

**Contribution of the Conservation of Silage Colonies to  
Tricolored Blackbird Conservation from 2005 – 2009**

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Sacramento Fish & Wildlife Office  
2800 Cottage Way, W-2605  
Sacramento, CA 95825

Robert J. Meese, Ph.D.  
Department of Environmental Science & Policy  
University of California  
Davis, CA 95616

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For over a decade, a major component of tricolored blackbird (*Agelaius tricolor*) conservation efforts has been the conservation of some of the largest breeding colonies in San Joaquin Valley fields of triticale, a wheat (*Triticum*) x rye (*Secale*) hybrid grain grown to provide fodder (“silage”) to dairy cows. Hence, these colonies have been referred to as “silage colonies”.

The stems of triticale, unlike the stems of other grain varieties, are strong enough to support adult tricolors and their nests and the fields of triticale are flood-irrigated, so it is believed that the attraction of triticale fields to nesting tricolors derives both from their similarity to fresh-water emergent vegetation, which is their native nesting habitat (Neff 1937), as well as to the proximity to grains and other easily accessible foods stored nearby. No other agricultural crop is utilized as nesting substrate by breeding tricolored blackbirds (Beedy and Hamilton 1999).

The conflict between nesting tricolors and San Joaquin Valley farmers results from the temporal overlap between the final days of development of nestling birds and the development to the point of optimal maturity of the triticale that supports the nests. The farmer wants to harvest his crop when it reaches the “dough stage”, the stage that maximizes his yield and provides the most silage to his herd (Staples 1989). In nearly all cases, the triticale reaches the dough stage when the young tricolors are still in the nests (pers. obs.).

Grain-field specific conservation actions, which have involved payments to landowners, have been used as stop-gap measures to prevent the destruction of some of the largest colonies established in triticale fields. These conservation actions have typically been of one of two types: silage buy-outs or harvest delays.

Silage buy-outs involve the payment to landowners of the full market value of the triticale in the portion of the field that is occupied by nesting tricolors. Harvest delays involve the financial compensation to landowners for the reduction in the value of their crop caused by the delay in its harvest until the young tricolors have fledged from their nests. As the dough stage represents the point at which the dry matter yields and digestibility, and hence the nutritional content to the cows, are at their maxima (Staples 1989), a delay beyond this point causes a reduction in the value of the farmer’s crop. Triticale harvested two weeks beyond the dough stage, for example, has gone completely to seed (“ripe” stage), and the ripe grain, although nutritious, is harder and less efficient for the cow’s rumen to digest (Fohner 2002) and the yield of dry matter is reduced (Staples 1989). Thus, payments for harvest delays are intended to compensate for these reductions in value and any associated costs (including extra irrigations that may be applied in an attempt to delay the crop’s maturation and reduction in yield).

A key difference between a harvest delay and a silage buy-out is the timing of the harvest of the crop following the fledging of the young tricolors. In the silage buy-out, the farmer agrees to wait until essentially all of the birds, the breeding adults plus the newly-fledged young, have departed and are fully independent of the field. In a harvest delay, the farmer agrees to delay the harvest only until the young have fledged (left the nests). Thus, in a harvest delay, the young are still present in the field in the day of harvest, being fed by adults during the day and roosting there at night. This difference may be due to the desire to minimize the impact of the harvest delay on the yield and nutritional quality of the crop.

It is the purpose of this report to assess the relative contribution of conserved silage colonies to all silage colonies over the interval between 2005 and 2009 by comparing the numbers of birds in conserved silage colonies to the numbers in colonies lost by harvest. This report is restricted to examining the years from 2005 to 2009 as during this period I have been monitoring and

documenting the fates of colonies (all final reports from field activities available on the Tricolored Blackbird Portal – <http://tricolor.ice.ucdavis.edu/downloads>).

