

Calero Reservoir Tricolored Blackbird Nest Monitoring 2015 Report



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and
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Executive Summary

Monitoring of a nesting colony of tricolored blackbirds (*Agelaius tricolor*) was conducted from April 1 through June 28, 2015 at Calero Reservoir County Park in Santa Clara County during a total of 1,563 observation minutes during 19 days. Tricolored blackbirds were first observed on May 2 (a single male) and the largest count for the 2015 nesting season was on May 11 with an estimated 250 individuals (60% males). Numbers of tricolored blackbirds observed on a given monitoring day ranged from 0-250 individuals. The first week of May, males began displaying by perching on the top of the cattails, flaring out their epaulets, as well as vocalizing and chasing off other males. Nest building by females commenced on May 11, 9 days after first observed, with copulations also observed during this time. The last observed nest building took place on May 18 and after this date males were only occasionally observed, with a high count of five individuals. The first female to bring food back to the nest, presumed to be feeding young, was on May 24 and the last individual to feed young was observed on June 3 (an 11 day period). Females and males delivered arthropods to only five nests where nestlings were heard begging for food. We did not observe any tricolored blackbird fledglings being fed in the blackbird colony (both red-winged and tricolors nesting). The mean distance to foraging grounds was 415.2 meters with a range of 30- 4,000 meters from the colony. Foraging was observed in nearby grasslands and horse stables, but it is likely that tricolored blackbirds occasionally foraged in the agricultural fields in Coyote Valley due to their direction of flight, but no direct observations of foraging were observed.

Predators such as American crows and common ravens, were observed around or in the colony on numerous occasions and predation was observed on several occasions by both species. On May 13, a raven was observed depredating a red-winged blackbird nestling, while on May 22, a crow was observed taking two red-winged blackbird nestlings from the same nest on two occasions and was likely to have robbed an egg from a tricolored blackbird nest. Camera-traps were placed around the colony to monitor the site conditions at night, and when the site was closed to the public. On May 18, the camera-traps around the colony captured an American crow with an egg in its beak. Corvids were a significant threat and most likely played a major role in the subsequent low productivity of this colony. Males that typically return to the colony during the nestling period to assist females in feeding only did so in very small numbers, fewer than five. While the breeding colony started strong, with approximately 250 individuals, only five nests made it to the nestling stage and we did not observe any young fledge from this colony. A site visit was made on September 30 during the post-breeding period and a conservative estimate of 600 tricolored blackbirds was observed roosting and vocalizing in the cattail.

Introduction

The tricolored blackbird (*Agelaius tricolor*) is a colonial nesting passerine largely endemic to California. Colonial nesting birds are susceptible to extinction because the majority of the population exists in a few large colonies that require a large prey base and are vulnerable to disturbance. Recent statewide surveys have shown a sixty-three percent population decline between 2008 and 2014, and an eighty percent decline over the last 90 years (Meese 2014). Therefore, the tricolored blackbird is a conservation concern of high research priority. The California Fish and Game Commission granted a 180 day emergency “Endangered” listing for the tricolored blackbird in 2014, but the status was not extended past the initial period. California

currently considers the tricolored blackbird a species of special concern. They are also a covered species in the Santa Clara Valley Habitat Conservation Plan.

The majority of tricolored blackbird breeding colonies are found in the Central Valley. However, smaller colonies can be found scattered throughout the Central Coast Range, including Santa Clara County. Records of tricolored blackbird breeding in Santa Clara County date back to the 1800's, but were considered to be uncommon and local breeders through the early 1900's (Bousman 2007). Recent breeding records show a scattered distribution in Santa Clara Valley and the Diablo Range (Bousman 2007) with nesting colonies found at Calero Reservoir (2014, 1989), Lake Cunningham Park (1994), Coyote Percolation Ponds (1983, 1985), Coyote Ranch Park (1994), Del Puerto Canyon Road (2005, 2008, 2010, 2011), and Halls Valley (1982, 1983, 1987) (Tricolored Blackbird Portal 2015).

