

## Tal Avar, Ph.D.

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### Research Interests

Animal conservation and space-use ecology, wildlife population biology, consumer-resource interactions, ecological modelling and biometry

### Current Research Program

*Density-dependent wildlife space-use ecology*: investigating the relationship between local population-level processes and individual-level habitat-selection and movement behaviours.

### Education

- 2008 – 2013 Ph.D. research under the supervision of Prof. John Fryxell. Integrative Biology program, University of Guelph, Ontario, Canada. Thesis title: *From diffusion to cognition: analytical, statistical and mechanistic approaches to the study of animal movement*.
- 2004 – 2007 M.Sc. research under the supervision of Prof. Ran Nathan. Environmental Science program, The Hebrew University of Jerusalem, Israel. Graduated *magna cum laude*. Thesis title: *Linking foraging traits of seed-eating ants to spatial patterns of surviving seeds*.
- 2001 – 2004 B.Sc. in Geology and Biology, The Hebrew University of Jerusalem, Israel.

### Significant Awards and Honours

- 2022 QCNR Graduate Mentor of the Year. Utah State University, USA.
- 2021 QCNR Undergraduate Research Mentor of the Year. Utah State University, USA.
- 2015 The Banting Postdoctoral Fellowship. Federal government, Canada.
- 2013 The Killam Postdoctoral Fellowship. University of Alberta, Edmonton, Alberta, Canada.
- 2009 NSERC Vanier Canada Graduate Scholarship. Federal government, Canada.

### Research and Teaching Experience (2013-present)

- 2018 – Assistant professor, Department of Wildland Resources, Utah State University, Logan, Utah, USA. PI, [Wildlife Space-Use Ecology research group](#). Courses taught: *Space-Use Ecology*, *Graduate Ecology*, *Ecology of Our Changing World*.
- 2017 – 2018 Postdoctoral fellow, Department of Integrative Biology, University of Guelph, Canada.
- 2014 – 2017 Killam and then Banting postdoctoral fellow, Department of Biological Sciences, University of Alberta, Canada. Instructor, Bamfield Marine Science Centre, Canada.
- 2013 – 2014 Postdoctoral fellow, Department of Integrative Biology, University of Guelph, Canada.

