Bonderman Field Station at Rio Mesa
2018 Bird Banding Report

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

DEPARTMENT OF BIOLOGY
THE UNIVERSITY OF UTAH

THE UNIVERSITY OF UTAH
Bonderman Field Station at Rio Mesa

Cover Photos, clockwise from top left: Woodhouse's Scrub-jay, Williamson's Sapsucker, and Sharp-shinned Hawk. All captured and banded during 2018 at the Rio Mesa banding station.

Station Overview

Statistics

	Station Lifetime Totals
Species Observed	190
Species Caught	125
Species Banded	117
Overall Captures	14,350
Birds Banded	11,193
Banding Days	779

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 (RMC) using mist-netting and mark-recapture analysis. By capturing and banding birds we are able 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 environment[1] and every year we welcome hundreds of visitors to our station where people from all walks of life can receive a hands-on education about nature, ecology, ornithology and conservation.

Bonderman Field Station at Rio Mesa

The RMC represents an ideal location to conduct ornithological research. Riparian zones, like the RMC's 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]. Riparian zones are also under severe threat from climate change[3]. 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.

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 6 hours. Nets are open 10 out of every 12 days from April-June and August-November. Nets are checked every 30 minutes and any birds are extracted and taken back to a central location for processing. Each bird is outfitted 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 rates[5]. 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 mass. These data allow us to describe the bird community at RMC as well as monitor the health of individuals as they undergo their yearly migration.

2018

We have now gathered 7 ½ years (15 seasons) of banding data from RMC, making our station one of the longest-running bird banding operations in Utah and one of only two passerine (songbird) stations currently operating in the state (the other station being our bird banding station in Red Butte Canyon, near Salt Lake City). Though the station has been operating for three quarters of a decade, we continue to detect new species for the area. This year we banded four species that had previously been only visually observed or not detected at all: Red-winged Blackbird, Western Meadowlark, Yellow-breasted Flycatcher and Winter Wren.

Statistics

	2018 Totals
Species Caught	77
Species Banded	74
Total Captures	3,115
Birds Banded	2,528
Banding Days	124

Participants

In the spring, our banding team consisted of lead bander Josh Haughawout (experienced MAPS bander from NM) and volunteers Dan Errichetti (former U student) and Mikaela Kropp (from MN). In the fall, our banding team consisted of veteran bander Michael Ford (who has banded for us in Turkey, Ethiopia and RMC over many years) and volunteers Hannah Horowitz and Tara Rodkey (both from CA). Our volunteers come to the RMC with varying degrees of experience working with birds, but our station is dedicated to providing educational opportunities to volunteers of all skill levels and by the end, they are highly competent banders. Aside from the regular banding teams, our station also hosted many individual or group visitors including:

- High school students from the Salt Lake Center for Science and Math Education
- Multiple classes from the University of Utah
- Natural education workshops for Utah educators
- Local school groups
- Several University of Utah graduate students
- Many local citizens interested in getting hands-on experience bird-banding

While many groups were not counted completely, we estimate that over 500 people have been exposed to avian conservation and ecology research at our station.

Preliminary Analyses

Bird-banding data has great value in its ability to elucidate long-term trends in populations or community demographics[6,7]. As our project begins to mature, we are able to continue preliminary community and mark-recapture analyses. It is important to note that these patterns currently represent more of a "snap-shot" in time rather than long-term continuing trends. However, the results presented here still give us an idea of what factors need additional monitoring in the years to come.

Species Accumulation:

For an area that has received limited ornithological interest, like the RMC, one of the first avenues of research is to simply describe the bird community, the relative abundance of different species and their phenology throughout the year. All species encountered over the course of our research are listed in the appendix, along with capture rates. We also performed species-accumulation analyses to predict the species richness of the overall bird community at RMC that we can document with mist nets (Figure 1).

