CURRICULUM VITA

Larry D. Howery
Ecology, Management, and Restoration of Rangelands (EMRR) Program
School of Natural Resources and the Environment (SNRE)
The University of Arizona
ENR2 – Room N361
1064 E. Lowell Street
Tucson, AZ 85721

lhowery@ag.arizona.edu
520.309.5412

EDUCATION

- Ph.D. Range Science, 1993. Utah State University, Logan, UT.
- M.S. Wildlife Science, 1987. Texas Tech University, Lubbock, TX.
- B.S. Wildlife Management, 1984. Texas Tech University, Lubbock, TX.

PROFESSIONAL AND ACADEMIC APPOINTMENTS

- Chair: Ecology, Management, and Restoration of Rangelands (EMRR) Program. July 2019-present.
- Professor and Extension Specialist, Rangeland Ecology and Management, SNRE, The University of Arizona, Tucson. 2006-present.
- Associate Professor and Extension Specialist, Rangeland Ecology and Management, SNRE, The University of Arizona, Tucson. 2001–2006.
- Assistant Professor and Extension Specialist, Rangeland Ecology and Management, SNRE, The University of Arizona, Tucson. 1995-2001.

SUMMARY OF CURRENT JOB APPOINTMENT

- 45% Extension, 20% Research, 25% Teaching, 10% Service
- Extension, research, teaching, and service duties support viable economic and ecologic practices on both private and public rangelands. Collectively, my programs bring science to bear on many complex rangeland management issues while focusing on: 1) Noxious, Invasive Plants, 2) Animal Foraging Behavior and Distribution, 3) Rangeland Ecology and Management, and 4) Work Force Development/STEM. Extension, research, teaching, and service duties provide integrated conduits for transmitting science-based information to Arizona clientele and diverse audiences throughout the U.S. and the world.

HONORS/AWARDS (2010-present)

- 2nd VP, 1st VP, and President, International Society for Range Management. Elected in October 2014 to a 3-year term to the Executive Council and Board of Directors of the International SRM. Served as 2nd VP in 2015-16, as 1st VP in 2016-17, and as President 2017-18.
- Outstanding Scholarly Achievement. The School of Natural Resources and the Environment, The University of Arizona. Awarded in 2015.
- Appointed to Arizona BLM Resource Advisory Council by the Secretary of Interior Gale Norton, 2006-2008 (1, 3-year term) and Secretary of Interior Ken Salazar. 2010-2012 and 2013-2015 (2, 3-year terms). BLM Arizona State Director presented appreciation awards in 2008, 2012, and 2015.
- Graduate Student Presentation Award. Stephenson et al. poster paper presented at International Society for Range Management Conference in Orlando, FL. Poster paper won 2nd place in graduate competition for a Ph.D. student. Awarded in 2014.
- Sustained Contribution Award. Presented by the RFR Faculty of the SNRE. Awarded in 2013.
- Lifetime Membership Award. Arizona Association of FFA. Presented by the Arizona Association of FFA. Awarded in 2013.
- Publication of the Year Award. The National Wildlife Research Center/USDA-APHIS-WS (for Breck et al. publication, 2011). Awarded in 2012.
- Graduate Student Presentation Award. Varelas et al. poster paper presented at International Society for Range Management Conference in Spokane, WA. Poster won 1st place in graduate competition for a M.S. student. Awarded in 2012.
- Graduate Student Presentation Award. Knapp et al. poster paper presented at International Society for Range Management Conference in Billings, MT. Poster won 2nd place in graduate competition for a Ph.D. student. Awarded in 2011.
- Fellow Award. The International Society for Range Management. Presented in Billings, MT. Awarded in 2011.
- Outstanding Project Award. For excellent work and leadership in the development of the "Non-native, invasive plants of Arizona" field guide. Presented by the Coronado RC&D. Awarded in 2010.
- Elected to SRM Board of Directors. 2007-10.
- The University of Arizona's Undergraduate Range Management Exam (URME) Team finished 1st (1999, 2020), 2nd (2001), 3rd (2016), 4th (2013, 2018), 5th (2012, 2014), 6th (2009, 2015), and 7th (2008) out of about 19-25 teams across North America. Individual students have won awards by placing 1st, 2nd (three times), 3rd (twice), 4th (three times), and 5th out of about 200+ students.

