



Spirit of the Rockies: Songbirds, Mountain Lions, and More 2012 FIELD REPORT

Background Information

Lead PI: Embere Hall

Project scientists: Embere Hall began a PhD at the University of Wyoming in August, at which point Jenny McCabe (jennifer.mccabe@tetonscience.org) and Josh Kleyman (josh.kleyman@tetonscience.org) became Co-PI's.

Report completed by: Embere Hall

Period Covered by this report: June 8 - August 16, 2012

Date report completed: 2012-10-16 17:42:14



Conservation Research Center

Advancing the Science of Stewardship

Dear Earthwatch Volunteer,

Thank you for joining us on the Songbirds of the Rocky Mountains project! We enjoyed meeting you and could not have completed the season without your dedication to our research.

Fifty-two Earthwatch volunteers participated in our project this season, braving early mornings, field lunches, hours in rubber boots, and occasional snow. Collectively, volunteers spent 1,620 hours in the field. In other words, you completed the equivalent of 9 months of field work in 26 field days! During your field time, you located and monitored 123 active nests of four species. The most abundant nesting species were Yellow warblers (52), American robins (36), and Song sparrows (19). Preliminary data analyses suggest lower nest success in sites surrounded by human development. This trend may result from increased nest predation near human communities.

Our field biologists conducted 79 fixed-radius point counts in 2012. As the number of houses near a site increased, the number of Black-billed magpies, crows, and ravens observed also increased. These birds are known songbird nest predators, and include both songbird eggs and nestlings in their diets. We captured 1,754 birds of 62 different species from May 31 – August 17, 2012 at our 5 banding stations. The most commonly captured birds included Yellow warbler (485), Pine siskin (176), Song sparrow (138), and American robin (119). We continue to share our findings with local, regional, and national audiences. This season, Conservation Research Center staff shared hands-on bird banding demonstrations with 558 students, community members, and visitors. These banding demonstrations are an opportunity to help individuals understand the importance of birds as ecological indicators of environmental health and expose them to an exciting aspect of field data collection.

On a personal note, in the fall, Donna Rose Smith returned to her adjunct faculty position at Southern Connecticut State University. Benj Sinclair embarked on a return trip to Bhutan, where he has previously taught courses at the Royal University of Bhutan and volunteered

with the Royal Society for the Protection of Nature. Jenny McCabe continued her fall migration research at the University of Maine, and will be defending her thesis in the spring.

As for myself, I began my PhD at the University of Wyoming where I will be investigating the effects of changing climate on pika populations.

Thank you for the incredible contributions that you made to our research. You made our project possible.

A handwritten signature in black ink that reads "L. Embere Hall". The signature is written in a cursive style with a large, stylized initial "L" and a prominent flourish at the end of the name.

Embere Hall

SECTION ONE: Scientific research achievements

Top highlight from the past season

We had an exceptionally productive nest-searching and mist netting (passive bird capture) season this year. At 118 monitored nests, our Earthwatch teams found the second highest number of nests since the Songbirds of the Rocky Mountains project began! This effort will add a significant amount of important nesting information to our five-year dataset. Another highlight of the season was the passive capture of a White-throated sparrow (*Zonotrichia albicollis*, Photo 1), which we had previously heard singing in the area. This bird has never been documented breeding in Wyoming, as its typical breeding range is many hundreds of miles north in Canada. This information has been reported to the USGS Bird-Banding Lab and ebird.org, an online bird mapping and information site.



Photo 1:Adult male white-throated sparrow (*Zonotrichia albicollis*). Photo credit: TSS Staff

Reporting against research objectives

OBJECTIVE 1. Examine the effects of human development on avian demography through constant-effort mist netting (banding) and analysis of long-term population trends.

We continued our work on long-term avian survivorship patterns during the 2012 summer field season. Consistent with previous years, we operated all five stations in cooperation with the Institute for Bird Populations' (IBP) Monitoring Avian Productivity and Survivorship (MAPS) program (Fig. 1).

