Mountain Plover Brood Habitat Selection & Survival: Year Two

2022 Lois Webster Fund - Final Report

Casey Weissburg
M.S. Graduate Student
Department of Biology
Colorado State University Pueblo

Questions can be directed to:
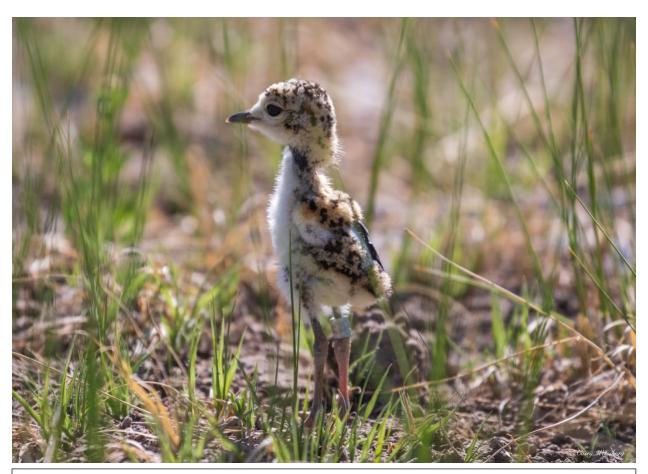Casey.weissburg@pack.csupueblo.edu
(925) 360-1142

Figure 1. *The first chick of the 2022 season, at 3-4 days old, sports the first radio transmitter to be deployed as it scurries back to its worried parent.*

The Mountain Plover is a unique upland shorebird of short-grass prairies, and a Species of Concern in the State of Colorado, which has suffered historic population losses of over 60% since monitoring began in the 1960's and may continue to decline without proper consideration. **Chick survival** is the vital rate that affects Mountain plover population growth the most after adult survival during migration. Thus, we can use the brood responses as a lens for population responses during the breeding season.

PROJECT OBJECTIVE

The goal of this project is to fill knowledge gaps into how this declining species selects habitat during the breeding season, and how selection decisions influence the survival of chicks to fledging age. This research will quantify two brood responses, a behavioral response, **brood habitat selection**, and a fitness response, **chick survival rates**, to evaluate two hypotheses: **(H1)** Mountain plover brood habitat selection patterns depend on variation in predation risk levels, mediated by forage availability and vegetation structure; **(H2)** Mountain plover chick survival depends on variation in predation risk levels, mediated by forage availability and vegetation structure.

Herein we report the progress and preliminary findings as of October 2022.

METHODS

Following the protocols of our 2021 field season, we monitored plovers at two study sites: Chico Basin Ranch, a shortgrass prairie on the Pueblo/El Paso County line, from April 15th until breeding efforts concluded; as well as at James Mark Jones State Wildlife Area (JMJ), in the high plains of Park County, from May 30th until August 26th. Nest searching and monitoring were conducted throughout these months, and for each nest that hatched, one chick was fitted with a Lotek radio transmitter for daily monitoring of brood locations. In addition to plover nest and brood monitoring, environmental factors under the three categories of predator encounter rates, insect biomass, and habitat structure were sampled at both sites during the peak brood-rearing period of each site, with mammalian predators surveyed via camera trapping, avian predators by point counts, arthropods by pitfall traps and

Figure 2. *The parent of the second-to-last nest of the season quietly guides its last surviving chick away from the area where its sibling was depredated the day before.*

grasshopper net-sweeping, and habitat structure by simple groundcover and shrub density measurements. Covariate sampling was conducted at landscape-wide locations in a standardized 600-by-600-meter grid that encompassed all available habitat in each study area.

In order to assess habitat selection, brood locations and randomly-generated available locations were compared in Resource Selection Functions, fit as Generalized Linear Mixed-Models in a series of a priori models to evaluate which environmental covariates best explain brood land use. Best fit was evaluated using AICc model selection for small sample size. Chick survival will be estimated from daily survival rates and modeled similarly in a series of a priori models to evaluate the effects of habitat selection on survival rates.