In 2014, a nesting colony of an estimated 600 tricolored blackbirds was discovered at Calero Reservoir following a report of 30 Tricolored Blackbirds at the junction of McKean Road and Bailey Avenue on May 25. This was the only confirmed nesting colony in Santa Clara County in 2014 (T. Rahmig pers. comm.). This colony used the alfalfa fields in Coyote Valley (2-4 miles away) as foraging grounds for insects, as many flight lines (1-30 individuals) were observed moving between Coyote Valley and the breeding colony (Phillips pers. obs.).

As the only known breeding colony in Santa Clara County and due to the pressures to develop Coyote Valley, the Calero colony affords a key opportunity to better understand tricolored blackbird colonial nesting and foraging behavior. Tricolored blackbirds are also a covered species under the Santa Clara Habitat Conservation Plan making them a research and conservation priority. With this research we can better understand the needs and requirements of tricolored blackbirds in Santa Clara County to better strategize conservation and enhancement efforts for this species.

Talon Ecological Research Group (Talon) is a newly formed non-profit organization dedicated to scientific research, conservation, and education. Talon's mission is to lead and foster students in environmental science education, research, conservation, environmental planning, and civic engagement. It was co-founded by biologists Andrew Bradshaw, Philip Higgins, Josh McCluskey, and Ryan Phillips. Talon conducted this research project in partnership with De Anza College and Santa Clara County Parks and Recreation, while in communication with the Santa Clara Valley Habitat Agency, Dr. Bob Meese from UC Davis, the Tricolored Blackbird Working Group and Troy Rahmig from ICF Consulting.

Study Area

This monitoring was conducted within Calero County Park which is owned and managed by Santa Clara County Parks and Santa Clara Valley Water District, both government agencies. The 4,455 acre county park is located in the eastern foothills of the Santa Cruz Mountains with habitats consisting of oak woodland, wetland, grassland, lake, riparian and chaparral (www.sccgov.org). The nesting colony site is situated at the southern extent of the reservoir in a dense patch of cattail (*Typha* sp.) (95%) and tule (*Schoenoplectus acutus*) (5%) located at W 37.18114° N 121.76984° (Figure 1). The Santa Clara Valley Water District built the 2.2 mile long reservoir in 1935 to store 9,934 acre-feet of water (www.valleywater.org). It covers a

surface area of 349 acres, depending on water capacity. Water is received from rain run-off within the Calero watershed or imported via the Pacheco and Santa Clara Conduit, which are pipelines that feed water from the San Luis Reservoir where the water is conveyed from the Delta of the San Joaquin and Sacramento Rivers (www.valleywater.org).

Methods

Pre-nesting

Suitable breeding habitat for the tricolored blackbird was monitored in April and May, 1-2 times per week for 15 minutes (per the protocol by the statewide tricolored blackbird survey) in Calero County Park to determine the location of the breeding colony/ies. During pre-nesting site visits, a spotting scope and binoculars were used to scan the suitable substrate for tricolored blackbird during a fifteen minute period to establish if any birds were present (Tricolored Blackbird Portal 2015) (Figure 2).

Nesting

Once tricolored blackbirds were observed, monitoring occurred by the listed P.I. and Talon biologists, assisted by De Anza College's Wildlife Science Technician student, Marcus Przyborowski, and Environmental Science class members. All students were accompanied by a Talon biologist. Once females were observed nest building (3-4 days per female), monitoring increased to every 2-5 days to determine the number of nest building females. During the incubation period (10-12 days) monitoring occurred every 2-3 days to determine colony size, number of nests, foraging ground locations, time away from nest, and prey abundance and items. Each colony monitoring visit during the egg laying, incubation, and nestling periods was a 2 hour monitoring block. Each nest was mapped out on a printed panoramic photo of the colony by using feeding adults as they came into the nest to feed nestlings. During the nestling period (10-14 days) monitoring occurred every 2-3 days during a 2 hour monitoring block. During the post-fledging stage (4-6 days) the colony was monitored every 2-3 days for 2 hours to estimate productivity and colony success. We attempted to locate post-dispersal foraging grounds and the colony was re-visited 2-4 times per week to determine if any individuals produced a second brood. Population size was estimated using the methods described by Kelsey (2008) and the Tricolored Blackbird Portal. For the entirety of the breeding cycle, monitoring blocks were established at 2 hours for consistency and to obtain sufficient data (Figure 3).

