Wildcat Canyon Breeding Bird Survey

An assessment of breeding birds for the EBRPD Wildcat Canyon Regional Park Bike Trail Project

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Golden Gate Bird Alliance

Funded by SPRWLDF

Report prepared and survey conducted by Fen Conway, fen.conway@gmail.com

Golden Gate Bird Alliance Contact: Whitney Grover, wgrover@goldengatebirds.org

Introduction

With the increasing popularity of outdoor recreation and mountain biking in the Bay Area, many East Bay Regional Park District (EBRPD) trails have experienced adverse effects of overcrowding. The mountain biking community has also expressed frustration, as they are only permitted to ride on 3 miles of single-track trails within Wildcat and Tilden Regional Parks (EBRPD 2024). This ultimately results in degradation of multi-use trails, resource damage from bootleg trails, and potentially unsafe interactions between bikers and pedestrian/equestrian users.

EBRPD's Wildcat Canyon Regional Park Bike Trail Project aims to increase mountain bike access in Wildcat Regional Park while taking into consideration impacts to wetland, plant, and animal communities. The proposed flow trail roughly adheres to the existing Mezue Trail in the northwest part of the park, and would include the construction of a graded trail with features specially designed and designated for mountain biking (EBRPD 2024). Preliminary biological surveys assessed the vegetative composition and wetland delineation in the project area, however they did not assess the composition of avian communities in the project area or adjacent habitat. A literature review of 69 papers found that recreational use of trails, such as mountain biking, can negatively impact the physiology, behavior, abundance and reproductive success of birds in a variety of habitat types (Steven et al. 2011). Another study of breeding birds in both forested and prairie habitat found that species composition, nest success, and rates of nest predation are affected by the presence of recreational trails (Miller et al. 1998). Therefore, it is important to assess and take into consideration the presence of breeding birds in Wildcat Canyon, as many species could be impacted by the Bike Trail Project.

The Wildcat Canyon Breeding Bird Survey was designed to assess the abundance, species richness, diversity, and breeding status of birds within the proposed project area and adjacent trails, as well as the presence/breeding status of California Species of Special Concern. In particular, Havey Creek, which flows alongside the Havey Canyon Trail, was identified by Golden Gate Bird Alliance as potentially important breeding habitat for riparian-associated bird species; Grasshopper Sparrow (GRSP), a CDFW Bird Species of Special Concern, have been known to utilize the grasslands encompassing Mezue Trail, Leonard's Trail, and the easternmost portion of Havey Canyon Trail. This survey provides deeper insight into the avian communities and sensitive bird species that depend on the habitats found in Wildcat Canyon Regional Park, and can be used to inform stakeholders involved with the Wildcat Canyon Regional Park Bike Trail Project when making land-management decisions.

Survey Area

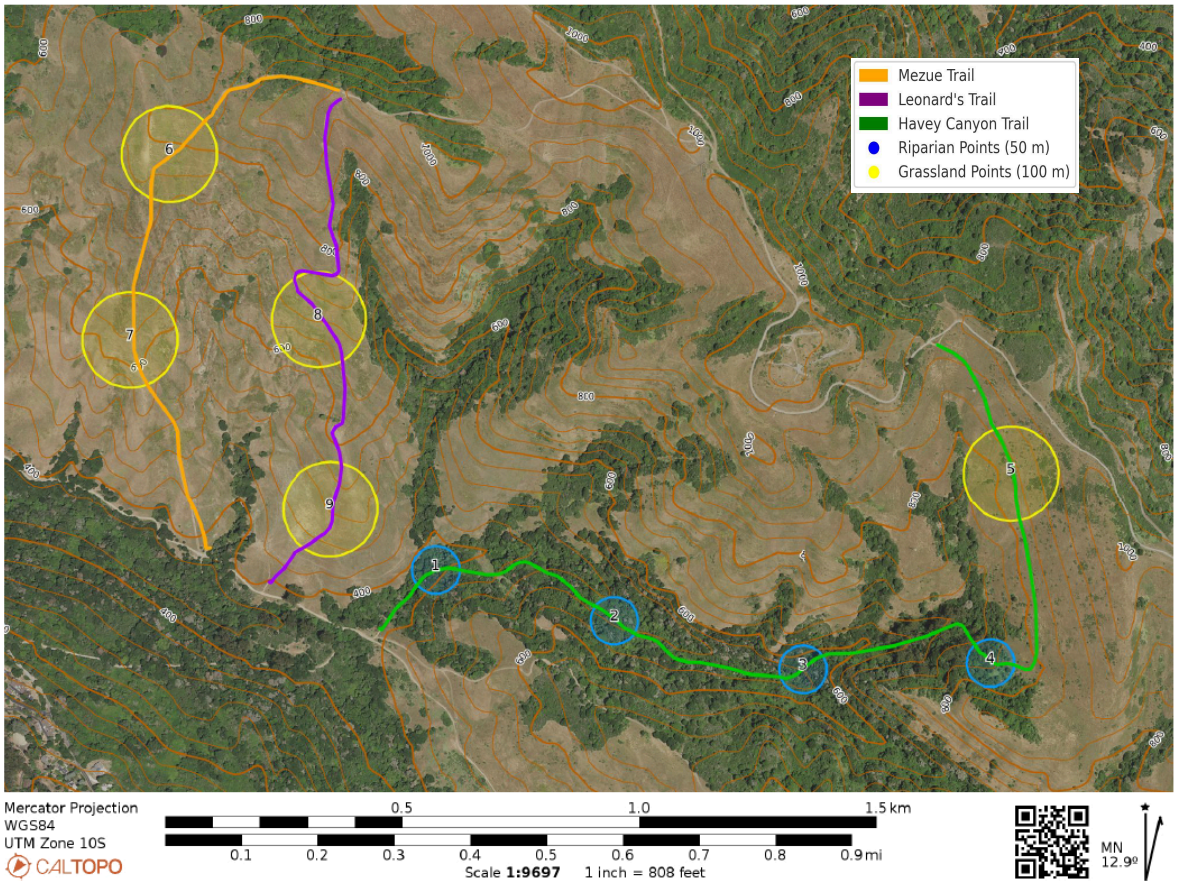
The survey area (Figure 1) encompasses nine points: four of which are located in closed riparian habitat along the Havey Canyon Trail (points 1-4), and five of which are located in predominantly open grassland habitat along the easternmost portion of Havey Canyon Trail, Mezue Trail, and Leonard's Trail (points 5-9).

