Bonderman Field Station at Rio Mesa 2024 Bird Banding Report







Cover Photos, clockwise from top left: Brown Thrasher, Steller's Jay, Red-eyed Vireo, Sage Thrasher with a MOTUS NanoTag, Common Poorwill, Western Screech-Owl, Northern Saw-whet Owl, and Cooper's Hawk. All captured and banded during fall 2024 at the Rio Mesa banding station. All pictures taken by Kyle Kittelberger and Arden Schneider.

Şekercioğlu Lab University of Utah Department of Biology 257 South 1400 East Salt Lake City, UT 84112 801-587-5661

Station Overview

Station Lifetime Banding Totals			
Species Observed	195		
Species Caught	135		
Species Banded	128		
Total Captures	23,177		
Birds Banded	18,392		
Total Recaptures	3,925		
Banding Days	1,448		

Our Mission

The primary purpose of our project is to understand the ecology and migratory patterns of the bird community at the Bonderman Field Station at Rio Mesa using mist-netting and bird banding. We capture and band birds to gain valuable insights into population size, community structure, the timing of migration, and how avian groups are responding to anthropogenic threats. We are also dedicated to outreach and education. Birds are an exceptional flagship group to help instill interest in conservation and the environment¹ and every year we welcome dozens of visitors to our station where people from all walks of life can receive hands-on education about nature, ecology, ornithology and conservation.

Bonderman Field Station at Rio Mesa

Rio Mesa represents an ideal location to conduct ornithological research. Riparian zones, like along the Dolores River, comprise a disproportionately important habitat in the arid Intermountain West. Birds, in particular, depend heavily on this delicate environment, and riparian zones serve as critical migratory corridors for birds moving through an otherwise harsh area^{2,9}. Riparian zones are also under severe threat from climate change³. With the growing threat of global change we, more than ever, need a detailed understanding of the ecology of riparian habitats and the organisms that depend on them. Additionally, our presence at this location contributes to eBird records of birds here, especially since many banders are also avid birders, making Rio Mesa one of the best-monitored hotspots for birds in Utah. Furthermore, since this location is closed to the public, there would be few records of birds without our long-term banding effort: <a href="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchart?r=L5750423&yr=all&m="https://ebird.org/barchar





Our Research

Our station follows standard protocol developed by the Monitoring Avian Productivity and Survivorship program (MAPS)⁴. We operate sixteen 12 x 2.5 meter mist-nets that are opened 30 minutes before sunrise and remain open for six hours. Nets are open 10 out of every 12 days from early April to early June for the spring season, and mid-August to early November for the fall season⁵. Nets are checked every 30 minutes and any birds are extracted and taken back to the banding office for processing. Each bird is fitted with a metal leg band issued by the United States Geological Survey (USGS). This allows us to track the capture history for every individual bird and perform robust mark-recapture analyses to estimate changes in demographic rates⁶. We also take a suite of morphological and demographic measurements from each bird including sex, age, fat content, breeding state, molt stage, wing length, and body mass⁷, as well as body condition⁵. These data allow us to describe the bird community at Rio Mesa and monitor the health of individuals as they undergo their yearly migration⁵.

<u> 2024</u>

This spring and fall were respectively our 25th and 26th banding season, representing 13 ½ years of banding data from Rio Mesa. These data continue to cement our station as the longestrunning bird banding operation in Utah and one of only two consistent, continuously run passerine (songbird) stations in-operation in the state (the other station being our bird banding site in Red Butte Canyon, near Salt Lake City⁸). For the spring we banded from April 7 through June 9, and the fall lasted from August 25 through November 2.

<u>Statistics</u>				
Spring 2024 Totals				
Species Caught	51			
Species Banded	50			
Total Captures	903			
Birds Banded	756			
Banding Days	56			

This spring season saw the most number of birds caught in a spring at Rio Mesa since 2019, with just over 900 captures. It started off very slow though, with numbers not jumping until early May. This season continued our effort of tagging birds with NanoTags for the Motus project, with 4 Black-headed Grosbeaks, 1 Blue Grosbeak, 2 Western Tanagers, 1 Yellow-breasted Chat, and 2 White-crowned Sparrows tagged. We also continued to take wing, tail, and body photos of many of the birds, allowing us to continue creating a library of spring birds of different ages and sexes.

Some notable captures this season included our 2nd record of **Yellow-headed Blackbird**, 3rd **Hairy Woodpecker**, 4th **American Kestrel**, 4th and 5th **American Redstarts**, 4th through 6th **Cedar Waxwing**, and our first **Violet-green Swallows** in 5 years.