## Results

Figure 1 provides a comparison of the proportions of birds in silage colonies that have been conserved to those in colonies that have been lost to harvest in the period 2005 - 2009. Table 1 summarizes the characteristics and fates of all silage colonies documented from 2005 through 2009. Note that the geographic scope of the “silage belt” is vast, extending from Riverside County in the south to Merced County in the north, although the dairy industry has largely moved north out of southern California and into the San Joaquin Valley in the past three decades (Hirsch 2006). Thus, currently the “silage belt” extends from Kern County to Merced County.

2005. There were 4 known silage colonies in the San Joaquin Valley in 2005, 2 in Kern County, 1 in Tulare County, and 1 in Fresno County, with a combined total of 142,000 breeding birds. The 2 Kern County colonies, consisting of 80,000 birds and 42,000 birds, were both conserved through silage buy-outs at a combined cost of \$80,000. These colonies produced at least 170,000 fledglings (Hamilton and Meese 2006). Both the Tulare County (15,000 birds) and Fresno County (5,000 birds) colonies were lost due to harvest.

A statewide survey in 2005 produced an estimate of 260,000 birds, so the conservation of just these two colonies conserved the potential reproductive output of ca. 47% of the statewide population. Note that this is an estimate of early-season reproductive output only, and second or third breeding attempts would add to the annual total reproduction.

2006. In 2006 there were 9 known silage colonies in the San Joaquin Valley plus Riverside County with a combined total of 371,900 birds. Silage buy-outs conserved 3 of these, a total of 216,900 birds, at a cost of \$123,157. The West Poso colony in Kern County was estimated by post-season nest transects to consist of 138,000 breeding birds that produced 132,545 young (Meese 2006). Importantly, the buy-out of the Riverside County colony conserved the largest known colony in southern California, and the total number of birds in southern California in 2008 (5,400; Kelsey 2008) and 2009 (5200; Feenstra 2009) is now only about two-thirds of that conserved in this single silage buy-out.

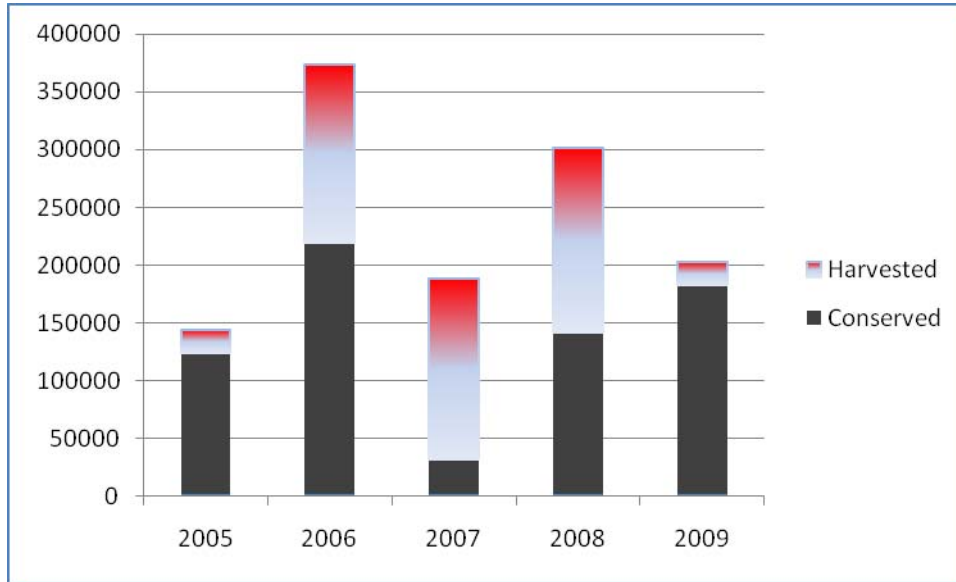


Figure 1. Proportions of Breeding Birds in Harvested and Conserved Silage Colonies 2005-2009

2007. In 2007 there were 8 known silage colonies in the San Joaquin Valley, with a combined total of 186,750 birds. There was a single silage buy-out that conserved a colony of 30,000 breeding birds, although a second buy-out contract was canceled when a 50,000 bird colony failed and the birds abandoned the site, apparently due to drought-induced reductions in insect abundance and a failure of females to form eggs. A total of 2,000 young was produced by the conservation of the single colony.

