Point Blue Report

Pre-Implementation Bird Monitoring of Mountain Meadows Creek Restoration

Report to Plumas Corporation

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Introduction

The Mountain Meadows Creek restoration project lies within a large meadow complex at the headwaters of the Upper North Fork of the Feather River. The creek flows into Walker Lake on the east side of the reservoir near the town of Westwood, CA in extreme southwestern Lassen County. The project area lies at an elevation of 1550 meters and surrounding uplands are primarily yellow pine forest. The meadow is in a degraded state with significant reduction in water table elevation because of a deeply incised channel that carries the majority of flow through the project area. There are numerous diversion and human made ditches on and adjacent to the project area. Plumas Corporation, in collaboration with the landowner and W.M. Beaty & Assoc., is in the process of planning a hydrologic restoration of the meadow here to reactivate the floodplain, raise the water table and realize the multiple ecological benefits of these actions. One of the target benefits of this project is to restore meadow bird habitat. The meadow has great potential to support an abundant meadow bird community including several special status species: endangered Willow Flycatcher, threatened Greater Sandhill Crane, and Yellow Warbler, a bird species of special concern. As part of this project Point Blue has been monitoring birds and vegetation within the meadow restoration project area since 2021. Here we present results from two years of pre-restoration avian monitoring and vegetation surveys.

Methods

We surveyed birds and vegetation at 19 survey locations within the project area from 2021 to 2022 (Figure 1). We established survey locations across the entire project area, using world imagery in ARCGIS. We placed survey locations every 250m from the top of the project area.

For bird surveys, we conducted standardized five-minute exact-distance point counts at each survey location (Ralph et al. 1995). With the aid of a rangefinder, we estimated the exact distance to individual birds at the time of initial detection. We counted from sunrise to 4.5 hours after sunrise, and did not count in inclement weather (i.e., precipitation, fog, or high wind) that would reduce detection probability. We visited each survey location twice from late May – June, the regional peak of the bird breeding season.

For vegetation surveys, we conducted relevé-style vegetation surveys making ocular estimates of the percent cover and heights of conifers, shrubs, and herbaceous vegetation for the area within 50 m of each survey location. We also estimated the amount of the 50 m radius inundated with water. We collected additional vegetation data not presented in this report that may be used in post-restoration reporting.

I limited analyses of bird data in this report primarily to a subset of the birds encountered that were *a priori* identified as focal species for meadow restoration projects in the region (Campos et al. 2014). A focal species group is likely to provide a better measure of the health of meadow habitat than using all species combined (Chase & Geupel 2005). These 13 focal species are: Wilson's Snipe (*Gallinago delicata*), Red-breasted Sapsucker (*Sphyrapicus ruber*), Calliope Hummingbird (*Selasphorus calliope*), Willow Flycatcher (*Empidonax traillii*), Swainson's Thrush (*Catharus ustulatus*), Warbling Vireo (*Vireo gilvus*), Wilson's Warbler (*Cardellina pusilla*), Yellow Warbler (*Setophaga petechia*), MacGillivray's Warbler (*Geothlypis tolmiei*), Song Sparrow (*Melospiza melodia*), Lincoln's Sparrow (*Melospiza lincolnii*), Mountain West White-crowned Sparrow (*Zonotrichia leucophrys oriantha*), and Black-headed Grosbeak (*Pheucticus melanocephalus*). This suite of focal species reach their greatest breeding density in