<u>Statistics</u>	
Fall 2024 Totals	
Species Caught	63
Species Banded	61
Total Captures	937
Birds Banded	707
Banding Days	58

This season saw the most captures in a given fall since 2020. Daily numbers of birds in the nets fluctuated much more across this season than expected, resulting in a bit of an unusual banding season that did not align with previous ones; e.g., some species like Wilson's Warbler and Yellow-rumped Warbler were respectively either far fewer in number than usual or never captured at all. However, it was a banner season for sagebrush-inhabiting species, with 18 captures of Sagebrush Sparrows (2nd most across seasons) and an astounding 125 captures of Sage Thrashers (eclipsing the combined total from all prior years; this was actually one of the most abundant birds captured and, for most of the season, the most numerous bird in the nets, with at least one thrasher in hand almost every day for close to two months. Consequently, this was, without a doubt, the most successful season in the past 5 years in terms of quality of species captured, with many infrequently captured species (see below). We also deployed the most tags to date for the Motus project, with 10 Sage Thrashers and 6 White-crowned Sparrows tagged. The fall crew also had the most successful season for owl banding, capturing numerous owls across multiple nights.

Notable captures this fall included our 2nd records of **Cooper's Hawk**, **Red-eyed Vireo**, **Steller's Jay**, **Brown Thrasher**, and **Red-winged Blackbird**; 3rd **Common Poorwill**; 3rd through 7th captures of **Northern Saw-whet Owl**; 4th **Hairy Woodpecker** and **Brown Creeper**; 4th and 5th captures of **Western Screech-Owl**; and 7th **Grasshopper Sparrow**. Other highlights included 3 **Sharp-shinned Hawks**, 2 **Violet-green Swallows**, 2 **Loggerhead Shrikes**, 125 **Sage Thrashers**, 18 **Sagebrush Sparrows**, and 3 **White-throated Sparrows**.

Participants

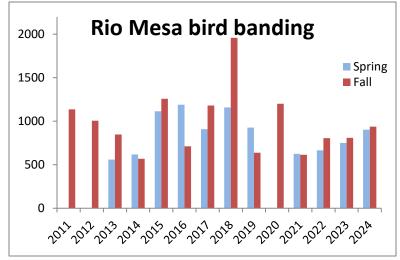
In the spring, our banding team consisted of assistants MP Chino, Iggy Colon, Ella Bollinger, and Stefany Flores. In the fall, our banding team consisted of lead bander Arden Schneider and assistants Jake Brown and Stephen Mooney. Our team members come to Rio Mesa from across the country with varying degrees of experience working with birds. Other people, including Nick Seefeldt, Kyle Kittelberger, Megan Miller, Flavio Mota, Tully Frain, Nathan Murthy, David Blount, Amy Buxton, and Nik Orton helped out with banding at various times throughout the spring and/or fall. Our station is dedicated to providing educational opportunities to volunteers of all skill levels, with the goal of assistants becoming highly competent banders by the end of the season; many of our crew members continue on with other banding positions. Our station also hosted several visiting groups this spring and fall, including some school groups. It is always a rewarding experience for our banders and volunteers to interact with these visitors and help more people understand the necessity of conservation biology, ecology and ornithology research and the importance of ensuring healthy ecosystems.





Future Directions

Looking into the future, with an ever growing number of additional years and seasons of data, our ability to accurately monitor the changes in bird populations and community composition continues to improve greatly; this should allow us to soon be able to estimate migratory arrival and departure dates, as well as other facets of species' demography.



These data are especially important now given the accelerating pace of climate change and the ramifications for riparian ecosystems^{5,9,10}. We are continuously analyzing data for new projects, so the next few years should see even more papers published based on our banding efforts.

