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Detection, monitoring, and fates of Tricolored Blackbird colonies in 2008 in the Central Valley of California

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Final Report

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Introduction

The tricolored blackbird (*Agelaius tricolor*), hereafter "tricolor", is a highly colonial North American songbird that is nearly endemic to California (Beedy and Hamilton, 1999). Due to large-scale losses of its breeding and foraging habitats, deliberate poisoning and shooting, market hunting and several other factors, the numbers of tricolors dropped dramatically during the 20th Century (Neff, 1937; DeHaven, et al., 1975a; Beedy and Hamilton, 1997; DeHaven, 2000; Unitt 2004; Cook and Toft, 2005) and concern for the future of the tricolor led to a petition by the Center for Biological Diversity to list the tricolor under the State of California and U.S. Endangered Species Acts (CBD, 2004). This petition was declined by the U.S. Fish & Wildlife Service in December, 2006 (Federal Register, 2006).

The work described in this report continues and expands upon dedicated field efforts that began with Johnson Neff's work in the late 1920's to the mid-1930's (Neff, 1937), continued with DeHaven and his collaborators in the early 1970's (DeHaven et al., 1975a,b), and that have been on-going annually since the 1990's (Beedy and Hamilton, 1997; Hamilton, 2000). These efforts were primarily directed toward documenting the status and trends, breeding biology, food habits, and habitat affinities of tricolors through field work conducted during the breeding season. Neff and DeHaven also banded large numbers (ca. 47,000) of nestling tricolors several decades ago in an effort to document temporal and spatial patterns of movement (Neff, 1942; DeHaven and Neff, 1973), but tricolors were not banded again until Hamilton banded 300 birds in one location in Kern County in 2000 (Hamilton 2000). For the second year in a row, tricolors were color-banded in three locations in 2008, but unlike last year, when birds were banded in Yolo, Yuba, and Colusa counties, this year birds were banded in Merced, Yolo, and Yuba counties. The results of this year's banding efforts are described in a separate report (Meese, 2008).

The field work described here and in previous reports emphasizes the Central Valley, although the tricolor has two distinct population segments: the Central Valley population and the southern California population (Beedy and Hamilton 1999), and historically has nested in large numbers in coastal marshes in southern California (Baird, 1870; Neff, 1937; Unitt, 2004). Workers in southern California have documented severe population declines in the southern California population segment (Neff, 1937; Beedy and Hamilton, 1997; Unitt, 2004) and participants in the 2008 Statewide Survey counted only ca. 5,500 birds in the six county southern California region (Tricolored Blackbird Portal, http://tricolor.ice.ucdavis.edu/, accessed 8/26/08; Kelsey, 2008). Small numbers of tricolors are also found in northern Baja California, western Nevada, southern Oregon, and, since 1998, southern Washington (Beedy and Hamilton, 1999; Seattle Audubon Society Birdweb website, accessed August 2008), and as is the case in southern California, the Baja California population is in serious jeopardy (Erickson, de la Cueva, and Billings, 2007).

The annual search for, monitoring, and conservation of the largest tricolor colonies on private property, especially those established in grain fields in the San Joaquin Valley, are essential components of recent attempts to stem the population decline of the Central Valley population segment and to increase the numbers of tricolors in California, and it is perhaps partly in response to these efforts that the number of tricolors observed in the Statewide Survey increased to ca. 400,000 in 2008 (Kelsey, 2008; Tricolored Blackbird Portal, http://tricolor.ice.ucdavis.edu/, accessed 9/18/08). However, the increase in the number of birds reported from the 2008 Statewide Survey is likely also due to an increase in knowledge and better documentation of colony locations as well as far better coordination and a larger number of survey participants.

Recently, stochastic events over which we exert no control have played important roles in tricolor reproduction and, hence, our efforts to conserve the species. For example, the largest colony in 2008, the Riverview Dairy colony in Tulare County, was estimated to consist of 80,000 breeding birds, yet due to a combination of factors including severe blow-down of the triticale nesting substrate and intense predation by cattle egrets (*Bubulcus ibis*), the productivity of this colony was limited, and consisted of no more than a few thousand fledglings. Further, the drought that is believed to have resulted in the near-complete range-wide reproductive failure in 2007 intensified in the Sacramento Valley this year, and only 3 large colonies (defined as those containing between 10,000 and 50,000 breeding birds) I monitored in the Sacramento Valley were known to be relatively productive. In the Sacramento Valley in 2008, sites that have recently been documented to host large colonies (e.g., Pioneer Duck Club, Capital Outing Club, and Acre Farms) were not used by breeding tricolors this year, and the site bearing the largest colonies in each of the last three years, Delevan National Wildlife Refuge Tract 43, had recently been drained and was unavailable to breeding tricolors due to impending modifications of the wetland vegetation that are intended to benefit waterfowl.

Methods

Colony Detection. Field work began on 31 March, 2008 with surveys of the southern San Joaquin Valley to detect settlements and colonies following the methods developed in 2006 (Meese 2006, 2007). In 2008, however, I attempted to more critically examine regions around dairies for suitability for tricolor breeding in an attempt to eliminate some areas deemed unsuitable and thereby concentrate my survey efforts on only those areas likely to support breeding by tricolors. As tricolors require productive foraging habitats within 6 km of breeding locations (Beedy and Hamilton, 1999) and no colonies surrounded by perennial crops have been observed, I deemed dairies surrounded by orchards, vineyards, and other perennial crops to be unsuitable for breeding tricolors. These areas were documented and delineated on my field maps and unless land uses change, will not be intensively surveyed in the future.

In most years, tricolor breeding in the southern San Joaquin Valley begins in mid-to-late March (Beedy and Hamilton, 1999). However, the 2008 breeding season appeared to be advanced from two to four weeks earlier than average, with some birds reported to be settling into known colony locations as early as late February (Dave Hardt and Scott Frazer, Kern NWR, pers. comm.) and in both Kern and Tulare counties, I found well-established colonies in my first days of field work in late March and early April.

Colony detection efforts continued for three weeks and consisted of:

- surveys of all previously documented colony locations in the San Joaquin Valley
- additional targeted surveys of the immediate vicinities of all known dairies within Kern, Tulare, Kings, Fresno, Merced, and part of Madera counties.

Monitoring. Subsequent to field surveys intended to detect settlements and colonies, I reported the results of my surveys to National Wildlife Refuge staff. Where birds were settling or breeding on private property, typically Refuge staff would identify and contact the landowner to:

1. report the occurrence of the birds
2. explain the dependence of the birds on the nesting substrate
3. estimate the amount of time it would take for the young birds produced to leave the nest and become independent of the site
4. attempt to negotiate an agreement to conserve the breeding colony, and
5. obtain permission to monitor and study the colony.

I revisited all occupied sites until a colony failed, was destroyed through harvest, or fledged its young. In most cases, colonies were monitored (i.e. observed from the closest public road if located on private property where permission to access had not been obtained, or by immediately adjacent roads if located on public property or on private property where permission to access had been obtained) approximately twice-weekly to assess current conditions as well as to best assess colony chronology to estimate optimal times for conducting reproductive success and breeding population size estimates.

