement of fringe areas by males who did not attract females were followed by a decline in numbers at this colony.

Table 3A. Comparison of alternative measures of reproductive success.

	Transect	Pre Fledging Survey
Reproductive success	exact number	minimum number
Sample size	20 - 50 nests	to hundreds of nests
Location in colony	may be limited	less limited
Minimum visits	three	one - two
Measures starvation	yes	yes
Measures predation	yes	yes
Effectively monitors temporal RS variation	only with more than one transect	less limited than transect

Table 3B. Colonies at which reproductive success was determined in 1994.

COUNTY SITE	BREEDING SITE	FORAGING ARENA	ADULTS
BUTTE:			
Marvin Owen	cattail	rice	1,500
COLUSA:			
COC I	cattail	rice	10,000
COC II	cattail	rice	50,000
Delevan NWR	cattail	rice, row c.	12,000
Pyle (Arbuckle)	cattail	upland	800
FRESNO:			
Producers Dairy	barley	pasture, alfalfa ag. set aside	20,000
GLENN:			
Quarry 2 (Owen)	cattail, willows	?	10,000
Chrome I	cattail	rangeland	2,300
Howard Slough	blackberry	rice	5,000
KERN:			
Wildwood Road	barley	alfalfa	28,000
Poso Creek	barley	alfalfa, waste	11,600
MERCED:			
Los Banos, Lot 4	cattail	pasture	2,500
Late nesting	cattail	pasture	7,500
Los Banos, Old Salt Slough	cattail	alfalfa	600
San Luis NWR	barley silage mix	range, refuge	20,000
mid			70,000
late			15,000
O'Neill Forebay,	Himalaya berry	range, pasture	1,000
O'Neill Forebay,	Himalaya berry	range, pasture	5,000
O'Neill Forebay, cattail	Himalaya berry	range, pasture	2,000
MONTEREY:			
Laguna Seca	cattail	grassland	2,500
late			2,000

COUNTY SITE	BREEDING SITE	FORAGING ARENA	ADULTS
SACRAMENTO:			
Koessler	Himalaya berry	pasture, urban	4,000
Rancho Seco, early	Himalaya berry	range, pasture	20,000
Van Vleck Ranch	cattail		4,000
Alta Mesa			3,000
Scott Marsh late	cattail	range	4,000 5,000
Sheldon			500
Knox			15,000
Brad/Elder late			4,500 2,500
Eagles Nest			1,000
TULARE:			
Canal	barley oat silage	weeds, alfalfa	50,000
YUBA:			
Blackberry	Himalaya berry	range, pasture	13,500
Total			**406,000**

Table 4A. Summary of Appendix 3. Landowner status of 74 Tricolored Blackbird colony nesting sites. Percentages are in parentheses. Number of birds is determined by multiplying number of nests times 1.5 in the case of our (Hamilton, Cook, Grey) observations.

NESTING SITES:

OWNERSHIP	BY INDIVIDUAL BIRDS		BY COLONIES	
Total private land	**419,705**	**(69.8)**	**53**	**(71.6)**
ranches and farms	406,405	(66.8)	51	(69)
water district	13,300	(2.2)	2	(2.7)
Total public land	**188,825**	**(31.1)**	**21**	**(28.4)**
city/park	25,400		3	(4.1)
state	28,300		8	(10.8)
county	3,500		3	(4.1)
Federal (NWR, military)	120,625		6	(8.2)
College campus	11,000		1	(1.4)
Unknown ownership	0		0	
Total known ownership	**608,530**	**(100%)**	**74**	**(100%)**

Table 4B. Summary of Appendix 3, landowner status of 70 Tricolored Blackbird colony foraging areas. Percentages are in parentheses. Number of birds is determined by multiplying number of nests times 1.5.

FORAGING AREAS:

OWNERSHIP	BY INDIVIDUAL BIRDS		BY COLONIES	
Total private land	**523,330**	**(86)**	**64.5**	**(87.2)**
ranches and farms	523,330	(86)	64.5	(87.2)
water district	0		0	
Total public land	**83,100**	**(13.6)**	**5.5**	**(7.4)**
city/park	22,500		1.5	
state	2,000		0.5	
county	500		0.5	
Federal (NWR, military)	58,100		3.0	
Unknown ownership	**2,100**	**(0.35)**	**4.0**	**(5.4)**
Total known ownership	**606,430**	**(99.7)**	**70**	**(94.6)**

Table 5. The number of Tricolored Blackbirds observed or inferred to be present on April 23, 1994. The grand total is the estimated minimum species abundance. Number of birds is determined by multiplying number of nests times 1.5 in the case of our (Hamilton, Cook, Grey) observations.

To April 23, Northern California north of the Tehachapis:

Total inferred settled by April 23	253,511
Additional NAS/CF&G Survey birds, settled April 23	13,536
S. Laymon; Fay Ranch, L. Isabella	680
Total settled	**267,727**
Unsettled or unassigned to a colony:	
L. Isabella area, fide S. Laymon	2,820
*Arena Plains, April 22, Mike Peters	15,000
April 22, Hamilton and Grey, Kings County	10,000
Unsettled, NAS-CF&G Survey	9,474
Total unsettled on April 22-24	**37,294**
Total, Northern California, April 23, 1994	305,021
****Add for Southern California**	**19,600**

Total, April 23, 1994: 324,621 +/- 15% = 275,928 - 373,314

* Settled but did not nest

** Southern California is treated as a separate population (see DeHaven 1975A) and not as an effectively monitored area on April 23. The summary for Southern California by Richard Grey estimates the Southern California population at 19,600 birds (Appendix 4).

Table 6. Summary of Appendix 6. Distribution of colony substrates by number of colonies and individuals. Number of birds is determined by multiplying number of nests times 1.5 in the case of our (Hamilton, Cook, Grey) observations.

SUBSTRATE	NO. OF COLONIES	NO. OF BIRDS
silage	5.0	214,600
cattail	32.0	175,075
Himalaya berries	26.5	139,835
wheat	1.0	32,000
nettles (Urtica holosericea)	2.5	19,000
mesquite (Prosopis pubescens)	0.5	10,000
willows	1.0	5,500
mustard	0.5	4,500
native blackberry (Rubus pubescens)	1.0	3,750
mixed	1.0	1,500
(Atriplex)	0.5	1,500
bulrushes	1.0	1,000
multiflora rose	0.5	20
unknown	1.0	250
Total	**74.0**	**608,530**

	Percentages of total	
	by colonies	**by individuals**
silage, grain	8.1	40.5
cattail	43.2	28.8
Himalaya berry	35.8	23.0
other	12.8	7.7
Total	**100.0**	**100.0**

Table 7. The 10 largest Tricolored Blackbird colonies seen by us in 1992, 1993 and 1994.*

1992	# Nests	1993	# Nests	1994	# Nests
Lettuce I5	43,333 (18)	Dairy, Tulare	32,000 (22)	San Luis	70,000 (17)
COC, Acre Farms	40,000 (17)	Lettuce I5	13,000 (9)	COC	33,333 (8)
Harbison, Colusa	20,000 (8)	Cherokee	10,000 (7)	Tulare	33,333 (8)
Rancho Seco, Sac.	13,333 (6)	San Luis, Winton	6,500 (4)	Thunder Hill	21,333 (5)
Bozick Ranch, Sac.	13,333 (6)	East Park	6,000 (4)	Mid-Am	18,667 (5)
Lost Hills, Kern	12,000 (5)	Delevan NWR	6,000 (4)	Wildwood	18,667 (5)
Kern NWR	10,000 (4)	Betts, Sac.	5,000 (3)	Bakersfield	16,666 (4)
George Dairy	8,000 (3)	O'Neill Forebay	5,000 (3)	R. Seco	13,333 (3)
San Luis	6,667 (3)	Moore, Sac.	5,000 (3)	Knox Rd.	10,000 (2)
Quarry, Glenn	4,000 (2)	Campbell, Sac.	4,667 (3)	Yuba	9,000 (2)
Total 10 largest	**170,666 (71%)**		**93,167 (63%)**		**244,332 (60%)**
Total, all colonies	**242,060 (100%)**		**148,705 (100%)**		**405,687(100%)**

* Observations in Alameda, Butte and Contra Costa Counties and throughout Southern California are excluded because no systematic observations were made in those counties in 1993. Numbers in parentheses are percentages of all nesting birds located during the season. Since there are colonies we did not locate or estimate the proportion of all birds nesting in the largest colonies will be less than those calculated. Numbers are number of nests.

Table 8. Proportion and number of Tricolored Blackbird colonies by colony size. Data from 1930s is from Neff, 1937; 1968-1972 is DeHaven et al., 1975A; 1980s is Beedy et al., 1991; 1992, 1993 and 1994 are this study; 1994S is the NAS-CF&G Survey summarized and abstracted in this report.

	1931-1936	1968-1972	1980s	1992	1993	1994	1994S
< 100	treated as absent (no data)			(2)	(3)	(2)	(22)
100	22.6 (54)	32.0 (43)	61.5 (79)	18.8 (9)	22.2 (10)	22.2 (18)	51.2 (40)
1,000	64.9(155)	50.0 (67)	34.4 (42)	62.5(30)	71.1 (37)	58.0 (47)	39.7 (31)
10,000	7.9 (19)	14.2 (19)	3.3 (4)	12.5 (6)	4.4 (2)	12.3 (10)	7.7 (6)
25,000	2.5 (6)	3.7 (5)	0.0 (0)	2.0 (1)	2.2 (1)	3.7 (3)	1.3 (1)
50,000	1.3 (3)	0.0 (0)	0.8 (1)	4.0 (2)	0.0 (0)	2.5 (2)	0.0 (0)
>100,000	0.8 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	1.2 (1)	0.0 (0)

Table 9. Comparison of some Colusa County colonies in different years. COC = Capitol Outing Club, a rectangular 320 acre cattail marsh managed to maintain some open water.

East Park includes both upper arms of that reservoir. Number of birds is determined by multiplying number of nests times 1.5 in the case of our observations. COC = Capitol Outing Club, Colusa County, California.

COLONY	YEAR	NUMBER	AUTHOR
COC,	1959	120,000	Orians, 1961
COC,	1960	150,000	Orians, 1961
COC,	1992	60,000	this report
COC,	1993	3,000	this report
COC,	1994	60,000	this report
East Park,	1959	2,250	Orians, 1961
East Park,	1960	975	Orians, 1961
East Park,	1962	250	Payne, 1969
East Park,	1963	400	Payne, 1969
East Park,	1964	20,000	Payne, 1969
East Park,	1965	400	Payne, 1969
East Park,	1971	<1,000	DeHaven, in Beedy et al. 1991
East Park,	1992	5,000	this report
East Park,	1993	9,000	this report

Table 10. Settlement statewide, first egg, number of birds in thousands, by 10 day intervals. The summary does not equal the total birds observed because some colonies were encountered under circumstances precluding accurate evaluation of the timing of laying of the first egg and are not included in this table. Number of birds is determined by multiplying number of nests times 1.5.

DATE	THOUSANDS OF NESTING BIRDS
mid-March	0
late March	0.2
April 1-10	108.3
April 11-20	146
April 21-30	53
May 1-10	70
May 11-20	34
May 21-30	71
May 31-June 9	27
June 10-19	9
June 20-29	11
June 30 and later	0
Total	**529.5**

Table 11. Timing of laying of the first egg in Central Valley region by number of birds - males and females - present. Number of birds is determined by multiplying number of nests times 1.5 in the case of our (Hamilton, Cook, Grey) observations.

	San Joaquin Valley	Sacramento County	Sacramento Valley*
March	200	0	0
April	261,400	81,165	2,800
May	19,725	30,340	90,000
June	7,500	0	74,000
Total	**288,825**	**111,505**	**166,800**

*The Survey of the Sacramento Valley was less intense than that conducted in the San Joaquin and in Sacramento County. Therefore, this number is a limited sample of a substantially larger breeding population. We estimate that we observed less than half of all Tricolored Blackbirds nesting in California north of Yolo and Sacramento Counties in 1994 based upon observations of birds we did not pinpoint to colony location. Missed nesting colonies include two large colonies in Glenn County we could not reach because of access limitations.

Table 12. Overall abundance by county as represented by the maximum annual estimate of Tricolored Blackbirds for the years 1931-1936, 1968-1972 and 1992-1994. This accounting method over represents abundance because it takes the highest of the several annual estimates for each county during each of the three studies. Counts are not directly comparable because effort was unequal through time and space. Number of birds is determined by multiplying number of nests times 1.5 in the case of our (Hamilton, Cook, Grey) observations.

	1931-1936	#0	1968-1972	1992-1994	1992-1994*
	Neff	Orians	DeHaven	Bowen, Cook, Grey, Hamilton	
San Joaquin Valley:					
Fresno	100	NR	0	20,200	20,200 (1994)
Kern	3,000	NR	3,000	71,200	72,325 (1994)
Kings	25,000	NR	3,000	64,000	64,000 (1992)
Merced	87,000	NR	25,300	104,700	129,200 (1994)
San Joaquin	7,500	NR	5,050	14,500	14,500 (1994)
Stanislaus	18,750	NR	25,300	7,075	7,075 (1994)
Tulare	3,000	NR	1,500	50,000	50,000 (1994)
	144,350	NR	63,150	331,675	357,300*
Sacramento Valley:					
Colusa	55,500	165,000	57,000	106,827	106,827 (1992)
Glenn	423,000	NR	18,500	83,000	83,300 (1994)
Yuba	84,750	87,725	5,250	13,500	13,500 (1994)
Butte	159,000	52,500	25,000	6,500	6,500 (1992)
Yolo	57,000	105,000	31,000	1,773	1,773 (1992)
	779,250	410,225	136,750	211,600	211,900*
Sacramento County:					
	181,500**		50,915	89,415	111,505*
Total	**1,105,100*** **		**250,815*** **	**632,690*** **	**680,705*** **

* These numbers include renesting individuals which would not have been included in Neff's survey and possibly not in DeHaven's. Thus, by counting renests the figure is raised by 25,625 or 4%.

** Minor observation effort.

*** The method for deriving these numbers generates estimates greater than those observed in any year.

#0 These are compilations from Orians for 1959 and 1960 for the stated counties. Orians did not attempt a survey and these are minimal values, not directly comparable to other surveys. They are included here because they show **minima** greater than reported at any other time for Colusa, Yuba and Yolo Counties.

Table 13. Reproductive success of Tricolored Blackbirds in 1994 by county. Number of birds in colonies is determined by multiplying number of nests times 1.5. RS determined on 8th day after fledging on marked transect (A) or by colony inspection (B).

COUNTY / SITE	COLONY SIZE	NESTS EXAMINED A	NESTS EXAMINED B	RS/SUC. NEST	RS ALL NESTS	DATE	NEST SUBSTRATE
COLUSA:							
Delevan	8,000	52	19	1.94	0.34		cattail
Capitol Outing Club I	10,000	200	50	0.00	0.00*	May 28	cattail
Capitol Outing Club II	50,000	200	50	0.00	0.00*	May 31	cattail
MERCED:							
San Luis "D"		24		1.45	0.67		barley (silage)
Los Banos	5,000	29		2.50			cattail
O'Neill, Blackberry I	2,000	26	10	1.00	0.38	May 15	Himalaya berry
O'Neill, Blackberry II	2,000	75	42	2.15	1.33	June 27	Himalaya berry
MONTEREY:							
Laguna Seca	2,500		8	1.62		June 10	cattail

COUNTY / SITE	COLONY SIZE	NESTS EXAMINED A	NESTS EXAMINED B	RS/SUC. NEST	RS ALL NESTS	DATE	NEST SUBSTRATE
SACRAMENTO:							
Koessler	4,000	15		2.50	0.33	May 7	Himalaya berry
Rancho Seco (first nesting effort)	20,000	25		1.54	1.31	May 8,9	Himalaya berry
Scott Marsh (first nesting effort)	4,000	25		1.00	0.09	May 10	cattail
Sheldon	500	25		1.94	1.32	May 10	Himalaya berry
Brad/Elder	4,500	25		1.43	0.40	May 12	Himalaya berry
Alta Mesa	3,000	21		2.80	0.67	May 16,17	Himalaya berry
Van Vleck	4,000	75		0.00	0.00	May 18	cattail
Knox	15,000	25		1.18	0.87	May 18,19	Himalaya berry
Scott Marsh (second nesting effort)	5,000	25		2.80	0.56	May 26	cattail
Eagles Nest	1,000	31		1.92	0.81	May 26	Himalaya berry
SANTA BARBARA:							
New Cuyama (first and second nesting)	2,000	0	17	2.50	2.35	May 17	nettles, Atriplex
		0	4	2.25	2.25	May 27	nettles, Atriplex
TULARE:							
Silage Colony	50,000	200	0	1.0**	0.00**		silage (barley, oats)

*Entire colony failed due to predation.

**Entire colony failed, no birds fledged, due to harvest of silage.

Table 14. Species preying upon Tricolored Blackbird nests, 1992-1994, and colonies affected. Predators are arranged within classes according to severity of impacts.

SPECIES	COLONY [IMPACTED]
MAJOR AVIAN PREDATORS	
Black Crowned Night Heron (Nycticorax nycticorax)	[COC, Kesterson NWR, 1992?, 1993]
Raven (Corvus corax)	[Little Panoche], Lettuce (1992), Kern NWR (1992)
Least Bittern (Ixobrychus exilis)	COC, Delevan (inc.)
Yellow-billed Magpie (Pica nuttallii)	Glenn Quarry, 1993
Marsh Wren (Cistothorus palustris)	Delevan, COC, Eagles Nest Rancho Seco
Great Blue Heron (Ardea herodias)	Van Vleck Ranch (cattail)
Harrier (Circus cyaneus)	San Luis, Producers Dairy, Lettuce (1992, 1993), others
Crow (Corvus)	Chamberlain (1992)
MINOR AVIAN PREDATORS	
Barn Owl (Tyto alba)	
Great Horned Owl (Bubo virginianus)	Los Banos, San Luis NWR
MAJOR MAMMALIAN PREDATORS	
Raccoon	Scott Marsh, Van Vleck Ranch,
Coyote	San Luis NWR, Glenn dairy
House cat	Fresno - Producers Dairy
Striped skunk	Kern NWR
OTHER MAMMALIAN PREDATORS	
mice, probably Perognathus	Lettuce (Kings County)
Rat	Delevan NWR
(Eastern) red fox	Pyle (Colusa County)
REPTILIAN PREDATORS	
Garter snake (Thamnophis)	O'Neill Forebay cattail
Gopher snake	
King Snake	
PREDATORY INSECT	
Argentine ant (Iridomyrmex humilis)	Owen II, major mortality

Table 15. Outcome of nesting efforts and causes of colony losses, 1994. Number of birds (Colony Size) was determined by multiplying number of nests times 1.5.