Breeding cycle interval lengths of tricolored blackbirds and monitoring intervals and time blocks (Tricolored Blackbird Portal 2015):

Breeding Period	Length of Period Per individual	Monitoring Interval	Monitoring Time Block
Territory set-up	Up to 7 days	Every 4-7 days	15 minutes
Nest building	3-4 days	Every 2-5 days	2 hours
Egg laying	3-5 days	Every 2-3 days	1 hour
Incubation	10-12 days	Every 2-3 days	1 hour
Nestling	10-14 days	Every 2-3 days	1 hour
Post-nestling	4-6 days	Every 2-3 days	2 hours
Post-dispersal of brood 1	?	Every 3 days	15 minutes

Researchers avoided any disturbance of nesting birds by surveying from 50 meters away from the closest substrate being used. Based on prior studies, a distance of 50-100 meters sufficed. We did not see a change in the blackbird's behaviors at the distance we monitored from.

During each site visit the following data was obtained: estimated number of individuals present (sex ratio), number of estimated nests mapped onto the photos, behaviors of individuals (displaying, nest building, copulating, incubating, feeding young), direction of departing and arriving individuals, estimated distance and direction to foraging grounds, number of females and males in and out of the colony in a 20 minute period, and prey items brought back to nests.

To keep the directions systematic between monitoring teams, we constructed a large compass dial made out of plywood and set it on the ground where we monitored and calibrated it with a live compass. All compass bearings were taken in magnetic north. Two 20 minute surveys were conducted at the start and end of each of the two hour monitoring blocks during each site visit. The number of males and females that were departing and arriving during those 20 minutes was recorded. This gave us a systematic estimate of number of individuals that could be extrapolated over a larger time frame. When an individual departed or arrived a bearing of the direction it was departing to or arriving from was taken. A sample of 30 for each was taken if enough birds were observed. One person on the team would follow the departing individual and record where the bird was foraging. Once the bird was observed to drop into the habitat or substrate it was considered foraging. This location was estimated by taking a bearing of the location and determining the distance.

Historical accounts of predation documented include a wide diversity of species by avian, mammalian, and reptilian taxa, which include black-crowned night-herons (*Nycticorax nycticorax*), common ravens (*Corvus corax*), raccoons (*Procyon lotor*), California kingsnakes (*Lampropeltis getula*), and coyotes (*Canis latrans*) (Tricolored Blackbird Portal). To determine what potential predators are in or near the colony, two remote-sensing field camera traps were installed on the edge of the colony.

Results

Colony Population

We monitored the Calero Reservoir tricolored blackbird nesting colony from April 1 to June 28, 2015 during 1563 minutes (26.1 hours) under permit from Santa Clara County Parks and permission from Santa Clara Valley Water District. The colony was located in the southern portion of the reservoir in substrate dominated by cattail. It was a mixed colony with also red-winged blackbirds (*Agelaius phoeniceus*), but the colony was segregated by species. The first tricolored blackbird observed at this site was on May 2, a male flyover. On May 11, we estimated approximately 250 individuals were present at the colony consisting of 150 (60%) males and 100 females, where males were displaying and two females were building nests (Figure 4). This was the highest count for the entire monitoring season. Number of tricolored blackbirds observed during a monitoring block ranged from 0-250 individuals. On May 13, we estimated approximately 160 individuals of which 100 (63%) were females. The population continued to decrease over the next 6 weeks, until no individuals were observed at the colony

(Figure 4). No individuals were observed after June 10 (Figure 4). We observed five nests that made it to the nestling stage and none of the nests fledged young.