Estimating Area Occupied. The dimensions of all colonies were visually estimated while observing from a position immediately adjacent to the colony or directly measured via GPS while walking the perimeter of a colony. Dimensions of colonies are reliably estimated by careful observation of birds viewed from outside the colony. In nearly all cases, this consists of quietly observing a colony through binoculars from a vehicle parked or slowly driven around the perimeter of the substrate used by the breeding birds. Birds will leave and then return to nests at intervals defined by the stage of the breeding cycle, with longest intervals when females are incubating eggs and shortest intervals when both adults are feeding young. The perimeter initially determined by the birds' behavior is confirmed through subsequent monitoring activities, including on-site estimates of reproductive success (RS; see below) and colony population size (see below). Both visual estimates and coordinates directly measured by GPS were placed

into Google Earth Pro to create a bounding box corresponding to the perimeter of the colony. The area occupied by the breeding birds was defined as the area within this perimeter.

Estimating Reproductive Success. For colonies where permission to access had been obtained, I entered colonies when the average age of nestlings was assessed (based upon the behavior of provisioning adults) to be 7-9 days old. I counted the contents of a sample of 20 or more nests per colony to estimate the number of young produced per nest (= reproductive success, RS).

Estimating Breeding Colony Population Size. For colonies where permission to access had been obtained, I re-entered colonies after the young had fledged and conducted line transect nest counts. From the line transect nest counts is derived an estimate of the number of nests per unit area (typically the number of nests per acre). The number of nests constructed is then estimated as the product of the estimate of the number of nests constructed per acre multiplied by the number of acres occupied by breeding birds. Assuming that each male breeds, on average, with two females, the number of nests multiplied by 1.5 yields an estimate of the number of breeding birds at a colony.

Estimating the Number of Young Produced. The number of young produced at a colony was visually estimated by repeated observations of young in groups ("crèches") following fledging. In practice, the number of fledged birds may often be carefully counted, especially for colonies where access has been granted, as young tricolors spend a minimum of several days in groups perched and calling conspicuously from the margins of colonies (Beedy and Hamilton, 1999). Where estimates of RS and of the number of nests built are available, an estimate of the number of young produced is derived as the product of the number of nests multiplied by the average number of young produced per nest. This estimate of the number of young produced serves as an independent check on the visual estimate of the number of young produced (= number of fledglings observed).

Following the completion of first breeding efforts in the San Joaquin Valley, I repeated these activities, and responded to reports of aggregations of tricolors, in the Sacramento Valley (Yolo, Sacramento, Yuba, Colusa, Glenn, and Butte counties), where tricolors typically (Hamilton, 1998), but not always (e.g., Meese, 2006) move to breed again. I began to survey for settlements and colonies in the Sacramento Valley in mid-May and monitored colonies until the young had fledged. The last young were observed at the Plumas Arboga colony in Yuba County in late July.

I trapped and banded birds during the interval from late April to late July. The results of my banding efforts are reported elsewhere (Meese, 2008).

Results

Colonies Studied. Field work started on March 31st and ended on July 28th, 2008. During this time a total of 37 sites was detected (Appendix I); of these, 13 were monitored (Table 1). I received a report of one additional colony, Mendenhall Ranch in San Diego County, from a US Fish & Wildlife Service biologist. Despite intensive, targeted searches using dairies as surrogates for colony locations (see Meese 2006, 2007), no settlements nor breeding colonies were detected in Kings County (a single colony of 2,500 birds was reported from Lemoore Naval Air Station in Kings County during this year's Statewide Survey, a site that I did not check due to lack of permission to access). Only two colonies (Producer's Dairy and 4 Mile Slough) were detected in Fresno County (a participant in the 2008 Statewide Survey reported another 40 birds, not associated with a colony, from western Fresno County), and only one colony (Avenue Road 14) was detected in Madera County (the colony was destroyed by harvest prior to the Survey; no birds were seen in Madera County during the Statewide Survey). See Kelsey (2008) and the Tricolored Blackbird Portal (http://tricolor.ice.ucdavis.edu) for detailed results of the 2008 Tricolored Blackbird Statewide Survey.

Productivity. Overall, 2008 was a year of limited productivity, but not as poor as the drought-induced statewide reproductive failure of 2007 (Table 1; Meese, 2007). Only one colony in the lower San Joaquin Valley was documented to have relatively good reproductive success: the Costa's Dairy colony in Kern County. This colony of 60,000 breeding birds was conserved through a silage buy-out and was estimated, visually and through in-colony estimates of RS and the number of nests built, to have fledged over 43,000 young. In contrast, the larger 80,000 breeding bird Riverview Dairy colony in Tulare County fledged no more than 5,000 young, due primarily to losses to cattle egret (*Bubulcus ibis*) predation and blow-down of the triticale nesting substrate, and consequent mortality to eggs and young, from strong winds in April. The Riverview Dairy colony was conserved through a harvest delay. The Vander Eyk Dairy colony, which was conserved at no cost through verbal agreement with the owner, consisted of approximately 10,000 breeding birds and fledged a visually estimated 2,500 young. The number of young produced at the Deer Creek Dairy colony in Tulare County is unknown, as the owner of the property requested that his property not be actively monitored as a condition of his agreeing to delay the harvest of his triticale field until after the young had fledged.

In the Sacramento Valley, both the number of large colonies as well as the numbers of young produced of colonies was well below average for the second year in a row (Appendix I). The drought that was believed to be responsible for last year's state-wide reproductive failure (Meese 2007) was ameliorated somewhat in the San Joaquin Valley but intensified in the Sacramento Valley this year and is believed responsible for the low reproductive outputs of the Sacramento Valley colonies monitored (Table 1). The drought is likely also responsible for the low number of large colonies formed –

especially the lack of successful colony formation in the Capital Outing Club/Pioneer Duck Club/Acre Farms complex, a trio of duck clubs where, prior to 2008, birds had bred successfully for several successive years (the Capital Outing Club basin was largely dry this year due to maintenance activities). It is believed that drought conditions result, among other effects, in reduced availability of the animal foods, primarily insect larvae, necessary to bring females into reproductive condition (e.g., Ramsay and Houston, 1998; Skorupa, Hothem, and DeHaven, 1980).

Table 1: Fates of colonies monitored in 2008.