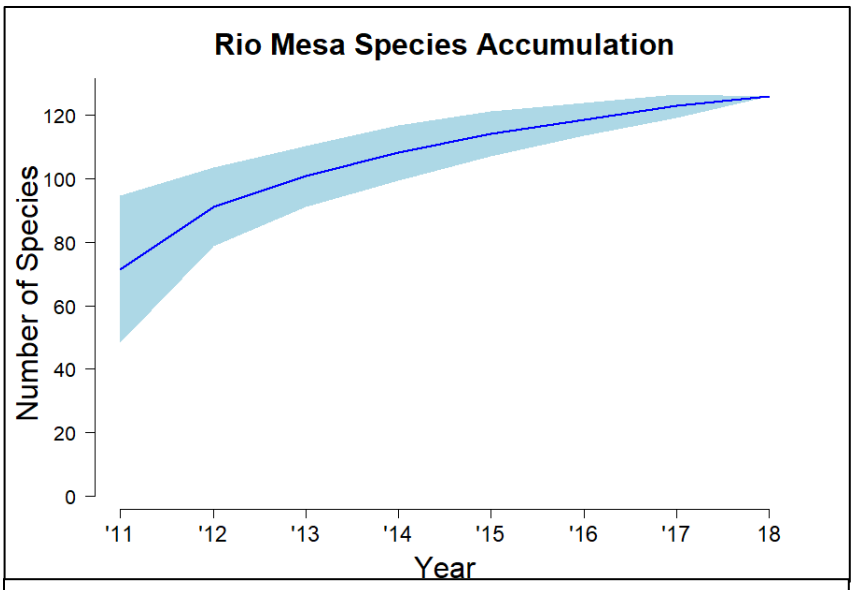

Figure 1. Species accumulation analysis over the course of 7 ½ years of banding at RMC. Total predicted species capable of being sampled by mist-netting is 151.

When we started this project in 2011, only 44 species had been recorded at Rio Mesa. Our model predicts that the bird community at RMC that can be sampled with banding is approximately 151 species though this figure could vary by 10 species in either direction (141-161 species). It is important to keep in mind that this analysis is based on banding data and thus cannot incorporate species unlikely to be caught in mist-nets such as herons or large raptors. Because of this, 151 species is likely an underestimate of the bird species richness at the RMC. However, the total number of species observed at the RMC, banded or otherwise, currently stands at 190. Therefore we can be reasonably sure that there are still a handful of species that occasionally make use of the habitat at RMC and have yet to be recorded in mist nets. We record new species every year and at this rate we expect that the RMC bird list will exceed 200 species within a decade. A greater understanding of the number of species that regularly or occasionally use the RMC's riparian habitat will be critical to ensure successful conservation action. Moreover, as climates continue to warm, we may see the arrival of more southerly species at the RMC.

