2023 Alkali Mariposa Lily and Blackbird Surveys on the Kern River Valley Heritage Foundation properties in Lake Isabella, CA

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Introduction

The Kern River Valley Heritage Foundation (KRVHF) contracted the Southern Sierra Research Station for the 2023 spring-summer season to conduct monitoring for species of concern on their properties, specifically Alkali Mariposa Lily (*Calochortus striatus,* AML), Tricolored Blackbird (*Agelaius tricolor,* TRBL), and Kern Red-winged Blackbird (*Agelaius phoeniceus aciculatu*s, RWBL). These birds are of special interest because of their limited distributions. They are also of interest because the health of their populations is indicative of the health of the hot springs wetlands and surrounding uplands. These habitats are scattered throughout the Southwestern United States, but they are often heavily impacted by human development. The focal properties are surrounded by roads and the town or Lake Isabella, and they were purchased to protect them and the plants and wildlife that live there from development.

Methods

We conducted one lily survey during the flowering season and blackbird surveys every 2 weeks from April to June. We surveyed 3 properties in Lake Isabella, CA: the Bob Powers Gateway to Lake Isabella Preserve (18 ac), Hot Springs Valley Wetlands (189 ac), and the newly acquired and previously unsurveyed Woo Property (3 ac) (Figure 1). All survey data collection was completed in the ArcGIS Field Maps app on android tablets or phones. SSRS biologists also kept eBird checklists during each visit (including highest breeding codes for all species when possible), as well as field notes on other wildlife and plant species detected within the property boundaries (Appendix A).

Background

SSRS staff surveyed KRVHF sites in Lake Isabella, CA for the Alkali Mariposa Lily, a perennial bulb native to California and ranked on the CNPS Inventory as rare, threatened or endangered in California and elsewhere (1B.2). This vulnerable species grows in alkaline soils and is present in the remnant alkaline/sub-alkaline marsh and meadow system of the HSVW. This HSVW population is documented as the second largest population in California (behind the Edwards Air Force base population). The stems from these bulbs begin to appear in March with flowers present from April through June.
Our surveys collected data on the number and location of lilies, as well as their reproductive phenology. Historical monitoring efforts in 2005, 2008, 2009, 2011, 2012, 2015, 2016, 2019 and 2020 have found lilies on the HSVW and BPGP properties, and our survey efforts will follow the same methodology in order to compare results across years. This was the first survey of the newly acquired Woo property.

Kern Red-winged and Tricolored Blackbird surveys were conducted on the KRVHF sites (BPGP and HSVW) 5 to 6 times from April to June in 2019. Both species were detected on the site with Kern Red-winged nesting colonies on both the BPGP and the HSVW sites. Nesting Tri-colored Blackbirds (approximately 40 -50 were also detected successfully nesting in cattails in a diked cattail pond adjacent to Vons Plaza (across the road from the HSVW). These Tricolored Blackbirds were often seen foraging on the HSVW property. Another Tricolored Blackbird colony (10 -15) was detected in a stinging nettle patch in the fields between Barlow Road and Hwy 178. Tricolored Blackbirds from these colonies were detected many times foraging on KRVHF sites, but were mostly gone by early June. Kern Red-winged Blackbird nesting colonies were detected on both sites; with a colony of approximately 15 to 20 birds on the BPGP and 25-30 birds on the HSVW site.

Alkali Mariposa Lily Surveys

We conducted 1 survey for Alkali Mariposa Lilies in the 3rd and 4th week of May. Each group of surveyors was assigned a plot within the study area. To match surveys done in previous years, surveyors walked transects to visually cover 100% of suitable habitat (wetland edges, alkaline meadows) within their plot. Areas of less suitable habitat were scanned with binoculars to find additional patches of lilies. Pin flags were utilized during the survey to delineate lily patches in order to facilitate counting lilies (Figure 1).

Figure 1. A surveyor marks Alkali Mariposa Lily plants with pin flags on the Bob Powers Gateway Preserve during the survey on May 20, 2023.

All lily plants in the study area (Figure 2) were documented on ArcGIS Field Maps. Lilies were recorded using a "point" feature for groups of 1-10 plants, and a "polygon" feature for groups of >10 plants. Points were dropped in the center of patches of up to 10 lilies (not more than 10 meters apart), polygons were drawn around the minimum convex polygon of the indicated count (>10) of lilies. Small groups of lilies more than 10 meters apart were recorded with multiple points. There were no size restrictions for polygons. For each point or polygon, the observer filled out the Field Maps form as described below.

- **Count of plants**: indicates the number of AML individuals at/within that feature. An "individual" included all stems from a single bulb.
- **Percent vegetative stage**: estimates the percent of AML plants with leaves only (no reproductive structures).
- **Percent in bud:** estimates the percent of AML plants in bud (but no flowers or fruit).
- **Percent flowering:** estimates the percent of AML plants with flowers (but no fruit).
- **Percent fruiting:** estimates the percent of counted plants with fruit.
- **BPGP ONLY – Count of buds:** For points, the total count of buds across counted plants was recorded. For polygons, the total count of buds within the polygon were recorded.
- **BPGP ONLY – Count of flowers:** For points, the total count of flowers across counted plants was recorded. For polygons, the total count of flowers within the polygon was recorded.
- **BPGP ONLY – Count of fruit:** For points, the total count of fruit across counted plants was recorded. For polygons, the total count of fruit within the polygon was recorded.

