**Marcus E. Blum, Ph.D.**

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# RESEARCH GOALS

My research focuses on the collection and use of behavior, nutrition, and movement data to better understand the effects of environmental variation, climate, and anthropogenic disturbances on the management of large mammal populations using frequentist, modeling, and Bayesian inference methods.

# EDUCATION

**Ph.D., University of Nevada, Reno** August 2021

Ecology, Evolution, and Conservation Biology Interdisciplinary Ph.D. Program

*Habitat selection of female desert bighorn sheep: tradeoffs associated with reproduction*

*Advisor: Dr. Kelley M Stewart*

**M.S., University of Nevada, Reno** August 2014

Natural Resources and Environmental Science

*Disturbance of large-scale gold mining: effects on long distance migration in the Ruby Mountains of eastern Nevada*

*Advisor: Dr. Kelley M Stewart*

**B.S., Texas A&M University–Kingsville** May 2011

Range & Wildlife Management, minor in Biology

# PROFESSIONAL MEMBERSHIPS

American Society of Mammalogists (2012–Present)

The Wildlife Society (2011–Present)

Western Section (2012–Present)

Nevada Chapter (2012–2021)

Texas Chapter (2021–Present)

Nutritional Ecology Working Group (2019–Present)

Desert Bighorn Council (2015–Present)

# CERTIFICATIONS AND TRAINING

Remote Pilot: Small Unmanned Aircraft Systems Certification (2017, 2021)

Bayesian Integrated Population Modeling Using JAGS Workshop (2020)

Safe-Capture Wildlife Chemical Immobilization Certification (2009)

# PUBLICATIONS

# In preparation

# \* Indicates a manuscript in the final internal review prior to submission

13. **Blum ME**, DP Nielson, KM Stewart, M Cox, and MD Matocq. Microbial community and diet shifts in desert bighorn sheep (*Ovis canadensis nelson*) following translocation. *Journal of Mammalogy* (target outlet).

12. \* **Blum ME**, KM Stewart, J Greenberg, TE Dilts, M Cox, BF Wakeling, and VC Bleich. Selection of birth site and bed sites by neonatal bighorn sheep using unmanned aerial vehicles: a room with a view. *Journal of Applied Ecology* (target outlet).

11. **Blum ME**, C Schroeder, T Dilts, and KM Stewart. Mule deer migratory responses to pre-mining expansion. *Wildlife Society Bulletin* (target outlet).

# In review

10.**Blum ME**, KM Stewart, KT Shoemaker, M Cox, JR Bennett, BW Sullivan, BF Wakeling, and VC Bleich. Variation in diet of desert bighorn sheep around parturition: tradeoffs associated with reproduction. *Frontiers in Ecology and Evolution.*

9. \* Dilts T, **ME Blum**, KT Shoemaker, KM Stewart, and P Weisberg. Next generation measures of topographic ruggedness. *Landscape Ecology.*

8. **Blum ME**, KM Stewart, KT Shoemaker, M Cox, BF Wakeling, TE Dilts, JR Bennett, and VC Bleich. Risk-averse and risk-prone behaviors: tradeoffs associated with reproduction in a montane ungulate. *Movement Ecology.*

7. **Blum ME**, JR Bennett, F Buderman, KM Stewart, M Cox, and P Williams. Estimating abundance of desert bighorn sheep: comparing mark-resight models to traditional indices. *The Journal of Wildlife Management.*

6. **Blum ME,** TN LaSharr, KM Stewart, JT Hogg, BL Wagler, RA Smiley, KS Huggler, RP Jakopak, MJ Brunet, R Levine, SPH Dwinnell, BM Regan, M Cox, BF Wakeling, D Brimeyer, GL Fralick, B Scurlock, R Kaiser, M Thonhoff, PW Burke, A Courtemanch, D Lutz, and KL Monteith. Capture-induced mortality in neonate ungulates: role of handling protocols. *Journal of Mammalogy.*

# Published

5. Bowyer RT, KM Stewart, VC Bleich, JC Whiting, KL Monteith, **ME Blum**, and TN LaSharr. 2020. Metrics of harvest for ungulate populations: misconceptions, lurking variables, and prudent management. *ALCES* 56:15-38.

