Curriculum Vitae

14 September 2019

**Jennifer Sorensen Forbey, Ph.D.**

Department of Biological Sciences

Boise State University

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**PROFESSIONAL PREPARATION**

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| INSTITUTION AND LOCATION | DEGREE | YEAR(s) | FIELD OF STUDY |
| Mesa State College, Grand Junction, CO | B.S. | 1997 | Biology |
| University of Utah, Salt Lake City, UT | Ph.D. | 2003 | Biology |
| Australian National Univ, Univ. Tasmania, AUS | NSF, PostDoc | 2003-04 | Biology |
| Pharmacokinetics and Toxicokinetics for the Industrial Scientist Training |  | 2006 | Pharmacokinetics |
| Pharmacokinetics for Pharmaceutical Scientists Course |  | 2007 | Pharmacokinetics |

**APPOINTMENTS**

2019-Pres Professor, Dept of Biological Sciences, Boise State University, Boise, ID

2014-Pres. Associate Professor, Dept of Biological Sciences, Boise State University, Boise, ID

2015-2016 US Fulbright Scholar, Sweden. Swedish Agricultural Institute, Grimsö, Sweden

2008-2014 Assistant Professor, Dept of Biological Sciences, Boise State University, Boise, ID

2007-2009 Pharmacokinetic Consultant, Rosa Pharmaceuticals, INC

2007 Instructor, Pharmacokinetics and Pharmacodynamics, Dept of Pharmacology and Toxicology, University of Utah, SLC, UT

2007-2008 Research Assistant Professor, Dept Pharmaceutics and Pharmaceutical Chemistry, University of Utah, SLC, UT

2007 Instructor, Global Crises in Natural Resources, Dept of Biology, University of Utah, SLC, UT

2005-2007 Scientist I, Pharmacokineticist, NPS Pharmaceuticals, SLC, UT

2003-2007 National Science Foundation International Research Postdoctoral Fellow (Australia and New Zealand)

2004-2005 Assistant Professor, Oregon State University, Dept of Fisheries and Wildlife, Cascade Campus, Bend, OR

2002-2003 Graduate Research Fellow, University of Utah, SLC, UT

2001-2002 University Teaching Assistantship Fellow, University of Utah, SLC, UT

1999-2001 Dept of Biology Teaching Assistant, University of Utah, SLC, UT

**PUBLICATIONS**

Of the 58 total peer-reviewed papers that include graduate students, undergraduates and international collaborators as co-authors. This demonstrates my commitment to collaboration, my inclusion of students in research, and my ability to build strong international networks that have scientific impact on the international stage. (J.S. Sorensen/Forbey authorship in bold, graduate student authorship indicated with \*, undergraduate authorship indicated with \*\*, international collaborators underlined**)**

***Peer-reviewed research articles***

In review or revision for resubmission

60. Hudon, SF\*, AN Wilkening, EJ Hayden, **JS Forbey**, LA Shipley. Submitted 31 Dec 2018 to Microorganisms. Rapid changes in the gut microbiome of a captive mule deer upon introduction to a natural diet.

59. Fremgen, MR\*; J.J Peña\*\*; JW Connelly; **JS Forbey**. Availability and dietary quality of three-tip and Wyoming big sagebrush influence winter foraging ecology of Greater Sage-Grouse in a post-fire habitat. Resubmitted to Journal of Arid Environments on 16 Dec 2018.

**2019**

58. Dwinnell, S.\*; Sawyer, H.; Randall, J.; Beck, J.; **Forbey, J.S**.; Fralick, G.; Monteith, K. 2019. Where to Forage When Afraid: Does Perceived Risk Impair Use of the Foodscape? Ecological Applications. <https://doi.org/10.1002/eap.1972>

57. Speed, J.D.M., I.Å. Skjelbred, I.C. Barrio, M.D. Martin, D.Berteaux, K. Christie, D. Ehrich, **J.S. Forbey**, D. Fortin7, J.Grytnes, K. Hoset, N. Lecomte, B. Marteinsdóttir, J. B. Mosbacher, Å. Pedersen, V. Ravolainen, E. Rees, S. Rozenfield, N. Sokolova, A. Thornhill, I. Tombre, E.M. Soininen. 2019. Trophic interactions and abiotic factors drive functional and phylogenetic structure of vertebrate herbivore communities across the Arctic tundra biome. Ecography. DOI:10.1111/ecog.04347.

56. Oh, K.P, C.L. Aldridge, **J.S. Forbey**, C.Y. Dadabay, S.J. Oyler-McCance, Conservation genomics in the sagebrush sea: population divergence, demographic history, and local adaptation in sage-grouse (Centrocercus spp.), Genome Biology and Evolution, evz112, <https://doi.org/10.1093/gbe/evz112>.

**2018**

55. Nobler, JD\*, MJ Camp\*, MM Crowell\*, LA Shipley, C Dadabay, JL Rachlow, L James\*\*, **JS Forbey**. 2018. Preferences of specialist and generalist mammalian herbivores for mixtures versus individual plant secondary metabolites. Journal of Chemical Ecology. Published online: 06 Nov 2018. DOI: 10.1007/s10886-018-1030-5.

56. **Forbey, J.S.**, R. Liu, T.T. Caughlin, M.D. Matocq, J.A. Vucetich, K.D. Kohl, M.D. Dearing, A.M. Felton. 2018. Review: Using physiologically based models to predict population responses to phytochemicals by wild vertebrate herbivores. Animal. 12(s2): s383-s398. doi: 10.1017/S1751731118002264. PMID: 30251623.

54. Pauli, B.P. E.R. Sun\*\*, Z.K. Tinkle\*, **J.S. Forbey**, K.E. Demps and J.A. Heath. Human habitat selection: Using tools from wildlife ecology to predict recreation in natural landscapes. Accepted Natural Areas Journal on 10/19/18.

53. Kohl, K.D. K.F. Oakeson, T.J. Orr, A.W. Miller, **J.S. Forbey**, C.D. Phillips, C. Dale, R.B. Weiss, M.D. Dearing*.* 2018. Metagenomic sequencing provides insights into microbial detoxification in the guts of small mammalian herbivores (Neotoma spp.). FEMS Microbiology Ecology. 94 (12). doi: 10.1093/femsec/fiy184.

52. Smith, Kurt\*, **J.S. Forbey**, J.L. Beck. 2018. Effects of mowing and tebuthiuron treatments on the nutritional quality of Wyoming big sagebrush. Rangeland Ecology & Management: 71:47-423.