The other 6 colonies, consisting of a total of 106,750 (57%) breeding birds, were destroyed through harvest.

2008. In 2008, there were 10 known silage colonies in the San Joaquin Valley, with a combined total of 300,000 breeding birds. Of these, one was conserved by a silage buy-out and another was conserved by a harvest delay, conserving 140,000 breeding birds (47%) at a cost of \$60,000. These two colonies produced a total of 48,775 young.

In addition, one colony of 10,000 breeding birds was conserved at no cost through an oral agreement between the landowner and Kern National Wildlife Refuge staff and a second colony of 10,000 breeding birds was conserved by a landowner who was under legal proceedings for destroying a colony in 2007 through harvest of the substrate after agreeing to conserve the colony.

2009. In 2009, 8 of 9 silage colonies were believed to be conserved, although the fate of one colony in Fresno County was ambiguous due to lack of access for monitoring, resulting in an attempt to monitor this site from the shoulder of the closest public road, over a half-mile away. The fate of this colony is unknown. The two colonies conserved by harvest delay produced a total of 12,250 young.

The sole colony that was destroyed by harvest was the Lone Tree colony in Merced County, consisting of a visually estimated 20,000 birds that were still flying about the field several hours after it had been harvested (Meese 2009). This field was harvested within days of the birds' settlement, while birds were building nests.

Over the interval covered in this study, \$311,746 was spent to conserve 11 colonies consisting of 546,000 breeding birds that produced 396,025 young.<sup>1</sup>

## Discussion

In a given year, more than 50% of the nests constructed by first-breeding tricolors are situated in silage fields (Hamilton and Meese 2006); thus, the conservation of tricolor breeding colonies established in silage fields has become a major focus of efforts intended to conserve the species. These efforts have generally taken one of three forms: 1) voluntary agreements with landowners who request no compensation to conserve colonies established in silage fields, 2) agreements to delay the harvest of silage fields until after the young have fledged with compensatory payments intended to cover the costs incurred by the landowners in delaying the harvest, and 3) silage buy-outs where the farmer is paid the full market value of the fields in exchange for delaying harvest until the young have fledged and the birds have departed. Over the past 5 years, these efforts have resulted in the conservation of the breeding efforts of a low of 16% (2007) to a high of 86% (2005) of the birds nesting in silage fields (Table 1).

Although costly and little more than “emergency room” responses to short-term conflicts, these efforts appear to have contributed significantly to tricolor productivity in the past 5 years by conserving colonies that would otherwise have been lost through harvest. As the largest colonies are, in most years, established in silage fields (Cook and Toft 2005; Hamilton and Meese 2006; Kelsey 2008), the conservation of these colonies through the fledging and independence of the young are essential efforts to increase the numbers of tricolors (Tricolored Blackbird Working Group 2007). Further, the reproductive success, defined as the number of young produced per nest, of San Joaquin Valley colonies tends to be greater than that of Sacramento Valley colonies (Cook and Toft 2005), thus the conservation of these early nesting attempts may be disproportionately important to overall conservation efforts.