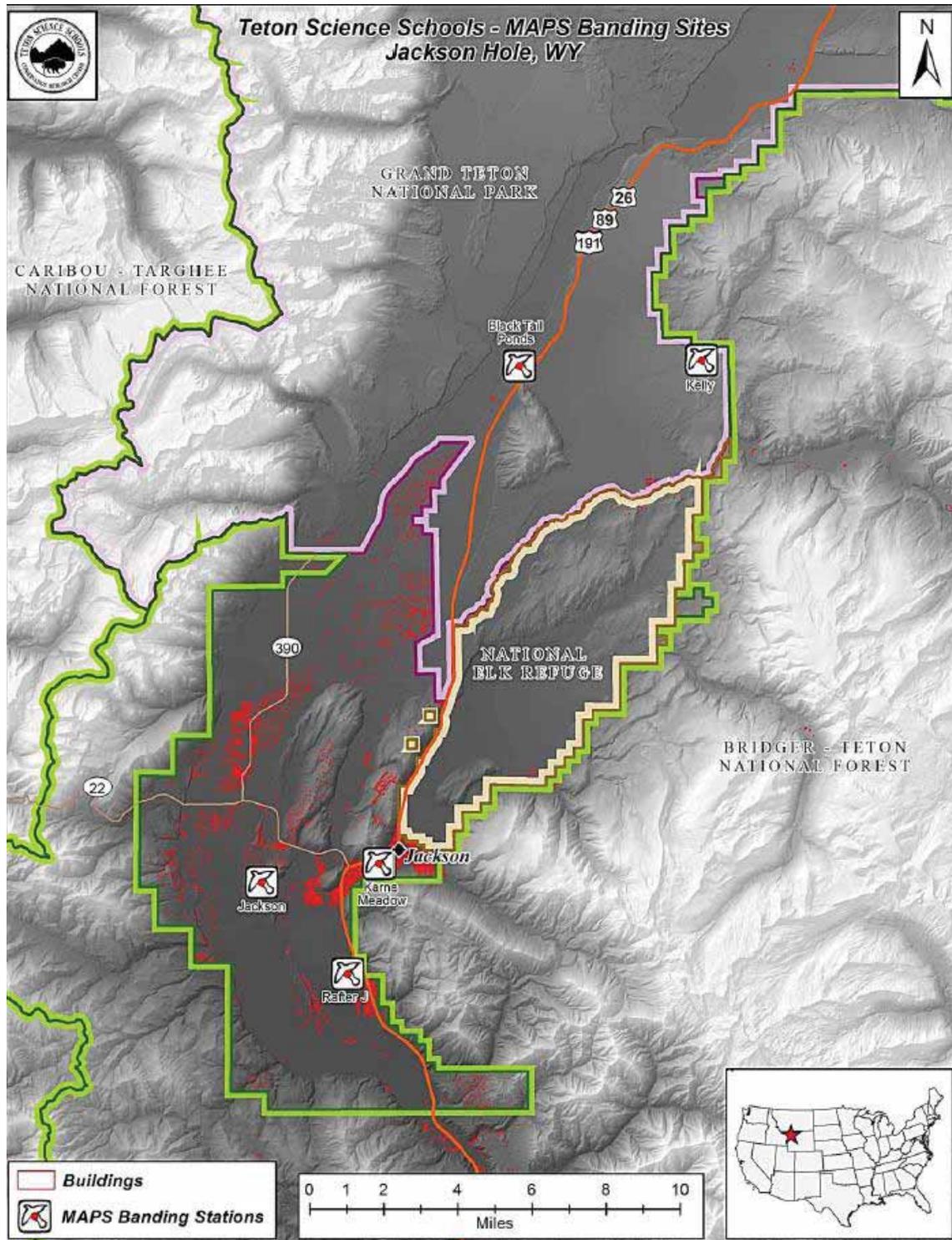


Figure 1: Study area and location of five research sites in Jackson Hole, WY, 2012. Sites are marked with a bird image. Buildings appear as digitized red polygons

Sites are arranged along a gradient of building density, with low-development sites in Grand Teton National Park and high-development sites near Jackson, WY (Table 1).

Table 1: Building density in a 1000 m buffer around 5 MAPS and nest survival study sites in Jackson Hole, WY

Site	Structures/ ha
BLTP	0.08
TSS	0.09
JACK	0.17
RAFJ	1.24
KARN	2.28

This season, we added a third year of data to our newest site. This site, called Rafter J, is located in a housing development south of Jackson and was added to enhance sample size and to increase the rigor of our study. Our sites, in increasing order of building density, are named Blacktail Ponds (BLTP), Teton Science Schools (TSS-), Jackson (JACK), Rafter J (RAFJ), and Karns Meadow (KARN). We captured 1,754 birds of 62 different species from May 31 – August 17, 2012 (Fig. 2).