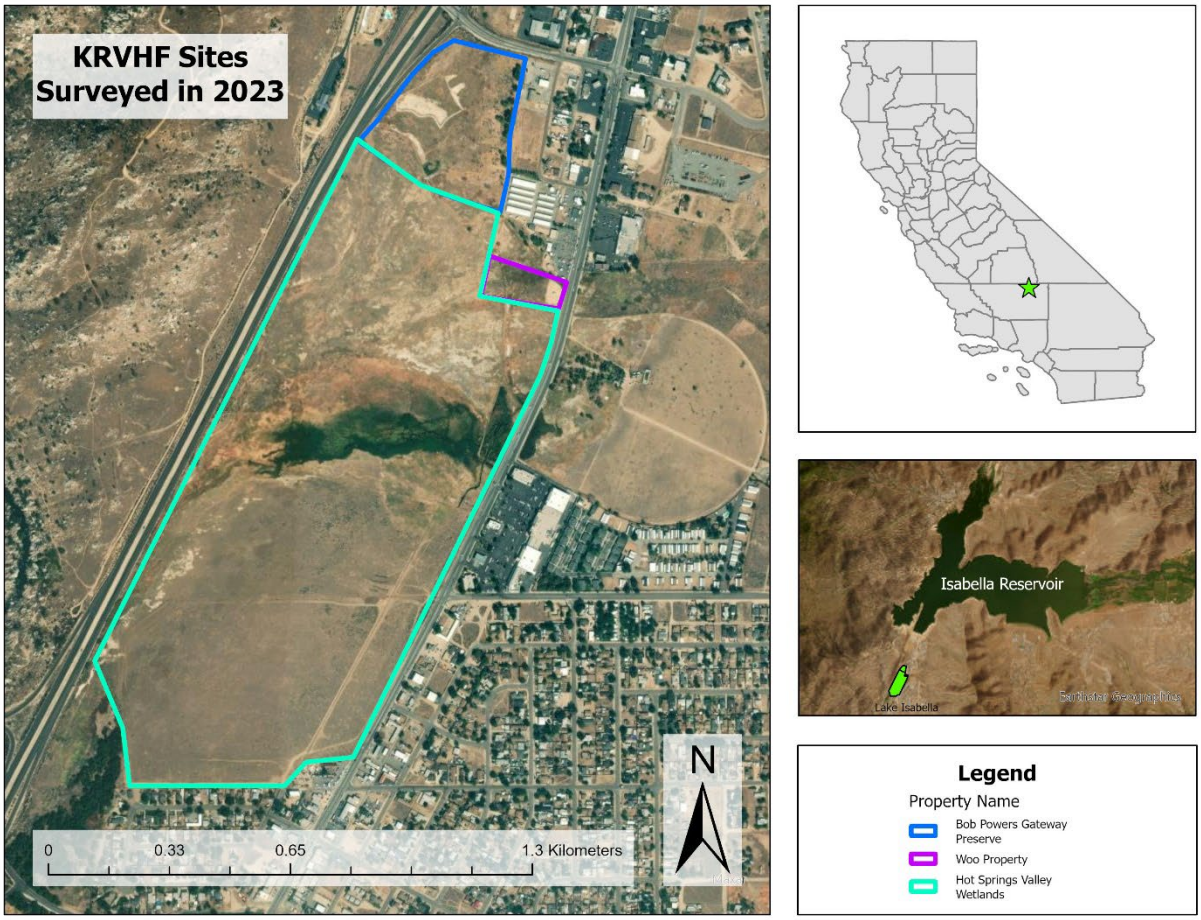

Figure 2. Kern River Valley Heritage Foundation properties in Lake Isabella surveyed in 2023. BPGP: Bob Powers Gateway to Lake Isabella Preserve; HSVW: Hot Springs Valley Wetlands; WOO: Woo Property.

Lily identification was based on Fiedler 2012 which allowed the plant to be identified in both vegetative and flowering or fruiting state. For "percent veg/bud/flower/fruit" fields, each plant was represented in only the most developed percentage category. For example, an AML plant with leaves, buds and flowers was only counted in the flowers category, because the most developed reproductive structure on the plant was a flower. Some reproductive structures were transitioning between bud-flower/flower-fruit and required subjective decisions, we examined multiple examples in the field with all surveyors during training to calibrate our classifications.

To be consistent with surveys in previous years, we collected additional data on the Bob Powers Gateway to Lake Isabella Preserve. At BPGP, in addition to percent stage fields, surveyors recorded the counts of buds, flowers and fruit in total across all individuals at each point/polygon. Percentage estimates gave us information on this AML population's phenology, whereas counts of reproductive attempts (buds/flowers/fruit) gave us information on annual reproductive output.

Blackbird Surveys

Survey Protocol

We surveyed the 3 properties (Figure 2) for Tricolored Blackbird (TRBL; *Agelaius tricolor)* and Kern Red-winged Blackbird (RWBL; *Agelaius phoeniceus aciculatus*). Area search surveys were conducted every 2 weeks from April through June (Table 1). Our goal was to document blackbird use of the properties during the breeding season, specifically their approximate population sizes, locations within the site, and breeding status. Surveys began at sunrise and were completed by 1100.

Data collection was set up so that each surveyor started with a blank map each survey morning to limit bias between survey visits. Surveyors walked systematically through the study plot, passing in roughly 50m transects. On Field Maps, surveyors dropped blackbird location points on aerial imagery using a compass and rangefinder, rather than walking to the bird's location, to avoid disturbing the birds. Surveyors dropped separate points for the two blackbird species; if they could not identify an *Agelaius* blackbird to species they were instructed to record it as "unknown blackbird" rather than guessing. However, all blackbirds were identified to species. For each blackbird detection, we recorded the following data: date, time, coordinates, count of males, count of females, count of unknown sex, and any breeding behavior observed.

For each survey morning, the observer did their best to document each individual once. To facilitate this, blackbird location points were dropped at the coordinates for which an individual or group was most territorial or showed the most evidence for breeding, as both species will leave on long-distance foraging trips away from their territories. Blackbirds which flew overhead and never landed in the study area were not recorded.

Red-winged Blackbirds

Due to the behavioral characteristics of the species, we chose to record male territories in the field and indicate how many females were seen in the territory on the same point/feature. One reason for this is that males are more visible throughout the breeding season than females as they sit up in territorial defense and do not assist with prolonged hidden activities like incubation (Yasukawa and Searcy 2020). Male Red-winged Blackbirds also defend distinct territories for the duration of the breeding season and can be monogamous or polygynous (Dickinson and Lein 1987), whereas females commonly switch mates mid-season (Nero 1956). Because RWBL males typically do not breed in their second summer, unlike female RWBL (Yasukawa and Searcy 2020), we recorded additional notes about subadult males and subsequently removed them from territory counts.

Nest monitoring was not within the scope of this study, however adult breeding behavior, nests and fledglings were noted when observed opportunistically during surveys. If an observer did encounter a blackbird nest while walking through the study area, nest stage was documented and then the observer immediately left the territory, continuing in the same direction of travel away from the nest to minimize predation risk.

Tricolored Blackbirds

Tricolored Blackbirds are colonial nesters, and as such we attempted to record one point feature for each nesting colony or group, rather than a single point per male as for RWBL. Observers watched Tricolored Blackbirds carefully for at least 25 minutes per group/colony per visit in order to get accurate counts and determine breeding status at the sites. If TRBL(s) were detected using the site but no colony was located,

then a point was dropped for the individual/group and notes were taken. We followed the detailed survey and counting methods outlined in the 2018 report by Western Riverside County MSHCP titled “2018 Tricolored Blackbird Survey Protocol”.

Results

Alkali Mariposa Lilies

The Alkali Mariposa Lily survey occurred May 20-24, 2023. We recorded 62,592 AML plants across all sites: 60,997 plants at Hot Springs Valley Wetlands, 1,595 plants at Bob Powers Gateway Preserve and zero AML on the newly acquired Woo Property (Table 1, Figure 4). There was considerable variation in reproductive phenology between sites: lilies on the Bob Powers Gateway Preserve were mostly in bud (62%) during the survey, with only 7% fruiting, whereas lilies on the Hot Springs Valley Wetlands property were already mostly at the fruiting stage (58%) (Figure 3).