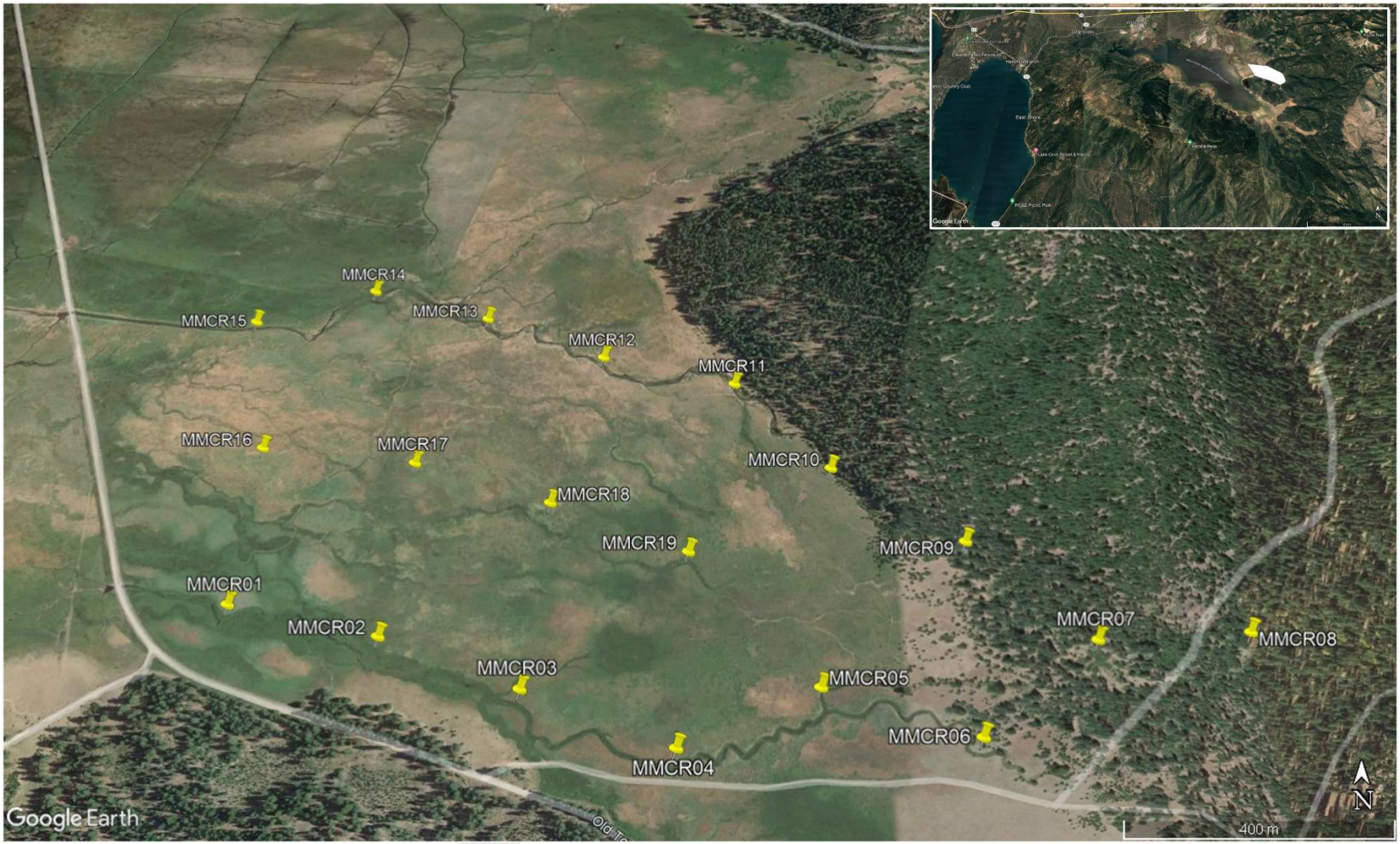

Figure 1. Avian survey locations within the Mountain Meadows Creek restoration project area with location in the upper North Fork Feather River watershed (insert with project location in white). Note Walker Lake to the immediate west and Lake Almanor far western (left side) of image.

montane meadow and riparian habitat in the study area, are appropriately sampled by passive point count methods, and are expected to respond positively to habitat conditions created by the restoration of meadow form and function, specifically: (a) floodplain inundates at a <2 year interval; (b) water table within the rooting zone of meadow plants for growing season, including some flooded or perennially saturated areas in oxbows or other depressional areas; (c) vigorous herbaceous layer dominated by native meadow graminoid species; (d) riparian shrubs with active recruitment; and (e) riparian deciduous trees.