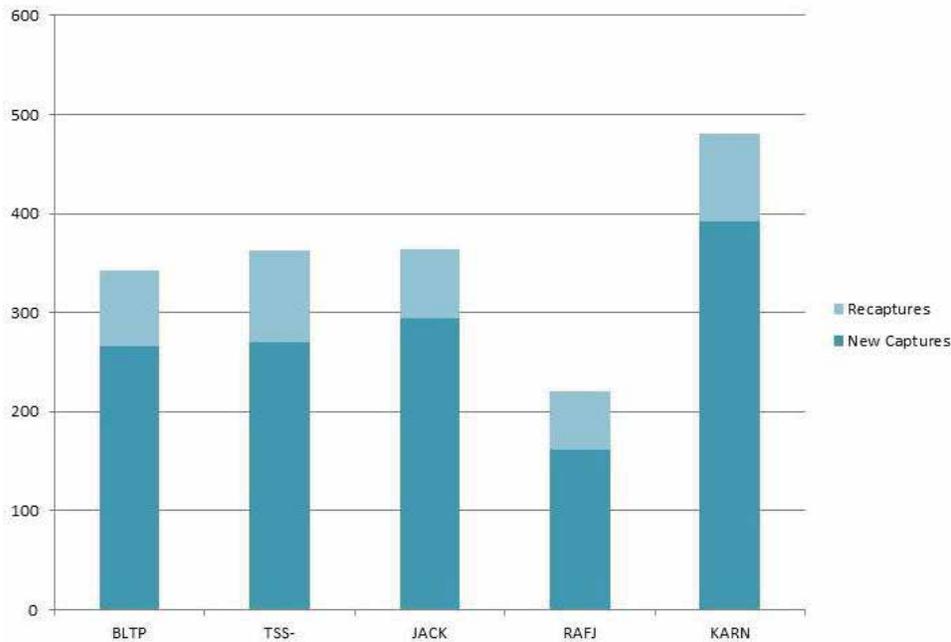


Figure 2: Number of new capture birds and recapture birds at 5 MAPS banding stations in Jackson Hole, WY, 2012

The most commonly captured birds include: Yellow warbler (*Setophaga petechia*; 485), Pine siskin (*Spinus pinus*; 176), Song sparrow (*Melospiza melodia*; 138), and American robin (*Turdus migratorius*; 119). Approximately 20% of birds captured had been captured previously (Appendix 1). Capture rates (number of adult birds captured/net hour) in 2012 were similar to previous years. Effort for all sites combined was 2,537.5 net hours (Table 2).

Table 2: Banding effort (net hours) at 5 MAPS banding stations in Jackson Hole, WY. 2012.

Site	Net Hours
BLTP	325.2
TSS-	744.6
JACK	619.5
RAFJ	519.0
KARN	329.2
Total	2537.5

Productivity (HY: AHY; ratio of hatch-year: after hatch-year captures) estimates from 1998-2012 indicate variability in population trends for all birds captured as well as our focal riparian-nesting species. Our banding data do not show a strong relationship between productivity and housing development. Nesting data have helped us to better understand both within and between season variability in productivity estimates. Our 2012 results are opposite of what we found in 2011 with TSS (low-development site) having the lowest productivity and JACK (moderate-development site) having the highest productivity (Fig. 3).

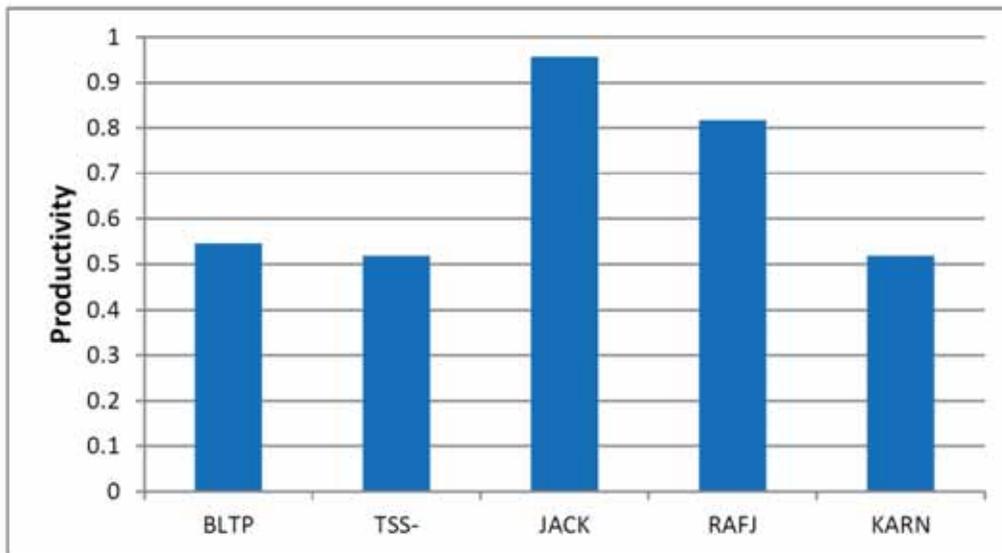


Figure 3: Songbird productivity estimates for all captured species at 5 MAPS banding stations in Jackson Hole, WY. 2012

We feel this discrepancy in our findings has to do with the rough estimate of productivity that can be obtained using capture ratios. This finding increases the importance of the data our Earthwatch teams collect on nesting success.

OBJECTIVE 2. Improve avian conservation by incorporating project data into local, regional, and statewide planning processes.

We enhanced regional and continent-wide population models for over 60 species of birds through data sharing initiatives with IBP, US Geological Survey (USGS), National Park Service (NPS), Wyoming Game and Fish Department (WGFD), and Intermountain West Joint Venture (IWJV).

OBJECTIVE 3. Evaluate the effects of exurban development on songbird nest survival.

Staff and volunteers located and monitored songbird nests on five sites from May 31 – August 17, 2012. Sites were arranged along a gradient of building density, with two sites representing a low-development landscape, one site representing moderate development, and two sites representing high-density development (Fig. 1; Table 1).