***Table 1**. Total numbers and reproductive stages of Alkali Mariposa Lilies (AML) in the Bob Powers Gateway Preserve and Hot Springs Valley Wetland. No lilies were located on the Woo Property. Each AML plant was classified according to the most developed stage of reproductive structure present, listed in order of development: veg (no reproductive structure present), bud, flower or fruit.*

Count of AML		Percent of Plants in Each Stage			
		Vegetative	Bud	Flower	Fruit
Bob Powers Gateway Preserve	1,595	4%	62%	27%	7%
Hot Springs Valley Wetlands	60,997	0%	6%	36%	58%
Total	**62,592**				

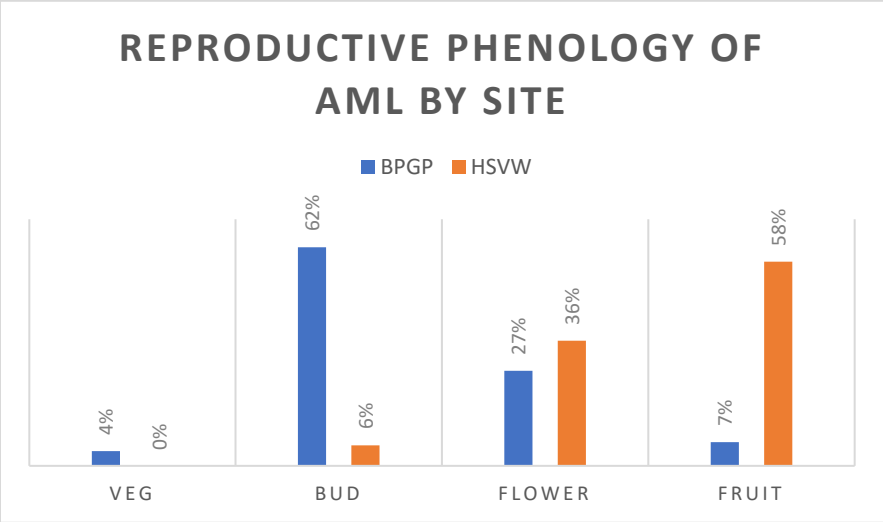

***Figure 3**. Reproductive phenology of Alkali Mariposa Lilies (AML) at the Bob Powers Gateway Preserve (BPGP) and Hot Springs Valley Wetlands (HSVW) sites during the week of May 20, 2023. Each AML plant was classified according to the most developed stage of reproductive structure present, listed in order of development: veg (no reproductive structure present), bud, flower, or fruit.*

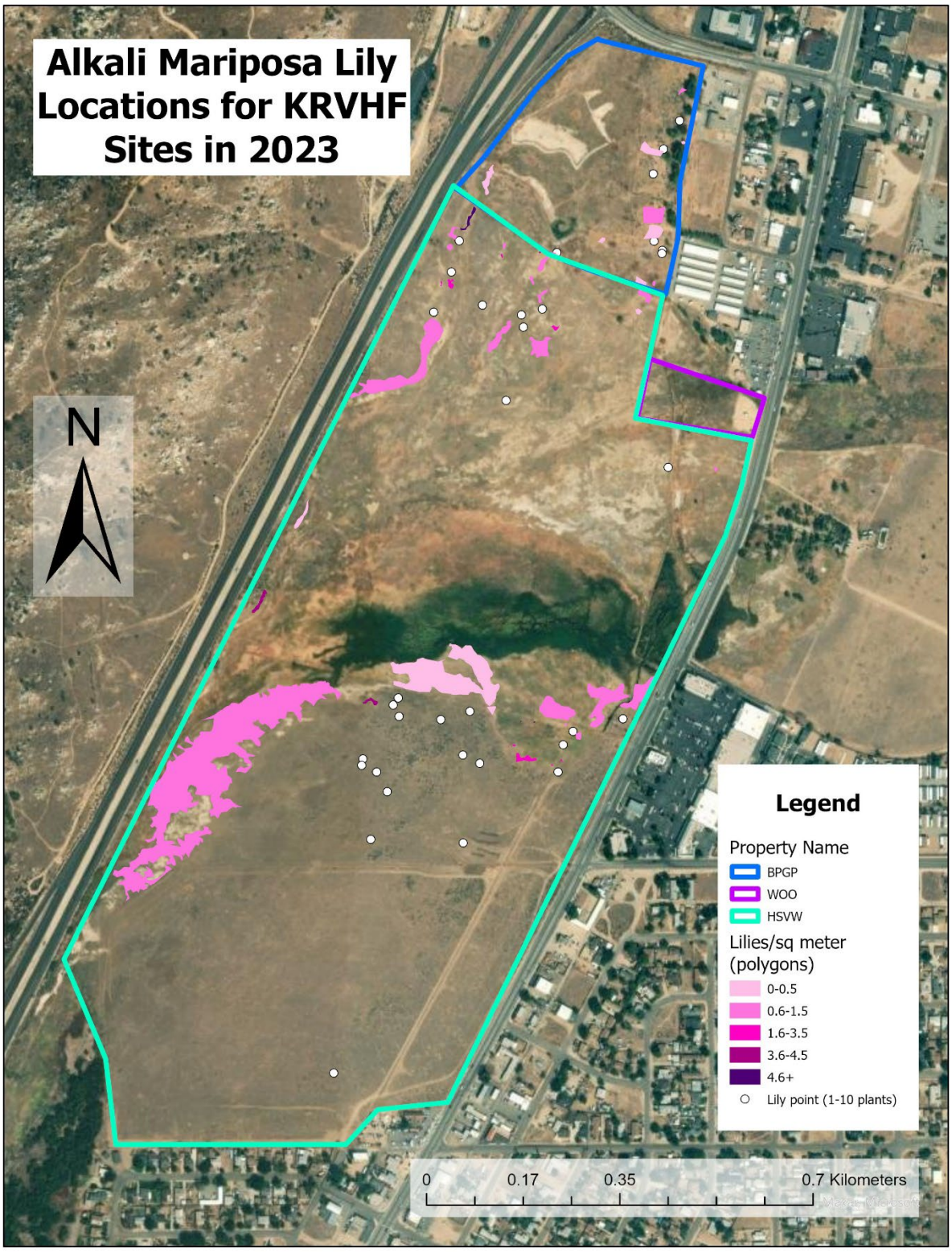

Figure 4. *Alkali Mariposa Lily locations and density on KRVHF properties in Lake Isabella, CA, during the week of May 20, 2023.*

Kern Red-winged Blackbirds

Kern Red-winged Blackbirds were detected on all 3 properties. We detected on average 48.6 (± SE 4.3) adult RWBL across 5 surveys of Heritage Foundation properties; of those 25.6 (± SE 2.5) were male and 23 (± SE 2.5) were female (Table 2, Figure 6). We estimate a minimum of 30 male RWBL territories within the study area (Table 3, Figure 7, Figure 8). A breeding territory was defined for this study as an area of habitat which a territorial male was detected at on at least 3 site visits, or where breeding evidence was documented within a male's territory.