The mean number of females that departed during the two 20 minute monitoring blocks was 13.0 (n=22) and the mean number of females that arrived was 12.0 (n=22). The mean number of males that departed during the two 20 minute monitoring blocks was 3.2 (n=22) and the mean number of males that arrived was 3.6 (n=22).

Colony Behavior and Phenology of Periods

During the first week of May males were displaying by perching on the top of the cattails flaring out their epaulets, as well as vocalizing and chasing off other males. Nest building occurred only by females and was observed over an 8 day period from May 11 to May 18, during which copulations were also observed (Figure 5). The last observation of nest building was on May 18 and after this date males were only occasionally observed with a high count of five individuals. The first female to bring food back to the nest, presumed to be feeding young, was on May 24 and the last individual to be feeding young was on June 3 (11 day period) (Figure 5). Females and males delivered arthropods to only five nests where nestlings were heard begging for food. We did not observe any tricolored blackbird fledglings being fed or in the blackbird colony (both red-winged and tricolor nesting). Double brooding did not occur in this colony and the last day during the breeding season a tricolored was observed was on June 5. On September 30, an estimated 600 tricolored blackbirds were observed vocalizing and roosting in the colony. This estimate was conservative and there could have been well over 1,000 individuals, as large flocks continued to fly into the colony when there was an already large vocalizing group. The birds could not be observed because they were low in the cattail, but they could be heard throughout the substrate wing fluttering. Sex ratio appeared to be made up of about 50% males and females. Many individuals were hatch year (juvenile) males, which suggests that these individuals successfully bred, but from another location.

Foraging

Females and males delivered arthropods to only five nests where nestlings were heard begging for food. Females were more active in feeding nestlings compared to males (<1% of total feedings observed). The mean distance to foraging grounds was 415.2 meters with a range of 30-4,000 meters from the colony. Foraging was observed in the surrounding grasslands within 1,000 meters (Figure 6) of the colony, the horse stables near the boat launch entrance and near the Calero headquarters office. We suspect they foraged occasionally in the agricultural fields in Coyote Valley due to the direction of flight. However, no direct observations of foraging in the valley were made. The mean direction to foraging grounds was 194.5 degrees. Most birds foraged within 300 meters of the colony, along the edge of the trail to the southwest. Numerous birds also foraged in the tall non-native grasses to the northeast along the McKean Road. We also observed tricolor following and foraging below the horses above the horse stables on the east side of McKean Road. We were able to identify three prey items that were delivered to young, which included: crane fly *Tipula sp.*, California antis *Stagmomantis californica*, and caterpillar of an unknown species.

Predators and Depredation

American crow, *Corvus brachyrhynchos*, and common raven, *Corvus corax*, were observed in the vicinity of the nesting colony on numerous occasions and direct predation of the blackbird

