

MATHEW W. ALLDREDGE

Colorado Division of Wildlife
Mammals Research
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RESEARCH INTERESTS

Population dynamics and sampling of wildlife populations to improve our understanding of ecological processes and their application to ecological theory, conservation and management. Estimation of demographic rates, such as survival, productivity, and dispersal. Specific interests towards large mammals, especially carnivores.

Affiliate Faculty:

Colorado State University
University of Wisconsin

EDUCATION

- 2004 Ph.D. in Biomathematics and Zoology, minor in Statistics, North Carolina State University, Raleigh, NC.
(41 semester hours)
Advisors: Kenneth Pollock (co-chair), Theodore Simons (co-chair), Cavell Brownie, James Gilliam, James Nichols
Dissertation title: "Avian point count surveys: Estimating components of the detection process."
- 2002 Master of Biomathematics, minor in Statistics, North Carolina State University, Raleigh, NC.
(36 semester hours)
Advisors: Kenneth Pollock (Chair), Cavell Brownie, James Gilliam.
Paper title: "Golden-cheeked warbler *Dendroica chrysoparia* population viability analysis."
- 1999 M.S. in Wildlife Resources, University of Idaho, Moscow, ID.
(74 semester hours)
Advisors: James Peek (chair), William Wall, Patricia Heglund, and Christopher Williams.
Thesis title: "Shrub communities and elk habitat relationships on an industrial forest of northern Idaho"
University of Idaho, College of Natural Resources outstanding graduate student, 1999.
- 1994-1996 Visiting student. Colorado State University, Fort Collins, CO.
Graduate and undergraduate curricula in wildlife biology, ecology and statistics. (28 semester hours)
- 1994 B.S. in Mechanical Engineering, University of Colorado, Boulder, CO.

(127 semester hours)

WORK EXPERIENCE:

- May 2006 Carnivore Researcher. Colorado Division of Wildlife.
Present
- Project 1: Cougar-human interactions in urban environments and assessing aversive conditioning methods.
 - Project 2: Cougar predator-prey dynamics.
 - Project 3: Cougar genetic degradation.
 - Project 4: State wide cougar and bear population structure.
 - Project 5: Using telomeres to determine age structure of cougars and bears.
 - Project 6: Determining diet composition, use of anthropogenic food sources, and prey use of carnivores utilizing stable isotope analysis.
 - Project 7: Development of solar ear tag PTT transmitter for studying carnivore dispersal.
 - Project 8: Co-development of automatic deer collaring device.
 - Project 9: Spatial analysis of cougar habitat use.
 - Project 10: Spatial modeling of cougar movement data.
 - Pending project: Bear-human interactions in urban environments.
 - Pending project: Bear translocation.
- Duties: I am the principal investigator on all of the projects listed so my duties include the design and development of the studies, data collections (including capture and handling of animals), data analysis, and publication of research results.
- Mar 2005 Workshop. Point count surveys for forest songbirds. North Carolina Wildlife Resources Commission.
I organized and instructed a point count workshop to train personnel to conduct point count surveys of forest songbirds.
- Apr 2005 Instructor. National Conservation Training Center, U.S. Fish and Wildlife Service. (West Virginia)
Course: Mark-recapture techniques for sampling wildlife populations.
Objectives: I present current methods for estimating abundance, survival and productivity, and demonstrate the use of program MARK.
- June 2004 Postdoctorate Research. USGS, Cooperative Fish and Wildlife Research
May 2006 Unit, North Carolina State University.
Project: Evaluation of methods and sources of bias for estimating abundance of forest song birds using point count surveys.
Duties: I designed experiments, organized personnel, conducted experiments, analyzed data and wrote reports for professional publication.