Figure 5*. Red-winged Blackbird nest on the Hot Springs Valley Wetlands in 2023, detected incidentally during a blackbird survey. Nestlings pictured are approximately 9 days old based on feather development. The nest likely fledged, because surveyors found fledglings in the immediate vicinity during the next survey visit and the nest showed signs of fledging when it was checked opportunistically after the breeding season.*

Fledglings were observed in 9 territories, evidence of active nests (containing nestlings or eggs) were observed in another 5 territories, nest building in another 2 territories, and paired status in 13 other territories (Figure 8). We did not detect a female in only one territory (Figure 7), although there may have been additional territories not included in our totals if unpaired males shifted territory locations during the breeding season. Subadult males (determined by plumage) were not included in territory estimates because they rarely breed in their second summer (Yasukawa and Searcy 2020). Of the 29 paired territories, at least 34% were polygynous (Figure 7). Most of our detections of polygyny were of 2 females with one male, but one male territory on HSVW appeared to have 3 females (Figure 7).

Table 2. *Blackbird survey summary*

Visit #	Survey Date	Surveyor(s)	Count of Male RWBL	Count of Female RWBL	Count of TRBL
1	4/19/2023	Annie Meyer, Sasha Robinson	31	26	0
2	5/4/2023	Annie Meyer, Sasha Robinson	26	21	14
3	5/18/2023	Nidia Jaime, Lauren Roux	28	30	0
4	6/2/2023	Annie Meyer, Krista Tsui	16	18	0
5	6/15/2023	Lauren Roux	27	20	0

Table 3. *Count of Kern Red-winged Blackbird male breeding territories on KRVHF properties.*

Property Name	Count of Male RWBL Territories
Hot Springs Valley Wetland	23
Bob Powers Gateway Preserve	6
Woo	1
Total	**30**

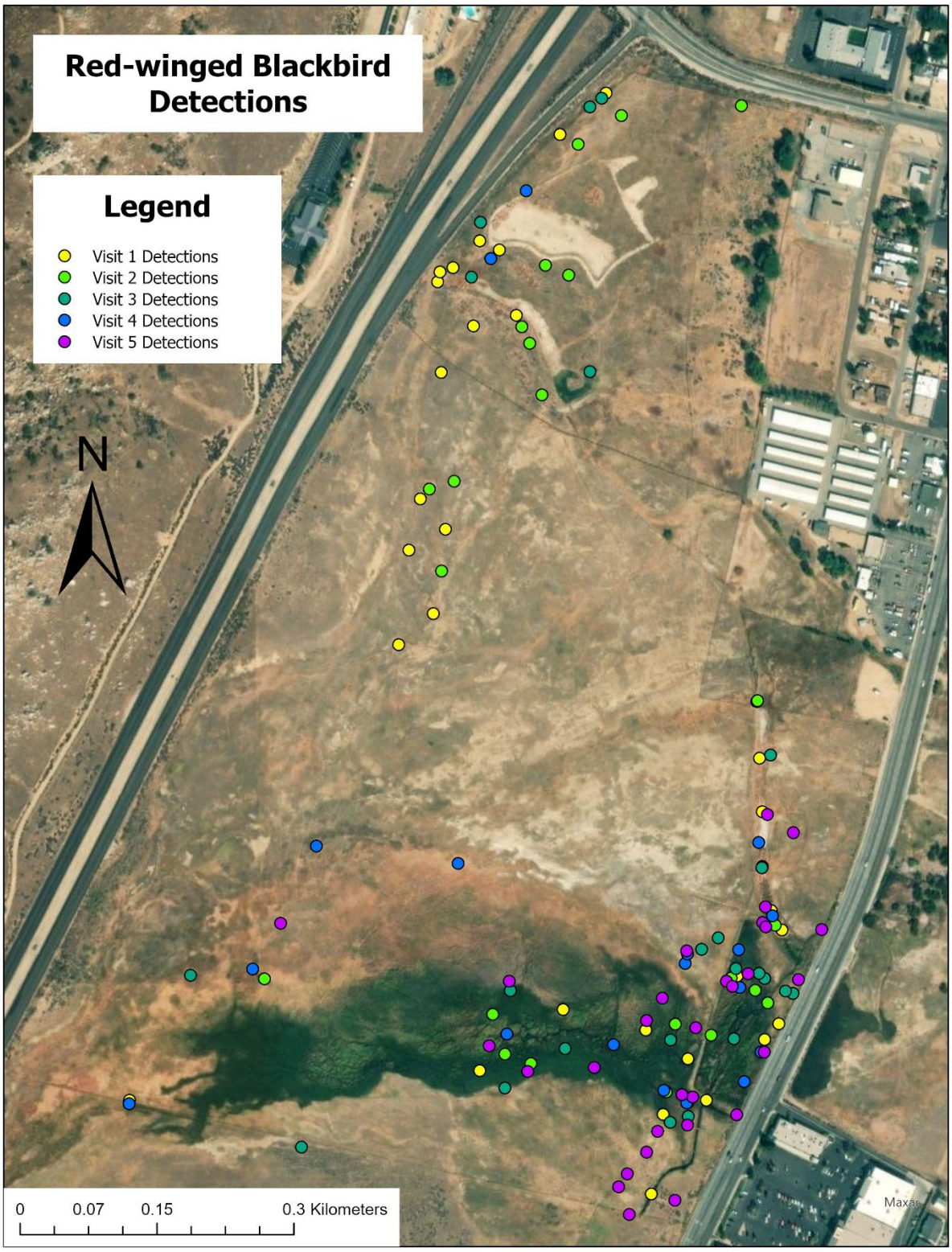

Figure 6. *Red-winged Blackbird survey detections for each visit, April-June 2023. Each point represents a territorial male.*