The timing of the harvest of fields conserved via harvest delay vs. those conserved via silage buyouts is potentially significant. In a harvest delay, many if not most of the young produced are still present and using the triticale substrate when the field is harvested, whereas in a silage buy-out, the adults and young have already departed the field when it is harvested (pers.obs.). The difference in the timing of harvest appears to be due to differences in the terms of the agreements. Silage buy-outs involve the sale of the crop by the farmer and the absence of the birds from the field is one of the terms of the contract. In contrast, harvest delays do not involve the sale of the crop but rather the compensation to the farmer of costs incurred due to: 1) the reduction in the value of his triticale crop, 2) any anticipated reduction in the yield of the subsequent corn crop, and 3) any associated costs for extra irrigation(s). To minimize the reductions in yields, the delay in the harvest of the triticale is set to a few days beyond the date when essentially all young birds are expected to have fledged from their nests. Thus, although the young have fledged by the time the field is harvested, many if not most fledged birds may still be present and utilizing, if not dependent upon, resources in the field such as perches from which to be fed by adults and for roosting at night. There are unknown effects related to the harvest of a field in which young are still present and upon which young birds may still be dependent, and these effects have never been studied.

A notable characteristic of these efforts is their flexibility: as noted above and in Table 1, it has often been the case that negotiations between U.S. Fish & Wildlife Service staff and affected landowners result in an agreement that is subsequently cancelled. The cancellation of existing

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<sup>1</sup> excluding young produced at Ramona Farms

agreements may be due to breeding failures, such as at Poso 1 in Kern County in 2007, or intense predation by cattle egrets leading to the abandonment of breeding colonies, such as at both Riverview colonies in 2009. This flexibility has benefits to both the landowner and the Service: upon the cancellation of an agreement, the landowner is able to harvest his field at the time of his choosing and the Service conserves scarce financial resources that can be used for future conservation efforts.

Over the five years of this study, payments totaling \$331,921 were made to conserve 11 breeding colonies consisting of 546,000 birds. These colonies produced 396,025 young.<sup>2</sup> Without the conservation of these colonies, this productivity would have been eliminated. As San Joaquin Valley breeding has historically been relatively more productive than subsequent breeding in the Sacramento Valley (Cook and Toft 2005), more eggs are laid in nests built in triticale than in any other substrate (Hamilton and Meese 2006), and nests built in triticale are at risk of being destroyed through harvest, efforts to increase the number of tricolors should concentrate on colonies in the San Joaquin Valley.

A permanent solution to the dilemma between the needs of the nesting birds and the needs of the farmers does not consist of annual negotiations between U.S. Fish & Wildlife Service staff and San Joaquin Valley farmers; rather, it consists of the provision of permanent nesting habitats surrounded by productive foraging habitats that provide a secure alternative to nesting in triticale fields (Tricolored Blackbird Working Group 2007). Previous attempts to create such alternative nesting habitats (e.g., ECLA Pond in Kern County, Toledo Pit in Tulare County) have met with limited success, but unless the tricolor modifies its breeding distribution, this is the only realistic resolution to the conflicts. Recent changes including intense predation by cattle egrets (*Bubulcus ibis*) and the loss of formerly productive alfalfa foraging habitats to conversion to orchards and vineyards may be reducing the suitability of the southern San Joaquin Valley to tricolor breeding (Meese 2009), only complicating future attempts to increase the abundance of the species.

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<sup>2</sup> excluding young produced at Ramona Farms

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**Table 1. Characteristics and Fates of Silage Colonies, 2005-2009.**