51. Crowell, M. M\*., L. A. Shipley, **J. S. Forbey**, J. L. Rachlow, and R. G. Kelsey. 2018. Dietary partitioning of toxic leaves and fibrous stems differs between sympatric specialist and generalist mammalian herbivores. Journal of Mammalogy 99:565-577, <https://doi.org/10.1093/jmammal/gyy018>.

50. Milling, C.R.\*, J.L. Rachlow, P.J. Olsoy\*, M.A. Chappell, T.R. Johnson, **J.S. Forbey**, L.A. Shipley, and D.H. Thornton. 2018.  Habitat structure modifies microclimate: an approach for mapping fine-scale thermal heterogeneity.  Methods in Ecology and Evolution 9:1648-1657.DOI: 10.1111/2041-210X.13008.

49. Milling\*, C. R., J. L. Rachlow, M. A. Chappell, M. J. Camp\*, T. R. Johnson, D. R. Paul, L. A. Shipley,and **J. S. Forbey**. 2018. Seasonal temperature acclimatization in a semi-fossorial mammal and the role of burrows as thermal refuges. PeerJ 6:e4511; DOI 10.7717/peerj.4511.

48. Camp\*, M. J., L. A. Shipley, C. R. Milling\*, J. L. Rachlow, and **J. S. Forbey**. 2018. Interacting effects of ambient temperature and food quality on the foraging ecology of small mammalian herbivores. *Journal of thermal biology*, *71*, 83-90.

**2017**

47. McMahon, L. A.\*, J. L. Rachlow, L. A. Shipley, **J. S. Forbey**, and T. R. Johnson. 2017. Habitat selection differs across hierarchical behaviors: Selection of patches and intensity of patch use. Ecosphere 8(11):0.1993.

46. Olsoy, P, J.\*, **L. A. Shipley**, J. L. Rachlow, J. S. Forbey, N. Glenn, M. Burgess, and D. Thornton. 2017.  Unmanned aerial systems measure structural habitat features for wildlife across multiple scales. Methods in Ecology and Evolution. 9(3): 594-604. DOI:10.1111/2041-210X.12919.

45 Camp\*, M. J., **L. A. Shipley**, T. R. Johnson, P. Olsoy\*, J. S. Forbey, J. L. Rachlow, and D. Thornton. 2017. The balancing act of foraging: Mammalian herbivores trade-off multiple risks when selecting food patches. Oecologia 185:537-549, DOI 10.1007/500442-017-3957-6.

44. Milling\*, C. R., J. L. Rachlow, T. R. Johnson, J. S. Forbey, and **L. A. Shipley**. 2017. Seasonal variation in behavioral thermoregulation and predator avoidance in a small mammal. Behavioral Ecology 28:1236-1247. doi:10.1093/beheco/arx084.

43. McMahon, LS\*, JL Rachlow, LA Shipley, **JS Forbey**, TR Johnson, PJ Olsoy\*. 2017. Evaluation of micro-GPS receivers for tracking small-bodied mammals. PLoS ONE. 12(3): e0173185. doi.org/10.1371/journal.pone.0173185.

42. Parikh, GL\*, **JS Forbey**, B. Robb\*\*, RO Peterson, LM Vucetich and JA Vucetich. 2017. The influence of plant defensive chemicals, diet composition, and winter severity on the nutritional condition of a free-ranging, generalist herbivore. *Oikos*, 126:196-203. doi:10.1111/oik.03359.

41. **Forbey, JS**, GL Patricelli, DM Delparte, AH Krakauer, PJ Olsoy\*, MR Fremgen\*, JD Nobler\*, LP Spaete, LA Shipley, JL Rachlow, AK Dirksen\*, APerry\*, BA Richardson, NF Glenn. *Accepted* Wildlife Biology 2017*.* Emerging Technology to Measure Habitat Quality and Behavior of Grouse: examples from studies of Greater Sage-grouse. DIO:10.2981/wlb.00238.

40. Fremgen, MF\*, D Gibson, RL Ehrlich\*, AH Krakauer, **JS Forbey**, EJ Blomberg, JS Sedinger, GL Patricelli. *Accepted in Review* Wildlife Biology*.* Necklace-style radio-transmitters are associated with changes in display vocalizations of male Greater Sage-grouse. DOI: 10.2981/wlb.00236.

**2016**

39. Sherburne, J\*; Anaya, A\*; Fernie, K; **Forbey, J**; Furlong, E; Kolpin, D; Dufty, A; Kinney, C. 2016. The occurrence of triclocarban and triclosan within a terrestrial food web: from biosolids to birds. DOI: 10.1021/acs.est.6b01834. Environmental Science & Technology. 50(24): 13206-13214.

38. Olsoy PJ\*, Griggs TC, Ulappa AC\*, Gehlken K\*\*, Shipley LA, Shewmaker GE, **Forbey JS**. 2016. Nutritional analysis of sagebrush by near-infrared reflectance spectroscopy. *Journal of Arid Environments* 134:125-131. doi:10.1016/j.jaridenv.2016.07.003.

37. Kohl, K.D., J.W. Connelly, M.D. Dearing, **J.S. Forbey**. 2016. Microbial detoxification in the gut of a specialist avian herbivore, the Greater Sage-Grouse. *FEMS microbiology letters.* fnw144. doi: 10.1093/femsle/fnw144.

36. Crowell, MM\*, LA Shipley, MJ Camp\*, JL Rachlow, **JS Forbey**, and TR Johnson. 2016. Selection of food patches by sympatric herbivores in response to concealment and distance from a refuge. *Ecology and Evolution*, *6*(9), 2865-2876. doi:10.1002/ece3.1940.

35. Utz, J.\*, L.A. Shipley, J. Rachlow, T.L. Johnstone-Yellin, M.J. Camp\*, **J.S. Forbey**. 2016. Understanding tradeoffs between predation and food risks in a specialist mammalian herbivore. Wildlife Biology, 22(4): 167-173. <http://dx.doi.org/10.2981/wlb.00121>.

**2015**

34. Camp, M.J.\*, L.A. Shipley, T.R. Johnson, M.M. Crowell\*, **J.S. Forbey**, J.L. Rachlow. 2015. Modeling tradeoffs between plant fiber and toxins: A framework for quantifying risks perceived by foraging herbivores. Ecology. 96: 3292-3302. <https://doi.org/10.1890/14-2412.1>.

33. Kohl, K.D.\*, E. Pitman\*\*, B. Robb\*\*, J.W. Connelly, M.D. Dearing, **J.S. Forbey**. 2015. Monoterpenes as inhibitors of digestive enzymes and counter-adaptations in a specialist avian herbivore. Journal of Comparative Physiological Biology-B. 185(4): 425-34. DOI 10.1007/s00360-015-0890-z.