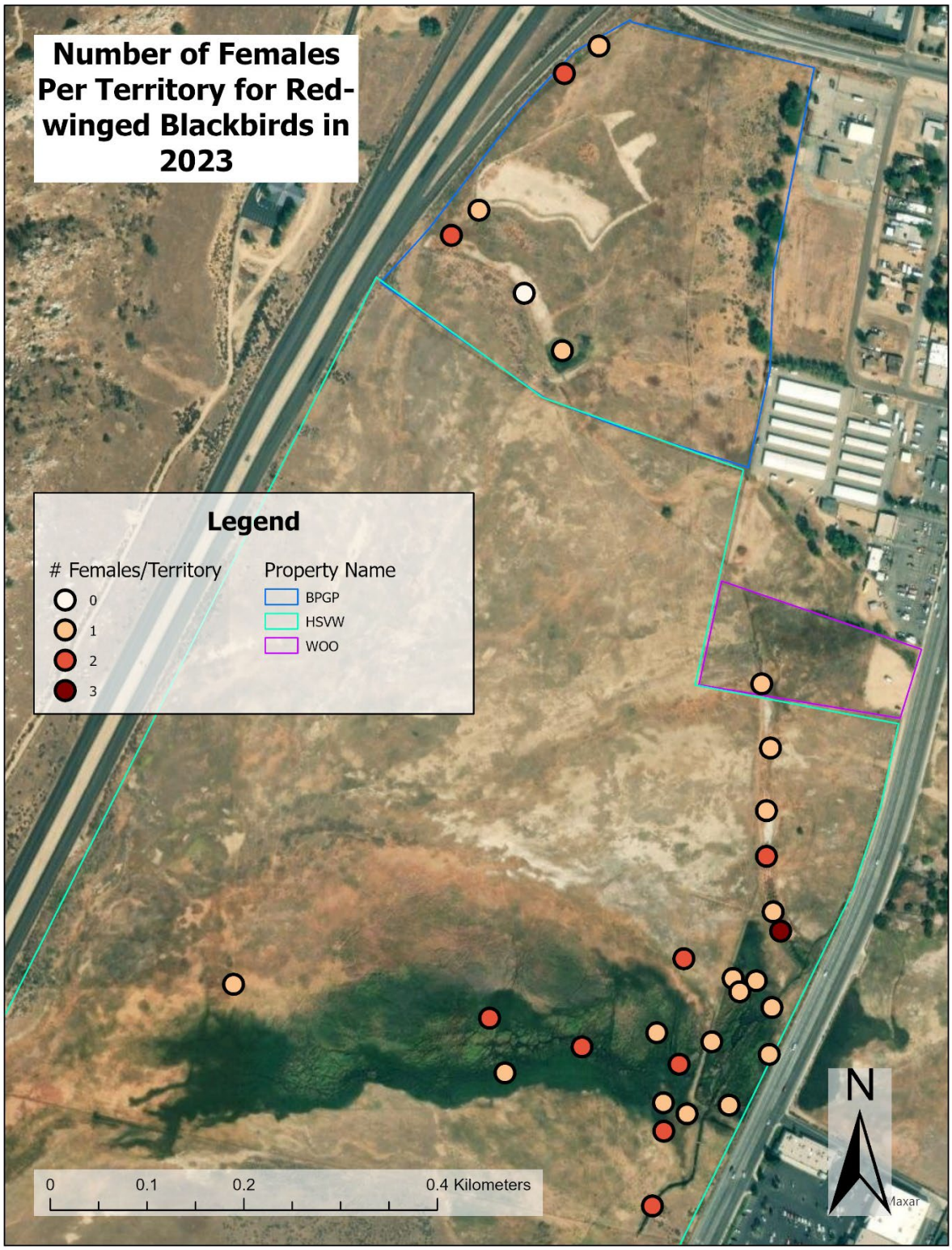

Figure 7*. Red-winged Blackbird estimated male territory locations and estimated number of females per territory on KRVHF properties April-June 2023.*

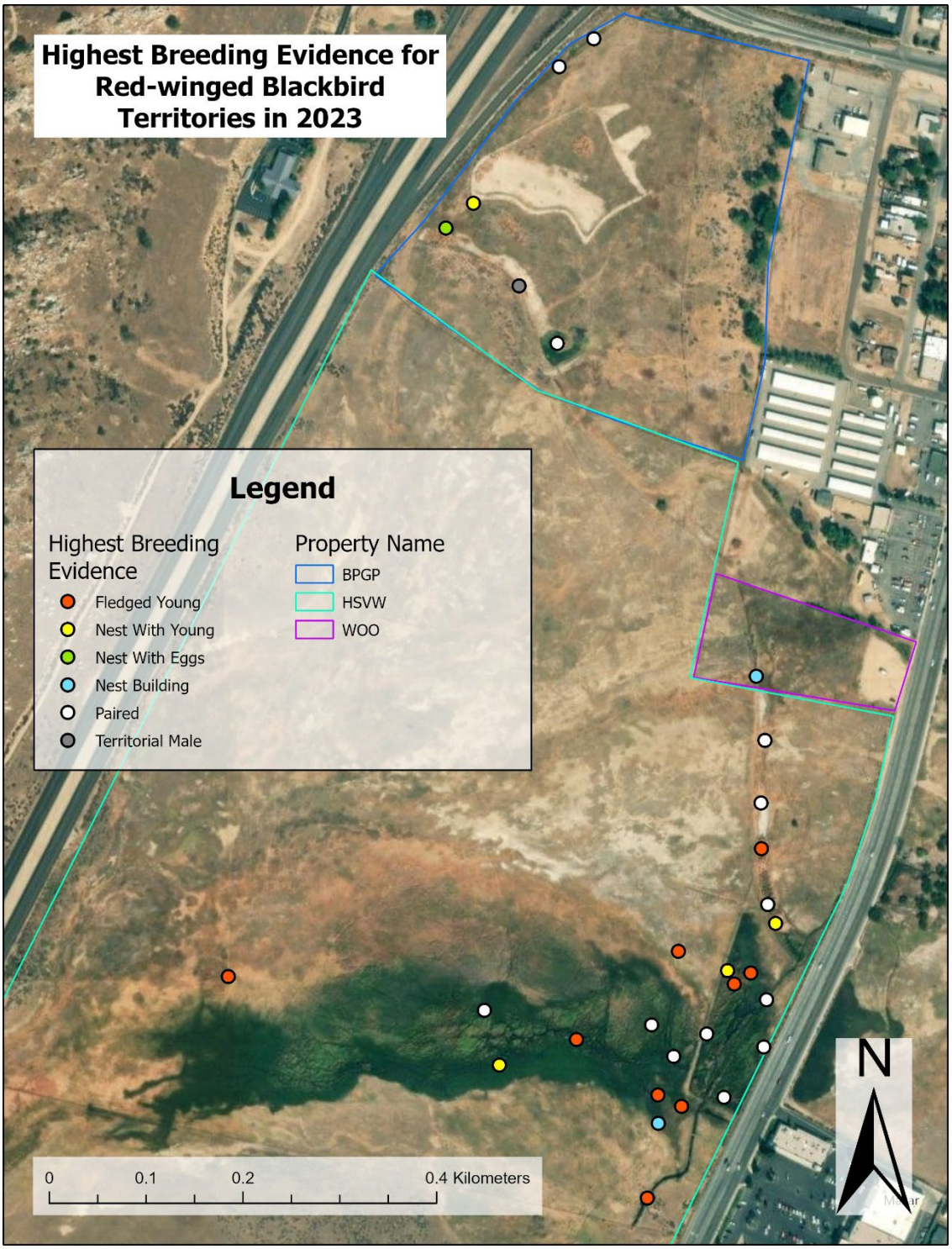

***Figure 8**. Highest evidence of breeding for each male Red-winged Blackbird territory from 5 survey visits in 2023.*

Tricolored Blackbirds

Tricolored Blackbirds did not appear to establish a breeding colony within the survey area in 2023. We detected TRBL on only one day of the surveys: May 4, 2023 (Table 2, Figure 9). On that date we observed an estimate of 14 birds, males and females, foraging in upland shrub (especially on Lepidoptera larvae in *Ericameria nauseosa* shrubs*)* and wetland habitats on the property for about 30 minutes. The birds then flew north of the town of Lake Isabella and disappeared over the dam. We did not observe TRBL on the Woo property at any time.

