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Research Interest

My primary research interests include applied wildlife management and quantitative ecology centralized around terrestrial wildlife. Specifically, I am interested in further exploration of predator-prey theory, population ecology, wildlife-habitat relations, spatial ecology, and the incorporation of the use of Bayesian statistical modeling.

Education

Ph.D. in Biology

January 2020-Present

New Mexico State University, Las Cruces, NM

GPA: 4.0

Concentration: Ecology and Evolution*Minor:* Applied Statistics*Dissertation:* Elk (*Cervus canadensis*) Demographic and Life History in the Mexican Wolf Recovery Area in New Mexico and Arizona*Advisors:* Dr. James Cain, III, Dr. Timothy Wright, and Dr. Fitsum Abadi Gebreselassie**M.S. in Wildlife Science (Incomplete)**

August 2018-December 2019

New Mexico State University, Las Cruces, NM

GPA: 4.0

B.S. in Fish, Wildlife, and Conservation Biology

May 2018

Colorado State University, Fort Collins, CO

GPA: 3.5

Concentration: Wildlife Biology

Academic and Research Positions

PhD Graduate Research Assistant

2018-Present

New Mexico State University, Las Cruces, NM

- My research is centralized around understanding the potential impact of the recovering Mexican Gray wolf population on elk population dynamics within New Mexico and Arizona.
- Investigation of adult and neonate survival and cause-specific mortality via GPS collars and VHF ear tags.
- Use of novel Bayesian statistical modeling including the use of expert knowledge in cause-specific mortality assignment.
- Development integrated population model and use of simulation to estimate population growth rates under changing conditions (e.g., hunter harvest, wolf density, changes in climate).
- Estimation of predator impact towards prey species under changing climatic conditions through the investigation of Mexican wolf and mountain lion clusters.
- Collaboration with Arizona Game and Fish Department, New Mexico Department of Fish and Game, and US Fish and Wildlife Service. As well as coordination and inclusion of the White Mountain Apache Tribe in research efforts.

- Field skills included adult and neonate capture and handling, aerial and ground telemetry, remote living, group and independent field work, management of field personnel and volunteers, field necropsies, predator cluster investigation, and behavioral observations.

Teaching Experience

Instructor of Record

Fall 2022

New Mexico State University, Las Cruces, New Mexico

- FWCE 301: Wildlife Ecology
- Development of course material including lectures, course syllabus, exams, quizzes, homework, and group assignment
- Class size: 38 students

Graduate Teaching Assistant

Spring 2022

New Mexico State University, Las Cruces, New Mexico

- FWCE 409/509: Population Ecology (34 students)
- Grade weekly assignments, assist students with R-coding and interpretation of statistical analysis, assist with teaching course material
- Professor: Dr. Fitsum Abadi Gebreselassie

Graduate Teaching Assistant

Fall 2021

New Mexico State University, Las Cruces, New Mexico

- FWCE 457: Biometry (28 students)
- Graded weekly assignments, assisted students with R-coding and interpretation of statistical analysis, guest lectures, developed extra credit assignments
- Professor: Dr. Fitsum Abadi Gebreselassie

Graduate Teaching Assistant

Spring 2020

New Mexico State University, Las Cruces, New Mexico

- Taught two lab section of FWCE 330: Natural History of the Vertebrates (36 students)
- Prepared and presented lectures on the history and evolution of vertebrates, covering external and internal anatomy and evolution of fish, Lissamphibia, Aves, and mammals
- Developed lectures, lab exams, homework assignments, and grading rubric
- Professor: Dr. Gary Roemer

Scholarship and Awards

2022 Merit Based Enhancement Award, New Mexico State University
 2022 Biology Graduate Excellence Award, New Mexico State University
 2021 PhD Tuition Scholarship, New Mexico State University
 2020 8th Natural History of the Gila Symposium Travel Grant Award
 2020 New Mexico Chapter of The Wildlife Society Student Travel Award
 2018 Warner College Dean's List, Colorado State University
 2017 The Shari Fraker Memorial Scholarship in Wildlife Management
 2016 Rocky Mountain Elk Foundation Volunteer of the Year
 2016 Rocky Mountain Elk Foundation's Wildlife Leadership Award
 2015 The Shari Fraker Memorial Scholarship, Colorado State University
 2014 The Donald G. Lauridson Memorial Scholarship, Colorado State University

Research Grants (PI OR CO-PI: \$109,000 USD)

- 2022 – 2024 **Boyle, S.**, J.W. Cain III, and C.R. Anderson Jr. Prediction capability of blood metabolites in estimating nutritional condition of wild ungulates. Muley Fanatic Foundation. \$4,000 (Co-PI)
- 2021 – 2024 **Boyle, S.** and J.W. Cain III. Elk Demography, Movement, and Habitat Selection in the Mexican Wolf Recovery Area-Year 3. Arizona Rocky Mountain Elk Foundation PAC. \$10,000 (Co-PI)
- 2021 – 2024 **Boyle, S.** and J.W. Cain III. Elk Demography, Movement, and Habitat Selection in the Mexican Wolf Recovery Area-Year 3. New Mexico Rocky Mountain Elk Foundation PAC. \$10,000 (Co-PI)
- 2020 – 2023 **Boyle, S.**, J.W. Cain III, C. Thompson, and Z. Farley. 2020. Elk Demography, Movement, and Habitat Selection in the Mexican Wolf Recovery Area-Year 2. Arizona Rocky Mountain Elk Foundation PAC. \$20,000 (Co-PI)
- 2020 – 2023 **Boyle, S.**, J.W. Cain III, C. Thompson, and Z. Farley. 2020. Elk Demography, Movement, and Habitat Selection in the Mexican Wolf Recovery Area-Year 2. New Mexico Rocky Mountain Elk Foundation PAC. \$30,000 (Co-PI)
- 2019 – 2021 **Boyle, S.T.**, J.W. Cain III. Elk Demography, Movements, and Habitat Selection in the Mexican Wolf Recovery Area in New Mexico and Arizona. Houston Safari Club. \$7,500 (Co-PI)
- 2019 – 2021 **Boyle, S.T.** and J.W. Cain III. Age class survival of elk (*Cervus canadensis*) within a reintroduced population of Mexican gray wolves (*Canis lupus baileyi*). T & E, Inc. \$3,000 (Co-PI)
- 2019 – 2021 **Boyle, S.T.** and J.W. Cain III. Elk Demography, Movements, and Habitat Selection in the Mexican Wolf Recovery Area in Arizona-Year 1. Arizona Elk Society. \$15,000 (Co-PI)
- 2019 – 2022 **Boyle, S.**, C. Thompson, and Z. Farley. Elk Demography, Movement, and Habitat Selection in the Mexican Wolf Recovery Area-Year 1. New Mexico Rocky Mountain Elk Foundation PAC. \$9,500 (Co-PI)

Publications

Book Chapter

Cain, J.W., III, P.R. Krausman, **S.T. Boyle**, and S.S. Rosenstock. In Press-2022. Chapter 13: Water and Other Welfare Factors, Pages XXX-XXX in P.R. Krausman and J.W. Cain III, Editors. Wildlife Management and Conservation: Contemporary Principles and Practices, 2nd edition. The Wildlife Society and Johns Hopkins University Press.

Technical Reports

Boyle, S.T., J.W. Cain, F.A. Grebreselassie, C. Thompson, Z. Farley, S. Martinez, and J. Olson. 2022. Elk Demography, Movements and Habitat Selection in the Mexican Wolf Recovery Area (October 2018 to August 2022). Project status report submitted to Arizona Game and Fish Department, New Mexico Department of Fish and Game, Fish and Wildlife Service, and White Mountain Apache Tribe.

- Boyle, S.T., J.W. Cain.** 2021. Age class survival of elk (*Cervus canadensis*) within a reintroduced population of Mexican gray wolves (*Canis lupus baileyi*). Final Report submitted to T&E, Inc.
- Boyle, S.T., J.W. Cain.** 2021. Elk Demography, Movements, and Habitat selection in the Mexican Wolf Recovery Area in Arizona and New Mexico–Year2/3. Annual progress report submitted to Rocky Mountain Elk Foundation.
- Boyle, S.T., J.W. Cain.** 2021. Elk Demography, Movements, and Habitat Selection in the Mexican wolf Recovery Area in Arizona and New Mexico. Annual progress report submitted to New Mexico Cooperative Fish and Wildlife Research Unit.
- Boyle, S.T., J.W. Cain, C. Thompson, and Z. Farley.** 2021. Elk Demography, Movements and Habitat Selection in the Mexican Wolf Recovery Area (1 October 2018 to 24 March 2021). Project status report submitted to Arizona Game and Fish Department, New Mexico Department of Fish and Game, Fish and Wildlife Service, and White Mountain Apache Tribe.
- Boyle, S.T., J.W. Cain.** 2021. Elk Demography, Movements, and Habitat selection in the Mexican Wolf Recovery Area in Arizona and New Mexico–Year 1. Final Report submitted to the Rocky Mountain Elk Foundation.
- Boyle, S.T., J.W. Cain.** 2020. Elk Demography, Movements, and Habitat Selection in the Mexican wolf Recovery Area in Arizona and New Mexico. Annual progress report submitted to New Mexico Cooperative Fish and Wildlife Research Unit.
- Boyle, S.T., J.W. Cain.** 2020. Age class survival of elk (*Cervus canadensis*) within a reintroduced population of Mexican gray wolves (*Canis lupus baileyi*). Annual Progress Report submitted to T&E, Inc.
- Boyle, S.T., J.W. Cain, C. Thompson, and Z. Farley.** 2020. Case Studies of Elk Calves Deemed as Malnutrition. Project status report submitted to Arizona Game and Fish Department and New Mexico Department of Fish and Game.
- Boyle, S.T., J.W. Cain, C. Thompson, and Z. Farley.** 2020. Elk Demography, Movements, and Habitat Selection in the Mexican Wolf Recovery Area (1 October 2018 to 15 August 2020). Project status report submitted to Arizona Game and Fish Department, New Mexico Department of Fish and Game, Fish and Wildlife Service, White Mountain Apache Tribe, and Arizona Elk Society.
- Boyle, S.T., J.W. Cain.** 2020. Elk Demography, Movements, and Habitat selection in the Mexican Wolf Recovery Area in Arizona and New Mexico–Year 1. Annual progress report submitted to Rocky Mountain Elk Foundation.

Field Work Experience

Mule Deer and Cougar Technician, Colorado Parks and Wildlife, Canon City, CO

Mule deer and mountain lion predator-prey ecology; tasked with obtaining and managing field gear; coordinate with field technicians and state agency personnel; evaluated parturition movements via GPS data for 60 mule deer; capture and collaring mule deer fawns; field necropsies on adults and neonates; build mountain lion calls for bait sites; review camera data for mark recapture of mountain lions; data management; field crew lead; remote field living. May 2017-July 2018

Elk Field Technician, Colorado Parks and Wildlife, Montrose, CO

Elk survival and mortality; capture and collar elk neonates; perform field necropsies on neonates and adults; database management and organization; coordinate with state agency personnel; remote field work and living; field crew lead. May 2018-July 2018.

Quantification of Geographic information system (GIS) Data, Colorado Parks and Wildlife, Fort Collins, CO

Spatial analyst of climate data; Created GIS maps depicting temperature and precipitation data; Independent work; data management and organization. October 2017-May 2018.

Bobcat Mark-Recapture Technician, Colorado Parks and Wildlife, Fort Collins, CO

Unique identification of bobcats via camera trap photos; tasked with going through trail camera photos to establish unique individual based on unique marks; establish frequency of occurrence within a gridded camera study design; data management. September 2017-May 2018.

Chukar Partridge Field Technician, Colorado Parks and Wildlife, Fort Collins, CO

Survival and reproduction of newly reintroduced population of chukar partridge; tasked with performing weekly and daily aerial and ground telemetry; flush and count number of individuals per group; general habitat surveys; data entry; independent field work; create ArcGIS maps and summary tables. January-May 2016.

Moose Field Technician, Colorado Parks and Wildlife, Fort Collins, CO

Shiras moose ecology in Colorado; tasks included obtaining daily visual observations of calves on heal; data entry; remote field living; ground and aerial telemetry. May-July 2015 and 2016.

Professional and Technical Presentations

- Boyle, S.T.**, J.W. Cain, F.A. Grebreselassie, N. Tatman, S. Liley, J. DeVos, and J. Avery. 2021. Mortality Risk of Elk within a Multi-Predator System. USGS Cooperative Research Unit, Las Cruces, New Mexico.
- Boyle, S.T.**, J.W. Cain, F.A. Grebreselassie, N. Tatman, S. Liley, J. DeVos, and J. Avery. 2021. Elk Mortality Risk in the Mexican Wolf Recovery Area. New Mexico and Arizona Joint Annual Meeting of The Wildlife Society.
- Boyle, S.T.**, J.W. Cain, N. Tatman, S. Liley, J. DeVos, and J. Avery. 2020. Cause-specific Mortality and Survival of Elk in the Mexican Wolf Recovery Area in New Mexico and Arizona. 8th Natural History of the Gila Symposium, Silver City, New Mexico.
- Boyle, S.T.**, J.W. Cain, N. Tatman, S. Liley, J. DeVos, and J. Avery. 2020. Cause-specific Mortality and Survival of Elk in the Mexican Wolf Recovery Area in New Mexico and Arizona. New Mexico and Arizona Joint Annual Meeting of The Wildlife Society, Prescott, Arizona.
- Boyle, S.T.**, J.W. Cain, N. Tatman, S. Liley, J. DeVos, and J. Avery. 2019. Age-Class Survival of Elk (*Cervus canadensis*) in the Mexican Wolf Recovery Area in New Mexico and Arizona. USGS Cooperative Research Unit, Las Cruces, New Mexico.
- Boyle, S.T.** 2019. Elk Demography, Movements, and Habitat Selection in the Mexican Wolf Recovery Area: Update (February 1, 2019 to November 30, 2019). Arizona Game and Fish Region 1 Area Meeting, Pinetop, Arizona.

