2018 – 2020 Progress Report

1. Introduction

This progress report was prepared by the Utah Black Rosy-finch Study Partnership, led by the Department of Defense, Tracy Aviary, U.S. Forest Service, Utah Division of Wildlife Resources, Utah State University, and Wild Utah Project. Major contributions to the study and report were made by Kim Savides at Utah State University. We are appreciative of the many partners that made this work possible: Alta Ski Area and Alta Environmental Center, Beaver Mountain, Bridgerland Audubon Society, Brighton Institute, Cottonwood Canyons Foundation, Friends of Alta, Great Salt Lake Audubon, Powder Mountain, Powder Ridge Condominiums, Snowbird Ski and Summer Resort, Solitude Mountain Resort, Snowbasin Resort, The Nature Conservancy – Canyonlands Research Center, Town of Alta, U.S. Fish and Wildlife Service, and many dedicated volunteer community scientists.

The purpose of this report is to communicate the progress of our Study to our peers and stakeholders throughout the range of all three rosy-finch species.

Black Rosy-finch (*Leucosticte atrata*) are one of the least understood birds in North America. Climate change threatens their high-elevation breeding habitat and very little is known about their life history, making them a high priority for conservation (Conrad 2015). The U.S. Fish and Wildlife Service, Partners in Flight, Utah Division of Wildlife Resources, and U.S. Forest Service identify Black Rosy-finch as a species of conservation concern. A significant hurdle in understanding threats to the Black Rosy-finch and its future well-being is an absence of the most basic life history and demography information. The lack of data limits effective conservation actions critical to ensuring that populations can be sustained, even in the face of threats like climate change (Paprocki and Pope 2019, Brown et al. 2018, Johnson 2002). The Utah Black Rosy-finch Study was developed to fill these data gaps, make recommendations based on the data, and conserve the Black Rosy-finch. The goal of the Study is to understand the life history requirements and demography of Black Rosy-finch in Utah to ensure this species persists into the future, while providing data to managers and practitioners through the specie's range.

2. Methods

Study Design

Our Phase I pilot efforts (2019) established the feasibility of our methods and these were continued and expanded upon into Phase II (2019 - 2020). Our research has two main components: (1) establish a

network of high-tech radio frequency identification (RFID)-enabled bird feeders to digitally resight and record feeder use by marked birds; and (2) conduct community science-based feeder counts.

Study Area

The Study focuses on bird feeders maintained at ski areas, nature centers, and private residences in Northern Utah. Mountain sites provide food for wintering finches, as well as accessible places for data collection (**Appendix 1**). The four pilot feeder locations in Little Cottonwood Canyon were expanded to 12 feeders across five Utah regions in 2019-2020; Little Cottonwood Canyon (3), Big Cottonwood Canyon (3), Dugway Proving Grounds (2), Powder Mountain and Snowbasin (3), and Beaver Mountain (1). Study sites were maintained by a mixture of dedicated volunteers, project scientists, land owners, and ski patrollers.

RFID-enabled Feeders & Banding

Feeders

Each site participating in the study was provided with a custom-built RFID enabled bird feeder and seed if requested. Feeders consist of a large PVC tube with a screw lid, two feeding ports, loop antenna perches, a circuit board/battery, and a solar panel (**Figure 1**). Feeders were either mounted to existing structures or on mobile, free-standing poles to allow feeders to be adjusted with changing snow levels. Feeders were maintained full of black oil sunflower seed throughout the season (December - late April). Unfortunately, this year most feeders could not be maintained through the whole season due to ski resort closures amid the pandemic. However, the feeders which were frequented by rosy-finches were able to be maintained continuously thanks to very dedicated patrollers, volunteers, and homeowners.

Figure 1. Rosy-finch study feeder design. Note black loop antennas on the perches, electronics box, and solar panel.

Feeder hosts and other volunteers were effective in filling the bird feeders with seed, cleaning feeders, and downloading data from the SD card. Troubleshooting the antennas and RFID-reader can be difficult. If using community members and volunteers to maintain feeders, very detailed instructions were provided or a project scientist addressed the issue personally. The addition of dipping the antennas in liquid rubber increased the durability of the antennas this season. Leads were occasionally found snapped where pinched by the box lid or chewed by squirrels. Silica packets were effective in reducing moisture from the equipment boxes.

Trapping

Individual birds were captured using mist-nets (36 mm) or ground traps (0.5 inch coated hardware cloth) at four of the study sites, both were effective in catching rosy-finches. Ground traps became especially helpful when windy and snowy conditions eliminated mist nets as a capture option. In northern Utah,

Gray-crowned Rosy-finches are the dominant species in finch flocks, Black Rosy-finches are much less numerous. In order to capture Black Rosy-finches, the management of "by-catch" (i.e., species that are not rosy-finches) should be considered. The ground traps were effective as rosy-finches could easily be removed from the traps and by-catch let go quickly. The rosy-finches habituated to the ground trap quickly when it was left open for several minutes before trapping began. With the addition of a manual trap trigger, a volunteer or bander had the option to wait to spring the trap until a particular bird (i.e., Black Rosy-finch) entered the trap. This also allowed for greater participation and reward experience to volunteers assisting in the banding process while maintaining bird safety and maximizing capture rates.

The mist-nets were very effective at catching Black Rosy-finches. We found that a V-shape made by setting up two nets, one on either side of the bird feeders, was most effective. The birds could be startled off the feeders and into the nets and captured fairly reliably. However, banders should ensure they are able to extract and process large volumes of birds at once when utilizing this technique. The birds were able to see the mist-net against the white snow and often avoided it, so startling was often necessary for the birds to fly into the nets. A disadvantage of the mist-nets is capturing by-catch such as Mountain Chickadees. Removing by-catch from the nets can be very time consuming, overwhelming staff, and taking away from attempts to capture rosy-finches.

