

CURRICULUM VITAE

University of Idaho

NAME: Jason William Karl

DATE: January 24, 2022

RANK OR TITLE: Associate Professor, Harold F. and Ruth M. Heady Endowed Chair of Rangeland Ecology

DEPARTMENT: Forest, Rangeland, and Fire Science

OFFICE LOCATION AND CAMPUS ZIP: CNR 205D, MS 1135

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DATE OF FIRST EMPLOYMENT AT UI: August 14, 2017

DATE OF TENURE: Tenured

DATE OF PRESENT RANK OR TITLE: August 14, 2017

EDUCATION BEYOND HIGH SCHOOL:

Degrees:

Ph.D., Michigan State University, East Lansing, MI, May 2009, Fisheries and Wildlife/Environmental Science and Public Policy

M.S., University of Idaho, Moscow, ID, May 1998, Environmental Science

B.S., University of Idaho, Moscow, ID, May 1996, Wildlife Resources

EXPERIENCE:

Teaching, Extension and Research Appointments:

2017 – Present Associate Professor, Department of Forest, Rangeland, and Fire Sciences, University of Idaho
2013 – 2017 Category I Research Ecologist, USDA Agricultural Research Service, Las Cruces, NM
2009 – 2013 Post-doctoral Research Ecologist, USDA Agricultural Research Service, Las Cruces, NM
2002 – 2009 Spatial Ecologist, The Nature Conservancy, Hailey, ID
1999 – 2001 Senior GIS Analyst, Pacific Biodiversity Institute, Winthrop, WA
1996 – 1999 Senior GIS Analyst, Idaho Cooperative Fish and Wildlife Research Unit, Moscow, ID

Consulting:

2001 – 2022 Sound Science LLC, Senior Ecologist, GIS and statistical consulting

TEACHING ACCOMPLISHMENTS: (Academic and Extension teaching)

Areas of Specialization:

Rangeland ecology, natural resource monitoring, data science, spatial analysis, remote sensing

Courses Taught:

FW 419: GIS for Natural Resources, FW 419 (Michigan State University), 2008 – 2009

FOR 546: Science Synthesis and Communications, 2020-2022

REM 252: Wildland Plant Identification, 2018 – 2019

REM 475: Remote Sensing Applications of Unmanned Aerial Systems, 2019 – 2021

REM 410: Principles of Vegetation Measurement and Assessment, 2017 – 2021

REM 476: Unmanned Aerial Systems Operations, 2022

REM 504/520: Advanced Vegetation Monitoring, 2018 – 2021

REM 504: Data Science for Natural Resources, 2018 – 2019

Students Advised:**Undergraduate Students:**

Advise 5 students per semester in Rangeland Conservation
 Advisor, Range Club, University of Idaho, 2017-2021
 Co-Advisor, College of Engineering Senior Design Projects
 Virtual Fencing, 2018-2019, 2019-2020
 Drone Development, 2018-2019

Undergraduate Researchers (8):

Kennedy Beech, 2019-2020
 Dan Lauritzen, 2018-2020
 Jared Parsons, 2019-2020
 Kyle Ureta, 2020-2021
 Sam Fulbright, 2020-2021
 Luke Johnson, 2021-2022
 JP Krog, 2022
 Tyler Ernst, 2021-2022

Graduate Students:**Currently Advising as Major Professor or Committee Member (7):**

Sean DiStefano (**Major Advisor**), Ph.D. Natural Resources, 2018-present
 Leah Dreesmann (**Major Advisor**), Ph.D. Natural Resources, 2021-present
 Derek Tilley (**Major Advisor**), Ph.D. Natural Resources, 2021-present
 Jared Parsons (**Major Advisor**), MNR, Natural Resources, 2020-present
 JB Playfair (**Committee Member**), Ph.D., Natural Resources, 2021-present
 Dan Lauritzen (**Committee Member**), Ph.D., Natural Resources, 2021-present
 Justin Jensen (**Committee Member**), M.S. Animal and Veterinary Science, 2019-present

Advised to completion of degree as major professor (9) or committee member (8):

Sarah Burnett (**Co-major Advisor**), Animal and Range Science, New Mexico State University, M.S., 2014
 Sarah McCord (**Co-major Advisor**), Geography, New Mexico State University, M.S., 2016
 Sean DiStefano (**Co-major Advisor**), Animal and Range Science, New Mexico State University, M.S., 2018
 Venkata Ramakanth (**Committee Member**), M.S. Computer Science, New Mexico State University, 2011
 Samuel Perry (**Committee Member**), M.S. Agricultural Economics, New Mexico State University, 2013
 Christine Laney (**Committee Member**), Ph.D. Bioinformatics, University of Texas at El Paso, 2014
 David Kimiti (**Committee Member**), Ph.D. Animal and Range Science, New Mexico State University, 2017
 Jeffrey Gillan (**Committee Member**), Ph.D. Natural Resources, University of Arizona, 2019
 Ian Smith (**Committee Member**), M.S. Natural Resource, 2019
 William Gentry (**Major Advisor**), M.S., Natural Resources, 2019
 Ian Hellman (**Committee Member**), M.S. Water Resources, 2019
 Emily Washburne (**Major Advisor**), MNR, Natural Resources, 2019
 Alex Traynor (**Major Advisor**), MS Natural Resources, 2020
 Nelson Stauffer (**Major Advisor**), M.S. Natural Resources, 2021
 Charles Jones (**Major Advisor**), M.S. Natural Resources, 2021
 Taylor Fletcher (**Major Advisor**), M.S. Natural Resources, 2021
 Lindsey Rusch (**Committee Member**), M.S. Natural Resources, 2021

Postdocs Advised:

Dr. Vincent Jansen, 2018-present
 Dr. Jonathan Maynard, 2013-2017, Currently Research Ecologist, USDA Agricultural Research Service, Corvallis, OR
 Dr. Kert Young, 2013-2016, Currently Assistant Professor, New Mexico State University

Agricultural Extension, Las Cruces, NM

Technicians:

Jeffrey Gillan (ARS), 2010 - 2016
 Sarah McCord (ARS), 2012 - 2017
 Nelson Stauffer (ARS), 2014 - 2017
 Cynthia Hart (ARS), 2011 - 2014
 Ruben Baca (ARS), 2016 - 2017
 Sean Perry (ARS), 2014 - 2017
 Dan Lauritzen, 2018 – 2020
 Matthew Shryock, 2018 – present
 Jared Parsons, 2019 – present