While no new papers on Rio Mesa came out during 2024, two studies are very close to

being accepted as of the end of the year and should hopefully be published in early 2025. The first of these is a study on shifts in molt phenology in birds, which functions as one of the chapters for Kyle Kittelberger's PhD dissertation. This study examined the past 13 years of banding data for trends in the timing of the molt of body and flight feathers. It found that while there were no significant temporal trends in molt timing in the spring, importantly, there were significant trends in the fall, such that birds were advancing the timing of their body and flight feather molt over time at a rate of roughly 1 day/year. There was also a significant influence of climate on molt phenology: El Niño/Southern Oscillation and maximum temperature were both associated with advances in spring body molt, maximum temperature was associated with delays in fall flight feather molt timing, and precipitation was associated with advances in both fall body and flight feather molt timing. This study provides the first examination of long-term trends in the molt phenology of North American birds. The second of these projects is led by Liz Allocca (one of our assistants from spring 2023), who wrote her Master's dissertation on the demographics of Yellow-breasted Chats over the 13 years at Rio Mesa. She found that adult chats had a significantly greater probability of survival than younger birds. Notably, she established that stronger El Niño years corresponded with reduced survival of chats, which has implications for the populations of chats and other migratory species in the future as the climate warms further. She also found moderate negative effects of breeding season heat events and spring precipitation, as well as a positive association between chat survival and breeding season streamflow with the Dolores River.

Looking ahead to 2025, we will continue analyzing the Rio Mesa data to evaluate longterm trends in bird migration and natural history and see how these patterns compare





between the spring and the understudied fall migratory periods. Currently, Kyle Kittelberger is working on analyzing data from Rio Mesa (along with data from our lab's Turkish bird banding station along the Aras River) to explore how the morphology of birds (e.g., wing length and body mass) is changing over time and how these trends may be influenced by climate and environmental variables and the life history of bird species. Work will also continue examining the impact of wildfires on the migratory bird community, building off our first bird paper based on Rio Mesa data, titled "Fall bird migration in western North America during a period of heightened wildfire activity," that was published at the end of 2022⁵. For this study, we looked at the past decade of fall banding data, with a particular focus on fall 2020, to assess the potential indirect effects of wildfires in western North America on fall bird migration. We used a correlative approach to evaluate the relationship between estimates of acres burned by wildfires in western North America on several variables representing bird abundance and body condition⁵. Notably, we found that during fall 2020, more bird captures were correlated with more acres burned for the day birds were captured and that a reduction in body mass of captured birds was correlated with more acres burned one week prior⁵. Additionally, in this study we examined the usefulness of different proxies of body condition in highly stressed birds and introduced an emaciation scale to help researchers track landbird body condition and health better than with fat⁹. This is one of the only studies of its kind to look at this relationship between wildfires and actively migrating birds⁵. In 2025, work will finish on a second study on the effects of wildfires on birds, utilizing heavy hydrogen isotopes in collected feathers to help better determine from where migrants originated.

We also will continue genetic work with some of the thousands of feathers that we have collected over the years from birds while banding, partnering with Kristen Ruegg and her lab at CSU to provide samples for The Bird Genoscape Project, an initiative that uses genetic information in feathers to identify the breeding origin of migratory birds according to the map of genetic variation for the species. We have already provided close to 2000 feather samples (representing 2000 individual birds) to this project, collected between 2019 and 2024. We are also partnering with our collaborator and friend Sean Mahoney on a feather project for Willow Flycatchers and Yellow Warblers. Excitedly, we are expecting to publish a study, led by lab member Amy Buxton, on using DNA within collected feathers to help assess the accuracy of in-hand identifications of *Empidonax* flycatchers to species. This study, based on the thesis of former lab Master's student Hailey Blair, found that field and genetic identifications matched for 93% of individuals examined, suggesting that a majority of Empidonax flycatchers (at least at Rio Mesa) are accurately being identified to species in the field by banders. This study highlights the importance of using additional morphometric data when identifying challenging bird groups like Empidonax flycatchers, and emphasizes the merit of supplementing these field identifications with genetic analysis.

Finally, we will work on our long-talked about paper on Lucy's Warblers (for which preliminary work has begun), which will examine demographic and recapture data as well as provide a description and photos of the molt strategies of this species at Rio Mesa. We





are likely one of the few banding stations in the country that has such banding success with Lucy's Warbler (Rio Mesa is located at the northern limit of the bird's breeding range), a species which is actually noted in *Handbook to Birds of the World* as being a species with future research needs. We also hope to write a paper next year focusing on the emaciation scale we introduced in our first wildfire paper⁵, since this is an important metric that is not traditionally recorded at banding stations across the country.

Signing off, Kyle Kittelberger

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<u>Appendix</u>: Capture details for all species caught at Rio Mesa from 2011 to 2024. Species with no capture records have only been observed on the property.