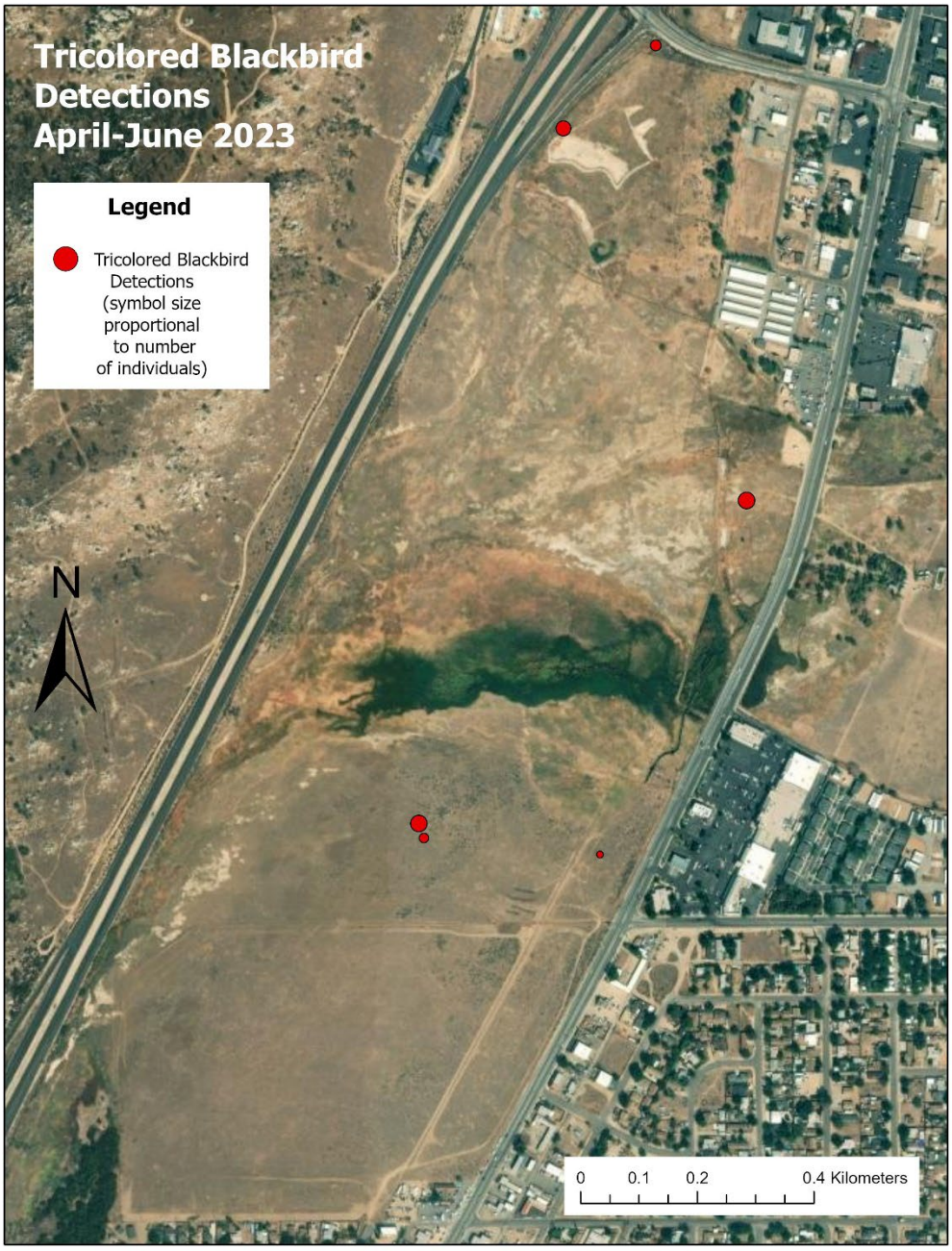

Figure 9. *Tricolored Blackbird detections April-June 2023. All detections occurred on May 4, 2023. Each point represents 1 (minimum) to 8 (maximum) individuals.*

Discussion

Alkali Mariposa Lilies

Our survey in 2023 shows a significant increase in the total count of Alkali Mariposa Lily plants on the Hot Springs Valley Wetland site, but a slight decrease for Bob Powers Gateway Preserve compared to the 2016 survey. This enormous increase in the population estimate may be due to increased survey effort, as our field team needed 12 surveyor days to accurately count lilies for the entire study area (previously surveyed in 4-6 surveyor days). The increase could also have been a real change resulting from the extremely high levels of precipitation in Lake Isabella in January through March 2023. Overall, the population of AML seems to be increasing over time at the KRVHF properties in Lake Isabella (Figure 10). At the newly acquired Woo Property we detected no Alkali Mariposa Lilies; the nearest lily to this property was 55 meters away on the Hot Springs Valley Wetlands site.

Previous survey efforts have examined lily occurrence on the Bob Powers Gateway Preserve within subplots (Miller and McCormick 2016, McCormick and Pryor 2015, Sheehey and Gillentine 2011), and these are valuable for comparing fine-scale relative lily abundance and reproductive measurements. We compared our results using the most recent subplot divisions as per surveys in 2015-16. Overall, in 2023 we recorded less than half as many lily plants within subplots as were detected in 2016, but slightly more than in 2015 (Table 4). This, like our overall survey data, suggests a large amount of variation in lily estimates from year to year, due to either observer bias, timing of the survey relative to reproductive phenology (affecting lily detectability), or to environmental factors causing large swings in the lily population. In 2023, 87% of reproductive structures within these subplots were in bud, 12% were flowering and 1% were fruiting (n=3899) (Table 4). In 2016 (n=10262) and 2015 (n=3513), respectively, 32% and 45% of reproductive structures were in bud, 31% and 30% were flowers, and 38% and 25% were fruiting (Miller and McCormick 2016, McCormick and Pryor 2015). From this, it appears that the 2023 survey was conducted at an earlier phenological stage on Bob Powers Gateway Preserve than in 2015 and 2016. Additionally, the Bob Powers Gateway Preserve was at an earlier phenological stage than the Hot Springs Valley Wetlands site in the survey period in 2023 (Figure 3). Since not all reproductive structures are equally visible, with buds likely being the least visible to surveyors and flowers the most visible, the timing of the survey relative to site-specific phenology is important to standardize between years. We recommend several test surveys leading up to the lily survey each year to schedule the survey date for each property during peak flowering.

We recommend continued surveys of Alkali Mariposa Lilies to document the population trend over time. Lily occurrence on the landscape had a patchy distribution (Figure 4), and as such any extrapolation of the results from sampling subplots within the study area should take into account the fine-scale habitat requirements of the species.