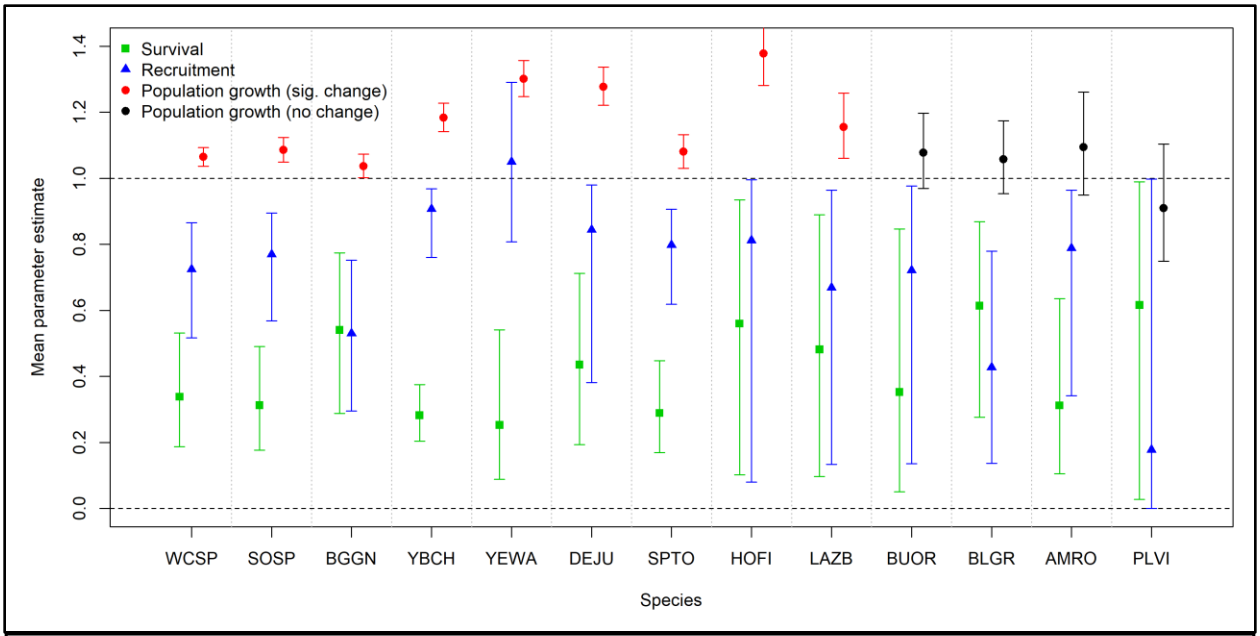

Figure 2. Demographic rates of 13 bird species at the RMC. Survival (green squares) is the proportion of individuals that leave the population each year (deaths and emigration). Recruitment (blue triangles) is the proportion of new individuals that join the population each year (births and immigration). Population growth (circles) is the proportional change in the population each year. Nine species experienced population growth (red) while four were stable (black). Species are ordered from highest to lowest capture rates. WCSP = White-crowned Sparrow; SOSP = Song Sparrow; BGGN = Blue-gray Gnatcatcher; YBCH = Yellow-breasted Chat; YEWA = Yellow Warbler; DEJU = Dark-eyed Junco; SPTO = Spotted Towhee; HOFI = House Finch; LAZB = Lazuli Bunting; BUOR = Bullock's Oriole; BLGR = Blue Grosbeak; AMRO = American Robin; PLVI = Plumbeous Vireo

Demographics: We performed some basic mark-recapture modeling to estimate the survival, recruitment and population growth rates for commonly captured species at RMC. These estimates are based on tracking the capture history of individual birds over many years. Thus, our ability to estimate demographic information will improve substantially with each additional year of data gathered. We had sufficient data to estimate rates for 13 species (Figure 2). That populations appear to be increasing for most of the species is reassuring, despite the fact that many species are declining nationally as determined by the United States Geological Survey, the most comprehensive bird monitoring project in the country[8]. Of the nine species showing population increases, three are declining nationally while six are stable. Of our four stable species, three are increasing nationally while one is stable. It is worth noting, however, that our ability to confidently estimate population growth rates depends on sample size and the four 'stable' species are the species with the lowest capture rates.

Future Directions

The next few years promise to be an exciting time for our ornithological research at the RMC. With additional years of data, our ability to accurately monitor the changes in bird populations and community composition will improve greatly and we will

soon be able to estimate migratory arrival and departure dates. These data are especially important now given the accelerating pace of climate change and the ramifications for riparian ecosystems[9]. Our work at the RMC will continue to be one of the only locations in Utah producing this kind of valuable data and will be integral in developing conservation regulations in the near future. We also plan to continue our outreach program, bringing several groups to the station. These efforts will help more people understand the necessity of conservation biology, ecology and ornithology research and the importance of ensuring healthy ecosystems.

Literature Cited

1. Şekercioğlu, Ç. H. Promoting community-based bird monitoring in the tropics: Conservation, research, environmental education, capacity-building, and local incomes. *Biol. Conserv.* **151,** 69–73 (2012).
2. Parrish, J. R., Norvell, R. E., Roberts, D., White, H. & Howe, F. P. *Population Monitoring of Neotropical Migratory Birds in Riparian Habitats of Utah*. (2007).
3. Seavy, N. E. *et al.* Why climate change makes riparian restoration more important than ever: Recommendations for practice and research. *Ecol. Restor.* **27,** 330–338 (2009).
4. Desante, D. F. *et al.* MAPS Manual 2016 Protocol. (2016).
5. Ralph, C. J., Geupel, G. R., Pyle, P., Martin, T. E. & DeSante, D. F. Handbook of Field Methods for Monitoring Landbirds. *Director* **144,** 1–41 (1993).
6. Sodhi, N. S., Butler, R., Laurance, W. F. & Gibson, L. Conservation successes at micro-, meso- and macroscales. *Trends Ecol. Evol.* **26,** 585–594 (2011).
7. Newmark, W. D. A 16-year study of forest disturbance and understory bird community structure and composition in Tanzania. *Conserv. Biol.* **20,** 122–134 (2006).
8. Sauer, J. R. *et al.* The North American Breeding Bird Survey, Results and Analysis 1966-2013. Version 01.30.2015. (2014).
9. Niman, R. J., Decamps, H. & Pollock, M. The Role of Riparian Corridors in Maintaining Regional Biodiversity. *Ecol. Appl.* **3,** 209–212 (1993).