Species Name	Totals	Totals			
	Number Banded	Number Banded Number Recaught Number Unba			
Waterfowl					
Canada Goose					
Wood Duck					
Mallard					
Gadwall					
Blue-winged Teal					
Cinnamon Teal					
Northern Shoveler					
Green-winged Teal					
Common Merganser					
Duck spp.					
Gamebirds					
Chukar					
Wild Turkey					
<u>Grebes</u>					
Pied-billed Grebe					
Herons, Ibis, and Allies					
Great Blue Heron					
Great Egret					
Snowy Egret					
White-faced Ibis					
Vultures, Hawks, and Allies					
Turkey Vulture					
Osprey					
Golden Eagle					
Northern Harrier					
Sharp-shinned Hawk	18	0			
Cooper's Hawk	2	0			
American Goshawk					
Bald Eagle					
Swainson's Hawk					
Red-tailed Hawk					
Rough-legged Hawk					
Rails, Gallinules, and Allies					
Sora	1	0			
Sandhill Crane					





Shorebirds			
Killdeer			
Wilson's Snipe			
Spotted Sandpiper	2	0	0
Solitary Sandpiper			
Greater Yellowlegs			
Pigeons and Doves			
Rock Pigeon			
Band-tailed Pigeon			
Eurasian-collared Dove			
White-winged Dove			
Inca Dove	1	0	0
Mourning Dove	31	0	6
Cuckoos			
Yellow-billed Cuckoo	1	0	0
<u>Owls</u>			
Western Screech-Owl	5	1	0
Great Horned Owl			
Northern Saw-whet Owl	7	0	0
Northern Pygmy-Owl	1	0	0
Nightjars			
Common Nighthawk			
Common Poorwill	3	0	0
<u>Swifts</u>			
Vaux's Swift			
White-throated Swift	4	0	4
Hummingbirds			
Costa's Hummingbird	0	0	1
Black-chinned Hummingbird	0	0	238
Broad-tailed Hummingbird	0	0	34
Calliope Hummingbird	0	0	15
Rufous Hummingbird	0	0	66
Unidentified Hummingbird	0	0	7
Kingfishers			
Belted Kingfisher			
Woodpeckers			
Williamson's Sapsucker	4	2	0
Yellow-bellied Sapsucker	1	0	0
Red-naped Sapsucker	67	3	0
Red-breasted Sapsucker			
Downy Woodpecker	7	0	1





Hairy Woodpecker	4	0	0
Lewis's Woodpecker			
Northern Flicker (Red-shafted)	39	6	4
Northern Flicker Intergrade	4	0	0
Falcons			
American Kestrel	4	0	0
Merlin			
Peregrine Falcon			
Prairie Falcon			
Tyrannid Flycatchers			
Olive-sided Flycatcher	4	0	0
Western Wood-pewee	162	5	2
Least Flycatcher	4	0	0
Willow Flycatcher	437	16	0
Western Flycatcher	14	2	0
Yellow-bellied Flycatcher	1	0	0
Hammond's Flycatcher	28	4	0
Dusky Flycatcher	277	40	2
Gray Flycatcher	71	6	0
Unidentified Empidonax Flycatcher	42	0	2
Black Phoebe	6	0	1
Say's Phoebe	16	2	0
Ash-throated Flycatcher	94	15	1
Eastern Kingbird	3	0	0
Cassin's Kingbird			
Western Kingbird	19	3	0
Unidentified Flycatcher	7	2	3
Shrikes			
Loggerhead Shrike	14	1	0
Northern Shrike			
Vireos			
Bell [®] 's Vireo	1	1	0
Plumbeous Vireo	21	4	0
Cassin's Vireo	24	1	0
Warbling Vireo	381	37	0
Gray Vireo	47	16	0
Red-eyed Vireo	2	0	0
Corvids			
Steller's Jay	2	0	0
Pinyon Jay			
Woodhouse's Scrub-jay	40	3	1





Black-billed Magpie			
American Crow			
Common Raven			
Larks			
Horned Lark			
Swallows			
Purple Martin			
Northern Rough-winged Swallow			
Tree Swallow			
Violet-green Swallow	24	0	0
Bank Swallow			
Barn Swallow	1	0	0
Cliff Swallow	2	0	0
Tits			
Black-capped Chickadee	53	23	0
Mountain Chickadee	36	8	0
Mountain x Black-capped Chickadee	3	1	0
Juniper Titmouse	10	1	0
Bushtit	452	143	31
Nuthatches and Creepers			
Brown Creeper	4	0	0
Red-breasted Nuthatch	4	0	0
White-breasted Nuthatch			
Wrens			
Bewick's Wren	269	96	16
Rock Wren	28	13	2
Canyon Wren	16	10	1
Northern House Wren	106	26	2
Winter Wren	1	0	0
Marsh Wren	53	3	3
Gnatcatchers and Kinglets			
Blue-gray Gnatcatcher	994	188	35
Golden-crowned Kinglet	2	0	0
Ruby-crowned Kinglet	720	114	36
<u>Thrushes</u>			
Mountain Bluebird	7	1	0
Western Bluebird			
Townsend's Solitaire	14	2	0
Swainson's Thrush	23	3	1
Hermit Thrush	340	77	3
American Robin	51	18	2