- 2004 Instructor. National Conservation Training Center, U.S. Fish and Wildlife Service. (courses in West Virginia (January) and Alaska (March))
Course: Mark-recapture techniques for sampling wildlife populations.
Objectives: I present current methods for estimating abundance, survival and productivity, and demonstrate the use of program MARK.
- Aug. 2002 Research Assistant. Biomathematics program, North Carolina State
May 2004 University.
Project: Development and evaluation of abundance estimators of avian populations from point count surveys.
Duties: I developed statistical estimators of abundance, analyzed data and wrote reports for professional publication.
- Jan 2003 Consulting. Vail Associates, Vail, CO, and National Wildlife Federation,
Aug 2003 Boulder Co.
Project: Analysis of pellet plot data to determine trends in mammal populations following ski area expansion.
Project: I analyzed harvest and survey data for trends in antelope, deer, elk, and sage grouse populations across Wyoming's Great Divide resource area.
- Aug 2001 Research Assistant. Biomathematics program, North Carolina State
Aug 2002 University.
Project: Development of abundance estimators of dugong populations in Australia from multiple observer aerial transects.
Duties: I developed population estimators, ran simulations, and analyzed data for double observer dugong surveys.
- June 2002 Biologist. USGS-Patuxent Wildlife Research Center, Laurel, MD.
Aug 2002 Grade level: GS-11
Project: Estimating survival, productivity and population growth rates for the Black-capped Vireo.
Duties: I located existing data, analyzed data to determine survival, productivity and population growth rates, and wrote the final report.
- Aug 2000 Research Assistant. Biomathematics program, North Carolina State
Aug 2001 University.
Project: Development of sampling methodology for monitoring a recovering population of Red-cockaded Woodpeckers.
Duties: I developed the statistical design, performed data analysis, and wrote the final report.

- June 2001 Biologist. USGS-Patuxent Wildlife Research Center, Laurel, MD.
 Aug 2001 Project: Population viability analysis of the Golden-cheeked Warbler.
 Duties: I located existing data, analyzed data to determine survival, productivity and population growth rates, performed a population viability analysis, and wrote the final report.
- Jan 2000 Wildlife Biologist. University of Idaho, Moscow, ID.
 Aug 2000 Project: Development of a regional elk study to monitor elk habitats and develop an elk habitat model in relation to timber harvest.
 Duties: I designed an elk habitat survey, hired and coordinated technicians, conducted field work, involved local interest groups, private industry and state agencies with research.
- Jan 2000 Adjunct Professor. Lewis-Clark State College, Lewiston, ID.
 May 2000 Course: Introduction to Natural Science
 Objectives: Introduction to the scientific method and interpreting scientific findings (writing intensive course)
- May 1996 Research Assistant. University of Idaho, Moscow, ID.
 Dec 1999 Project: Examine habitat use and nutritional relationship of elk and examine successional development and productivity of understory vegetation on private timber lands in Northern Idaho.
 Duties: I designed experiments, collected and analyzed data and wrote manuscripts for professional publication. I also worked with local interest groups concerned with declining elk populations.
- 1996-2000 Teaching Assistant/Instructor. University of Idaho, Moscow, ID.
 Courses: Principles of Wildlife Management (3 semesters), Population Ecology (3 semesters), Population Dynamics (1 semester)
- May 1995 Biologist. Wyoming Game and Fish Department, Lander, WY.
 Nov 1995 Projects: Grizzly bear cattle depredation study and grizzly bear, black bear interaction project.
 Duties: Trapping, handling, and radio-telemetry of bears. Perform necropsies. I also worked with local interests groups (ranchers) concerned about conflicts between land use and recovering grizzly populations.

PROFESSIONAL ASSOCIATIONS

The Wildlife Society
 American Ornithologists' Union
 Cooper Ornithological Society
 Wilson Ornithological Society

PUBLICATIONS

Allredge, M.W., D.P. Walsh, L.L. Sweanor, R.B. Davies, and A. Trujillo. (2013). Evaluation of translocation of black bears involved in bear-human conflicts in south-central Colorado. In review.

Hanks, E.M., M.B. Hooten, and **M.W. Allredge**. 2012. Continuous-Time Discrete-Space Models for animal movement data. *Journal of Agricultural, Biological, and Environmental Statistics*. In Review.

Hooten, M.B., E.M. Hanks, D.S. Johnson, and **M.W. Allredge**. (2013). Temporal variation and scale in movement-based resource selection functions. *Statistical Methodology*, In Press.

Hooten, M.B., E.M. Hanks, D.S. Johnson, and **M.W. Allredge**. (2013). Reconciling resource utilization and resource selection functions. *Journal of Animal Ecology*, DOI: 10.1111/1365-2656.12080.

