

Education

University of Wyoming

Jan 2015–Dec 2017

Wyoming Cooperative Fish and Wildlife Research Unit, Dept. of Zoology and Physiology

Masters of Science in Zoology & Physiology

Advisor: Dr. Anna D. Chalfoun

Thesis: *Mechanisms underlying increased songbird nest predation near natural gas development*

- GPA 4.00 out of 4.00
- Relevant coursework: ornithology, quantitative analysis of field data, biological statistics, modeling resource selection and habitat-based demography, database management, programming with R, advanced topics in ecology, scientific writing

University of California, Berkeley

Sept 2006–May 2010

Bachelor of Science in Environmental Science

Senior Thesis: *Algerian ivy removal techniques along a riparian zone in Berkeley, CA*

- GPA: 3.57 out of 4.00
- Relevant coursework: terrestrial resource ecology, plant biology, environmental modelling, environmental toxicology, statistics, LEED certification, wildlife identification, environmental philosophy, soil science, biology, chemistry, physics, education, senior research thesis

Publications (* indicates independent research mentees)

Sanders, L.E. and A.D. Chalfoun, 2018. Novel landscape elements within natural gas fields increase densities of an important songbird nest predator. *Biological Conservation*, 228: 132-141.

Sanders, L.E., A.D. Chalfoun, T.M. Scherr,* 2018. Inter-species nest use by a Loggerhead Shrike (*Lanius ludovicianus*). *Wilson Journal of Ornithology*, 130(3): 774-777.

Carlisle, J., **L. Sanders**, A. Chalfoun and K. Gerow. 2018. Raptor nest-site use in relation to the proximity of coalbed-methane development. *Animal Biodiversity and Conservation* 41(2): 227-243.

Parsons, L., **L. Sanders**, A. Ryan, M. Reichmuth. 2015. Changes in the food web linked to restoration effort intensity and watershed conditions. *Natural Resources*, 6: 344-362.

Sanders, L. 2012. Algerian ivy removal techniques along a riparian zone in Berkeley, CA. *Berkeley Scientific Journal*, 16(2): 1-7.

Sanders, L.E. and A.D. Chalfoun. *In review*. Mechanisms underlying increased nest predation near natural gas development: a test of the mesopredator release hypothesis. *Ecosphere*.

Wagler, B.L.*, **L.E. Sanders**, and A.D. Chalfoun. *In review*. Nest predator responses to reclaimed areas on natural gas fields at the home-range scale. *Mammalian Biology*.

Chalfoun, A.D., T.M. Scherr* and **L.E. Sanders**. *In prep*. Why thy neighbors matter: evidence that nest partitioning decreases nest predation risk. *Ecology Letters*.

Hall, L.E., J.D. Carlisle, **L.E. Sanders**, T.L. McDonald, A.D. Chalfoun. *In prep*. A plastic home-building strategy mediates potential thermal risk for sedentary prey. *Animal Behavior*.

Hethcoat, M.G., **L.E. Sanders** and A.D. Chalfoun. *In prep*. Cheating death: can adaptive nest site selection mitigate an ecological trap in energy field landscapes. *Global Change Biology*.

Sanders, L.E., M.L. Kenney*, and A.D. Chalfoun. *In prep*. Songbirds mitigate nest predation risk differentially via parental care behaviors. *Behavioral Ecology*.

Technical Reports and Theses

Sanders, L. and A. Chalfoun. 2018. Influence of energy development on sagebrush non-game birds III. Final Report to the U.S. Geological Survey.

Sanders, L. and A. Chalfoun. 2017. Mechanisms underlying increased songbird nest predation near natural gas development. Final report to the Wyoming Game and Fish Department.

Sanders, Lindsey E. 2017. Mechanisms underlying increased songbird nest predation near natural gas development. Master's thesis. University of Wyoming, Laramie, WY, USA.

Chalfoun, A., J. Carlisle, **L. Sanders** and K. Gerow. 2013. Analysis of temporal and spatial patterns of raptor nest occupancy in areas of coal-bed methane development in the Powder River Basin, Wyoming. Final Report to the Bureau of Land Management, Buffalo Field Office.

Presentations (* indicates independent research mentees)

Sanders, L. and A. Chalfoun. Differential avian responses to density and proximity of disturbance. Joint Conference of the Wyoming Chapter of the Wildlife Society and The Wyoming Landscape Conservation Initiative, Laramie, WY, November 2018 (oral presentation)

Sanders, L. and A. Chalfoun. Why are nest-predator abundances higher on natural gas fields? Wyoming Chapter of the Wildlife Society Conference, Jackson, WY, December 2017 (oral presentation)

Sanders, L., M. Kenney*, and A. Chalfoun. Sagebrush songbirds mitigate nest predation risk via parental care. Wyoming Chapter of the Wildlife Society Conference, Jackson, WY, December 2017 (poster)

Wagler, B.*, **L. Sanders**, and A. Chalfoun. Nest predator responses to reclaimed areas on natural gas fields at the home-range scale. Wyoming Chapter of the Wildlife Society Conference, Jackson, WY, December 2017 (oral presentation)

Chalfoun, A., M. Hethcoat, and **L. Sanders**. Natural gas fields as ecological traps for nesting sagebrush songbirds. Wyoming Chapter of the Wildlife Society Conference, Jackson, WY, December 2017 (oral presentation)

Sanders, L., A. Chalfoun, and T. Scherr. Are natural gas fields for the birds? Public meeting of the Laramie Audubon Society, Laramie, WY, November 2017 (oral presentation)

Chalfoun, A., M. Hethcoat, and **L. Sanders**. Natural gas fields as ecological traps for nesting sagebrush songbirds. Joint Conference of the American Ornithological Society and the Society of Canadian Ornithologists, East Lansing, MI., August 2017 (oral presentation)

Sanders, L. and A. Chalfoun. What is sustaining higher abundance of nest predators within natural gas fields? Joint Conference of the American Ornithological Society and the Society of Canadian Ornithologists, East Lansing, MI., August 2017 (oral presentation)

Sanders, L. and A. Chalfoun. Who ate my babies? Mechanisms underlying increased nest predation near energy development. Wyoming Cooperative Fish and Wildlife Research Unit Annual Cooperators Meeting, Laramie, WY, April 2017 (oral presentation)

Sanders, L. and A. Chalfoun. Is a mesopredator release underlying increased songbird nest predation rates near natural gas development? Joint Conference of the Wyoming Chapter of the Wildlife Society and The Society for Range Management, Cody, WY, November 2016 (oral presentation)

Wagler, B.*, **L. Sanders** and A. Chalfoun. Identifying a mechanistic response to energy development: are reclaimed areas augmenting small mammal body condition and abundance? Joint Conference of the

Wyoming Chapter of the Wildlife Society and The Society for Range Management, Cody, WY, November 2016 (poster)

Kenney, M.*, **L. Sanders** and A. Chalfoun. Persnickety parents: how parental care behaviors affect songbird nest success. Joint Conference of the Wyoming Chapter of the Wildlife Society and The Society for Range Management, Cody, WY, November 2016 (poster)

Sanders, L. and A. Chalfoun. Is a mesopredator release underlying increased songbird nest predation rates near natural gas development? North American Ornithological Conference, Washington D.C., August 2016 (oral presentation)

Sanders, L. and A. Chalfoun. Mechanisms underlying increased songbird nest predation rates with natural gas development. Joint Conference of the Wyoming Chapter of the Wildlife Society and The Wyoming Landscape Conservation Initiative, Lander, WY, December 2015 (poster)

Sanders, L. and A. Chalfoun. Mechanisms underlying increased songbird nest predation with natural gas development. Wyoming Cooperative Fish and Wildlife Research Unit Annual Cooperators Meeting, Cheyenne, WY, April 2015 (oral presentation)

Sanders, L., J. Carlisle, A. Chalfoun, K. Gerow. Raptor nest occupancy in relation to coal-bed methane development in the Powder River Basin, Wyoming. The Wildlife Society 19th Annual Conference, Portland, OR, October 2012 (poster)

Research Experience

Academic Professional Research Scientist, University of Wyoming Aug 2018–present

- Managed large historic database containing information on over 6,000 nests, collected over 18 years.
- Conduct analyses on how songbird productivity is affected by climate change (variability in temperature and precipitation)
- Prepare manuscripts and reports

Marbled Murrelet Technician, Oregon State University April–Aug 2018

- Establish survey sites, conduct early morning surveys for marbled murrelets in coniferous forests, navigate off-trail through dense vegetation on steep terrain
- Drive on logging roads with CB radios

Research Assistant, University of Wyoming March–April 2018

- Database management, data analysis, spatial analyses, and manuscript preparation

Graduate Assistantship, University of Wyoming Jan 2015–Dec 2017

- Database Management: created relational SQL database to house historic data (2008-2016) and future data, maintained database, created views, wrote queries, created and updated metadata. This database contained data from 5 related projects (each with its own relationship map), with ~30 data tables and 12 lookup tables.
- Study design development and literature review
- Project management: budget, hiring, permitting, field logistics, supervise 6-person field crew
- Field work: nest searching and monitoring, small mammal trapping (Sherman and Tomahawk traps), vegetation surveys (point-line intercept, identifying potential nest shrubs, estimating % concealment), avian point counts (focused on raptors and corvids), baited trail cameras (Bushnell and Browning), giving-up density experiment, powder tracking, audio recording (TASCAM recorder and parabolic mic)
- Data analysis, spatial analyses, report preparation, and manuscript preparation

Sierra Nevada Red Fox Technician, University of California, Davis July–Oct 2014

- Conducted carnivore scat surveys
- Maintained passive and baited trail cameras (Scoutguard and Reconyx)
- Hiked 10-20 miles each day over steep terrain off-trail at high elevation. Regularly backpacked for 3-7 day stints, carrying heavy equipment.

Biological Science Tech, GS-5, USGS N. Prairie Wildlife Research Center April–July 2014

- Re-sighted banded piping plovers and least terns, identified suitable nesting habitat and nest locations
- Trapped birds on nests using walk-in and bow-net traps, applied color bands and federal metal bands, recorded mass, wing chord length, and demographic information
- Drove government vehicles while trailering a boat, piloted motorboats (flat bottomed boats and Zodiacs)

Biological Science Tech, GS-5, Sequoia-Kings Canyon National Park June–Sept 2013

- Removed invasive trout from high alpine lakes using gill nets and a backpack electro fisher
- Conducted shoreline surveys for mountain yellow-legged frogs
- Communicated project mission to park visitors, co-organized work schedule, conducted safety meetings, communicated crew progress to project lead
- Lived and worked in the backcountry for the entire season, maintained two remote backcountry camps, hiked 10-16 miles off-trail to access camps

Prairie-Chicken Research Technician, University of Nebraska March–May 2013

- Conducted early morning surveys to identify suitable leks for trapping, Trapped male and female Greater Prairie-Chickens using drop nets and walk-in traps on leks
- Collected measurements, took feather sample, applied leg bands, attached radio transmitters
- Tracked birds to nest sites using handheld radio telemetry unit, triangulated bird locations and monitored nest progress
- Vegetation surveys (Daubenmire frames, robe poles, point-line intercept, grass/forb ID)
- Navigated with Garmin GPS units and created maps of lek location using ArcGIS
- Communicated with private land owners to gain access to property
- Drove ATVs and pickup truck equipped with a directional telemetry unit to access remote terrain

Avian Point Count Technician, PRBO Conservation Science April–Aug 2012

- Conducted early morning avian point counts in an area with ~120 potential species, followed by 3-4 hours of targeted woodpecker nest searches (20 ha)
- Vegetation surveys (DBH, % cover, tree height, tree/shrub ID)
- Navigated to study sites in steep shrubby conditions using Garmin GPS unit and topo maps
- Spent one week at a banding station extracting birds from mist nets (~100), recording data and banding juvenile songbirds
- Drove government trucks on logging roads in rough condition,

Statistical Research Assistant, Wyoming Cooperative Research Unit Oct 2011–April 2012

- Database Management: managed an MS Access database with over 6,000 raptor nests monitored from 2003-2011 by private contractors on BLM land near coal-bed methane wells
- Assisted with developing study design and with statistical analyses, quality checked data
- Assisted with preparation of final report and manuscript
- Communicated with BLM managers to clarify data collection and compilation methods
- Reviewed videos of sparrow nesting behavior, compiled spot map data, entered and proofed songbird nesting data, corresponded with federal agencies

Bird and Small Mammal Technician, Wyoming Cooperative Research Unit June–Sept 2011

- Early morning avian point counts in an area with ~70 potential species
- Nocturnal small mammal trapping (Sherman traps) and processing (administered anesthesia, collected physical and demographic information, PIT tagged)
- Habitat assessments (DBH, % groundcover, litter depth, shrub/tree ID)
- Navigated to study sites in conifer forest using Garmin GPS unit
- Accessed sites with a pickup on rough roads and on ATVs loaded with gear

Restoration Intern, Point Reyes National Seashore Oct 2011–May 2012

- Database management: data entry, validation, and manipulation in MS Excel
- PCA analysis of benthic invertebrate data
- Data collection in a recently restored wetland (vegetation transects, water quality, digging sediment cores, zooplankton sampling, benthic invertebrate sampling)
- Created maps and uploaded data points in ArcGIS
- Communicated with private land owners to gain access to property

Pika Research Technician, Wyoming Cooperative Research Unit June–Sept 2010

- Pika density and occupancy surveys (based on scat and audio/visual observations), deployed climate sensors on talus slopes
- Vegetation surveys (alpine flora ID, % groundcover, talus depth)
- Established survey sites in the alpine, navigated with Garmin GPS and map/compass
- Backpacked off-trail through steep alpine terrain for 4-7 days at a time with a heavy pack (~50 lbs)

Interpretive Student Aide, East Bay Regional Park District Sept 2007–May 2010

- Provided visitor with natural history information in the Tilden Nature Area Environmental Education Center
- Developed original educational programs based on local flora/fauna, survival skills, and ecosystem functioning
- Led activities for 5-9 year olds in summer day camp
- Led 9-17 year olds on hikes and backpacking trips encouraging teambuilding, leave no trace ethic, and leadership in an outdoor setting
- Manned the cash register in the visitor's center

Environmental Protection Assistant II, UCB Environmental Health & Safety Sept 2009–May 2010

- Coordinated and recruited volunteers for restoration events, aided in invasive plant removal
- Developed an original volunteer training program, co-wrote a restoration handbook for volunteer use
- Communicated invasive plant removal techniques to the public,

Mentorship

Independent Research Mentor, University of Wyoming

Mentored three students with independent research projects. Mentorship included helping with: developing research questions, establishing protocols for answering those questions, applying for grant money, collecting data, analyzing data, presenting research at professional conferences, and preparing manuscripts for publication.

Undergraduate Student: Brittany Wagler Jan 2016–Dec 2017

- Senior Thesis: *Do reclaimed areas within natural gas fields augment deer mice body condition and abundance?*
- Funding: Wyoming EPSCoR (NSF) and University of Wyo. College of Arts & Sciences

Undergraduate Student: Macy Kenney Sept 2015–May 2017

- Senior Thesis: *Persnickety parents: how parental care behavior affects songbird nest success.*
- Funding: Wyoming EPSCoR (NSF)

Research Assistant: Tayler Scherr

March–Dec 2016

- Independent Project: *Why thy neighbors matter: evidence that nest partitioning decreases nest predation risk*

Outreach

Laramie Girl Scouts

April–July 2017

- Developed and implemented a nest box monitoring program for the Laramie Girl Scouts
- Through this program, we taught girls about avian biology and conservation, and brought them into the field for 11 weeks during the summer to help monitor tree swallow nest boxes. Scouts helped collect data, and together created a presentation about their experience which they gave at a public Laramie Audubon Society meeting
- Participants: 30

STEM Own It! Pop-Up Discovery Center

April 2017

- Developed and staffed a program through the WY Coop Research Unit for this one-night event.
- Program included a hands-on table for high school and college students to learn about wildlife
- Participants: 100-120

Laramie High School

March 2017

- Developed and taught a three-day long curriculum for high school students
- Curriculum taught students about the scientific process, and allowed them to develop research questions, collect data, view results, and formulate conclusions based on their results.
- Curriculum was made available to the Biodiversity Institute for future use in other classrooms
- Participants: 30

Beitel Elementary

April 2016

- Developed and taught a 2-hour lesson plan for a fourth grade class about predator prey dynamics
- Lesson included discussion of what predators and prey are, food chains, and a group activity to see how predator and prey dynamics change with food availability
- Participants: 25-30

Wyoming State Science Fair

March 2016

- Co-organized and implemented three 1-hour workshops for elementary students across Wyoming participating in the State Science Fair
- Workshops helped students become more comfortable presenting their results to the public
- Participants: 70

Media Coverage

National Audubon, magazine

Nov 2017

Title: In sagebrush country, drilling brings nest-raiding rodents

University of Wyoming, alumni magazine

Nov 2017

Title: Of Mice and Birds – how sagebrush habitat loss contributes to predation of sagebrush songbirds

Professional Services

Committees and Boards

Laramie Audubon Society

Membership Coordinator, Board of Directors Nov 2015–Dec 2017

- Coordinated membership info, tracked member payments, outreach to community to recruit new members
- Worked with other board members to develop education programs and field trips, led field trips, organized speakers to present at monthly public meetings, participated in discussions of where to spend funds to make largest impact on avian conservation in our community

Small Grants Committee Chair, Board of Directors March 2016–Dec 2017

- Reviewed grant applications bi-annually and worked with committee to select conservation and outreach projects for funding

Symposia Organized

Joint Conference of American Ornithological Society and the Soc. of Canadian Ornithologists Aug 2017

Symposium Title: “Mechanisms underlying avian decline near energy development”

Memberships and Affiliations

American Ornithological Society

March 2015–present

Laramie Audubon Society

Jan 2015–Aug 2018

Northwestern Scientific Association

Feb 2018–present

The Wildlife Society

Oregon Chapter, Member

Aug 2018 – present

National Member

Nov 2011–present

Idaho Chapter, Member

Jan 2018–Jan 2019

Wyoming Chapter, Member

Nov 2015–Nov 2018

Specialized Skills

Certifications

Motorboat Operator Certification Course

Apr 2014–2019

CPR Training

Feb 2018–Feb 2020

Wilderness First Aid Training

May 2015–May 2017

Software Proficiencies

Microsoft SQL Server 2014, Microsoft Office Suite (including Access and Excel), Program R,

ArcGIS software 10.0+, Mini Tab 16, and Sigma Plot

Scholarships and Awards

American Ornithological Society, Travel Award

June 2017

University of Wyoming, Reed W. Fautin Memorial Scholarship

April 2017

The Wildlife Society, Graduate Student Scholarship

Dec 2016

The Wildlife Society, Travel Award

Dec 2016

Lindsey Sanders

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<https://sanderslindsey.wixsite.com/wildlife-biology>

Association of Field Ornithologists, Travel Award

Aug 2016

NASA Space Grant Consortium, Travel Award

Aug 2016

Grants Received

Wyoming Governor's Big Game License Coalition Grant

June 2017

Amount: \$15,000

Biodiversity Institute Research Grant

April 2017

Amount: \$4,500