**Publications (peer reviewed; \* signifies mentees; \*\* signifies USU mentees)**

- Dickie\*, M., R. Serrouya, **T. Avgar**, P. McLoughlin, R.S. McNay, C. DeMars, S. Boutin, and A. Ford (in press) Resource exploitation efficiency collapses the home range of an apex predator. *Ecology*.
- Doden\*\*, E., P. Budy, **T. Avgar**, and J. Young (2022) Movement patterns of resident and translocated beavers at multiple spatiotemporal scales in desert rivers. *Frontiers in Conservation Science* (Research Topic: Animal Behavior after Translocation into Novel Environments), 3:777797.
- Berger\*\*, D.J., D.W. German, C. John, R. Hart\*\*, T.R. Stephenson, and **T. Avgar** (2022) Seeing is be-Leaving: perception drives seasonal migration in Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*). *Frontiers in Ecology and Evolution* (Research Topic: Cognitive Movement Ecology), 10:742275.
- Avgar, T.**, and O. Berger-Tal (2022) Biased learning as a simple adaptive foraging mechanism. *Frontiers in Ecology and Evolution* (Research Topic: Cognitive Movement Ecology), 9:759133.
- Kashetsky, T., **T. Avgar**, and R. Dukas (2021) The cognitive ecology of animal movement: evidence from birds and mammals. *Frontiers in Ecology and Evolution* (Research Topic: Cognitive Movement Ecology), 9:724887.
- Fieberg, J., J. Signer, B.J. Smith\*\*, and **T. Avgar** (2021) A 'How-to' guide for interpreting parameters in resource- and step-selection analyses. *Journal of Animal Ecology*, 90: 1027-1043.
- Avgar, T.**, G. Betini, and J. Fryxell (2020) Habitat selection patterns are density-dependent under the Ideal Free Distribution. *Journal of Animal Ecology*, 89: 2777-2787.
- Garland, L., E. Neilson, E. Bayne, **T. Avgar**, and S. Boutin (2020) Random encounter and staying time model testing with human volunteers. *Journal of Wildlife Management*, 84: 1179-1184.
- Fryxell, J., **T. Avgar**, L. Boyan, A. Rodgers, J. Shuter, I. Thompson, D. Reid, A. Kittle, A. Mosser, S. Newmaster, G. Street, G. Brown, B. Patterson, and J. Baker (2020) Anthropogenic disturbance and population viability of Woodland Caribou in Ontario. *Journal of Wildlife Management*, 84: 636-650.
- Betini, G., X. Wang, **T. Avgar**, M. Guzzo, and J. Fryxell (2020) Food availability modulates temperature-dependent effects on growth, reproduction, and survival in *Daphnia magna*. *Ecology and Evolution*, 10: 756-762.
- Broadley\*, K., C. Burton, **T. Avgar**, and S. Boutin (2020) Density-dependent space use affects interpretation of camera detection-rate indices. *Ecology and Evolution*, 9: 14031-14041.
- Dickie\*, M., S. McNay, G. Sutherland, M. Cody, and **T. Avgar** (2020) Corridors or risk? Movement along, and use of, linear features vary predictably among large mammal predator and prey species. *Journal of Animal Ecology*, 89: 623-634.
- Betini, G., **T. Avgar**, K. McCann, and J. Fryxell (2019) Temperature triggers a non-linear response in resource-consumer interaction strength. *Ecosphere*, 10: e02787.

- Signer, J., J. Fieberg, and **T. Avgar** (2019) Animal Movement Tools (amt): R package for managing tracking data and conducting habitat selection analyses. *Ecology and Evolution*, 9: 880-890.
- Ladle\*, A., **T. Avgar**, G. Stenhouse, M. Wheatley, S. Nielsen, and M.S. Boyce (2019) Grizzly bear response to spatio-temporal variability in human recreational activity. *Journal of Applied Ecology*, 56: 375-386.
- Viejou\*, R., **T. Avgar**, G.S. Brown, B. Patterson, D. Reid, *et al.* (2018) Woodland caribou habitat selection patterns in relation to predation risk and forage abundance depend on reproductive state. *Ecology and Evolution*, 8: 5863-5872.
- Street, G.M., **T. Avgar**, and L. Börger (2018) Net displacement and temporal scaling: model fitting, interpretation, and implementation. *Methods in Ecology and Evolution*, 9: 1503-1517.
- Scrafford\*, M., **T. Avgar**, R. Heeres, and M.S. Boyce (2018) Roads elicit negative movement and habitat-selection responses by wolverines (*Gulo gulo luscus*). *Behavioral Ecology*, 29: 534-542.
- Tucker, M.A., K. Böhning-Gaese, W.F. Fagan, J.M. Fryxell, B. Van Moorter, *et al.* (2018) Global reductions in terrestrial mammalian movements in human-dominated landscapes. *Science*, 359: 466-469.
- Neilson\*, E., **T. Avgar**, C. Burton, K. Broadley, and S. Boutin (2018) Animal movement affects interpretation of occupancy models from camera trap surveys of unmarked animals. *Ecosphere*, 9: e02092.
- Avgar, T.**, S.R. Lele, J.L. Keim, and M.S. Boyce (2017) Relative Selection Strength: quantifying effect size in habitat- and step-selection inference. *Ecology and Evolution*, 7: 5322-5330.
- Signer\*, J., J. Fieberg, and **T. Avgar** (2017) Estimating utilization distributions from fitted step-selection functions. *Ecosphere*, 8: e01771.
- Betini, G., **T. Avgar**, K.S. McCann, and J.M. Fryxell (2017) Daphnia inhibits the emergence of spatial pattern in a simple consumer-resource system. *Ecology*, 98: 1163-1170.
- Scrafford\*, M., **T. Avgar**, B. Abercrombie, J. Tigner, and M.S. Boyce (2017) Wolverine habitat selection in response to anthropogenic disturbance in the western Canadian boreal forest. *Forest Ecology and Management*, 395: 27-36.
- Kittle, A.M., M. Anderson, **T. Avgar**, J.A. Baker, G.S. Brown, *et al.* (2017) Landscape-level wolf space use is correlated with prey abundance, ease of mobility and the distribution of prey habitat. *Ecosphere*, 8: e01783.
- Prokopenko\*, C., M.S. Boyce, and **T. Avgar** (2017) Characterizing wildlife behavioural responses to roads using integrated step selection analysis. *Journal of Applied Ecology*, 54: 470-479.
- Ladle\*, A., **T. Avgar**, M. Wheatley, and M.S. Boyce (2017) Predictive modeling of ecological patterns along linear-feature networks. *Methods in Ecology and Evolution*, 8: 329-338.
- Betini, G., **T. Avgar**, and J.M. Fryxell (2017) Why are we not evaluating multiple competing hypotheses in Ecology and Evolution? *Royal Society Open Science*, 4: e160756. [F1000Prime recommended].