Courses Developed:

REM 475: Remote Sensing Applications of Unmanned Aerial Systems
 REM 476: Unmanned Aerial Systems Operations
 REM 504: Data Science for Natural Resources
 REM 520: Advanced Vegetation Measurement & Monitoring

Non-credit Classes, Workshops, Seminars, Invited Lectures, etc.:

2022	Idaho Weed Control Association: Workshop presentation on using drones for invasive species management. Boise, ID
2021	UI Extension Workshop: Designing, Interpreting, and Applying Rangeland Monitoring to Management. Co-instructor. Murphy, ID
2021	UI Extension Forestry LEAP Update program presentation: Opportunities for Drones in Logging.
2020	UI Extension Workshop: Designing, Interpreting, and Applying Rangeland Monitoring to Management. Co-instructor. Murphy, ID
2019	Idaho Cattle Association Panel Discussion on Engaging with Rangeland Science, Invited Panelist. Sun Valley, ID
2019	Utah BLM Range Program Annual Meeting, Monitoring Methods and Sampling Design, Instructor. Provo, UT
2019	Annual Zumwalt Prairie Partners Meeting, Oregon Chapter of The Nature Conservancy. Invited speaker. Enterprise, OR
2018	UI Extension Rangeland Monitoring Workshop, Co-instructor. Rinker Rock Creek Ranch, Hailey, ID.
2018	Bureau of Land Management AIM Core Methods Training, Co-instructor. Twin Falls, ID
2018	UI CALS Drone Demo Day, Co-instructor. Craigmont, ID
2017	Bureau of Land Management AIM Core Methods Training, Co-instructor. Las Cruces, NM, Reno, NV
2016	Bureau of Land Management AIM Core Methods Training. Co-instructor. Las Cruces, NM, Billings, MT
2016	Bureau of Land Management AIM Project Leads Training. Co-instructor. Reno, NV, Casper, WY, Albuquerque, NM
2015	Bureau of Land Management AIM Core Methods Training. Co-instructor. Boise, ID, Moab, UT, Reno, NV
2015	Bureau of Land Management AIM Project Leads Training. Co-instructor. Grand Junction, CO, Boise, ID, Anchorage, AK
2014	Bureau of Land Management AIM Core Methods Training. Co-instructor. Reno, NV, Moab, UT
2011	USFS Monitoring and Assessment Workshop. Co-instructor. Salt Lake City, UT
2010	U.S. Army Training Support System Workshop, Monitoring for Range Training Lands Assessment. Co-instructor. Chicago, IL
2009	U.S. Army Training Support System Workshop, Monitoring for Range Training Lands Assessment. Co-instructor. Indianapolis, IN

Guest Lectures in UI Courses:

ASM 305 – *GPS and Precision Agriculture*, Fall 2018
 ECE 491 – *Senior Seminar*, Spring 2018, Fall 2018
 FOR/NRS 375 – *Introduction to Spatial Analysis for Natural Resource Management*, Fall 2018,
 Fall 2019, Spring 2020
 FOR/NRS 472 – *Remote Sensing of the Environment*, Spring 2020
 REM 151 – *Rangeland Principles*, Fall 2018
 REM 429 – *Landscape Ecology*, Spring 2019, Spring 2020

Materials Developed:

Landscape Toolbox Learning Portal (<http://learn.landscapetoolbox.org>) – learning resources and reviews for vegetation monitoring methods and rangeland plant identification.
 Landscape Toolbox (<http://www.landscapetoolbox.org>) – resources for rangeland monitoring and assessment via field and remote sensing methods.

SCHOLARSHIP ACCOMPLISHMENTS:

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Publications, Exhibitions, Performances, Recitals:

(* denotes student, post-doctoral associate or technician)

Refereed/Adjudicated: (i.e. books, book chaps., journals, proc., abstr., etc)

1. Karl, J.W., Herrick, J.E., and D.A. Pyke. 2017. Monitoring protocols: options, approaches, implementation, and benefits. In *Rangeland Systems: Processes, Management and Challenges*, D.D. Briske (ed.), pp 527–67. Springer Series on Environmental Management. Springer Verlag.
2. Unnasch, R.S. and Karl, J.W. 2012. Scale and conservation planning. In: Craighead, L. (ed). *Conservation Planning*. ESRI Press. Redlands, CA.
3. Karl, J.W., and Porter, M. 2006. Digital aerial sketch-mapping for early detection and mapping of invasive species. In: *Invasive Plant Inventory Methods*. Center for Invasive Plant Management, Montana State University, Bozeman, MT.
4. Karl, J.W., Svancara, L.K., Heglund, P.J., Wright, N.M., and Scott, J.M. 2002. Species commonness and the accuracy of habitat-relationship models. In Scott, J.M., P.J. Heglund, and M.L. Morrison (eds). *Predicting Species Occurrences*. Island Press. Washington, D.C.
5. Morrison, P., and Karl, J.W. 2001. Pacific Biodiversity Institute. Pp 76-79 in Convis, C.L. Jr. (ed.). *Conservation geography: case studies in GIS, computer mapping, and activism*. ESRI Press. Redlands, CA.

Peer Reviewed/Evaluated: (i.e. journals, articles, proceedings, abstracts, etc.)

6. Stéfano, Sean Di, Jason W. Karl, Michael C. Duniway, Robert Heinse, April Hulet, and J.D. Wulforth. "Oil and Gas Reclamation on US Public Lands: How It Works and Improving the Process with Land Potential Concepts." *Rangelands* 43, no. 6 (December 2021): 211–21. <https://doi.org/10/gnvpzz>.
7. Smith, Ian T., Sonya J. Knetter, Leona K. Svancara, Jason W. Karl, Timothy R. Johnson, and Janet L. Rachlow. "Overlap Between Sagebrush Habitat Specialists Differs Among Seasons: Implications for Umbrella Species Conservation." *Rangeland Ecology & Management* 78 (September 2021): 142–54. <https://doi.org/10.1016/j.rama.2021.06.007>.
8. Zhang, Junzhe, Gregory S. Okin, Bo Zhou, and Jason W. Karl. "UAV-derived Imagery for Vegetation Structure Estimation in Rangelands: Validation and Application." *Ecosphere* 12, no. 11 (November 2021). <https://doi.org/10/gnkd2p>.
9. Allred, B., Bestelmeyer, B., Boyd, C., Brown, C., Davies, K., Ellsworth, L., Erickson, T., Fuhlendorf, S., Griffiths, T., Jansen, V., Jones, M., Karl, J., Maestas, J., Maynard, J., McCord, S., Naugle, D., Starns, H., Twidwell, D., Uden, D. 2021. Improving Landsat predictions of rangeland fractional cover with multitask learning and uncertainty. *Methods in Ecology and Evolution* 2041-210X.13564. <https://doi.org/10.1111/2041-210X.13564>
10. Jansen, Vincent, Alexander C.E. Traynor, Jason W. Karl, Nika Lepak, and James Sprinkle. "Monitoring Grazing Use: Strategies for Leveraging Technology and Adapting to Variability." *Rangelands*, August 2021, S0190052821000687. <https://doi.org/10/gnvpzs>.
11. Wardropper, Chloe B., Jay P. Angerer, Morey Burnham, Maria E. Fernández-Giménez, Vincent S. Jansen, Jason W. Karl, Katherine Lee, and Katherine Wollstein. "Improving Rangeland Climate