Colony & Colony Size		Percent Loss (accuracy of estimate)	Causes of losses
PREDATION			
Scott Marsh	(4,000)	60%	predation
same	(5,000)	80%	predation
Van Vleck	(4,000)	>90%	predation, great blue herons
Delevan	(12,000)	>75%	predation, especially night herons
San Luis	(20,000)	50%???	predation, coyote, data mgt. in progress
Owen, Marvin	(1,500)	>90%	predation
COC	(60,000)	100%(100%)	predation, night herons, least bitterns,
Owen	(5,000)	95%	predation
Slough BBry	(10,000)	100%(100%)	predation
Pyle	(800)	100%(100%)	predation
STARVATION			
Some at most colonies. Data to be developed.			
CLIMATOLOGICAL EVENTS			
Rancho Seco	(20,000)	15%	rainy and cold weather
Koessler	(4,000)	87%	rainy and cold weather
Brad Elder	(4,500)	72%	rainy and cold weather
Sheldon	(500)	32%	rainy and cold weather
San Luis	(40,000)	20%	rainy weather
San Luis	(60,000)	42%	blowdown of nesting substrate
AGRICULTURAL OPERATIONS			
Tulare	(50,000)	100%	harvest of silage
Kern	(11,600)	100%	harvest of silage
Chrome II	(300)	>90%	cattle grazing of nest site cattails
Kern, I-5	(600)	90%	flooding from agricultural runoff

Total losses (this subsample 211,390 of 313,800 total observed nesting, 67%).

Table 16. Tricolored Blackbird colonies nesting in grain and hay fields in 1994. Number of birds is determined by multiplying number of nests times 1.5 in the case of our (Hamilton, Cook, Grey) observations.

Location (COUNTY)	Colony size	Saved?	RS	Fledglings/ colony
REPRODUCTIVE SUCCESS MONITORED				
San Luis (MERCED)	105,000	+	0.67	46,900
Dairy (FRESNO)	20,000	+	1.8	24,000
Canal (TULARE)	50,000	-	0	0
Wildwood (KERN)	28,000	+	1.8	36,000
Poso Creek (KERN)	11,600	-	0	0
REPRODUCTIVE SUCCESS NOT CLOSELY MONITORED				
Wheat (GLENN)	32,000	?	unknown	>10,000
Total	**246,600 = 40.5% of all observed nesting attempts in 1994**			

Table 17. Possible demographic consequences of intervention in favor of Tricolored Blackbird colonies. Mean RS follows breeding colony size. The rest of the numbers are survivors assuming 2/3 of fledglings die before the initiation of breeding the following year and 30% of adult birds die annually. The San Antonio RS is based upon the assumption of 1.0 chicks produced at San Antonio, a minimum value. Other RS values are exact values for the respective colonies. Number of birds is determined by multiplying number of nests times 1.5 in the case of our (Hamilton, Cook, Grey) observations.

YEAR	COLONY	ADULTS	RS	SURVIVORS FROM SAVED COHORT 1992	1993	1994	1995
1991,	San Antonio	3,500		1166	816	571	400
1992,	Lettuce	65,000	(2.5)		36,111	25,277	17,694
1993,	Lettuce	15,000	(2.2)			7,333	5,133
1993,	Tulare	48,000	(1.0)			10,666	7,467
1994,	Wildwood Rd.	28,000	(1.5)				9,333
1994,	Producers D.	20,000	(1.8)				8,000
1994,	San Luis	105,000	(0.67)				15,633
Total*							**63,660**

*Estimated number of additional Tricolored Blackbirds entering 1995 breeding season due to protection afforded breeding colonies by all parties.

Table 18. Tricolored Blackbird colonies in areas of rice cultivation in California and their reproductive success. Failure is defined as <0.1 fledglings per nest. Number of birds is determined by multiplying number of nests times 1.5 in the case of our (Hamilton, Cook, Grey) observations. Fates of colonies are A, reproductive success of successful nests and B, RS of all nests, including failed (preyed upon) nests.

COUNTY, COLONY	NUMBER OF NESTS	FATE OF COLONY		FLEDGLINGS
1992		A	B	
BUTTE:				
Mustard	500	Failed		0
Thistle	6,000	2.0	1.5	9,000
COLUSA:				
COC A	33,333	2.0	0.2	6,667
COC B	3,333	2.1	0.4	1,333
COC C	3,333	2.2	0.5	1,666
Colusa NWR	2,667	2.1	0.35	933
Harbison	20,000	2.3	1.2	24,000
Lurline	18	2.0	0.7	13
Sacramento NWR	533	Deserted		0
GLENN:				
Owen	1,500	Failed		0
Quarry	4,000	Failed		0
Blackberry	unknown	Failed		0
Total, 1992	**75,217**			
1993				
COLUSA:				
Acre Farms	3,000	Failed		200
Delevan	9,000	Failed		20
Total, 1993	**12,000**			
1994				
COLUSA:				
COC I	6,667	Failed		0
COC II	33,333	Failed		0
Interstate 5		Did not settle		
Delevan	8,000	1.9	0.5	4,000
BUTTE:				
Marvin Owen	1,500	unk. (Failed)	trace	

Table 18, continued .....

GLENN:

Mid-America Dairy	16,667	Successful* about	20,000
Owen Cattail	3,333	2.0 0.4	1,333
Owen Willow	3,333	Failed	30
Slough	3,333	Failed	200
Howard Slough	3,333	Failed	0

1994 Total nests: 79,500**

1994 weighted RS: 25,563/79,500 = 0.33
Mean RS successful nests, all yrs = 2.1

* This colony was located June 29 by Paul Hoffman. We reached the colony July 1 but were unable to gain entry until July 5. By that date fledging had occurred. We estimate that there were 20,000 flightlings at this colony on July 1. Provisioning adults foraged in rice paddies for dragonfly nymphs and in grassland for grasshoppers. This was an important observation because it demonstrates the potential for rice habitat colonies to succeed. Unusual conditions at this colony include enclosure by chain link fence, a fairly uniform substrate depth and the absence of Least Bitterns and Black Crowned Night Herons as locally breeding birds.

** 1994 rice observed breeding, 78,000, 19.2% of all Tricolored Blackbird nests located. In addition, two large June colonies in rice surroundings in Glenn County were not monitored because of time and access limitations.

Table 19. Tricolored Blackbird colonies dependent upon dairies and cattle feedlots for some aspects of the reproductive cycle in 1994. Number of birds is determined by multiplying number of nests times 1.5.

LOCATION	NUMBER OF NESTING BIRDS
ALL BREEDING FEATURES (NEST SUBSTRATE, WATER, FORAGING AREAS)	
Producers Dairy	20,000
Wildwood Road Dairy	28,000
PREBREEDING FORAGING AT FEEDLOT CONTINUES THROUGH BREEDING SEASON	
*Koessler	4,000
San Luis	**100,000
*Rancho Seco	30,000
SILAGE FOR CATTLE OR DAIRY IS NESTING SUBSTRATE	
Tulare silage operation	50,000
San Luis NWR	counted above
Poso Creek silage for feedlot	11,600
IRRIGATED PASTURE ACCOMMODATES BLACKBERRIES (NESTING SUBSTRATE)	
Koessler Dairy	counted above
*Lewallen Ranch ???	12,500
*Yuba blackberry pasture	13,500
*Knox	15,000
*Davis	1,000
Rancho Seco	(80% of 27,000) counted above
*Bose Road	3,000
CATTLE OPERATIONS, FARM PONDS THE NESTING SUBSTRATE	
*Chrome I	2,300
*Chrome II	2,000
*Van Vleck	4,000
MILK TREATMENT, WASTE WATER DISPOSAL THE NESTING SITE	
Mid-America Dairy	25,000
Total	**331,900**
Total all substrates statewide	**608,530**

* Not counted elsewhere in this report as agriculture dependent. Add 87,300 birds equaling 14.3% of all colonies located. Summing rice and grain this equals 76.3% of all Tricolored Blackbird nests placed upon or dependent upon agricultural land or operations.

** This was on and controlled by the management of a NWR.

Table 20. Some examples of water level changes adversely affecting Tricolored Blackbird reproduction. Number of birds is determined by multiplying number of nests times 1.5.

COLONY	COUNTY	YEAR	WATER LEVEL CHANGE	CONSEQUENCE
			RISING WATER	
San Antonio	Alameda	1991	reservoir filled	1,000 bird colony in *Baccharis pilularis* lost
San Antonio	Alameda	1991	reservoir filled further	Filling halted to save nests, 3,500 nest colony, colony saved
O'Neill	Merced	1994	pond water level raised	18% of 2,000 bird colony lost, CF&G changes situation when notified
I-5	Kern	1994	irrigation drain water	over 90% of 600 bird colony lost
Chrome	Glenn	1993	small ag. dam fills	first 1,000 nests all flooded
L. Isabella	Kern	1993	reservoir filled, water level rises	colony of +/- 1000 flooded
			FALLING WATER	
Delevan	Colusa	1994	management causes evaporative fall, then stabilizes	about 5% of 12,000 bird colony preyed upon by mammalian predators
Kern NWR	Kern	1992	area of colony drained	skunks enter area, no obvious effect
Twisselman	Kern	1994	individual farming operation uses water from private reservoir	settlement in large area of salt cedar was abandoned, colony declines from 2,000 to 500 birds.

Table 21. Breeding populations of Tricolored Blackbirds in Yolo County, California. Number of birds is determined by multiplying number of nests times 1.5 in the case of our observations.

1931	15,000	birds	Neff, 1937 (60 days)
1932	57,000	birds	Neff, 1937 (3 days)
1960	105,000	birds	Orians, 1961
1971	25,150	birds	DeHaven, in Beedy et al., 1991
1972	25,000	birds	DeHaven, in Beedy et al., 1991
1992	1,773	birds	this report
1993	975	birds	this report
1994	600	birds	this report

Table 22. Tricolored Blackbird breeding effort at all Sacramento County sites. For 1992-1994 this is the summary of the early season and represents what we find to be the main breeding effort.

YEAR	NUMBER	EFFORT	AUTHORITY
1932	121,000	5 days searching	(Neff, 1937)
1933	101,000	3 days searching	(Neff, 1937)
1934	80,000	3 days searching	(Neff, 1937)
1992	83,350	throughout breeding season	(Cook)
1993	63,022	throughout breeding season	(Cook)
1994	90,855	throughout breeding season	(Cook plus Manolis, Burke)

Table 23. Outcomes positively determined by intervention, 1994. Number of birds is determined by multiplying number of nests times 1.5.

COLONY	NUMBER IN COLONY	OUTCOME	ACTION TAKEN
Wildwood	(28,000)	some weather related losses	Bought crop, about $9,400
Producers Dairy	(20,000)	minimal losses	Enlisted cooperation of the grower.
San Luis NWR	(70,000-105,000)	some biological losses,	USFWS agreed to additional agricultural activities on the NWR

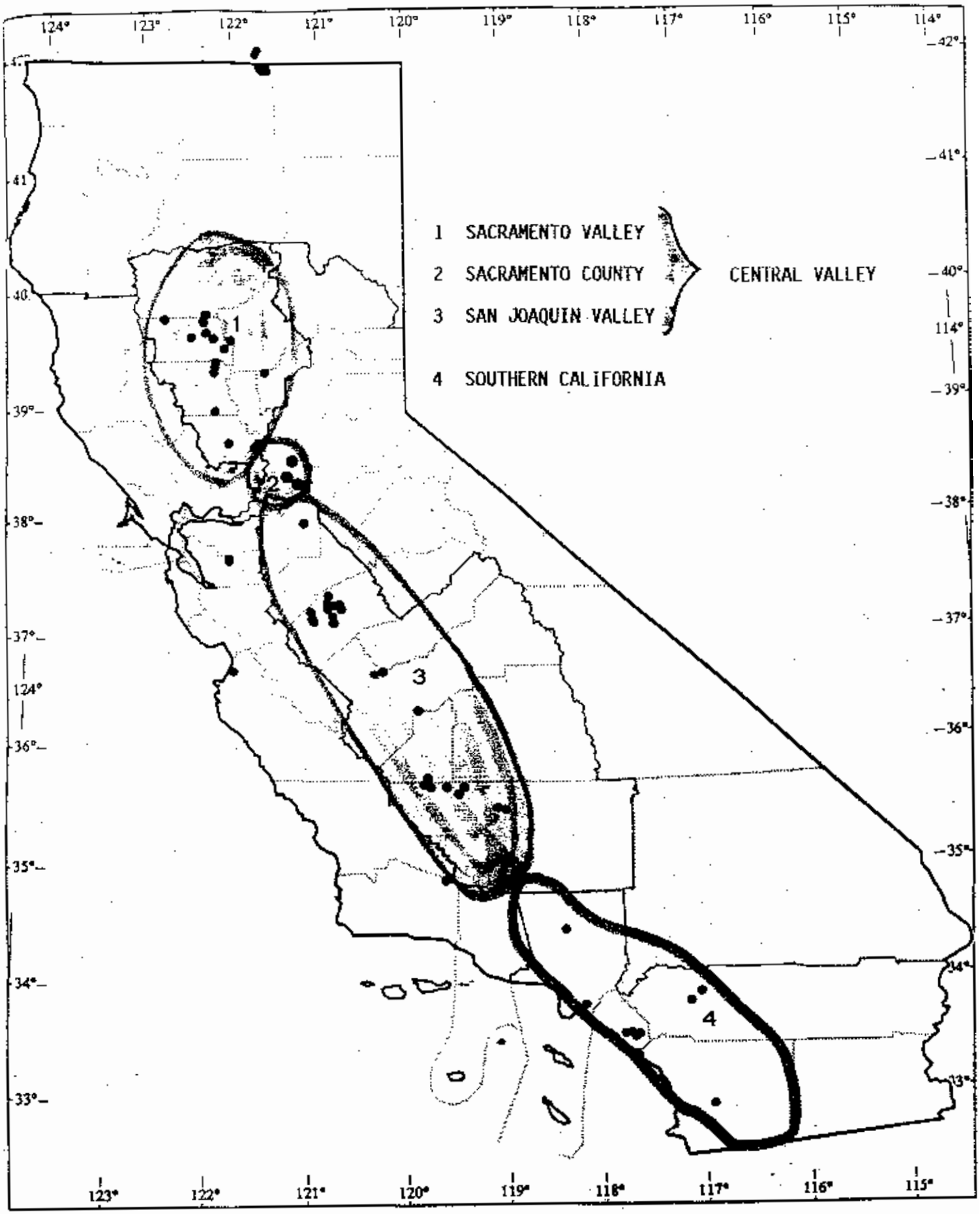


Figure 1. Location of Tricolored Blackbird colonies referred to in this report.