Staff and volunteers found 123 active nests of four species during the 2012 nesting season. The most abundant nesting species were Yellow warblers (52), followed by American robins (36), and Song sparrows (19). Overall nest survival in 2012 was 49%, a 5% increase from 2011 and a 25% increase from 2010. A nest was considered successful if at least one nestling fledged.



Photo 2: Earthwatch volunteers monitoring a song sparrow (*Melospiza melodia*) nest. Photo credit: TSS staff

Preliminary analyses indicate that human development may reduce nest survival, though the mechanism responsible for decreased nest survival is not clear. Analysis of the 2008-2011 nesting data showed an inverse relationship between productivity and building density. This trend continued in 2012, with BLTP, the low-development site, having higher apparent nest success than any of the moderate or high-development sites (Table 3, Fig. 4).

Table 3: Apparent nest success for 4 riparian-nesting songbird species found on 5 sites in Jackson Hole, WY. 2012

Site	American Robin	Black-headed Grosbeak	Song Sparrow	Yellow Warbler	Success by Site
BLTP	43%	83%	43%	65%	58%
TSS	0%	--	--	17%	13%
JACK	75%	0%	--	0%	38%
RAFT-J	25%	--	50%	33%	36%
KARN	43%	67%	43%	60%	52%
Success by species	42%	70%	44%	51%	49%

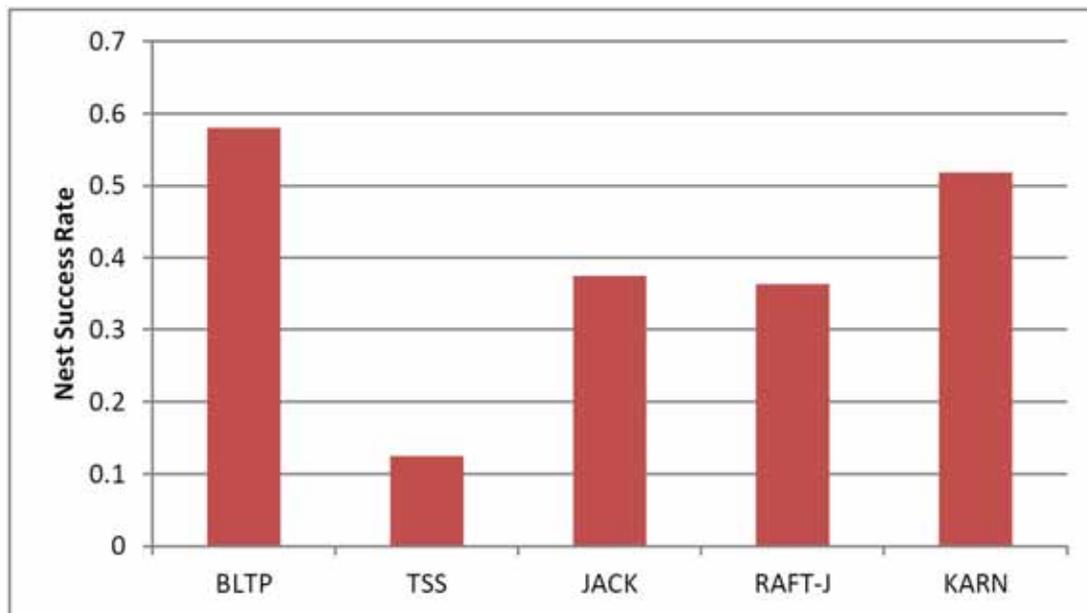


Figure 4: Apparent nest success at five study sites in Jackson Hole, WY, 2012; focal species include American robin, Black-headed grosbeak, Song sparrow and Yellow warbler.

Unlike other years, however, our second least developed site had the lowest apparent nest success, though this may be due to a low sample size for that particular site. During winter 2012-2013, we will develop more advanced nest survival models that include time-specific covariates, as well as estimates of corvid abundance. We suspect that increased corvid abundance in developed areas may reduce songbird nest survival, as corvids commonly feed on both songbird eggs and nestlings. Since 2010, we have been quantifying the songbird nest predator community at each study site ($n = 5$) by documenting the relative abundance of corvid species. Corvidae is the family of birds that includes jays, crows, ravens, and magpies. The most abundant species at all sites was the Black-billed magpie (*Pica hudsonia*), followed by the Common raven (*Corvus corax*). The trend among our songbird nest survival rates indicates lower nest success in developed landscapes. Variation in the predator community may explain this trend and provide insight into the cascading effects of human development on natural systems (Marzluff and Neatherlin 2006). We conducted 79 fixed-radius point counts in 2012. As building density increased, the number of Black-billed magpies observed also increased (Fig. 5).