TEACHING (2015-present)

		Enrollment by Year					
Course Title	**Course Number**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Grazing Ecology & Management (2 SCH)	RAM 436/536	26	16	16	30	25	TBD
URME Independent Study (2 SCH)	RNR 496B	8	9	10	11	12	11
Noxious, Invasive Plants of Arizona (3 SCH)	RNR/PLS 400	8	9	Not offered	10	17	18
Internship (3 SCH)	RNR 493					1	1
Number of Advisees		8	11	12	13	13	13

Grazing Ecology & Management -- RAM 436/536

Summary of Course and Objectives: This course focuses on western rangelands in the U.S. but the principles taught in this class are applicable to most arid and semi-arid rangeland ecosystems throughout the world. Course objectives are to: 1) Test students' knowledge of underlying ecologic and economic principles of how wild and domesticated rangeland herbivores interact with their foraging environment, and, how understanding these interactions can be applied to the management of rangeland animals and the habitats they inhabit, 2) Test students' knowledge of the scientific bases for grazing management decisions which can be planned to accomplish a variety of outcomes for both wild and domesticated ungulate herbivores.

Expected Learning Outcomes: 1) Understand and explain the principles that underlie the interactions between ungulate herbivores (both wild and domestic) and the rangeland environments they inhabit. This includes being able to understand and explain how complex interactions occur across spatial and temporal scales as predicted by state-and-transition models of plant succession; 2) Describe the primary methods and procedures used in the management of ungulate rangeland herbivores by articulating the scientific terms and vocabulary commonly used in the field of grazing ecology and management; 3) Understand and critically interpret scientific and popular presentations and publications pertaining to grazing ecology and management, including the influences and interactions

among history, ecology, economics, social influences and public policies, including natural and human selection for behavioral/genetic traits; 4) Develop independent and critical thinking skills as demonstrated by evaluating information from multiple perspectives, drawing reasonable conclusions, and defending your ideas using scientific objectivity, and/or using strong inference from practical experiences related to grazing ecology and management; 5) Clearly communicate objective scientific concepts and analytical arguments related to grazing ecology and management to both general and scientific audiences; 6) Explain and apply the "5 Principles (or Tools) of Grazing Ecology and Management" to address various natural resource issues and problems in arid and semi-arid rangeland environments.

URME Independent Study -- RNR 496B

Summary of Course and Objectives: This independent study course is designed to prepare undergraduate students for the URME which is given at the Annual International Society for Range Management (SRM) meeting. Course objectives are to: 1) Test students' knowledge of a broad range of senior-level material similar to a capstone course in a rangeland ecology and management curriculum; 2) Provide opportunities for students to interact with range professionals and explore job/career opportunities by attending International SRM annual meetings; 3) Allow students to directly experience and develop insights concerning the structure and function of the premier rangeland professional society.

Expected Learning Outcomes: 1) Demonstrate knowledge of Range Ecology, Grazing Management, Range Improvements, Range Regions, Range Inventory and Analysis, and Multiple-Use Relationships; 2) Synthesize information related to current topics in Range Management and build communication skills by leading and participating in weekly 2-hour discussions based on readings and books from the rangeland ecology and management literature; 3) Apply communication skills by interacting with range professionals at a professional meeting while exploring job and career opportunities.

Noxious, Invasive Plants of Arizona -- RNR/PLS 400

Summary of Course and Objectives: This fully on-line course's primary focus is on the biology, ecology, impacts, and management options for noxious, invasive plants in [or near] Arizona and the southwestern U.S. However, it also provides an overview of the ecological and economic effects of invasive species (both plants and animals) across North America. Course objectives are to: 1) Test students' knowledge of their understanding of noxious and invasive plants that are currently established in Arizona or that threaten the state due to their close proximity in bordering states/countries; 2) Provide a strong framework for helping students to make science-based, integrated weed management (IWM) decisions to address noxious and invasive plant problems.