- Services for Ranchers and Pastoralists with Social Science.” *Current Opinion in Environmental Sustainability* 52 (2021): 82–91. <https://doi.org/10/gmjbs>.
12. Stauffer, Nelson G., Michael C. Duniway, Jason W. Karl, and Travis W. Nauman. “Sampling Design Workflows and Tools to Support Adaptive Monitoring and Management.” *Rangelands*, September 2021, S0190052821000870. <https://doi.org/10/gnvpzv>.
 13. McCord, Sarah E., Justin L. Welty, Jennifer Courtwright, Catherine Dillon, Alex Traynor, Sarah H. Burnett, Ericha M. Courtright, et al. “Ten Practical Questions to Improve Data Quality.” *Rangelands*, August 2021, S0190052821000699. <https://doi.org/10/gnvpzt>.
 14. McCord, Sarah E., Nicholas P Webb, Justin W Van Zee, Sarah H Burnett, Erica M Christensen, Ericha M Courtright, Christine M Laney, et al. “Provoking a Cultural Shift in Data Quality.” *BioScience*, March 31, 2021, biab020. <https://doi.org/10.1093/biosci/biab020>.
 15. Jansen, V.S., C.A. Kolden, H.J. Schmalz, J.W. Karl, and R.V. Taylor. “Using Satellite-Based Vegetation Data for Short-Term Grazing Monitoring to Inform Adaptive Management.” *Rangeland Ecology & Management* 76 (May 2021): 30–42. <https://doi.org/10.1016/j.rama.2021.01.006>.
 16. Cunliffe, A.M., Anderson, K., Boschetti, F., Brazier, R.E., Graham, H.A., Myers-Smith, I.H., Astor, T., Boer, M.M., Calvo, L., Clark, P.E., Cramer, M.D., Encinas-Lara, M.S., Escarzaga, S.M., Fernández-Guisuraga, J.M., Fisher, A.G., Gdulová, K., Gillespie, B., Griebel, A., Hanan, N.P., Haggito, M.S., Haselberger, S., Havrilla, C.A., Heilman, P., Ji, W., Karl, J.W., Kirchhoff, M., Kraushaar, S., Lyons, M.B., Marzolff, I., Mauritz, M.E., McIntire, C.D., Metzen, D., Méndez-Barroso, L.A., Power, S.C., Prošek, J., Sanz-Ablanedo, E., Sauer, K.J., Schulze-Brüninghoff, D., Šimová, P., Sitch, S., Smit, J., Steele, C.M., Suárez-Seoane, S., Tweedie, C.E., Vargas, S.A., Villarreal, M.L., Visser, F., Wachendorf, M., Wirnsberger, H., Wojcikiewicz, R. 2021. Drone-derived canopy height predicts biomass across non-forest ecosystems globally. *Remote Sensing in Ecology and Conservation*, July 7, 2021, rse2.228. <https://doi.org/10.1002/rse2.228>.
 17. Hellman, Ian, Robert Heinse, Jason W. Karl, and Mark Corrao. “Detection of Terracettes in Semi-Arid Rangelands Using Fourier-Based Image Analysis of Very High-Resolution Satellite Imagery: Detection of Terracettes Using Fourier-Based Image Analysis.” *Earth Surface Processes and Landforms*, August 4, 2020. <https://doi.org/10.1002/esp.4971>.
 18. Whiting, M., Salley, S., James, D., Karl, J.W., and C. Brungard. 2020. Rapid bulk density measurement using mobile device photogrammetry. *Journal of the Soil Science Society of America*. saj2.20063. doi:10.1002/saj2.20063
 19. DiStefano, S.*, Karl, J.W., Bailey, D., and S. Hale. 2020. Evaluation of the automated reference toolset as a method to select reference sites for oil and gas reclamation on Colorado rangelands. *Journal of Environmental Management*. 265:110578. doi:10.1016/j.jenvman.2020.110578
 20. Karl, J.W., Yelich, J., Ellison, M.J., and D. Lauritzen*. 2020. Estimates of willow (*Salix spp.*) canopy volume using unmanned aerial systems. *Rangeland Ecology and Management*. doi: 10.1016/j.rama.2020.03.001
 21. Gillan, J.K.*, J.W. Karl, and W.J.D. van Leeuwen. 2020. Integrating Drone Imagery with Existing Rangeland Monitoring Programs. *Environmental Monitoring and Assessment* 192(5): 269. doi:10.1007/s10661-020-8216-3.
 22. Traynor, A.C.E.*, Karl, J.W., and Z.M. Davidson. (*in press*). Using assessment, inventory, and monitoring data for adaptive management of northern New Mexico rangelands. *Rangelands*: 42(4).
 23. Webb, N.P., Kachergis E., Miller, S.W., McCord, S.E., Bestelmeyer, B.T., Brown, J., Chappell, A., Karl, J.W., et al. 2020. Indicators and Benchmarks for Wind Erosion Monitoring, Assessment and Management. *Ecological Indicators* 110 (March 2020): 105881. doi:10.1016/j.ecolind.2019.105881.
 24. Karl, J.W., and J.E. Sprinkle. 2019. Low-Cost Livestock Global Positioning System Collar from Commercial Off-the-Shelf Parts. *Rangeland Ecology & Management*, October 2019, S1550742419300582. doi:10.1016/j.rama.2019.08.003.
 25. Salley, S.W., Herrick, J.E., Holmes, C.V., Karl, J.W., Levi, M.R., McCord, S.E., van der Waal, C., and J.W. Van Zee. 2018. A Comparison of Soil Texture-by-Feel Estimates: Implications for the Citizen Soil Scientist. *Soil Science Society of America Journal* 82, no. 6 (2018): 1526. doi:10.2136/sssaj2018.04.0137.
 26. SRM Rangeland Assessment and Monitoring Committee. 2018. Utilization and Residual Measurements: Tools for Adaptive Rangeland Management. *Rangelands* 40, no. 5 (October 2018): 146–51. doi:10.1016/j.rala.2018.07.003.