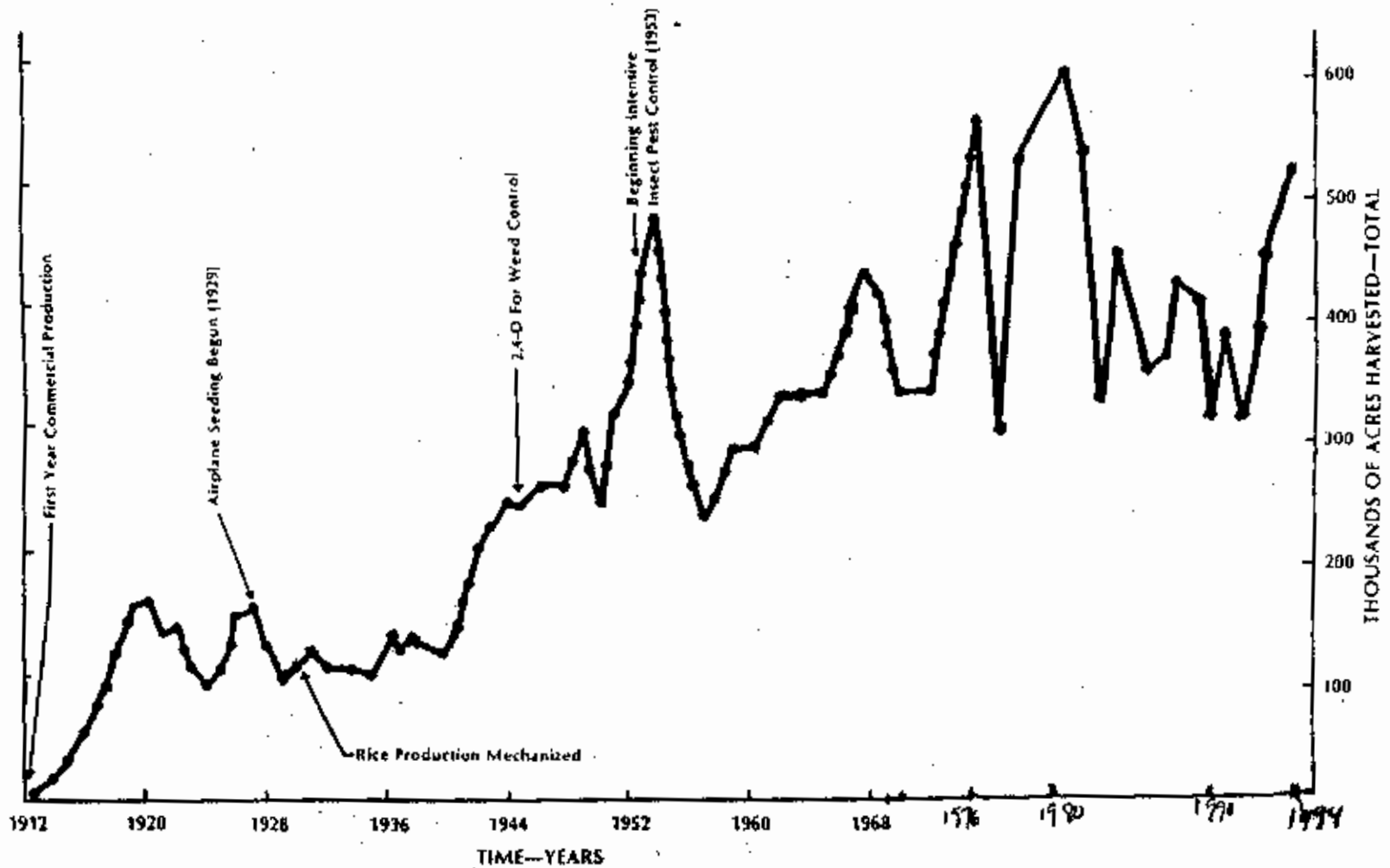
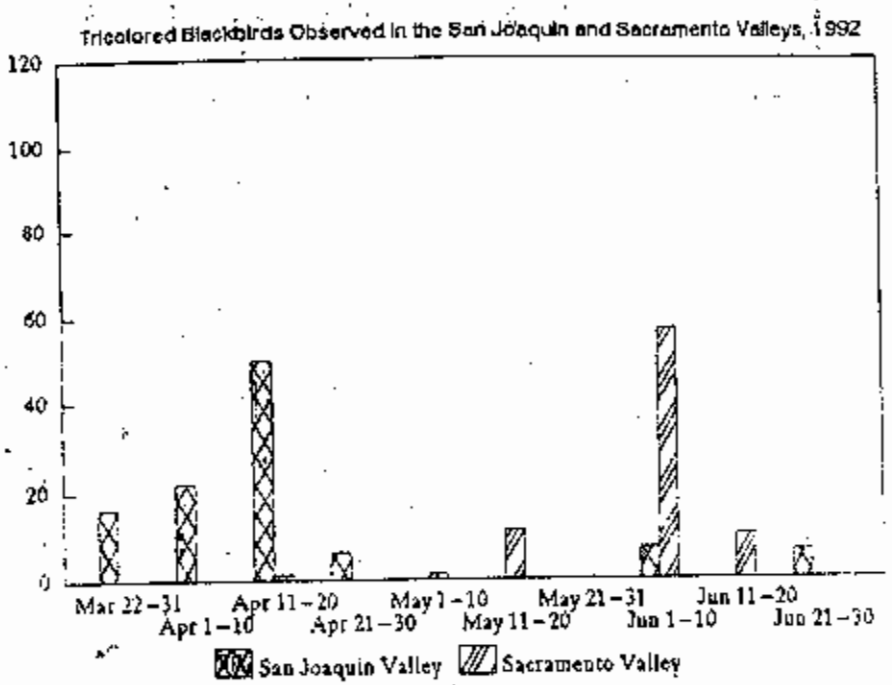
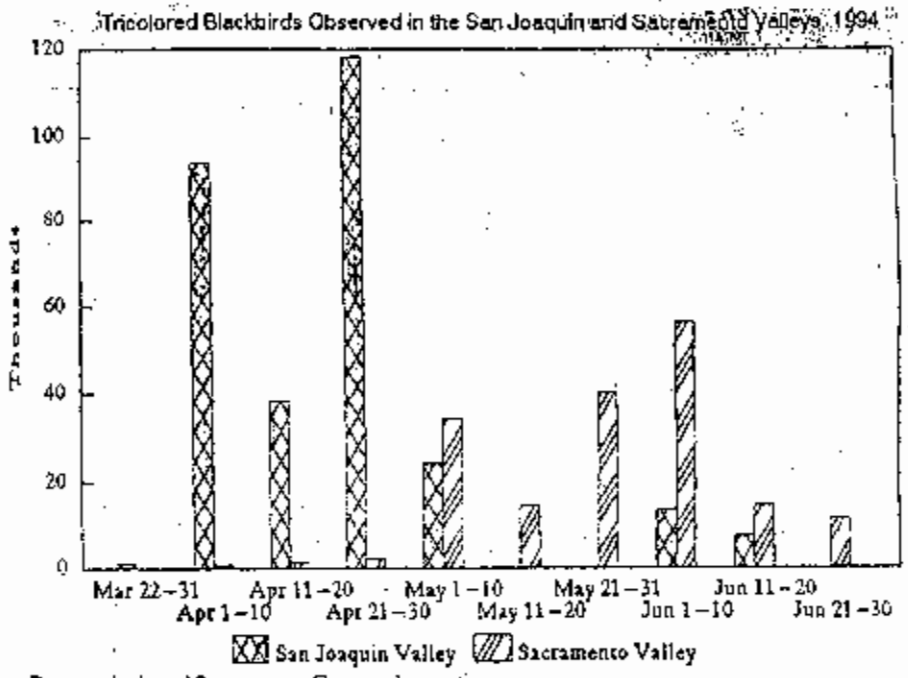


FIG. 2 CALIFORNIA RICE ACREAGE VS. TECHNOLOGICAL DEVELOPMENTS



Data exclusive of Sacramento County observations



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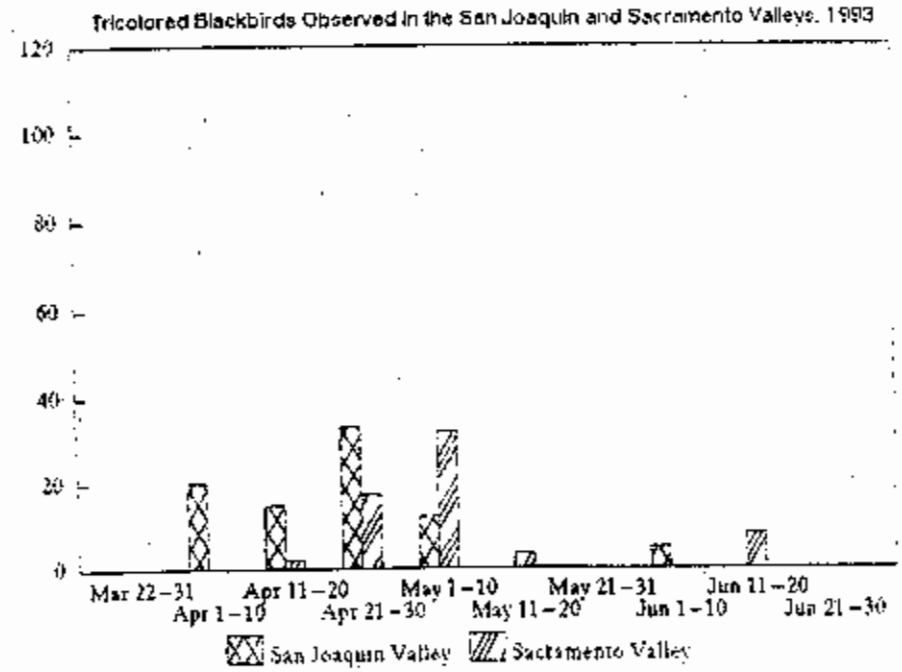

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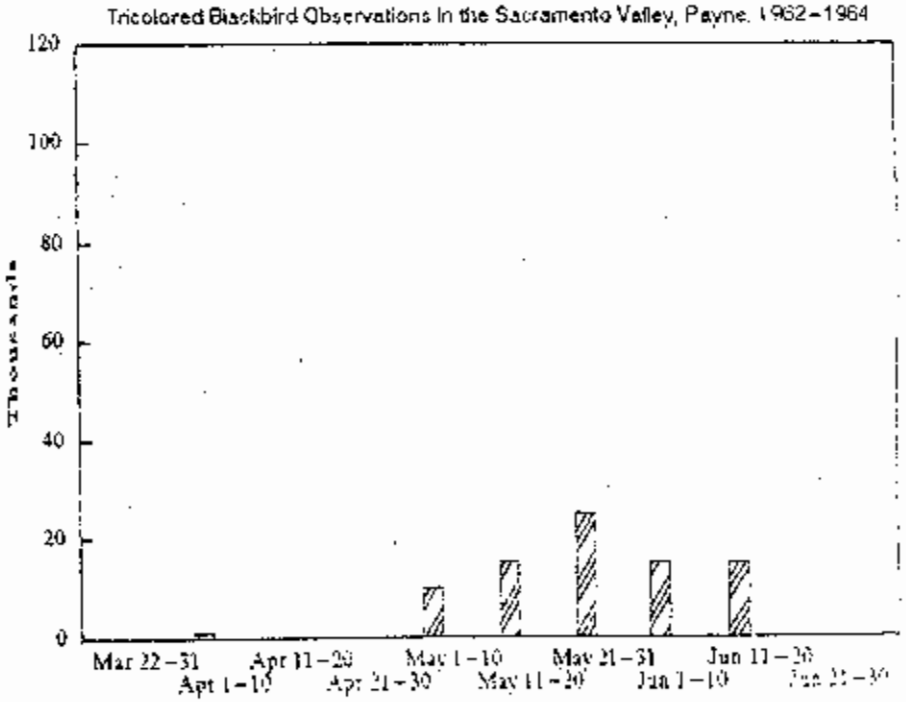

Appendices have not been included with this copy. If you wish to receive them, contact Lyanne Comrack, CF&G or Tara Zimmerman, USFWS.

APPENDICES

APPENDIX I. Coordinates of colonies observed in 1994 and habitat saturation. The first column considers whether or not all local habitat is occupied by nests. The second column identifies situations where two or more settlements occur at the same place but at different times, with overlap of occupancy. Coordinates were determined once and need double checking.

COUNTY SITE	LOCATION	ALL NESTING SUBSTRATE USED?	OVERLAP NESTS?
ALAMEDA:			
1. Blackberry	37°33.8'N 121°52'W		UNK.
2. Quarry I	37°39.6'N 121°48.5'W		UNK.
3. Quarry II	37°40.2'N 121°49.25'W		UNK.
BUTTE:			
1. Marvin Owen	39°34.6'N 121°55.1'W	YES	NO
COLUSA:			
1. COC I	39°14.4'N 122°6.5'W	NO	NO
2. COC II	39°13.4'N 122°6.5'W	NO	NO
3. Delevan NWR	39°17'N 122°5.7'W	NO	NO
4. Pyle (Arbuckle)	38°56.7'N 122°3.1'W		
FRESNO:			
1. Producers Dairy	36°44.4'N 120°14'W	NO	NO
2. Mendota	36°42.5'N 120°17.6'W	(Bruggemann) NO	NO
GLENN:			
1. Mid-America Dairy	39°35.2'N 122°11.2'W		UNK.
2. Quarry 2 (Owen)	39°33'N 122°10.2'W	NO	NO
3. Thunder Hill	39°32.9'N 122°19.1'W	NO	NO
4. Berry I	39°47.3'N 122°13.6'W		UNK.
5. Chrome I	39°44.2'N 122°33.5'W		UNK.
6. Chrome II	39°43'N 122°34'W		UNK.
7. Howard Slough	39°30.7'N 121°53'W	(Grecco) NO	NO
KERN:			
1. Kern NWR	35°43.75'N 119°35.5'W		UNK.
2. Twisselman Overpass	35°44.5'N 119°45'W	NO	NO
3. Wildwood Road	35°43.7'N 119°25.8'W	NO	NO
4. Poso Creek	35°40.6'N 119°27.75'W	NO	NO
5. Kern R. Recharge	*35°24'N 119°1.5'W	(Chichester)	UNK.
6. Kern Riverbed	*35°24'N 119°1.5'W	(Chichester)	UNK.

COUNTY SITE	LOCATION			
KINGS:				
1. I5, site I	35°47.5'N 119°46.3'W	NO		NO
2. Lemoore	36°23.5'N 119°55.25'W	NO		NO
LOS ANGELES:				
1. Holiday Lake	34°48'N 118°34.5'W		UNK.	
2. El Dorado Park	33°48.2'N 118°5'W		UNK.	
MERCED:				
1. Los Banos, Lot 4	37°6.6'N 120°48'W			
Early nesting		NO		NO
Late nesting		NO		NO
2. Los Banos, Old Salt Slough	37°9.1'N 120°48'W	NO		NO
3. San Luis NWR (West Gallo)	37°15.5'N 120°50'W			
early		NO		YES
mid		NO		NO
late		NO		NO
4. Bose Road	37°17.5'N 120°49'W	NO		NO
5. O'Neill Forebay, blackberry I	37°4.9'N 121°1.4'W	NO		NO
6. O'Neill Forebay Blackberry II	37°4.9'N 121°1.4'W	NO		NO
7. O'Neill Forebay, cattail	37°4.75'N 121°1'W	NO		NO
8. Blackberry, 22070 Hwy. 140		NO		NO
9. Arena Plains Bear Creek	37°15'N 120°42.5'W		UNK.	
10. Kesterson Sand Slough	37°14.3'N 120°51.5'W		UNK.	
11. [Merced NWR vic.] Duck Slough	37°12.5'N 120°38'W		UNK.	
MONTEREY:				
1. Laguna Seca	36°34.2'N 121°46'W			
early			UNK.	
late			UNK.	
ORANGE:				
1. Sulphur Cr. Res.	33°33'N 117°42.3'W		UNK.	
2. Canada Chiquita	33°33.75'N 117°37.25'W		UNK.	
3. Canada Gobernadora	33°33.5'N 117°35.15'W		UNK.	
4. San Juan Reservoir	33°31'N 117°34'W		UNK.	

COUNTY SITE	LOCATION	ALL NESTING SUBSTRATE USED?	OVERLAP NESTS?
RIVERSIDE::			
1. Quarry	33°53'N 117°4.I'W		UNK.
2. Duck pond	33°50'N 117°7'W		UNK.
SACRAMENTO:			
Koessler		YES	NO
Rancho Seco,			
early		NO	?
late		NO	?
Calvine/Bradshaw		NO	?
Van Vleck Ranch		YES	YES
Latrobe		YES	NO
Alta Mesa		YES	NO
Colony Road			
early		*	NO
late		*	NO
Folsom			
early		YES	?
late			
Scott Marsh			
early			
late			
later			
Davis (late)			
Sheldon			
Knox			
Brad/Elder			
Excelsior/Jack			
Elder Creek			
Grant Line (late)			
early			
late			
Eagles Nest			
Mather			
Sloughhouse (late)			
Clay/Dillard (late)			
SAN DIEGO:			
1. Lindo Lake	32°51.5'N 116°55'W		UNK.
2. Jacumba	32°37'N 116°11'W		UNK.
SAN JOAQUIN:			
1. Lewallen Ranch	38°3.5'N 121°3.I'W		UNK.
SAN LUIS OBISPO:			
1. Cattail	34°55.8'N 119°30.75'W	NO	NO

COUNTY SITE	LOCATION	ALL NESTING SUBSTRATE USED?	OVERLAP NESTS?
SANTA BARBARA:			
1. Nettles	34°56.2'N 119°36'W	YES	YES
TEHAMAH:			
1. Berry II	39°47.3'N 122°13.6'W		UNK.
TULARE:			
1. Canal		YES	YES
YOLO:			
1. County Road	38°39.2'N 121°53.4'W		UNK.
YUBA:			
I. Blackberry	39°17.9'N 121°30'W	NO	NO

* This is a linear colony extending for several kilometers. Hence, saturation and its relationship to foraging areas cannot be determined.

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. A list of reported colonies.

Reference ID # (county-###)	Observer	Date	Reproductive Stage (Evidence)	Number of Birds	Location (USGS Quad Name)	Nesting
CALA-001	Amy Augustine P.O. Box 3117, Sonora, CA., 95370, (209) 984-4760 Carolyn Augustine P.O. Box 1519, Jamestown, CA, 95327, (209) 984-0947	4/6/94	nest building	350-400	15372 Hunt Rd., approx. 2 miles outside of Milton in drainage on left hand side of road	blackberries
CALA-005	Dan Hiroca Jones and Stokes Assoc., 2600 V St., Sacramento, CA., (916) 737-3000	5/1/94	pre-nesting (unreported)	1,200	2 miles NW of Altaville, 1 mile W Dogtown Rd. (Airola Ranch)	blackberries
COLU-001	Gorenzel Wildlife Extension, Univ. of Cal., Davis, 95616	4/23/94	unreported	25	Pyle's ranch, Wisconsin--S of Arbuckle	cattails

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FRES-001	M.J. Kie 1234 E. Shaw Ave., Fresno, CA, 93710, (209) 222-3761	4/23/94	unreported	200	North Friant-Kern Canal. 1.5 miles E of Tollhouse/Shelman/Thompson intersection	cattails
FRES-003	Steve Brieggemann (?)	4/23/94	unreported	200-1000	Mendota Wildlife Area; Field 22, cells 4 and 5.	cattails
FRES-002	M.J. Kie 1234 E. Shaw Ave., Fresno, CA, 93710, (209) 222-3761	4/23/94	unreported	200-500	N side Shaw Ave; 0.6 miles W of Academy Ave. (Round Mtn. T13 S22E)	cattails
HUMB-001	S. Harris 1595 Charles Ct., Arcata, CA, 95521 (707) 822-3802	4/20/94	unreported	70 (males), 30 (females)	Jct. of Drake Hill Rd. and Hwy. 101, just S of Fortuna, then down the railroad tracks S	blackberries
KERN-001	Joe Engler Kern NWR, Delano, CA, 93216, (805) 725-2767	4/20/94	incubating (B. Hamilton)	28,000	2 miles S of intersection of Garces Hwy. and Wildwood Rd. (on Wildwood Rd.); West side; 7 miles E of KNWR.	barley
KERN-002	Joe Engler Kern NWR, Delano, CA, 93216, (805) 725-2767	4/23/94	incubating	3000	Kern NWR--Unit 1	cattails, tules
KERN-003	Joe Engler Kern NWR, Delano, CA, 93216, (805) 725-2767	4/23/94	unreported	4000	I-5 and Twisselman Rd.	cattails

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. A list of reported colonies.