Colony	County	Substrate	No. of Breeding Birds	Fate
ECLA Pond	Kern	Cattails	ca. 8,000	Both ponds near-complete failures; a total of perhaps 150 young produced by both basins
Costa's Dairy	Kern	Silage	60,000	Conserved via silage buy-out, highly productive, ca. 43,775 young produced.
El Cinco Duck Club	Kern	Cattails	5,000	Modestly productive, with 2-300 birds produced.
Lawrence Duck Club	Kern	Cattails	2,000	Modestly productive, with < 50 young seen.
Toledo Pit	Tulare	Cattails	2,000	Nesting substrate in poor condition and only ca. 20% of basin flooded; estimate 5-800 young fledged
Riverview Dairy	Tulare	Silage	80,000	Very low output given the number of breeding birds; a visually estimated 5,000 young fledged; heavy cattle egret predation, much silage blow-down
Vander Eyk Dairy	Tulare	Silage	10,000	Conserved without compensation. Fairly productive, min. 2,500 fledglings produced.
Merced NWR Duck Slough	Merced	Milk thistle and mustard	16,500	Very low output; maximum of 100 fledglings seen
Merced NWR West Farmfield 1	Merced	Milk thistle and mustard	4,000	Modestly productive, ca. 250 fledglings seen
Owens Creek	Merced	Fiddleneck and milk thistle	14,660	Unproductive; maximum of 800 young produced.
Crane Ranch	Merced	Himalayan blackberry	30,000	Modestly productive; ca. 5,000 young produced.
Willow Slough	Yolo	Milk thistle	35,000	Modestly productive, ca. 6,000 young produced.
Plumas Arboga	Yuba	Cattails	21,000	Modestly productive, ca. 3,000 young produced.

Reproductive Success. Reproductive success (RS) was estimated at Costa's Dairy in Kern County, Riverview Dairy in Tulare County, and Plumas Arboga in Yuba County. In most colonies this year, RS could not be reliably estimated due to a pattern of extended or multiple settlements. The measurement of RS depends upon an ability to enter a colony when a large percentage of nests have young that are between 7 and 10 days old as the estimate of RS is most reliable when settlement occurs only once, and over a

brief interval of time, that is, when settlement is highly synchronous. When settlement occurs over several days, or comes in sequential "waves", that is, is asynchronous, there are at any one time many nests that contain nestlings older than 10 days, which may fledge prematurely. Such colonies also contain many nestlings younger than 7 days, which may be subject to increased rates of predation, especially in agricultural settings where scent trails left by investigators may be used by mammalian predators (e.g., Hamilton 2000).

Table 2: 2008 Reproductive Success Measurements

Colony	Number of nests	Number of adults	Number of young/nest (RS)	Number of young produced
Costa's Dairy	39,795	60,000	1.1	43,775
Riverview Dairy	53,333	80,000	.06	3,200
Plumas Arboga	14,000	21,040	.48	6,720

Vegetation Condition and Productivity of Wetland Colonies. In the San Joaquin Valley, the rapid senescence of wetland vegetation, especially in sites specifically managed for tricolor reproduction, is a contributing factor to the relatively low productivity documented this year.

ECLA Pond, Kern County, receives LIP funding to provide nesting habitat for tricolors but was settled by, at most, 4,000 birds in 2008 due to two factors:

1. the rapid accumulation, since 2006, of primarily dead (horizontal and vertical) stems in the south pond, and
2. the delay in the development of the year's new growth, of the type known to be preferred by nesting tricolors. It was not until the end of April, when the breeding birds had already departed the south pond, that the height of this year's cattail growth approached the height that is typically utilized by breeding birds (Figure 1).

The vast majority of the 4,000 birds seen at ECLA Pond in 2008 attempted to nest in the north pond, which had pockets of lush growth, but this breeding population was less than 1/10th that observed in the south pond in 2006 (Table 3).

Toledo Pit, Tulare County, showed a similar pattern of rapid senescence of the vegetation providing the nesting substrate. In 2008, only a very narrow fringe at the far southwest end of the basin that was estimated to be ca. 0.75 acres (2.5% of the 30 acre basin) was flooded and provided the green, rapidly-growing cattails preferred by nesting tricolors (Figure 2). Toledo Pit had a breeding population in 2008 that was only 1/10th of that in 2006 and 2007 (Table 3), and whereas an estimated 2-3,000 young were produced here in 2007, only 5-800 were produced here this year.

Ellsworthy Marsh in Merced County is a private duck club that had supported breeding colonies of up to 30,000 birds as recently as two years ago, but the marsh was not occupied by breeding tricolors this year. The cattails in Ellsworthy Marsh, too, are conspicuously older, drier, and contain a higher percentage of lodged stems than was the case only two years ago.

Figure 1. ECLA Pond, Kern County. Left photo taken 4/2/2008 showing disced area with minimal new growth surrounded by preponderance of old, dried stems. Right photo taken 4/29/2008 showing disced area with sparse green growth surrounded by old stems. No more than 500 tricolors nested in this basin in 2008 and no young were observed following the breeding bout.

Table 3. Examples of reduced productivity of wetland colonies.

Colony	County	Breeders/relative productivity in 2005	Breeders/relative productivity in 2006	Breeders/relative productivity in 2007	Breeders/relative productivity in 2008
ECLA Pond	Kern	N/A	60,000/unknown	20,000/complete failure	8,000/near complete failure
Toledo Pit	Tulare	500/very low	20,000/undetermined; basin dry in June	20,000/> 2,000 young produced	2,000/500-800 young produced
Ellsworthy	Merced	6,000/3,000+ young produced	30,000/fairly productive	5,000/very low productivity	0 – not occupied

Figure 2. Toledo Pit, Tulare County. Photo taken 4/15/2008. Only the narrow green fringe was suitable for tricolor nesting in 2008. This fringe accounted for ca. 2.5% of the area of the basin.

New Colonies. Twenty-one colonies were detected by or reported to me in locations not previously known to me to host tricolor colonies (Table 4).

While it is perhaps unnecessary to describe each of these sites individually, it is worth emphasizing the quite large number of colonies in new locations that was documented this year. It should also be emphasized that this number of new locations does not result from the 2008 Statewide Survey, as only the Hallwood Road site in Yuba County was reported to me as a result of Statewide Survey activities. Indeed, it is quite likely that a number of additional colonies in new locations were detected by Survey participants but not reported to me.

Table 4: New colony locations detected in 2008.

Site Name	County	Substrate	No. Birds
El Cinco Duck Club	Kern	Cattails	5,000
Lawrence Duck Club	Kern	Cattails	2,000
Cornerstone Marsh	Tulare	Cattails	2,500
Avenue Road 14	Madera	Triticale	10,000
Los Banos Wildlife Area	Merced	Cattails/tules	9,000
Honey Lake Duck Club	Merced	Cattails	12,750
Volta Lake Marsh	Merced	Cattails	2,000
Merced NWR Duck Slough	Merced	Milk thistle and mustard	16,500
A & O Sousa Dairy	Merced	Triticale	30,000
Lisbon Road	Merced	Himalayan blackberry	100
Central American 1	Merced	Himalayan blackberry	2,000
Central American 2	Merced	Himalayan blackberry	1,000

El Nido	Merced	Triticale	25,000
Willow Slough	Yolo	Mustard and milk thistle	30-35,000
Hallwood Road	Yuba	Himalayan blackberry	10,000
Ostrom Bend	Yuba	Himalayan blackberry	800
Jasper Lane	Yuba	Cattails	2,000
Thermalito	Butte	Himalayan blackberry	30,000
Cherokee Canal 1	Butte	Himalayan blackberry	500
Cherokee Canal 2	Butte	Himalayan blackberry	2,000
Road P	Glenn	Himalayan blackberry	5,000