Bevins, S.N., S. Carver, E.E. Boydston, L.M., **M.W. Allredge**, K.A. Logan, S.P.D. Riley, R.N. Fisher, T. W. Vickers, W. Boyce, M. Salman, M.R. Lappin, K.R. Crooks, and S. Vandewoude. 2012. Three pathogens in sympatric populations of pumas, bobcats, and domestic cats: implications for infectious disease transmission. *PLoS ONE* 7(2):e31403. Doi:10.1371/journal.pone.0031403.

Horne, J.S., K.M. Strickler, and **M.W. Allredge**. 2011. Quantifying the importance of patch-specific changes in habitat to metapopulation viability of an endangered songbird. *Ecological Applications*. 21:2478-2486.

Allredge, M.W., 2011. Cougars on the Edge. *The Wildlife Professional*. 5:72-77.

Bevins, S.N., J.A. Tracey, S. P. Franklin, V. L. Schmit, M. L. MacMillan, K. A. Logan, L. L. Sweanor, **M.W. Allredge**, W. M. Boyce, W. Vickers, S. P. D. Riley, L. M. Lyren, E. E. Boydston, C. Krumm, M. Salman, M. E. Roelke, K. L. Gage, M. E. Schrieffer, K. R. Crooks, and S. VandeWoude. 2009. Plague and wild felids: zoonotic disease in the western US. *Emerging Infectious Diseases* 15: 2021-2024.

Simons, T.R., K.H. Pollock, J.M. Wettrath, **M.W. Allredge**, K. Pacifici, and J. Brewster. 2009. Sources of measurement error, misclassification error, and bias in auditory avian point count data. Pp. 237-254 in D.L. Thompson et al. (eds.), *Modeling Demographic Processes in Marked Populations*, Environmental and Ecological Statistics 3, Springer Science and Business Media.

Allredge, M.W., K. Pacifici, T.R. Simons, and K.H. Pollock. 2008. A field evaluation of the effectiveness of distance sampling and double independent

observers to estimate detection probability in aural avian point counts. *Journal of Applied Ecology* 45:1349-1356.

Aldredge, M.W., T.R. Simons, K.H. Pollock, and K. Pacifici. 2007. A field evaluation of the time-of-detection method to estimate population size for aural avian point counts. *Avian Ecology and Conservation* 2(2): 13.

Simons, T.R., **M.W. Aldredge**, and K.H. Pollock. 2007. Experimental analysis of the auditory detection process on avian point counts. *The Auk* 124:986-999.

Aldredge, M.W., T.R. Simons, and K.H. Pollock. 2007. An experimental evaluation of distance measurement error in avian point count surveys. *Journal of Wildlife Management*. 71:2759-2766.

Aldredge, M.W., K.H. Pollock, and T.R. Simons. 2007. Multiple species analysis of point count data: A more parsimonious modeling framework. *Journal of Applied Ecology* 44:281-290.

Aldredge, M.W., T.R. Simons, and K.H. Pollock. 2007. Factors affecting aural detections of songbirds. *Ecological Applications* 17:948-955.

Aldredge, M.W., K.H. Pollock, T.R. Simons, and J. Collazo. 2007. Time of detection method for estimating abundance from point count surveys. *Auk* 124:653-664.

Rice, S.M., J.A. Collazo, **M.W. Aldredge**, B.A. Harrington and A.R. Lewis. 2007. Local annual survival and seasonal residency rates of Semipalmated and Western Sandpipers in Puerto Rico. *Auk* 124:1397-1406.

Aldredge, M.W., K.H. Pollock, and T.R. Simons. 2006. Estimating detection probabilities from multiple observer point counts. *Auk* 123:1172-1182.

Pollock, K.H., H.D. Marsh, I.R. Lawler, and **M.W. Aldredge**. 2006. Estimating animal abundance in heterogeneous environments: An application to aerial surveys for dugongs. *Journal of Wildlife Management* 70:255-262.

Marsh, H., I. Lawler, D. Kwan, S. Delean, K. Pollock, and **M. Aldredge**. 2004. Aerial surveys and the potential biological removal technique indicate that the dugong fishery in Torres Strait is unsustainable. *Animal Conservation* 7: 435-443.

Pollock, K.H., H.D. Marsh, L.L. Bailey, G.L. Farnsworth, T.R. Simons, and **M.W. Aldredge**. 2004. Methodology for separating components of detection probability in population abundance estimation, in *Sampling Rare or Elusive Species* (W.L. Thompson ed.).