- Prokopenko\*, C., M.S. Boyce, and **T. Avgar** (2017) Extent-dependent habitat selection in a migratory large herbivore: road avoidance across scales. *Landscape Ecology*, 32: 313-325.
- Street, G.M., A.R. Rodgers, **T. Avgar**, L.M. Vander Vennen, and J.M. Fryxell (2017) Comparing resource selection and demographic models for predicting animal density. *Journal of Wildlife Management*, 81: 16-25.
- Avgar, T.**, J.R. Potts, M.A. Lewis, and M.S. Boyce (2016) Integrated step selection analysis: bridging the gap between resource selection and animal movement. *Methods in Ecology and Evolution*, 7: 619-630.
- McGreer\*, M.T., E.E. Mallon, L.M. Vander Vennen, P.A. Wiebe, **T. Avgar**, et al. (2015) Selection for forage and avoidance of risk by woodland caribou (*Rangifer tarandus caribou*) at coarse and local scales. *Ecosphere*, 6: e288.
- Street, G.M., L.M. Vander Vennen, **T. Avgar**, A. Mosser, M. Anderson, A.R. Rodgers, and J.M. Fryxell (2015) Habitat selection following recent disturbance: model transferability with implications for management and conservation of moose (*Alces alces*). *Canadian Journal of Zoology*, 93: 813-821.
- Avgar, T.**, J.A. Baker, G.S. Brown, J. Hagens, A.M. Kittle, et al. (2015) Space-use behavior of woodland caribou based on a cognitive movement model. *Journal of Animal Ecology*, 84: 1059-1070.
- Kittle, A.M., M. Anderson, **T. Avgar**, J.A. Baker, G.S. Brown, et al. (2015) Wolves adapt territory size, not pack size to local habitat quality. *Journal of Animal Ecology*, 84: 1177-1186.
- Street, G.M., A.R. Rodgers, **T. Avgar**, and J.M. Fryxell (2015) Characterizing demographic parameters across environmental gradients: a case study with Ontario moose. *Ecosphere*, 6: e138.
- Mosser, A., **T. Avgar**, G.S. Brown, C.S. Walker, and J.M. Fryxell (2014) Towards an energetic landscape: broad-scale accelerometry in woodland caribou. *Journal of Animal Ecology*, 83: 916-922.
- Avgar, T.**, G. Street, and J.M. Fryxell (2014) On the adaptive benefits of mammal migration. *Canadian Journal of Zoology*, 92: 481-490.
- Fagan, W.F., M.A. Lewis, M. Auger-Methe, **T. Avgar**, S. Benhamou, et al. (2013) Spatial memory and animal movement. *Ecology Letters*, 16: 1316-1329.
- Avgar, T.**, R. Deardon, and J.M. Fryxell (2013) An empirically parameterized individual based model of animal movement, perception and memory. *Ecological Modeling*, 251: 158-172.
- Kuefler, D., **T. Avgar**, and J.M. Fryxell (2013) Density- and resource-dependent movement characteristics in a rotifer. *Functional Ecology*, 27: 323-328.
- Avgar, T.**, A. Mosser, G.S. Brown, and J.M. Fryxell (2013) Environmental and individual drivers of animal movement patterns across a wide geographical gradient. *Journal of Animal Ecology*, 82: 96-106.
- Berger-Tal, O., and **T. Avgar** (2012) The glass is half-full: overestimating the quality of a novel environment is advantageous. *PLoS ONE*, 7: e34578.