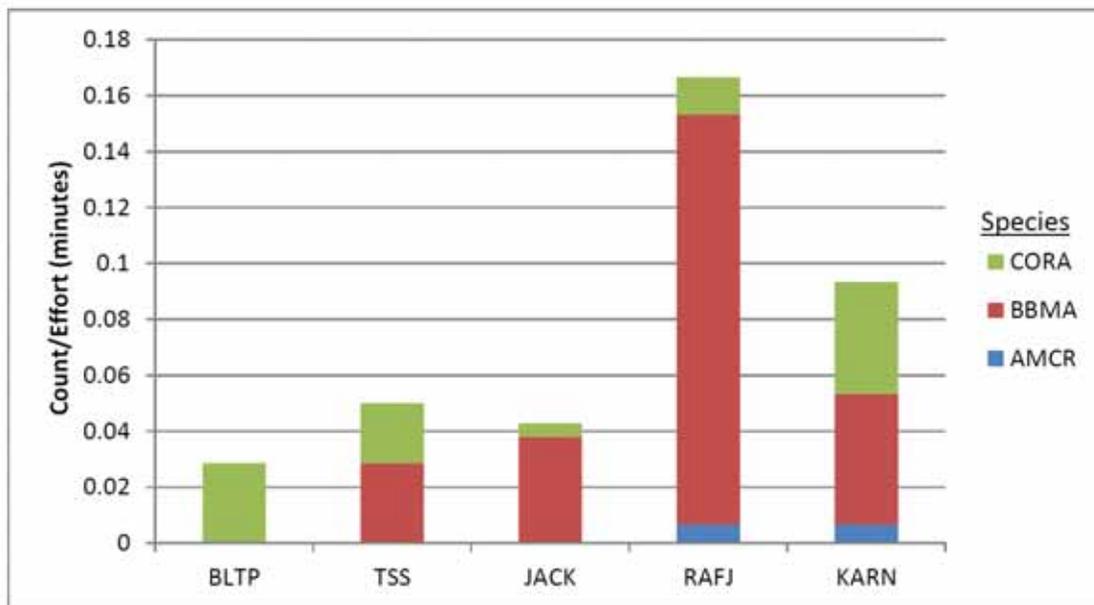


Figure 5: Corvid count per effort recorded at 5 study sites in Jackson Hole, WY, 2012

Research has shown that the behavior and demography of corvids (specifically crows, ravens, and jays) are correlated with proximity to human development. Crows and magpies have smaller home ranges and higher reproductive rates near human settlements (Marzluff and Neatherlin 2006). Given the success of these preliminary corvid surveys, we will continue this work during the 2013 field season.

OBJECTIVE 4. Promote responsible stewardship and natural resource management through educating local, national, and international groups about avian population ecology and associated monitoring methods.

See LOCAL COMMUNITY ACTIVITIES and CONTRIBUTIONS TO CONVENTIONS, AGENDAS, POLICIES AND MANAGEMENT PLANS below.

SECTION TWO:

Partnerships

We continue to build capacity through partnerships with several collaborators. Primary project partners include:

- Grand Teton National Park – permits research on two sites; receives annual project updates that are available to the public through the National Park Service Investigator Annual Reporting database (<http://science.nature.nps.gov/research>).
- Institute for Bird Populations – approves banding stations; receives banding data each year; verifies data; includes data in large-scale analyses of avian population trends; makes data available to other scientists and researchers around the globe.
- Jackson Hole Land Trust – permits research on two sites; receives annual project updates.
- Rafter J Homeowners Association – permits research on one site; receives annual project updates.
- Teton County Parks and Recreation Department – permits research on one site; receives annual project updates.
- USGS Bird Banding Lab – approves and manages federal bird banding permit.
- Wyoming Game and Fish Department – permits research on five sites; receives annual project updates; receives project data; inputs data into wildlife observation system.
- Nature Mapping Jackson Hole/Jackson Hole Wildlife Foundation – supports local citizen-scientists and facilitates online database where trained project volunteers can submit sightings of color-banded birds.
- University of Maine – collaborates on MS student thesis research to examine the relationship between Song sparrow bill size and abiotic factors that may affect avian thermoregulatory processes.

Contributions to conventions, agendas, policies, management plans

- **International**

We monitor over 25 neotropical migratory species, including species documented in several conservation concern lists (Table 4). Through our data sharing initiatives, we foster close collaborations with organizations that promote international bird conservation efforts, including Partners In Flight (PIF). PIF strives to document and reverse declines in avian species requiring terrestrial habitats. Our Avian Research Program accomplishes both data collection and analysis of declining population trends, which may best be reversed by identifying causal mechanisms on local scales.

Table 4: Species of conservation importance monitored through the Songbirds of the Rocky Mountains research project.

Species	USFWS BCC	PIF	IWJV	Audubon	WY BCP	WY SGCN
Brewer's Sparrow	BCR 9,10,16,17; USFWS 1,6,8; national	SCI/IW; Watch List +	I	yellow	I	NSS4
Broad-tailed Hummingbird*					II	
Bullock's Oriole					III	
Calliope Hummingbird*	BCR 9,10,15; USFWS 1,8; national	SCI/IW; Watch List ++		yellow	II	
Cassin's Finch	BCR 10,15,16; USFWS 1,6	SCI/IW; SS				
Cordilleran Flycatcher					II	
Dusky Flycatcher		SCI/IW; SS			II	
Green-tailed Towhee	BCR 9, USFWS 1,8	SCI/IW; SS				
Hammond's Flycatcher					II	
Lincoln's Sparrow		SS				
Red-naped Sapsucker		SCI/IW; SS	I		II	
Rufous Hummingbird*	BCR 5; USFWS 1,7; national	SCI/IW; Watch List +	I		II	
Willow Flycatcher	BCR 5,9,10,15,16,18,23; USFWS 1,6,8; national	SCI/IW; Watch List +	I	yellow	II	NSS4

*Capture, but not permitted to band.