Expected Learning Outcomes: 1) Quantitatively describe at least 5 economic and 5 ecologic impacts of noxious, invasive plants; 2) Site-identify (through photos) at least 30 species of invasive plants that are currently problematic in the southwestern U.S.; 3)

Synthesize information related to why and how invasive plants become problematic and build communication skills to objectively convey this information; 4) Describe at least 2 tools that can be used in combination with one another in an integrated weed management approach (or ecologically-based vegetation management approach) to control or manage a noxious, invasive plant of the student's choice.

REFERREED SCIENTIFIC PUBLICATIONS (2010-present)

Pierce, C. F., S. E. Speidel, S. J. Coleman, R. M. Enns, D. W. Bailey, J. F. Medrano, A. Cánovas, P. J. Meiman, L. D. Howery, W. F. Mandeville, M. G. Thomas. 2020. Genome-wide association studies of beef cow terrain-use traits using Bayesian multiple-SNP regression. Livestock Sci. 232:1-10.

Stephenson, M., D. W. Bailey, R. A. Bruegger, and L. D. Howery. 2017. Factors affecting the efficacy of low-stress herding and supplement placement to target cattle grazing locations. Rangeland Ecol. Manage. 70(2):202–209.

Stephenson, M., D. W. Bailey, L. D. Howery, and L. A. Henderson. 2016. Efficacy of low-stress herding and low-moisture block supplement to target cattle grazing on New Mexico rangelands. J. Arid Environ. 130:84-93.

Bruegger, R. A., Varelas, L. A., Howery, L. D., Torell, L. A., Stephenson, M. B., and Bailey, D. W. 2016. Targeted grazing in southern Arizona: using cattle to reduce fine fuel loads. Rangeland Ecol. Manage. 69:43-51.

Howery, L. D., A. F. Cibils, and D. M. Anderson. 2013. Potential for using visual, auditory, and olfactory cues to manage foraging behaviour and spatial distribution of rangeland livestock (***Invited Review***). CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources. 8:049:1-10.

Pepper, M.B., L.D. Howery, P.R. Krausman, G.B. Ruyle, J.W. Cain III, and D.W. Schafer. 2013. Adaptive grazing management and use of forage by cattle (*Bos taurus*) and elk (*Cervus elaphus*) in central Arizona. Southwestern Naturalist. 58(1):20-27.

Kluever, B. M., L. Lagos, S. W. Breck, L. D. Howery, M. L. Sanmartin, D. L. Bergman, and F. Barcena. 2012. Integrity and retention of ear-tag radio transmitters in domestic cattle and feral horses. Wildl. Soc. Bull. 36(1):189–193.

Sommers IV, W. D., L. D. Howery, R. L. Pendleton, R. D. Lee, and B. K. Pendleton. 2012. Applying the successional weed management model for revegetating a yellow starthistle-infested dryland pasture in the Chihuahuan Desert. ISRN Agronomy, vol. 2012, Article ID 213289, 7 pg. https://www.hindawi.com/journals/isrn/2012/213289/.

Breck, S., B. Kluever, M. Panasci, J. Oakleaf, T. Johnson, W. Ballard, L. D. Howery, and D. Bergman. 2011. Domestic calf mortality and producer detection rates in the Mexican

wolf recovery area: Implications for livestock management and carnivore compensation schemes. Biol. Cons. 144:930–936.

Kluever, B. M., L. D. Howery, and S. W. Breck. 2010. Predator and heterospecific stimuli alter behaviour in cattle. Behavioural Processes. 81:85-91.

REFERREED EXTENSION AND POPULAR PRESS PUBLICATIONS (2010-present)

Gornish, E. S., and L. D. Howery. 2019. Non-Native, Invasive Plants or Arizona. Peer-reviewed Arizona Cooperative Extension Publication. #AZ 1482. https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1482-2019.pdf

Barton D., and L. D. Howery. 2019. Pointleaf manzanita ('little apple') *Arctostaphylos pungens*. Peer-reviewed Arizona Cooperative Extension Publication. #AZ 1791. https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1791-2019.pdf.