Appendix: Capture rates for all species caught at RMC. Species with no capture records have only been observed

Species Name	Totals		
	Number Banded	Number Recaught	Number Unbanded
Waterfowl			
Canada Goose			
Mallard			
Blue-winged Teal			
Cinnamon Teal			
Northern Shoveler			
Green-winged Teal			
Common Merganser			
Duck spp.			
Grouse, Quails, and Allies			
Chukar			
Wild Turkey			***4***
Herons, Ibis, and Allies			
Great Blue Heron			
White-faced Ibis			
Vultures, Hawks, and Allies			
Turkey Vulture			
Osprey			
Golden Eagle			
Northern Harrier			
Sharp-shinned Hawk	***5***		
Cooper's Hawk	***1***		
Northern Goshawk			
Bald Eagle			
Swainson's Hawk			
Red-tailed Hawk			
Rough-legged Hawk			
Rails, Gallinules, and Allies			
Sora	***1***		
Shorebirds			
Killdeer			
Wilson's Snipe			
Spotted Sandpiper	***1***		

Pigeons and Doves			
Rock Pigeon			
Band-tailed Pigeon			
Eurasian-collared Dove			
White-winged Dove			
Mourning Dove	***18***		***4***
Owls			
Western Screech-Owl	***2***		
Great Horned Owl			
Northern Saw-whet Owl	***2***		
Nightjars			
Common Nightawk			
Common Poorwill	***2***		
Swifts			
Vaux's Swift			
White-throated Swift	***4***		***4***
Hummingbirds			
Costa's Hummingbird			***1***
Black-chinned Hummingbird			***176***
Broad-tailed Hummingbird			***24***
Calliope Hummingbird			***8***
Rufous Hummingbird			***60***
Hummingbird spp.			***4***
Kingfishers			
Belted Kingfisher			
Woodpeckers			
Williamson's Sapsucker	***3***	***2***	
Yellow-bellied Sapsucker	***1***		
Red-naped Sapsucker	***40***	***1***	
Downy Woodpecker	***3***		
Hairy Woodpecker	***2***		
Northern Flicker (Red-shafted)	***24***	***3***	***2***
Falcons and Caracaras			
American Kestrel			
Merlin			
Peregrine Falcon			
Prairie Falcon			
Flycatchers and Allies			
Olive-sided Flycatcher	***3***		

Western Wood-pewee	***96***	***4***	***2***
Willow Flycatcher	***200***	***11***	
Western Flycatcher	***5***		
Pacific-slope Flycatcher	***2***	***2***	
Cordilleran Flycatcher	***9***		
Yellow-breasted Flycatcher	***1***		
Hammond's Flycatcher	***21***		
Dusky Flycatcher	***194***	***28***	***1***
Gray Flycatcher	***47***	***5***	***1***
Black Phoebe	***2***		***1***
Say's Phoebe	***11***	***2***	
Ash-throated Flycatcher	***63***	***11***	
Eastern Kingbird	***3***		
Cassin's Kingbird			
Western Kingbird	***10***	***3***	
Flycatcher spp.	***38***	***1***	***2***
Shrikes			
Loggerhead Shrike	***7***		
Northern Shrike			
Vireos			
Bell's Vireo		***1***	
Plumbeous Vireo	***17***	***3***	
Cassin's Vireo	***12***		
Warbling Vireo	***218***	***23***	
Gray Vireo	***29***	***6***	
Red-eyed Vireo	***1***		
Vireo spp.			
Crows and Jays			
Pinyon Jay			
Woodhouse's Scrub-jay	***23***	***1***	
Black-billed Magpie			
American Crow			
Common Raven			
Larks			
Horned Lark			
Martins and Swallows			
Northern Rough-winged Swallow			
Tree Swallow			
Violet-green Swallow	***7***		
Bank Swallow			

Barn Swallow	***1***		
Cliff Swallow	***2***		
Swallow spp.			
Chickadees and Allies			
Black-capped Chickadee	***27***	***7***	
Mountain Chickadee	***13***	***2***	
Juniper Titmouse	***7***	***1***	
Bushtit	***217***	***64***	***16***
Nuthatches and Creepers			
Brown Creeper	***3***		
Red-breasted Nuthatch	***1***		
White-breasted Nuthatch			
Wrens			
Bewick's Wren	***184***	***66***	***12***
Rock Wren	***20***	***11***	
Canyon Wren	***12***	***9***	***1***
House Wren	***73***	***15***	***1***
Winter Wren	***1***		
Marsh Wren	***35***		***2***
Gnatcatchers and Kinglets			
Blue-gray Gnatcatcher	***593***	***136***	***15***
Golden-crowned Kinglet	***2***		
Ruby-crowned Kinglet	***479***	***80***	***30***
Thrushes			
Mountain Bluebird	***2***		
Western Bluebird			
Townsend's Solitaire	***6***	***2***	
Swainson's Thrush	***19***	***3***	***1***
Hermit Thrush	***208***	***57***	***3***
American Robin	***37***	***18***	***2***
Mockingbirds and Thrashers			
Gray Catbird	***35***	***3***	
Northern Mockingbird	***9***	***1***	
Brown Thrasher	***1***		
Sage Thrasher	***40***	***13***	***1***
Starlings and Mynas			
European Starling			
Wagtails and Pipits			
American Pipit			