32. Pu,, X , L. Lam\*\*, K. Gehlken\*\*, A.C. Ulappa\*, J.L. Rachlow, **J.S. Forbey**. 2015. Antioxidant capacity of Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*) varies spatially and is not related to the presence of a sagebrush dietary specialist. Western North American Naturalist. 75(1): 78-87. <http://dx.doi.org/10.3398/064.075.0109>.

**2014**

31. Olsoy, P.J.\*, **J.S. Forbey,** J.L. Rachlow, J.D. Nobler\*, N.F. Glenn, L.A. Shipley. 2014. Fearscapes: mapping functional cover of prey with terrestrial LiDAR. BioScience. 65(1): 74-80.

30. McArthur, C., P.B. Banks, R. Boonstra, **J.S. Forbey**. 2014. The dilemma of foraging herbivores: dealing with food and fear. Oecologia.176(3):677-689.

29. Ulappa, A.C.\*, R.G. Kelsey, G.G Frye\*, J.L. Rachlow, L.A. Shipley, L. Bond, X. Pu, **J.S. Forbey**. 2014. Plant protein and secondary metabolites influence diet selection in a mammalian specialist herbivore.

28. Frye, G.G.\*, J.W. Connelly, D.D. Musil, C. Cardinal, L. Cross, **J.S. Forbey**. 2014. Do necklace-style radiotransmitters influence flushing behavior of greater sage-grouse? The Wildlife Society Bulletin. 38(2):433-438.

**2013**

27. **Forbey, J.S.**, N.L. Wiggins, G.G. Frye\*, J.W. Connelly. 2013. Hungry grouse in a warming world: Emerging risks from plant chemical defenses and climate change. Wildlife Biology. 19: 374-381.

26. Frye, G.G.\*, J.W. Connelly, D.D. Musil, **J.S. Forbey**. 2013. Phytochemistry predicts habitat selection by an avian herbivore at multiple spatial scales.Ecology. 94(2): 308-314.

25. **Forbey, J.S.**, M.D. Dearing, E. Gross, C. Orians, E. Sotka and W.J. Foley. 2013. Vertebrate Herbivores in Terrestrial and Aquatic Systems: A Pharm-Ecological Perspective. Journal of Chemical Ecology. 39(4): 465-480.

**2012**

24. Shipley, L.A., E.M. Davis, L.A. Felicetti, S. McLean, **J.S. Forbey**. 2012. Mechanisms for eliminating monoterpenes in sagebrush by specialist and generalist rabbits. J Chem Ecol. 38:1178-1189.

**2011**

23. **Forbey J.S.,** X. Pu, D. Xu, K. Kielland, J.P. Bryant. 2011. Inhibition of succinate dehydrogenase activity as a mode of action for papyriferic acid in birch to deter snowshoe hares. J Chem Ecol. 37:1285-1293.

**2010**

22. Simpson, S.J., Raubenheimer, D, Charleston, M., Clissold, F., **Working Group1**. 2010. Modeling nutritional interactions: from individuals to communities. Trends in Ecology and Evolution. 25(1): 53-60. Online 17 August. doi:10.1016/j.tree.2009.06.012

 1 The Working Group comprised of several contributors, including J.S. Forbey. However, TREE limits the number of authors to five.

**2009**

21. **Forbey, J.S.**, A.L. Harvey, M.A. Huffman, F. Provenza, R. Sullivan, D. Tasdemir. 2009. Exploitation of secondary metabolites by animals: A response to homeostatic challenges. Integrative and Comparative Biology. 49(3):314-328.

20. **Forbey, JS** and WJ Foley. 2009 A pharmacological approach to understanding plant-herbivore interactions: an introduction to the Pharm-Ecology Symposium. Integrative and Comparative Biology. 49(3):267-273.

19. Sotka, E.E., **J.S. Forbey**, M.H. Horn, A.G.B. Poore, D. Raubenheimer and K.E. Whalen. 2009. The emerging role of pharmacology in understanding marine and freshwater consumer-prey interactions. Integrative and Comparative Biology. 49(3):291-313.

18. Shipley, L.A., B. Moore and **J.S. Forbey**. 2009. Revisiting the dietary niche: when is a mammalian herbivore a specialist? Integrative and Comparative Biology. 49(3):274-290.

**2008**

17. Dearing, M.D., **J. S. Forbey**, J. D. McLister, L. Santos\*\*. 2008. Ambient temperature influences diet selection and physiology of an herbivorous mammal, *Neotoma albigula*. Physiological Biochemical Zoology. 81(6): 891–897.

***Book Chapters***

1. **Forbey, J.S.** and M.D. Hunter. 2012. The herbivore's prescription: A pharm-ecological perspective on host plant use by vertebrate and invertebrate herbivores. *In* The ecology of plant secondary metabolites: genes to global processes. Eds. GR Iason, M. Dicke and SE Hartley. Ecological Reviews. Cambridge University Press, Cambridge.

***Other publications***:

**6. Forbey, JS**, G.L. Patricelli, D.M. Delparte, A.H. Krakauer, P.J. Olsoy\*, M.R. Fremgen\*, J.D. Nobler\*, N.F. Glenn, L.P. Spaete, B.A. Richardson, L.A. Shipley, J.Mitchell.*2016.* Overview of a Workshop to Expand the Use of Emerging Technology to Understand the Ecology of Grouse in a Changing Climate. Grouse News 52: 7-18.

**5**. Peña, J.\*\*, M.R. Fremgen\*, **J.S. Forbey**. "Is Diet Selection by Greater Sage-Grouse Influenced by Biomass Availability or Toxins?." *McNair Scholars Research Journal* 12.1 (2016): 16.

**4.** M.R. Fremgen. 2015. Diversity within a Species: Studying Sagebrush Morphotypes. Sage Notes 37(1): 12-13. Idaho Native Plants Society. Available at:

http://idahonativeplants.org/news/SageNotesMar2015.pdf.

**3.** Moore, B.D., W.J. Foley, **J.S. Forbey**, J.L. DeGabriel. 2013. Response letter to ”Self-medication in animals,” J. C. de Roode *et al*., Perspectives, 12 April, p. 150. Science. 340: 1041.

**2. Forbey, JS**. 2013. Evolutionary insight merges with toxicology, a review of Monosson, Emily. 2012. Evolution in a toxic world: how life responds to chemical threats. Ecology. 94(1): 257-264.