KERN-004	Fred Heath 1532 Westgate #5, Los Angeles, CA, 90025, (310) 826-0083	4/23/94	unreported	300	pond N of Ave A between 40 and 50 Streets West; foraging in Los Angeles Co. (Rosamond)	cattails, tules
LOSA-001	Jonathan Aldufer 208 S. La Brea Ave., Inglewood, CA, 90301 (310) 673-9894	4/27/94	unreported	20	Lake Palmdale; private access off Ave. S in City of Palmdale (Antelope Valley)--at the Fin and Feather Club	cattails, tules
LOSA-003	Fred Heath 1532 Westgate, #5, Los Angeles, CA, 90025, (310) 826-0083	4/23/94	unreported	400-500	Holiday Lake--N of Ave. D and E of 260th Street West (Neenach School)	mostly cattail, some tule
LOSA-004	John Fitch 5037 Via Helena, La Palma, CA, 90623 (714) 229-0126, (213) 244-5520 (work) Mark C. Wimer 1425 E. First St., Apt. 8, Long Beach, CA, 90802, (310) 491-0819	4/23/94, 4/24/94	unreported	20-100.	El Dorado Nature Center, southernmost pond. (Los Alamitos)	tules

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. A list of reported colonies.

LOSA-005	Clarann Lerakis 3002 Sawyer, Long Beach, CA, 90805, (310) 984-9880 Mark C. Wimer 1425 E. First St., Apt. 8, Long Beach, CA, 90802, (310) 491-0819	4/23/94, 5/1/94	unreported	40-50	El Dorado Regional Park, Area III; northernmost pond (Los Alamitos)	tules
LOSA-006	Arthur Langton 7435 Lena Ave., Canoga Park, kCA, 91307-1522, (818) 341-6661, (818) 887-0973	4/17/94-5/1/94	unreported	75-280	immedeately S of Valley Circle Blvd. 1.5 miles W of State Hwy. 27 (Topanga Canyon Blvd.); inside Chatsworth Reservoir; 34°14'4" North, 118°37'35" (Calabasas 7.5', Canoga Park 7.5')	cattails, tules
MERC-001	Mike Peters San Luis NWR Complex, P.O. Box 2176, Los Banos, CA 93635, (209) 826-3508	4/22/94	unreported	15,000	Adjacent Bear Creek on Arena Plains NWR (Arena)	blackberries

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. A list of reported colonies.

MERC-002	Mike Peters San Luis NWR Complex, P.O. Box 2176, Los Banos, CA 93635, (209) 826-3508 Mark White USFWS, P.O. Box 2176, Los Banos, CA, 93635, (209) 826-3508	4/13/94,4/22/94	unreported	500-5,000	Adjacent Duck Slough; approx. .5 mile N of NW corner of Merced NWR (Turner Ranch, Calif.)	blackberries
MERC-003	Dennis Woolington San Luis NWR Complex, P.O. Box 2176, Los Banos, CA, 93635, (209) 826-3508	4/22/94	unreported	20,000	San Luis National Wildlife Refuge; Field 6 of West Gallo Unit (Turlock)	oat, wheat, barley mix (silage)
MONT-001	Don Roberson 282 Grove Acre., Pacific Grove, CA, 93950, (408) 373-4463	4/22/94	unreported	1200	Laguna Seca pond on Hwy. 68 between monterey and Salinas	cattails
MONT-002	Don Roberson 282 Grove Acre., Pacific Grove, CA, 93950, (408) 373-4463 Rita Carratello	4/24/94	unreported	100	"San Carlos Ranch pond"=San Francisquito Flat pond on Robinson Canyon Rd.	tule

MONT-003	Don Roberson 282 Grove Acre., Pacific Grove, CA, 93950, (408) 373-4463 Rita Carratello	4/24/94	unreported	10	"Gatehouse Pond" at intersection of Robinson Canyon Rd. and private road to San Clemente Rancho	tules
MONT-004	Don Roberson 282 Grove Acre., Pacific Grove, CA, 93950, (408) 373-4463	4/23/94	unreported	20	Locke Padden pond(public park) in Marina on Reservation Rd.	tule
MONT-005	Don Roberson 282 Grove Acre., Pacific Grove, CA, 93950, (408) 373-4463 Rita Carratello	4/23/94	unreported	800	"Hebert Rd. Pond"=private reservoir just N of n end of Hebert Rd., off San Juan Grade Rd., NE of Salinas	tule
MONT-006	Don Roberson 282 Grove Acre., Pacific Grove, CA, 93950, (408) 373-4463 Rita Carratello	4/24/94	unreported	30	farm pond on W side of Old Stage Rd., just S of Zubala Rd.	tules
MONT-007	Don Roberson 282 Grove Acre., Pacific Grove, CA, 93950, (408) 373-4463 Rita Carratello	4/24/94	unreported	30	farm pond on E side of Old Stage Rd., between Zubala and Alisal Rd.	tules

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. A list of reported colonies.

MONT-008	Don Roberson 282 Grove Acre., Pacific Grove, CA, 93950, (408) 373-4463	4/24/94	unreported	10	farm pond on Bryant Cyn. Rd., E of Soledad	tules
NAPA-001	Bob and Carol Foley	4/23/94	unreported	11	UTM 4225X555 R4W T4N SEC7 1/4NW 1/4NE (Cuttings Wharf)	cattails and tules
PLAC-001	John Ranhett	4/28/94	unreported	1000	2 miles S of Lincoln, CA, W of Industrial Blvd. (Roseville 7.5')	bullrush
RIVE-001	Tom Paulek San Jacinto Wildlife Area, P. O. Box 1254, Lakeview, CA, 92567, (909) 654-0580	4/23/94	unreported	300-500	2.5 miles N of Lakeview (El Casco 7.5)	cattails
RIVE-002	Henry E. Childs Jr., PhD 1875 N. First Ave., Upland, CA, 91784, (909) 985-8182	4/22/94	unreported	200	Jackrabbit Rd. at Hlen Ivy Rd. in gravel pit--near Mystic Lake	cattail
RIVE-003	Henry E. Childs Jr., PhD 1875 N. First Ave., Upland, CA, 91784, (909) 985-8182	4/22/94	nest building (females constructing nests)	1,000-2,000	0.5 mile N of Ramona Freeway on Bridge Rd.	nettles

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

ORAN-002	Ken Green 957 W. Harrison, Claremont, CA, 91711, (909) 626-0034 L.R. Hays U.S. Fish and Wildlife, 2730 Loker Ave., West Carlsbad, CA 92008 (619) 431-9440 James Pike (714) 968-7977	4/23/94	foraging	18-20	Carr Park, City of Huntington Beach; 1.7 miles N of the Bolso Chica Ecological Reserve and 1.3 miles NW of Huntington Central Park; Carr Park lies just SW of the intersection of Springdale and Heil	freshwater pond, riparian, and landscaped city park
SACR-002	Tim Manolis and Carl Burke 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/22/94	foraging	3	W side of 16th St. 0.25 miles N of intersection W/ Elverta Rd.--between Elverta and Gibson Ranch Co. Park	pasture
SACR-003	Tim Manolis and Carl Burke 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	1/21/94, 2/3/94	foraging	50	0.2 mile S of Sac/Sutter Co. line, just W of E. Levee Rd.	pasture
SACR-012	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	foraging	250	S.P. Railroad right-of-way between Cherokee and Marengo Rds. S of Twin Cities Rd.	pasture

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

SACR-015	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	foraging	700	W side of Alabama Rd. 0.5 mile S of intersection w/ Borden Rd.	recently flooded rice fields
SACR-016	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	foraging	100	Simmerhorn Rd. between Alabama and Loll Rds.	dry rice field
SANJ-001	Waldo Holt 3900 River Dr., Stockton, CA, 95204, (209)462-4438	4/23/94	foraging	420	NW corner of Liberty Rd. and Jack Tone Rd.	annual grasses
SANJ-002	Waldo Holt 3900 River Dr., Stockton, CA, 95204, (209)462-4438	4/23/94	foraging--W. Holt suggests they may be engaged in pre-nesting behavior	120	NE corner of Liberty Rd. and Sowles Rd.	annual grasses, oats, etc.
SANJ-003	Waldo Holt 3900 River Dr., Stockton, CA, 95204, (209)462-4438	4/23/94	flying overhead	150	end of Bruella Rd. and Dry Creek	unreported
SANJ-004	Waldo Holt 3900 River Dr., Stockton, CA, 95204, (209)462-4438	4/23/94	flying SE to NW	145	Elliot Rd. and Coyote Creek	unreported

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. A list of reported colonies.

SACR-001	Gary Fregian and Barbara Swinehart 4531 40th Ave., Sacramento, CA, 95824, (916) 653-0578	4/23/94	unreported	1000	Scott Rd. between Carson and Deer Creeks--on E side of Rd. 1.9 miles N of Deer Creek crossing (Folsom 7.5')	tules, cattails
SACR-004	Tim Manolis and Carl Burke 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	unreported	8,000-10,000	gravel pit NE Mather Field, just S of International and Zinfandel intersection	blackberries
SACR-005	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	unreported	1,500-2,000	Morrison Creek drainage just S of Creek and E of Bradshaw Rd.	blackberries
SACR-006	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	unreported	2,500-3,000	Elder Creek drainage intersection of Hwy. 16 and Excelsior --SW of Elder Creek Rd.	wild rose, blackberries
SACR-007	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	unreported	5,000-10,000	W of Bradshaw between Elder Creek and Florin Rds.--Elder Creek drainage	blackberries, wild rose
SACR-008	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	nest building (females carrying nesting material)	5,000-7,500	Knox Rd. at Florin Rd.	blackberries, some wild rose

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. A list of reported colonies.

SACR-009	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	unreported	2,000	NE of intersection of Waterman and Sheldon Rds.	blackberries
SACR-010	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	unreported	250	N of Calvine Rd./W of Bradshaw Rd.	blackberries
SACR-011	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	unreported	6,000-7,500	Grant Line Rd., 0.5 mile S of intersection w/ Bradshaw to just below intersection w/ Waterman	cattails, blackberries
SACR-013	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	probably nest building (T. Manolis)	600	on either side of West Rd. 0.5 mile S of the town of Herald	blackberries
SACR-014	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	unreported	5,000-7,500	W of Alta Mesa Rd., N of intersection w/ Borden Rd. just S. of intersection w/ Walkerville	blackberries, cattails
SACR-017	Tim Manolis 808 El Encino Way, Sacramento, CA, 95864, (916) 485-9009	4/23/94	nest building (T. Manolis not confident)	10,000-15,000	Clay and vacinity along Hwy. 104	blackberries

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. A list of reported colonies.

SACR-018	Carl Burke 2610 Marshall Way, Sacramento, CA, 95818, (916) 457-2740	4/23/94	unreported	410	0.75 miles S of Florin Rd on Eagles Nest Rd.; go W on dirt rd. until dirt rd. "T"s. nest site is to SW 200 meters	tules
SACR-019	Carl Burke 2610 Marshall Way, Sacramento, CA, 95818, (916) 457-2740	4/23/94	unreported	40-110	Sloughouse Rd. 0.6 mile E of Grant Line Rd.; S of Rd.	blackberries
SACR-020	Carl Burke 2610 Marshall Way, Sacramento, CA, 95818, (916) 457-2740	4/23/94	unreported	20-40	Diefer Blvd. across from entrance to Co. dump; about 150 meters to the S.	blackberries, eucalyptus, willows
SACR-021	Carl Burke 2610 Marshall Way, Sacramento, CA, 95818, (916) 457-2740	4/23/94	unreported	110	S of intersection of Wilton Rd. and Dillard Rd.; 150 meters directly S of Fire Station	blackberries
SANJ-011	Amy Augustine P.O. Box 3117, Sonora, CA., 95370, (209) 984-4760 Carolyn Augustine P.O. Box 1519, Jamestown, CA, 95327, (209) 984-0947	4/23/94	recent settlement	10,000-15,000	Lewallen Ranch, Linden; at corner of Clements Rd. and Messick Rd. (Linden--T2N:R8E Sects 2 &3)	blackberries

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. A list of reported colonies.

SANJ-012	Dan Airoca Jones and Stokes Assoc., 2600 V St., Sacramento, CA., (916) 737-3000 Amy and Carolyn Augustine P.O. Box 3117, Sonora, CA, 95370, (209) 984-4760	4/23/94,4/30/94	nest not observed--may be est. colony	2000	0.25 miles S Hwy. 12, S of Camanchi Reservoir, 1 mile W of Wallace at San Joaquin/Calavaras Co. line	cattails
SANJ-013	Amy and Carolyn Augustine P.O. Box 3117, Sonora, CA, 95370, (209) 984-4760	4/23/94	unreported	1000	intersection of Tully Rd. and Sargent (T3N R8E intersection of sects. 5,6,7,8)	blackberries
SANL-001	Joe Engler Dem NWR, Box 670, Delano, CA, 93216, (805) 725-2767	5/12/94	early hatching (most nests w/ eggs, some w/ chicks)	1,500	on outskirts of Cuyama along Hwy 166; E side of town, N sike of road across from school; 0.25 mile W of Cuyama River bridge (T10N R25W S19)	Atriplex
SANL-002	Joe Engler Kern NWR, Bos 670, Delano, CA, 93216	5/8/94 5/12/94	probably nesting (not confirmed)	75	on small agricultural pond along Hwy. 33, E side; pond is 1 mile S of Junction w/ Hwy 166; just S of Kern Co. line	tules

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. A list of reported colonies.

SANT-002	Chris Otahal Coyote Creek Riparian Station, P.O. Box 1027, Alviso, CA (408) 262-9204	4/24/94	nest building (C. Otahal observed females with nesting material and males displaying)	1,200-1,500	intersection of Metcalfe Rd. and 101 at Coyote Ranch Park--directly behind the large E terminal	tules
SANT-003	Chris Otahal Coyote Creek Riparian Station, P.O. Box 1027, Alviso, CA (408) 262-9204	4/23/94	nest building (C. Otahal observed females with nest material)	1,900-2,100	Silver Creek at junction w/ Lake Cunningham--corner of Cunningham and Capitol Expressway	tules
SHAS-001	Harry Rectewald 601 Locust St. 225-2368 Warner Jacobson 221-3155	4/23/94 4/24/94	nest building (W. Jacobson saw females carrying nesting material)	500-600 (H. Rectewald) 2,000-3,000 (W. Jacobsen)	0.25 mile SW of Redding Municipal Airport in a vernal pool area adjacent to Clover Creek	blackberries
SISK-001	Dave Manser USRWS, KBNWR, Rt. 1, Box 74, Tule Lake, CA, 96134, (916) 667-22321	4/22/94	early incubation (3 nests w/ 3 eggs ea.)	400	on W edge of lower sump on Tule Lake NWR (The Panhandle 7.5', T46N R4E S11 NW of SW)	cattail
STAN-001	Harold M. Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/17/94	nest building (observed)	2500	0.9 miles W of intersection of Jennings Rd. and Monte Vista Ave.; immediately south of Modesto sewage ponds (Brush Lake 7.5')	tules

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. A list of reported colonies.

STAN-005	Harold M. Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/23/94	nesting not confirmed but strongly suspected	500	Milton Rd. 3.1 miles N of Hwy. 4; along Rock Creek, 0.2 miles W of Milton Rd. (Bachelor Valley 7.5')	blackberries
STAN-007	Harold M. Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/23/94	unreported	75	in blackberries 50-70 yds. E of Twenty-six Mile Rd., 0.25 miles N of Eastman Rd. (near Woodward Reservoir) (Escalon 7.5')	blackberries
SUTT-001	Dee Warenycia 104 Stratford Ct., Roseville, CA, 95661, (916) 322-7307 (w), (916) 786-5056 (h)	4/23/94	unreported	20-50	W side of West Butte Rd., just S of the entrance to Sutter Butte Outing Club, W side of the Sutter Buttes (Sanborn Slough, 3912138)	cattail, tule
TULA-001	Joe Engler Kern NWR, Delano, CA, 93216, (805) 725-2767	4/23/94	incubating (males feeding)	40,000	1.5 to 6 miles E of Hwy 43 along Ave. 120; Probably nest colony 2.5 miles E and 1 mile S in private barley field	barely/oats ?
VENT-001	Rick Farris 2574 Sirius St., Thousand Oaks, CA, 91360, (805) 493-2612	4/23/94	unreported	53	Lake Sherwood, 2.5 miles S of US 101/SR 23 interchange.(Thousand Oaks T1N R19W Secs 27,28,34; Newbury Park Sec 28)	cattails, willows, and coyote brush

Appendix 2b: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

Some of the following reports may be of birds associated with a colony which was not located, while other reports may be of birds that have not reached their first settlement site for 1994.