Waxwings			
Cedar Waxwing	***2***		
Wood Warblers			
Northern Waterthrush	***17***		
Orange-crowned Warbler	***265***	***35***	***1***
Nashville Warbler	***31***	***2***	
Virginia's Warbler	***81***	***11***	
Lucy's Warbler	***46***	***55***	***1***
MacGillivray's Warbler	***358***	***42***	***6***
Common Yellowthroat	***138***	***3***	***2***
American Redstart	***2***	***2***	
Northern Parula	***2***		
Magnolia Warbler	***4***	***1***	
Yellow Warbler	***507***	***98***	***3***
Black-throated Blue Warbler	***1***	***1***	
Palm Warbler	***1***		
Yellow-rumped Warbler (Unidentified)	***22***		
Yellow-rumped Warbler (Audubon's)	***468***	***28***	***5***
Yellow-rumped Warbler (Myrtle)	***22***	***6***	
Yellow-rumped Warbler (MxA)	***7***		
Black-throated Gray Warbler	***13***		
Townsend's Warbler	***4***		
Wilson's Warbler	***929***	***85***	***15***
Yellow-breasted Chat	***559***	***427***	***14***
Warbler spp.			***1***
Sparrows			
Green-tailed Towhee	***88***	***37***	***1***
Spotted Towhee	***326***	***146***	***20***
Vesper Sparrow	***23***		***2***
American Tree Sparrow	***1***		
Chipping Sparrow	***76***	***22***	
Clay-colored Sparrow	***12***	***6***	
Brewer's Sparrow	***533***	***100***	***11***
Lark Sparrow	***28***	***2***	***1***
Lark Bunting			
Black-throated Sparrow	***35***		
Sagebrush Sparrow	***52***	***2***	
Savannah Sparrow	***1***		
Song Sparrow	***620***	***184***	***13***
Lincoln's Sparrow	***343***	***66***	***11***

Grasshopper Sparrow	***6***		
Fox Sparrow	***4***		
Dark-eyed Junco (Unidentified)	***13***		***2***
Dark-eyed Junco (Gray-headed)	***8***		
Dark-eyed Junco (Oregon)	***365***	***143***	***13***
Dark-eyed Junco (Pink-sided)	***31***	***11***	
Dark-eyed Junco (Slate-colored)	***6***	***4***	
White-throated Sparrow	***20***	***5***	***1***
White-crowned Sparrow (Unidentified)	***319***	***77***	***15***
White-crowned Sparrow (Mountain)	***230***	***16***	***5***
White-crowned Sparrow (Gambel's)	***511***	***221***	***33***
Golden-crowned Sparrow	***1***		
House Sparrow			
Sparrow spp.	***1***		***2***
Cardinals			
Summer Tanager	***1***		
Western Tanager	***247***	***11***	***2***
Rose-breasted Grosbeak	***1***		
Black-headed Grosbeak	***72***	***3***	***2***
Blue Grosbeak	***63***	***12***	***2***
Lazuli Bunting	***104***	***25***	
Indigo Bunting	***6***	***1***	
Painted Bunting			***1***
Orioles and Blackbirds			
Red-winged Blackbird	***1***		
Western Meadowlark	***2***		
Yellow-headed Blackbird			
Brewer's Blackbird			
Common Grackle			
Brown-headed Cowbird	***27***	***3***	***1***
Hooded Oriole	***2***		
Bullock's Oriole	***64***	***15***	***1***
Finches and Allies			
Cassin's Finch	***2***		***1***
House Finch	***190***	***25***	***11***
Pine Siskin	***46***	***1***	***1***
Lesser Goldfinch	***48***	***1***	
American Goldfinch	***11***		
Evening Grosbeak			