Mimids			
Gray Catbird	76	5	1
Northern Mockingbird	25	4	4
Brown Thrasher	2	0	0
Sage Thrasher	146	67	2
Starlings and Mynas			
European Starling			
Wagtails and Pipits			
American Pipit			
Waxwings and Dippers			
Cedar Waxwing	6	0	0
American Dipper			
Wood Warblers			
Northern Waterthrush	35	1	0
Orange-crowned Warbler	369	41	2
Nashville Warbler	47	5	0
Virginia's Warbler	152	17	3
Lucy's Warbler	96	84	1
MacGillivray's Warbler	591	70	12
Connecticut Warbler	1	0	0
Common Yellowthroat	229	5	3
American Redstart	4	1	0
Northern Parula	2	0	0
Chestnut-sided Warbler	1	0	0
Magnolia Warbler	1	1	0
Blue-winged Warbler	1	0	0
Yellow Warbler	905	142	10
Black-throated Blue Warbler	1	1	0
Palm Warbler	1	0	0
Yellow-rumped Warbler	25	0	2
Yellow-rumped Warbler (Audubon's)	705	36	12
Yellow-rumped Warbler (Myrtle)	26	7	0
Yellow-rumped Warbler (MxA)	17	0	0
Black-throated Gray Warbler	17	2	0
Townsend's Warbler	1	0	0
Wilson's Warbler	1462	150	22
Painted Redstart			
Unidentified Warbler	0	0	1
Yellow-breasted Chat			
Yellow-breasted Chat	935	633	25
New World Sparrows			





Green-tailed Towhee	177	85	2
Spotted Towhee	538	241	27
Vesper Sparrow	31	0	2
American Tree Sparrow	3	0	0
Chipping Sparrow	98	22	1
Clay-colored Sparrow	14	6	1
Brewer's Sparrow	707	124	18
Lark Sparrow	34	3	0
Lark Bunting			
Black-throated Sparrow	59	0	1
Sagebrush Sparrow	88	2	1
Savannah Sparrow	3	0	0
Song Sparrow	1127	346	23
Lincoln's Sparrow	587	107	19
Grasshopper Sparrow	7	0	0
Fox Sparrow	6	0	0
Dark-eyed Junco	18	0	2
Dark-eyed Junco (Gray-headed)	12	0	1
Dark-eyed Junco (Oregon)	422	132	10
Dark-eyed Junco (Pink-sided)	110	28	4
Dark-eyed Junco (Slate-colored)	14	4	0
White-throated Sparrow	31	6	2
White-crowned Sparrow (Mountain)	405	30	8
White-crowned Sparrow (Gambel's)	1031	357	42
White-crowned Sparrow hybrid (GxM)	1	0	0
White-crowned Sparrow	322	66	18
Golden-crowned Sparrow	2	0	0
Unidentified Sparrow	3	0	2
<u>Cardinals</u>			
Summer Tanager	2	0	0
Western Tanager	342	16	3
Rose-breasted Grosbeak	2	0	0
Black-headed Grosbeak	118	4	4
Blue Grosbeak	139	38	3
Lazuli Bunting	283	76	2
Indigo Bunting	14	1	1
Painted Bunting	0	0	2
Orioles and Blackbirds			
Red-winged Blackbird	2	0	0
Western Meadowlark	3	0	0
Yellow-headed Blackbird	2	0	0





Brewer's Blackbird			
Common Grackle			
Great-tailed Grackle			
Brown-headed Cowbird	31	5	2
Hooded Oriole	2	0	0
Scott's Oriole			
Bullock's Oriole	93	16	2
Finches and Allies			
Black Rosy-Finch			
Cassin's Finch	3	0	1
House Finch	306	37	15
Pine Siskin	75	2	1
Redpoll			
Lesser Goldfinch	65	1	0
American Goldfinch	14	0	0
Evening Grosbeak			