A mixture of native California flora and non-native flora are found within Havey Canyon (points 1-4). The understory primarily consists of California blackberry, poison oak, coyote brush, snowberry, blue elderberry, California hazelnut, coffeeberry, thimbleberry, and ferns. The overstory includes red alder,

willows, big-leaf maple, madrone, California buckeye, and coast live oak. Non-native tree and shrub species, such as eucalyptus, Himalayan blackberry, and English ivy, dominate in patches within the easternmost end of the canyon. Havey Creek is a perennial tributary of Wildcat Creek, and provides cool, protected habitat for birds and other animals throughout the year. Early in the spring, Havey Creek has significant flow, but as summer progresses, the creek slows to small trickles and sluggish pools.

The easternmost portion of Havey Canyon Trail, Leonard's Trail, and Mezue Trail (points 5-9) cut across open grassland habitat and are dominated mostly by non-native grasses, thistle, and fennel, with patches of native coyote brush and scattered coast live oaks. In wetter years, a seep flows between Leonard's Trail and Mezue trail in the early spring, providing habitat for a different subset of birds than later in the season as the groundwater dwindles. These grasslands are multi-use, working lands. Small cattle herds graze and meander their way across the open slopes as hikers, bikers, and horseback riders enjoy the trails.

Figure 1 Wildcat Canyon Breeding Bird Survey point count stations



Survey Materials and Methods

The Wildcat Canyon Breeding Bird Survey is a point-count survey with nine designated survey points, each spaced 400 meters apart. The survey is conducted twice per month during the breeding season, April through July. Each of the nine points are surveyed for 10 minutes per visit. The starting location for each survey date is chosen by a random number generator, with all starting points unrepeated, and then the points are visited in numerical order starting with the randomly chosen point first.

The survey starts between 10 minutes before to 20 minutes after local sunrise, and is completed within 3.5 hours of local sunrise. If more than two points are missed due to poor conditions or other factors, the survey must be made up. Surveys will be rescheduled, ended early, or paused and restarted if the conditions are poor; poor conditions are defined as wind >5 on the Beaufort Scale or any precipitation more than a light drizzle.

The surveyor stands at each point for 10 minutes and records the start time and all birds observed, to infinite distance. Binoculars are used for visual observation and identification. The four letter American Ornithological Society banding code is used to designate the species. Each individual bird observed is accompanied by one letter based on how the bird is observed: by song (S), visual (V), or call (C). If the bird is observed in multiple ways (e.g. seen and heard) then they are marked by priority of S, V, and lastly C. For example, if an individual bird is first seen, and marked "V" but then observed singing, "V" would be corrected to "S".

The surveyor records if there are two or more birds acting as a flock or if the bird is observed as a flyover. The surveyor does their best to not double count individual birds, within a point or between points. If the same bird is detected from multiple points, the surveyor denotes "No" or "Yes" in the "Nearest Obs?" section of the point-count form. In addition, the distance of the bird to the nearest 5 meters should be recorded. The observer calibrates their distance estimates at each point using a rangefinder.

If a bird displays one or more of these behaviors in addition to the S/V/C code, the corresponding codes are recorded:

Behavior	Code	Description	Breeding Behavior Designation
Song/Visual/Call	**S/V/C**	Bird observed visually or aurally by song/call in suitable breeding habitat	Possible
Foraging	**F**	Bird observed actively searching for food or consuming food in suitable breeding habitat	Possible
Copulation	**C**	Copulation observed	Probable
Display	**D**	Breeding display observed	Probable
Pair	**P**	Two birds believed to be a mated pair observed, showing pair bonding behavior or courtship displays	Probable
Carry Material	**CM**	Bird observed carrying nesting material	Confirmed
Carry Food	**CF**	Bird observed carrying food to a nearby nest	Confirmed
Nest	**N**	Active nest found	Confirmed
Fledgling	**FL**	Dependant fledgling being fed by adults, begging, and/or with fledgling-length tail observed	Confirmed

In addition to collecting point-count data, the observer records local weather conditions (temperature, wind, and cloud cover), number of points completed per visit, and opportunistic observations of CDFW California Bird Species of Special Concern and breeding evidence. Local temperature is obtained from GPS pin-pointed location using The Weather Channel data. From the start time of the first point to the end time of the last point, observations of Species of Special Concern are recorded regardless if the observer is point-counting or between points. The observer also records any observations of confirmed breeding behavior between points and uses these observations to confirm breeding status for a species.