**1. Forbey, JS**, G.G. Frye, X. Pu and J.W. Connelly. 2011. Toxic Scat: A mechanism to prevent overdosing on plant chemicals by grouse. Grouse News 42:24-29.

***Manuscripts in Preparation***:

**Forbey, J.S.** G.G Frye\*, B. Robb\*\*, M. Camp\*, J.W. Connelly.*In prep* for Journal of Chemical Ecology. Regulated absorption as a strategy for limiting exposure to plant secondary metabolites in vertebrate herbivores.

**FUNDING**

**Summary: My scholarly work at Boise State has received over $30.7 million total funding since 2008, with over $9.7 million coming directly to Boise State from external federal and state agencies (National Science Foundation, Bureau of Land Management, Idaho Department of Fish and Game, Idaho Office of Species Conservation, Idaho Army National Guard) and the remainder supporting collaborative projects.** Below are the sources and brief description of funding that is planned, pending, current and completed.

***Awarded in 2018***

National Science Foundation

Forbey (PI)

Project/Proposal Title: EPSCoR Research Infrastructure Improvement Program: Track-2 Focused EPSCoR Collaborations (RII Track-2 FEC): **Genomics Underlying Toxin Tolerance (GUTT): Identifying molecular innovations that predict phenotypes of toxin tolerance in wild vertebrate herbivores**

Source of Support: National Science Foundation, OIA-1826801

Total Award Amount: $6,000,000 total award, **$2,586,000 to Boise State University**

Total Award Period Covered: 9/1/18-8/30/22

Location of Project: Boise State University, Boise, ID

The overall objective of this project is to create the research infrastructure and diverse workforce to sustain research competitiveness in genome to phenome science in Idaho, Nevada, and Wyoming EPSCoR jurisdictions. The team will pursue three Themes to: 1) Identify molecular mechanisms of toxin tolerance by using metabolomics, herbivore transcriptomics, microbial metagenomics, and molecular modeling to identify how herbivore and gut microbial genomes interact with naturally ingested toxins; 2) Quantify physiological mechanisms of toxin tolerance by using *in vivo* data and *in vitro* bioassays to quantify rates of toxin absorption and metabolism and toxin-dependent changes in digestive function; and 3) Predict demographic consequences of toxin exposure by using models that link molecular and physiological mechanisms with *in vivo* manipulations to predict how toxin exposure influences demography of wild herbivores.

National Science Foundation

Forbey (Co-PI)

Project/Proposal Title: “**RII Track-1: Using Genome to Phenome Mechanisms and Patterns to Predict Adaptive Responses of Organisms to Changing Landscapes**”

Source of Support: National Science Foundation, OIA-1757324

Total Award Amount: $20,000,000 total award, **$5,269,609 to Boise State University**

Total Award Period Covered: June 1, 2018 – May 31, 2023

Location of Project: Idaho

The overall objective of this proposal isto identify how genetic diversity interacts with the environment (GxE) to alter phenotypes linked to adaptive capacity of populations. Our team will: (1) build novel modeling frameworks and corresponding knowledge to advance mechanistic ecological modeling; (2) develop long-term study sites to generate new understanding of GxE outcomes in social-ecological systems and increase forecasting and monitoring occupancy and population stability in non-model organisms; and (3) increase capacity to monitor GxE outcomes relative to human decisions and apply scientific advances to effectively manage populations in the face of changing landscapes.

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| Bureau of Land Management/US Department of the Interior |
| Forbey (PI)Total Award Amount: $24,715 |  |

Project/Proposal Title: **Using Chemical and Genetic Tools to Identify Post-Fire Recruitment and Use of Sagebrush by Wildlife**

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| Total Award Period Covered: 8/01/2018-07/12/2021Location of Project: Boise State University, Boise, IDPerson-Months per Year Committed to the Project: Sumr: 0.1The goal of this project is to use biomarkers of diet composition and health of sage-grouse and other wildlife and of diet quality of sagebrush to accurately map plants, patches, and habitats with the highest dietary quality across various temporal scales following post-fire recovery. This effort may directly translate to predicting and monitoring habitat use and responses by herbivores in the sagebrush steppe. |

***Submitted and awarded in 2017***

New support in 2017:

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| National Science Foundation $1,000,000 | 2/1/17 | - | 1/31/22 |  |
| Forbey (Co-PI) |  |

Title: **Gateway Scholarships for Biological Sciences**

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| The goal of the Boise State University Gateway Scholarships in Biological Sciences Program is to emphasize the importance of recruiting students to STEM disciplines, and the significance of improving retention, graduation rates, and overall student success of academically talented students with demonstrated financial need.  The program has five key components: 1) a mentored cohort program; 2) enhanced risk-based advising; 3) evidence-based instructional practices integrated into the curriculum; 4) co-curricular experiences for students; and 5) a study to investigate the effects of activities on retention, student success, and degree attainment. Co-curricular and cohort-building activities allow students to engage in the profession and recognize the interdisciplinary nature of the biological sciences. Connecting active learning practices in the classroom, self-efficacy, and rapport with mentors will facilitate the success of biology students, particularly underrepresented students.  |

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| Bureau of Land Management/US Department of the Interior$34,000 | 2/1/17 | - | 1/31/22 |  |
| Forbey (PI) |  |

Title: **Responses of greater sage-grouse and sagebrush to vegetation treatments and disturbance in the Owyhee uplands**

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| The goal of **this project is to obtain and provide reliable data on the health of wildlife and plants in public and private lands and foster the discussions needed to use the best available science to efficiently monitor and manage sagebrush ecosystems under existing and future vegetation treatments and habitat disturbances**. To meet this mission, we will assess the movement, survival, reproductive success, and health of greater sage-grouse and both the dietary and structural characteristics of sagebrush across a gradient of vegetation treatments and disturbances. |

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| Murdock Charitable Trust$15,000 | 9/2017 | - | 9/2019 |  |
| Forbey (PI) |  |

Title: **Wildlife-Directed Bioprospecting of Chemical Diversity for Pest Control**

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| The goal of this research project is to use observations of wildlife and their interactions with plants to direct the discovery of chemicals that can control pest species. Specifically, we will test if chemicals in the green plants selected by birds for nesting material are cytotoxic to pest species such as the Mexican chicken bug (*Haematosiphon indorus*, a pest of chickens and golden eagles) and the common bed bug (*C. lectularius*, a pest of humans). This approach to drug discovery is novel in that it uses ecological insight from wildlife to direct discovery of potential therapeutics that can combat agricultural and human pests. |

**Completed funding (selected projects):**

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| NSF-DEB- 1146194$347,728 of $980,000 total collaborative award  | 6/12/12 | - | 5/31/18 | 10% effort |
| Forbey (PI)  |  |
| Title: **Collaborative Research: Modeling the Tradeoffs of Food-, Fear-, and Thermal-Scapes to Explain Habitat Use by Mammalian Herbivores** |
| The main objective of this proposal is to elucidate the functional relationships between pygmy rabbits and interacting habitat features (nutrients in food, toxins in food, security cover, and thermal cover), to understand how individuals tradeoff resources, and to predict responses to habitat alterations. Integral to our research program is a novel educational model that trains graduate, undergraduate, and high school students who will conduct research collaboratively, participate in a tiered mentoring program, and engage with the community and regional biologists. |

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| NSF- REU Supplement to existing NSF$24,905 | 4/2016 | - | 5/31/18 | 5% effort |
| Forbey (PI) |  |

Title: **Developing remote sensing tools to monitor foodscapes in a changing climate**.