Reference ID (county-###)	Observer	Date	Behavior	Number of Birds	Location (USGS Quad Name)	Habitat Description
CALA-002	Amy Augustine P.O. Box 3117, Sonora, CA., 95370, (209) 984-4760 Carolyn Augustine P.O. Box 1519, Jamestown, CA, 95327, (209) 984-0947	4/6/94	sitting on power lines and in a solitary fruit tree	250	Milton Rd.; downtown Milton across from cemetery	residential/farmland
CALA-003	Amy Augustine P.O. Box 3117, Sonora, CA., 95370, (209) 984-4760 Carolyn Augustine P.O. Box 1519, Jamestown, CA, 95327, (209) 984-0947	4/6/94	solitary	1	intersection of Hunt Rd. and Salt Spring Valley Rd.	across from pond with cattails in a grassy field

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

CALA-004	Dan Airoca Jones and Stokes Assoc., 2600 V St., Sacramento, CA., (916) 737-3000	5/1/94	foraging	300	general area from a)Hunt Rd. and Milton Rd. junction to b) Rock Creek Rd. 2 miles SE Milton	annual grassland
COLU-002	W. P. Gorenzel Wildlife Extension, Univ. of Cal., Davis, 95616	4/23/94	foraging	1	Ohm Rd.--opposite Colusa NWR--0.5 mile S of intersection w/ Abel	disked rice paddy
COLU-003	Gorenzel Wildlife Extension, Univ. of Cal., Davis, 95616	4/23/94	unreported	1	at intersection of Curline Ave and Jameson Rd.--W of Colusa	disked rice paddies and flooded rice paddies
LOSA-002	R. A. Erickson LSA Associates, 1 Park Plaza, Suite 500, Irvine, CA, 92714, (714) 553-0666	4/24/94	commuting	60	Ritter Ranch, Leona Valley; 3 groups flying NW up Amargoso Creek	alkali meadows and grassland
MARI-001	Rich Stallcup Box 36, Inverness, CA, 94937, (415) 663-8660	4/23/94	foraging	280 (mostly females)	Horick Ranch (Historic "D" Ranch), Drake's Beach Rd., outer Point Reyes	open range--holstein feedlot
MARI-002	Rich Stallcup Box 36, Inverness, CA, 94937, (415) 663-8660	4/23/94	foraging	120 (mostly females)	Mendoza Ranch (Historic "B" Ranch), outer Point Reyes	open range--Holstein feedlot

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.
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MERC-004	Dennis Woolington San Luis NWR Complex, P.O. Box 2176, Los Banos, CA, 93635, (209) 826-3508	4/22/94	foraging	4000	junction of Edminster Rd. and Hwy. 140	dairy feedlot and alfalfa field
MODO-001	Dave Manser USRWS, KBNWR, Rt. 1, Box 74, Tule Lake, CA, 96134, (916) 667-22321	4/22/94	foraging	100	N edge of Lower Sump on Tule Lake NWR (Tule Lake 15', CA and OR) (T46N R5E S6 NE)	plowed field
MODO-002	Dave Manser USRWS, KBNWR, Rt. 1, Box 74, Tule Lake, CA, 96134, (916) 667-22321	4/24/94	foraging	150	SE portion of Frey's Island (NE portion of Lower Sump on Tule Lake NWR)	willows and nettles
MONT-009	Don Roberson 282 Grove Acre., Pacific Grove, CA, 93950, (408) 373-4463 Rita Carratello	4/24/94	foraging	20	along Lonoak (?) Rd., 5 miles E of Kings City	grasslands
ORAN-001	L.R. Hays U.S. Fish and Wildlife, 2730 Loker Ave., West Carlsbad, CA 92008 (619) 431-9440 James Pike (714) 968-7977	4/23/94	foraging and roosting	2 (female), 12 (males)	between Slater and Ellis, Centerline Goldenwest Ave., 1.5 miles from Pacific Coast Hwy.; immediately NE of Bolsa Chica Ecological Reserve	freshwater pond, riparian, and landscaped city park

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994.
Tricolored Blackbirds not associated with a colony.
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SANJ-005	Waldo Holt 3900 River Dr., Stockton, CA, 95204, (209)462-4438	4/23/94	flying SE to NW	155	Elliot Rd. and Coyote Creek	unreported
SANJ-006	Waldo Holt 3900 River Dr., Stockton, CA, 95204, (209)462-4438	4/23/94	foraging	110	Dry Creek Rd. N of Coyote Creek (dirt road)	annual grasses
SANJ-007	Waldo Holt 3900 River Dr., Stockton, CA, 95204, (209)462-4438	4/23/94	flying SE to NW	26	Elliot Rd. and Coyote Creek	unreported
SANJ-008	Jim Rowoth 427 E. Wyandotte, Stockton, CA, (209) 462-7512 Don Mix 1629 Rutledge, Stockton, CA, (209) 478-0100	4/23/94	foraging	24	N side of Sonora Rd., b/t Henry Rd. and Farmington Dam	flooded pasture

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

SANJ-009	Amy Augustine P.O. Box 3117, Sonora, CA., 95370, (209) 984-4760 Carolyn Augustine P.O. Box 1519, Jamestown, CA, 95327, (209) 984-0947	4/23/94	foraging	100	between 22531 and 22451 Flood Rd.; also in feedlot S of Hyponex Plant (T2NR8E sect. 24 NE 1/4, T2NR9E sect. 19 N 1/2, 18 SE 1/4)	irrigated pasture and feedlot
SANJ-010	Amy Augustine P.O. Box 3117, Sonora, CA., 95370, (209) 984-4760 Carolyn Augustine P.O. Box 1519, Jamestown, CA, 95327, (209) 984-0947	4/23/94	foraging	53	end of Graves Rd/ off of Escalon-Bellota Rd.-Manuel Nones and Sons Dairy	dairy
SANJ-014	Amy and Carolyn Augustine P.O. Box 3117, Sonora, CA. 95370, (209) 984-4760	4/23/94	unreported	50	Escalon-Bellota Rd. at Foster Farms Turkey sheds; just N of Norman's Nursery on W side of Escalon-Bellota Rd.--1.5 miles S of Hwy 26/Escalon-Bellota intersection	pasture
SANT-001	Chris Otahal Coyote Creek Riparian Station, P.O. Box 1027, Alviso, CA (408) 262-9204	4/23/94	foraging	100-200	Ed Levin Co. Park--hills above Sandy Wool Lake	bay, oak, sycamore riparian strip in oak-grassland

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

SHAS-002	Bruce Deuel CDFG, 601 Locust St., Redding, CA, 96001, (916) 225-2143	4/22/94	foraging	80	field in SW area of intersection of Brown Rd. and Glenburn Rd.(A20); W of Glenburn (Fall River Mills 7.5')	moist wild rice field
SISK-002	Steve Haydock Klamath Basin Refuges, Ft. 1 Box 74, Tulelake, CA 96134, (916) 667-2231	4/22/94	foraging	1 (male)	Lower Klamath NWR, 15 miles from Tulelake, CA (Lower Klamath Lake)	tule marsh and gravel road
SISK-003	Steve Haydock Klamath Basin Refuges, Ft. 1 Box 74, Tulelake, CA 96134, (916) 667-2231	4/22/94	roosting and singing	2 (males)	Lower Klamath NWR (Lower Klamath Lake)	nettles
SISK-004	Steve Haydock Klamath Basin Refuges, Ft. 1 Box 74, Tulelake, CA 96134, (916) 667-2231	4/22/94	foraging	2 (males)	Lower Klamath NWR (Lower Klamath Lake)	gravel road
SISK-005	Steve Haydock Klamath Basin Refuges, Ft. 1 Box 74, Tulelake, CA 96134, (916) 667-2231	4/22/94	foraging	40 (males)	Lower Klamath NWR (Lower Klamath Lake)	barley field

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

SISK-006	Steve Haydock Klamath Basin Refuges, Ft. 1 Box 74, Tulelake, CA 96134, (916) 667-2231	4/22/94	roosting	2 (males)	Lower Klamath NWR (Lower Klamath Lake)	unreported
SOLA-001	Fran Scarlett 2480 Mankas Corner Rd., Suisun CA, 94585, (707) 425-2732	4/23/94	foraging	1	irrigated pasture E side of Stevenson Bridge Rd.--0.5 mile S of Stevenson's Bridge	irrigated pasture
SOLA-002	Harold Connor 806 Capistrano Dr., Suisun, CA, 94585 Fran Scarlett 2480 Mankas Corner Rd., Suisun CA, 94585, (707) 425-2732	4/20/94	in flight	4 (males)	Highway 113 at Calhoun Cut--see bay River Area AAA map (Dozier T5W R1E S25)	riparian
STAN-002	Harold M. Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/19/94	foraging	100	0.2 mile E of intersection of Sylvan Ave. and Esta Ave. (between Modesto and Riverbank); (Riverbank 7.5')	alfalfa field
STAN-003	Harold M. Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/23/94	foraging	700-800	Sonora Rd. 1.7 miles W of Frankenheimer Rd. (NE at Woodward Reservoir); (Oakdale 7.5')	wet, grassy field

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

STAN-004	Harold M. Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/23/94	foraging	175	Milton Rd. 0.1 mile S of town of Milton (Jenny Lind 7.5')	wet grassy pasture
STAN-006	Harold M. Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/23/94	flying S	100-125	Milton Rd. 1 mile S of Hwy. 4 (Bachelor Valley 7.5')	grasslands, pasture
STAN-008	Harold M. Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/23/94	foraging	100-110	Sonora Rd. 2.4 miles W of Frankenheimer Rd.; near small pond on S side of Sonora Rd. (Bachelor Valley 7.5')	grazed annual grassland; near pond with cattails
STAN-009	Harold M. Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/23/94	foraging	25	Sonora Rd. 2.5 miles W of Frankenheimer Rd. (Bachelor Valley 7.5')	gazed annual grassland
STAN-010	Harold and Sharon Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/24/94	foraging	40	Sonora Rd. 2.4 miles W of Frankenheimer Rd.; near pond on S side of Sonora Rd. (Bachelor Valley 7.5')	grazed annual grassland; near pond with cattails
STAN-011	Harold and Sharon Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/24/94	foraging	25	Warnerville Rd. 0.8 mile E of Emery Rd. (Paulsell 7.5')	grazed annual grassland (irrigated)

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

STAN-012	Harold and Sharon Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/24/94	foraging	25	Cooperstown Rd. 0.3 mile east of Williams Rd. (Cooperstown 7.5')	dry, grazed annual grassland
STAN-013	Harold and Sharon Reeve 1404 Bandera Ln., Modesto, CA, 95355, (209) 527-2281	4/24/94	flying over creek in easterly direction	70	Sonora Rd. at Little John Creek 1.4 miles W of Frankenheimer Rd. (Oakdale 7.5')	creek with limited riparian vegetation; some cattails, rushes, blackberries; most surrounding vegetation is grazed annual grassland
STAN-014	Amy Augustine P.O. Box 3117, Sonora, CA., 95370, (209) 984-4760 Carolyn Augustine P.O. Box 1519, Jamestown, CA, 95327, (209) 984-0947	4/6/94	foraging	2,500-3000	1.4 miles E of intersection of Milton Rd. and Hwy 4 at turkey barns across from Orvis Ranch entrance	grassland, feedlot
SUTT-002	Dee Warenycia 104 Stratford Ct., Roseville, CA, 95661, (916) 322-7307 (w), (916) 786-5056 (h)	4/23/94	foraging	200	along West Butte Rd., 0.5 mile S of Pass Rd. on the SW edge of the Sutter Buttes (Meridian, 3912128)	annual grassland

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

YUBA-001	Ted Beedy 133 North St., Woodland, CA, 95695, (916) 662-2655 Terry Colborn 1714 Magnolia Pl., Davis, CA, 95616	4/23/94	foraging	550	W side of Loma Rica Rd., 1.5 miles S of its intersection with Iowa City Rd. (Loma Rica)	rolling grassland and open terrain
YUBA-002	Ted Beedy 133 North St., Woodland, CA, 95695, (916) 662-2655 Terry Colborn 1714 Magnolia Pl., Davis, CA, 95616	4/23/94	foraging	7	E end of Plumas-Arboga Rd. along Best Slough (Olivehurst 7.5')	rolling grassland and slough
YUBA-003	Anita Peacemaker 703 Rideout Way, Marysville, CA, 95901, (916) 743-7688	4/23/94	foraging	30-50	S side Plumas-Arboga Rd., E of Algadon Rd., just W of Plumas School, 1 mile W of Forty Mile Rd., 8 miles SE of Marysville	pasture, tall grasses

Appendix 2b: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

Some of the following reports may be of birds associated with a colony which was not located, while other reports may be of birds that have not reached their first settlement site for 1994.

Reference ID (county-###)	Observer	Date	Behavior	Number of Birds	Location (USGS Quad Name)	Habitat Description
CALA-002	Amy Augustine Carolyn Augustine	4/6/94	sitting on power lines and in a solitary fruit tree	250	Milton Rd.; downtown Milton across from cemetery	residential/farmland
CALA-003	Amy Augustine Carolyn Augustine	4/6/94	solitary	1	intersection of Hunt Rd. and Salt Spring Valley Rd.	across from pond with cattails in a grassy field
CALA-004	Dan Airoca	5/1/94	foraging	300	general area from a)Hunt Rd. and Milton Rd. junction to b) Rock Creek Rd. 2 miles SE Milton	annual grassland
COLU-002	W. P. Gorenzel	4/23/94	foraging	1	Ohm Rd.--opposite Colusa NWR--0.5 mile S of intersection w/ Abel	disked rice paddy

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994.
Tricolored Blackbirds not associated with a colony.
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COLU-003	Gorenzel	4/23/94	unreported	1	at intersection of Curline Ave and Jameson Rd.--W of Colusa	disked rice paddies and flooded rice paddies
LOSA-002	R. A. Erickson	4/24/94	commuting	60	Ritter Ranch, Leona Valley; 3 groups flying NW up Amargoso Creek	alkali meadows and grassland
MAR1-001	Rich Stallcup	4/23/94	foraging	280 (mostly females)	Horick Ranch (Historic "D" Ranch), Drake's Beach Rd., outer Point Reyes	open range--holstein feedlot
MAR1-002	Rich Stallcup	4/23/94	foraging	120 (mostly females)	Mendoza Ranch (Historic "B" Ranch), outer Point Reyes	open range--Holstein feedlot
MERC-004	Dennis Woolington	4/22/94	foraging	4000	junction of Edminster Rd. and Hwy. 140	dairy feedlot and alfalfa field
MODO-001	Dave Manser	4/22/94	foraging	100	N edge of Lower Sump on Tule Lake NWR (Tule Lake 15', CA and OR) (T46N R5E S6 NE)	plowed field
MODO-002	Dave Manser	4/24/94	foraging	150	SE portion of Frey's Island (NE portion of Lower Sump on Tule Lake NWR)	willows and nettles
MONT-009	Don Roberson Rita Carratello	4/24/94	foraging	20	along Lonoak (?) Rd., 5 miles E of Kings City	grasslands

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.
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ORAN-001	L.R. Hays James Pike	4/23/94	foraging and roosting	2 (female), 12 (males)	between Slater and Ellis, Centerline Goldenwest Ave., 1.5 miles from Pacific Coast Hwy.; immediately NE of Bolsa Chica Ecological Reserve	freshwater pond, riparian, and landscaped city park
ORAN-002	Ken Green L.R. Hays James Pike	4/23/94	foraging	18-20	Carr Park, City of Huntington Beach; 1.7 miles N of the Bolso Chica Ecological Reserve and 1.3 miles NW of Huntington Central Park; Carr Park lies just SW of the intersection of Springdale and Heil	freshwater pond, riparian, and landscaped city park
SACR-002	Tim Manolis and Carl Burke	4/22/94	foraging	3	W side of 16th St. 0.25 miles N of intersection W/ Elverta Rd.--between Elverta and Gibson Ranch Co. Park	pasture
SACR-003	Tim Manolis and Carl Burke	1/21/94, 2/3/94	foraging	50	0.2 mile S of Sac/Sutter Co. line, just W of E. Levee Rd.	pasture
SACR-012	Tim Manolis	4/23/94	foraging	250	S.P. Railroad right-of-way between Cherokee and Marengo Rds. S of Twin Cities Rd.	pasture

Appendix 2a: Summarized Results of ..icolored Blackbird Census--April 23, 1994.
Tricolored Blackbirds not associated with a colony.
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SACR-015	Tim Manolis	4/23/94	foraging	700	W side of Alabama Rd. 0.5 mile S of intersection w/ Borden Rd.	recently flooded rice fields
SACR-016	Tim Manolis	4/23/94	foraging	100	Simmerhorn Rd. between Alabama and Lott Rds.	dry rice field
SANJ-001	Waldo Holt	4/23/94	foraging	420	NW corner of Liberty Rd. and Jack Tone Rd.	annual grasses
SANJ-002	Waldo Holt	4/23/94	foraging--W. Holt suggests they may be engaged in pre-nesting behavior	120	NE corner of Liberty Rd. and Sowles Rd.	annual grasses, oats, etc.
SANJ-003	Waldo Holt	4/23/94	flying overhead	150	end of Bruella Rd. and Dry Creek	unreported
SANJ-004	Waldo Holt	4/23/94	flying SE to NW	145	Elliot Rd. and Coyote Creek	unreported
SANJ-005	Waldo Holt	4/23/94	flying SE to NW	155	Elliot Rd. and Coyote Creek	unreported
SANJ-006	Waldo Holt	4/23/94	foraging	110	Dry Creek Rd. N of Coyote Creek (dirt road)	annual grasses
SANJ-007	Waldo Holt	4/23/94	flying SE to NW	26	Elliot Rd. and Coyote Creek	unreported
SANJ-008	Jim Rowoth Don Mix	4/23/94	foraging	24	N side of Sonora Rd., b/t Henry Rd. and Farmington Dam	flooded pasture

Appendix 2a: Summarized Results of .colored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.