Analysis

Point Count Data The avian community indices calculated from the point count data were species presence, species richness, abundance, and species diversity. These community indices were averaged by point over the course of two years of surveys, from 2024 to 2025. *Species richness* is the number of species detected at a point. *Abundance* is the density, or number of individual birds detected at a point per hectare. *Species diversity* measures the avian diversity of each point or habitat by weighing the proportional abundance of each species detected, with a higher number indicating a higher diversity of bird species per hectare. To allow for comparison across sites and increase interpretability, species diversity was calculated using a MacArthur-transformed Shannon Index (MacArthur 1965). The score can be understood as the "effective number of species" per unit area. For example, an area with an index of 5 can be interpreted as supporting 5 equally abundant species. In the equation below, the Shannon Index is represented by H' where S is the total number of species, p_i is the proportion of individuals belonging to a species, and ln is the natural log. The MacArthur transformation is represented by N_1.

$$H' = -\sum_{i=1}^{S} p_i \ln(p_i) \qquad N_1 = \exp(H')$$

There were two broad categories of habitat type within the survey area: riparian habitat (points 1-4) with more enclosed, stratified vegetation, and grassland habitat (points 5-9) with open vegetation. This contrast in vegetation composition had a significant impact on the detectability of birds (Figure 2). In

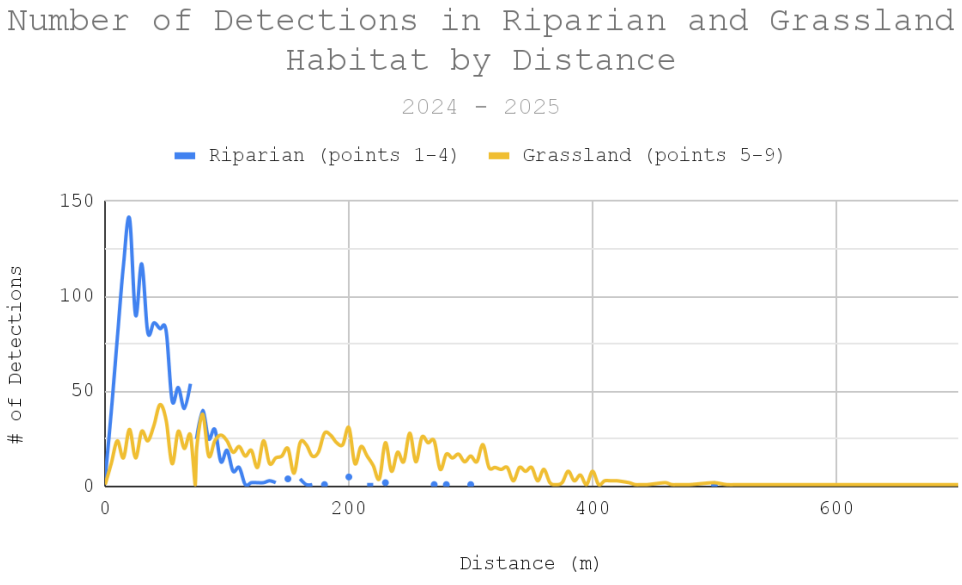


Figure 2 Number of detections by habitat type and distance

riparian habitat, the majority of detections were within 50 meters of the survey point, whereas in the grassland habitat, birds could be detected by sight and sound from much further distances. To mitigate detection variance between the two habitat types, only detections ≤ 50 meters in riparian habitat and ≤ 100 meters in grassland habitat were included in the analysis (Figure 1).

Grasshopper Sparrow Distribution Grasshopper Sparrow abundance was only calculated using point count data, however opportunistic observations of GRSP were used to create a map of detections from 2024 through 2025. This map (Appendix B) offers a rough idea of GRSP distribution.

Opportunistic Observations of Breeding Activity Any opportunistic observations of breeding activity between survey points were used to confirm breeding status for a species, however they were not used for analysis of avian community indices.

Results

Species Presence and Species Richness Over two seasons of surveys, from 2024 to 2025, a total of 82 bird species were recorded from 2,705 detections (Appendix A). In the riparian habitat (points 1-4), a total of 57 species were detected with an average of 38 species per point. In the grassland habitat (points 5-9), a total of 50 species were detected with an average of 24 species per point. The riparian habitat within Havey Canyon exhibited a higher average species richness than the grassland habitat (Figure 3), however there were a number of unique grassland-associated species observed within the Bike Trail Project area that were not detected, or were detected at significantly lower rates, within the riparian habitat including Western Meadowlark, Western Bluebird, Red-winged Blackbird, Ash-throated Flycatcher, and Grasshopper Sparrow. Five species were only opportunistically detected between survey points, including Blue-gray Gnatcatcher, Lawrence's Goldfinch, White-tailed Kite, Great Blue Heron and Double-crested Cormorant.