Guest Lectures

Boyle, S.T. 2022. Introduction to program R. Class FWCE 409: Population Ecology, New Mexico State University.

Boyle, S.T. 2021. One-way Analysis of Covariance (ANOVA). Class: FWCE 457: Biometry New Mexico State University.

Boyle, S.T. 2021. Point and Interval Estimates. Class: Class: FWCE 457: Biometry. New Mexico State University.

Boyle, S.T. 2018. Wildlife Field Work. Class: New to major seminar. Colorado State University

Boyle, S.T. 2016. Wildlife Field Work. Class: New to major seminar. Colorado State University

Workshops Attended

2019 Bayesian Integrated Population Modeling using Jags. Dr. Marc Kéry, Dr. Michael Schaub, and Dr. Fitsum Abadi Gebreselassie, New Mexico State University, Las Cruces, NM.

Certification and Trainings

2020	USGS Snowmobile
2019 & 2021	USGS ATV
2018 & 2021	Wilderness First Aid
2018	CPR and AED
2018 & 2021	NSC Defensive Driving
2017	Wildlife Handling and Chemical Immobilization
2017	Wildlife Capture techniques
2017	Boaters safety
2012	Mountain Lion Education and Identification
2012	Bowhunter Education Certificate
2007	Hunters Education Certificate

Summary of Technical Skills

Computer Software

Statistical Software (R-studio, JAGs, WinBUGS, Nimble)

Digital mapping software (ArcGIS)

Microsoft Office: Excel, Word, PowerPoint, Access

Online Collar Computer Software (Vectronics Aerospace, Telonics, ATS, Lotek, and GPS Plus X)

Field skills

Fixed wing telemetry and survey experience (~64 hours)

Telemetry experience

Neonate and Adult ungulate necropsy

Neonate capture and handling

Elk immobilization, handling, and blood draw

Mountain Lion immobilization handling and blood drawing (limited)

Bighorn sheep immobilization, handling, and blood draw

Data entry and management in database and excel

ATV, trailer, and 4WD experience
Boat experience
Camping and backpacking for extended periods of time

Public Outreach and Media Coverage

Media

Short Video Field Production. 2022. Rocky Mountain Elk Foundation.
<https://www.youtube.com/watch?v=boatPPgjYIE&t=12s>

Outreach Presentations

Boyle, S.T. 2022. Elk Research and student involvement. Colorado State University, Rocky Mountain Elk Foundation Student Chapter.
Boyle, S.T. 2022. Elk Research and life as a graduate student. University of Wyoming.
Boyle, S.T. 2020. Elk Research in the Mexican Wolf Recovery Area in New Mexico and Arizona. Colorado State University, Rocky Mountain Elk Foundation Student Chapter.
Boyle, S.T., C. Thompson, and Z. Farley. 2019. Elk Demography, Movement, and Habitat Selection in the Gila and Apache-Sitgreaves National Forest. Elk Workshop, Sipe, Arizona.

Magazine and Online Article

McQueary, J. (2020, April). "Arizona Elk Society Grant-Elk Collars". *Tracker 1st Quarter 2020*, 10–11. https://issuu.com/aes_trackers/docs/tracker_q1_2020_final_web
"Hosted by Arizona Game and Fish Department and the Arizona Ek Society". *OutdoorsSw*, <https://www.outdoorssw.com/white-mountain-elk-workshop>

Professional Affiliation

2017–Present The Wildlife Society
2013-present Rocky Mountain Elk Foundation
2014-2018 Colorado State University Rocky Mountain Elk Foundation Student Chapter

Volunteer Experience

2017 & 2018	Habitat Restoration Project
2017	Black Bear Project
2015	Colorado Parks and Wildlife Bighorn Sheep Survey
2015	Rocky Mountain Elk Foundation Habitat Restoration
2013–2018	Huntsman with the Colorado Parks and Wildlife