SANJ-009	Amy Augustine Carolyn Augustine	4/23/94	foraging	100	between 22531 and 22451 Flood Rd.; also in feedlot S of Hyponex Plant (T2NR8E sect. 24 NE 1/4, T2NR9E sect. 19 N 1/2, 18 SE 1/4)	irrigated pasture and feedlot
SANJ-010	Amy Augustine Carolyn Augustine	4/23/94	foraging	53	end of Graves Rd/ off of Escalon-Bellota Rd.-Manuel Nones and Sons Dairy	dairy
SANJ-014	Amy and Carolyn Augustine	4/23/94	unreported	50	Escalon-Bellota Rd. at Foster Farms Turkey sheds; just N of Norman's Nursery on W side of Escalon-Bellota Rd.--1.5 miles S of Hwy 26/Escalon-Bellota intersection	pasture
SANT-001	Chris Otahal	4/23/94	foraging	100-200	Ed Levin Co. Park--hills above Sandy Wool Lake	bay, oak, sycamore riparian strip in oak-grassland
SHAS-002	Bruce Deuel	4/22/94	foraging	80	field in SW area of intersection of Brown Rd. and Glenburn Rd.(A20); W of Glenburn (Fall River Mills 7.5')	moist wild rice field
SISK-002	Steve Haydock	4/22/94	foraging	1 (male)	Lower Klamath NWR, 15 miles from Tulelake, CA (Lower Klamath Lake)	tule marsh and gravel road

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994.
Tricolored Blackbirds not associated with a colony.
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SISK-003	Steve Haydock	4/22/94	roosting and singing	2 (males)	Lower Klamath NWR (Lower Klamath Lake)	nettles
SISK-004	Steve Haydock	4/22/94	foraging	2 (males)	Lower Klamath NWR (Lower Klamath Lake)	gravel road
SISK-005	Steve Haydock	4/22/94	foraging	40 (males)	Lower Klamath NWR (Lower Klamath Lake)	barley field
SISK-006	Steve Haydock	4/22/94	roosting	2 (males)	Lower Klamath NWR (Lower Klamath Lake)	unreported
SOLA-001	Fran Scarlett	4/23/94	foraging	1	irrigated pasture E side of Stevenson Bridge Rd.--0.5 mile S of Stevenson's Bridge	irrigated pasture
SOLA-002	Harold Connor Fran Scarlett	4/20/94	in flight	4 (males)	Highway 113 at Calhoun Cut--see bay River Area AAA map (Dozier T5W R1E S25)	riparian
STAN-002	Harold M. Reeve	4/19/94	foraging	100	0.2 mile E of intersection of Sylvan Ave. and Esta Ave. (between Modesto and Riverbank); (Riverbank 7.5')	alfalfa field
STAN-003	Harold M. Reeve	4/23/94	foraging	700-800	Sonora Rd. 1.7 miles W of Frankenheimer Rd. (NE at Woodward Reservoir); (Oakdale 7.5')	wet, grassy field

Appendix 2a: Summarized Results of Tricolored Blackbird Census--April 23, 1994. Tricolored Blackbirds not associated with a colony.
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STAN-004	Harold M. Reeve	4/23/94	foraging	175	Milton Rd. 0.1 mile S of town of Milton (Jenny Lind 7.5')	wet grassy pasture
STAN-006	Harold M. Reeve	4/23/94	flying S	100-125	Milton Rd. 1 mile S of Hwy. 4 (Bachelor Valley 7.5')	grasslands, pasture
STAN-008	Harold M. Reeve	4/23/94	foraging	100-110	Sonora Rd. 2.4 miles W of Frankenheimer Rd.; near small pond on S side of Sonora Rd. (Bachelor Valley 7.5')	grazed annual grassland; near pond with cattails
STAN-009	Harold M. Reeve	4/23/94	foraging	25	Sonora Rd. 2.5 miles W of Frankenheimer Rd. (Bachelor Valley 7.5')	gazed annual grassland
STAN-010	Harold and Sharon Reeve	4/24/94	foraging	40	Sonora Rd. 2.4 miles W of Frankenheimer Rd.; near pond on S side of Sonora Rd. (Bachelor Valley 7.5')	grazed annual grassland; near pond with cattails
STAN-011	Harold and Sharon Reeve	4/24/94	foraging	25	Warnerville Rd. 0.8 mile E of Emery Rd. (Paulsell 7.5')	grazed annual grassland (irrigated)
STAN-012	Harold and Sharon Reeve	4/24/94	foraging	25	Cooperstown Rd. 0.3 mile east of Williams Rd. (Cooperstown 7.5')	dry, grazed annual grassland

Appendix 2a: Summarized Results of ..rtcolored Blackbird Census--April 23, 1994.
Tricolored Blackbirds not associated with a colony.
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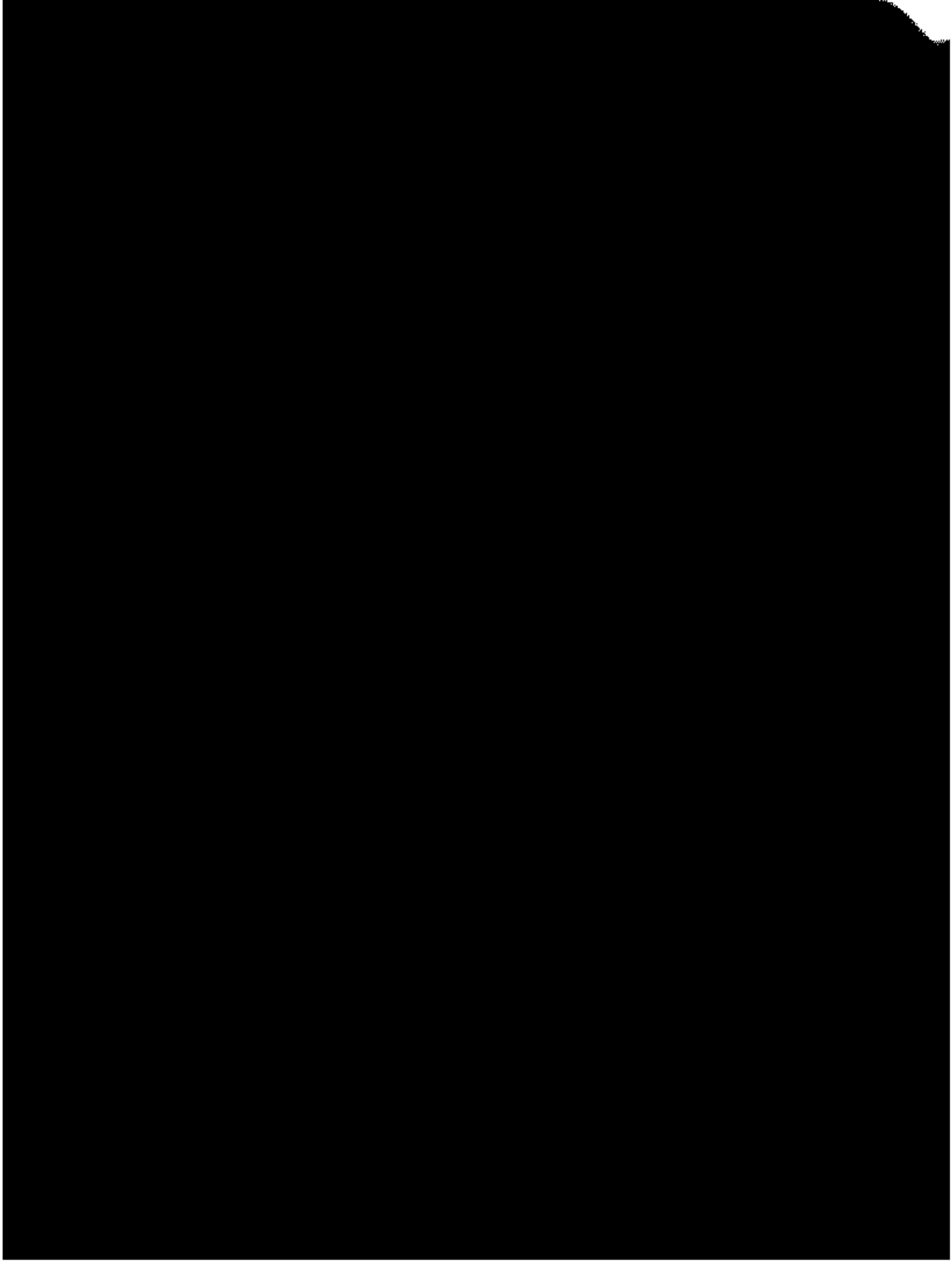
STAN-013	Harold and Sharon Reeve	4/24/94	flying over creek in easterly direction	70	Sonora Rd. at Little John Creek 1.4 miles W of Frankenheimer Rd. (Oakdale 7.5')	creek with limited riparian vegetation; some cattails, rushes, blackberries; most surrounding vegetation is grazed annual grassland
STAN-014	Amy Augustine Carolyn Augustine	4/6/94	foraging	2,500-3000	1.4 miles E of intersection of Milton Rd. and Hwy 4 at turkey barns across from Orvis Ranch entrance	grassland, feedlot
SUTT-002	Dee Warenycia	4/23/94	foraging	200	along West Butte Rd., 0.5 mile S of Pass Rd. on the SW edge of the Sutter Buttes (Meridian, 3912128)	annual grassland
YUBA-001	Ted Beedy Terry Colborn	4/23/94	foraging	550	W side of Loma Rica Rd., 1.5 miles S of its intersection with Iowa City Rd. (Loma Rica)	rolling grassland and open terrain
YUBA-002	Ted Beedy Terry Colborn	4/23/94	foraging	7	E end of Plumas-Arboga Rd. along Best Slough (Olivehurst 7.5')	rolling grassland and slough



Appendix 2a: Summarized Results of ...ricolored Blackbird Census--April 23, 1994.
Tricolored Blackbirds not associated with a colony.
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YUBA-003	Anita	Peacemaker	4/23/94	foraging	30-50	S side Plumas-Arboga Rd., E of Algadon Rd., just W of Plumas School, 1 mile W of Forty Mile Rd., 8 miles SE of Marysville	pasture, tall grasses

APPENDIX 2b. Colonies seen by CF&G-National Audubon Society Survey, not seen by us.

ALAMEDA:

Across from GE plant off Highway 84 (Vallecitos Rd.)

April 29	300-400	willows	apparently nested	Peeters, H. via Granholm

Calaveras Road, near I-680, 100 yards north of Lonestar Gravel.

No date	1, 1,000	narrow flowered thistle	nested	Peeters, H. via Granholm

East side of Agnino Road, n. of Springtown Road. mile north of Springtown Rd. 1/2 mile n. of May School Road. Farm pond on the right.

April 23	15	cattail	frenetic movement in and out	Aspen Mayers

CONTRA COSTA:

Danville, End of Lawrence Road. Through locked metal gate, through drag gate to immediate right, hike west approx. 1/4 mile.

April 23	300-350	cattails and tule	nest material carried	Aspen Mayers

KERN:

South edge of Kern Riverbed

April 24	5,000	nettles	incubation?	Mark Chichester

Kern River recharge of groundwater area

April 24	20,000	mesquite, nettles	settling	Mark Chichester

Little Creek Marsh

April 23	100	cattails	not stated on front of form	Rich Saval

KINGS:

Crescent Bypass NE Lemoore NAS

June 13	1,000-1,500	cattails	not stated	Gail Presley, Rob Hansen

KLAMATH:

off Highway 97

June 6, 1994	400-500	nettles	not stated	Dawn Follansbee

off Klamath Falls - Malin Highway 0.3 miles W. of Adams Pt. Road

June 23, 1994	unknown	blackberries	not known	Dawn Follansbee

along highway 97 SE of Hagelstein Park

June 28, 1994	not stated	nettles	not stated	Dawn Follansbee

LASSEN:

1.5 mi E Johnstonville

May 29	100-200	cattails	carrying food	Tim Manolis

MERCED:

Merced NWR, 1/2 mile north.

May 22, 1994	1,000	H. berry	incubation?	Mike Peters

SAN JOAQUIN:

Landfill at 580 and Corral Hollow Road
April 30

SISKIYOU

Lower Klamath NWR

May 5, 1994	1,500	nettles	not stated	Dave Mauser

Lower Klamath Lake, SW Corner

May 5, 1994	800	nettles	carrying nesting material	Dave Mauser

Lower Klamath Lake, west side unit 3A

May 12, 1994	700	nettles	not stated	Dave Mauser

Lower Klamath NWR, west side of unit 3A (same as above?)

June 6, 1994	400-500	nettles	not stated	Dawn Follansbee

Lower Klamath NWR, east edge of unit 3A

June 9, 1994	200-300	nettles	successful	Dawn Follansbee

Lower Klamath NWR,
June 20, 1994 400-500 cattails and bulrush feeding yg. Dawn Follansbee

Lower Klamath NWR, West edge of unit 8B

June 8, 1994	300-400	nettles	successful	Dawn Follansbee

Lower Klamath Lake, South side of unit 9A adjacent to "P" canal

May 17, 1994	400	nettles	not stated	Dave Mauser

Lower Klamath NWR, Unit 13A

May 26, 1994	1,000	nettles	not stated	Dave Mauser

Lower Klamath NWR, NE corner unit 13B

June 3, 1994	200-300	nettles	successful	Dawn Follansbee

STANISLAUS:

1/4 So. of Hwy.4 along Duntom Road
May 28, 1994 <1,000 willows, cottonwood not stated Jon Winter

North side of Highway 4 where it crosses Rock Creek
May 28, 1994 2,000-4,000 willows not stated Jon Winter

TEHAMA:

On Toomla Creek at the Tehama and Vina Road Crossing Anonymous
June 9, 1994 250 blackberry, willow, cottonwood provisioning

APPENDIX 3. Landowner status of Tricolored Blackbird colonies observed in 1994. Only colonies observed by the authors are included. Number of birds is determined by multiplying number of nests times 1.5.

COUNTY SITE	BREEDING SITE	FORAGING ARENA	ADULTS
ALAMEDA:			
Blackberry	Private	Private	3,500
Quarry I	Private	Private	3,000
Quarry II	Private	Private	1,000
Total			**7,500**
BUTTE:			
Marvin Owen	Private	Private	1,500
Total			**1,500**
COLUSA:			
COC I	Private	Private	10,000
COC II	Private	Private	50,000
Delevan NWR	Federal	Private	12,000
Pyle (Arbuckle)	Private	Private	800
Total			**72,800**
FRESNO:			
Producers Dairy	Private	Private	20,000
Mendota	State	?	200 (Bruggemann)
Total			**20,200**
GLENN:			
Mid-America Dairy	Private	Private	25,000
Quarry 2 (Owen)	Private	Private	10,000
Thunder Hill	Private	Private	32,000
Berry I	Private	Private	2,500
Chrome I	Private	Private	2,300
Chrome II	Private	Private	2,000
Howard Slough	State	Private	5,000 (Grecco)
Total			**78,800**
KERN:			
Kern NWR	Federal	Private	1,525
Twisselman Overpass	Private	Private	2,000
Wildwood Road	Private	Private	28,000
Poso Creek	Private	Private	11,600
Kern R. Recharge	city (Bakersfield)	same	20,000 (Chichester)
Kern Riverbed	city (Bakersfield)	city & Private	5,000 (Chichester)
Total			**69,125**

Appendix 3, continued.....

COUNTY SITE	BREEDING SITE	FORAGING ARENA	ADULTS
KINGS:			
I5, site I	Private	Private	600
Lemoore	Water district	Private	11,300
Total			**11,900**
LOS ANGELES:			
Holiday Lake	Water district	Private	2,000
El Dorado Park	County park	unknown	500
Total			**2,500**
MERCED:			
Los Banos, Lot 4	State	Private	
Early nesting			2,500
Late nesting			7,500
Los Banos, Old Salt Slough	State	Private	600
San Luis NWR (West Gallo)	Federal	Private, Federal	
early			20,000
mid			70,000
late			15,000
Bose Road	Private	Private	3,000
O'Neill Forebay, blackberry I	State	Private	1,000
O'Neill Forebay Blackberry II	State	Private	5,000
O'Neill Forebay, cattail	State	Private	2,000
Blackberry, 22070 Hwy. 140	Private	Private	500
Arena Plains	Federal	Federal	600
Kesterson	Federal	Federal	500
Merced NWR [vic.]	Federal	unknown	1,000
Total			**129,200**
MONTEREY:			
Laguna Seca	State	Private,	
early		state	2,500
late			2,000
Total			**4,500**

Appendix 3, continued.....

COUNTY SITE	BREEDING SITE	FORAGING ARENA	ADULTS	
ORANGE:				
Sulphur Cr. Res.	County Park	Private, County	1,000	
Canada Chiquita	Private	Private	4,500	
Canada Gobernadora	Private	Private	3,000	
San Juan Reservoir	Private	Private	1,000	
Total				**9,500**
RIVERSIDE:				
Quarry	Private	Private	200	
Duck pond	Private	Private	5,000	
Total				**5,200**
SACRAMENTO:				
Koessler	Private	Private	4,000	
Rancho Seco,	Private	Private		
early			20,000	
late			7,000	
Calvine/Bradshaw	Private	Private	250	(Manolis)
Van Vleck Ranch	Private	Private	4,000	
Latrobe	Private	Private	4,000	
Alta Mesa	Private	Private	3,000	
Colony Road	Private	Private		
early			400	
late			400	
Folsom	Public (college)	Private		
early			6,000	
late			5,000	
Scott Marsh	Private	Private		
early			4,000	
late			5,000	
later			750	
Davis (late)	Private	Private	1,000	
Sheldon	Private	Private	500	
Knox	Private	Private	15,000	
Brad/Elder	Private	Private	4,500	
Excelsior/Jack	Private	Private	15	
Elder Creek	Private	Private	7,000	
Grant Line (late)	Private	Private		
early			6,750	(Manolis)
late			2,500	
Eagles Nest	Private	Private	1,000	
Mather	Private	AFB, Private	9,000	
Sloughhouse (late)	Private	Private	40	
Clay/Dillard (late)	Private	Private	400	
Total				**111,505**

Appendix 3, continued.....

COUNTY SITE	BREEDING SITE	FORAGING ARENA	ADULTS	
SAN DIEGO:				
Lindo Lake	Public, County	Private	2,000	
Jacumba	? (park)	unknown	400	
Total				**2,400**
SAN JOAQUIN:				
Lewallen Ranch	Private	Private	12,500	(Augustine)
Total				**12,500**
SAN LUIS OBISPO:				
Cattail	Private	Private	300	
Total				**300**
SANTA BARBARA:				
Nettles	Private	Private	3,000	
Total				**3,000**
TEHAMAH:				
Berry II	Private	Private	3,000	
Total				**3,000**
TULARE:				
Canal	Private	Private	50,000	
Total				**50,000**
YOLO:				
County Road	Private	Private	600	
Total				**600**
YUBA:				
Blackberry	Private	Private	13,500	
Total				**13,500**
GRAND TOTAL				***608,530**

* This is not an estimate of the Tricolored Blackbird population in 1994. See itinerant breeding, pp. 34-35 for a rationalization of population numbers.

Appendix 4. Tricolored Blackbirds In Southern California

Richard Grey

My survey of Southern California consisted of two separate trips; the first was from April 27, 1994 to May 1,1994, and the second was from May 14, 1994 to May 18, 1994. I searched for tricolors and their colonies by visiting historical sites, and following the suggestions of naturalists in the region. The main reference used for historical sites was Beedy et al. (1991). In addition, several naturalists and individuals with the Tricolored Working Group provided me with valuable leads to possible colonies and access to private properties with colonies. My second trip to Southern California included visits to sites that were reported in the April 23, 1994 statewide census.

I observed 10 tricolor colonies in 1994 (Table 1); I estimated these colonies had a total of 19,600 individuals. There were three colonies reported to me in 1994 that I did not observe (Table 1)--they had an estimated total of 223 individuals. Therefore, 13 Southern California colonies were seen in 1994 with an estimated total of 19,823 individuals.