- Kuefler, D., **T. Avgar**, and J.M. Fryxell (2012) Rotifer population spread in relation to food, density and predation risk in an experimental system. *Journal of Animal Ecology*, 81: 323-329.
- Avgar, T.**, D. Kuefler, and J.M. Fryxell (2011) Linking rates of diffusion and consumption in relation to resources. *American Naturalist*, 178: 182-190. [*F1000Prime* recommended].
- Mari, L., R. Casagrandi, M. Gatto, **T. Avgar**, and R. Nathan (2008) Movement strategies of seed predators as determinants of plant recruitment patterns. *American Naturalist*, 172: 694-711.
- Avgar, T.**, I. Giladi, and R. Nathan (2008) Linking traits of foraging animals to spatial patterns of plants: social and solitary ants generate opposing patterns of surviving seeds. *Ecology Letters*, 11: 224-234.
- Avgar, T.**, N. Horvitz, L. Broitman, and R. Nathan (2008) How movement properties affect prey encounter rates of ambush versus active predators: a comment on Scharf *et al.* *American Naturalist*, 172: 593-595

## Publications (other)

- Berger\*\*, D., J. Huang\*\*, and **T. Avgar** (2021) Book review: *Species-Habitat Associations: Spatial Data, Predictive Models, and Ecological Insights*. J. Matthiopoulos, J. Fieberg, and G. Aarts. 2020. University of Minnesota Libraries Publishing, Minneapolis, Minnesota, USA. 103 pp. \$0.00 online. ISBN: 978-1-946135-68-1. *Journal of Wildlife Management*, 85: 1746-1747.
- Hart\*\*, R., B.J. Smith\*\*, V. Winter\*\*, and **T. Avgar** (2021) Book review: *Habitat Ecology and Analysis*. J.A. Veech. 2021. Oxford University Press, Oxford, United Kingdom. 215 pp. \$49.95 paperback. ISBN: 978-0-19-882941-6. *Journal of Wildlife Management*, 85: 1744-1745.
- Fryxell, J.M., and **T. Avgar** (2012) Animal migration: catching the wave. *Nature*, 490: 182-183.

## Manuscripts undergoing review or revision

- Bar-Ziv, E., S. Picardi, A. Kaplan, T. Avgar, and O. Berger-Tal. Sex differences dictate the movement patterns of striped hyenas, *Hyaena hyaena*, in a human-dominated landscape. *Frontiers in Ecology and Evolution* (Research Topic: Proximate and Ultimate Approaches to Behavior in a Changing World).
- Prokopenko\*, C., **T. Avgar**, A. Ford, and E. Vender Wal. Trait-mediated functional response: antipredator traits drive prey switching in multi-prey systems. *Ecology*.
- Betini, G., **T. Avgar**, E. Miller, and J.M. Fryxell. Body size mediates the effects of external environmental conditions on *Daphnia* movement rates. *Ecology*.
- Vilk, O, E. Aghion, **T. Avgar**, C. Beta, O. Nagel, A. Sabri, R. Sarfati, D. Schwartz, M. Weiss, D. Krapf, R. Nathan, R. Metzler, and M. Assaf. Unravelling the origins of anomalous diffusion: from molecules to migrating storks. *Nature Communications*.