27. Jones, Matthew O., Brady W. Allred, David E. Naugle, Jeremy D. Maestas, Patrick Donnelly, Loretta J. Metz, Jason Karl, et al. Innovation in Rangeland Monitoring: Annual, 30 m, Plant Functional Type Percent Cover Maps for U.S. Rangelands, 1984-2017. *Ecosphere* 9, no. 9 (September 2018): e02430.
28. DiStefano*, S., Karl, J.W., McCord*, S.E., Stauffer*, N.G., Makela, P.D., and M. Manning. 2018. Comparison of two vegetation height methods for assessing greater sage-grouse seasonal habitat. *The Wildlife Society Bulletin* 42(2):213-224.
29. Karl, J.W. 2018. Mining location information from life- and earth-science studies to facilitate knowledge discovery. *Journal of Librarianship and Information Sciences* 096100061875941.
30. Salley, S.W., Herrick, J.E., Holmes, C., Karl, J.W., Levi, M.R., McCord*, S.E., van der Wall, C., and J.W. Van Zee. 2018. Assessing and improving the quality of citizen scientists' soil hand texture estimates. *Journal of Soil and Water Conservation* 82(6):15-26.
31. SRM Assessment and Monitoring Committee. 2018. Utilization and residual measurements: tools for adaptive rangeland management. *Rangelands* 40(5):146-151.
32. Browning, D., J. Karl, D. Morin, A. Richardson, and C. Tweedie. 2017. Phenocams Bridge the Gap between Field and Satellite Observations in an Arid Grassland Ecosystem. *Remote Sensing* 9:1071.
33. Browning, D. M., J. J. Maynard*, J. W. Karl, and D. C. Peters. 2017. Breaks in MODIS time series portend vegetation change: verification using long-term data in an arid grassland ecosystem. *Ecological Applications* 27:1677–1693.
34. *Gillan, J., J. Karl, A. Elaksher, and M. Duniway. 2017. Fine-Resolution Repeat Topographic Surveying of Dryland Landscapes Using UAS-Based Structure-from-Motion Photogrammetry: Assessing Accuracy and Precision against Traditional Ground-Based Erosion Measurements. *Remote Sensing* 9:437.
35. *Maynard, J. J., and J. W. Karl. 2017. A hyper-temporal remote sensing protocol for high-resolution mapping of ecological sites. D. Rocchini, editor. *PLOS ONE* 12:e0175201.
36. *McCord, S. E., M. Buenemann, J. W. Karl, D. M. Browning, and B. C. Hadley. 2017. Integrating Remotely Sensed Imagery and Existing Multiscale Field Data to Derive Rangeland Indicators: Application of Bayesian Additive Regression Trees. *Rangeland Ecology & Management* 70:644–655.
37. SRM Assessment and Monitoring Committee. 2017. Does Size Matter? Animal Units and Animal Unit Months. *Rangelands* 39:17–19.
38. Webb, N. P., J. W. Van Zee, J. W. Karl, J. E. Herrick, E. M. Courtright, B. J. Billings, R. Boyd, A. Chappell, M. C. Duniway, J. D. Derner, J. L. Hand, E. Kachergis, S. E. McCord*, B. A. Newingham, F. B. Pierson, J. L. Steiner, J. Tatarko, N. H. Tedela, D. Toledo, and R. Scott Van Pelt. 2017. Enhancing Wind Erosion Monitoring and Assessment for U.S. Rangelands. *Rangelands*.
39. Karl, J.W., McCord, S.E.*, and B.C. Hadley. 2017. A Comparison of Cover Calculation Techniques for Relating Point-Intercept Vegetation Sampling to Remote Sensing Imagery. *Ecological Indicators* 73:156–65. doi:10.1016/j.ecolind.2016.09.034.
40. Gillan, J.K.*, Karl, J.W., Barger, N.N., Elaksher, A., and M.C. Duniway. 2016. Spatially Explicit Rangeland Erosion Monitoring Using High-Resolution Digital Aerial Imagery. *Rangeland Ecology & Management* 69(2):95–107. doi:10.1016/j.rama.2015.10.012.
41. Karl, J.W., and C.J. Talbot. 2016. Role of Data and Inference in the Development and Application of Ecological Site Concepts and State-and-Transition Models. *Rangelands*. 38(6):322–328. doi:10.1016/j.rala.2016.10.009.
42. Karl, J.W., Karl, M., McCord, S.E.*, and E. Kachergis. 2016. Critical Evaluations of Vegetation Cover Measurement Techniques: A Response to Thacker et al. (2015). *Rangelands* 38(5):297–300. doi:10.1016/j.rala.2016.08.005.
43. Herrick, J. E., Beh, A., Barrios, E., Coetzee, N.M., Bovier, I., Dent, D., Elias, E.H., Hengle, T., Karl, J. W., Liniger, H., Matuszak, J., Neff, J., Ndungu, L., Obersteiner, M., Shepard, K., Urama K., Van Den Bosch, R., Webb, N. 2016. The land-potential knowledge system (LandPKS): mobile apps and collaboration for optimizing climate change investments. *Ecosystem Health and Sustainability*. 2(3): e01209. doi:10.1002/ehs2.1209.
44. Maynard, J. J.*, Karl, J. W., Browning, D. M. 2016. Effect of spatial image support in detecting long-term vegetation change from satellite time-series. *Landscape Ecology*. 31:2045-2062. doi:10.1007/s10980-016-0381-y.