Howery, L. D., and D. W. Bailey. 2018. Nature and nurture's influence on cattle distribution. Peer-reviewed Arizona Cooperative Extension Publication #AZ 1760. https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1760-2018.pdf

Hawkes, K., M. McClaran, J. Brugger, M. Crimmins, L. Howery, G. Ruyle, J Sprinkle, and D. Tolleson. 2018. Guide to Co-Developing Drought Preparation Plans for Livestock Grazing on Southwest National Forests. Peer-reviewed Arizona Cooperative Extension Publication #AZ 1764. 80pp.

Duval, D., G. Ruyle, and L. D. Howery. 2016. Economic impact of Cooperative Extension efforts in rangeland management for northern Arizona ranching allotment. Peer-reviewed Arizona Cooperative Extension Publication #AZ 2016-0513. 3pp.

Howery, L. D. 2015. A brief history of how the Society for Range Management was founded. Rangelands 37:20-25.

Howery, L. D. 2015. Strategies for setting stocking rates in variable environments. ***Invited*** paper and proceedings. Presented at the 37th Annual AZ/UT Range Livestock Strip Workshop and Tour. Held in Hurricane and Oderville, UT.

Breck, S.W., P. Clark, L. D. Howery, D. Johnson, B. M. Kluever, S. Smallidge, and A. F. Cibils. 2012. A Perspective on Livestock–Wolf Interactions on Western Rangelands. Rangelands 34(5):6-11. [This paper was developed from ***Invited*** papers presented as the 2009 SRM Symposium entitled, Wolf-livestock interactions: Using science to develop innovative management to protect natural and cultural resources. The 62nd Annual Meeting of the International Society for Range Management. Albuquerque, NM].

Tolleson, D. R., L.E. Halstead, L.D. Howery, D.W. Schafer, S.D. Prince, K.K. Banik. 2012. The effects of a rotational cattle grazing system on elk diets in Arizona piñon-juniper rangeland. Rangelands 34(1):19-25.

Masayesva, A., L. D. Howery, and P. Orr. 2012. Building capacity to manage noxious and invasive weeds in the Southwestern United States. Rangelands. 34(2):37-41.

Howery, L. D. 2011. Book review of *Cows Eat Weeds: How to Turn Your Cows Into Weed Managers.* Rangelands. 33:51.

Crimmins, T., M. Crimmins, L. Howery, C. Casler, C. Hansen. 2011. Managing Rangelands Before, During, and after Drought. USDA/CSREES. http://www.modulesforestandrange.org/module_Rangeland_Drought/

Howery, L., F. Provenza, and B. Burritt. 2010. Rangeland Herbivores Learn to Forage in a World Where the Only Constant is Change. Peer-reviewed Arizona Cooperative Extension paper #1518. 9pgs. https://extension.arizona.edu/pubs/rangeland-herbivores-learn-forage-world-where-only-constant-change.

OTHER PUBLICATIONS (2010-present)

Howery, L. D. 2017. A brief look back and a longer look forward. Rangeland News. https://mailchi.mp/rangelands.org/srm-rangeland-news-2017-volume-4. December Issue.

Howery, L. D. 2017. President's message. Rangeland News. http://rangelands.org/rlnspring2017presidents-message/. March Issue.

Howery, L. D. 2016. Get in the arena! Rangeland News. http://us14.campaign-archive2.com/?u=aabb3bc932b99943fd4ad042f&id=aedf64d3ce#Article%202.

Howery, L. D. 2015. Keeping the momentum going. Rangeland News. http://rangelandnews.org/archives/2015_march.html#2vp.

Howery, L. D. 2014. Waging the War on Weeds. Interviewed by La Monica Everett-Haynes for UA Blog in recognition of the 100-year anniversary of the College of Agriculture and Life Sciences Cooperative Extension. http://uanews.org/blog/waging-war-weeds.