USFWS BCC: Geographic scales – BCR=Bird Conservation Region; USFWS Regions; National

PIF: SCI/IW=Species of Continental Importance in Intermountain West Avifaunal Biome; Watch List +=moderately abundant/widespread with declines or high threats, ++=restricted distribution/low population size;

SS=Stewardship species

IWJV: I=priority species

Audubon: yellow=either declining or rare; typically of national conservation concern

WY BCP 2.0: Level I=conservation action; Level II=monitoring; Level III=local interest

WY SGCN: NSS4 (native species status 4)=breeding populations declining, nesting habitat vulnerable.

- **National or regional**

NATIONAL OR REGIONAL

The Intermountain West Joint Venture (IWJV) Coordinated Implementation Plan ranks riparian habitat as a Priority A conservation target. Priority A habitats show high threat, high opportunity and high value to birds statewide. Our study sites are located in montane riparian areas which are particularly vulnerable to development pressures. We operate along the Snake River Riparian Corridor, which is a Bird Habitat Conservation Area (IWJV 2005). Neotropical migrant density, abundance, and habitat relationships will help refine IWJV's HABPOPS database, which is designed to predict the relationship between habitat management efforts and avian population trends. Population trend information relative to habitat and development gradients will be essential as the IWJV moves forward in ecoregional planning and prioritization of conservation activities at multiple spatial scales. Additionally, IBP utilizes our data to estimate survival rates, recruitment and population change. IBP considers our stations "an integral part of a regional monitoring program...and hopes to include Teton Science Schools' MAPS data in regional analyses on the Northern Rockies region."

STATEWIDE

In the 2010 revision of Wyoming's State Wildlife Action Plan, five issues were identified as the most significant challenges facing Wyoming's wildlife. One of these challenges was rural subdivision and development (WGFD 2010). As Teton County and many other Wyoming communities continue to grow, accurate data collection on species' distribution and population trends will be essential to conservation efforts. The Wyoming PIF Bird Conservation Plan 2.0 identified population monitoring as the foundation of avian conservation, acknowledging a dearth of information in the state (Nicholoff 2003). As a member of the WY-PIF working group, our research is integral in the improvement of monitoring, research, and education initiatives for native, nongame landbirds. Wyoming Game and Fish Department also includes our data into the State Wildlife Observation System, a database which is "queried by department staff state-wide to obtain information for environmental review of proposed projects, to answer data requests from the public and other agencies, for preparing grants, and developing management action plans."

- **Local**

We facilitate local use of our data through collaboration with planners from the Town of Jackson and from the Teton County Planning Department. Teton County recently completed its Comprehensive Plan (adopted May 8, 2012) which is the long-range planning document that guides policy, investment, and land use decisions for both the Town of Jackson and the

County. The plan's first section addresses stewardship of wildlife, natural resources, and scenery. It also includes specific clauses addressing the maintenance of healthy populations of native species, and the need to enhance water and air quality. Our research helped inform planners as they drew up this plan which protects and stewards open space. The Conservation Research Center is also an active member of the Natural Resources Technical Advisory Board (NRTAB), designed to improve the dialogue between planners and scientists. This group provides an arena for planners and researchers to discuss how to best incorporate science in local planning efforts and use available ecological data. Our data will help prioritize habitat management, restoration projects, conservation planning, and education efforts. The Town of Jackson will use our data to better understand the effects of a stormwater wetland development project in Karns Meadow, one of our banding sites.

Developing Environmental Leaders

Conservation Research Center staff continued to teach about avian natural history, population sampling, field research, and conservation through hands-on bird banding demonstrations June 1 – August 17, 2012. During the 2012 bird banding season, we educated 552 participants at two educational sites (TSS- and JACK). Our education programs engage groups of all ages in hands-on field research. The banding demonstrations allow students to learn about the scientific method through direct participation in field research. The opportunity to watch field biologists collect data from live birds is a powerful learning experience for participants of all ages. During the 2011-2012 winter, Teton Science Schools' Research and Stewardship Coordinator, Kelli Petrick, developed curricula that will allow students to examine a subset of data collected at the banding stations. The curriculum also helps students to better understand avian ecology and local songbird population trends. Since 2009, we have partnered with the Meg and Bert Raynes Wildlife Fund (www.rayneswildlifefund.org) and the Jackson Hole Wildlife Foundation (www.jhwildlife.org) to support citizen-scientist training, data management, and study design.