**Grants Awarded (bold text signifies lead PI)**

- 2021 California Department of Fish and Wildlife: \$167,071 granted to **T. Avgar** (in collaboration with M. Conner and T. Stephenson) by the Sierra Nevada Bighorn Sheep Recovery Program. Title: *Sierra Nevada Bighorn space-use ecology*. Start date: 01/05/2021. End date: 01/05/2024.
- 2020 USDA-NIFA: \$495,230 granted to **K. Veblen**, T. Avgar, and M. Duniway (in collaboration with E. Thacker, J. Villalba, M. Garcia, and S. Reed) by USDA-NIFA. Title: *Criollo cattle as a strategy to maintain output of ecosystem services under a changing climate*. Start date: 01/06/2021. End date: 31/12/2025.
- State grant: \$124,825 granted to **T. Avgar** and **L. Yocom** by the Utah Division of Wildlife Resources. Title: *Wildlife space-use and post-fire habitat dynamics*. Start date: 01/01/2021. End date: 31/12/2023.
- Mississippi State University: \$111,000 granted to **T. Avgar** (in collaboration with G. Street) by the High Performance Computing Collaboratory. Title: *Using camera traps to monitor deer density at high resolution through space and time*. Start date: 01/09/2020. End date: 31/08/2022.
- State grant: \$171,300 granted to **T. Avgar** (in collaboration with K. Hersey and D. Olson) by the Utah Division of Wildlife Resources. Title: *Understanding and mapping mule deer migration across Utah*. Start date: 01/07/2020. End date: 30/06/2024.
- State grant: \$86,144 granted to **T. Avgar** (in collaboration with D. Olson) by the Utah Division of Wildlife Resources. Title: *Quantifying the impacts of anthropogenic movement barriers on ungulate space-use patterns in Utah*. Start date: 01/07/2020. End date: 30/06/2022.
- State contract: \$8,000 granted to **T. Avgar** by Utah Division of Wildlife Resources. Title: *Demonstrating the utility of wildlife cameras in monitoring deer and elk demographic parameters*. Start date: 01/07/2020. End date: 31/12/2020.
- Utah State University's Public Lands Initiative grant: \$58,642 granted to **T. Avgar** (in collaboration with E. Thacker and D. Olson) by the Utah Agricultural Experiment Station. Title: *Pronghorn space-use ecology in Utah: a key to effective management and conservation*. Start date: 01/07/2020. End date: 30/06/2022.
- 2019 Utah State University's Research Catalyst seed grant: \$20,000 granted to **T. Avgar** by the Office of Research. Title: *Coupling individual and population perspectives to enhance understanding and management of wildlife space-use pattern*. Start date: 01/01/2019. End date: 31/12/2019.
- 2018 Moose Stewardship Study Program: \$230,000 granted to **E. Vander Wal**, T. Avgar, and G. Street by Manitoba Hydro. Title: *Disentangling the effects of local and regional factors that promote occupancy and abundance of moose*. Start date: 01/09/2018. End date: 31/08/2022.

## Grants under Consideration

**Daniel MacNulty, Scott Peacor, Tal Avgar, and Daniel Stahler.** (\$605,976; October 2021). Title: A new framework to understand the ecological relevance of predation risk in free-living systems. *National Science Foundation*.

## Grants not Awarded

2020 Federal grant: \$986,508 not granted to **Tal Avgar** by the National Science Foundation. Title: Biased learning as an adaptive foraging mechanism shaping animal behavior in the face of environmental changes.

2019 National Geographic Exploration Grant: \$30,000 not granted to **Brian Smith\*\***, Tal Avgar, and Daniel MacNulty by the National Geographic Society. Title: *Understanding the effects of prey density and multiple predators on prey space use*.

Utah State University's Research Catalyst seed grant: \$20,000 not granted to **Doug Ramsey**, Tal Avgar, and Simona Picardi by the Office of Research. Title: *Anthropogenic effects on ungulate migrations in the intermountain West*.