45. Browning, D. M., Rango, A., Karl, J. W., Laney, C., Vivoni, E., Tweedie, C. 2015. Emerging technology and cultural shifts advancing dryland research and management. *Frontiers in Ecology and the Environment*. 13:52-60. doi:10.1890/140161
46. Karl, J.W., Gillan, J.K., and Herrick, J. E. 2014. Geographic searching for ecological studies: a new frontier. *Trends in Ecology & Evolution*. 28(7):383-384. doi:10.1016/j.tree.2013.05.001.
47. Gillan, J. K.*, Karl, J. W., Duniway, M. C., and A. Elaksher. 2014. Modeling vegetation heights from high-resolution stereo aerial photography: an application for broad-scale rangeland monitoring. *Journal of Environmental Management*. 144:226-235. doi:10.1016/j.jenvman.2014.05.028.
48. Karl, J. W. and Herrick, J. E. 2013. A rangeland wikicology? Implementing collaborative internet technologies for rangeland management. *Rangelands* 35:1-11. doi:10.2111/RANGELANDS-D-12-00069.1.
49. Karl, J. W., Gillan, J.*, Barger, N. M. Herrick, J.E., Duniway, M. C. 2014. Interpretation of high-resolution imagery for detecting vegetation cover composition change after fuels reduction treatments in woodlands. *Ecological Indicators*. 45:570-578. doi:10.1016/j.ecolind.2014.05.017.
50. Karl, J. W., Taylor, J., and Bobo, M. 2014. A double-sampling approach to deriving training and validation data for remotely-sensed vegetation products. *International Journal of Remote Sensing* 35:1936-1955. doi:10.1080/01431161.2014.880820.
51. Herrick, J.E., Osvaldo E.S., and J.W. Karl. 2013. Land Degradation and Climate Change: A Sin of Omission? *Frontiers in Ecology and the Environment* 11(6): 283–283. doi:10.1890/1540-9295-11.6.283.
52. Gillan, J.*, Strand, E., Karl, J. W., Reese, K., Laninga, T. 2013. Using spatial statistics and point-pattern simulations to assess the spatial dependency between great sage-grouse and anthropogenic features. *Wildlife Society Bulletin*. 37:301-310. doi:10.1002/wsb.272.
53. Karl, J., Herrick, J. E., Unnasch, R. S., Gillan, J., Ellis, E., Lutters, W., Martin, L. 2013. Geo-semantic searching: discovering ecologically-relevant knowledge from published studies. *BioScience*.63:674-687. doi:10.1525/bio.2013.63.8.10.
54. Herrick, J. E., Urama, K. C., Karl, J.W., Boos, J., Johnson, M.-V.V., Shepherd, K., Hempel, J., Bestelmeyer, B., Davies, J., Guerra, J. L., Kosnik, C., Kimiti, D. W., Ekai, A. L., Muller, K., Norfleet, L., Ozor, N., Reinsch, T., Sarukhan, J., West, L. T. 2013. The global land-potential knowledge system (LandPKS): Supporting evidence-based, site-specific land use and management through cloud computing, mobile applications, and crowdsourcing. *Journal of Soil and Water Conservation* 68:5A-12A. doi:10.2489/jswc.68.1.5A.
55. Herrick, J. E., Brown, J. R., Bestelmeyer, B. T., Andrews, S. S., Baldi, G., Davies, J., Duniway, M. C., Havstad, K., Karl, J.W., Karlen, D. L., Peters, D. C., Quinton, J. N., Riginos, C., Shaver, P. L., and Steinaker, D. 2012. Revolutionary land use change in the 21st century: is (rangeland) science relevant? *Rangeland Ecology & Management*. 65:590-598. doi:10.2111/rem-d-11-00186.1.
56. Karl, J. W., Herrick, J. E., and Browning, D. 2012. A strategy for rangeland management based on best available knowledge and information. *Rangeland Ecology & Management*. 65:638-646. doi:10.2111/REM-D-12-00021.1.
57. Karl, J. W., Opsomer, J., Nusser, S., Laliberte, A. S., Duniway, M. C., and Unnasch, R. S. 2012. Using very-large scale aerial (VLSA) imagery for rangeland monitoring and assessment: some statistical considerations. *Rangeland Ecology & Management* 65:330-339. doi:10.2111/rem-d-11-00102.1.
58. Herrick, J. E., Duniway, M. C., Pyke, D. A., Bestelmeyer, B. T., Wills, S. A., Brown, J. R., Karl, J. W., and K. M. Havstad. 2012. A holistic strategy for adaptive land management. *Journal of Soil and Water Conservation*. 67:105A-113A. doi:10.2489/jswc.67.4.105A.
59. Karl, J. W., Duniway, M. C., and Schrader, T. S. 2012. A technique for estimating canopy-gap size distributions from very-high-resolution digital imagery. *Rangeland Ecology & Management* 65:196-207. doi:10.2111/REM-D-11-00006.1.
60. Duniway, M. C., Karl, J. W., Schrader, S., Baquera, N., and Herrick, J. E. 2012. Rangeland and pasture monitoring: an approach to interpretation of high-resolution imagery focused on observer calibration for repeatability. *Environmental Monitoring and Assessment* 184:3789-3804. doi:10.1007/s10661-011-2224-2.
61. Toevs, G. R., Karl, J.W., Taylor, J. J., Spurrier, C. S., Karl, M. S., Bobo, M. R., and Herrick, J. E. 2011. Consistent indicators and methods and a scalable sample design to meet assessment, inventory, and monitoring information needs across scales. *Rangelands* 33:14-20.

62. Karl, J. W., Colson, K., and Swartz, H. 2011. Rangeland assessment and monitoring methods guide. *Rangelands* 33:48-54. 2011. doi:10.2111/1551-501x-33.4.48.
63. Karl, J. W. 2011. Turning information into knowledge for rangeland management. *Rangelands* 33:3-5. doi:10.2111/1551-501x-33.4.3.
64. Reo, N. J. and Karl, J. W. 2010. Tribal and state ecosystem management regimes influence forest regeneration. *Forest Ecology and Management* 260:734-743.
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66. Karl, J. W. and Maurer, B. A. 2010. Multivariate correlations between imagery and field measurements across scales: comparing pixel aggregation and image segmentation. *Landscape Ecology* 24:591-605. doi:10.1007/s10980-009-9439-4.
67. Karl, J. W. and Herrick, J. E. 2010. Rangeland monitoring and assessment based on ecological sites. *Rangelands* 32:60-64. doi:10.2111/RANGELANDS-D-10-00082.1.
68. Karl, J. W. 2010. Spatial Predictions of Cover Attributes of Rangeland Ecosystems Using Regression Kriging and Remote Sensing. *Rangeland Ecology and Management* 63:335-349. doi:10.2111/RED-D-09-00074.1.
69. Karl, J. W., Scott, J. M., and Stand, E. K. 2005. An assessment of Idaho's wildlife management areas for the protection of wildlife. *Natural Areas Journal*. 25:36-45.
70. Karl, J. W., Scott, J. M., Heglund, P. J., Garton, E. O., Wright, N. M., and Hutto, R. L. 2000. Sensitivity of habitat-relationship models to effects of data resolution, model complexity and scale. *Ecological Applications* 10(6):1690-1705.
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Other: (reports, proceedings, papers, citations and references, performances)