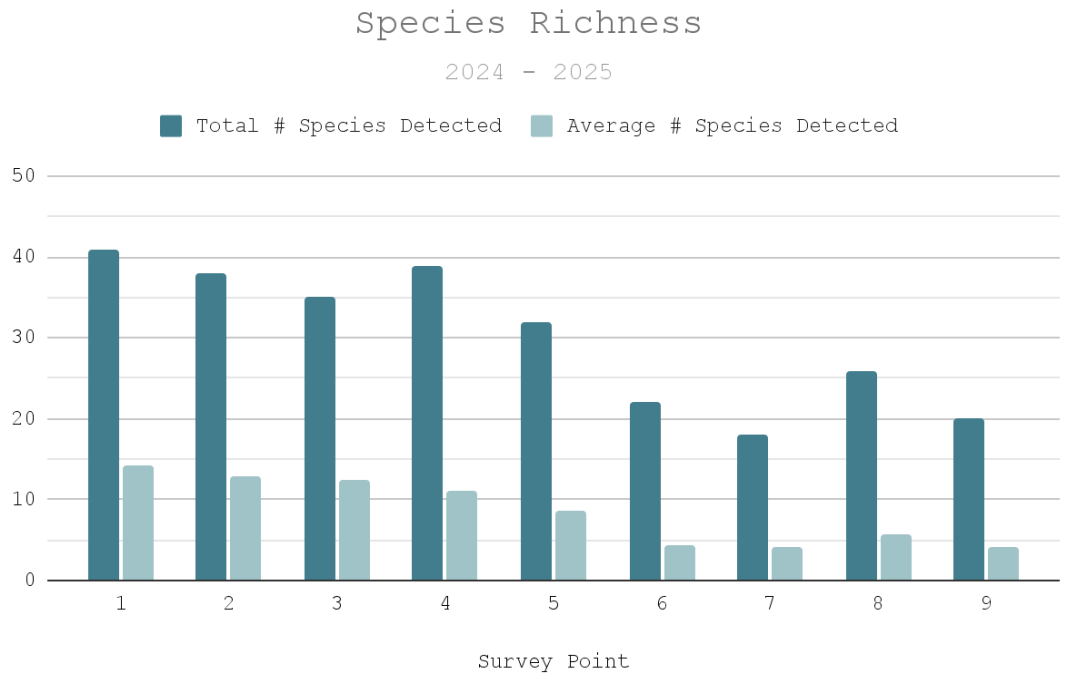


Figure 3 Total and average species richness by point

Bird Abundance The average total bird abundance, or density, in riparian habitat (points 1-4) was 22.5 birds per hectare (Figure 4) with Spotted Towhee, Chestnut-backed Chickadee, Wilson's Warbler, Bewick's Wren, and Dark-eyed Junco being the most abundant species (Figure 5). In grassland habitat (points 5-9), the average total abundance was 2.8 birds per hectare (Figure 4), with Grasshopper Sparrow, Lesser Goldfinch, Lazuli Bunting, Anna's Hummingbird, and Western Meadowlark being the most abundant species (Figure 6).