Howery, L.D., and D.W. Bailey. 2013. Cattle Distribution on Western Rangelands: Nature, Nurture, or Both? Cattlelog, November:7-8.

Howery, L.D. 2013. Targeted grazing. Cattlelog. May:10-12.

PROFESSIONAL PRESENTATIONS -- INVITED (2010-present)

Howery, L.D., and D. W. Bailey. 2019. What is the basis for grazing distribution: Nature vs Nurture? Abstract submitted and accepted in 2018 and paper was presented at a Symposium during the 2019 International Society for Range Management Conference. Minneapolis, MN.

Bailey, D. W., T. Mercado, M. Gannon, M. G. Thomas, S. E. Speidel, J. F. Medrano, R. M. Enns, C. F. Pierce and L. D. Howery. 2019. Selection for Grazing Distribution, Difficulties and Opportunities. Abstract submitted and accepted in 2018 and paper was presented at a Symposium during the 2019 International Society for Range Management Conference. Minneapolis, MN.

Stephenson, M. B., D. W. Bailey, R. A. Bruegger, L. D. Howery. 2019. Factors affecting the efficacy of low-stress herding and supplement placement to target cattle grazing locations. Abstract submitted and accepted in 2018 and paper was presented at a Symposium during the 2019 International Society for Range Management Conference. Minneapolis, MN.

Howery, L. D., B. Hutchinson, A. Lien, J. Conley, C. Burleson, W. Gray, G. Ruyle, A. Brischke, J. Grace, A. Hall, K. McReynolds, J. Schalau, P. Sundareshan. 2019. Public Land Grazing and NEPA: A Multimedia Educational Program for Arizona Cooperative Extension and Beyond Tucson, AZ.

Smalls, Z., L. Howery, S. Tuttle, G. Ruyle, and R. Steidl. 2017. Effects of time-controlled cattle grazing on habitat of southwestern willow flycatchers habitat in west-central Arizona. Abstract submitted and accepted in 2017 and paper was presented at the 2017 The Wildlife Society Annual Conference. Albuquerque, NM.

Howery, L. D. 2017. Introduction and Welcome to the Symposium. International Year of Rangelands and Pastoralists. International Society for Range Management Conference. St. George, UT. Introduced the symposium as the 1st VP of SRM.

Steidl, R.J., D.J. Griffin, L.D. Howery, G. Ruyle, Z. Smalls, S. Tuttle. 2016. Ensuring habitat for southwestern willow flycatchers through sustainable grazing. Abstract submitted and accepted in 2016 and paper presented in 2016 at The Wildlife Society Annual Conference; Raleigh, NC.

Howery, L. D. 2015-16. How can SRM enhance my career? Abstract submitted and accepted in 2015 and paper presented to the Youth Professional Conclave at the 2016 International Society for Range Management Conference. Corpus Christi, TX.

Bailey, D. W., and L. D. Howery. 2012-13. Why worry about grazing distribution? Abstract submitted and accepted in 2012 and paper presented 2013 at the International Society for Range Management Conference. Oklahoma City, OK.

Howery, L. D., and D. W. Bailey. 2012-13. Why use cattle for targeted grazing? Abstract submitted and accepted in 2012 and paper presented at the 2013 International Society for Range Management Conference. Oklahoma City, OK.

Bruegger, R., L. D. Howery, and D. W. Bailey. 2012-13. How effective is targeted cattle grazing? Abstract submitted and accepted in 2012 and paper presented at the 2013 International Society for Range Management Conference. Oklahoma City, OK.

Stephenson, M., D. W. Bailey, R. Bruegger, and L. D. Howery. 2012-13. Keys to making targeted cattle grazing more effective. Abstract submitted and accepted in 2012 and paper presented at the 2013 International Society for Range Management Conference. Oklahoma City, OK.

Varelas, L., A. Torell, M. Stephenson, R. Bruegger, L. D. Howery, and D.W. Bailey. 2012-13. Potential effect of fine fuel management by targeted cattle grazing on wildfire behavior. Abstract submitted and accepted in 2012 and paper presented at the 2013 International Society for Range Management Conference. Oklahoma City, OK.