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| The objective of this ROA is to optimize NIRS techniques developed in the lab at the leaf-scale to predict the phytochemistry of plants as part of an existing NSF grant. The ROA will also test extension of these techniques to field and airborne platforms for the purpose of mapping plant chemical information for preferred foraging species across a sagebrush steppe landscape (foodscape).  |

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| NSF-IOS-1258217 | 2/1/13-2/1/16 5% effort |
| $38,400 of $470,000 awardForbey (PI of subcontract) |
| Title: **Courtship negotiation in a life-history context: interaction between on- and off-lek tactics in sage-grouse** |
| The goal of this proposal is to investigate courtship negotiation by exploring how condition, foraging efficiency and off-lek movements affect the dynamics of courtship haggling for both males and females. |

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| NIH-INBRE 3, NIH IDeA NIGMS #P20GM103408$764,000 to College of Idaho | 7/15/14 | - | 7/14/19 | 5% effort |
| Forbey (Mentor for College of Idaho PI) |  |

Title: **Co-evolutionary approach to discover natural products that enhance therapeutics**.

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| Our objective is to take advantage of millions of years of co-evolution to discover compounds which can enhance the bioavailability of important therapeutics by altering the cellular signals controlling mechanisms of absorption, distribution, and metabolism (i.e. pharmacokinetics) of orally ingested therapeutics in humans.  |

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| Idaho Army National Guard $9,000 | 3/31/14 | - | 12/31/14 | 1% effort |
| Forbey (PI) |  |
| Title: **Piute Ground Squirrel Population and Behavior Study** |
| The overall purpose of this project is to understand the spatial and temporal distribution of Piute ground squirrels (*Urocitellus mollis*) and how personality interacts with habitat types and use by this important prey species. This data will provide information on Piute ground squirrel (PGS) populations across the Orchard Combat Training Center (OCTC) for management of vegetation, prey and predators. |

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| Idaho Office of Species Conservation and Idaho Department of Fish and Game $178,325 | 12/21/10 | - | 8/30/16 | 5% effort |
| Forbey (PI) |  |
| Title: **Assessing the Dietary Quality of Sagebrush in Sage-Grouse Winter and Breeding Habitats** |
| The overall purpose of this project is to identify the nutritional importance of different sagebrush species in the sage-grouse diet and determine how diet quality influences reproductive success in sage-grouse at various sites in Idaho. The research will meet some of the population and habitat objectives outlined in the Idaho Sage-grouse Conservation Plan and will improve our understanding of sage-grouse distribution and population trends. |

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| BLM-Challenge Cost Share LO9AC16253 $82,500 | 02/01/10 | - | 9/30/15 | 5% effort |
| Forbey (PI) |  |
| Title: **Nutritional and chemical quality of winter diets selected by pygmy rabbits** |
| The purpose of this project is to gain an understanding of how the chemical and nutritional quality of sagebrush influences the diet selection and potential habitat use of pygmy rabbits in the sagebrush steppe. |

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| Wyoming Game and Fish Department $17,061 | 02/01/14 | - | 9/30/15 | 5% effort |
| Forbey (Co-PI) |  |
| Title: **Effects of Mowing and Herbicide Treatments on the Nutritional Quality of Sagebrush in south-central, Wyoming** |
| The purpose of this project is to identify how management treatments such as mowing and herbicide influence the dietary quality of sagebrush as a food for wildlife. |

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| NSF Workshop Award$7,800 | 7/1/2015 | - | 6/30/2016 | 5% effort |
| Forbey (PI) |  |

Title: **Workshop to Expand the Use of Emerging Technology to Understand the Ecology of Avian Herbivores in a Changing Climate**

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| The overall objective of the workshop is to show an international audience how to take advantage of advances in rapid biochemical assays, robotics and remote sensing to better understand, monitor and manage wildlife in a changing climate.This workshop will translate technological advances from basic science to the applied community and will highlight the value of basic research to solve applied problems. |

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| Murdock Charitable Trust$15,000 | 9/2015 | - | 9/2017 | 5% effort |
| Forbey (PI) |  |

Title: **Understanding the role of structural and chemical diversity in the sagebrush steppe**

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| The goal of our research project is to discover and broaden the public and student perception of structural and chemical diversity and function in a local ecosystem in Idaho. We will rely on both field and laboratory research to test the hypotheses that 1) greater structural diversity of plants in habitats promotes greater habitat use by wildlife and that 2) chemical diversity of plants can be exploited for their anti-bacterial and insecticidal properties. These studies will contribute to better management of habitats and discovery of chemicals that can benefit humans. |

International Arctic Science Committee travel award to participate in Herbivory Network Workshop, Reykjavik, Iceland. 500 Euros

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| J. William Fulbright Foreign Scholarship Grant$13,000 USDFulbright Inter-country travel award $1500 USD | 2/14/16 | - | 6/15/16Iceland, Norway | 30% effort |

Title: **Developing a Co-Evolutionary Directed Bioprospecting Program in Scandinavia**

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| The objective of this Fulbright is to develop a co-evolutionary directed drug discovery collaboration that enhances the economic value of natural systems in Scandinavia.This goal will be met by using the foraging behavior (i.e. plant selection or avoidance) of vertebrate herbivores in Sweden and Norway as a natural bioassay to select the plants most likely to have biologically active compounds. The broad multiplier effects of this research include multidisciplinary training of personnel in Sweden and Norway, and demonstrating to the public in Scandinavia how chemical biodiversity and sustainable harvesting of wildlife can benefit human health and local economic development. Our work will also generate preliminary data for proposals to the National Science Foundation (International Research Experiences for Students and Dimensions of Biodiversity Programs) to support an education exchange program between Sweden and Norway and Idaho to conserve the chemical biodiversity of natural systems and discover new drugs. |