I calculated the richness of focal species (focal species richness), and for additional reference, the richness of all species detected (overall species richness). I calculated richness by taking the average number of species detected per station per visit within a year. I also calculated the total abundance of all focal species combined, by summing all individuals of each focal species per station per visit and then averaging that across the two visits within a year. I limited all analyses to those birds initially detected within 50 m of the observer to allow direct comparison to the meadow restoration avian targets identified in Campos et al. (2014) and other projects in the watershed (Vernon et al. 2021). I used naïve point count detections uncorrected for detection probability, thus abundance metrics herein represent indices rather than true densities (Johnson 2008).

Results & Discussion

The Mountain Meadows Creek project area supported very few meadow focal bird species in 2021 and 2022. We detected a total of 65 species during surveys in the project area but only 35 of those were detected within 50 meters of observers. Many of the species were detected in the adjacent conifer forest and a few from far outside the project area in Walker Lake (e.g. Canada Goose, American White Pelican). The most abundant birds in the project area using the meadow were Horned Lark and Brewer's Blackbird, two species associated with degraded meadow conditions. Horned Lark prefer dry grasslands with short herbaceous vegetation and areas of bare ground. Brewer's Blackbird are a generalist species associated with dry meadow conditions in the region among other human altered habitats. The next most abundant species was Red-winged Blackbird, which is associated with wetland habitats including wet meadow. They primarily occurred in several small patches of wet meadow habitat near survey station 14 which is just downstream of the deep incision on the creek.

We detected 7 of the 13 meadow focal species across all years but only 4 of those within 50 meters of the observer. These species were primarily detected in the upstream-most area of the project where a remnant riparian habitat patch exists with willow and cottonwood. The lack of riparian deciduous vegetation across most of the project area, coupled with dry conditions, presents unsuitable habitat for the majority of meadow focal species (Campos et al. 2014). The most abundant meadow focal species detected was Song Sparrow, which is less reliant on dense riparian deciduous vegetation than other focal species (Campos et al. 2014). At least 1 pair of Greater Sandhill Crane were observed within the project area in both years and across visits, suggesting the project area is a highly utilized part of their home range. We did not detect evidence of nesting as the birds were together at all times across multiple hours of observations (not sitting on a nest) and no colts were detected from this pair in either year. However, it would not be surprising if this pair attempted to breed in the project area in subsequent years. Restoration actions proposed should greatly improve nesting habitat conditions for this species by promoting more areas of saturated conditions with tall dense herbaceous vegetation for concealing nests.

Overall species richness, focal species richness, and focal species total abundance were all higher in 2022 than 2021 (Figure 2). Focal species richness ranged from 0.29 in 2021 to 0.31 in 2022. The focal species richness target for healthy meadows from Campos et al. (2014) is 1.03 species per acre. At Mountain Meadows Creek, focal species richness was 0.16 species per acre, far below the target for healthy meadows. The total abundance of meadow focal species combined ranged from 0.31 to 0.41 per station from 2021 to 2022. A single Yellow Warbler, a California Bird Species of Special Concern and meadow indicator, was detected across the two years but none were detected within 50 m of an observer. The restoration target for this species is 0.54 per acre or 1.04 per (50 m radius) station (Campos et al. 2014). Restoring floodplain function and water table elevation along with grazing management would promote the dense willow stringer habitat this species uses. The average riparian deciduous shrub cover (e.g., willow) was 2.37% with 10 stations having no riparian shrub cover and the highest riparian shrub cover was 10% at station 7. Active revegetation to jump start the establishment of willow and other riparian shrubs is recommended as there is very little currently present. Protecting this revegetation from herbivory will be important to achieving dense patches used by meadow birds.

We did not detect Willow Flycatcher within the project area and suitable nesting habitat for this species does not currently exist here. Recommendations for restoring habitat for this species are similar to those identified above for Yellow Warbler. These include saturated soil conditions and standing water on the floodplain into June and dense patches of willow (20 – 40% cover). The area of the survey plots covered by standing or moving water was 2.89% on June 9, 2022. Herbaceous vegetation height averaged 0.3 meters (~1 foot).