PROFESSIONAL PRESENTATIONS WITH ABSTRACTS (2010-present)

Howery, L. D., B. Hutchinson, A. Lien, J. Conley, C. Burleson, W. Gray, G. Ruyle, A. Brischke, J. Grace, A. Hall, K. McReynolds, J. Schalau, P. Sundareshan. 2020. Public Land Grazing and NEPA: A Multimedia Educational Program for Arizona Cooperative Extension and Beyond. Abstract submitted and accepted in 2019 and paper was presented at the 2020 International Society for Range Management Conference. Denver, CO.

Smalls, Z., L. Howery, S. Tuttle, G. Ruyle, and R. Steidl. 2017. Effects of managed cattle grazing on habitat of southwestern willow flycatchers habitat in west-central Arizona. Abstract submitted and accepted in 2017 and paper was presented at the 2018 International Society for Range Management Conference. Sparks, NV.

Smalls, Z., L. Howery, S. Tuttle, G. Ruyle, and R. Steidl. 2016-17. Effects of time-controlled cattle grazing on habitat of southwestern willow flycatchers habitat in west-central Arizona. Abstract submitted and accepted in 2016 and paper presented at the 2017 International Society for Range Management Conference. St. George, UT.

Hawkes et al. 2015-16. Using a co-development process to improve livestock management during drought on national forests. Abstract submitted and accepted in 2015 and paper presented at the 2016 International Society for Range Management Conference. Corpus Christi, TX.

Stephenson, M.B., D. W. Bailey, R. A. Bruegger, L. D. Howery. 2013-14. Targeted cattle grazing with low-moisture block protein supplement and herding in the Southwest USA. Abstract submitted and accepted in 2013 and paper presented at the 2014 International Society for Range Management Conference. Orlando, FL.

Bruegger, R., L. D. Howery, D. W. Bailey, C. Duncan, S. Lockwood, M. B. Stephenson, and A. McGibbon. 2011-12. Landscape use of cattle used to manage fine fuels in southeastern Arizona through targeted grazing. Abstract submitted and accepted in 2011 and paper presented at the 2012 International Society for Range Management Conference. Spokane, WA.

Bruegger, R., L. D. Howery, D. W. Bailey, C. Duncan, S. Lockwood, M. B. Stephenson, and A. McGibbon. 2011-12. Using targeted grazing to reduce fine fuels in the Santa Rita Mountains of southeastern Arizona. Abstract and poster paper presented at the 8th Annual Research Insights in Semiarid Ecosystems (RISE 2011) Symposium. University of Arizona, Tucson. Updated poster papers were also presented at the 2012 International Society for Range Management Conference in Spokane, WA, and at the 2012 Colorado Section of the SRM in Ft Collins.

Varelas, L. A., L. A. Torell, D. W. Bailey, L. D. Howery, and R. Bruegger. 2011-12. Measuring the potential benefits of using targeted cattle grazing to alter fire behavior. Abstract submitted and accepted in 2011 and paper presented at the 2012 International Society for Range Management Conference. Spokane, WA. *Poster won 1st place in graduate competition for a M.S. student.*

Knapp, C. N., M. Fernandez-Gimenez, R. Bruegger, L. Howery, A. Torrell, and D. Bailey. 2010-11. Perceptions of Targeted Grazing In the Desert Southwest. Abstract submitted and accepted in 2010 and paper presented at the 2011 International Society for Range Management Conference. Billings, MT. *Poster won 2nd place in graduate competition for a Ph.D. student.*

Young, S., R. Sheley, B. Smith, L. Howery, S. McDonald, R. Westbrooks, and E. Lehnhoff. The importance of education in managing invasive plant species. 2010-11. Abstract submitted and accepted in 2010 and papers presented in 2011 at the following 4 conferences:

-International Society for Range Management Conference. Billings, MT.
-North Central Weed Science Society annual meeting. Lexington, KY.
-Weed Science Society of America annual meeting. Portland, OR.
-Western Society of Weed Science annual meeting. Spokane, WA.