colony was observed on several occasions. On May 13, a raven was observed depredating a red-winged blackbird nestling (Figure 7). The camera-traps around the colony captured an American crow with an egg in its beak on May 18 (Figure 8). On May 22, a crow was observed taking two red-winged blackbird nestlings from a nest on two occasions, and what appeared to be an egg robbing of a tricolored blackbird nest. A video was taken of this nest robbing and is available upon request. After the crow dropped into the tricolored blackbird nest area, screaming from an apparent female was heard for four minutes. The same crow then emerged with nothing in its beak and began incessantly feaking as if it just fed. Due to the behavior of both the crow and the female tricolored, we suspect that the crow depredated the egg/s. Numerous blackbirds, both red-winged and tricolored were observed mobbing corvids as they approached the colony, getting more aggressive if the corvid flew into the substrate. The blackbirds would continue to hit the corvid, but were ineffective at deterring predation. Other potential predators observed or captured on the cameras included coyote (*Canis latrans*), black-crowned night-heron (*Nycticorax nycticorax*), great blue heron (*Ardea Herodias*), wild boar (*Sus scrofa*) (Figure 9), and northern raccoon (*Procyon lotor*). The coyote was captured on camera-traps multiple days, including an individual in the water and mud at the edge of the colony (Figure 10). While black-crowned night-herons were rarely seen at the colony, the camera-trap captured an individual that appears to be hunting in the cattail near a tricolored nest (Figure 11). Great blue herons were observed frequently near the colony, but there was no tricolored predation observed on their part (Figure 12). Raccoons were caught frequently on the camera-traps including in the water and mud adjacent to the nests (Figure 13). By far the greatest predation risk to the colony, that was observed, were crows and ravens, as they were directly observed predating the colony and were not deterred, despite mobbing from tricolored and red-winged blackbirds.

Colony Substrate Characteristics

Nesting tricolored blackbirds were in three disjunct substrates that were separated by water approximately 3-10 meters apart from one another (Figure 1). The substrate consisted of 95% cattail and 5 % tule, ranging from 1-4 meters in height. The three patches had an estimated area of: 371, 1,962, and 4,045 m², for a total approximate substrate area of 6,378 m² or .638 ha (1.58 acres). In April, the water levels were lower than from May through September, therefore the cattail started to slowly grow in April. The height in April was 1-2 meters and by June was 2-4 meters. Also, the cattail became much denser later in the breeding season. Density and height of substrate may be an important characteristic in nesting success, as it may be more difficult for predators to locate and access tricolored nests.

Water Level

Water level data from Santa Clara Valley Water District was not available for analysis at the time this report was written. However, observations of the water level will be discussed. In March, the water level was receded 3 meters from the edge of the cattail on April 1. For the month of April the water continued to recede. Beginning in May, water was imported into the reservoir from the pipeline and by May 2, water levels were observed reaching the cattails. On June 10, importation of water increased and the water level of the reservoir was observed to be considerably higher than the previous month. There is a probable correlation between an increase of water during early May and the arrival of tricolored. However, without the water district level data this conclusion is only anecdotal.

Other Observations

Grasshopper sparrows (*Ammodramus savannarum*) were singing during the entire monitoring season and observed on multiple occasions (Figure 15). We estimated at least two pairs in the vicinity of the colony. An adult bald eagle (*Haliaeetus leucocephalus*) was observed on multiple occasions foraging over the reservoir. We observed, nearly every visit, a vocalizing Virginia rail, (*Rallus limicola*) and we suspect it is nesting in the area of the blackbird colony. There are no confirmed nesting sites of this species in Santa Clara County and only eight sites in the north portion of the county that has observed them in the breeding season (Bousman 2007). Along the shores of the reservoir an unknown Chinese species of large snail was observed. It was submitted to Santa Clara County Parks and Fish and Wildlife for analysis. There was an abundance of spawning carp (*Cyprinus carpio*) in early June when the water level increased. Hundreds of individuals were observed in the flow from the imported water pipeline drainage and along the southern portion of the reservoir