During most of the winter, the best time for trapping was on snowy days. Black Rosy-finches tend to move to lower elevation bird feeders during snow storms, facilitating capture. By late April and into May, Black Rosy-finches were very active at the feeders in Little Cottonwood Canyon and at Powder Mountain, and could be readily captured in all weather, including clear days.

Figure 2. A Black Rosy-finch banded with an aluminum band and a green RFID band.

Banding

As part of the Study, birds were banded with a federal metal band on one leg and with a small passive integrated transponder tag (RFID band) on the other and released unharmed (**Figure 2**). The tag provides a unique identification code for each bird that is read automatically by the RFID-enabled feeders when an individual perches on the antenna.

In the 2019 pilot season and beginning of the 2019-2020 season only Black Rosy-finches were RFID banded, while Gray-crowned Rosy-finches were only metal banded. In order to increase the sample size of tagged birds and learn more about Gray-crowned Rosy-finch survival and feeder attendance, for the remainder of the 2019-2020 season all rosy-finch species caught were metal and RFID banded if conditions allowed. Captured birds were either banded outdoors in a place sheltered from the snowfall, or in an unheated building entryway. All birds were released unharmed. Birds banded in 2019 received a black 2.6 mm, model EM4102 125KHz RFID band (Eccel Technology LTD, Groby, Leicester, UK). In the 2019-2020 season, rosy-finches in Little Cottonwood Canyon received blue or yellow RFID bands and birds at Powder Mountain received reddish-pink or green RFID bands. It should be noted a few Gray-crowned Rosy-finches in Little Cottonwood Canyon received green RFID bands due to a

shortage of yellow bands. A total of 223 rosy-finches were RFID banded in 2019-2020, of which 14 were Black and 209 were Gray-crowned Rosy-finches. An additional 59 Gray-crowned Rosy-finches were metal banded only, yielding a total of 283 rosy-finches newly marked on the project this season and two returning Gray-crowned Rosy-finches recaptured. Banding occasions and rosy-finches banding numbers are displayed in **Appendix 2**.

We would have liked to have increased the number of banding days March through April. However due to local public health restrictions during those months, banding opportunities in the Town of Alta were cancelled. Banding at Powder Mountain was permitted and as very productive during that time frame.

Feeder Counts

Overview

Feeder counts were conducted with support from community scientists using two methods: standardize counts and opportunistic counts. Standardized counts of Black Rosy-finches at feeders will serve as the link between where and when Black Rosy-finches are seen, and provide species compositions and ratios of banded to unbanded birds in flocks. Opportunistic counts can also contribute useful data, no matter when the finches show up at feeders.

All volunteer feeder counters either attended an in-person training event in Salt Lake City or Ogden, Utah before the first count window, or viewed a recording of one of the training sessions posted publicly online (Savides 2020). Each participant additionally had access to a Feeder Count Guide posted online which contained a project overview, natural history information, identification tips, count protocols, counting tips, and other resources (Savides & Rushing 2020).

The Black Rosy-finch count season ran from mid-January to the end of April. This season was broken into five 3-week count windows. Count volunteers were asked to select 1 day within each 3-week window to survey based on their availability. Participants were asked to schedule count days in advance when possible to ensure consecutive counts are at least 5 days apart. Scheduling counts in advance additionally reduces bias of counting only when large numbers of birds are present. Volunteers were given flexibility to conduct counts on different days of the week and times of day - selecting times and dates convenient to their schedule and safe traveling conditions.

On count days, volunteers watched feeders and the surrounding area for rosy-finches and chickadees for a total of 20 minutes. Volunteers were asked to count and record the maximum number of each rosy-finch and chickadee species they were able to see at once. Priority was assigned to counts of Black Rosy-finches, followed by Gray-crowned Rosy-finches and chickadees. To additionally engage volunteer counters, especially in areas where rosy-finches were not necessarily expected, volunteers were given the option to count the maximum number of any additional species not specified on the provided datasheet. During the trainings, the value of “Zero Counts” to the project was reinforced. Even though you might not expect a rosy-finch to attend a specific feeder, knowing that the species was not present still contributes valuable data to our understanding of rosy-finch habitat selection.

At RFID feeders, volunteers were asked conduct a 10-min survey looking for banded birds. In those 10-minutes, volunteers scanned the flock looking for RFID bands and recorded the number of RFID banded Black Rosy-finches out of the number they checked for bands, producing a proportion of banded Black Rosy-finches present. This time also allowed volunteers to take note of banded Gray-crowned Rosy-finches. Though the latter was not explicitly asked for, several volunteers noted this on their datasheets.

3. Results

Feeder Data

Feeder Usage

Of the 12 RFID feeders, four feeders in two regions recorded banded rosy-finches (Little Cottonwood Canyon 3, Powder Mountain 1). A total of 24,992 tag reads were recorded at 10 second intervals. Raw tag read data were run through the visits function in the feedr package (LaZerte 2020) in Program R to collapse consecutive tag reads into discrete visits by each tagged individual (R Core Team 2019). We recorded 11,384 feeder visits by 91 tagged rosy-finches (Little Cottonwood Canyon n= 46, Powder Mountain=45). Ten tagged Black Rosy-finches were recorded at our feeders, including three returning birds from the pilot 2019 season (out of 11 banded that season).