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| BLM-CESU Award ID: LO9AC15385 $13,940 | 06/01/09 | - | 06/01/11 | 10% effort |
| Forbey (PI) |  |
| Title: **Nutritional and chemical quality of winter diets selected by sage-grouse** |
| This research will investigate both nutritional and chemical factors that drive selection of sagebrush for food by sage-grouse during the winter. The ultimate goal is to identify functional habitat use by sage-grouse and will provide land managers with insight based on nutritional ecology of sage-grouse that will compliment existing efforts to conserve and restore quality sagebrush habitat. |

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| NSF Award ID: 0827239 $24,800 + $2565 supplement | 9/15/08 | - | 8/31/2010 | 10% effort |
| Forbey (PI) |  |
| Symposium: PharmEcology Symposium: A Pharmacological Approach to Understanding Plant-Herbivore Interactions, to be held January 2-6, 2009 in Boston, MA. |
| This symposium provides an opportunity to define research at the interface of pharmacology and ecology, termed Pharm-Ecology. The new research areas will focus on: 1) mechanisms of absorption, distribution, metabolism and excretion (ADME) of plant secondary metabolites (PSMs) in herbivores; 2) mechanisms of action of PSMs in herbivores; and 3) genetic polymorphisms associated with these two components. The broader impacts of the symposium are to initiate international communication between leaders in ecology and pharmacology that will lead to novel funding opportunities, engage students to new research opportunities and promote diversity |

**PROFESSIONAL ACTIVITIES**

***Presentations, conferences and workshops* –**

2018 Invited Symposium Speaker: “Something Old, New, Borrowed and Overdue: Marrying Mechanism with Patterns to Advance Grouse Ecology”, 14th International Grouse Symposium, Logan, UT, September 24-28, 2018

2018 Invited Symposium Speaker: “Unravelling the rules of foraging: using genomes to predict and manage foraging phenomes in vertebrate herbivores”, International Symposium on the Nutrition of Herbivores (ISNH) in Clermont Ferrand (France) September 2-6, 2018

2018 Invited Seminar Speaker, BIOM - Biologie Intégrative des Organismes Marins, Sorbonne Université Laboratoire, Banyuls sur Mer, France, August, 2018

2018 Invited Seminar Speaker, University of Oslo, Oslo, Norway, April 2018

2017 Invited Symposium Speaker, Morley Nelson Snake River Birds of Prey National Conservation Area Science Working Group Annual Symposium, October, 2017

2017 Invited Seminar Speaker, University of Idaho, Moscow, ID, November, 2017

2017 Invited Conference Speaker for session “The Ecology of Plant-Herbivore Interactions in Cold Places” at Canadian Society for Ecology and Evolution, Annual Meeting, May, 2017

2017 Invited Conference Speaker at the Winter Animal Behavior Meetings, Steamboat Springs, CO, January, 2017

2016 Invited Symposium Speaker, Morley Nelson Snake River Birds of Prey National Conservation Area Science Working Group Annual Symposium, November, 2016

2016 Invited Seminar Speaker, University of Toronto, Toronto, Ontario, Canada, October, 2016

2016 Invited Seminar Speaker, Trent University, Peterborough, Ontario, Canada, October, 2016

2016 Invited Seminar Speaker, Umeå, May, 2016

2016 Invited Seminar Speaker, University of Bern, May, 2016

2016 Invited Workshop Speaker, Iceland Natural History, April, 2016

2016 Invited Seminar Speaker, University of Tromø and Norwegian Polar Institute

2016 Invited Seminar Speaker, Hedmark University Evenstad, May, 2016

2016 Invited Symposium Speaker and Women in Science Workshop lead, Annual symposium at the Department of Ecology, Swedish University of Agricultural Sciences, SLU, Uppsala, Sweden, February 2016.

2015 Invited Seminar Speaker, Grimsö Wildlife Research Station, Department of Ecology, Swedish University of Agricultural Sciences, SLU, Riddarhyttan, Sweden

2015 Invited Seminar Speaker, University of Eastern Finland, Department of Biology, Joensuu, Finland

2015 Invited Workshop Organizer: “Workshop to Expand the Use of Emerging Technology to Understand the Ecology of Avian Herbivores in a Changing Climate” at the International Grouse Symposium, Reykjavik, Iceland, Sept 3, 2015. Supported by NSF-DEB-1540085, JS Forbey, PI

2014 Invited IGNITE Session Speaker, The Wildlife Society Conference: "The Herbivore's Prescription: A Tale of Wildlife-Directed Bioprospecting", Oct 2014.

2014 Invited Seminar Speaker, Department of Ecology and Evolutionary Biology, University of Tennessee, Oct 2014.

2014 Invited Symposium Speaker for Evolutionary Ecology Symposium: "Molecular mechanisms and ecological consequences of plant chemical defenses in vertebrate herbivores", International Society for Chemical Ecology Meeting, University of Illinois at Urbana-Champaign, July, 2014.

2014 Speaker: 29th Sage & Columbian Sharp-tailed Grouse Workshop: “Detecting palatable plants for sage-grouse in the sagebrush sea”. Elko, NV, Jun 2014.

2014 Invited Seminar Speaker, Department of Evolution and Ecology, University of California - Davis, Jan 2014.

2013 Invited Symposium Speaker: Owyhee Research and Restoration Roundup. “Sage-grouse's eye view of habitat quality” Marsing, ID, 23 Oct, 2013.

2013 Invited Symposium Speaker: AAAS Symposium - Mechanisms of Tumor Progression & Cancer Therapeutics. “A co-evolutionary strategy to discovery novel anticancer drugs”, Las Vegas, USA, 18 June 2013.

2013 Invited Symposium Speaker: Plant Herbivore Interactions Gordon Conference. “Scaling up dose-response curves: Translation between lab and landscape”, Ventura, USA, 24-28 February 2013.

2013 Invited Conference Speaker for Great Basin Consortium Conference 2013: “A hungry sage-grouse’s view on habitats and climate”

2012 Speaker: International Grouse Symposium 2012: “Hungry grouse in a warming world”. Matsumoto, Japan, 20-24 July 2012.