Colonies Destroyed by Harvest. As in all recent years, several of the largest tricolored blackbird breeding colonies were destroyed by the harvest of the grain crop that had provided the nesting substrate (Table 5). The timing of the ripening of the grain, nearly always triticale, an intergeneric hybrid between hard red or durum wheat *(Triticum turgidum* L.) and rye *(Secale cereal* L.; Miller, Joost, and Harrison, 1993), often corresponds to a date within a few days of the fledging of young tricolors. Farmers prefer to harvest their fields when the grain heads reach the so-called "dough stage" as this is when it provides the highest digestible dry matter yield, has the highest crude protein yield, and is most efficiently converted to silage and stored for later use as cattle feed (Staples, 1989). In 2008, the geographic region affected by destruction through harvest stretched from Tulare County to Merced County and included the only colony detected in Madera County (Table 5). In all cases except El Nido, these colonies had been detected prior to their destruction through harvest and their locations were reported to U.S. Fish & Wildlife Service staff. U.S. Fish & Wildlife Service staff subsequently contacted the owners of the Cornerstone, Producer's Dairy, and 4 Mile Slough colonies, but the owners of the Avenue Road 14 and A & O Sousa Dairies were not contacted. El Nido, in Merced County, was being destroyed through harvest at the time of its detection.

Table 5: Colonies destroyed by harvest

Colony	County	Number of birds	Date Harvested
Cornerstone	Tulare	30,000	4/19/08 – 4/20/08
Avenue Road 14	Madera	10,000	4/09/08 – 4/21/08
A & O Sousa Dairy	Merced	30,000	4/16/08 – 4/17/08
El Nido	Merced	25,000	4/28/08
Producer's Dairy	Fresno	15,000	4/21/08
4 Mile Slough	Fresno	30,000	4/23/08 – 4/28/08
Total		140,000*	

* total may be less due to a lack of independence of events, e.g., A & O Sousa and El Nido may share some birds, and Producer's Dairy and 4 Mile Slough are likely mostly the same birds. However, these figures suggest the magnitude of the chronic problem of loss of first nesting attempts of tens of thousands of breeding birds by the destruction through harvest of their breeding colonies.

Colonies Conserved by Agreement. In contrast to the colonies that were destroyed by harvest, two "silage colonies" and two colonies in fields not planted to a crop were conserved by agreements with landowners who did not request compensation (Table 6). All of the owners of these sites were contacted, two by Kern NWR staff and two by the author. All were conserved by oral agreements with the landowners. The grain fields were harvested after all, or nearly all, of the young had fledged, the Owens Creek site was fallowed until after the young had fledged, and the cutting of a weedy field at the Willow Slough site was delayed by a month, which enabled almost all of the young to fledge.

Table 6: Colonies conserved by agreement.

Colony	County	Number of birds	Comments
Deer Creek Dairy	Tulare	20,000	Owner agreed to allow birds to fledge young without compensation.
Vander Eyk Dairy	Tulare	15,000	Owner agreed to delay harvest until nearly all of the young had fledged.
Owens Creek	Merced	10,000	Owner agreed to fallow field while occupied by breeding birds. Crop not planted.

Planting Crops Unattractive to Nesting Tricolors. In what may be a sign of what's to come, two landowners in Kern County who have recently had the largest tricolored blackbird colonies in the state on their properties switched crops in autumn of 2007, and did not grow triticale. Triticale is preferred by farmers due to its productivity (highest digestible dry matter yield), and is used by nesting tricolors due to its height, vigor (able to hold a nest containing nestlings), and proximity to water and stored grains. If alternative crops (e.g., wheat, oats) are planted, however, fields containing these crops will be avoided by nesting tricolors, thereby eliminating any potential conflict between the birds and the farmers. The cost to the birds is a reduced area of potential nesting substrate while the cost to the dairy operator is a reduction in quantity of silage available to feed cows.

Trapping and Banding. The results of the trapping and banding efforts are reported elsewhere (Meese 2008) but a summary of the 2008 banding results is provided here (Table 7).

A total of 38 days was spent trapping and banding birds. During this time, a total of 5,174 birds was banded; in addition, 6 bands were lost. Examined by sex and age class, 4,199 banded birds were after hatch year (AHY) females (81%), 960 banded birds were AHY males (18%), and 15 (< 1%) were hatch year (HY) birds of undetermined sex.

Table 7: 2008 Banding Results Summary

Site Name	County	No. Banding Days	No. Birds Banded	Females	Males
Bert Crane Ranch	Merced	5	2066	1998	65
Willow Slough	Yolo	7	920	659	261
Plumas Arboga	Yuba	26	2188	1542	635

Taken together, the 1772 birds banded in 2007 (Meese, 2007) and the 5,174 birds banded in 2008 total 6946 birds banded in two years. Assuming that there are approximately 400,000 tricolors in California (Kelsey, 2008), ca. 1.7% of all California tricolors have been banded.

New, previously unreported nesting substrate. The Owens Creek (Merced County) colony provided one of the 2008 field season's surprises: many of the birds at this colony constructed their nests in fiddleneck (*Amsinckia* sp., Fig. 3). Fiddleneck has not been reported as a tricolor nesting substrate and until I conducted nest transects I had believed that the nests in this colony had been constructed only in the milk thistle (*Silybum marianum*) "islands" embedded within the sea of fiddleneck. However, upon conducting the nest transects I discovered that many, perhaps a majority, of the nests in this colony had been constructed in the tops of fiddleneck plants.

Anti-predator Behavior. On April 24 while monitoring the Owens Creek colony I observed an adult peregrine falcon (*Falco peregrinus*) attempting to capture a breeding adult tricolor. When the tricolors detected the peregrine they immediately dove into the fiddleneck substrate and called loudly while out of sight. This anti-predator behavior contrasts strongly with that displayed when a northern harrier (*Circus cyaneus*) is detected above the colony. Tricolors fly quickly out of the vegetation and fly above the harrier when it appears above the colony. This observation demonstrates that tricolors are able to 1) rapidly discriminate among avian predators and 2) adopt appropriate, predator-specific behavioral responses. Harriers take prey that is on or near the ground while peregrines almost always take prey that is flying; thus, if a tricolor were to respond to a peregrine as it would to a harrier, it would increase, rather than decrease, its risk of predation.

Figure 3: Portion of Owens Creek colony showing fiddleneck and milk thistle substrate.

Discussion

Reproduction

The 2008 field season, as the 2007 field season, was characterized by abnormally low reproductive output. The three most important factors causing this low reproductive output are:

1. the destruction of colonies by harvest
2. drought-induced failures
3. reduction of potential reproduction by severe predation by cattle egrets

The destruction of the potentially most productive colonies by harvest may be the most significant factor in preventing the Central Valley population of tricolored blackbirds from increasing, and may be especially important in years when second breeding attempts do not occur or are unsuccessful. The San Joaquin Valley is the region where the vast majority of the global population is found from March to mid-May, when most first breeding attempts occur. For example, 81.5% (326,000 of 400,000) of the birds reported from the 2008 Statewide Survey were observed in colonies I monitored in four San Joaquin Valley counties (Kern, 69,462; Tulare, 90,800; Kings, 2,500; and Merced, 163,174), and of these, 149,550 (45.9%) were reported from silage colonies. This

percentage would have been even higher if silage colonies in Fresno and Madera counties had not been destroyed by harvest prior to the Survey.