Overall feeder usage did not statistically differ in the length of each feeder visit ($p = 0.39$) or number of days ($p = 0.35$) in which each individual tagged bird used the feeders between the two regions, Little Cottonwood Canyon and Powder Mountain (**Figure 3**). However, birds banded in Little Cottonwood Canyon averaged 2.9 more visits to the feeder per feeder visit-day than Powder Mountain banded birds ($\mu_{\text{Little Cottonwood Canyon}} = 3.37$ visits/visit-day, $\mu_{POWD} = 6.06$ visits/visit-day, $p = 0.004$.

When aggregating across the two regions, and differentiating by species, we found tagged Black Rosy-finches to use the feeders more often than tagged Gray-crowned Rosy-finches (**Figure 4**). Black Rosy-finches visited study feeders an average of 13.5 more days than Gray-crowned Rosy-finches ($\mu_{BLRF} = 27.3$ days, $\mu_{GCRF} = 13.7$ days, $p = 0.028$), but Black Rosy-finches and Gray-crowned Rosy-finches made a similar

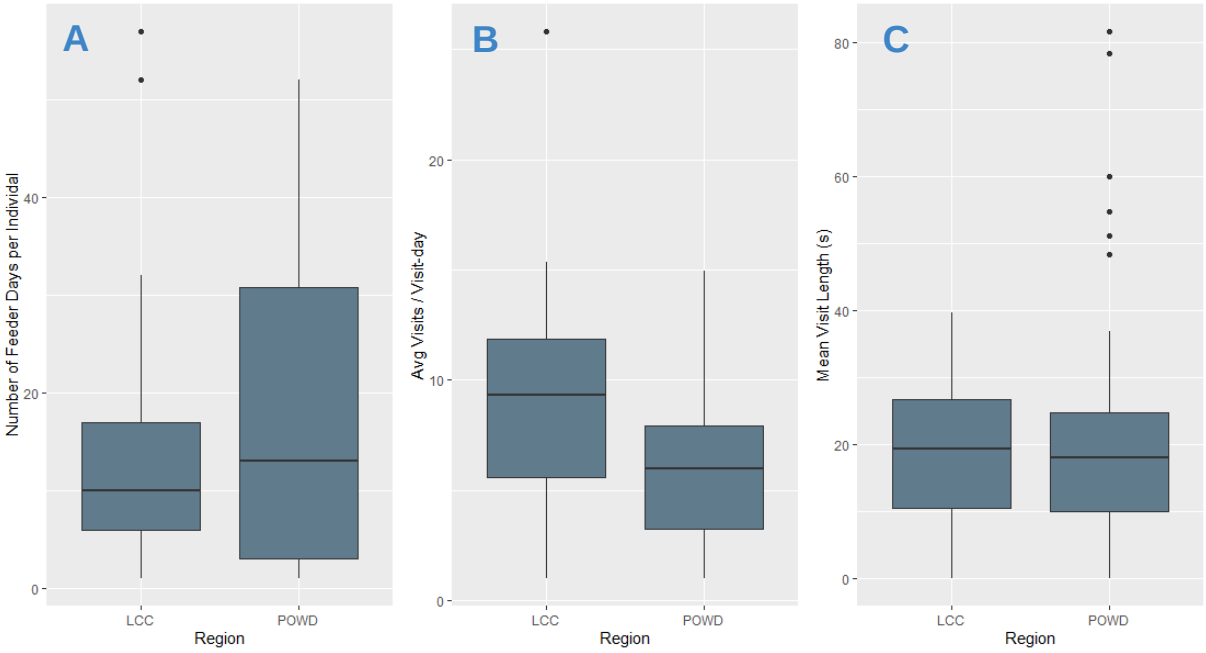

Figure 3. Comparing feeder usage of both Black Rosy-finch and Gray-crowned Rosy-finch between regions (Little Cottonwood Canyon [LCC] and Powder Mountain [POWD]) by (A) average number of days each tagged individual visited the feeder, (B) average number of visits per number of days each tagged bird used the feeder, and (C) the mean visit length of tagged birds.

