

**HALL SAWYER, *Research Biologist*****EDUCATION**

Ph.D.	University of Wyoming, Laramie, Wyoming	2010	<i>Zoology and Physiology</i>
M.S.	University of Wyoming, Laramie, Wyoming	1997	<i>Zoology, minor: Statistics</i>
B. S.	Colorado State University, Fort Collins, Colorado	1994	<i>Wildlife Biology</i>

**PROFESSIONAL EXPERIENCE**

- 2002-Present *Research Biologist*, Western EcoSystems Technology, Inc., Laramie, Wyoming  
 1997-2001 *Research Scientist*, Wyoming Cooperative Fish and Wildlife Research Unit, Laramie, Wyoming

**SPECIALTY AREAS**

**Wildlife Research:** Fifteen years experience conducting and coordinating research projects for a variety of state and federal agencies, as well as industry and non-government organizations. Responsible for the design, animal capture, data collection, analysis, and report writing for studies of resource selection, migration ecology, and demography for a wide range of ungulate species. Worked with state and local governments, NGOs, and industry to develop management guidelines and land-use plans that incorporate wildlife migration routes in western Wyoming (Sawyer et al. 2005, 2009a). Conducted the first long-term study evaluating the effects of natural gas development on mule deer (Sawyer et al. 2006, 2009b). Developed seasonal habitat use models for elk in non-forested regions of southwest Wyoming (Sawyer et al. 2007).

**Global Positioning System (GPS)-telemetry, Resource Selection, and Migration Ecology:** Fifteen years of experience with radio-telemetry methodologies, and data analysis. Utilized both traditional VHF collars and GPS units to evaluate movement patterns and resource selection. Sawyer et al. (2006, 2007, 2009b) present a state-of-the-art resource selection method that has broad application for estimating resource selection patterns with GPS data. Nielson et al. (2009) recently developed resource selection methods that apply when GPS success is < 100%, and Sawyer et al. (2009a) developed a quantitative framework for identifying and prioritizing ungulate migration routes from GPS data.

**Animal Capture and Handling:** Responsible for the capture and handling of >800 ungulates, including mule deer, white-tailed deer, pronghorn, moose, and elk. Experience with a wide range of capture techniques including corral traps, clover traps, drive nets, helicopter net-gunning, and drug immobilization. Completed safe, efficient capture operations across a variety of seasons and landscapes.

**Roadway Impact Assessment:** Coordinated wildlife crossing studies for two major highway reconstruction projects in the Greater Yellowstone area to identify mitigation opportunities and assist engineers with wildlife-friendly design plans.

**REPRESENTATIVE PROJECTS**

Long term study designed to assess potential impacts of energy development on mule deer in the Pinedale Anticline Project Area (*Questar Exploration and Production Company, Bureau of Land Management, Wyoming Game and Fish Dept., Pinedale Anticline Planning Office*)

Large-scale GPS study designed to identify seasonal distribution and migration routes of mule deer prior to energy development in the Atlantic Rim Project Area (*Anadarko Petroleum Company, Bureau of Land Management, Wyoming Game and Fish Dept.*)

Before-after GPS study designed to evaluate potential impacts of bike path on elk distribution in Grand Teton National Park (*National Park Service*)

Mule deer underpass monitoring along US 30: Nugget Canyon (*Wyoming Department of Transportation*)

Before-after GPS study designed to evaluate potential impacts of wind development on elk (*Bureau of Land Management*)

**PUBLICATIONS**

**Sawyer, H.,** M. J. Kauffman, R. M. Nielson, and J. S. Horne. 2009a. Identifying and prioritizing ungulate migration routes for landscape-level conservation. *Ecological Applications* 19:2016-2025.

**Sawyer, H.,** M. J. Kauffman, and R. M. Nielson. 2009b. Influence of well pad activity on the winter habitat selection patterns of mule deer. *Journal of Wildlife Management* 73:1052-1061.

Nielson, R. M., B. F. J. Manly, L. L. McDonald, **H. Sawyer,** and T. L. McDonald. 2009. Estimating habitat selection when GPS fix success is less than 100%. *Ecology* 90:2956-2962.

**Sawyer, H.,** R. M. Nielson, F. Lindzey, L. Keith, J. Powell, and A. Abraham. 2007. Habitat selection of Rocky Mountain elk in a non-forested environment. *Journal of Wildlife Management* 71:868-874.