Bailey, D., C. Moore, T. Wheeler, T. Davis, L. Howery, B. Witmore, M. Russell, C. Kemmerly. 2009-10. Strategic placement of low-moisture block supplement to improve cattle distribution in mountainous terrain of the Southwest. Abstract submitted and accepted in 2009 and paper presented at the 2010 International Society for Range Management Conference. Denver, CO.

SUMMARY OF GRADUATE STUDENT ADVISEES (2010-present)

Student name	Degree	Program	Role	Dates
Marquel Begay	Ph.D.	EMRR/SNRE	Committee Member	2020-present
Flavie Audoin	Ph.D.	EMRR/SNRE	Committee Member	2016-present
Zach Smalls	M. S.	EMRR/SNRE	Major Professor	2015-2018
Shawn Stone	M. S.	EMRR/SNRE	Committee Member	2015-2017
Andrew Brischke	M. S.	EMRR/SNRE	Committee Member	2011-2014
Retta Bruegger	M. S.	EMRR/SNRE	Major Professor	2009-2012

SUMMARY OF EXTENSION & OUTREACH ACTIVITIES (2010-present)

My extension programs bring science to bear on many complex rangeland management issues while focusing on: 1) Noxious, Invasive Plants, 2) Animal Foraging Behavior and Distribution, 3) Rangeland and Natural Resource Ecology and Management, and 4) Work Force Development/STEM. These 4 programming areas permit me to implement educational programs that embrace the breadth of the range science and management discipline while highlighting my areas of expertise. A programmatic approach that emphasizes these 4 areas has allowed me to design and implement the kind of programs necessary to meet the evolving needs of Arizona's citizenry as stated in the Cooperative Extension Service mission statement (i.e., "the Cooperative Extension Service is constantly changing to meet the shifting needs and priorities of the people it serves"). The development and direction of programming is guided by local needs as well as national concerns and objectives. Extension programs are typically developed and implemented with the help of county extension agents, state extension specialists, as well as state and federal agency professionals. Program implementation includes presentations at training events, workshops, short courses, as well as publishing on websites, peer-reviewed journal articles, professional abstracts, cooperative extension papers, popular articles, pamphlets, and booklets related to programming areas. Programming is therefore offered in electronic, oral, and written forms and attempts to reach both traditional (rural) and non-traditional (urban) audiences. Audiences of programming efforts are often very diverse and include ranchers, environmentalists, range and wildlife managers, scientists, students, and the general public. Over the past 10 years I have made > 180 presentations to these audiences in my 4 programming areas.

SUMMARY OF SERVICE ACTIVITIES (2010-present)

INTRAMURAL

School of Natural Resources and the Environment (SNRE)

- Chair: Ecology, Management, and Restoration of Rangelands (EMRR) Program. 2019-present.
- Member: Promotion and Continuing Committee. 2010-present.
- Mentor: Dr. Greg Garfin, Associate Professor and Extension Specialist. 2008-present.
- Member: Renewable Resources Extension & Continuing Education Advisory Committee. 1995-present.
- Member: SNRE Academic Program Review Committee (Self Study Committee). 2015-2017.
- Member: SNRE Website Committee. 2012-2015.
- Member: SNRE Agency Committee. 2012-2015.
- Member: Awards Committee. 2010-2011; 2015.
- Member: Mission/Vision Statement Task Force. 2009-10.
- Member: Computer Resources Committee. 2000-2010.