Table 1. Number of detections for all species encountered from 2 visits in each year within 50 meters of all station during 5 min point count surveys within the Mountain Meadows Creek restoration project in 2021 and 2022 and all species detected (X) at any distance. Species with asterisks were detected outside of the project area.

	Unlimited Distance		**50 meters**	
Common Name	**2021**	**2022**	**2021**	**2022**
American Kestrel	X	X	0	0
American Robin	X	X	7	4
American White Pelican*	X	X	0	0
Barn Swallow	X	X	0	1
Black-headed Grosbeak	0	X	0	0
Brewer's Blackbird	X	X	13	11
Brown Creeper	0	X	0	2
Brown-headed Cowbird	X	X	1	1
Calliope Hummingbird	X	X	1	1
Canada Goose*	X	X	0	0
Cassin's Finch	X	X	2	0
Cassin's Vireo	X	X	1	0
Chipping Sparrow	X	X	0	4
Cinnamon Teal	0	X	0	0
Cliff Swallow	X	X	0	0
Common Nighthawk	X	0	0	0

Common Raven	X	X	0	0
Dark-eyed Junco	X	X	6	8
Forster's Tern*	0	X	0	0
Fox Sparrow	X	X	0	0
Gadwall	X	X	0	2
Green-tailed Towhee*	X	X	0	0
Green-winged Teal	X	0	0	0
Hairy Woodpecker*	X	X	1	0
Hammond's Flycatcher*	X	X	0	2
Hermit Warbler*	X	X	0	1
Horned Lark	X	X	15	79
House Wren	X	0	0	0
Lazuli Bunting	0	X	0	1
MacGillivray's Warbler	X	X	1	1
Mallard	X	X	0	0
Mountain Chickadee	X	X	2	8
Mountain Quail*	X	0	0	0
Mourning Dove	X	X	0	0
Nashville Warbler	X	X	1	3
Northern Flicker	X	X	0	0
Northern Harrier	X	0	0	0
Northern Pintail	0	X	0	2
Northern Rough-winged Swallow	X	0	2	0
Olive-sided Flycatcher*	X	X	0	0
Orange-crowned Warbler	0	X	0	1
Pine Siskin	X	X	0	0
Pygmy Nuthatch	X	X	1	0
Red Crossbill	X	X	0	0
Red-breasted Nuthatch	X	X	1	0
Red-breasted Sapsucker	0	X	0	0
Red-tailed Hawk*	X	X	0	0
Red-winged Blackbird	X	X	10	6
Ring-necked Duck	0	X	0	0
Sandhill Crane	X	X	0	0
Savannah Sparrow	X	X	7	3
Song Sparrow	X	X	5	9
Spotted Towhee	0	X	0	0
Steller's Jay	X	X	1	0
Tree Swallow	X	X	0	0
Vesper Sparrow	X	X	2	2
Warbling Vireo	X	X	5	4
Western Meadowlark	X	X	1	1
Western Tanager*	X	X	1	1

Western Wood-Pewee	X	X	8	7
White-breasted Nuthatch	X	X	0	2
White-headed Woodpecker	0	X	0	0
Wild Turkey*	X	0	0	0
Wilson's Snipe	X	X	0	1
Yellow Warbler	X	0	0	0
Yellow-rumped Warbler	X	X	2	4