Some (e.g., DeHaven, 2000) have questioned whether colony destruction through harvest can severely restrict reproductive output (i.e., can have population-level impacts), given that the breeding adults are not killed and thus may simply fly off to breed again elsewhere. A wealth of research has shown that second breeding attempts are, on average, much less productive than are first breeding attempts (reviewed by Martin, 1987), due primarily to the energetic and physiological costs of egg formation in females (Carey, 1996). However, even if these costs did not reduce the relative productivities of second breeding attempts, and assuming that both first and second breeding attempts were to be equally productive, the elimination of one of two breeding attempts reduces by half the absolute potential for productivity of an entire breeding season for an individual female. In reality, colony destruction through harvest typically occurs well after females have already laid eggs and many, if not most, eggs have hatched, so the potential output through the renesting of these females is greatly reduced due to the energetic and physiological costs of the first reproductive bout (Martin, 1987). These losses may be exaggerated in drought years, as productivity in the Sacramento Valley is affected not only by the fates and costs of earlier reproductive efforts, but by local conditions that exist during the second breeding bouts. If breeding conditions decline throughout the season (e.g., breeding conditions during second breeding attempts are worse than those during first breeding attempts), first reproductive bouts are disproportionately important to sustain the entire Central Valley population and it is the conservation of these first breeding efforts that must form the core of efforts to sustain the species.

For 2008, it appears that breeding conditions were far worse in the Sacramento Valley (second breeding attempts) than those in the San Joaquin Valley (first breeding attempts) if breeding conditions are reflected by colony formation and reproductive output, because: 1) no colonies formed in regions of the Sacramento Valley where they have consistently formed in recent years (e.g., Colusa County), 2) no mega-colonies formed anywhere in the Sacramento Valley (the largest was the Willow Slough colony in Yolo County; Table 1, Appendix 1), and 3) the colonies that did form were relatively unproductive (Table 1). Thus, the limited number of young that were produced in 2008 came primarily from the San Joaquin Valley in first breeding attempts, and the majority of these were produced by a single colony, Costa's Dairy in Kern County, that was conserved via a silage buy-out (Table 1).

Destruction of Silage Colonies

The issue of the destruction of silage colonies was addressed in the recent decision to decline the petition to list the tricolored blackbird as threatened or endangered under the Endangered Species Act of 1973 (Federal Register, 2006). This decision states, in part, "The Service agrees with the petitioner that harvesting of silage while the species is still

nesting would be a violation of the MBTA if eggs and young are destroyed." Further, the decision states "We are unaware of, and were not provided by the petitioners, with information that documents lack of enforcement of specific violations under the MBTA. Therefore, we believe that the MBTA provides protections for the species." The destruction of tens of thousands of tricolored blackbird eggs and nestlings through the harvesting of triticale fields is an annual event and is the fate each spring of most of the larger colonies in the San Joaquin Valley. If the U.S. Fish & Wildlife Service is unaware of the frequency and intensity of these losses, and if made aware would take effective action to reduce or eliminate these losses, a more effective mechanism should be developed to report the locations and sizes of "silage colonies" as soon as possible after their detection in order to ensure their conservation.

Silage Colony Reporting Mechanism

The silage colony reporting mechanism, as it exists today, is not uniform: it varies from region to region. In the southern San Joaquin Valley, most colonies are detected through an active collaboration between Kern National Wildlife Refuge staff and myself, whereby all colonies detected by Kern staff are reported to me, and I report all colonies that I detect to Kern staff. Kern staff then identifies landowners on whose properties tricolors are nesting and contacts landowners to attempt to negotiate an "on-the-ground" resolution to the impending conflict between the needs of the birds and the needs of the dairyman. This resolution is intended to conserve the breeding colonies while meeting the needs of the dairyman.

In the northern San Joaquin Valley, I survey for and detect nearly all silage colonies (colonies on dairies adjacent to Merced NWR and some non-silage colonies are typically reported to me by San Luis NWR staff). I then report silage colonies to San Luis NWR staff, but only in one instance in 2008 (Producer's Dairy, Fresno County) was a landowner contacted; in all other cases, landowners were not contacted and the colonies were destroyed through harvest. The landowner who was contacted reported that birds had been in his field for several days, and San Luis NWR staff recommended that he attempt to "haze" the birds (i.e., prevent birds from breeding by creating sustained disturbances of various types). The hazing of this colony was attempted by the landowner but was unsuccessful, as the birds had already built nests and were laying and incubating eggs; at this stage tricolors are rarely if ever prevented from breeding by disturbance other than intense predation (Beedy and Hamilton, 1999; Hamilton and Meese, 2006). The landowner then reported to San Luis NWR staff that the birds were still breeding, and was told to harvest his field despite the breeding of the tricolors.

Subsequently, another colony began to form in a silage field ca. 1 mile to the west of Producer's Dairy, on property owned by the same landowner, but this colony, too, was destroyed through harvest.

In the Sacramento Valley, the needs of the breeding birds and the needs of the farmers are rarely, if ever, in such direct conflict, as most colonies occupy either a cattail/bulrush marsh or Himalayan blackberry nesting substrate, and neither of these substrates is subject to harvest.

A consistent mechanism for the reporting of silage colonies followed by subsequent efforts to identify and contact affected landowners has yet to be developed, although efforts by Kern National Wildlife Refuge staff have been notable and often effective. It is strongly suggested that the Tricolored Blackbird Working Group acknowledge the primary importance of so-called "silage colonies" to tricolor productivity and conservation and for education and outreach efforts directed toward affected landowners. Attempts to negotiate the conservation of all vulnerable colonies throughout the San Joaquin Valley would likely greatly reduce losses due to destruction through harvest and stabilize or increase the number of tricolors in the Central Valley. It is stressed that currently and historically there has been no industry participation in education and outreach efforts and dairy industry participation may be essential to enhance the effectiveness of U.S. Fish & Wildlife Service and field investigator efforts to communicate with landowners. Members of the Tricolored Blackbird Working Group should identify the specific roles and responsibilities of those who will contact owners when a tricolored blackbird breeding colony is detected in a grain field in the San Joaquin Valley, and include the active participation of industry representatives in these efforts. Similar suggestions have been made for years (e.g., Meese, 2006), yet contact with landowners continues to be made only reactively, after birds have formed a breeding colony, and only in some cases, and never with industry participation. Education and outreach efforts should include pro-active, non-breeding season components, and include industry representatives to inform landowners before birds arrive and begin to nest in farmers' fields.