Photo 3: Earthwatch volunteers observe TSS staff at conducting song bird research. Photo credit: TSS staff.

Actions or activities that enhance natural and/or social capital

We offered seven hands-on bird banding demonstrations to community members during the 2012 summer season. While these activities have inherent educational value, they also help to foster local scientific literacy. In a culture that is increasingly dependent on “sound-bite science”, opportunities to engage in hands-on research are essential. These activities helped participants understand the importance of sample size, research design, hypothesis testing, and the scientific method.



Photo 4: Examining the wing of a cedar waxwing (*Bombycilla cedrorum*). Photo credit: TSS staff

Conservation of Taxa

We captured more than 25 neotropical migratory species, including species listed on the USFWS Birds of Conservation Concern (USFWS BCC; USFWS 2008), PIF Species of Continental Importance (Rich et al. 2005), IWJV priority species list, Audubon Watchlist (Audubon 2007), WY Bird Conservation Plan 2.0 (WY BCP; Nicholoff 2003), and WY Species of Greatest Conservation Need (WY SGCN; WGFD 2010) (Table 4). Neotropical migratory songbird populations are facing a growing number of environmental threats. In order to plan effective conservation strategies and to manage in an adaptive framework, it is important to monitor avian demography and to evaluate the factors contributing to population change. We deliver annual population trend data on 25 neotropical migratory songbird species, including 13 species of conservation concern. Data are processed internally and submitted to partners at the end of each field season: IBP, USGS, WGFD, NPS, and Earthwatch Institute. At IBP, MAPS data are archived in an internationally-accessible database comprised of over 1 million records. Ultimately, our data helps prioritize habitat management, targeted restoration projects, conservation planning, and detect possible impacts of climate change.



Photo 5: Riparian area in Grand Teton National Park. Photo credit: Allison Byrd

Conservation of Habitats

Data from our research provide insight into the conservation of riparian systems. Riparian systems cover a fraction of the landscape in arid parts of the intermountain west, yet more species of breeding birds are found in this limited habitat than in the extensive surrounding uplands (Naiman and D'ecamps 1997). One of the most significant challenges facing Wyoming's wildlife is rural subdivision and development (WGFD 2010). Much of the recent development has occurred in riparian areas. As Teton County and many other Wyoming communities continue to grow, accurate data collection on species' distribution and population trends will be essential to continued conservation efforts.

Ecosystem Services

Long-term avian monitoring data provide insight into habitat conditions and associated ecosystem function. Insectivorous birds, for example, are often dependent on clean water resources that sustain healthy populations of macro-invertebrates. Degradation of aquatic systems can result in decreased numbers of birds and in reduced seasonal productivity. Monitoring data provide important information on annual population trends and can reflect

changes in habitat quality. Birds are an especially relevant ecological class to monitor as they are an indicator of ecosystem health (Carignan and Villard 2002).

Impacting Local Livelihoods

During the 2012 season, we regularly hosted a local volunteer. This volunteer worked with the research team as often as he was available. He learned skills which will allow him to compete more successfully for other bird research positions as he builds his career in wildlife ecology. Additionally, we enhanced the livelihood of six avian research summer staff by providing them with well-compensated field jobs. We also give them an opportunity to “host meals” (assist with meal time for other field programs) in exchange for free food throughout the work week. While receiving a competitive wage and housing, our staff was also granted the opportunity to teach students and Earthwatch volunteers about songbird ecology and conservation in Jackson Hole, Wyoming. The 552 students that joined field staff at the banding stations participated in hands-on educational experiences. Many participants were able to release birds once they had been banded. Releasing a bird instills a sense of wonder and appreciation for the natural world that is truly transformative.

Local community activities

From impromptu discussions at the local park to scientific presentations, the research team maintains a strong relationship with the local community. We offer summer bird identification trainings, participate in a local citizen-science effort (Nature Mapping Jackson Hole), provide community bird banding demonstrations, and share our research with local students through summer educational programs. We also share results of our research with designated town and county government representatives to ensure that our research supports science-based conservation planning. The local response to our work is generally positive, especially because we share data with community conservation agencies and organizations. Each year these groups use our data in habitat management efforts, proposal evaluations, and community planning.

Dissemination of research results

Scientific peer-reviewed publications

Smith, C., E. Hall, A. Johnson, D. Gentry and D. Wachob. Critical thresholds and residential development: An application of critical threshold theory using bird field data (in preparation for Landscape and Urban Planning).

Grey literature and other dissemination

PRINT: We prepared an interim project report that details preliminary research results. We shared the report with project partners, including the National Park Service, WGFD, Teton County Parks and Recreation Department, Rafter J Homeowners Association, Jackson Hole Land Trust and the IWJV. Earthwatch was acknowledged in the report.

Citation: Hall E., J. McCabe, A. Johnson and S. Fagan. (2011). *Monitoring Avian Productivity and Survivorship in Jackson Hole: 1991-2011 Interim Report*. Teton Science Schools. Jackson, WY.