Utah State University's Public Lands Initiative: \$60,000 not granted to **Tal Avgar** and Julie Young by the Utah Agricultural Experiment Station. Title: *Pronghorn space-use ecology in Utah: a key to effective management and conservation*.

## Current Graduate Students

Randall McBride (MSc; USU). Tentative thesis title: *Spatial interactions between elk, cattle, and hunters*. Start date: September 2018. Estimated end date: May 2022.

Jennifer Hogg (MSc; Memorial University of Newfoundland; joint supervision with Dr. Eric Vander Wal & Dr. Garrett Street). Tentative thesis title: *Reconstructing the random encounter and staying time model to determine the mean and variance of species density*. Start date: May 2019. Estimated end date: May 2022.

Brian Smith (PhD; USU; joint supervision with Dan MacNulty). Tentative thesis title: *The influence of prey density on the effects of predation in natural systems*. Start date: September 2019. Estimated end date: August 2023.

Ronan Hart (MSc; USU). Tentative thesis title: *Quantifying the impacts of anthropogenic movement barriers on ungulate space-use patterns in Utah*. Start date: September 2020. Estimated end date: December 2022.

Veronica Winter (MSc; USU). Tentative thesis title: *Pronghorn space-use ecology in Utah: a key to effective management and conservation*. Start date: September 2020. Estimated end date: August 2022.

Danielle Berger (PhD; USU; Quinney Fellow). Tentative thesis title: *Spatially explicit population viability of Sierra Nevada bighorn sheep*. Start date: September 2020. Estimated end date: August 2024.

Courtney Check (MSc; USU). Tentative thesis title: *Using camera traps to monitor deer density at high resolution through space and time*. Start date: January 2021. Estimated end date: May 2023.

John Huang (PhD; USU). Tentative thesis title: *Understanding and mapping mule deer migration across Utah*. Start date: January 2021. Estimated end date: December 2024.

Megan Whetzel (MSc; USU; joint supervision with Larissa Yocom). Tentative thesis title: *Wildfire-herbivore interactions*. Start date: January 2021. Estimated end date: May 2023.

## Current Undergraduate Students

Emily Bonbrake (recipient of QCNR's Undergraduate Research and USU's Undergraduate Research and Creative Opportunities grants). Start date: September 2020. Estimated end date: May 2022.

Emily Lowrimore (recipient USU's Undergraduate Research and Creative Opportunities grant). Start date: July 2021. Estimated end date: May 2022.

## Current Postdoctoral Fellows

Dr. Sean Boyle (Memorial University of Newfoundland; joint supervision with Eric Vander Wal & Garrett Street)

## Lab Alumni

Tatum Del Bosco (MSc; USU; September 2018 - December 2020). Thesis title: An Eulerian perspective on spring migration in mule deer. Currently employed as an analyst with California Fish and Game.

Steven Handtke (undergraduate research; September 2019 – December 2020; recipient of QCNR's Undergraduate Research and USU's Undergraduate Research and Creative Opportunities grants). Thesis title: Vegetation Green Up: Ground-truthing NDVI data using wildlife cameras.

## Graduate Students Committees

Justin Schwabedissen (MSc; USU). Start date: January 2018. Estimated end date: May 2022.

Stephanie Landry (PhD; USU). Start date: May 2018. Estimated end date: May 2022.

Binod Borah (PhD; USU). Start date: September 2018. Estimated end date: May 2022.

Lauren Ricci (PhD; USU). Start date: September 2018. Estimated end date: May 2022.

Andi Stewart (MSc; USU). Start date: September 2018. Estimated end date: May 2022.

Luke McDonald (PhD; USU). Start date: September 2019. Estimated end date: May 2022.

Daniel Taylor (MSc; USU). Start date: September 2019. Estimated end date: May 2022.



Brianna Johnson (MSc; USU). Start date: September 2019. Estimated end date: May 2022.