- Good, R. E., R. M. Nielson, **H. Sawyer**, and L. L. McDonald. 2007. A Golden eagle population estimate for the western United States. *Journal of Wildlife Management* 71:395-402.
- Sawyer, H.**, R. M. Nielson, F. Lindzey, and L. L. McDonald. 2006. Winter habitat selection of mule deer before and during development of a natural gas field. *Journal of Wildlife Management* 70:396-403.
- Sawyer, H.**, F. Lindzey, and D. McWhirter. 2005. Mule deer and pronghorn migration in western Wyoming. *Wildlife Society Bulletin* 33:1266-1273.
- Sawyer, H.** and F. Lindzey. 2001. Habitat selection and sexual segregation of elk in northern Wyoming. *Intermountain Journal of Science* 7:71-77.
- Van Campen, H., J. Ridpath, E. Williams, J. Cavender, J. Edwards, S. Smith, and **H. Sawyer**. 2001. Isolation of bovine viral diarrhea virus from a free-ranging mule deer (*Odocoileus hemionus*). *Journal of Wildlife Diseases* 37:306-311.

#### TECHNICAL REPORTS AND PROCEEDINGS

- Sawyer, H.**, R. Nielson, and M. Hicks. 2009. Distribution and habitat selection patterns of mountain sheep in the Laramie Range. Western Ecosystems Technology, Inc. Cheyenne, Wyoming.
- Sawyer, H.**, R. Neilson, and D. Strickland. 2009. Sublette Mule Deer Study (Phase II): Final Report 2007 - long-term monitoring plan to assess potential impacts of energy development on mule deer in the Pinedale Anticline Project Area. Western Ecosystems Technology, Inc. Cheyenne, Wyoming.
- Sawyer, H.** 2007. Final Report for the Atlantic Rim Mule Deer Study. Western Ecosystems Technology, Inc. Cheyenne, Wyoming.
- Sawyer, H.**, and R. Nielson. 2005. Seasonal distribution and habitat use patterns of elk in the Jack Morrow Hills Planning Area. Western Ecosystems Technology, Inc. Cheyenne, Wyoming.
- Sawyer, H.**, and B. Rudd. 2005. Pronghorn roadway crossings: a review of available information and potential options. Western Ecosystems Technology, Inc. Cheyenne, Wyoming.
- Sawyer, H.** and F. Lindzey. 2004. Assessing Impacts of Oil and Gas Development on Mule Deer. *Transactions of the 69<sup>th</sup> North American Wildlife and Natural Resource Conference* 267-278. Wildlife Management Institute, Washington, D.C.
- Sawyer, H.**, R. Neilson, D. Strickland, and L. McDonald. 2005. 2005 Annual Report: Sublette Mule Deer Study (Phase II): long-term monitoring plan to assess potential impacts of energy development on mule deer in the Pinedale Anticline Project Area. Western Ecosystems Technology, Inc. Cheyenne, Wyoming.
- Sawyer, H.** and F. Lindzey. 2002. A review of predation on bighorn sheep (*Ovis Canadensis*). Wyoming Cooperative Fish and Wildlife Research Unit, Laramie. 36 pp.
- Lindzey, F., **H. Sawyer**, C. Anderson, and B. Banulis. 2001. Performance of store-on-board GPS collars on elk, mule deer and mountain lions in Wyoming, USA. Pages 29-31 in A.M. Sibbald and I.J. Gordon, editors. *Proceedings of the Conference Tracking Animals with GPS*. Macaulay Land Use Research Institute 113 pp.
- Sawyer, H.** and F. Lindzey. 2001. Sublette Mule Deer Study. Wyoming Cooperative Fish and Wildlife Research Unit, Laramie. 52 pp.
- Sawyer, H.** and F. Lindzey. 2000. Jackson Hole Pronghorn Study. Wyoming Cooperative Fish and Wildlife Research Unit, Laramie. 57 pp.
- Sawyer, H.** and F. Lindzey. 2000. Ecology of sympatric mule deer and white-tailed deer in riparian communities of southeast Wyoming. Wyoming Cooperative Fish and Wildlife Research Unit, Laramie. 49 pp.
- Sawyer, H.**, F. Lindzey, and B. Jellison. 1998. Applying GIS technology to test an elk habitat effectiveness model in north-central Wyoming. Pages 176-183 in J.C. deVos, ed. *Proceedings of the 1997 Deer/Elk Workshop*, Rio Rico, Arizona. Arizona Game and Fish Department, Phoenix.
- Sawyer, H.** and F. Lindzey. 1997. North Fork Powder River and Horse Creek Elk Studies in the Bighorn Mountains, Wyoming. Wyoming Cooperative Fish and Wildlife Research Unit, Laramie. 129 pp.