We also prepared end-of-season banding summaries specific to banding sites and sent those to the appropriate permitting organizations/agencies. Using funds provided by Wyoming Wildlife-The Foundation, we developed a popular guide to our avian research program. The guide summarizes the results of our 20+ years of bird work and presents the information in an approachable manner for non-biologists. Earthwatch support was acknowledged in the guide.

Citation: S. Fagan and E. Hall. (2011). *Popular guide to Teton Science Schools' avian research program: 1991-2011*. Teton Science Schools. Jackson, WY.

EDUCATIONAL RESOURCES: This season, the banding crew Education Specialist updated laminated cards highlighting our focal species. The cards were used to help students learn how they can identify birds in the wild and were used in conjunction with lessons on the use of avian field guides. We also updated and enhanced our bird banding journal. The children's journal includes activities that emphasize the fundamentals of bird ecology, along with pages to sketch the birds that they see during demonstrations. We also included a section that highlights important vocabulary words used in ornithology. The adult journal includes vocabulary, bird identification tips and topics related to bird conservation. This winter, we will continue to work with TSS' Research and Stewardship Coordinator to maintain our avian research-focused classroom curriculum. The new curriculum makes our data accessible for high school students. The curriculum teaches students about the importance of long-term monitoring data and conservation concerns in their hometown. The curriculum was included in Teton Science Schools' educational programming during the 2011-2012 academic year, and will continue to be included during the 2012-2013 school year.

MEDIA AND WEB: www.tetonscience.org/index.cfm?id=crc_home

SECTION THREE: Anything else

Is there anything else you would like to tell us?

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Acknowledgements

Wyoming Wildlife-The Foundation, the Earthwatch Institute, and an anonymous private donor provided funding for our research. We thank Grand Teton National Park, Jackson Hole Land Trust, Rafter J Homeowners Association, and the Teton County Parks and Recreation Department for allowing us to study birds within their administrative boundaries. We also acknowledge the Wyoming Game and Fish Department and the US Geological Survey for permitting our research. Field staff contributions to this project cannot be overstated. Special thanks to Jenny McCabe, Joanna Woodruff, Allison Byrd, Rebecca Gerber and Nick Beauregard.

APPENDIX 1

Captured and recaptured birds at 5 MAPS banding stations in Jackson Hole, WY. 2011.

Species	New	Recaptured	Total	% Recaptured
American Goldfinch	40	14	54	25.9
American Robin	93	23	116	19.8
Audubon's Warbler	32	1	33	3.0
Bank Swallow	2		2	0.0
Barn Swallow	1		1	0.0
Black-capped Chickadee	60	16	76	21.1
Brown-headed Cowbird	11	10	21	47.6
Black-headed Grosbeak	29	22	51	43.1
Brewer's Sparrow	31		31	0.0
Bullock's Oriole	10	1	11	9.1
Cassin's Finch	5		5	0.0
Cedar Waxwing	92	12	104	11.5
Chipping Sparrow	6		6	0.0
Cliff Swallow	1		1	0.0
Common Grackle	1		1	0.0
Common Yellowthroat	1		1	0.0
Downy Woodpecker	6	2	8	25.0
Dusky Flycatcher	18	6	24	25.0
Fox Sparrow	4	2	6	33.3
Gray Catbird	37	25	62	40.3
Green-tailed Towhee	15	2	17	11.8
Hairy Woodpecker	2	1	3	33.3
House Finch	3		3	0.0
House Sparrow	1		1	0.0
House Wren	20	4	24	16.7
Lazuli Bunting	15	1	16	6.3
Lincoln's Sparrow	18	7	25	28.0
McGillivray's Warbler	30	26	56	46.4
Mountain Chickadee	6	1	7	14.3
Mountain White-crowned Sparrow	32	2	34	5.9
Northern Waterthrush	3		3	0.0
Northern Rough-winged Swallow	2		2	0.0
Orange-crowned Warbler	15	5	20	25.0
Oregon Junco	27	6	33	18.2
Pine Siskin	164		164	0.0
Red-breasted Nuthatch	1		1	0.0
Ruby-crowned Kinglet	13		13	0.0
Red-naped Sapsucker	17	9	26	34.6
Red-shafted Flicker	2		2	0.0
Red-winged Blackbird	4		4	0.0
Savannah Sparrow	4		4	0.0
Song Sparrow	92	43	135	31.9
Swainson's Thrush	4		4	0.0
Townsend's Solitaire	1		1	0.0
Townsend's Warbler	1		1	0.0
Tree Swallow	1		1	0.0
Vesper Sparrow	2		2	0.0
Violet-green Swallow	5	1	6	16.7
Warbling Vireo	13	1	14	7.1
White-breasted Nuthatch	1		1	0.0
Western Tanager	29	1	30	3.3
Western Wood Pee-wee	6	3	9	33.3
Willow Flycatcher	12	1	13	7.7
Wilson's Warbler	4		4	0.0
White-throated Sparrow	1		1	0.0
Yellow Warbler	338	139	477	29.1
Total	1384	387	1771	21.9