2011 Invited Seminar Speaker: Department of Biological Science, California State University Fullerton. “Nature's Chemical Arms Race: The defensive strategies of plants and herbivores”

2010 Invited Symposium Speaker: British Ecological Society Annual Symposium 2010: “The integrative role of plant secondary metabolites in ecological systems.” University of Sussex, UK, 12 – 14 April, 2010. Invited by Dr. Glenn Iason (Macaulay Institute, Aberdeen, UK). “The herbivore's prescription: A pharmacological perspective on host plant use by herbivores”

2009 Conference Organizer: Society for Integrative and Comparative Physiology Symposium host: “PharmEcology: Integrating Ecological Systems and Pharmacology”, Jan 3-7, 2009; <http://www.sicb.org/meetings/2009/index.php3>. Supported by NSF0827239, JS Forbey, PI

2008 Invited Seminar Speaker: Department of Natural Resource Sciences, Washington State University and Department of Fish & Wildlife Resources, University of Idaho, "Behavioral, physiological and biochemical offenses of mammalian herbivores against plant chemical defenses"

**MENTORING**

**Summary: Since 2008, I have mentored and directly supervised 65 undergraduate students, 6 high school students and 10 K-12 teachers in my laboratory: 6 received funding from the NSF Idaho EPSCoR, 4 from the STEP program, 3 from the NSF LSAMP, 4 from NIH INBRE and 3 from the McNair Program.** Over the past three years alone, I have provided scientific experience of over 300 middle and high school students, three K-12 teachers, over 90 undergraduates, and 13 graduate students. **54 of the undergraduates working in my lab have been accepted into graduate, medical, PA, or other professional school or been offered jobs in STEM. Nine undergraduates I have mentored have been co-authors on publications or those recently accepted or submitted (2004-present) and 28 have been authors on presentations at local, regional, and national conferences and six have received awards for their presentations. Of the 10 graduate students I have mentored, 8 have been supported from external funding for at least 1 semester and 4 received a student research grant for their research. I have graduated 7 graduate students, 2 are or have successfully pursued PhDs with one currently as a clinical faculty at a university. All others have full-time research or education jobs in Biology.**

***Supervising graduate students***

Thesis Advisees (12 total since 2008, 8 have graduated):

*Current major advisor (Chair)*:

Clara Buchholts, PhD Ecology, Evolution, Behavior. Dissertation title: Predictors and Consequences of Changing Arctic Foodscapes.

Chelsea Merriman, M.S. Biology. Thesis title: Plant structure and chemistry drive patch selection for multiple activities in a specialist avian herbivore. Expected graduation May 2020.

Brittany Pendleton, M.S. Biology. Title: Using wildlife to discover New Approaches for Pest Control: The Golden Eagle Strategy. Expected graduation May 2020.

Brecken Robb, M.S. Biology. Title: Remotely-sensing chemical diversity and function of native Plants across sagebrush-steppe landscapes. Expected graduation May 2020

*Previous major advisor of graduated students*:

Dan Melody, M.S. Biology. 2017. Title: The Cost of Roaming Free: Assessing the Effects of Plant Secondary Metabolites on Diet Selection and Nutritional Condition in a Free-Ranging Generalist Herbivore. Teaching Assistantship funded by Department of Biological Sciences. Currently technician for Owyhee Air remote sensing of landscapes and wildlife.

Zoe Tinkle, M.S. Biology 2017. Thesis title: To Boldly Go: Boldness Predicts Behavior and Survivorship of a Critical Prey Species. Teaching Assistantship funded by Department of Biological Sciences. Currently Natural Resources Specialist, Environmental Management Office, Idaho Army National Guard

Jordan Nobler, M.S. Biology. 2016. Risky business: Tradeoffs between nutrition, toxicity, and predation by a specialist mammalian herbivore. Research Assistantship funded by NSF-DEB. Research supported by National Science Foundation (DEB-1146194 (sagescape), IOS-1258217 (Patricelli) and OIA-1826801 (GUTT), J.S. Forbey; NSF; DEB-1146368, L.A. Shipley; DEB-1146166, J.L. Rachlow), Washington State University, Bureau of Land Management (BLM; #L09AC16253, J.S. Forbey; #L09AC15391, J.L. Rachlow), the USDA National Institute of Food and Agriculture (NIFA; Hatch Project 1005876, L.A. Shipley) and the Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under Grant #P20GM103408 and P20GM109095, National Science Foundation Grant Nos. 0619793 and 0923535; the MJ Murdock Charitable Trust; and the Idaho State Board of Education (C. Dadabay, L. James, J.S. Forbey). **Currently Field Education Faculty at Teton Science Schools**

Marcella Fremgen, M.S. Biology. Plant toxins influence diet selection and intestinal parasites in a specialist herbivore. 2015. Research Assistantship funded by Idaho Department of Fish and Game. Research supported by the (Pittman-Robertson funds) from Idaho Department of Fish and Game, and we thank D. D. Musil and L. Cross for their assistance. Other funding that made this research possible included: Sigma Xi Grants-In-Aid, and National Science Foundation grant IOS-1258217 and DEB-1146194 to JSF, and Bureau of Land Management grant #L09AC16253. **Currently a private lands range ecologist for Bird Conservancy of the Rockies.**

Amy Ulappa, M.S. Biology awarded 2011, Research Assistantship funded by the Bureau of Land Management, Teaching Assistantship funded by Department of Biological Sciences and the NSF K-12 program. **Currently Clinical Faculty at Boise State University.**

Jamie Utz, M.S. Raptor Biology awarded 2012. Thesis title: UNDERSTANDING THE TRADEOFF BETWEEN SAFETY AND FOOD QUALITY IN A MAMMALIAN HERBIVORE SPECIALIST, THE PYGMY RABBIT. Research Assistantship funded by the Bureau of Land Management, Teaching Assistantship funded by Department of Biological Sciences. Research supported by the Bureau ofLand Management (no. L09AC16253 to JSF, no. L09AC15391 toJLR), the National Science Foundation (DEB-1146368 to LS,DEB-1146166 to JR, and DEB-1146194 and IOS-1258217 toJSF), Michael Butler Ecological Award 2011 to JLU, Boise StateUniv., Washington State Univ. and the Univ. of Idaho and the National Science Foundation. Currently employee for Idaho Department of Fish and Game.

Graham Frye, M.S. Biology awarded 2012, Research Assistantship funded by Idaho Department of Fish and Game. Currently PhD candidate at University of Alaska Fairbanks.

Jessie Sherburne, M.S. Raptor Biology, Teaching Assistantship funded by Department of Biological Sciences Raptor Program. Currently a full time lecturer in the Department of Biological Sciences at Boise State University.