Colton Wise (MSc; Oregon State University). Start date: September 2019. Estimated end date: May 2022.

Martinique Chavez (MSc; USU). Start date: September 2019. Estimated end date: May 2022.

Mitch Parsons (PhD; USU). Start date: September 2020. Estimated end date: August 2023.

Mallory Lambert (PhD; USU). Start date: January 2021. Estimated end date: December 2024.

Maria Stahl (PhD; USU). Start date: September 2021. Estimated end date: August 2024.

Brendan Carswell (MSc; Memorial University of Newfoundland). Start date: September 2021. Estimated end date: August 2023.

Jake Van Deursen (MSc; USU). Start date: September 2021. Estimated end date: August 2023.

### **Former Graduate Students Committees**

Ben Stout (PhD; USU).

Bonnie McDonald (MSc; USU).

Emma Doden (MSc; USU).

David German (MSc; Oregon State University).

### **Teaching Activities at USU**

2021 Delivering a graduate course titled "Space-Use Ecology" [WILD 6900; 23 students].

Developed and delivering (together with Kezia Manlove) a graduate course titled "Graduate Ecology" [WILD 6900; 21 students].

Delivering an undergraduate BLS course titled "Ecology of our World" [WILD 2200; 69 students].

Developed and delivered guest lectures in LAEP 6110.

2020 Delivered a graduate course titled "Space-Use Ecology" [WILD 6900; 5 students].

Developed and delivering (together with Kezia Manlove) a graduate course titled "Conceptual Ecology" [WILD 6900; 17 students].

Delivering an undergraduate BLS course titled "Ecology of our World" [WILD 2200; 72 students].

2019 Developed and delivered a graduate course titled "Space-Use Ecology" [13 students].

Developed and delivering an undergraduate BLS course titled "Ecology of our World" [WILD 2200; 66 students]

Developed and delivered guest lectures in WILD 2400 and LAEP 6110.

## Conference Presentations and Invited Talks (2018-present)

- 2022 Smith\*\*, B.J., and **T. Avgar**. Invited webinar. *Integrated Step-Selection Analysis*. EFI and ESA-SES joint Statistical Methods Webinar Series. Online.
- T. Avgar**. Invited lecture. *Reconnecting place-based (Eulerian) and individual-based (Lagrangian) perspectives in animal movement ecology*. Oregon State University's FWCS Winter Seminar Series. Online.
- T. Avgar**. Invited lecture. *Reconnecting place-based (Eulerian) and individual-based (Lagrangian) perspectives in animal movement ecology*. Kent State University' BSCI Seminar. Online.
- T. Avgar**. Invited lecture. *Reconnecting place-based and individual-based perspectives in animal ecology*. Simon Fraser University. Online.
- Bonebrake\*\*, E., C. Check\*\*, and **T. Avgar**. Oral presentation. *Estimating density and distribution of cattle using wildlife cameras*. Utah TWS Annual Conference. Online.
- Check\*\*, C., E. Bonebrake\*\*, G. Street, and **T. Avgar**. Oral presentation. *Evaluating multiple avenues of interspecific competition between mule deer, elk, and cattle*. Utah TWS Annual Conference. Online.
- Smith\*\*, B.J., D. MacNulty, and **T. Avgar**. Oral presentation. *Density alters drivers of distribution in northern Yellowstone elk*. Utah TWS Annual Conference. Online.
- Berger\*\*, D. German, C. John, R. Hart\*\*, T.R. Stephenson, and **T. Avgar**. Oral presentation. *Seeing is Be-Leaving: Perception informs migratory decisions in Sierra Nevada bighorn sheep*. Utah TWS Annual Conference. Online.
- Huang\*\*, J., B.J. Smith\*\*, D. Berger\*\*, S. Picardi, V. Winter\*\*, and **T. Avgar**. Oral presentation. *Classifying migration in large datasets*. Utah TWS Annual Conference. Online.
- Hart\*\*, R., and **T. