FOREST P. HAYES
FALL 2022

Colorado State University FOREST.HAYES@COLOSTATE.EDU
GRADUATE DEGREE PROGRAM IN ECOLOGY
Department of Fish, Wildlife,
and Conservation Biology
Fort Collins, CO 80523

EDUCATION

Ph.D. **Colorado State University**
Ecology (*in progress*) GPA: 4.00 / 4.00
Research focuses on understanding the effects of climate and glacial loss on cold-adapted species.

M.S. **University of Montana**
Wildlife Biology (2020) GPA: 4.00 / 4.00
Thesis: Resource selection and calving success of moose in Colorado.

B.A. **New College of Florida**
Biology & Environmental Science (2011) GPA: NA / NA
Undergraduate thesis: Temporal patterns of burrow use by gopher tortoises (*Gopherus polyphemus*) at the Ordway-Swisher Biological Station.

RESEARCH AND WORK EXPERIENCE

2020-Present **Graduate Research Assistant, Colorado State University**
RESEARCH FOCUSES ON THE EFFECTS OF CLIMATE AND GLACIAL LOSS ON COLD-ADAPTED SPECIES.
Collected field observations of behavioral and demographic responses of mountain goats (*Oreamnos americanus*) to local climate in Glacier National Park. Developed a study to address applied issues of conservation within protected areas. Facilitated collaboration with National Park Service biologists to assess population demographics. Developed methods for remote field access of satellite GPS data to facilitate field observations.

2017-2020 **Graduate Research Assistant, University of Montana**
CONDUCTED RESEARCH ON THE POPULATION DEMOGRAPHICS AND RESOURCE USE OF MOOSE (*ALCES ALCES*) IN COLORADO. Designed a field study and answered questions related to applied conservation and management of moose in Colorado. Developed advanced field methodologies including automation of access to satellite GPS data and use of drones to facilitate observations of moose. Employed novel analytical methods for evaluating hierarchical resource selection and calving success of moose. Conducted multiple years of field research in harsh remote environments, including the capture and handling of moose. Oversaw technicians and coordinated between multiple partners and stakeholders.

2019 **Graduate Teaching Assistant, University of Montana**
INSTRUCTED THE LAB PORTION OF CONSERVATION OF WILDLIFE POPULATIONS, A CAPSTONE UNDERGRADUATE CLASS IN THE WILDLIFE BIOLOGY PROGRAM. Revised course curricula to include additional use of Program R. Taught Program R to novice users and advised students in the design of research projects and development of proposals. Graded lab and written assignments.

2016-2017 **Biological Technician, Colorado Parks and Wildlife**
WORKED TO ASSESS THE RECRUITMENT AND SURVIVAL OF MOOSE IN COLORADO. Used radio telemetry and satellite GPS collars to repeatedly track and locate moose. Maintained a Microsoft Access Database of observations and GPS locations. Managed day-to-day scheduling and field operations.

2015 **Biological Technician, Colorado Parks and Wildlife**
MONITORED BIGHORN SHEEP (*OVIS CANADENSIS*) TO ASSESS EWE AND LAMB SURVIVAL. Tracked and located sheep using radio telemetry and conducted field necropsies, when necessary. Deployed game cameras to monitor the population and use of habitat. Conducted predator response surveys using audio playback. Entered and maintained project data and managed day-to-day research activity.

2015 **Biological Technician, Colorado Parks and Wildlife**
COLLECTED ON-THE-GROUND VEGETATION DATA IN NORTH PARK, COLORADO TO VALIDATE SPATIAL MODELS OF VEGETATION. Coordinated surveys efforts between state and federal agencies. Managed the schedule of multiple technicians and maintained a database of project data.

2014-2015 **Biological Scientist I, Florida Fish and Wildlife Research Institute**
AIDED IN MONITORING THE DISTRIBUTION, INFLUENCE OF VEGETATIVE COMMUNITIES, GENETIC DISTINCTION, AND POPULATION OF FOX SQUIRRELS (*SCIURUS NIGER*) IN FLORIDA. Led a field crew of multiple technicians. Coordinated with land managers, technicians, and volunteers to facilitate research objectives. Conducted camera trap and vegetation surveys. Oversaw data entry, including developing methods for rapidly assessing game camera images.

2013 **Biological Technician, University of Florida**
WORKED TO MONITOR VOLE POPULATION DEMOGRAPHICS AND HABITAT USE. Monitored populations of the endangered Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*) using floating game cameras and Sherman traps. Conducted vegetation surveys on remote costal islands.

2012-2013 **Biological Technician, University of Central Florida**
WORKED TO ASSESS HIGHWAY IMPACTS ON WILDLIFE POPULATIONS ALONG STATE ROAD 40 IN OCALA NATIONAL FOREST. Employed drift fences with funnel and bucked traps to mark and recapture amphibians, reptiles, and small mammals. Tracked tortoises using radiotelemetry. Conducted track bed and roadkill surveys.

2011-2012 **Biological Technician, University of Florida**
CONTRIBUTED TO THE NEAR SHORE ECOLOGY PROJECT ASSESSING HUMPBACK CHUB (*GILA CYPHA*) POPULATIONS ON THE COLORADO RIVER. Used hoop nets and electrofishing on the Colorado River to capture endangered humpback chub as part of a mark recapture study designed to determine the impact of various river flow regimes. Expanded upon initial research objectives and data collection culminating in the publication of a research manuscript.

PUBLICATIONS AND MANUSCRIPTS IN DEVELOPMENT

2022 J. Berger, M. Biel., and **Hayes, F.P**. 2022. Species conflict at Earth's edges – Contests, climate, and coveted resources. Frontiers in Ecology and Evolution. *Accepted for publication.*

2022 **Hayes, F.P**., J.J. Millspaugh, E.J. Bergman, C.J. Bishop. 2022. Effects of willow nutrition and morphology on calving success of moose. Journal of Wildlife Management, 86:e22175.

2020 **Hayes F.P**. Resource selection and calving success of moose in Colorado. 2020. Graduate Student Thesis, University of Montana.

2020 Bergman E.J., **F.P. Hayes**, and K. Aagaard. Estimation of moose parturition dates in Colorado: incorporating imperfect detections. Alces 2020(56).

2020 Bergman E.J., **F.P. Hayes**, P.M. Lukacs, C.J. Bishop. 2020. Moose calf detection probabilities: quantification and elevation of a ground-based survey technique. Wildlife Biology, 2020(1): 1:9.

2017 **Hayes, F.P.**, M.J. Dodrill, B.S. Gerig, C. Finch, W.E. Pine, III. 2017. Body condition of endangered Humpback Chub in relation to temperature and discharge in the lower Colorado River. Assessing native fish response to warming river conditions: Do length-weight relationships change? Journal of Fish and Wildlife Management 8(1): 333-342.

AWARDED GRANTS AND SCHOLARSHIPS

2022 **Rocky Mountain Goat Alliance – Science & Conservation Grant.**
Research grant for the purpose of conducting research at Mount Evans, CO and Glacier National Park, MT in the requested amount of $5,000.

2022 **Dr. James A. and Nan Bailey Wildlife Conservation Scholarship.**
Merit based award given to a graduate student at Colorado State University in the amount of $1,000.

2021 **Glacier National Park Conservancy – Jerry O'Neal Research Fellowship.**
Research grant for the purpose of conducting research in Glacier National Park in the requested amount of $5,000.

2021 **Dr. James A. and Nan Bailey Wildlife Conservation Scholarship.**
Merit based award given to a graduate student at Colorado State University in the amount of $1,000.

2020 **Colorado State University Graduate Student Council Professional Development Award**.
Award given to advance graduate student professional development in the amount of $100.

2019 **Faye G. Clark Memorial Scholarship.**
Merit based award given to a graduate student at the University of Montana in the amount of $1,000.

2018 **Philip L. Wright Memorial Research Award.**
Competitive award given to support graduate wildlife research in the amount requested of $1,000.