Name	County	Year	No. Breeding Birds	Size (Ac)	Fate	Cost	Comments
Poso 1	Kern	2005	80,000		conserved	\$65,000	Poso 1+2 produced 170,000 fledglings
Poso 2	Kern	2005	42,000		conserved	\$10,764	
Deer Creek	Tulare	2005	15,000		harvested		
Producer's	Fresno	2005	5,000		harvested		
2005 Subtotal			142,000			\$75,764	\$75,764 to conserve 122,000/142,000 (86%) of breeding birds (.62/bird). The two conserved colonies produced 170,000 young.
West Poso	Kern	2006	138,000	75.3	conserved	\$65,857	123,000 young produced
Homen	Merced	2006	70,800	41.8	conserved	\$22,300	funds provided on one-time emergency basis by San Luis NWR, not to be repeated; 40,000 young produced
Deer Creek	Tulare	2006	60,000	40	harvested		
Owens Creek	Merced	2006	30,000	40	harvested		
Plainsburg Road	Merced	2006	20,000	30	harvested		
Voice of America	Tulare	2006	20,000	40	harvested		
Costa's	Kern	2006	20,000	20	harvested		
Ramona Farms	Riverside	2006	8,100	13	conserved	\$35,000	productivity not documented
Dickenson Ferry	Merced	2006	5,000	25	harvested		
2006 Subtotal			371,900			\$123,157	\$123,157 to conserve 216,900/371,900 (58%) of breeding birds (.57/bird); 163,000 young produced by West Poso + Homen
Poso 1	Kern	2007	50,000	40			\$50,686 contract canceled after colony failed due to drought.
Cornerstone 1	Tulare	2007	30,000	80	conserved	\$4,000	Near-complete failure due to drought; heavy cattle egret predation; 2,000 young produced
Cornerstone 2	Tulare	2007	30,000	60	harvested		
Cornerstone 3	Tulare	2007	10,000+	20	harvested		
North Toledo	Tulare	2007	24,000	30	harvested		
East Toledo	Tulare	2007	6,000	10	harvested		
Angiola's	Tulare	2007	12,750	15	harvested		
Alvin Souza	Tulare	2007	24,000	20	harvested		
2007 Subtotal			186,750			\$4,000	\$4,000 to conserve 30,000/186,750 (16%) of



							breeding birds (.50/bird); 2,000 young produced
Costa's	Kern	2008	60,000	60	conserved	\$45,600	highly productive but fates of fledglings unknown; 43,775 young produced
Riverview	Tulare	2008	80,000	80	conserved	\$15,000	Near-complete failure due to cattle egret predation; 5,000 young produced
Vander Eyk	Tulare	2008	10,000	30	conserved	\$0	Owner requested no compensation
Cornerstone	Tulare	2008	30,000	30	harvested		
Deer Creek	Tulare	2008	10,000	30	conserved	\$0	no payment provided; pending legal action for 2007 harvest after verbal agreement not to harvest
Avenue Road 14	Madera	2008	10,000	20	harvested		
A & O Souza	Merced	2008	30,000	40	harvested		
El Nido	Merced	2008	25,000	30	harvested		
Producer's	Fresno	2008	15,000	15	harvested		
4 Mile Slough	Fresno	2008	30,000	30	harvested		
2008 Subtotal			300,000			\$60,600	\$60,600 to conserve 140,000/300,000 (47%) of breeding birds (.43/bird); 48,775 young produced by contracted colonies
Costa's NE	Kern	2009	13,300	16.5	conserved	\$27,000	9,000 young produced
Costa's NW	Kern	2009	4,700	12.5	conserved	\$7,200	3,000 young produced
Riverview	Tulare	2009	30,000	40	conserved		Production near zero due to cattle egret predation, contract cancelled; 250 young produced
Riverview 6	Tulare	2009	50,000	40	conserved		Contract cancelled, and production near zero, due to cattle egret predation.
GMC	Tulare	2009	31,500	28	conserved	\$13,825	
Southlake	Tulare	2009	1,000	5	unknown		Small colony mixed in with nesting white-faced ibis.
Producer's	Fresno	2009	35,000	40	ambiguous		Appeared to be conserved but no permission to access and monitored site from Hwy. 180, ½ mile away. Fate uncertain.
Milktime Dairy	Madera	2009	15,000	20	conserved		Unknown whether owner contacted, why conserved, or whether owner paid to conserve.
Lone Tree	Merced	2009	20,000	20	harvested		harvested during nest-building
2009 Subtotal			200,500			\$48,225	\$48,225 to conserve a minimum of 144,500/200,500 breeding birds; actual

							number unknown due to ambiguity of fate of Producer's colony; 12,250 young produced by contracted colonies
Total			1,201,150			\$311,746	Grand total of \$311,746 spent to conserve breeding by about 653,400 birds of an aggregate total of 1,201,150 birds, or 54%