Importance of First Breeding Efforts in San Joaquin Valley

The continuing drought, with consequent impacts on tricolor reproductive efforts in the Sacramento Valley, suggests that the entire Central Valley population is especially dependent upon breeding in early spring in the San Joaquin Valley. I do not believe that the Central Valley population can be sustained by the productivity of the Sacramento Valley breeding effort alone.

This was the second consecutive year in which tricolor reproduction was reduced due to drought (Meese, 2007; this study), although unlike last year, the severity and attendant effects on tricolor reproduction appeared to be more pronounced in the Sacramento Valley than they did in the San Joaquin Valley. Drought has been a characteristic of California's climate for centuries (Hughes and Brown, 1992; Stine, 1994), and the current drought continues a long-term trend of greater aridity in the western U.S. (Cook et al., 2004). Tricolors have no doubt endured and persisted through previous periods of drought; however, with fewer birds and much reduced abundances of breeding and

foraging habitats, and their extirpation from their original coastal breeding sites (Neff, 1937; Unitt, 2004), tricolors may now be more vulnerable to drought than they were in the past. Annual surveys by a dedicated tricolor researcher as well as triennial statewide surveys provide information essential to document changes in tricolor abundance and distribution and will be especially important should drought-induced reproductive failures continue.

Impacts of Cattle Egret Predation

The relatively great losses inflicted by intense cattle egret predation are a recent but now serious constraint on tricolor reproduction in some San Joaquin Valley colonies. Cattle egrets apparently reached the West Coast of the United States in 1964 (McCaskie, 1965) and since then their numbers have increased rapidly in the western U.S. (Bock and Lepthien, 1976). Although apparently unknown as predators on tricolors until 2006 (Meese, 2006), cattle egrets appear to concentrate their foraging in single tricolor colonies, as 20-30 cattle egrets were commonly observed preying on tricolor nest contents in one silage colony in Tulare County in 2006 (Meese, 2006) and in excess of 100 cattle egrets were observed feeding on tricolor eggs and nestlings at single silage colonies in 2007 (Meese, 2007) and again this year. Losses of eggs and nestlings due to predation by cattle egrets are believed to be a major cause for the very low productivity of the Riverview Dairy colony, the largest tricolored blackbird colony in 2008. If cattle egrets continue to inflict heavy losses on the largest and potentially most productive colonies, these losses may have population-level rather than colony-level impacts, as “big bang” reproductive events, such as those observed in 2005 (Hamilton and Meese, 2006) and again in 2006 (Meese, 2006), whereby a few large colonies successfully rear large numbers of young to fledging, may contribute disproportionately to productivity of the entire Central Valley population. Given the observations of the past three years, cattle egret populations near tricolor colonies must be closely monitored to more thoroughly assess local, regional, and population-level impacts. It may already be appropriate to consider contingency plans to locate and, if possible, eliminate cattle egret rookeries near tricolor colonies and other measures designed to reduce cattle egret numbers within foraging distances of tricolor colonies.

New Colony Locations

This year continued the recent pattern of detecting relatively large numbers of colonies in new locations. The detection of colonies in new locations results primarily from two factors:

1. the detection of colonies while conducting surveys for birds; examples from this year include El Cinco Duck Club in Kern County, Avenue Road 14 in Madera County, Lisbon Road and El Nido in Merced County, Willow Slough in Yolo County, and Ostrom Bend and Jasper Lane in Yuba County
2. colonies reported to me by other field workers; examples include Lawrence Duck Club in Kern County, A & O Sousa Dairy in Merced County, Hallwood Road in

Yuba County, Thermalito, Cherokee Canal 1 and Cherokee Canal 2 in Butte County, and Road P in Glenn County.

In addition, there were colonies detected while en route to observe colonies reported by others; examples include Central American 1 and 2 in Merced County, detected while en route to observe the Ag Slough colony in Stanislaus County. The Vander Eyk colony was detected while conducting surveys, but this site was formerly occupied by breeding tricolors five or more years ago (David Hardt, Kern NWR, pers. comm.) and was previously unknown to the investigator.

These results suggest that:

a. there is still much to be learned about tricolor colony locations in the Central Valley
b. the numerous other workers that are out in the field for a multitude of reasons may be a rich source of information, especially if they know where to report observations of tricolor aggregations (see, e.g., Meese, 2006), and
c. a dedicated tricolored blackbird biologist with specific responsibilities to survey for birds and to monitor the fates of colonies substantially increases our knowledge of tricolor distributions and abundances

The 21 new colony locations documented this year follow no obvious geographic pattern, and are distributed from Kern County in the south to Glenn County in the north. Tricolor colony locations are known to move from year to year (Neff, 1942; Hamilton, Cook, and Grey, 1995; Meese, 2006); however, these changes in colony locations do not appear to be random and without apparent cause (e.g., Neff, 1942), but rather appear to be due to inter-annual landscape changes in potential nesting substrates and the birds' close tracking of these changes. The detection of additional colony locations helps to further target survey activities, and may thus increase annual survey efficiency by allowing field workers to survey and monitor a larger proportion of the Central Valley population each year.

The colonies in the new locations show no apparent pattern in size, as the colonies in the new locations range in size from the 100-bird Lisbon Road colony in Merced colony to the 30,000-bird A & O Sousa Dairy colony also in Merced County. As the characteristics of grain fields, especially the average plant height and plant density, may influence site selection by tricolors nesting in silage, and these characteristics may change from one year to the next, it is useful for field workers to have a comprehensive knowledge of previous colony locations as a means to help to define the region which may be expected to be occupied by breeding tricolors. The increase in the number of occupied locations also suggests the need for effective data management including reliable estimates of the geographic coordinates of all occupied locations.

Better Utilization of Field Workers

Field workers are a potentially rich source of information on locations of tricolor aggregations (foraging flocks, settlements, and colonies) and this year's results illustrate the contributions to be made by field workers that are otherwise engaged in other activities. For example, this year I was informed of the A & O Sousa Dairy colony by Lara Sparks, a biologist with the Los Banos Wildlife Area, who observed the birds while driving to work and reported them to me via email. Similarly, Dave Bogener, staff environmental scientist with the California Department of Water Resources, reported via email the large Thermalito settlement as well as the Cherokee Canal colonies, which he observed as part of his monitoring of flood-control canals. Marc Kenyon, a biologist with the California Department of Fish & Game, reported via email the Road P settlement in Glenn County. The detection of tricolor colonies can be greatly enhanced through the utilization of the many "eyes on the ground" that are represented by the state and federal agency employees who are in the field during the breeding season. It would be useful to more formally enlist the assistance of field personnel in state and federal agencies and other institutions (NGOs, agricultural extension specialists, etc.), perhaps through appeals for assistance from state or regional supervisors.

Fiddleneck as Nesting Substrate

The observation of fiddleneck (*Amsinckia* sp.) serving as nesting substrate was a surprise, as this plant species has not been previously observed or reported to be used by nesting tricolors. The Owens Creek colony, in which nests were primarily built in fiddleneck and secondarily built in islands of milk thistle, was relatively unproductive, and it is tempting to attribute the lack of production to the nesting substrate as the fiddleneck appeared to offer far less protection from avian predators as do other substrates: the nests built in fiddleneck were constructed near the tops of the plants, with no overhanging branches or leaves, thus offering a clear, unobstructed view of the nests and nest contents to predators flying above the colony. These same characteristics may also expose the eggs and nestlings to relatively more weather-induced mortality, as the fiddleneck offers little of the protection of silage, cattails, Himalayan blackberries, or other common substrates. However, additional observations of the fates of nests in fiddleneck will be necessary to determine whether fiddleneck is relatively less secure than other nesting substrates and results in reproductive success estimates lower than those of other substrates.

Management Considerations

1. Experimental Planting of "Decoy" Nesting Substrate. There has been much discussion among Tricolored Blackbird Working Group members about additional methods to reduce the conflict in the San Joaquin Valley between breeding tricolors and dairymen, and until a source of funding is identified that could be used to create additional dedicated breeding habitat, a viable alternative may consist of the provision of

a “decoy” nesting substrate to serve as an alternate to a dairyman’s triticale crop. This method would entail the planting of triticale, on public or leased private lands, in the autumn, most likely in October. This would be followed immediately by an initial irrigation to germinate the seeds, in an attempt to create a triticale field the following spring, ideally in early-to-mid March, which is taller and denser than other, nearby fields. In most cases, triticale seeds are planted in autumn but then depend upon rainfall for germination, resulting in much site-to-site and year-to-year variation in crop height and density. Such an experiment would best be conducted as close as possible to recent colony locations, as additional, unknown considerations (e.g., distance to stored grains, site fidelity) may play large roles in the birds’ breeding site selection process. If successful, this experiment might be replicated in an attempt to reduce the frequency and intensity of conflicts. Of course, funding and willing landowners would have to be identified before this experiment could be conducted.

2. Cost/benefit analysis of Alternative Management Strategies. The provision of decoy nesting substrates may have far different funding requirements, and be far more acceptable to existing landowners, than the provision of full-time, permanent, dedicated breeding habitats. Tricolors in the southern San Joaquin Valley require nesting substrate for approximately 3 months (March – May) of the year, and following their departure in May, fields may be used to grow other crops. The alternative to providing decoy triticale fields is to provide fresh-water marsh, such as at ECLA Pond or Lawrence Duck Club, but providing fresh-water marsh requires year-round maintenance, especially the annual, not seasonal, provision of water to avoid the kind of rapid build-up of dead and lodged stems that nesting tricolors avoid (see discussion of ECLA Pond and Toledo Pit and Table 3, above). The provision of dedicated, full-time tricolor nesting substrate may also entail fee-title ownership of property, while the provision of decoy substrates would allow the land to be privately owned but leased to a state or federal agency for a portion of each year. The full costs and benefits of each of these alternatives ought to be examined and documented.

3. Analysis of Harvest Delays by Experts. The use of harvest delays as a tactic to provide a relatively low cost solution to the silage harvest/colony destruction conflict requires a formal analysis by a triticale-growing expert on a case-by-case basis. The harvest delay method, which relies upon an extra irrigation of a maturing crop, seeks to provide for the conservation of the silage crop for the farmer along with the conservation of the reproductive output of the breeding birds, thus producing a kind of win-win situation for both. This tactic is dependent upon a close timing between the fledging of young and grain seed-head maturation (without additional irrigation) date as well as a willing farmer. The assumption is that there will be a cost to the farmer if he delays the harvest of his crop. This cost typically consists of a reduction in the value of his grain crop due to the additional maturation of the developing seed heads beyond the point (the so-called “dough stage”) where the crop can be used for silage. This assumption was violated in the case of Riverview Dairy this year: the seed heads in the field occupied by the tricolor colony were still in the dough stage when the field was released

for harvest, i.e. following the harvest delay period, and none of the adjacent fields had been harvested when the field occupied by the breeding birds was released for harvest. Thus, in this case, a harvest delay was unnecessary, and payment to the farmer may have been avoided if a triticale-growing expert had evaluated the field occupied by the birds and worked with tricolored blackbird experts to determine whether a harvest delay was needed.

4. Management of Nesting Substrates. Observations in this and several prior years (Table 3) suggest strongly that breeding tricolors actively select young, rapidly-growing plants irrespective of type (silage, milk thistle, mustard, cattails, or bulrush). Land managers with responsibility for tricolors must be informed of the strong preference of nesting tricolors for young, rapidly-growing vegetation and incorporate active vegetation management into their management plans to attempt to provide the conditions preferred by nesting tricolors. Marsh vegetation (cattails and bulrush) is especially dependent upon adequate water supplies, and where these supplies are deficient, dead stems, shunned by nesting tricolors, can rapidly accumulate (Table 3), making marshes unsuitable for tricolor breeding. Where air quality regulations permit, marshes with dead and lodged stems should be burned during the fall or winter to remove senescent vegetation or plant parts and to promote the vigorous growth of new plants or above-ground plant parts in the next growing season. The Plumas Arboga marsh in Yuba County, to cite one example, is burned each winter, in February, and consistently supports breeding by tricolors beginning in May. In upland sites, burning, tilling, or similar kinds of disturbance also appear to promote the kind of vegetation growth preferred by tricolors, as was seen at the Conaway Ranch Thistles site in 2007 (following a burn in 2006) and the adjacent Willow Slough site (following a cultivation in 2007) this year.

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Appendix I: Characteristics and Fates of Tricolored Blackbird Settlements and Colonies Detected in 2008.

Colony	County	Substrate	Date Detected	Detected By	Area Occupied (acres)	Size (no. birds)	Comments
ECLA Pond South	Kern	Cattails	Mid-March	Frazer	5	ca. 4,000 on 1 April, < 400 on 15 April	LIP-funded private duck club, access permitted, secure; nesting substrate (cattails) in poor condition: mostly dead stems, many lodged stems; near-complete nesting failure, likely < 50 young produced, < 10 observed.
ECLA Pond North	Kern	Cattails		Meese	5	4,000	Complex settlement in different locations at different times, all in young, fresh cattail growth. Ca. 150 young produced, and all of the young produced seen at the north and south margins of the pond.
Costa's Dairy	Kern	Silage	Mid-March	Frazer	35.5	60,000	Conserved through silage buy-out. Highly productive colony. An estimated 43,775 young produced. But nesting habitat isolated, and young continue to return to field > 2 weeks after fledging, with unknown consequences on 1st year survival.
El Cinco Duck Club	Kern	Cattails	04/02/2008	Meese	1 acre	5,000	New, fresh cattail growth on pond where there has been no recent tricolor breeding.
Lawrence Duck Club	Kern	Cattails	Late March	Kwasny & Frazer	3	2,000	New colony location; site receiving LIP funding. Modestly productive, < 50 young seen.
Riverview Dairy	Tulare	Silage	Mid-March	Frazer	78 acres	80,000	Very large colony on private property. Conserved through harvest delay, but productivity limited by blow-down and intense cattle egret predation. Triticale still in "doe stage" on day before scheduled harvest. Albino tricolor seen here 4/2/08.
Toledo Pit	Tulare	Cattails	early March	Hardt & Frazer	ca. 12	2,000	Very early: young seen on 4/3/08. Most of basin dry; estimate that 20% of basin flooded. Nesting substrate in terrible condition: most cattail stems dry – last