Allredge, M. W., J. S. Hatfield, D. D. Diamond, and C. D. True. 2004. Golden-cheeked warbler *Dendroica chrysoparia* in Central Texas. Chapter 33 in H.R. Akçakaya, M. Burgman, O. Kindvall, C. Wood, P. Sjögren-Gulve, J.S. Hatfield, and M.A. McCarthy (editors), *Species Conservation and Management: Case Studies*. Oxford University Press. 21 pp.

Allredge, M.W., J.M. Peek, and W.A. Wall. 2002. Nutritional quality of forages used by elk in Northern Idaho. *Journal of Range Management* 55:253-259.

Allredge, M.W., J.M. Peek, and W.A. Wall. 2001. Shrub community development and annual productivity trends over a 100-year period on an industrial forest of Northern Idaho. *Forest Ecology and Management* 152:259-273.

Allredge, M.W., J.M. Peek, and W.A. Wall. 2001. Alterations of shrub communities in relation to herbivory in Northern Idaho. *Northwest Science*. 75:137-144.

Final Reports

Pollock, K.H., H.D. Marsh, I.R. Lawler, and **M.W. Allredge**. 2004. Improving the accuracy of aerial surveys for dugongs. Australian Fisheries Management Authority, final research report, R 99/0497.

Marsh, H., I. Lawler, D. Kwan, S. Delean, K. Pollock, and **M. Allredge**. 2004. Dugong distribution and abundance in Torres Strait. Australian Fisheries Management Authority, final research report, R 01/0895.

Allredge, M.W., C.C. Farquhar, D. Cimprich, and J.S. Hatfield. 2003. Survival, productivity and population growth of the Black-capped Vireo. Final Report, U.S. Fish and Wildlife Service, Austin, Texas. 27 pp.

Allredge, A.W., and **M.W. Allredge**. 2003. Pete's bowl wildlife plots: A 12-year summary 1992-2002. Vail, CO

Allredge, A.W. and **M.W. Allredge**. 2003. Great divide resource area wildlife analysis. National Wildlife Federation, Boulder, CO.

Allredge, M.W., J. S. Hatfield, D. D. Diamond, and C. D. True. 2002. Population viability analysis of the Golden-cheeked Warbler. Final Report, U.S. Fish and Wildlife Service, Austin, Texas. 38 pp.

Pollock, K.H., **M.W. Allredge**, J.R. Walters, and J. Britcher. 2001. A conceptual sampling model and its application to the estimation of population

demographics for Red-cockaded Woodpeckers on Fort Bragg. Final Report, U.S. Army, Fort Bragg, NC.

Professional Presentations

M.W. Alldredge, K.H. Pollock, and T.R. Simons. 2005. Factors affecting the detection process for aural detections of songbirds. American Ornithologists' Union. Santa Barbara, California.

M.W. Alldredge, K.H. Pollock, and T.R. Simons. 2005. Estimating distance to birds heard but not seen. American Ornithologists' Union. Santa Barbara, California.

M.W. Alldredge, K.H. Pollock, T.R. Simons, and J.A. Collazo. 2004. Multiple-observer and time of detection methods for estimating abundance of birds from point count surveys. American Ornithologists' Union in conjunction with the Society of Canadian Ornithologists. Quebec, Canada.

M.W. Alldredge, K.H. Pollock, and T.R. Simons. 2004. Multiple species modeling of point count surveys. American Ornithologists' Union in conjunction with the Society of Canadian Ornithologists. Quebec, Canada.

T.R. Simon, K.H. Pollock, and **M.W. Alldredge**. 2004. Experimental analysis of detection probabilities on avian point count censuses. Ecological Society of America Annual Meeting, Portland, Oregon.

K.H. Pollock, **M.W. Alldredge**, T.R. Simons. 2004. Application of capture-recapture type models in point count surveys. The Statistical Society of Canada, Montreal, Canada.

M.W. Alldredge, and J.M. Peek. 2000. Nutritional relationships to elk habitat use in Northern Idaho. Pacific Northwest Regional Wildlife Society meeting, Spokane, Washington.

M.W. Alldredge, and J.M. Peek. 1999. Elk habitat use on industrial forest lands. Idaho Wildlife Society meeting, Moscow, Idaho.