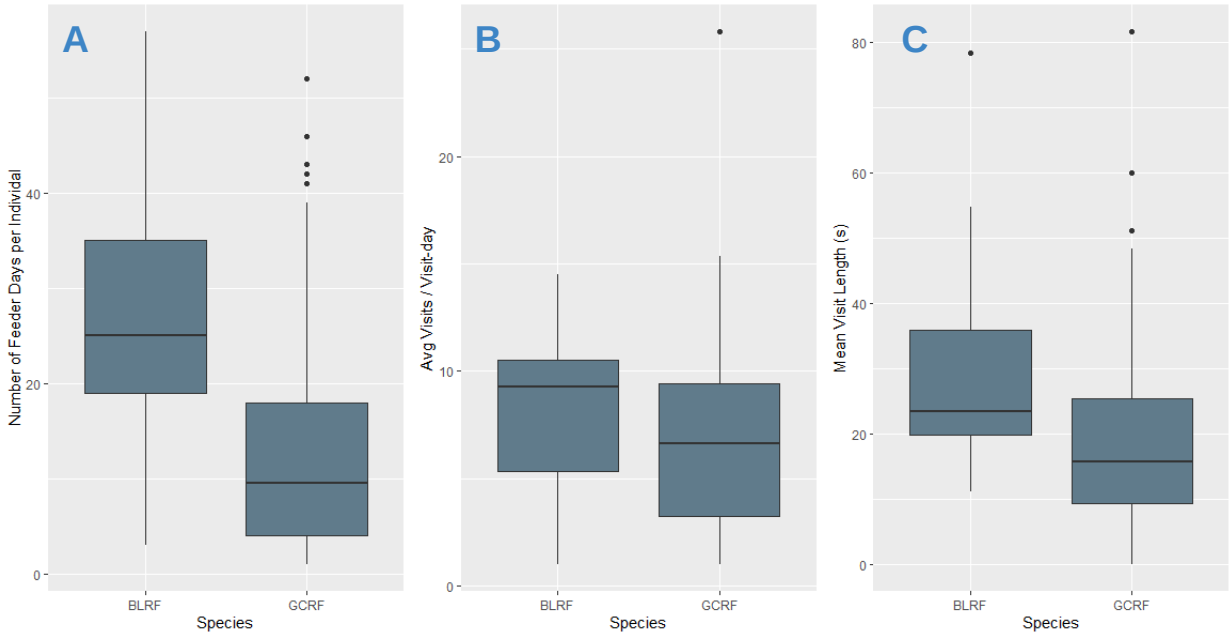

Figure 4. Comparison between Black Rosy-finch (BLRF) and Gray-crowned Rosy-finch (GCRF) feeder usage across the two regions by (A) average number of feeder visits made by a tagged individual, (B) average number of visits each tagged bird made per day it visited the feeder,

number of individual visit each day they used the feeder (μ_{BLRF}= 7.9 visits/visit-day, μ_{GCRF} = 6.9 visits/visit-day, p = 0.44). The average length of a Black Rosy-finches feeder visit was slightly longer than that of

Returning Black Rosy-finches

In winter 2020, we recorded three returning Black Rosy-finches from winter 2019, all in Little Cottonwood Canyon. Though only three birds returned, our feeders recorded an interesting pattern of feeder use (**Figure 7**). One bird (01103F6656, banded 8 Mar 2019) used the feeders from around the time feeders were set up in early December until 20 March. Around that same date, the other two returning Black Rosy-finches (01103F841E and 011016EED3, both banded 4 April 2019) began visiting the feeders. Based on incidental observations and eBird data, we hypothesized there might be two groups of Black Rosy-finches using Little Cottonwood Canyon. One group, smaller in numbers, seems to occupy the region from December through at least March. At which point Black Rosy-finches numbers increase in the region, presumably from individuals entering the region from outside the immediate area. Black Rosy-finch "011016EED3" was also visually observed in Alta during breeding season surveys on 23 July 2020. This male was seen with fledglings in the immediately vicinity.

Whether group one continues to occupy the region with group two would be unknown without resighting marked individuals. Our returning bird data, though small in sample size, lends some support to this hypothesis. This data most importantly highlights the lack of population closure over the traditional "wintering" stage of the full annual cycle. We must use caution when defining winter residency and abundance in future analyses. We hope to continue to investigate this hypothesis with more potential returning birds in 2021, look for similar or contrasting patterns in Gray-crowned Rosy-finches, and define periods of population closure if they exist.

Spatial Feeder-use

We hoped positioning feeders in several regions and several sites within each region would provide information about space-use and regional movements. A major advantage to RFID resighting over traditional resighting methods when movement events are short or infrequent is constant, simultaneous observations over space and time.

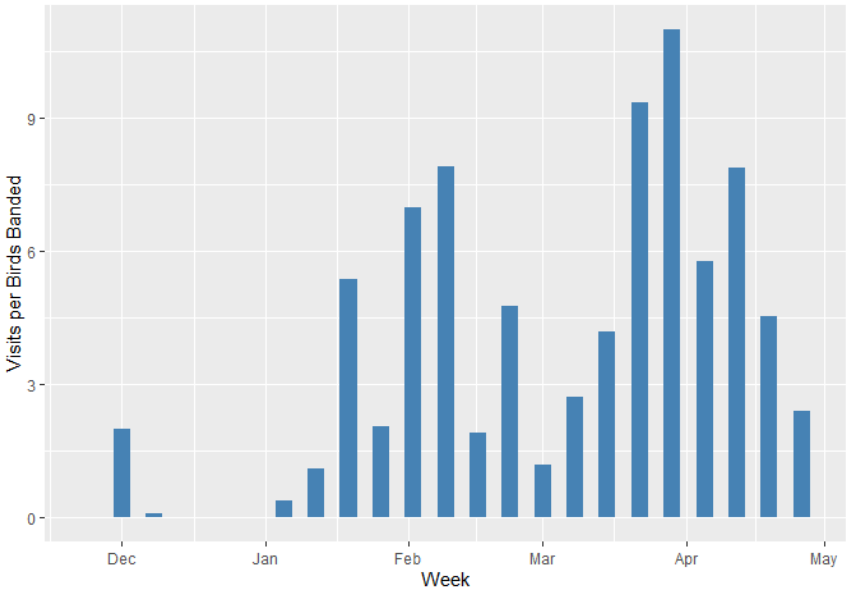

Figure 5. Number of visits per birds banded at study feeders by tagged Black Rosy-finch and Gray-crowned Rosy-finch during each week. Newly banded birds were added to the population throughout the study.

The three feeders in Little Cottonwood Canyon are spaced within 2 km of each other. These three feeders all recorded a subset of individuals from the other two feeders. By casually resighting banded birds and watching flocks move, we knew rosy-finches in Little Cottonwood Canyon moved around at least locally throughout the winter. However, of the two feeders at Powder Mountain placed 0.2 km apart, only one attracted any rosy-finches.

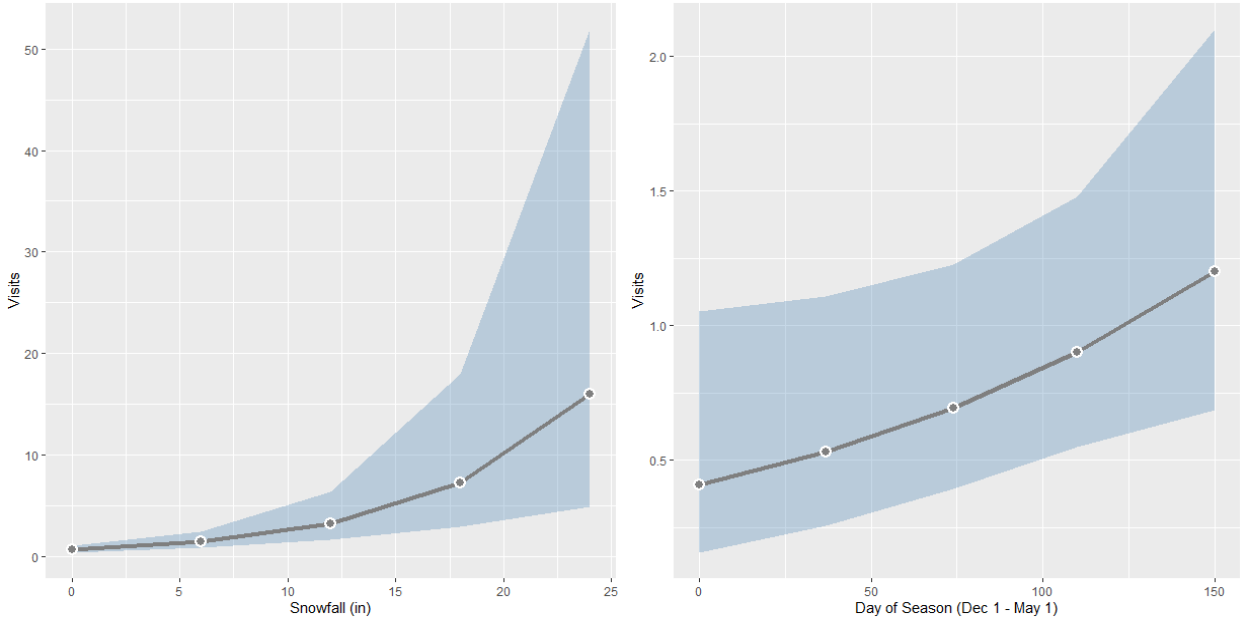

Figure 6. Effect sizes of snowfall and day of season on rosy-finch feeder visits in Little Cottonwood Canyon. Gray lines represent mean effect while blue regions represent estimated 95% confidence intervals.

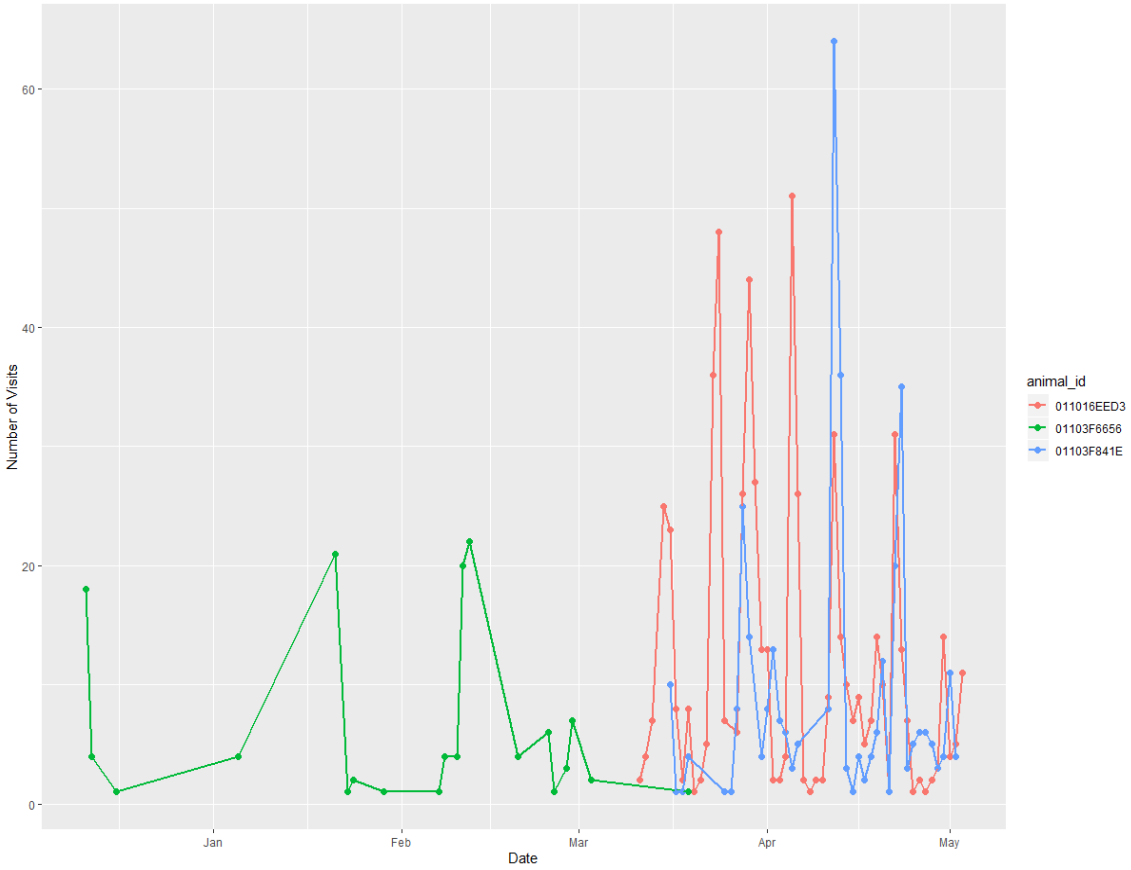

Figure 7. Feeder visits by date of three returning Black Rosy-finch banded in the 2019 season.

Our feeder network recorded one individual making regional forays away from its banding location. This individual was a second-year male Gray-crowned Rosy-finch banded at Powder Mountain on 19 February 2020. It used its "home" feeder almost daily from banding though 17 March 2020. The same individual was recorded using the feeder at the top of Collin's Lift at Alta Ski Area, 90 km away, on two separate occasions. The individual was recorded at Powder Mountain 27 March 2020 in the late morning and then in Alta early that same afternoon. The bird was recorded again in Powder Mountain the following morning. After its last record at Powder Mountain, this bird was recorded 6 days later again at Collin's Lift at Alta Ski Area. This observation, though anecdotal, suggests Gray-crowned Rosy-finches may move regionally throughout the winter season. With a now large, established sample of tagged birds we plan to look for additional movements such as this next season. Regional movements of Gray-crowned Rosy-finches may contribute to lower feeder-use days as compared to Black Rosy-finches. This observation highlights the great advantage of using RFID resighting. Next season we hope a large sample of returning Gray-crowned Rosy-finches will provide more robust data on feeder usage and regional movements.

Feeder Counts

Over the count season (mid January through late April), volunteers conducted a total of 118 feeder surveys at 17 locations for rosy-finches in Northern Utah (**Appendix 3**). Participation levels varied between volunteers and count sites. This was due in part to a sudden lack of access to feeder sites in the

midst of public health closures of ski areas. Though the survey dataset is not as robust in number of surveys as anticipated, these data highlight rosy-finch occupancy phenology and mirror activity recorded by RFID feeders.

Participation

Participation overall was lower than expected. Of over 200 people who either attend the in-person training or watched the webinar training, only 29 volunteers submitted feeder counts to the project. Attendees of the training seemed discouraged by the low likelihood of observing rosy-finches at their home feeders (non-mountain residences). In coming seasons, we should continue to emphasize the value of zero counts and highlight the relatively low commitment (i.e., one or two 20-minutes surveys per month). We should also brainstorm ways to better communicate the importance of repeated counts at the same location throughout the season. Repeated surveys by individual volunteers and overall as a group form the basis of the robust dataset we are striving to collect.

Further thought should go into targeting volunteer bases outside of the Study's partner organizations, including regional Audubon chapters, birding Facebook groups, ski groups, and other non-profit organizations. Reaching communities outside of the Salt Lake City area will expand our knowledge of Black Rosy-finch site occupancy and phenology. Though Utah is currently the focus of the Study, this protocol, minus the RFID subsurvey, can easily be implemented in other states with help from additional partner organizations.

Abundance & Detection

Our preliminary analysis of the feeder count data focuses solely on counts of Black Rosy-finches, rather than Gray-crowned Rosy-finches. To model predicted abundance at a count site, we formulated an N-mixture model of a single from our single-season abundance data in a Baysian framework (Kéry and Schaub 2012). We used the abundance of each site to model feeder presence probability over time, both date and time of day, with elevation as a covariate.

Abundance was modeled using the state process,

$$log(\lambda_i) = \alpha_0 + \beta_0 x_i \quad \textbf{(1)}$$

where we make the assumption abundance is a function of site elevation. Lambda represents the true abundance at a site i and x represents the elevation. The observed abundance is conditional on the state process. We modeled the observation process as a function of date and time of day, both as an additive and squared term

$$logit(p_{i,j}) = \alpha_1 + \beta_1 d_{i,j} + \beta_2 d_{i,j}^2 + \beta_3 d_{i,j} + \beta_4 d_{i,j}^2 \quad \textbf{(2)}$$

with d and h representing standardized date and hour of survey respectively, and $p_{i,j}$ being an independent Poisson random variable denoting the observed abundance during the jth survey of site i, and are related to the true patch abundance, λ_i.

The model yielded significant support for date, with counts and predicted abundance increasing with day of the season. However, the time of day the survey was conducted had little effect on Black Rosy-finch presence. Though, the probability of Black Rosy-finch being present at a feeder site tended to increase slightly toward the morning and late afternoon. Care should be used when interpreting the

increase of abundance with date. As highlighted by the returning Black Rosy-finch RFID data (**Figure 7**) and the overall RFID feeder usage (**Figure 5**), the population of Black Rosy-finch in Northern Utah is not closed over the whole count survey season. The late season abundance increase is likely driven by additional individuals entering the population and may be migrants.

In order to better guide survey protocols in future season, we also calculated P*, the probability of detecting the species at least once during *j* surveys of an occupied site. The accumulation of detection probability is moderate, achieving 50% certainty after two surveys and 95% certainty at five to seven surveys of a site (**Figure 8**). To ensure Black Rosy-finch are detected at a survey site given the species truly occupies the site, five or more surveys should be conducted. This guideline will help ensure adequate sampling at each site and can guide allocation of volunteer effort between sites.