*Current thesis committee member*:

*Merry Davidson, M.S. Biology*

*Dylan Gomes, PhD. Ecology, Evolution, Behavior Program*

 *Stephanie Hudon, PhD. Biomolecular Program*

*Caitlin Davis, MS., Raptor Biology*

*Josh Enterkin, MS Geoscience*

*Michael Henderson, MS. Raptor Biology*

*Lilja Steinthorsdottir, MS Biology, University of Oslo*

*Previous thesis committee member of graduated students*:

Juliette Rubin, MS Biology

Peggy Martinez, MS Biology

Stephanie Coates, M.S., Raptor Biology

John O’keefe, M.S. Raptor Biology

Robert Miller, M.S. Raptor Biology

Heidi Ware, M.S. Biology

Xochi Campos, M.S. Biology

Matt Schmasow, M.S. Biology

Martha Brabec, M.S. Biology

Chris Porterfield, M.S. Raptor Biology

Emily Drussel, M.S. Chemistry

Meghan Camp Ph.D. Biology, Washington State University

**SERVICE –**

***Professional Service in Discipline***

Provided a student mentor program for undergraduates, graduates and postdocs at the Society for Integrative and Comparative Physiology Symposium: “PharmEcology: Integrating Ecological Systems and Pharmacology”

Grant Reviewer

Fulbright – Regional peer reviewer for proposals to Sweden and Denmak. October 2017

NSF - International Collaborations in Organismal Biology Between US and Israeli Investigators (*ICOB*), ad hoc

NSF- Integrative Organismal Systems (OIS) full proposal panel, November 2013

Ad hoc Manuscript Reviewer

*Ecology*

*Journal of Animal Behavior*

*Oecologia*

*Journal of Chemical Ecology*

*Journal of Veterinary Pharmacology and Therapeutics*

*Biochemical Systematics and Ecology*

*Journal of Experimental Zoology*

*Behavioral Ecology*

*Wildlife Biology*

Membership to Professional Societies

Sigma Xi - The Scientific Research Society. My membership has allowed seven graduate and undergraduate students to submit grant application for support of their research to this society. Two have received funding.

The Idaho Chapter Wildlife Society. I have judged posters and presentations and am currently on the student research grant proposal review committee.

Society for Comparative and Integrative Biology. I have judged posters and presentations at their conferences and hosted a symposium at their conference.

***Institutional Service***

Departmental service:

Faculty search committee member for a Population Ecology position for the Ecology, Evolution, and Behavior PhD program in the Department of Biological Sciences.

Faculty search committee member for a Physiologist position for the Biomolecular PhD program in the Department of Biological Sciences.

Faculty search committee member for a Zoologist in the Department of Biological Sciences.

Committee member to develop the Workload Policy for our Department

Committee member for Graduate Student Admissions

Committee member for Research Development

Recruited 10 different national and international seminar speakers and provided opportunities for students, faculty and conservation agencies to meet and network with speakers

Developed a Science Honors Course (Scientific Immersion) that will help recruit and train undergraduates in research in our department:

*Description of Science Honors Course: This is a competitive honors course for students interested in gaining skills to become a successful researcher in the biological sciences. The course focuses on experiential learning for students through research in ecology, physiology, evolution and organismal biology. The program requires that students complete five different scientific immersion modules:*

* *Module A: Safety, library skills, time management (10 hrs)*
* *Module B: Writing skills (14 hours)*
* *Module C: Seminar speaking skills (8 hours)*
* *Module D: Laboratory and/or field training (25 hrs)*

*Module E: Career Choices Electives (12 hrs): 1. Quantitative methods; 2. Conservation agencies; or 3. Teaching and learning*

College and University service:

Member of Institutional Animal Care and Use Committee

College of Arts and Sciences Tenure and Promotion review committee member

Faculty mentor, panel speaker and application reviewer for undergraduates involved in NSF STEP, NSF EPSCoR, NIH INBRE, NSF and LSAMP

Seminar on research opportunities for high school students at the 8th annual Capital Scholars program

Mentor for Idaho Science and Aerospace Scholars Mission to Mars: Biology and physiology of living on Mars

***Public or Community Service -* Summary: Since 2008, I have presented eight public seminars to broaden the public’s view on local wildlife issues.**

Public seminars:

Sage-grouse state advisory committee (2)

BLM Boise District Resource Advisory Council (RAC)

Regional Sage-grouse Local Working Groups in Idaho (3)

Osher Lifelong Learning Institute at Boise State (2)

Media attention related to research

# Idaho Army National Guard IdahoWatch Adopt a Scientist: <https://www.dvidshub.net/news/328565/idaho-national-guards-adopt-scientist-program-works-with-local-students-preserve-nca>

*  Channel 6 IDARNG/OCTC Environmental Episode 1: <https://www.kivitv.com/news/idaho-national-guard-conducts-tank-training-on-the-orchard-combat-training-center>
*  Channel 6 IDARNG/OCTC Environmental Episode 2: <https://www.kivitv.com/news/balancing-military-training-with-conservation-on-the-orchard-combat-training-center>
*  Channel 6 IDARNG/OCTC Environmental Episode 3: <https://www.kivitv.com/news/idaho-national-guard-has-an-entire-team-dedicated-to-conservation>

# NSF Science Nation video “[Food and Fear: Modeling animal tradeoffs shaped by landscape complexity](https://www.nsf.gov/news/special_reports/science_nation/foragingrabbits.jsp)” about the research of ecologists Janet Rachlow of the University of Idaho, Lisa Shipley of Washington State University and Jennifer Forbey of Boise State University.

* <http://www.youtube.com/watch?v=_Nr5ezlfYM4>
* <http://news.boisestate.edu/update/2013/06/13/researchers-to-use-small-unmanned-plane-to-test-wildlife-habitat-quality-in-remote-areas/>
* <http://www.mtexpress.com/index2.php?ID=2005137389>
* <http://www.foxnews.com/us/2013/06/16/scientists-hunt-for-rabbit-habitat-with-military-style-drones/>
* <http://seattletimes.com/html/localnews/2021196039_apiddronehabitathunting.html>
* <http://www.oregonlive.com/pacific-northwest-news/index.ssf/2013/06/drone_to_study_rabbit_habitat.html>
* <http://www.idahostatejournal.com/news/local/article_c9355fda-d7e2-11e2-99b6-001a4bcf887a.html>
* <http://www.columbian.com/news/2013/jun/18/drone-aircraft-to-study-rabbit-habitat/>
* <http://www.saltlakecitysun.com/index.php/sid/215227163/scat/bcecd7f88c90b7a3>
* <http://www.idahostatesman.com/2015/09/10/3980010_rocky-barker-sage-advice-from.html?rh=1>