CONFERENCE PRESENTATIONS AND POSTERS

2019 **Hayes, F.P.**, C.J. Bishop, J.J. Millspaugh, E.J. Bergman, R.M. Callaway. Moose resource selection and the influence of mountain pine beetle epidemics at the southern extent of their range. Presentation at The Wildlife Society National Meeting. Reno, NV.

2019 **Hayes, F.P.**, C.J. Bishop, J.J. Millspaugh, E.J. Bergman, R.M. Callaway. Evaluating willow nutrition and calving success of moose in Colorado. Presentation to the Five Valleys Audubon Society. Missoula, MT.

2019 **Hayes, F.P.**, C.J. Bishop, J.J. Millspaugh, E.J. Bergman, R.M. Callaway. Preliminary results on the drivers of moose calving success and the impacts of mountain pine beetle epidemics on resource selection. Presentation at the Montana chapter of The Wildlife Society. Helena, MT.

2018 **Hayes, F.P.**, C.J. Bishop, J.J. Millspaugh, E.J. Bergman, R.M. Callaway. Impacts of mountain pine beetle epidemics on habitat selection by moose. Poster presentation at The Wildlife Society National Meeting. Albuquerque, NM.

2009 **Hayes, F.P.** Temporal patterns of use of burrows by Gopher Tortoises. Poster Presentation of at the annual Gopher Tortoise Council meeting. Sarasota, FL.

TEACHING EXPERIENCE

2019 **Conservation of Wildlife Populations (TA). University of Montana.**
Responsibilities included independently teaching the lab section of the course, developing and revising lab curricula, teaching Program R to novice users, advising students on research proposals, and grading written assignments.

2010 **Ornithology (TA). New College of Florida.**
Responsibilities included assisting with the development of a new course, incorporating emerging technology into course structure, leading fieldtrips, and administering tests.

STUDENT EXPERIENCE

2010-2011 **Student Thesis, New College of Florida.**
MONITORING TEMPORAL VARIATION OF GOPHER TORTOISE ACTIVITY. Designed and conducted a field study of gopher tortoise activity patterns using infrared camera traps and vegetation surveys. Completed thesis was submitted to New College of Florida. Study results were presented at the annual Gopher Tortoise Council meeting.

2010 **Intern, Mote Marine Laboratory.**
ASSESSING TRENDS OF DOLPHIN PREY IN SARASOTA BAY. Worked as an intern of the Sarasota Dolphin Research Project, assisting with purse-seine fishing, photographing dolphins, and identifying dolphins using PhotoID.

2009 **Volunteer, Myakka River State Park.**
COMMON BIRDS OF MYAKKA RIVER STATE PARK BROCHURE. Developed and produced a brochure for Myakka River State Park with photographs and descriptions of commonly occurring bird species.

2009 **Student, Organization for Tropical Studies.**
Designed and executed two cooperative studies on the distance-dependent predation on *Dipteryx panamensis* seeds and factors affecting pollinator selection of flowers. Projects included designing a study, collecting data in the field, data analysis, and presentation of results.

2008 **Student, New College of Florida.**
DEVELOPED AN INVASIVE SPECIES MONITORING PLAN FOR SARASOTA COUNTY, FL. Worked with Dr. Meg Lowman and students to assess and address current and impending issues.

PROFESSIONAL SKILLS

- **Programming**
  Highly proficient at programming using the R language. Skills include automation of data collection, building interactive web apps, package creation, and developing analytical tools. Proficiency with JavaScript (e.g., acquisition and analysis of data using Google Earth Engine).
- **Statistical analysis**
  Familiar with a wide range of ecological analyses in both Bayesian and Frequentist frameworks. Specialties include development of hierarchical multi-scale models.
- **Field research**
  Highly experienced at conducting field research in extreme, remote, and unforgiving environments. Very comfortable with a wide range of wildlife survey and capture techniques.
- **Coordination and management**
  Adept at coordination between multiple groups of collaborators including project partners, technicians, and volunteers. Skilled at managing day-to-day research operations including training and oversight of technicians.