Table 2 summarizes historical sites that I visited in 1994 but did not see any tricolored blackbirds. Table 2 also lists possible reasons why these sites may not be suitable for colonies. It is important to note that because I did not see any tricolors at these sites does not mean these sites are not used or that tricolors are not nesting nearby. For example, I visited San Jacinto Wildlife Area twice this year and did not see tricolors nesting there, but there were two colonies found less than three miles from here with approximately 5,200 individuals present. Also, I may have missed tricolors at one of these sites because I visited most of these sites only once during the season and they may have nested at these sites at a different time of the year.

It is difficult to interpret any comparisons of the data of previous years to this year's data because of the differences in methods and efforts in searching for tricolors.

The future of tricolored blackbirds in Southern California is dependent on the future of available nesting substrate and foraging habitat. In Southern California the nesting and foraging habitat required by tricolors is lost by removing nesting substrate when land management requirements do not accomodate tricolors, or by eliminating nesting and foraging habitat to build houses.

Of all of the sites in Southern California I visited this year the sites in Orange County are probably the most vulnerable to loosing their nesting and foraging habitat to housing development. The nesting site at Sulfur Creek Reservoir, one of the four sites in Orange County, is not threatened, but the foraging habitat is being lost to housing development. Most of the area directly surrounding the park that houses the reservoir has been recently developed or is currently being developed. This is depleting much of the foraging habitat for the birds at this site.

Similarly, much of the foraging habitat has been lost to housing development near Canada Gobernadora, but rancho Mission Viejo, just south of this site, provides suitable foraging habitat. On the other hand, the nesting habitat at Canada Gobernadora belongs to the Coto de Caza housing development and is likely to be eliminated as development continues. The sites in Rancho Mission Viejo, Canada Chiquita and San Juan Reservoir, will probably subsist if the current land use practices continue. Even though I am unfamiliar with plans for housing development on Rancho Mission Viejo I must note that this property is very attractive for housing, and the property adjacent to the north and west is either currently being prepared for housing or alreadyt has been developed.

In addition to sites lost to housing development sites may be lost when their nesting habitat is destroyed or altered. For example, at Holiday Lake in Los Angeles County the West Valley County Water District is considering removing the cattails from Holiday Lake.

In order to be knowledgeable of the current populations in Southern California and predict their future we should plan to monitor these populations and the future of their habitats. Current knowledge of tricolors and their habitats in Southern California will give us the opportunity to react to land management decisions that would negatively affect tricolors.

Table 1: Tricolored Blackbirds in Southern California

LOCATION AND COUNTY	VERB. DESCRIP. OF LOC.	DATE AND OBSERVER	# OF INDIVI DUALS	STAGE	REFERENCE	COMMENTS	NESTING SUBSTRATE
EL DORADO PARK (LOS ANGELES)	In two seperate lakes in park--South Lake and in lake in Area III. Both lakes are directly west of interstate 605 and east of the San Gabriel River. South Lake is in between Willow St. and Spring St. Area III is north of Wardlow Rd.	5/14/94 (R. Grey)	500	provisioning	John Fitch Clarann Lerakis	This colony is surrounded by urban housing--very little foraging habitat. I presume this colony will not persist for very long.	tules
HOLIDAY LAKE (LOS ANGELES)	Lake is owned by West Valley Co. Water District. At corner of Ideal and Calcot. Approx. 1.75 miles north of Route 138 and La Petite Ave.	4/30-5/1/94, 5/18/94 (R. Grey)	2000	settling and hatching (4/30-5/1)		At 4/19/94 meeting they discussed removing cattails from pond.	cattails
CANADA CHIQUITA (ORANGE)	In a stock pond on property belonging to Rancho Mission Viejo--approx. 3 miles north of 74 (Ortega Highway) in Canada Chiquita. Canada Chiquita is approx. 3 miles east of San Juan Capistrano on 74.	5/16-5/17/94 (R. Grey)	4500	provisioning	Beedy et al. (1991)	This area (RMV) looks very attractive for the preservation of TCBB's--adequate nesting substrate and foraging habitat. On the other hand, very suseptable to housing development.	cattails
CANADA GOBERNADORA (ORANGE)	In two stock ponds on property belonging to Coto de Caza housing development--approx. 4.2 miles north of 74 (Ortega Highway) in Canada Gobernadora (CG). The two ponds are east of Wagonwheel canyon. CG is approx. 4 miles east of San Juan Capistrano on 74	5/16-5/17/94 (R. Grey)	3000	unknown	Beedy et al. (1991)	The two ponds are most likely going to be developed into housing in the near future. The tc's are foraging primarily on pasture belonging to Rancho Mission Veijo.	cattails

LOCATION AND COUNTY	VERB. DESCRIP. OF LOC.	DATE AND OBSERVER	# OF INDIVIDUALS	STAGE	REFERENCE	COMMENTS	NESTING SUBSTRATE
SAN JUAN RESERVOIR (ORANGE)	In a large reservoir that was once a quarry--approx. 6 miles east of San Juan Capistrano on 74 (Ortega Hwy.); north of the hwy.	4/30/94 (R. Grey)	1000	settling	Beedy et al. (1991)	When I returned to this site on 5/17/94 there were no signs of tcbb's--I saw 8 empty nests, 6 with remains of egg shell and yolk in them, and 4-5 were torn down.	cattails surrounded by willows
SULFUR CR. RESERVOIR (ORANGE)	In Laguna Niguel Regional Park. Approx. 1.25 miles north of Crown Valley Parkway on La Paz Rd. Presumably in the city of Laguna Niguel.	4/30/94 (R. Grey)	1000	settling and provisioning	Richard Erickson pers. comm.	An interested party may be the South Coast Audubon at P.O. Box 4059, San Clemente, Ca. 92674-4059	tules
QUARRY AT CORNER OF GILMAN SPRINGS RD. AND JACKRABBIT TRAIL (RIVERSIDE)	In quarry occupied by Standard Concrete Products Inc., Moreno Valley Sand and Gravel, Inc., and Industrial Asphalt. Approx. 1.2 miles from northeast edge of Mystic Lake in San Jacinto Valley.	5/14/94 (R. Grey)	200	incubating	Henry E. Childs Jr.	H. Childs said that this colony has been here since the early 1980's.	cattails
PRIVATE DUCK POND NEAR THE CITY OF LAKEVIEW (RIVERSIDE)	The pond is approx. .5 miles north of Romona Expressway on Bridge St. (on the west side of the st.). The pond belongs to Slim and Glenda List (909-654-1450)--I think they are affiliated to the Double Bar S Ranch (909-654-3050).	5/14/94 (R. Grey)	5000	incubating and provisioning	Henry E. Childs Jr.	H. Childs said this was not an active colony in 1993.	Mostly nettles but some cattails.

LOCATION AND COUNTY	VERB. DESCRIP. OF LOC.	DATE AND OBSERVER	# OF INDIVI UALS	STAGE	REFERENCE	COMMENTS	NESTING SUBSTRATE
JACUMBA (SAN DIEGO)	Small pond in the city of Jacumba. Looked like a city park.	5/15/94 (R. Grey)	400	probably incubating	Beedy et al. (1991)	Colony may have been deserted--birds were spread thin and 3 of 4 nests were empty. Surrounding area was mixed desert scrub and chaparral--Unique compared to the other sites I have seen. Historical reference in Beedy.	cattails
LINDO LAKE (SAN DIEGO)	In Lindo Lake Co. Park. On Lakeshore Dr. in the city of Lakeside.	4/28/94 & 5/15/94 (R. Grey)	2000	settling (4/28), nest building and incubating (5/15)	Beedy et al. (1991)	This colony has historical references in the Beedy report.	cattails

Additional Colonies Not Observed By But Reported To Us

CHATWWORTH RESERVOIR (LOS ANGELES)	Immediately south of Valley Circle Blvd. 1.5 miles west of State Hwy. 27. Reservoir owned by the Los Angeles Department of Water and Power.	4/17/94-5/1/94 (Arthur Langton)	150	unkown	Arthur Langton		cattails and tules
LAKE PALMDALE (LOS ANGELES)	At the Fin and Feather Club (private); off Ave. S in the city of Palmdale	4/27/94 (Jonathan Aldufer)	20	unknown	Jonathan Aldufer	This colony has been larger in the past (J. Aldufer)	cattails and tules

Table 1: Tricolored Blackbird in Southern California--Page 4

LAKE SHERWOOD (VENTURA)	Approx. 2.5 miles south of US 101 and SR23 interchange; T.1.N., R. 19.W., sections 27.28, and 34. of Thousand Oaks quad.	4/23/94 (Rick Farris)	53	unknown	Rick Farris	Surrounding area is being developed and may remove current foraging habitat (R. Farris)	cattails, willows, and coyote brush

Table 2: Summary of Historical Tricolored Blackbird Nesting Sites in Southern California Where Birds Were Not Seen in the Spring of 1994

County	Location	Possible reason why location is not suitable
Los Angeles	Antelope Valley -Piute Ponds -Misc. duck ponds	Piute Ponds has suitable nesting substrate, but there is not suitable foraging habitat nearby. Most of the valley is unsuitable foraging habitat, except for the west end near Holiday Lake.
	Leona Valley -Elizabeth Lake -Lake Hughes -Munz or Forest Lake	Some of these lakes have potential nesting substrate, especially Munz or Forest Lake, but the surrounding areas may not be suitable for foraging.
Orange	Charles W. Twinkle Park	Insufficient foraging and nesting habitat.
	Huntington Beach -Carr Park -Huntington Central Park	Insufficient foraging habitat.
	Peters Canyon Reservoir	Insufficient foraging habitat.
Riverside	San Jacinto Wildlife Area	This location is suitable, but tricolors nested in a duck pond nearby.
San Diego	Old quarry east of Santee	Insufficient foraging habitat.
	Santee Lakes	Insufficient foraging habitat.
	Old Mission Dam on S.D. River	No nesting substrate.
	Lower Otay Lake	--
	San Pasqual Valley	Potential foraging habitat, but no nesting substrate.
	Guajome Lake	Insufficient foraging habitat.
	Whelan Lake	No nesting substrate.
	Tijuana River Valley	Insufficient foraging habitat.

APPENDIX 5. THREE YEAR RECORD OF NUMBERS OF NESTS AT KNOWN COLONIES:
Comparison of activity at colony sites seen by the authors in 1992-1994. Estimates are of numbers of nests established, not number of adults present.

Site	Nests 1992	1993	1994	Foraging arena changes between 1992 and 1993
ALAMEDA:				
Blackberry	0	2,333	2,333	Main foraging area ungrazed in '92, grazed in '93, '94
Quarry I	not seen	not seen	2,000	
Quarry II	not seen	not seen	667	
Total, comparable	**0**	**2,333**	**2,333**	
COLUSA COUNTY:				
East Park (PU,PV) (2)	3,333	6,000 (10%)*	+	No obvious land use changes 1994. Alternative local site used. Not checked.
Pyle Farm (PV,PV)	667	2,000 (>100%)**	533(0)	No obvious land use changes 1992-1993. Less uncultivated land = less grassland, 1994
Interstate 5 (PU,PV)	0	60 (0)*	0	Temporary colony. No nests.
Delevan NWR (PU,PV)	0	6,000 (0)*	8,000 (0)	1993 rice operations were later in the season and expanded from 1992. Further expansion in 1994.
Colusa NWR (PU,PV)	2,667	0	0	Rice operations later in the season, expanded from 1992
Lurline (PV.PV)	18	0	0	1992 was an abandoned larger colony
Little Stony Creek (PV,PV)	667	0	+	Cattails washed away in 1993 1992-3 (habitat gone)

Wheat I (PV,PV)	2,000	0	0	Conversion to grazing, routine 3-year crop rotation
Wheat II (PV,PV)	1,333	0	0	Conversion to grazing, routine 3-year crop rotation
Sacramento NWR (PU, PV)	533	0	0	
Capitol Outing Club (COC) and Acre Farms (PV,PV)	40,000	3,000 (0)*	40,000	COC drained for maintenance, 1992-3, Acre Farms is contiguous duck club marsh.
Harbison	20,000	0	0	later rice in district in '93, '94.
TOTAL:	71,218	17,060	48,533	
COMPARABLE	70,551	17,060	48,533	
FRESNO COUNTY:				
Little Panoche Res. I (PU, PV)	5,000	2,666 (0)*	0	No obvious foraging habitat changes between years, entire area 1994: low water in reservoir.
Little Panoche Res. II (PU, PV)	1,667	200 (0)*	0	No obvious foraging habitat changes between years, entire area
Little Panoche River (PU,PV)	0	65 (0)*	0	No obvious foraging habitat changes between years, entire area 1994: No stream below reservoir, low rainfall year.
Little Panoche River II (PU,PV)	0	800 (80%)*	0	No obvious foraging habitat changes between years, entire area 1994: No stream below reservoir, low rainfall year.

Little Panoche River III (PV, PV)	0	1,000 (0)*	0	water source gone in 1994
Producers Dairy	not seen	not seen	13,333	May have been overlooked.
Mendota	Bruggemann?	Bruggemann	133	

Additional small colonies were seen along the upper reaches of the Little Panoche River in 1993. This area was not investigated in 1992. There were no breeding tricolors there in 1994.

TOTAL:	6,667	4,731	13,466
COMPARABLE	6,667	4,731	0

GLENN COUNTY:

Chrome I (PV,PV)	not checked	1,200 (0)*	1,533	
Chrome II (PV, PV)	not checked	1,500 (unk.)*	1,333	
Quarry I (PV, PV)	1,500	0	0	
Quarry II (Owen) (PV,PV)	4,000	0	6,667	waste rice supplement by Steve Owen at colony site
Stony Gorge Reservoir (PV,PV)	+	+	+	no boat was available to adequately check this colony
Thunder Hill	0	0	21,333	
Mid-America	0	0	16,667	
Marvin Owen	?	?	1,000	
Blackberry I	?	?	1,667	
Blackberry II	?	?	2,000	
TOTAL: COMPARABLE	5,500	0	44,667	

KERN COUNTY:

Kern NWR (PU, P)*	10,000	3,333 (10%V)	1,025	Joe Engler no obvious changes
Bitter Creek NWR	667	not checked	0	
Klipstein Canyon I (PV, PV)	650	650 (0)*	0	No obvious changes between 1992 and 1993. No open water in K. Canyon in 1994
Klipstein Canyon II	?	400 (0)*	0	No open water in K. Canyon in 1994
Klipstein Canyon III	?	500 (0)*	0	No open water in K. Canyon in 1994
Lake Isabella area (3) (PV, PV)	+	+	+	insufficient effort to personally evaluate
Lost Hills (PV, PV)	12,000	1,000 (0)*	0	row crops in 1993, mustard, other weeds 1992 In 1994 foraging area planted to cotton.
Antelope Hills (PV, PV)	2,000	0	0	row crops in 1993, mustard, other weeds 1992 1994 - same foraging area as for Lost Hills.
Twisselman salt cedar (PV, PV)	0	1,666 (0)*	1,333	no obvious changes 1994 - more intensive agriculture, esp. cotton.
@Twisselman cattail (PV, PV)	0	1,000 (0)*	0	no obvious changes
Buena Vista Lakebed (PV, PV)	2,666	0	0	nest area burned in late spring, 1993.
Poso Creek	?	?	8,400	
Wildwood Road	?	2,333	18,667	
I5 at Co. Line	0	0	400	
Total comparable	27,316	7,649	2,758	

KINGS COUNTY:				
Lettuce (PV, PV)	43,000	13,000 (15%)*	0	In 1993 more row crops, grain, less weedy acreage 1994: Complete cultivation of breeding site.
Lemoore area	?	?	7,533	
Total	**43,000**	**14,950**	**7,533**	
Total comparable	**43,000**	**14,950**	**0**	
YOLO COUNTY:				
Chamberlain (PV, PV)	532	650 (0)*	0	earlier haying in 1993 relative to colony phenology 1994: Early hay mowing.
Teichert (PV, PV)	650	0	0	not observed by UCD team
County Road	0	0	666	
Total comparable	**1,182**	**650**	**666**	
MERCED COUNTY:				
McNamara	3,333	?	?	
Kesterson NWR, Lake (PU, PU)	4,000	4,000(5%)*	0	no conspicuous changes West Gallo colony preempts?
Kesterson NWR	0	0	333	
Kesterson NWR, Windmill (PU, PU)	2,000	0	0	West Gallo colony preempts?
Kesterson NWR, Gallo (PU, UNK)	0	2,000(2%)*	0	West Gallo colony preempts?
Blackberry I (PV, PV)	2,000(0)*	0	0	

Blackberry, Bose Road (PV, PV)	0	333(0)*	2,000	In foraging shadow of West Gallo.
Blackberry III (PV, PV)	3,333(?)*	0	0	
22070 Hwy. 140 (PV, PV)	0	0	333	
Arena Plains	1,333	?	400	little changed
Nettle, Turner Ranch	200	?	?	
O'Neill Forebay Wildlife Area (PU, PU & PV)				
Blackberry	?	3,333(100%)	4,000	
Late nest in cattails	0	0	1,333	Counterpart of 1993 blackberry renest.
San Luis NWR,. Winton in 1993; mustard 1992 (PU, PU & PV)	6,666	6,500(<5%)*	0	major counterpart colony at West Gallo, other colonies at Los Banos.
San Luis NWR, West Gallo	0	0	70,000	Crop change. No substrate 1992-92-1993.
Billy Wright Road (PV,PV)	2,000	0	0	Weak cattail growth in 1993, 1994.
Merced NWR (thistle) (PU, PV)	333	0	667	
Barn (PV, PV)	264	0	0	Dry in 1994.
Los Banos, Lot 4				
early	?	?	1,667	
late nesting	?	?	5,000	
Los Banos, Old Salt Slough	0	0	400	
TOTAL COMPARABLE:	**17,263**	**13,398**	**74,733**	

SACRAMENTO COUNTY:	1992	1993	1994	
Cherokee	1,333	10,000	0	
Campbell	3,333	4,667	0	Some foraging habitat developed
Rancho Seco	13,333	3,333	18,000	
Folsom	2,000	2,333	7,333	
Calvine/Bradshaw	?	+	167	
Van Vleck	2,200	2,000	2,667	
Knox	2,667	1,600	10,000	
Colony Rd.	2,000	580	533	
Ivie	0	173	0	
Elder Creek	3,333	30	4,667	
Alabama Marsh	3,333	0	0	
Green Road	2,000	0	0	
Sheldon Road	333	0	333	
Calvine road	167	0	0	Foraging area developed
Bozick Ranch	13,333	0	0	
Bond Road	667	0	0	Heavy vehicle traffic
Sloughhouse	0	0	26	
Clay	0	0	267	
Latrobe	2,667	0	2,667	
Excelsior/Jack	?	?	10	

Subtotal (Comparable colonies)	50,032	24,716	46,670
Additional Sacramento County colonies:			
Moore	2,000	5,000	+
Alta Mesa	+	2,333	2,000
Brad/Elder	?	2,333	3,000
Betts Ranch	?	5,000	?
Koessler	?	?	2,667
Scott Road	?	+	6,500
Grant Line	?	?	6,166
Bradshaw	?	233	0
Eagles Nest	?	?	667
Nather	?	?	6,000
Alabama Blackberry	333	0	+
Morse	+	1,333	0
Davis	+	1,067	667
Total	**55,033**	**42,015**	**74,337**
Adults	**82,550**	**63,022**	**111,505**

TULARE COUNTY:					
George (PV, PV) Pacheco Bros.	8,000	32,000	(10%*)	33,333	No obvious change in conditions, either at colony or in the
Lake Success (PU, PV)	?	3,500		0	
TOTAL COMPARABLE	**8,000**	**35,200**		**33,333**	

APPENDIX 6. Nest substrate of 1994 colonies and estimated date of first egg based upon inspection of nests or settlement dates. Estimates are based upon 12 days incubation and 4 days nest building. Number of birds is determined by multiplying number of nests times 1.5.