73. Karl, J.W., R. Sheley, E. Levi, and J. Brown. 2019. Editorial: On Conflict and Conflict of Interest. *Rangeland Ecology & Management* 72(3): 572–73. doi:10.1016/j.rama.2019.03.008.
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75. Karl, M.G., Kachergis, E., and J.W. Karl. 2016. Bureau of Land Management rangeland resource assessment - 2011. USDI Bureau of Land Management, National Operations Center. Denver, CO.
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77. Taylor, J.J., Toevs, G.R., Karl, J.W., Bobo, M.R., Karl, M.G., Miller, S.N., and C. Spurrier. 2014. AIM-monitoring: a component of the national assessment, inventory, and monitoring strategy. Denver, CO: U.S. Department of the Interior, Bureau of Land Management, National Operations Center.
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79. Karl, J.W. and Axel, A.V. 2009. Remote sensing and change detection for monitoring range condition and trend. U.S. Army Environmental Command, Range and Training Lands Assessment. 2009.
80. Karl, J.W. 2009. GIS Tools for RTLA. U.S. Army Environmental Command, Range and Training Lands Assessment.
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85. Karl, J.W., Morrison, P.H., and Swope, L.H. 2000. A conservation prioritization of the Wenatchee River Basin, Washington. A report to the Icicle Fund. Pacific Biodiversity Institute, Winthrop, WA.
86. Karl, J.W., Wright, N.M., Heglund, P.J., and J.M. Scott. 1998. Craig Mountain Wildlife Management Area Species of Interest: Wildlife Habitat Relationship Models. Idaho Cooperative Fish and Wildlife Research Unit, University of Idaho. Moscow, ID.
87. Herrick, J.E., Urama, K.C., Karl, J.W., Boos, J., Johnson, M.V., Shepherd, K.D., and J. Hempel. A land-potential knowledge system (LandPKS) based on local and scientific knowledge of land productivity and resilience.” United National Convention to Combat Desertification.
88. Bestelmeyer, B.T., Brown, J.R., Karl, J.W., Herrick, J.E., and K.M. Havstad. 2013. Toward a Method of Collaborative, Evidence-Based Response to Desertification. In Proceedings of the 22nd International Grassland Congress, pp.1076–83. Sydney, Australia: New South Wales Department of Primary Industry. 2013.
89. Karl, J.W., Herrick, J.E., Eaton, M., and Mackinnon, C. 2010. Uses and benefits of consistent indicators and scalable sample design for NLCS local-to-national data needs. in Eaton, M.; Landres, P. (eds.). Decade of Discovery in the National Landscape Conservation System, May 24-28, 2010, Albuquerque, New Mexico. Proceedings RMRS-P-000. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
90. Karl, J.W., Laliberte, A. S., and Rango, A. 2010. Spatial dependence of predictions from image segmentation: a method to determine appropriate scales for producing land-management information. In: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol. XXXVIII-4/C7.
91. Herrick, J.E., Bestelmeyer, B.T., Brown, J.R. and Karl, J. W. 2010. Land health and ecological sites: application to land use planning and management. In: Memorias de I Congreso Internacional de Pastizales Chiapas, Chiapas, Mexico.
92. Karl, J.W. 1994. Nest Site Characteristics of Sharp-Shinned Hawks in Idaho’s Frank Church-River of No Return Wilderness. Idaho Forest, Wildlife, and Range Experiment Station, University of Idaho. Moscow, ID.
93. Karl, J.W. 2014. JournalMap: map-based discovery of scholarly literature. Wiley Exchanges, Discover the Future of Research. John Wiley & Sons, Inc.
<https://hub.wiley.com/community/exchanges/discover/blog/2014/09/09/journalmap-map-based-discovery-of-scholarly-literature>
94. Karl, J.W. 2005. The Nature Conservancy uses mobile GIS technology in fight against invasive species. ESRI ArcNews 27(3):30-31.

Peer Reviewed/Evaluated (currently scheduled or submitted):

- Tilley, Derek, April Hulet, Shaun Bushman, Charles Goebel, Jason W. Karl, Stephen Love, Mary Wolf. (*in review*) When is a weed not a weed: succession management for intermountain rangeland restoration. Rangelands.
- Dickard, M., J. Lemly, M. Gonzalez, S. Smith, S. Marshall, M. Manning, S. Miller, E. Kachergis, J.W. Karl, K. Miller. (*in review*) AIM National Aquatic Monitoring Framework: Lentic Monitoring Methods. Bureau of Land Management. Technical Reference 1735-x.

Professional Meeting Papers, Workshops, Showings, Recitals: (provide date and location)

Authored or co-authored with students, technicians, and collaborators >120 presentations at national or international professional meetings (Society for Range Management, Ecological Society of America, Society for Conservation Biology, International Society for Ecological Informatics, Geographic Object-based Image Analysis Conference, United National Convention to Combat Desertification Science Conference, Society for Scholarly Publishing).

Invited presentations:

“Transforming livestock grazing through virtual fencing.” UI Renfrew Colloquium presentation given with K. Launchbaugh, M. Hefeida, and G. Murdock. Moscow, ID, Apr 2018.