Discussion

Unfortunately, this colony at Calero County Park was not successful (fledging young) even though tricolored blackbirds were present and nested. It is difficult to determine the reason why, but it is partially due may be partially due to the depredation of nests (eggs and nestlings) by American crows and common ravens. Other factors that could have contributed to the failure include the low abundance of insects in the surrounding foraging grounds and few alfalfa fields in Coyote Valley this year (Meese 2013). In 2014, during the nestling period, numerous males and females (on average 100 individuals per 30 minutes) were observed carrying food from Coyote Valley to the colony (R. Phillips pers. obs.). We do not know what the success and productivity of the colony was in 2014, but this could signify that the alfalfa fields in Coyote Valley are important for this colony. Over the past few years, the acreage dedicated to alfalfa has declined in Coyote Valley and this year was the fewest in recent years (5 years) (S. Kraus pers. comm., R. Phillips pers. obs.). This may have played a role in the lack of success for this year's colony. Other research has shown that alfalfa fields create important foraging habitat for tricolored blackbirds and other avian species, but further research is needed to better understand this dynamic. Meese (2013) found widespread and chronic reproductive failures throughout the Central Valley except in areas with high insect abundance, so success relies heavily on the productivity of foraging grounds. Also, after the first brood fails, often tricolored blackbirds attempt a second brood at another location. Observing over 600 individuals and many hatch year birds on September 30, may suggest that this colony bred elsewhere, but the only other known active colony in Santa Clara County during 2015 was in San Antonio Valley. Having this many birds roosting at this site exemplifies how important the area is for the species, not only for breeding, but also for the non-breeding season. The origin of these hatch year birds remains a mystery, but could have originated from the Central Valley. Banding studies by Dr. Meese at UC Davis may shed some light on the movements with band recoveries.

Male tricolored blackbirds typically return to the colony during the nestling period to assist in feeding (Tricolored Blackbird Portal 2015). We found that during the nestling stage, very few males, only 1-2, assisted with feeding, suggesting that most nests failed. Out of our estimated 5 nests with nestlings none successfully fledged. We found that American crows and common ravens are the main predator of this colony and presumably depredated one tricolored nest in our presence and possibly depredated others when we were not present. The camera-traps also caught an American crow with a blackbird egg in its beak. We could not determine if the egg

was a tricolored or red-winged. We assume that both crows and ravens depredating eggs and nestlings of both species. According to predation studies, once a predator finds a food source it will continue to make visits to that site until there is no longer any prey remaining. If the blackbirds cannot deter crows and ravens from the nesting colony they will continue to return, which we observed. Therefore, if a colony has a small population size, then a single crow or raven could potentially depredate a complete colony over a breeding season. To reduce the impact of predation, the size of the colony needs to be increased or other suitable breeding sites nearby are necessary to switch between sites or attempt a second brood elsewhere. The substrate where this colony was located is the largest and most dense cattail in the area, which is most likely why it was chosen. To reduce depredation on tricolored blackbirds, we suggest that cattail restoration occurs at Calero and all large bodies of water in Santa Clara County. With more and denser nesting substrate this may assist in maintaining viable nesting colonies in Santa Clara County.

Also, we recommend that Santa Clara County Parks works closely with Santa Clara Valley Water District and Santa Clara Habitat Agency to determine the ideal water levels for nesting tricolored blackbirds at all reservoirs in the county, including Calero, during the appropriate times. Coyote Valley may play a critical role in tricolored blackbird conservation, but further research is needed to determine insect abundance in the area and the validity of alfalfa in this area as an important foraging habitat for tricolored blackbirds. It is crucial to continue in-depth monitoring of this population of tricolored blackbirds to better understand the reproductive success for the long term viability of this sub-population and to determine the likelihood of survival of this colony, especially since this is the only known breeding colony in the region with the only other breeding colonies in the county found in San Antonio Valley.

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Figures



Figure 1a and 1b. Colony in cattails and tule at the southern extent of Calero Reservoir.



Figure 2. Monitoring team at the tricolored blackbird colony at Calero County Park.

Tricolored Blackbird Monitoring Field Data Sheet

Talon Ecological Research Group/ De Anza College

NESTING SHEET

Field Equipment List:

- Binoculars, spotting scope, permit, flags, meter tape, data sheets, site photo, insect guide, camera, red permanent marker, thermometer and compass

***Each site visit is a 2 hour monitoring block, if monitoring exceeds 2 hours use a separate data sheet and note that it is continuous data past the 2 hour monitoring block*

SITE: _____
DATE: _____
OBSERVERS: _____
START TIME: _____ END TIME: _____
Start: %cc ____ wind: ____ Temp: ____ Precip: ____
Middle: %cc ____ wind: ____ Temp: ____ Precip: ____
End: %cc ____ wind: ____ Temp: ____ Precip: ____

TRICLORED BLACKBIRD DATA

WATER LEVELS: 1: ____ m 2: ____ m

Number of TRBL Present:		Males:		Females:	
Number of active nests estimated:					
Number of Individual's Behaviors		Territorial Males (Singing & Displaying):		Females Nest Building/ Incubating:	
				Copulations:	
				Adults Carrying Food/Feeding Young:	
Adult Flight Directions (compass bearing) Record the first adult seen every 2 minutes	Arriving (n=30)			Departing (n=30)	
	_____			_____	
Estimated distance to foraging grounds	Direction (n=30)			Distance (n=30)	
	_____			_____	
Colony Numbers (survey 1) First 20 minutes	Female Out:	Female In:	Male Out:	Male In:	
	_____	_____	_____	_____	
Colony Numbers (survey 2) Last 20 minutes	Female Out:	Female In:	Male Out:	Male In:	
	_____	_____	_____	_____	
Number of Fledglings being fed:					

NOTES:

Figure 3. Monitoring data sheet for tricolored blackbird nest survey.

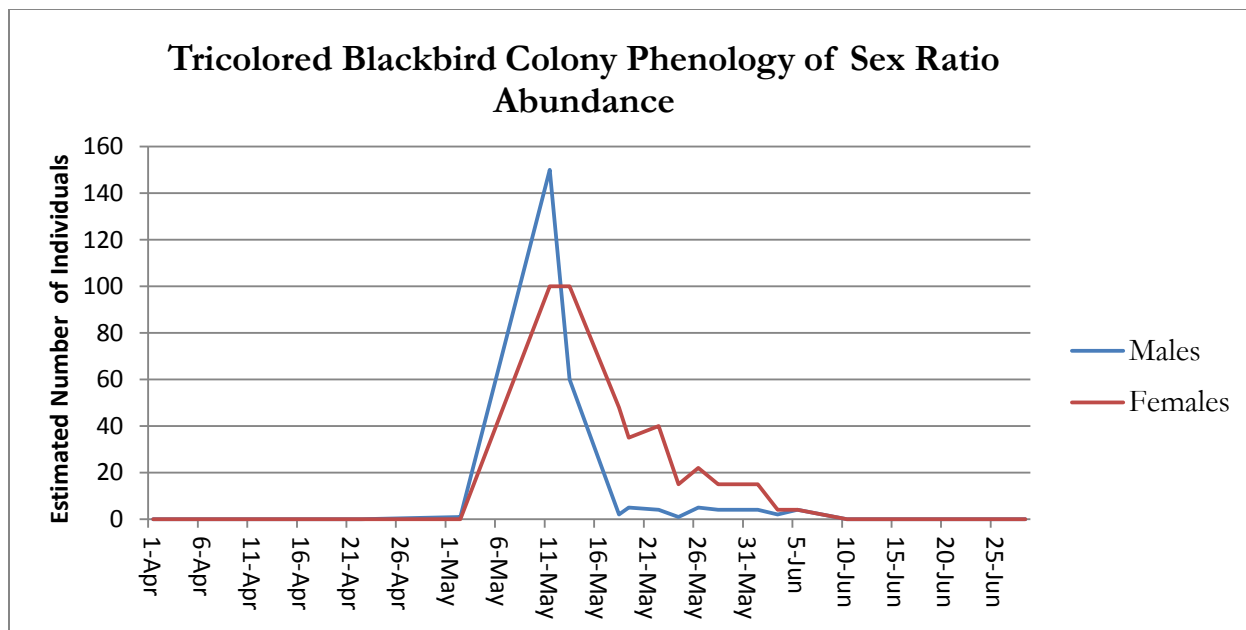


Figure 4. Graph of Calero tricolored blackbird colony phenology of male and female abundance in 2015.