RESULTS

The breeding season at Chico Basin Ranch this year was short and unproductive. Daily counts of breeding adults were low, and only five nests were found, compared with 14 in 2021. Of these five nests, four were depredated and the fifth was abandoned early on. Few birds stayed on site after the late winter storm of

May 21st, with the site fully abandoned by all plovers by June and no sign of renesting efforts in the three weeks of June during which environmental sampling was conducted. Thus the season ended quite early at Chico Basin Ranch this year.

In contrast, nest searching efforts at JMJ, where the study area and population are both larger, netted 34 nests in 2022. 18 of these known nests hatched; 12 were lost to predators, with four abandoned due to unviability or unknown causes. Of these 18 broods, 15 were tagged, along with an additional 6 broods from unknown nests, and monitored from hatching or first encounter until fledging or loss. Of these 21 tagged broods, 8 broods successfully fledged at least one chick; 6 were fully depredated and 7 were lost either due to the tagged chick's death or signal loss. These numbers are fairly similar to those obtained at JMJ in 2021, when we tagged 21 broods, with 7 fledging, 10 depredated and 4 lost for unknown reasons.

Including data from 2021, we have now monitored 19 nests at CHBR and 72 at JMJ, with only 4 broods monitored at CHBR but 42 at JMJ. Preliminary analysis on habitat selection have been run with the 2021 data, while 2022 data is still being processed for combined analysis. Preliminary analysis shows a significant effect of bare ground, shrub density, and raven encounter rates on brood habitat selection at CHBR, while this brood response at JMJ is significantly affected by mammal and raptor encounter rates as well as groundcover height. Survival analyses are still in progress.

DISCUSSION

Previous research has found that Mountain plovers select for nesting habitat with moderate-high percent bare ground. Our preliminary findings suggest that habitat selection during the brood-rearing phase similarly leans towards lower vegetation densities, but with a more nuanced and varied response than expected. In the prairie-dog dominated short-grass prairie of Chico Basin Ranch, the plovers select for moderate-high levels of bare ground and moderate-low levels of shrub density; while in the high plains of the South Park region, where the landscape is stunted by altitude and grazing rather than prairie-dogs, broods select for areas with low groundcover height regardless of bare ground and shrub density levels. Overall, these trends suggest that this species is able to adjust their brood-rearing strategies depending on what is available locally; yet importantly, that this species seeks out moderate and varied levels of vegetation density.

As plovers at both sites also selected for habitat with lower predator encounter rates, the preference for lower vegetation densities may be partially driven by predator avoidance. As an almost exclusively ground-dwelling species, having a far-reaching view of the landscape may be crucial to survival for a Mountain plover's chicks. This need may be delicately balanced with the necessity of adequate vegetation to shelter from harsh weather or predators. For the most part, prey availability does not seem to drive selection. Rather, this species of concern may require a landscape with intermediate levels of vegetation, generated by periodic disturbance via grazing or burning.

These findings are only preliminary and will be reassessed after inclusion of our 2022 data. With two years of data collected, the field component of this Master's project is complete. Due to the complicated nature of this research, and the vast quantity of data, Fall 2022 has been spent processing data and finalizing analyses. The winter will be spent writing, and thesis defense will occur in Spring 2023, with chapters on habitat selection and survival to be published soon thereafter.

LOIS WEBSTER FUND

ACKNOWLEDGEMENTS

nor without the trail cameras graciously loaned by CPW, and the cooperation and support of the Wunder Lab of University of Denver. We are so grateful for all of the support and effort that has gone into this project over the past two years and we look forward to sharing final results at the CFO convention in May 2022.

Figure 3. *The second chick of the season gets color bands just 4-5 days from fledging. We resighted this youngster as a fully flighted juvenile several times throughout August in small groups of other juveniles.*