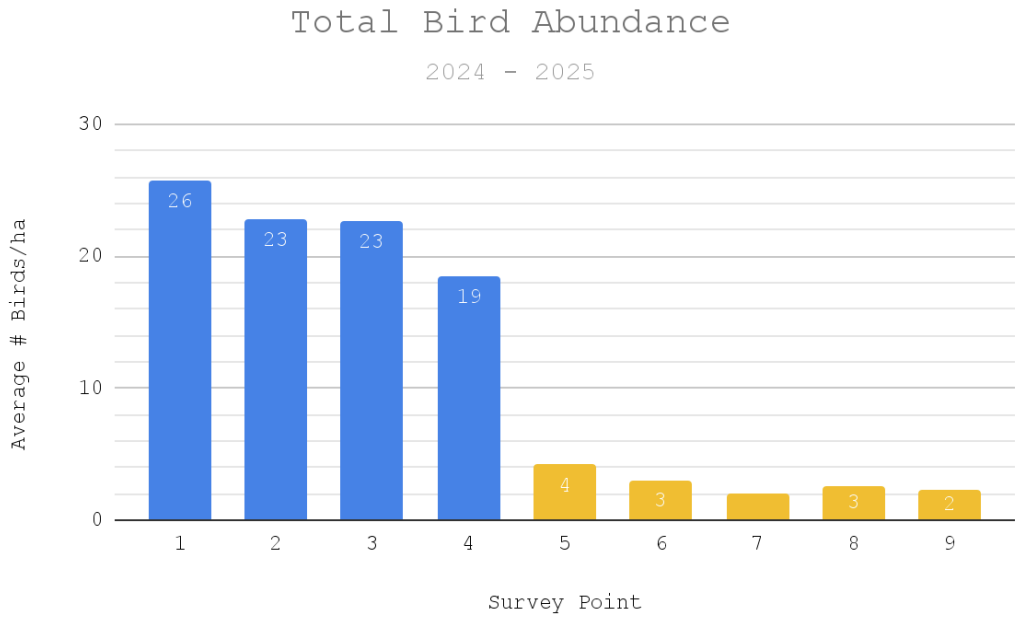


Figure 4 Total bird abundance by point

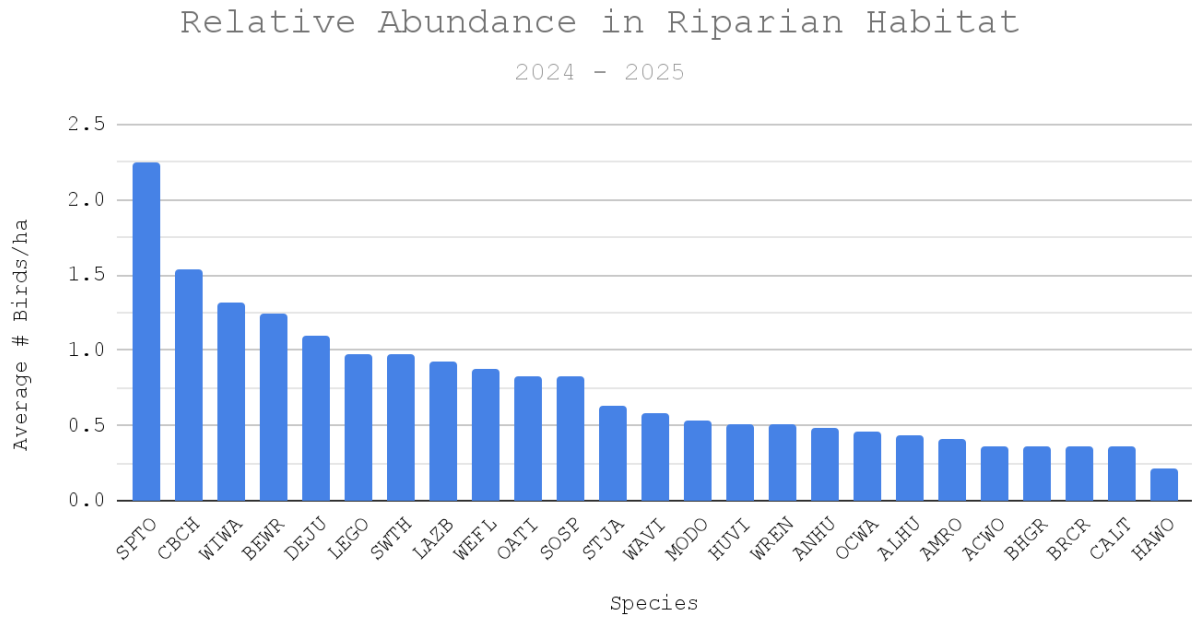


Figure 5 Relative species abundance in riparian habitat

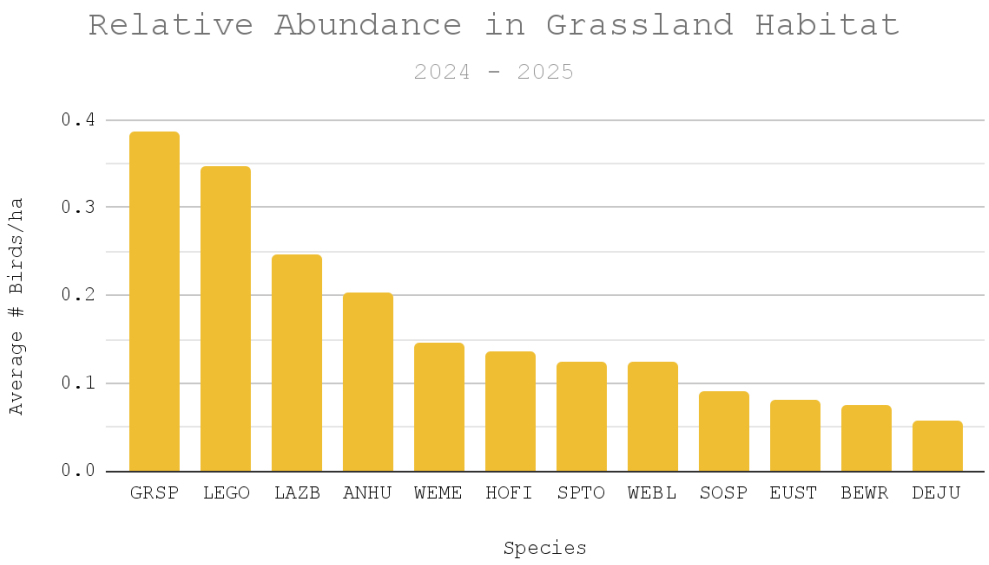


Figure 6 Relative species abundance in grassland habitat

Species Diversity The riparian points (1-4) had an average MacArthur-transformed Shannon Index of 25.1 species per hectare, and the grassland points (5-9) had an average index value of 13.8 species per hectare (Figure 7). Two of the grassland points, 5 and 8, had notably higher diversity scores. These points were situated within edge habitat, with more shrubs and stratification of vegetation than the other grassland points, as can be seen in Figure 1. Therefore points 5 and 8 were likely to support a greater diversity of birds as there were multiple habitat types represented by those points, unlike points 6, 7, and 9.

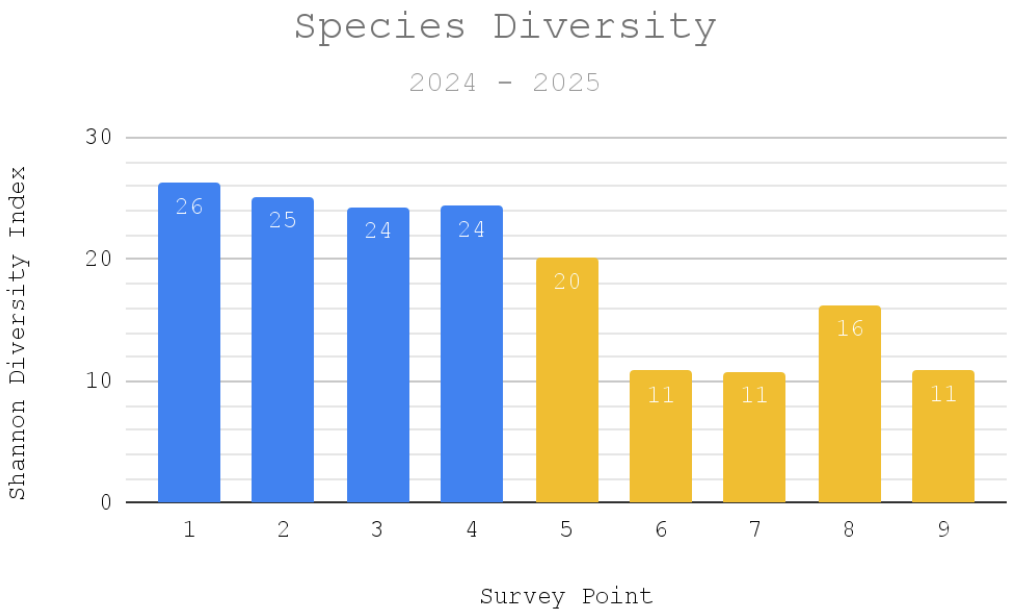


Figure 7 Species diversity by point

Grasshopper Sparrow Grasshopper Sparrow, a sensitive species, were widely observed within the survey area (Appendix B), and were found to be the most abundant species in the grassland habitat (Figure 6). A total of 40 birds were detected in 2024 and 74 birds in 2025. The average GRSP abundance in grassland habitat was conservatively estimated as 0.4 GRSP per hectare (Figure 8). An observation of a fledgling GRSP on July 6th, 2024 confirmed breeding status for the species.