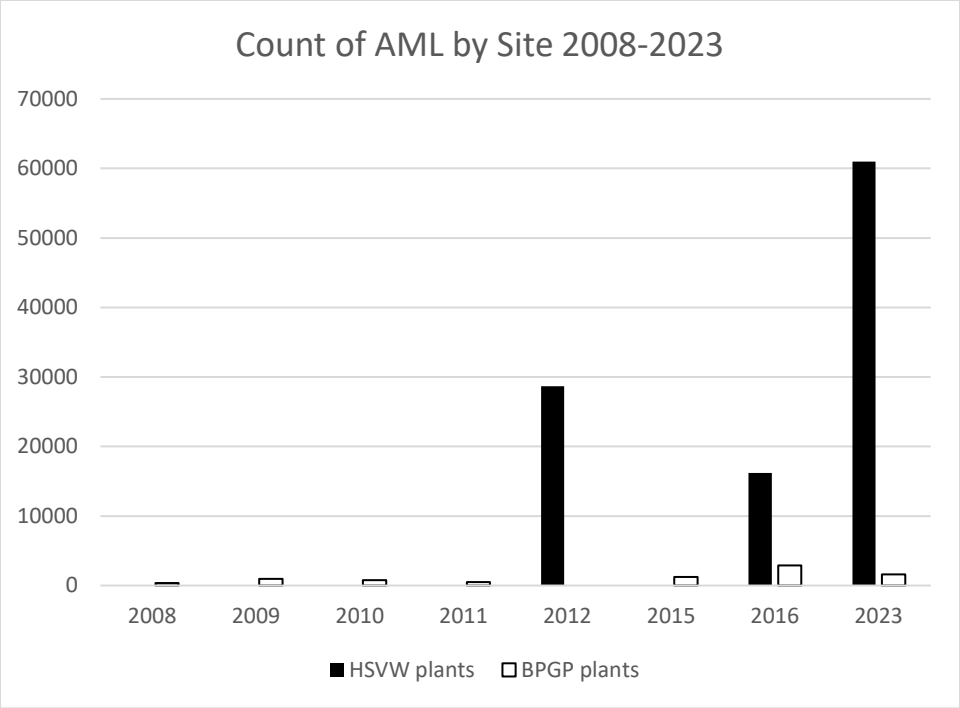

***Figure 10**. Count of Alkali Mariposa Lily plants for Hot Springs Valley Wetlands (HSVW) and Bob Powers Gateway Preserve (BPGP) from past and present reports. HSVW data is only available for 2012, 2016 and 2023.*

Subplot	Count of AML			# Buds	# Flowers	# Fruit
	2023	2016*	2015**			
1A	45	164	1	70	20	1
1B	40	19	117	196	9	0
2A	446	1189	252	1318	196	19
2B	464	705	87	1366	200	19
3A	1	88	17	0	1	0
3B	0	0	0	0	0	0
4A	67	131	171	186	10	1
4B	8	14	2	30	10	15
5A	0	84	54	0	0	0
5B	64	9	16	226	6	0
6A	0	155	231	0	0	0
6B	0	0	7	0	0	0
TOTAL IN BPGP SUBPLOTS	**1135**	**2558**	**955**	**3392**	**452**	**55**

***Table 4**. Count of Alkali Mariposa Lily (AML) plants in 2023, 2016, and 2015 and counts of buds, flowers and fruit in 2023 in each subplot on the Bob Powers Gateway Preserve. *2016 data from Miller and McCormick (2016). **2015 data from McCormick and Pryor (2015).*

Blackbirds

Kern Red-winged Blackbirds

Due to the secretive nature of female Red-winged Blackbirds during the breeding season, polygyny rates (and thus the number of females using the study area) presented in this document should be treated as a conservative estimate. Due to time constraints, we were not able to spend enough survey hours to give precise estimates of females; despite this, in most cases observers recorded the same number of females per territory across multiple survey visits. We found a male to female sex ratio of 0.75:1 in the population of RWBL at Heritage Foundation properties surveyed for the 2023 breeding season, which is higher than the typical reported sex ratio for the species at one year of age of 0.9:1 (Weatherhead and Teather 1991). This difference in sex ratios likely reflect unpaired, non-territorial males which we did not detect rather than actual differences in the population demographics.

One area in the northwest corner of the Hot Springs Valley Wetlands property appeared to have several territorial, paired males in the first 2 survey visits, including even polygyny, but these birds were subsequently not detected again. We did not include these birds in our territory estimates, because they did not meet our threshold of three survey detections and may have settled and been counted elsewhere in the property later in the season. We did not observe breeding evidence beyond paired status for these birds. The habitat on the first 2 survey visits was mixed grass (Poaceae) and rushes (Juncaceae) with prominent, short new growth of Curled Dock (*Rumex crispus*) and shallow water or damp soil underneath. During later visits the Curled Dock was taller than the surrounding vegetation and may have provided nesting substrates, but the water was no longer present. The natural disappearance of water as the summer progressed corresponded with the disappearance of RWBL from the patch. RWBL territories persisted through June in areas near standing water.

Tricolored Blackbirds

Our results suggest that Tricolored Blackbirds did not breed within the study area, but we recorded a group of adult males and females using wetland and upland habitat on site for an extended foraging trip. Tricolored Blackbirds are nomadic and tend to alternate breeding colony locations from year to year (Beedy et al. 2023), so the lack of a breeding colony on KRVHF properties in Lake Isabella does not necessarily mean that the habitat was unsuitable for breeding. The presence of foraging adults during the breeding season does point to these properties being valuable as native foraging habitat for Tricolored Blackbirds in the Kern River Valley.

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Appendix A: Bird, mammal, herpetofauna, insect and plant species detected incidentally during surveys on WOO, BPGP and HSVW Properties.

*Bird Species Detected (*non-native species)*

Common Name	Scientific Name	Breeding Status
Canada Goose	*Branta canadensis*	Migrant
Cinnamon Teal	*Spatula cyanoptera*	Breeding, pairs detected at BPGP & HSVW
Mallard	*Anas platyrhynchos*	Breeding, nest found on WOO
Green-winged Teal	*Anas crecca*	Migrant
Ruddy Duck	*Oxyura jamaicensis*	Migrant
Mourning Dove	*Zenaida macroura*	Possible breeder, pair detected at BPGP
Rock Pigeon*	*Columba livia*	No breeding evidence observed on site
Eurasian Collared-Dove*	*Streptopelia decaocto*	No breeding evidence observed on site
White-throated Swift	*Aeronautes saxatalis*	Frequently found foraging over BPGP
Anna's Hummingbird	*Calypte anna*	No breeding evidence observed on site
Sora	*Porzana carolina*	Likely breeding, often heard singing at HSVW
Virginia Rail	*Rallus limicola*	Breeding, dependent young found on HSVW
American Coot	*Fulica americana*	Breeding, dependent young found on HSVW
Killdeer	*Charadrius vociferus*	Likely breeding, pairs detected on BPGP & HSVW
Least Sandpiper	*Calidris minutilla*	Migrant
Wilson's Snipe	*Gallinago delicata*	Winter resident/migrant
California Gull	*Larus californicus*	Winter resident/migrant
White-faced Ibis	*Plegadis chihi*	Migrant
Snowy Egret	*Egretta thula*	Migrant
Great Blue Heron	*Ardea herodias*	No breeding evidence observed on site
Cooper's Hawk	*Accipiter cooperii*	No breeding evidence observed on site
Red-shouldered Hawk	*Buteo lineatus*	No breeding evidence observed on site
Red-tailed Hawk	*Buteo jamaicensis*	No breeding evidence observed on site
Prairie Falcon	*Falco mexicanus*	No breeding evidence observed on site
Nuttall's Woodpecker	*Dryobates nuttallii*	No breeding evidence observed on site
Say's Phoebe	*Sayornis saya*	Likely breeding, singing on BPGP & HSVW during multiple visits
Black Phoebe	*Sayornis nigricans*	No breeding evidence observed on site
Ash-throated Flycatcher	*Myiarchus cinerascens*	No breeding evidence observed on site
Western Kingbird	*Tyrannus verticalis*	No breeding evidence observed on site
California Scrub-Jay	*Aphelocoma californica*	No breeding evidence observed on site
American Crow	*Corvus brachyrhynchos*	No breeding evidence observed on site
Common Raven	*Corvus corax*	No breeding evidence observed on site, but frequently observed pairs foraging on HSVW