Colony	County	Substrate	Date Detected	Detected By	Area Occupied (acres)	Size (no. birds)	Comments
							year's growth. Modest productivity: perhaps 500-800 young produced.
Deer Creek Dairy	Tulare	Silage	Mid-March	Frazer	ca. 40	20,000	owner contacted by USFWS staff, colony to be conserved without compensation; no on-site monitoring
Cornerstone Dairy	Tulare	Silage	04/14/2008	Meese	40(?)	30,000	Settlement; owner contacted by USFWS staff, hazes birds to little effect, colony destroyed through harvest prior to 4/21/08
Cornerstone Marsh	Tulare	Cattails	04/14/2008	Meese	0.5	2,500	Small colony established in new location in tiny ag water pond.
Vander Eyk Dairy	Tulare	Silage	04/02/2008	Meese	3	10,000	Large colony thinly settled but heavily settled in weedy portions; conserved without compensation. Tricolors formerly nested here > 5 years ago.
Avenue Road 14	Madera	Silage	04/09/2008	Meese	40	10,000	Settlement in previously unknown location; reported to USFWS; destroyed by harvest prior to 4/21/08
Producer's Dairy	Fresno	Silage	04/09/2008	Meese		15,000	Settlement/early nesting; reported to USFWS; destroyed by harvest
4 Mile Slough	Fresno	Silage/mallow	04/21/2008	Meese		30,000	Settlement/early nesting; reported to USFWS; destroyed by harvest prior to 4/28/2008
Los Banos Wildlife Area	Merced	Cattails	Early April	Sparks/ Meese	5	9,000	Complex settlement, at least two breeding bouts, the second likely larger than the first. Cattails young, fresh, rapidly-growing. At least 4 females banded in Yuba County in 2007 breeding here.
Honey Lake Duck Club	Merced	Cattails	Early April	Meese	2	12,750	New colony in small, fresh, rapidly-growing cattail marsh. Owner identified, contacted, permission to access to monitor granted.
Volta Lake Marsh	Merced	Cattails	4/12/08	Meese and Kelsey	5	2,000	New colony discovered after completion of training course offered at Merced NWR. On private property, owner not identified.
Merced NWR Duck Slough	Merced	Milk thistle and mustard	April	Woolington	40	16,500	Secure colony; decoy grains provided to reduce utilization of grains at Homen Dairy. Birds nest in several distinct "islands" of milk thistle in sea of mustard.
Merced NWR	Merced	Milk thistle	April	Woolington	5	4,000	Same site utilized by birds last year. Ca. 5

Colony	County	Substrate	Date Detected	Detected By	Area Occupied (acres)	Size (no. birds)	Comments
West Farmfield 1		and mustard					acres of substrate.
A & O Sousa Dairy	Merced	Silage	4/16/2008	Sparks, Meese	80	30,000	Large colony reported by Lara Sparks of Los Banos Wildlife Area. Reported to San Luis NWR staff. Destroyed by harvest less than a week after discovery.
Owens Creek	Merced	Fiddleneck, milk thistle	4/16/2008	Meese	30	15,000	Nesting substrate primarily fiddleneck (Amsinckia spp.); field fallowed by agreement with landowner; unproductive, only 800 young produced.
Crane Ranch	Merced	Himalayan blackberry	4/20/2008	Simmons	Several copses, ca. 7 acres in aggregate	Ca. 50,000 birds in aggregate	Access to colony granted by owner; trap and band birds. Far more birds settled than remained to breed. Multiple large blackberry copses cascading over an irrigation canal.
Lisbon Road	Merced	Himalayan blackberry	4/24/2008	Meese	1	100	New colony location just north of Lisbon Road. Take Bert Crane Road for 2.5 miles south of Hwy. 140
Central American 1	Merced	Himalayan blackberry	05/02/2008	Meese	< 1	2,000	New colony location just across Merced County line from Ag Slough colony. Private property, owner not identified.
Central American 2	Merced	Himalayan blackberry 1	Merced	Central American 1	Merced	1,000	New colony location just across Merced County line from Ag Slough colony. Private property, owner not identified.
Ag Slough	Stanislaus	Cattails and bulrush	5/02/2008	Comrack	Not estimated; no access	10,000	Reported by Lyann Comrack, who surveys site for Statewide Survey. Private property, owner not identified.
Willow Slough	Yolo	Milk thistle and mustard	5/4/2008	Meese	20	30-35,000	Private property, owner contacted, access permitted, secure; cutting of weeds and cultivation of soil delayed for one month. Permission to trap and band birds granted.
El Nido	Merced	Silage	4/28/2008	Meese	Not estimated	ca. 25,000	Colony being destroyed by harvest while being discovered.
Pioneer Duck Club	Colusa	Cattails, bulrush	May 14	Culp	Not estimated	ca. 10,000	Large settlement reported by Leah Culp 5/20. Birds abandoned site less than 7 days later.
Plumas-Arboga	Yuba	Cattails, bulrush	May 27	Meese	3.25	21,040 birds	Detected on 5/27; owner contacted, obtained permission to monitor, trap, and

Colony	County	Substrate	Date Detected	Detected By	Area Occupied (acres)	Size (no. birds)	Comments
							color-band birds. Second consecutive year of activities at this site.
Hallwood Road	Yuba	Himalayan blackberry	Late April	Beedy	1	10,000+	Colony detected by Ted Beedy while en route to his Statewide Survey route. On private property, several attempts to contact owner to obtain permission to access failed, colony monitored from Hallwood Road.
Ostrom Bend	Yuba	Himalayan blackberry	06/11/2008	Meese	< 1	800	New colony location off Ostrom Road, just south of Beale AFB boundary.
Jasper Lane	Yuba	Cattails	06/11/2008	Meese	1	2,000	New colony location just south of Jasper Lane, 1 mile south of Ostrom Road
Thermalito	Butte	Himalayan blackberry, willows	06/11/2008	Bogener	3	30,000	Settlement in several copses and willows along creek just north of Thermalito Afterbay, on both sides of Hwy. 99
Cherokee Canal 1	Butte	Himalayan blackberry, willows	6/25/2008	Bogener	1	500	Small colony in new location; very odd, with birds in Himalayan blackberry copses underneath tall willow overstory
Cherokee Canal 2	Butte	Himalayan blackberry, willows	6/25/2008	Bogener	2	2,000	Small colony in new location; very odd, with birds in Himalayan blackberry copses underneath tall willow overstory
Road P	Glenn	Himalayan blackberry	6/11/2008	Kenyon	< 1	5,000	Possible settlement in new location; lots of activity but no nest building observed. Not monitored.
Mendenhall (Private Ranch)	San Diego	Freshwater marsh	Unknown	Grant	Unknown	300	***Not observed**; reported by Tyler Grant, USFWS