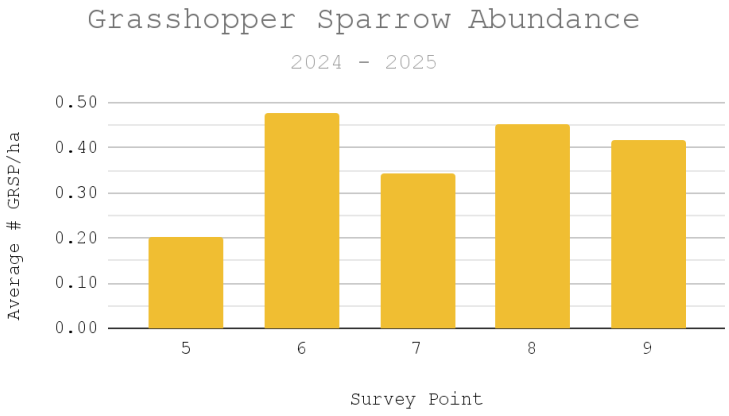


Figure 8 GRSP density by point

Breeding Birds Over the course of two survey periods in 2024 and 2025, 17 species were confirmed breeding (carrying food/nesting material, active nest, or fledgling), 7 were probably breeding (copulation, pairing, or display), 44 were possibly breeding (singing, calling, visual observation, or foraging in suitable breeding habitat), and 14 were unlikely to be breeding (Appendix A).

Confounding Variables Surveys did not start until May of 2024; under ideal circumstances, two additional surveys would have been completed in April of 2024, resulting in 8 complete survey days for the year. In addition, inclement weather conditions (primarily high winds and low visibility from fog) lowered bird detectability and reduced bird activity on May 27th and July 27th 2024, and resulted in the cancellation of a survey in July of 2025. These factors should be considered when interpreting the results, as the timing of surveys, daily weather conditions, and annual climatic variability significantly impact the number and species composition of detectable birds (Figure 9).

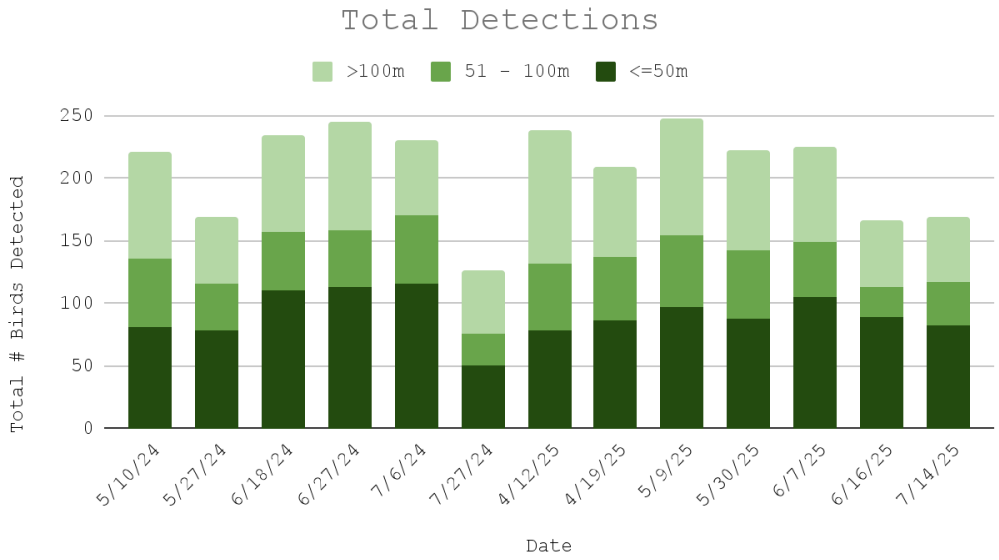


Figure 9 Number of detections by date

Discussion and Conclusion

A significant diversity of birds, including sensitive species, depend on grassland habitat within the Wildcat Canyon Regional Park Bike Trail Project area as well as the adjacent riparian habitat in Havey Canyon during the breeding season. A density of 0.4 Grasshopper Sparrows per hectare (a conservative estimate) is considered significant for the species, where in California their populations have declined due to habitat loss and habitat fragmentation (Ruth 2015). This suggests that Wildcat Canyon, specifically the grassland habitat encompassing the Wildcat Canyon Regional Park Bike Trail project, is important for sustaining a healthy population of GRSP in the park. Therefore, considering that GRSP prefer 30-100 continuous acres of breeding habitat (Vickery et al. 1994), the wider footprint of the Wildcat Bike Trail compared to the existing Mezue Trail could diminish the quality of GRSP breeding habitat in the park by increasing fragmentation and disturbance on the landscape. Future efforts could more accurately monitor GRSP breeding success by conducting nest search and/or territory mapping surveys.