Appendix A. Continued

Common Name	Scientific Name	Breeding Status
Violet-green Swallow	*Tachycineta thalassina*	No breeding evidence observed on site
Tree Swallow	*Tachycineta bicolor*	No breeding evidence observed on site
Cliff Swallow	*Petrochelidon pyrrhonota*	Breeding in culvert just north of BPGP
Marsh Wren	*Cistothorus palustris*	Winter resident
European Starling*	*Sturnus vulgaris*	No breeding evidence observed on site
House Sparrow*	*Passer domesticus*	No breeding evidence observed on site
American Pipit	*Anthus rubescens*	Winter resident/migrant
House Finch	*Haemorhous mexicanus*	Likely breeding, singing birds detected on site throughout season
Lawrence's Goldfinch	*Spinus lawrencei*	No breeding evidence observed on site
Red Crossbill	*Loxia curvirostra*	No breeding evidence observed on site
Brewer's Sparrow	*Spizella breweri*	Migrant
White-crowned Sparrow	*Zonotrichia leucophrys*	Winter resident
Savannah Sparrow	*Passerculus sandwichensis*	Likely breeding on site, heard singing throughout season and detected pairs
Lincoln's Sparrow	*Melospiza lincolnii*	Winter resident/migrant
Song Sparrow	*Melospiza melodia*	Possible breeder, detected just off site singing on multiple visits
Bullock's Oriole	*Icterus bullockii*	No breeding evidence observed on site
Brewer's Blackbird	*Euphagus cyanocephalus*	No breeding evidence observed on site
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	Migrant
Western Meadowlark	*Sturnella neglecta*	Likely breeding on site, detected multiple singing birds on HSVW & WOO throughout season
Brown-headed Cowbird*	*Molothrus ater*	No breeding evidence observed on site
Red-winged Blackbird	*Agelaius phoeniceus*	Confirmed breeding at WOO, HSVW & BPGP, nests found at all 3 sites
Tricolored Blackbird	*Agelaius tricolor*	Did not breed on site
Great-tailed Grackle	*Quiscalus mexicanus*	Collecting nesting material on site, although nest construction was off site
Common Yellowthroat	*Geothlypis trichas*	Breeding on site, adults carrying food
Yellow Warbler	*Setophaga petechia*	No breeding evidence observed on site
Yellow-rumped Warbler	*Setophaga coronata*	Migrant
Wilson's Warbler	*Cardellina pusilla*	Migrant
Western Tanager	*Piranga ludoviciana*	Migrant
Blue Grosbeak	*Passerina caerulea*	Likely breeding on BPGP, detected singing bird throughout season
Lazuli Bunting	*Passerina amoena*	No breeding evidence observed on site

Mammal Species Detected

Common Name	Latin Name
Domestic Dog	*Canus lupus domesticus*
Desert Cottontail	*Sylvilagus audubonii*
California Ground Squirrel	*Otospermophilus beecheyi*

Herpetofauna Species Detected

Common Name	Latin Name
Common Side-blotched Lizard	*Uta stansburniana*
Gilbert's Skink	*Plestiodon gilberti*
Western Fence Lizard	*Sceloporus occidentalis*
Baja California Tree Frog	*Pseudacris hypochondriaca*
Western Toad	*Anaxyrus boreas*

Insect Species Detected

Common Name	Latin Name
White-lined Sphynx	*Hyles lineata*
Painted Lady	*Vanessa cardui*
White Checkered-skipper	*Burnsius albezens*
Sachem	*Atalopedes campestris*
Acmon Blue	*Icaricia acmon*
Sandhill Skipper	*Polites sabuleti*
Western Forktail	*Ischnura perparva*
Black-fronted Forktail	*Ischnura denticolli*
Flame Skimmer	*Libellula saturata*
Paiute Dancer	*Argia alberta*
Yellow-faced Bumble Bee	*Bombus vosnesenskii*
Obscure Grasshopper	*Opeia obscura*
n/a	*Chimarocephala californica*

Plant Species Detected

Common Name	Latin Name
Menzies' fiddleneck	*Amsinckia menziesii*
Purple Owl's Clover	*Castilleja exserta*
Miniature Lupine	*Lupinus bicolor*
California Goldfields	*Lasthenia californica*
Curled Dock	*Rumex crispus*
Saltgrass	*Distichlis spicata*
Cattail sp.	*Typha sp.*
Sedge sp.	*Carex sp.*
Rush sp.	*Juncus sp.*

Appendix A continued

Common Name	Latin Name
Silverpuffs	*Uropappus lindleyi*
Small Melilot	*Melilotus indicus*
Rubber Rabbitbush	*Ericameria nauseosa*
Stinging Nettle	*Urtica dioica*
Alkali Mariposa Lily	*Calochortus striatus*
Rough Cocklebur	*Xanthium strumarium*
Narrowleaf Milkweed	*Asclepias fascicularis*
Sacred Datura	*Datura wrightii*
Yerba Mansa	*Anemopsis californica*
Foxtail Barley	*Hordeum jubatum*
Restem Stork's Bill	*Erodium cicutarium*
Tree Cholla	*Cylindropuntia imbricata*
Big Saltbush	*Atriplex lentiformis*
Biscuitroot sp.	*Lomatium sp*
Chaparral Yucca	*Hesperoyucca whipplei*
Brownplume Wirelettuce	*Stephanomeria pauciflora*
California Broomsage	*Lepidospartum squamatum*
Shortpod Mustard	*Hirschfeldia incana*
Birds-foot trefoil	*Lotus corniculatus*
Water Parsnip	*Berula erecta*
Common Spikeweed	*Centromadia pungens*
Primrose sp.	*Oenothera sp.*
Boraxweed	*Nitrophila occidentalis*
White Fiesta Flower	*Pholistoma membranaceum*
Seep Monkeyflower	*Erythranthe guttata*
Rabbitfoot Grass	*Polypogon monspeliensis*
Southern Checkerbloom	*Sidalcea sparsifolia*
American Three-square Bullrush	*Schoenoplectus americanus*
Sierra Mousetail	*Ivesia santolinoides*
Horseweed	*Erigeron canadensis*
Clasping Pepperweed	*Lepidium perfoliatum*
Rusty Popcornflower	*Plagiobothrys nothofulvus*
Arrowgrass sp.	*Triglochin sp*