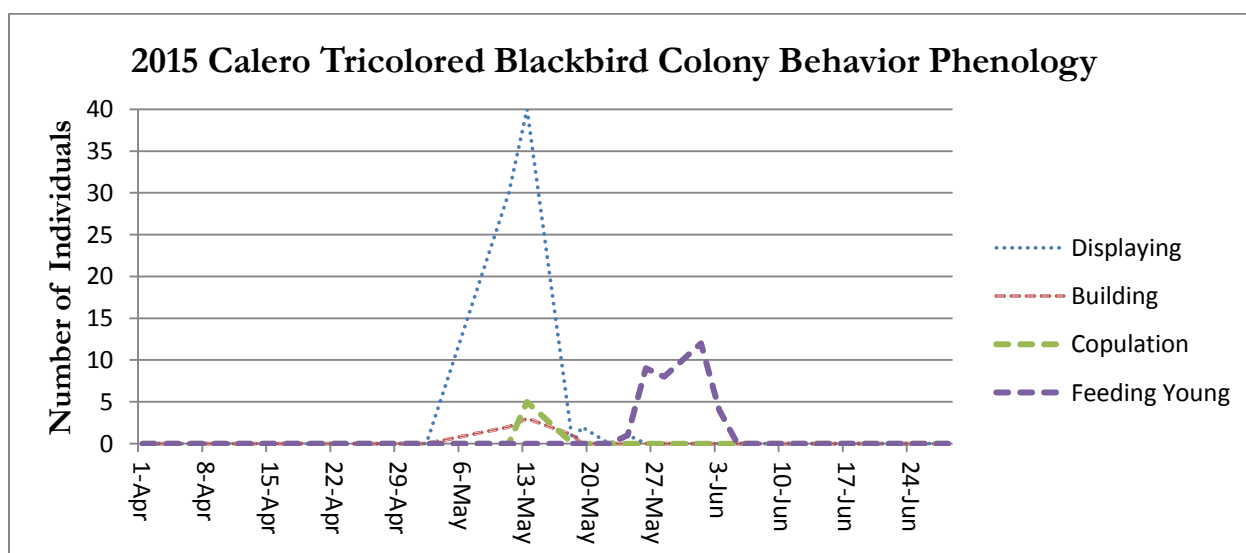


Figure 5. Calero tricolored blackbird colony phenology of behavior in 2015.



Figure 6. Area in adjacent grasslands where tricolored blackbirds were foraging frequently.



Figure 7. Common raven depredating on red-winged blackbird nestling from colony on May 13, 2015.



Bushnell

05-18-2015 19:18:31

Figure 8. American crow with a blackbird egg in its beak on May 18, 2015: evidence of predation of blackbird colony from camera-traps.



Bushnell

05-21-2015 21:59:16

Figure 9. Wild boar caught on the camera-traps at the tricolored blackbird colony on May 21, 2015, which could be a potential predator.



Bushnell

05-23-2015 07:26:42

Figure 10. Coyote in mud 5 meters from a tricolored blackbird nest, a potential predator.



Bushnell

05-24-2015 16:29:13

Figure 11. Black-crowned night-heron hunting in background on left 5 meters from tricolored blackbird nest, potential predator, with snowy egret in foreground.



Bushnell

05-18-2015 15:05:55

Figure 12. Great blue heron along shoreline moving away from tricolored blackbird colony on camera-traps, potential predator.



Bushnell

05-14-2015 23:54:54

Figure 13. Raccoon 10 meters from tricolored blackbird nest. They were captured nearly every night on the camera-traps, potential predator.



Bushnell

05-30-2015 19:53:56

Figure 14. Blackbird nightly dusk routine of drinking and foraging along shoreline adjacent to the colony.



Figure 15. Grasshopper sparrow, a species of special concern, photographed near the nesting colony on June 28, 2015.