The Wildcat Canyon Breeding Bird Survey has provided an initial baseline for breeding birds in Wildcat Canyon as the Bike Trail Project moves forward; however, it offers limited insight into long-term trends in the avian community. It remains crucial to monitor breeding birds in Wildcat Canyon in order to assess the ecological impacts of initiatives such as the Wildcat Bike Trail Project and to gain a greater understanding of population trends over time. Careful consideration should be made in regards to the breeding Grasshopper Sparrow population, in particular, the impact of fragmentation and trail use on their habitat. Monitoring avian populations in conjunction with consistent public engagement will allow the East Bay Regional Park District to make sustainable management decisions that work for both the birds and the bikes.

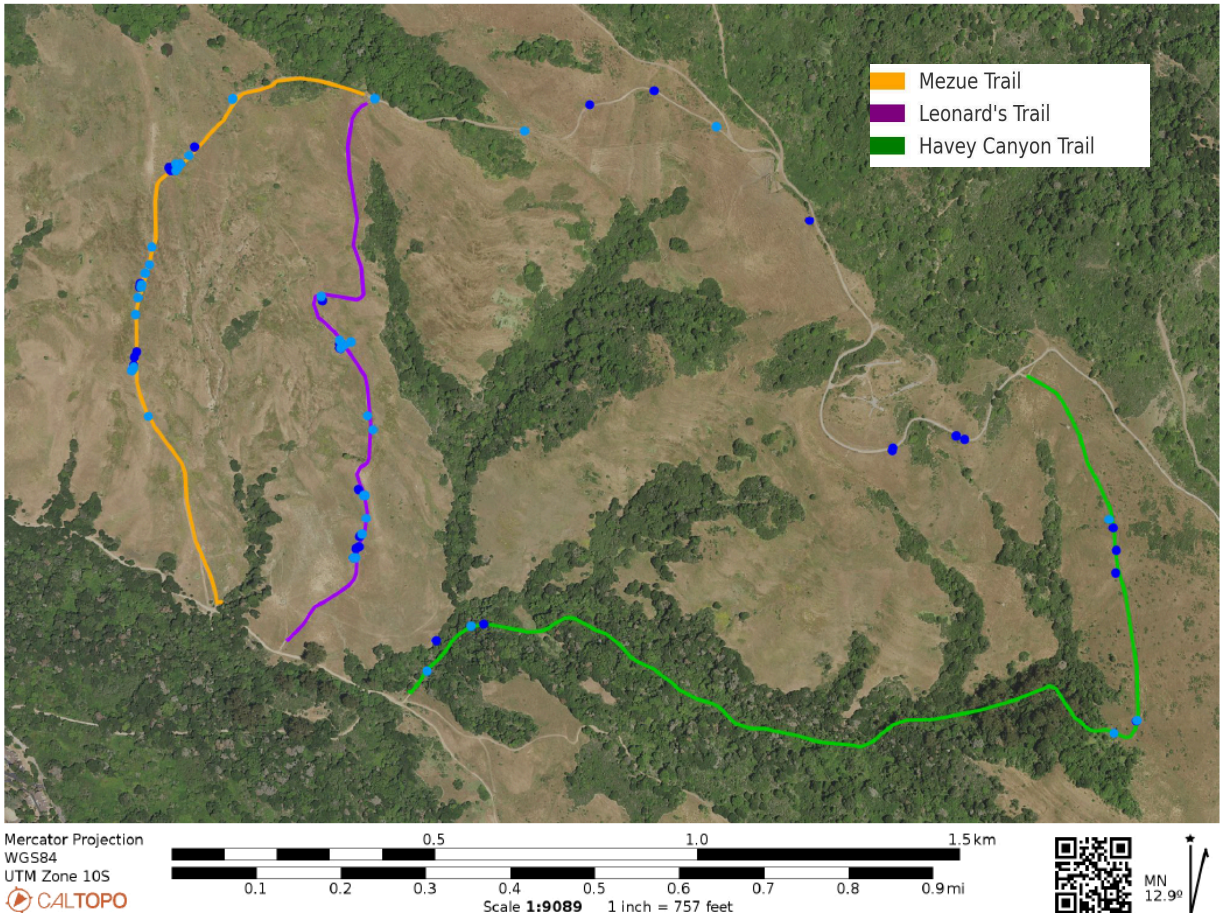
Appendix A: Species list, breeding status, and number of detections within the Wildcat Canyon Breeding Bird Survey area 2024 - 2025. A numeric value indicates the total number of birds detected within 50 or 100 meters of each point, respectively, while an "x" indicates that the species was detected further than the detection radius, or that the bird was detected as a flyover. Emboldened species names indicate a CDFW Bird Species of Special Concern.

Common Name	AOU Alpha Code	Breeding Designation	Detections by Point Count Station #								
			<=50m				<=100m				
			1	2	3	4	5	6	7	8	9
Acorn Woodpecker	ACWO	Possible	10	5	x	x	x		x	x	x
Allen's Hummingbird	ALHU	Probable	3	5	7	3	2				
American Crow	AMCR	Possible	x	x				x	x	x	1
American Goldfinch	AGOL	Possible		1			2				
American Kestrel	AMKE	Possible								1	
American Robin	AMRO	Confirmed	6	3	5	3	x	1	x	3	x
Anna's Hummingbird	ANHU	Confirmed	6	5	4	5	8	3	8	8	9
Ash-throated Flycatcher	ATFL	Possible	4			1	x	1	2	1	x
Band-tailed Pigeon	BTPI	Possible	x	x		x					x
Barn Swallow	BARS	Confirmed		1				1	2	3	3
Bewick's Wren	BEWR	Possible	11	21	9	10	12		x	1	x
Black Phoebe	BLPH	Confirmed	1					1			1
Black-headed Grosbeak	BHGR	Confirmed	3	5	6	1	x	x	x	x	x
Brown Creeper	BRCR	Possible	2	1	7	5					x
Brown-headed Cowbird	BHCO	Possible	2	1			x				x
Bushtit	BUSH	Probable	1	3	3	7	4	1			
California Quail	CAQU	Confirmed	x	3	1	1	3	x	x	1	x
California Scrub Jay	CASJ	Confirmed	1	1	2	5	6	x	x	1	1
California Thrasher	CATH	Possible					3			x	
California Towhee	CALT	Confirmed	4	1	6	4	6	x		x	x
Canada Goose	CANG	Unlikely									x
Caspian Tern	CATE	Unlikely		x							
Cassin's Vireo	CAVI	Unlikely			x						
Cedar Waxwing	CEDW	Possible	1						1		x
Chestnut-backed Chickadee	CBCH	Possible	12	18	18	15				1	x
Cliff Swallow	CLSW	Possible				1		1	2		
Common Raven	CORA	Possible	x	x	x	x	1	1	x	x	1