College of Agriculture and Life Sciences (CALS)

- Chair: Range Management Exam given during Career Development Day (formerly FFA Day). High school students who participate in CDE Day are tested on their skills concerning rangeland ecology and management principles, plant ID Skills, and quantifying forage utilization by herbivores. I use CDE Day as a unique opportunity to speak to high school students and encourage them to come to The University of Arizona to study natural resource management with special emphasis on the Ecology, Management, and Restoration of Rangelands (EMRR) Program. I hand out copies of the EMRR curricula and ask current undergraduate and graduate students from SNRE Programs to voluntarily speak about the many opportunities and career paths within SNRE. 1996-present.
- Chair/Member: Peer Review Committee for Continuing Status and Promotion. 2007-2010; 2018-present.
- Member: Santa Rita Experimental Range Discussion Group. 2007-present.
- Chair: Faculty Search and Screen Committee, Extension Agent, St. Johns, Arizona. 2018.
- Chair: Arizona Cooperative Extension Noxious Weed Working Group. 2017-2018.
- Mentor: Dr. Barron Orr. Associate Professor and Extension Specialist. 2005-2014.
- Mentor: Dr. Ed Northam. Assistant Professor and Extension Specialist. 2006-2011.

College of Research Discovery and Innovation; Department of Biosphere 2

- Member: Peer Review Committee for Continuing Status and Promotion. 2016-2017.

The University of Arizona

- Member: Peer Review Committee for Continuing Status and Promotion. 2010-2013.

EXTRAMURAL

- Member: Resource Advisory Council (RAC), Arizona Bureau of Land Management (3, 3-Year terms). 2006-2008; 2010-2012; 2013-2015.
- Chair: Wild Horses and Burro Working Group (Sub-Committee of RAC). 2010-2015.
- Peer Reviewer: Reviewed manuscripts from Applied Animal Behaviour Science, Computers and Electronics in Agriculture, Current Zoology, Ecological Applications, Invasive Plant Science and Management, Journal of Arid Environments, Journal of Range Management, Journal of Wildlife Diseases, Rangeland Ecology and Management, Rangelands, Rangelands Journal, Southwest Naturalist, Weed Technology, Western North American Naturalist, Cooperative Extension papers, Promotion Packets to Associate and Full Professor/Specialists, public land management plans (EAs and EISs) and monitoring manuals, and state and federal grant proposals. 1995-present.
- Researcher/Information Broker: Field phone calls on various rangeland management issues and problems (drought, reclamation, noxious weeds, poisonous plants, animal foraging behavior and distribution, etc.). Conduct field assessments/studies. 1995-present.

International Society for Range Management (SRM)

- Officer and Board of Directors: Elected to a 3-year term as 2nd VP, 1st VP, and President 2014-2018.
- Member: Nominating Committee (appointed by SRM President). 2010-2013.
- Coach: Undergraduate Range Management Exam (URME) Team. 1996-present.
- Board of Directors: 2007-2010.
- Chair: Search Committee for Executive Vice President. 2007-2008.
- Certified Professional in Range Management (Certification #CP01-266). 2001-present.

EXTRAMURAL FUNDING (2010-present)

2015-2020. USDA Western Region SARE. Implementation of genetic selection to make cattle grazing in the western US more sustainable. Total award was $271,166. Co-Author/Collaborator.

2014-2019. Natural Resource Conservation Service (NRCS/CEAP). Grazing management and willow flycatchers. Total award was $259,970. Co-author/Collaborator.

2014-2016. NOAA/SARP. Using a co-development process to improve, integrate and encourage use of drought information and adaptive management of livestock grazing on National Forests. Total award was $285,644. Co-author/Collaborator.

2014-2015. Western Center for Risk Management Education. The application of real-world drought scenarios in risk management education for Arizona ranchers/range managers. Total award was $36,040. Co-author/Collaborator.

2011-2014. USDA-AFRI Managed Ecosystems. Integrated approaches for targeting cattle grazing to improve ecosystem services. Total award was $363,327. Co-Author/Collaborator.

2011-2014. USDA Western Region SARE. Enhancement of sustainable livestock grazing through selection and training. Total award was $229,527. Co-Author/Collaborator.

2007-2010. National Learning Center for Private Forest and Range Land Owner. Managing Rangelands Before, During, and After Drought. Total award was $14,637. Co-Author/Collaborator.

2005-2010. National Science Foundation. Woody encroachment into desert grassland: Experimental assessment of the critical establishment phase. Total award was $450,000. Collaborator.