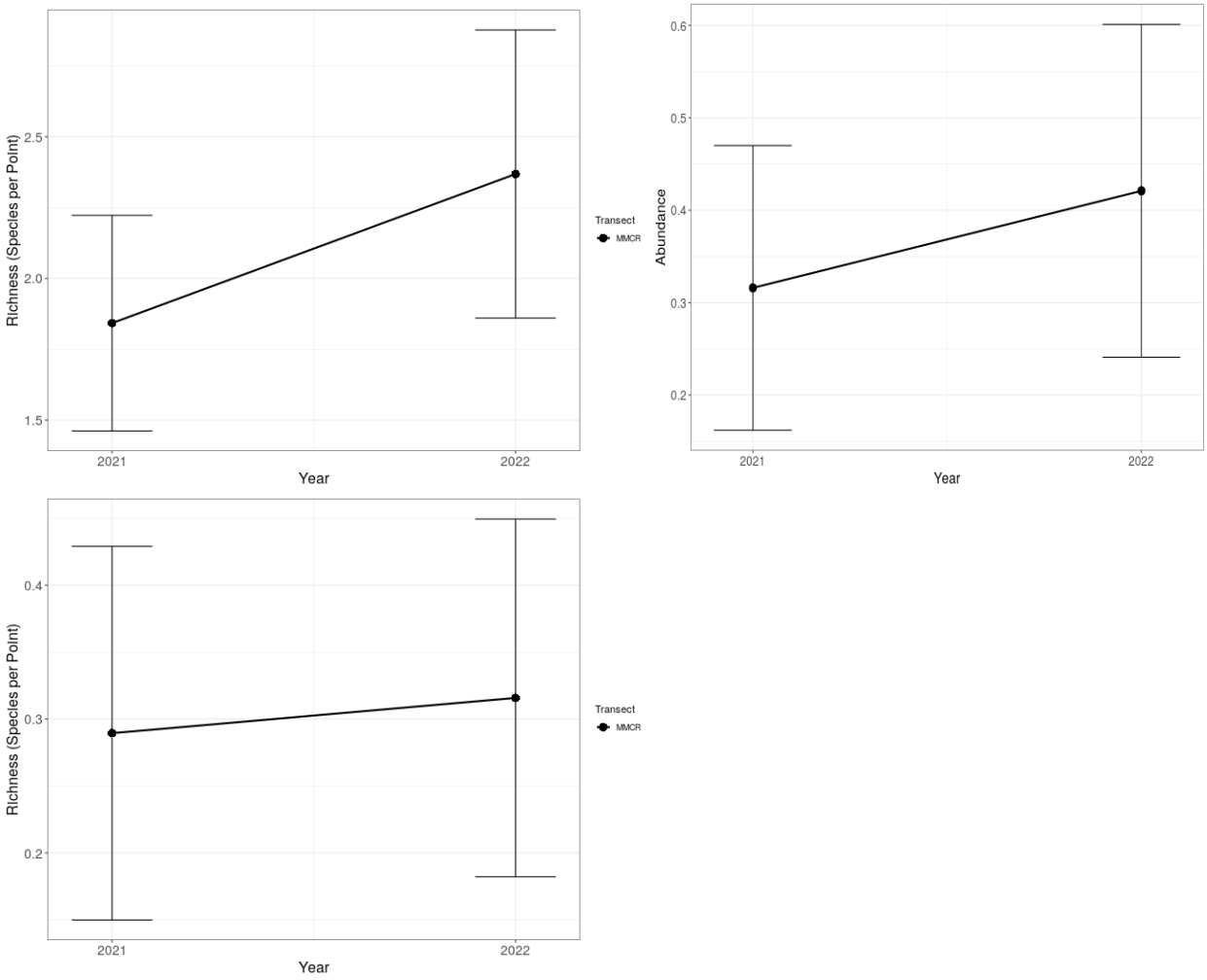

Figure 2. Total avian species richness (top left), meadow focal species abundance (top right), and meadow focal species richness (bottom) per year per station (w/in 50 m of observers) at the Mountain Meadows Creek restoration project pre-restoration. Note Y-axis scales vary. Error bars are standard error.

Careful consideration of grazing management strategies post-restoration will be needed to ensure meadow restoration benefits are fully realized (Vernon et al. 2022). Exclusionary fencing, periods of rest, and likely reductions in intensity and duration will be required while the meadow system recovers and likely beyond to promote high quality meadow breeding bird habitat.

I recommend resurveying these avian monitoring stations following restoration implementation to evaluate the effectiveness of the project in meeting its objectives. It will likely take 10- 20 years post-restoration to fully evaluate benefits of the project for meadow birds. The pace of bird response can be increased through large scale revegetation efforts to restore the riparian shrub habitat that has all but been eliminated from this site. With successful restoration the site has great potential to support breeding for all three special status meadow bird species: Willow Flycatcher, Yellow Warbler, and the already present Greater Sandhill Crane.

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