Common Name	AOU Alpha Code	Breeding Designation	Detections by Point Count Station #								
			<=50m				<=100m				
			1	2	3	4	5	6	7	8	9
Cooper's Hawk	COHA	Possible		x	x	1		x		x	
Dark-eyed Junco	DEJU	Confirmed	18	8	7	12	4	1	x	3	2
Downy Woodpecker	DOWO	Possible	1	2		x					x
European Starling	EUST	Possible		3		x	1	2	2	1	8
Golden-crowned Sparrow	GCSP	Unlikely				1	4				
Grasshopper Sparrow	**GRSP**	Confirmed	3				7	15	13	17	17
Great Horned Owl	GHOW	Probable	1	1	1			x	x		x
Hairy Woodpecker	HAWO	Possible	2	3	2	2	x			1	x
Hammond's Flycatcher	HAFL	Unlikely				1					
Hermit Thrush	HETH	Unlikely				x					
House Finch	HOFI	Probable	2	1			3	6	8	6	1
House Wren	HOWR	Confirmed				1	3			1	
Hutton's Vireo	HUVI	Possible	5	2	6	8	3		1		2
Lazuli Bunting	LAZB	Confirmed	23	3	5	7	9	9	9	6	11
Lesser Goldfinch	LEGO	Possible	13	9	6	12	11	15	13	10	13
Lincoln's Sparrow	LISP	Unlikely					1				
Mallard	MALL	Unlikely					x				x
Mourning Dove	MODO	Possible	5	9	7	1	1	x	1		1
Northern Flicker	NOFL	Possible	x	2		x	1	1			x
Northern Mockingbird	NOMO	Possible					x			x	
Nuttall's Woodpecker	NUWO	Possible	2		4	1	x		x		1
Oak Titmouse	OATI	Possible	11	9	4	10	5	x	x	6	x
Olive-sided Flycatcher	**OSFL**	Possible							x		
Orange-crowned Warbler	OCWA	Possible	5	7	7	x	3		x		x
Osprey	OSPR	Unlikely						x			
Purple Finch	PUFI	Possible	2	3	2	1			x		1
Purple Martin	**PUMA**	Possible					1		1	1	
Red-breasted Nuthatch	RBNU	Possible	x			x					x
Red-shouldered Hawk	RSHA	Possible		x	1				x	x	x
Red-tailed Hawk	RTHA	Confirmed	x	x		x	x	1	1	2	x
Red-winged Blackbird	RWBL	Possible						3	x	x	x
Ruby-crowned Kinglet	RCKI	Unlikely				2	1				

Common Name	AOU Alpha Code	Breeding Designation	Detections by Point Count Station #								
			<=50m				<=100m				
			1	2	3	4	5	6	7	8	9
Rufous-crowned Sparrow	RCSP	Possible						x	x		
Song Sparrow	SOSP	Confirmed	11	10	12	1	14	1	x	1	x
Spotted Towhee	SPTO	Confirmed	30	25	20	17	17	x	1	3	1
Steller's Jay	STJA	Possible	7	6	6	7	x	x	x	x	x
Swainson's Thrush	SWTH	Possible	5	12	22	1			x	x	x
Tree Swallow	TRES	Possible					2				
Turkey Vulture	TUVU	Possible		1			x		x	1	
Violet-green Swallow	VGSW	Possible	1		1				1		1
Warbling Vireo	WAVI	Confirmed	12	1	2	9	x		x	x	x
Western Bluebird	WEBL	Confirmed	5	x		3	2	4	2	7	7
Western Flycatcher	WEFL	Possible	11	9	6	10	1				x
Western Kingbird	WEKI	Unlikely						1			
Western Meadowlark	WEME	Possible					x	19	2	4	1
Western Tanager	WETA	Unlikely			1	x	x				x
Western Wood-pewee	WEWP	Possible		x	6	2	x				x
White-breased Nuthatch	WBNU	Possible	1								x
White-crowned Sparrow	WCSP	Possible				x		x			
White-throated Swift	WTSW	Unlikely						1	1	x	
Wild Turkey	WITU	Probable	1	x	1	2	x	x	x	x	x
Wilson's Warbler	WIWA	Probable	12	16	24	2	x		x		x
Wrentit	WREN	Possible	x	10	3	8	4	x	x	x	x
Yellow Warbler	YEWA	Possible									x
Yellow-rumped Warbler	YRWA	Unlikely	1			1	2	1		1	2

Appendix B: Map of opportunistic Grasshopper Sparrow detection locations from 2024 to 2025. Observations from 2024 are represented in dark blue, and 2025 in light blue.



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