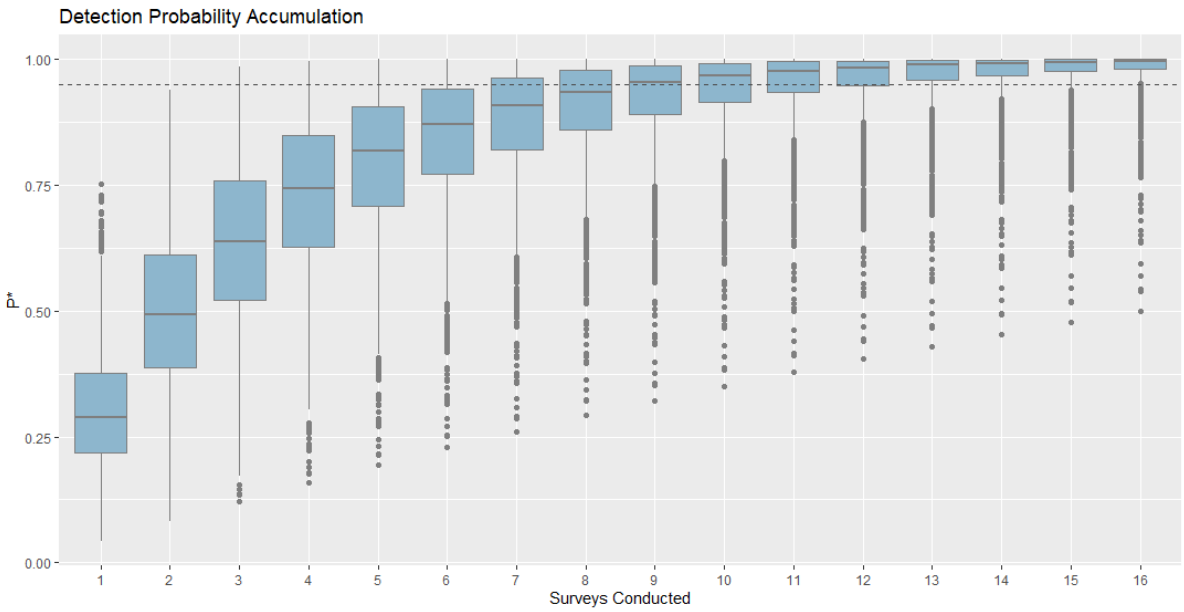

Figure 8. Estimated accumulation curve of detection probability of Black Rosy-finches at survey sites. The dashed line representing the 95% confidence threshold, is achieved between the fifth and seventh survey conducted.

4. Looking Forward

Successes and Challenges in Methodology

We've successfully piloted an automated capture and recapture method using RFID feeders. However, use of bird feeders by Black Rosy-finches is not as distributed throughout Utah as we initially thought. Only several locations were used by rosy-finches. Other, existing technologies are becoming miniaturized enough to be considered. So-called 'pinpoint' GPS tags are a notable new option to collect the movement data we seek. These 1.5 gm tags hold a battery-powered GPS unit and memory to collect and store up to a year's worth of occasional location data. However, there are several challenges to address. The tags must be recovered to download the data. Re-capturing birds to retrieve the data is a challenge, but in our Study we had an annual return rate of three out of 11 birds (27%). It should be noted for overwintering rosy-finches in Colorado, the recapture rate is as low as 3% to 7% (Russ Norvell, personal communication). The hand-built technology still suffers from an estimated failure rate of 15% to 30%. The cost-per-unit are expensive at approximately $900 each. Use of this technology may be considered in future phases, in limited or special circumstances.

Similarly useful in special circumstances, another option are Motus tags. These very small (less than 1 gram) and relatively inexpensive (less than $200/each) radio tags broadcast a unique numeric ID only a short distance (15 to 20 km), but can be solar powered and do not need batteries nor to be recaptured. The downside is that a special antenna, usually a powered tower with internet, is needed to 'listen' for the broadcast ID. Creating a wide network of such towers is in progress, but still years away.

For the 2020-2021 season, we will maintenance the successful RFID feeders at Powder Mountain and Alta, continue banding and tagging rosy-finches. Based on our results, we will expand feeder counts through the region. Expanded volunteer feeder counts will help define the timing and numbers involved in the wintering populations. We can understand the species our tagged rosy-finches assemble with, which will help us connect the timing and movements of tagged birds to the large numbers of observed overwintering birds.

Partnerships

We have learned we are not alone in our quest to understand rosy-finches. Despite having differing focal rosy-finch species, management partners have near-identical rosy-finch data needs. These overlapping needs are to 1) identify breeding and wintering ranges, 2) estimate breeding and wintering abundances, 3) and the define the pathways and timings that connect them. Answers to these questions need a regional approach as we are linked by the fluid seasonal movements of the various rosy-finch species.

We are working with peers in Colorado and hopefully other regional partners to pool our knowledge and coordinate our effort to answer our common questions through a collaborative approach. We will actively seek to coordinate with our peers where our Study's rosy-finches may winter, like Sandia, New Mexico. We believe we can in turn provide data and support to partners in Idaho, Wyoming, and Colorado whose birds we may host overwinter in Utah. We are interested in providing RFID feeders to partners with established feeders (e.g. in southern Utah) and expertise for research partners seeking to expand their banding efforts to include RFID technology. We believe if partners establish two to three RFID feeder stations, and banding 15 to 20 Black Rosy-finches each, we can obtain the answers our shared management questions.

What We've Learned

Although data remains preliminary, we have a few key, valuable results. In Utah, we do not have a closed population. Utah canyons and likely regions at lower elevations (e.g., Dugway Proving Ground DoD, anecdotes from chukar hunters) appear to be occasional hosts to part of a large, relatively free-moving and nomadic wintering population. This population is composed of mostly Gray-crowned Rosy-finches, along with Black Rosy-finches. Currently, the scale of their movements is unknown.

We now have anecdotal evidence to support the apparent return of 'local' birds in late spring (i.e., late March and April). These birds may well be our local breeders because at least one Black Rosy-finch banded and tagged at Alta was also observed during nesting season in with juveniles nearby. This hypothesis is supported by our colleagues in Colorado who found low recapture rates for wintering flocks of rosy-finches, but high re-sighting of color-marked adults banded on local breeding areas. Local breeders may be moving out of our current spatial scope to overwinter, or may stick close - the movements of our tagged birds. It is our goal for data collection in winter 2020-2021 to provide more insight. This lack of population closure is a challenge to our analysis framework and study design, and highlights the need for a regional more approach.