COUNTY SITE	ADULTS	SUBSTRATE	FIRST EGG	
ALAMEDA: (other)				
Blackberry	3,500	Himalaya berry	May 5	
Quarry I	3,000	cattail	*April 9	
Quarry II	1,000	cattail	*April 10	
Total				**7,500**
BUTTE: (Sacramento Valley)				
Owen, Marvin	1,500	Himalaya berry, ash, willow, b, buttonbrush (Cephalanthus occidentalis) valley oak (Quercus lobata), native blackberry	June 16	
Total				**1,500**
COLUSA: (Sacramento Valley)				
Pyle (Arbuckle)	800	cattail	*April 10	
COC I	10,000	cattail	May 28	
COC II	50,000	cattail	May 31	
Delevan NWR		cattail		
late	6,000		June 15	
later	6,000		June 24	
Total				**72,800**
FRESNO: (San Joaquin Valley)				
Mendota	200	cattail	*March 30	
Producers Dairy	20,000	silage (beardless barley	*April 5	
Total				**20,200**
GLENN: (Sacramento Valley)				
Chrome I				
early	2,000	cattail	**April 26	
late	300		June 2	
Thunder Hill	32,000	wheat, thistle, mustard	May 3	
Chrome II	2,000	cattail	May 8	
Mid-America Dairy	25,000	cattail	May 21	
Berry I	2,500	Himalaya berry, native blackberry	May 31	
Quarry 2 (Owen)	5,000	cattail, arboreal	June 10	
	5,000	willows	June 28	
Howard Slough	5,000	Himalaya and native	May 27	
Total				**78,800**

Appendix 6, continued .....

COUNTY	SITE	ADULTS	SUBSTRATE	FIRST EGG	
KERN:	(San Joaquin Valley)				
	Kern NWR	400	cattail	*April 21	
	second effort	1,125		May 11	
	Twisselman Overpass	2,000	cattail	*April 13	
	Wildwood Road	28,000	silage (beardless barley, oats, mustard)	*April 10	
	Poso Creek	11,600	silage (beardless barley, oats, mustard)	**April 27	
	Kern R. Recharge	20,000	mesquite, nettles	*late-April	
	Kern Riverbed	5,000	nettles	*mid-April?	
Total					68,125
KINGS:	(San Joaquin)				
	I5, site 1	600	cattail	*April 13	
	Lemoore	11,300	cattail	early June	
Total					11,300
LOS ANGELES:	(Southern California)				
	Holiday Lake	2,000	cattail	April 30	
	El Dorado Park	500	cattail	April 30	
Total					2,500
MERCED:	(San Joaquin)				
	Los Banos, Lot 4		cattail		
	early	2,500		May 4	
	late nesting	7,500		June 18	
	Los Banos, Old Salt Slough	600	cattail	May 9	
	San Luis NWR (West Gallo)		silage (beardless barley, oats, thistle)		
	first	20,000		*April 18	
	second	70,000		April 28	
	third	15,000		May 9	
	Bose Road	3,000	Himalaya berry	*April 17	
	O'Neill Forebay, Blackberry I	1,000	Himalaya berry	*April 16	
	O'Neill Forebay Blackberry II	5,000	Himalaya berry	*April 19	
	O'Neill Forebay, Blackberry, 22070	2,000	cattail Himalaya berry	June 4	
	Hwy. 140	500		*April 19	
	Arena Plains	600	Himalaya berry		
	Kesterson	500	cattail	May 15	
	Merced NWR Vic.	1,000	Himalaya berry	*April 16	
Total					129,200

Appendix 6, continued .....

COUNTY SITE	ADULTS	SUBSTRATE	FIRST EGG	
MONTEREY: (other)				
Laguna Seca		cattail		
early	2,500		*April 10	
late	2,000		May 18	
Total				**4,500**
ORANGE: (Southern California)				
San Juan Reservoir	1,000	cattail	April	
Sulphur Cr. Res.	1,000	bulrushes	May 3	
Canada Chiquita	4,500	cattail	May 17	
Canada Gobernadora	3,000	cattail	unknown	
Total				**9,500**
SACRAMENTO: (Sacramento County)				
Koessler	4,000	Himalaya berry	*April 17	
Rancho Seco,				
early	20,000	Himalaya berry	*April 18	
late	7,000		May 15	
Calvine/Bradshaw	250	unknown	*late April	
Van Vleck Ranch	4,000	cattail	May 4	
Latrobe	4,000	Himalaya berry	May 22	
Alta Mesa	3,000	Himalaya berry	**April 26	
Colony Road		Himalaya berry		
early	400		*April 14	
late	400	ag ditch	May	
Folsom		Himalaya berry		
early	6,000		*April 14	
late	5,000		May	
Scott Marsh		cattail		
early	4,000		*April 20	
late	5,000		May 6	
later	750		May 18	
Davis (late)	1,000	Himalaya berry	May 6	
Sheldon	500	Himalaya berry	*April 19	
Knox	15,000	Himalaya berry	**April 27	
Brad/Elder	4,500	Himalaya berry	*April 21	
Excelsior/Jack	15	Himalaya berry	*April 20	
Elder Creek	7,000	Himalaya berry	*April 20	
Grant Line		Himalaya berry		
early	6,750		*late April (Manolis)	
late	2,500		May	
Eagles Nest	1,000	Himalaya berry, willows	May 1	
Mather	9,000	Mustard, weeds, Himalaya berry	*late April	
Sloughhouse (late)	40	Himalaya berry, multiflora rose	May 9	
Clay/Dillard (late)	400	Himalaya berry	May 10	
Total				**111,505**

Appendix 6, continued .....

COUNTY SITE	ADULTS	SUBSTRATE	FIRST EGG	
RIVERSIDE: (Southern California)				
Duck pond	5,000	nettles and cattail	April 22 May 19	
Quarry	200	cattail	May 21	
Total				**5,200**
SAN DIEGO (Southern California)				
Lindo Lake	2,000	cattail	May 19	
Jacumba	400	cattail	[May 15 present]	
Total				**2,400**
SAN JOAQUIN: (San Joaquin)				
Lewallen Ranch	12,500	Himalaya berry	*late-April?	
Total				**12,500**
SAN LUIS OBISPO (other)				
Cattail	300	cattail (area)	[May 8, May 15-present]	
Total				**300**
SANTA BARBARA (other)				
Nettles		nettles, Atriplex		
early	2,000		*April 23	
late	1,000		May 17	
Total				**3,000**
TEHAMAH; (Sacramento Valley)				
Berry II	3,000	Himalaya berry	June 1	
Total				**3,000**
TULARE: (San Joaquin)				
Canal	50,000	silage (barley, mustard, oats)	*April 9	
Total				**50,000**
YOLO: (Sacramento Valley)				
County Road	600	cattail	June	
Total				**600**

Appendix 6, continued .....

COUNTY	SITE	ADULTS	SUBSTRATE	FIRST EGG	
YUBA	(Sacramento Valley)				
	Blackberry	I3,500	Himalaya berry	May I9	
Total					13,500
GRAND TOTAL					608,530

APPENDIX 7. Estimation of the San Luis colony as of April 23.

The San Luis colony was expanding rapidly at the time of the census and came to include an estimated 90,000 birds by May 4, when we were first permitted to visit this colony. Woolington's estimate on April 22 was 20,000+. Woolington also estimated that the colony occupied 50 acres and showed approximately that area on a map of the colony. Our final analysis of this colony on the ground after the breeding season showed that 83 acres was colonized at some time during the breeding season. The entire issue is complicated by an approximately 37% blowdown after May 4 and additional nest initiation. Our estimate of 70,476 adults was based upon 46,932 nests present after the breeding season and does not including the blown down nests.

Reanalysis of map by us shows a colonized area of 45 acres. Nest density at this colony was determined as follows:

Area of hayfield settled with tricolor nests:	83 acres
Blown down area:	37%
Residual area occupied by nests	52.3 acres
Nests located in this area	46,932
Nests established after blowdown	13,333
Calculated nests prior to blowdown plus established after blowdown (53,331 + 13,333)	66,664
Estimated number of birds nesting per season (66,664 X 1.5 to include males)	99,996
Colony nest density at seasons end	1/5.4 square yards of occupied area

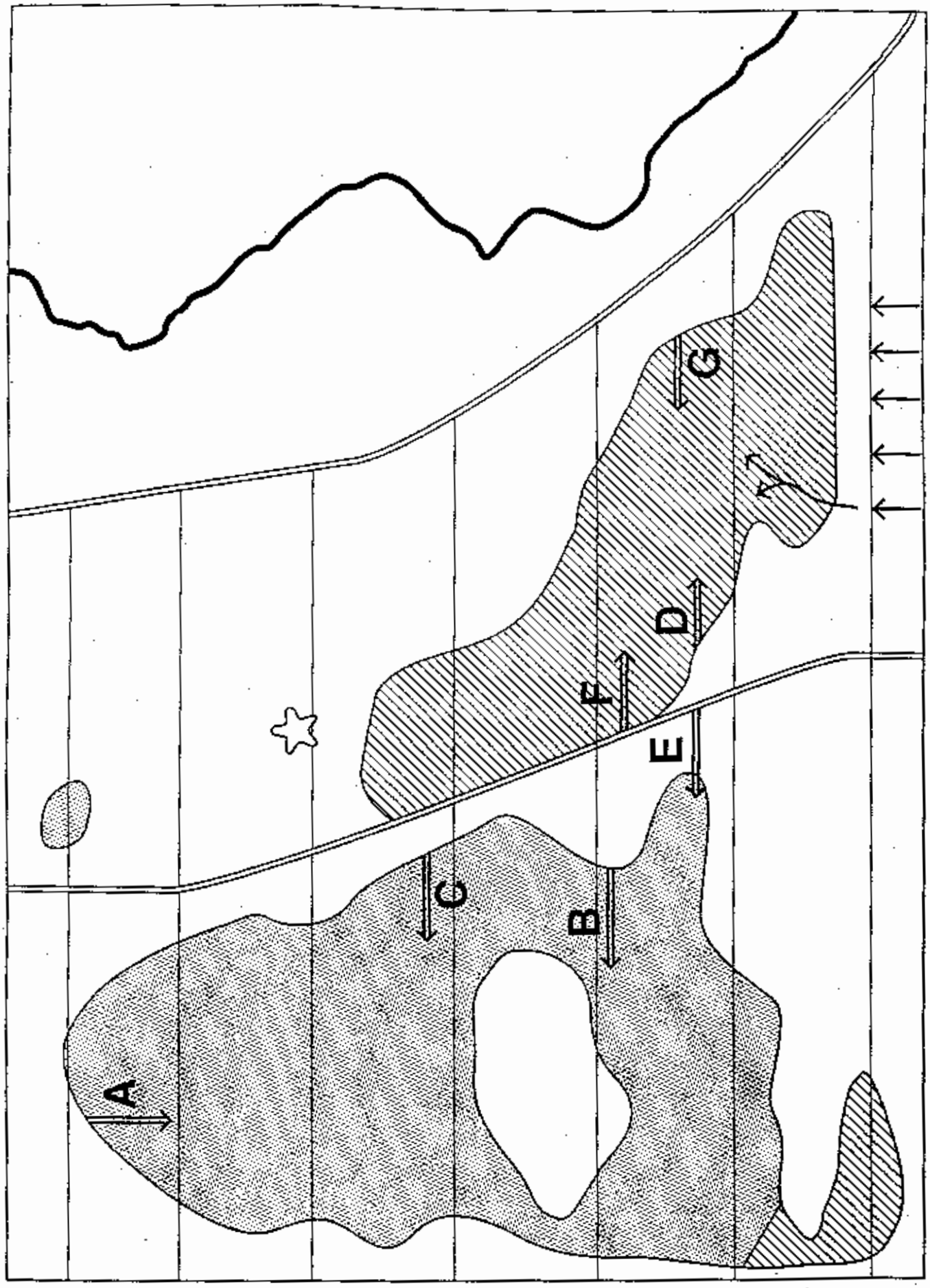
Now, for the 45 acres marked by Woolington and Peters:

At 1/5.4 sq. yds. we estimate	40,333 nests

Transects show that additional birds settled on occupied areas after April 23. For the available transect established on May 4 with Mike Peters, 25 of 32 nests were developed to the stage where they would have been established on April 23. This determination is based upon hatching dates.

40,333 nests X 25/32	31,510 nests
This equals 30,510 X 1.5	47,265 adults
The colony increased at this time at a rate of 3795 adults per day, not necessarily evenly, but calculated for this estimate to accommodate the increase between April 22 and April 23	51,060 adults

To round off and place proper emphasis upon the crudeness of our estimate, we adjust to 50,000.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APPENDIX 8. Heritage Colonies and Habitat Development.

We define heritage colonies by examples as the stream side colonies in the Bitter Creek NWR, the Kern River head water colonies, the intermittent colonies along Little Panoche Creek, the Laguna Seca Colony in Monterey County and the Scott Road Colony in Sacramento County. These colonies are all dependent upon natural runoff as opposed to pumped water (Scott Road source never observed, Little Panoche is below reservoir and depends upon controlled effluent). None of them are places in exotic plants and none seem to be in the way of imminent destruction. All are in esthetically pleasing surroundings and several of them are suitable for viewing by ecotourists.

The steady (successful every year) colonies at O'Neill Forebay (Merced County) deserve close consideration because they are productive of fledglings and have a confirmed dependable water source (San Luis Reservoir). This area should be visited by anyone contemplating Tricolored Blackbird management because it clearly demonstrates habitat relationships and the potential to produce both cattail and berry nesting substrates. This area is decidedly badly planned esthetically, but is a Tricolored Blackbird producer. Like many other areas it is vulnerable to losses of foraging habitat (agricultural intensification, housing development, roadside attractions).

APPENDIX 9. A Short History of the Politics and Abundance of Tricolored Blackbirds:

1853 Heerman reports clouds of blackbirds in the Central Valley.

1930s Neff reports tens of thousands of blackbirds on the Sacramento market.

1931-1936 Neff surveys Tricolored Blackbirds and finds a 300,000 bird colony in Glenn County. Despite reports at that time to the contrary, he reports that no decline is evident.

1959-1960 Orians does thesis work. Finds fall breeding, largely unsuccessful (the birds, not Orians). A 120,000 bird colony is described at the Capitol Outing Club in Colusa County.

1959 Collier works in Southern California, also thesis bound. Observed interaction with redwings, isolating mechanisms, excellent reports of reproductive success and influence of climate upon RS.

1966 Payne does a thesis on the physiology of reproduction. He monitors colony abundance at several localities and discovers a short interval between successful nesting attempts with a single marked bird.

1968-1972 DeHaven makes a major effort to determine movement patterns. He is the first full time employed person to work on tricolored blackbirds. The project documents movement from throughout the Central Valley to the Sacramento Valley in fall. He suggests that the Southern California population may be separate.

1974-1975 Hosea does thesis work. Sees colony lost to herbicide overflight at cattail marsh in the Sacramento Valley.

1986, 1987 The largest colony in the world, at the Kesterson NWR fails (1986) due to successful efforts by the USFWS to relocate birds out of harms way. Beedy does field work.

1991 Beedy and Saunders complete survey from reports and literature, find 35,000 birds and petition US and California to list as Endangered.

1991 Liz Cook and Bill Hamilton initiate observations of Tricolored Blackbirds late in the season, and with Hans Peeters save a 3,500 bird colony in Alameda County.

1992 Beedy and Hayworth report elevated selenium levels from earlier collections of nestlings at Kesterson. Report major mortality at Colusa NWR, Black-Crowned Night Herons implicated.

1992-1994 Cook, Hamilton do full time field work during the breeding season. They recommend with Bowen that Tricolored Blackbirds not be listed as Endangered in July, 1992.

They discover itinerant breeding and differential RS in alternative habitats. The implication is that the Central Valley refuges, as now constituted, are sinks for Tricolored Blackbirds.

They report heavy losses of breeding birds to harvest operations. They participate in negotiations with growers to save large colonies from destruction, but in the end argue that it is pointless and that effort should be spent in maintaining heritage colonies resembling nature in California.

A climate of distrust of conservationists by the agricultural communities begins to break down as nothing counterproductive happens to Tricolored Blackbirds or property rights. But there is no plan to manage beyond the refuges.

The world population is estimated to be somewhere between 275,000 and 400,000 by Cook, Hamilton and Richard Grey in collaboration with the NAS, CF&G and USFWS personnel.