4. Stephenson TR, DW German, RC Cook, EF Cassierer, DP Walsh, **ME Blum**, M Cox, KM Stewart, and KL Monteith. 2020. Linking population performance to nutritional condition in bighorn sheep (*Ovis canadensis*). *Journal of Mammalogy* 101:1244-1256.

3. Bleich VC, **ME Blum**, KT Shoemaker, D Sustaita, and S Holl. 2019. Habitat selection by bighorn in a mesic ecosystem: the San Rafael Mountains, California, USA. *California Fish and Game* 105:205-224.

2. Shoemaker KT, LJ Heffelfinger, NJ Jackson, **ME Blum**, T Wasley, and KM Stewart. 2018. A machine-learning approach for extending classical wildlife resource selection analyses. *Ecology and Evolution* 8:3556-3569.

1. **Blum ME**, KM Stewart, and C Schroeder. 2015. Effects of large-scale gold mining on migratory behavior of a large herbivore. *Ecosphere* 6:74. http:dx.doi.org/10.1890/ES14-00421.1.

# Popular

1. **Blum ME** and KM Stewart. 2015. Effects of large-scale gold mining on migratory behavior of mule deer in the Great Basin. *Nevada Bighorns Unlimited Newsletter*.

# GRANTS (Total awarded = $460,116)

**moose habitat selection**

**Analysis of Movement Data and Mapping of Moose Habitat in Nevada** $35,606

**ME Blum &** SL Webb *Nevada Department of Wildlife, 2022*

**Desert bighorn lambing habitat & male Movements**

**Quantifying the Importance of Cover in Bighorn Sheep Lambing Habitat using Unmanned Aerial Vehicles** $5,300 KM Stewart & **ME Blum** *Desert Bighorn Council*, 2019

**Diet Analysis of Bighorn Sheep Provisioning Young** $20,000 KM Stewart & **ME Blum** *Wild Sheep Foundation*, 2018

**Nevada Desert Bighorn Lambing Project** $15,000 KM Stewart & **ME Blum** *Nevada Wildlife Record Book Foundation*, 2018

**Delineation of Desert Bighorn Lambing Habitat and Ram Dispersal Patterns** $20,700 KM Stewart & **ME Blum** *Nevada Wildlife Heritage Trust*, 2016

**Delineate Desert Bighorn Lambing Habitat and Ram Dispersal Patterns** $255,267 KM Stewart & **ME Blum** *Nevada Department of Wildlife*, 2016

**Population Demographics, Resource Selection, and Movement Patterns of Mountain Sheep in Nevada** $20,000 KM Stewart & **ME Blum** *Nevada Bighorns Unlimited*, 2015

**Quantifying Desert Bighorn Lambing Habitat in Nevada** $10,000 KM Stewart & **ME Blum** *Dallas Safari Club*, 2015

**Bighorn Lambing Habitat and Ram Dispersal** $53,243 KM Stewart & **ME Blum** *Nevada Department of Wildlife*, 2015

**Mining Effects on Mule Deer Migration**

**Effects of Mining Disturbance on Migration Pathways of Mule Deer** $25,000 **ME** **Blum** & KM Stewart *Nevada Wildlife Heritage Trust*, 2014

# HONORS & AWARDS

**Outstanding PhD Student**

*Ecology, Evolution, and Conservation Biology; University of Nevada, Reno,* 2022

**Desert Bighorn Council Memorial Scholarship**

*Desert Bighorn Council*, 2017

**Student Travel Award**

*American Society of Mammalogists*, 2015

# Graduate Scholarship

*Austin Chalk Chapter of the American Petroleum Institute*, 2011

# Charly McTee Memorial Scholarship

*Texas Chapter of The Wildlife Society*, 2011

# TEACHING & MENTORING

**Undergraduate Student Mentoring**  Megan Osterhout, University of Nevada, Reno *Fall 2017 - Fall 2018*

**Graduate Student Mentoring** University of Nevada, Reno Megan Osterhout, University of Nevada, Reno, KM Stewart Lab *Summer 2019 – present*

*Selection of resources by pronghorn near large scale disturbances*

Jesse Exum, Texas A&M University-Kingsville, A Foley Lab *Fall 2018 – Summer*

*Estimating white-tailed deer population sizes using unmanned aerial vehicles 2022*

Jason Gundlach, University of Nevada, Reno, KM Stewart Lab *Fall 2018 – present*

*Winter resource selection of mule deer following pinyon-juniper removal*

Emily Hagler, University of Nevada, Reno, KM Stewart Lab *Fall 2016 – Spring*

*Resource selection of introduced California bighorn sheep 2022*

Jerrod Merrell, University of Nevada, Reno, KM Stewart Lab *Fall 2016 – present*

*Behavioral plasticity in a short distance mule deer migration: to go or not to go?*

**Graduate Teaching Assistant** University of Nevada, Reno

NRES 345, Range and Forest Plants *Fall 2020*

NRES 310, Wildlife Ecology and Management *Fall 2017 & 2020*

NRES 497, Range and Forest Soils *Spring 2015*

# SERVICE

**Ecology, Evolution, and Conservation Biology Interdisciplinary Ph. D. Program**

*EECB Colloquium Logistics Committee (2016-2019)*

**Wild Sheep Working Group, Western Association of Fish & Wildlife Agencies**

*Neonate Handling Committee, Lead (2020-21)*

**Nutritional Ecology Working Group, The Wildlife Society**

*Member (2019-2020)*

*Nominations Committee (2021-Present)*

*Secretary* (*2021-Present*)

*Chair-Elect (2022-Present)*

**Nevada Chapter of The Wildlife Society**

*Conservation Affairs Committee (2019)*

*Meeting Organization Committee (2016)*

**University of Nevada, Reno**

*Quantitative Population Ecologist Search Committee, Graduate Student Representative (2017)*

**Nevada Department of Wildlife**

*Proposal Review Committee, Grant Opportunity- Black Bear Surveying (2017)*

*Aerial Wildlife Capture and Transport Services Evaluation Committee (2016)*

*Fixed Wing Aerial Survey, Radio Telemetry, Aerial Infrared and Data Services Evaluation Committee (2015)*

# Manuscripts Reviewed

*Ecosphere, Environmental Science and Pollution Research, Environmental Conservation, Forest Ecology and Management, Peer J – The Journal of Life and Environmental Sciences, Movement Ecology*

# Conference Service

*International Deer Biology Congress,* Session Moderator (2018)

# Volunteer Research Assistant

*Mojave Mule Deer Project* 2014 (*500 hrs*) University of Nevada, Reno Baker, California

*Fallon Wood Duck Project* 2016-2018 (*50 hrs*)

U. S. Fish and Wildlife Service & University of Nevada, Reno Fallon, Nevada

*Mule Deer Migration Project* 2011-2015 (*200 hrs*) University of Nevada, Reno & Nevada Department of Wildlife Elko & Austin, Nevada

# PRESENTATIONS

# Invited

8. **Blum ME**, Advancing wildlife conservation through technology. Plenary Speaker. Western Section of The Wildlife Society, Feb. 10, 2022.

7. **Blum ME**, KT Shoemaker, M Cox, B Wakeling, VC Bleich, and KM Stewart. Reproductive ecology of desert bighorn sheep: Reproduction influences selection. SUNY ESF student chapter of The Wildlife Society, Feb. 16, 2021.

6. **Blum ME**, J Greenberg, M Cox, B Wakeling, and KM Stewart. Using unmanned aerial vehicles to quantify cover in bighorn sheep lambing habitat. Wild Sheep Foundation, Wildlife Professional’s meeting, Jan. 15, 2020.

5. **Blum ME,** KT Shoemaker, M Cox, and KM Stewart. Reproductive ecology of desert bighorn sheep: A case study from central Nevada. Texas A&M University of Kingsville, March 21, 2019.

4. **Blum ME**, M Cox, B Wakeling, and KM Stewart. Bighorn lambing habitat preliminary results in central Nevada. Fraternity of Desert Bighorn, Dec. 5, 2018.

3. **Blum ME**, M Cox, and KM Stewart. Bighorn sheep neonate handling techniques and recommendations. Western Association of Fish and Wildlife Agencies, Wild Sheep Working Group, Jan. 16 – 17, 2018, Reno, NV.

2. **Blum ME,** M Cox, B Wakeling, and KM Stewart. Bighorn sheep lambing habitat and the effect of translocation. Fraternity of Desert Bighorn, June 1, 2016.

1. **Blum ME,** M Cox, B Wakeling, and KM Stewart. Desert bighorn sheep reproductive ecology. Nevada Bighorns Unlimited. Oct. 11, 2016.

# Professional Conferences

26. **Blum ME**, M Cox, KT Shoemaker, B Wakeling, and KM Stewart. Resource selection in female desert bighorn sheep: Tradeoffs associated with reproduction. Oral Presentation. The Wildlife Society join conference with American Fisheries Society, Sept. 29 – Oct. 3, 2019, Reno, NV

25. JR Bennett, **ME Blum**, M Cox, KM Stewart, and P Williams. Estimating abundance and detection probability of an unmarked desert bighorn sheep population in central Nevada by leveraging auxiliary information from a subset of marked individuals. Oral Presentation. The Wildlife Society joint conference with American Fisheries Society, sept. 29 – Oct. 3, 2019, Reno, NV.

24. **Blum ME,** J Greenberg, M Cox, B Wakeling, and KM Stewart. Using unmanned aerial vehicles to quantify cover in bighorn sheep lambing habitat. Oral Presentation. 7th World Mountain Ungulate Conference, Sept. 10 – 13, 2019, Bozeman, MT.

23. **Blum ME**, M Cox, KT Shoemaker, B Wakeling, and KM Stewart. Resource selection in female desert bighorn sheep: Tradeoffs associated with reproduction. Oral Presentation. Desert Bighorn Council, April 17 – 19, 2019, Mesquite, NV.

22. JR Bennett, **ME Blum**, M Cox, KM Stewart, and P Williams. Estimating detection probability through mark-resight in a central Nevada desert bighorn sheep population. Oral Presentation. Desert Bighorn Council, April 17 – 19, 2019, Mesquite, NV.

21. **Blum ME**, M Cox, and KM Stewart. Resource selection in female desert bighorn sheep: Tradeoffs associated with reproduction. Oral Presentation. Nevada Chapter of The Wildlife Society, Jan. 22 – 23, 2019, Reno, NV.

20. **Blum ME**, M Cox, and KM Stewart. Monitoring the Garfield Hills bighorn sheep translocation. Poster Presentation. Nevada Chapter of The Wildlife Society, Jan. 22 – 23, 2019, Reno, NV.

19. **Blum ME,** T Dilts, KT Shoemaker, C Schroeder, M Gritts, KM Stewart. Habitat selection by mule deer within migration corridors in Nevada. Oral Presentation. International Deer Biology Congress, Aug. 5 – 10, 2018, Estes Park, CO.

18. **Blum ME**, M Cox, B Wakeling, and KM Stewart. Time related alterations in resource selection of desert bighorn sheep (*Ovis canadensis nelsoni*). Oral Presentation. The Western Section of The Wildlife Society 2018 Annual Meeting. Feb. 5 – 9, 2018. Santa Rosa, CA.

17. **Blum ME**, M Cox, B Wakeling, and KM Stewart. Resource selection in desert bighorn sheep (*Ovis canadensis nelsoni*): Tradeoffs associated with recruitment. Poster Presentation. American Society of Mammalogists 97th Annual Meeting, June 20 – 24, 2017, Moscow, ID.

16. **Blum ME**, M Cox, B Wakeling, and KM Stewart. Resource selection in desert bighorn sheep (*Ovis canadensis nelson*): Tradeoffs associated with reproduction and neonate age. Oral Presentation. The Wildlife Society 24th Annual Conference, Sept. 23 – 27, 2017, Albuquerque, NM.

15. **Blum ME**, M Cox, B Wakeling, KM Stewart. Resource selection in desert bighorn sheep (*Ovis canadensis nelson*): Tradeoffs associated with reproduction. Oral Presentation. Desert Bighorn Council 54th Meeting, April 18 – 21, 2017, St. George, UT.

14. **Blum ME**, M Cox, B Wakeling, and KM Stewart. Resource selection across gestation in desert bighorn sheep. Oral Presentation. The Western Section of The Wildlife Society 2017 Annual Meeting, Feb. 6 – 10, 2017, Reno, NV.

13. **Blum ME**, M Cox, KM Stewart. Does tranlocation alter resource selection during parturition in desert bighorn sheep (*Ovis canadensis nelson*). Poster Presentation. American Society of Mammalogists 96th Annual Meeting, June 24 – 28, 2016, Minneapolis, MN.

12. **Blum ME**, T Dilts, C Schroeder, KM Stewart. Mule deer migratory responses to pre-mining expansion. Oral Presentation. Nevada Chapter of The Wildlife Society, March 2 – 3, 2016, Reno, NV.

11. **Blum ME,** C Schroeder, T Wasley, and KM Stewart. Effects of large-scale gold mining on the migratory behavior of a large herbivore. Oral Presentation. The Western Section of The Wildlife Society 2015 Annual Meeting, Jan. 26 – 30, 2015, Santa Rosa, CA.

10. **Blum ME**, T Dilts, C Schroeder, T Wasley, and KM Stewart. Habitat selection by mule deer within migration corridors in Nevada. Poster Presentation. 11th Western States and Provinces Deer and Elk Workshop, May 11 – 14, 2015, Canmore, Alberta, CA.

9. **Blum ME,** T Dilts, C Schroeder, and KM Stewart. Habitat selection by mule deer within migration corridors in Nevada. Oral Presentation. American Society of Mammalogists 95th Annual Meeting, June 12 – 16, 2015, Jacksonville, FL.

8. **Blum ME**, T Dilts, C Schroeder, T Wasley, and KM Stewart. Variability in mule deer migration corridors in eastern Nevada. Oral Presentation. The Wildlife Society 22nd Annual Conference, Oct. 17 – 21, 2015, Winnipeg, Manitoba, CA.

7. **Blum ME**, C Schroeder, T Wasley, and KM Stewart. Impacts of mining on mule deer migration in Nevada. Oral Presentation. The Western Section of the Wildlife Society 2014 Annual Meeting, Jan. 28 – 31, 2014, Reno, NV.

6. **Blum ME**, C Schroeder, T Wasley, and KM Stewart. Impacts of mining on mule deer migrations in Nevada. Oral Presentation. American Society of Mammalogists 94th Annual Meeting, June 6 – 10, 2014, Oklahoma City, OK.

5. **Blum ME**, C Schroeder, T Wasley, and KM Stewart. Impacts of mining on mule deer migrations in Nevada. Oral Presentation. American Society of Mammalogists 93rd Annual Conference, June 15 – 18, 2013, Philadelphia, PA.

4. **Blum ME**, C Schroeder, T Wasley, and KM Stewart. Impacts of mining on mule deer migrations in Nevada. Oral Presentation. 10th Biennial Western States and Provinces Deer and Elk Workshop, May 6 – 9, 2013, Missoula, MT.

3. **Blum ME**, C Schroeder, T Wasley, and KM Stewart. Impacts of mining on mule deer migrations in Nevada. Poster Presentation. The Wildlife Society 20th Annual Conference, Oct. 5 – 10, 2013, Milwaukee, WI.

2. **Blum ME**, C Schroeder, T Wasley, and KM Stewart. Migratory corridors for mule deer using spatial modeling. Poster Presentation. American Society of Mammalogists 92nd Annual Meeting, June 22 – 26, 2012, Reno, NV.

1. **Blum ME,** C Schroeder, T Wasley, and KM Stewart. Migratory corridors for mule deer using spatial modeling. Oral Presentation. Nevada Chapter of The Wildlife Society, Jan. 25 – 27, 2012, Reno, NV.

# RELEVANT SKILLS

Undergraduate and graduate student mentoring and training

Working well with landowners

Demographic and spatial data analysis

Proficient in R, ArcGIS, ENVI, MARK, and Circuitscape

Wildlife capture and handling

Proficient in logistics, risk management, and crew management at remote research locations

Design and implementation of research

Research experience in sub-tropical and temperate ecosystems

Proficient at working with individuals and groups with different backgrounds and ideologies

# REFERENCES

# Dr. Kelley M. Stewart

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