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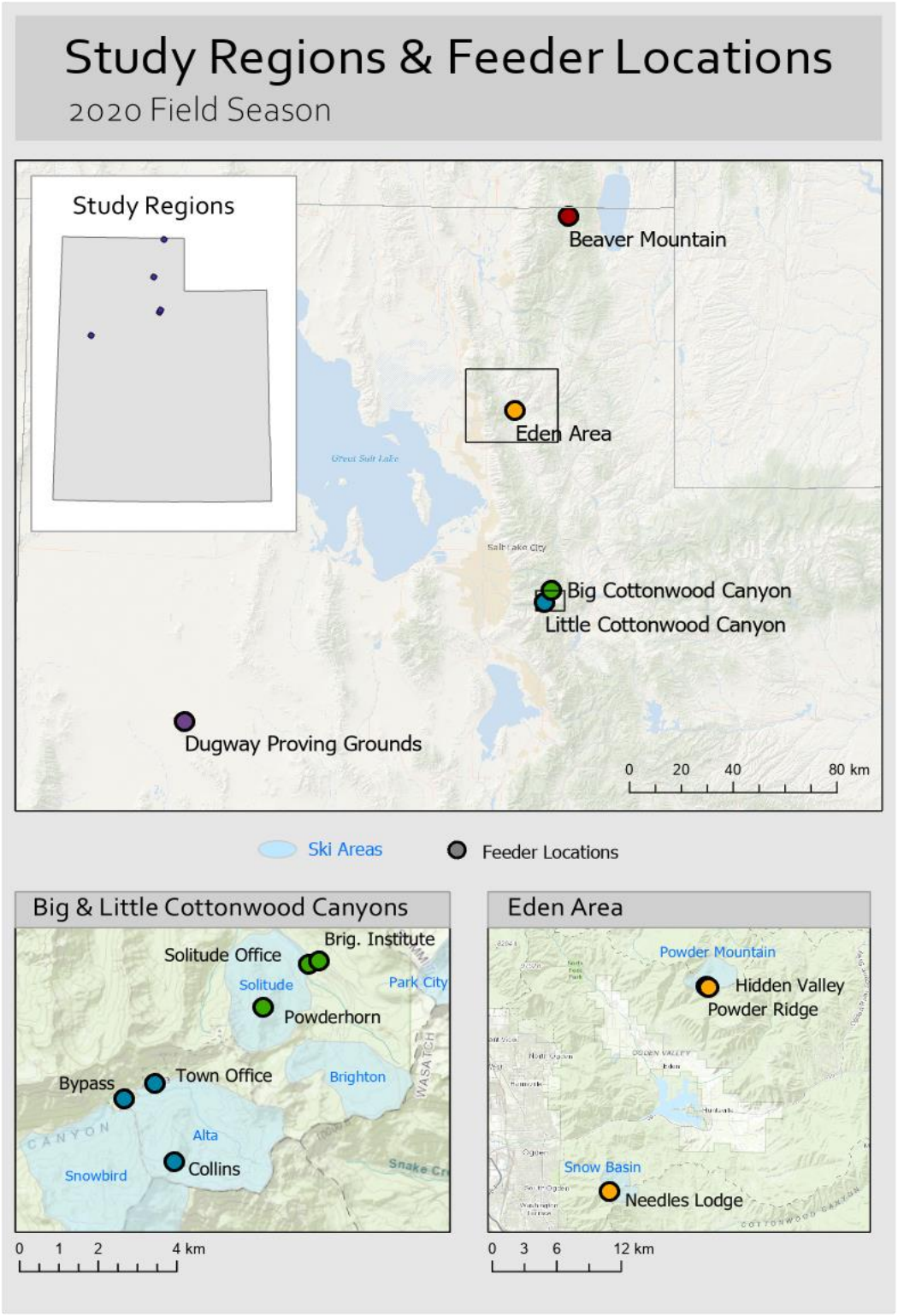
Appendix 1.

Map of the Utah Black Rosy-finch Study's 2020 study regions and feeder locations.



Appendix 2.

Banding effort and yield by species. Black Rosy-finch (BLRF) and Gray-crowned Rosy-finches (GCRF) were RFID banded upon initial capture. GCRF (m) denotes gray-crowns that were only metal banded on capture date. Recaptures with * denote birds recaptured with just metal bands and were released after adding RFID bands.

Date	Location	BLRF	GCRF	GCRF (m)	Recaptures
12/13/2019	Alta Town Office	0	0	0	0
01/17/2020	Alta Town Office	2	7	29	1* ('19 GCRF)
01/24/2020	Powder	0	16	0	0
02/14/2020	Alta Town Office	0	0	0	0
02/19/2020	Powder	0	27	0	0
02/21/2020	Alta Town Office	0	0	0	0
03/06/2020	Beaver	0	0	0	0
03/13/2020	Alta Town Office	1	63	26	1* ('20 GCRF)
03/20/2020	Alta TO	5	16	11	4 ('20 GCRF) 4* (3 '20, '19 GCRF)
04/03/2020	Alta Bypass Road	0	6	0	1 ('20 GCRF) 1* ('20 GCRF)
04/09/2020	Powder	0	22	0	1 ('20 GCRF)
04/15/2020	Powder	1	38	0	0
04/23/2020	Powder	0	5	0	0
05/01/2020	Alta Town Office	5	2	0	0

Appendix 3. Locations and number of citizen science rosy-finch feeder counts.