- “JournalMap.” Invited presentation given at UI GIS Day, Moscow, ID, Nov 2017.
- “Challenges & opportunities with standardized monitoring for management decision-making.” Invited presentation given at the AIM Monitoring Symposium at the 2018 Society for Range Management Annual Meeting, Reno, NV, Feb 2018.
- “The role of data and inference in the development and application of ecological site descriptions.” Invited presentation given at the Ecological Site Symposium at the 2017 Society for Range Management Annual Meeting, St. George, UT, Feb 2017.
- “Implementing the Bureau of Land Management’s Assessment, Inventory, and Monitoring Program: applications and data mining opportunities.” Guest lecture to the School of Natural Resources and the Environment at University of Arizona. February 2016.
- “JournalMap.” Invited presentation at the Allen Press 2015 Emerging Trends in Scholarly Publishing Seminar in Washington, D.C. April 2015.
- “Leveraging the ‘where’ in scholarly literature: enabling geographic-based knowledge discovery.” Invited presentation at the 2014 Society for Scholarly Publishing annual conference in Boston, MD. May 2014.
- “Using spatial statistics and point-pattern simulations to assess the relationship between Greater Sage-grouse and man-made features.” Guest lecture to the Department of Plant and Wildlife Sciences at Brigham Young University. February 2013.
- “JournalMap.” Invited presentation at the International Association of Scientific, Technical, and Medical Publishers annual Innovations Seminar in London, UK. December 2013.
- Geo-semantic searching for ecological knowledge. Guest lecture to the University of Texas at El Paso CyberShare Group. October 2012.
- “Scaling properties of semi-arid ecosystems through image segmentation: multivariate correlations across scales and identifying appropriate scales.” Invited presentation to the 2011 University of Texas at El Paso Bioinformatics Symposium. April 2011.

Grants and Contracts Awarded: (provide principal and co investigators, title, sponsor, funding dates, amount)
Total to date at the University of Idaho as PI, Co-PI, or Senior Personnel: **\$3,075,354**

Active:

- Measuring recreation use and its potential impacts on grazing cattle at Rinker Rock Creek Ranch. Little Endowment, **\$5,000**. J. Karl (PI), E. Winford, C. Packer, J. Sprinkle.
- Developing automated workflows for processing UAV imagery. Montana Chapter of The Nature Conservancy, **\$22,000**. J. Karl (PI), V. Jansen.
- Technology to Manage Livestock Location Within RANGE and REALITY. USDA-NIFA, **\$983,199**. K. Launchbaugh, G. Murdoch, T. Hudson, K. Lee, J. Karl (Co-PI), J. Sprinkle, D. Shrestha.
- Understanding sources of error in the BLM’s Terrestrial AIM program. USDI Bureau of Land Management, **\$266,692**. J. Karl (PI)
- Developing vegetation metrics for oil and gas reclamation success. US Geological Survey. **\$39,708** (awarded). J. Karl (PI), S. Di Stéfano.
- Planning the Creation of a Multi-Purpose, Public Facing Academic Research Database Platform for Agricultural Data with Geolocation Data Correlation. Institute of Museum and Library Sciences **\$99,969** (awarded). J. Kenyon, L. Olsen, J. Karl.
- Assessing the effectiveness of beaver dam analogues (BDAs). NRCS Idaho Conservation Innovation Grant. **\$73,463** (awarded, funds pending). C. Goebel, M. Ellison, C. Jones, J.W. Karl, A. Morris. E. Winford.
- A National Grazingland Information System: Expanding GlobalRangelands.org Through A Grazingland Thesaurus and Mobile Content Access. NRCS Conservation Innovation Grant. **\$616,586**. J. Karl (PI), J. Kenyon, G. Ruyle, J. Pfander.
- Deploying CERT: Integrating satellite and field measures for improved grazingland management at ranch scales. NRCS Conservation Innovation Grant. **\$661,118 (plus \$100,000 cash match from The Nature Conservancy)**. J. Karl (PI), K. Launchbaugh, C. Conway.
- Supporting outcome-based management on private and public rangelands: training agricultural professionals on monitoring techniques. NIFA Western SARE. **\$72,519**. J.W. Karl (PI), E. Winford, A. Hulet, A. Quandt, J.E. Herrick.
- USDA NIFA McIntire-Stennis. Managing for resilient rangelands: advancing land health monitoring for maintaining rangeland potential. **\$235,000**. J.W. Karl (PI)

Past:

- Development and testing of low-cost GPS collar systems for livestock using commercial off-the-shelf parts. David Little Livestock Range Management Endowment. **\$4,059**. J.W. Karl (PI), C. Conway.
- USDA Foreign Agricultural Service. Expression of interest to host a Borlaug Fellow from Mongolia. **\$31,057** (A. Cibils, J.W. Karl, B. Bestelmeyer).
- USDI Bureau of Land Management. 2017-2022 Technical support for assessment and monitoring-related projects. – interagency agreement. **\$2,859,000** (J.W. Karl, J.E. Herrick).
- USDI Bureau of Land Management. 2012-2017 Technical support for assessment and monitoring-related projects. – interagency agreement. **\$2,557,000** (J. Herrick, J.W. Karl).
- US Department of Defense Environmental Security Technology Certification Program. 2012. Automated Geospatial Watershed Assessment (AGWA) to aid in sustaining military mission and training. \$1,169,000 total (**\$265,750** to USDA-ARS Jornada). (D.C. Goodrich, P. Heilman, D.P. Guertin, L. Levick, J.W. Karl)
- USDI Bureau of Land Management. 2010. Taking A.I.M. to the field – interagency agreement. **\$185,000** (J. Herrick, J.W. Karl)
- USDA Natural Resources Conservation Service. 2009. Evaluating long-term carbon storage potential on private rangelands using dynamic landscape modeling. **\$69,334** (J.W. Karl, R. Unnasch)
- USDI Bureau of Land Management. 2008. Cumulative landscape assessment and restoration planning tools for evaluating management scenarios in the Castle Creek and Wildhorse areas of Idaho. **\$25,000** (J.W. Karl, D. Major, K. Colson)
- M.J. Murdock Charitable Trust. 2007. A landscape toolbox for effective management of arid rangelands. **\$370,000** (J. W. Karl, A. Sands, D. Major, L. Lunte, E. Stone, W. Whelan)
- Lava Lake Foundation for Science and Conservation. 2007. Developing a multi-scale assessment and monitoring framework for rangeland landscapes. **\$24,000** (J.W. Karl, A. Sands, B. Maurer)
- Rodney Johnson/Katherine Ordway Science Endowment, The Nature Conservancy. 2007. Developing a multi-scale assessment and monitoring framework for rangeland landscapes. **\$40,000** (J.W. Karl, J. Yeo, A. Sands, B. Maurer)
- Wilburforce Foundation. 2004. Multi-scale conservation planning for conservation of private, working forests in north-central Idaho. **\$25,000** (T. Klahr, J.W. Karl)

Honors and Awards:

- 2020 Best Paper Award, Geoscience Information Society, for “Mining Location Information from Life- and Earth-science Studies to Facilitate Knowledge Discovery”
- 2020 UI Excellence in Interdisciplinary and Collaborative Efforts Award
- 2020 CNR Outstanding Continuing Education & Service Award
- 2020 CNR Boot-in-the-Butt Award
- 2016 USDA-ARS Plains Area Early Career Scientist of the Year
- 2014 Federal Laboratory Consortium, Mid-Continent Region, Notable Technological Development for JournalMap
- 2007 Environmental Science and Policy Doctoral Fellowship, Michigan State University
- 2001 ESRI Special Achievement in GIS award for work with Pacific Biodiversity Institute
- 1994 Kurt Berklund Honorarium for Undergraduate Research

SERVICE:**University Committee and Service Assignments:**

- 2021 – present UI IRIC Facility Committee (Co-chair)
- 2019 – present UI Unmanned Aerial Systems Committee (Chair)
- 2021 – present CNR/CALS Search Committee, Rangeland Extension Specialist Faculty Search (Chair)
- 2021 CALS-SWS Search Committee, Precision Agriculture Faculty Search (Member)
- 2018 – 2020 CNR Awards Committee
- 2019 Interim Director of the UI Rangeland Center
- 2019 – present Rinker Rock Creek Ranch Research and Monitoring Committee (Member)
- 2019 – 2020 UI College of Natural Resources Dean Search Committee (Member)
- 2019 CNR-NRS Search Committee for LTAR Post-Docs (Member)

External Reviews:

2016 USDA-ARS Research Evaluation Performance System Panelist (USDA-ARS promotion system)

Professional and Scholarly Organizations (including memberships, committee assignments, editorial services, offices held and dates)

Leadership roles in scientific journals

2017 – present Editor in Chief, *Rangelands*
 2017 – present Editorial Board Member, *Fire*
 2010 Guest Editor, *Rangelands*

Membership and roles in professional organizations

2005 – present Society for Range Management
 2013 – present Committee Member Remote Sensing/GIS Committee
 2015 Chair Remote Sensing/GIS Committee
 2015 – 2017 USDA-ARS Representative to the Rangeland Assessment and Monitoring Committee
 2017 – present Committee Member Rangeland Assessment and Monitoring Committee
 2007 – 2014 Ecological Society of America

Reviewing of scholarly work

2010 – present Various BLM and USFS manuals, technical reports, and monitoring plans.
 2010 – present External reviewer for USGS and USDA-ARS scientific manuscripts (required before submission for publication).
 2005 – present Reviewed manuscripts for:
Rangeland Ecology & Management, Rangelands, EcoSphere, Restoration Ecology, Ecological Applications, International Journal of Remote Sensing, Ecological Informatics, Current Landscape Ecology Reports, Environmental Health and Sustainability, Journal of Arid Environments, Journal of Librarianship and Information Science, Environmental Monitoring and Assessment, Journal of Environmental Management, Invasive Plant Science and Management, Frontiers in Ecology and the Environment, Applied Vegetation Science, Journal of Vegetation Science, Evolutionary Ecology Reviews
 2011 – 2017 Reviewer for the following books: *Review of the NRCS National Resource Inventory Conservation Effects Assessment Program; EcoTrends; US Forest Service Rangeland Vegetation Assessment, Inventory, Monitoring, and Analysis Handbook.*

Organization Roles at Conferences and Professional Meetings

2020 Planning committee, program co-chair for the 2021 Society for Range Management Annual Meeting (to be held virtually, Feb 2021).
 2020 “Open(source) Range”, Co-organizer, Symposium at the 2020 Society for Range Management Annual Meeting, Denver, CO
 2018 “2nd University of Idaho Drone Summit”, Convener + Co-organizer, Moscow, ID, Nov 2018
 2018 “1st University of Idaho Drone Summit”, Convener + Co-organizer, Moscow, ID, Apr 2018
 2015 “Monitoring for Adaptive Management: Implementing the BLM AIM Strategy”, Co-organizer + Convener, Symposium at 2015 Society for Range Management annual meeting, Sacramento, CA.
 2015 “Building Bridges – Using Unmanned Aerial Systems (UASs) Imagery to Link Ecological Observations”. Co-organizer. Organized Oral Session at 2015 Ecological Society of America meeting. Baltimore, MD.
 2015 “Hacking ecology: the infiltration of coding in ecology for data integration, analysis, and visualization”. Co-organizer. Ignite session at 2015 Ecological Society of America meeting. Baltimore, MD.

Outreach Service:

2017 – present Member of the UI Rangeland Center

2018 – present	Member of the Rangelands Partnership, a collective of rangeland professionals and science librarians from 19 western states to improve the accessibility of information for sustainable land management.
2015 – present	Technical advisor to the USDA-ARS Land Potential Knowledge System (LandPKS) project
2013 – 2017	Member of the Bureau of Land Management’s national Assessment, Inventory, and Monitoring Program core leadership team
2016 – 2017	Faculty mentor for a USDA Foreign Agricultural Service Borlaug Fellowship recipient from Mongolia
2013 – present	Lead PI on the JournalMap.org project to provide a geographic literature search engine for natural resource and agricultural literature. JournalMap currently has >30,000 articles and agreements with 7 publishers to index content.
2009 – present	Lead PI for the Landscape Toolbox project which organized and presents information on rangeland monitoring and assessment. The LandscapeToolbox.org domain of websites sees monthly web usage of over 10,000 unique sessions.
2009 – present	Monitoring program reviews, assistance with data analysis, and site visits with various BLM, FS, State, and private rangeland practitioners
2014	USFWS Wolverine Science Panel Workshop

PROFESSIONAL DEVELOPMENT:

Scholarship:

- CITI Investigators Training Modules
 - Introduction to Animal Care and Use (2018)
 - Working with Cattle in Agricultural Research Settings (2018)

Administration/Management:

- Title IX Training (2018)
- FERPA Training (annually)
- IT Security Training (annually)
- UI Defensive Driving (2017)
- P Card and Travel Training at the University of Idaho (2017)
- Diversity & Inclusion at the University of Idaho (2017)
- Safety & security Awareness at the University of Idaho (2017)
- Our Inclusive Workplace (2017)
- University of Idaho Mission and Goals (2017)
- University of Idaho Stewardship of Resources & Ethical Conduct (2017)

Other:

- Red Cross Basic First Aid/CPR (2013-2017)
- FAA Remote Pilot Certification (2018-Present)
- Youth Protection Trainings – BSA (2005-2019)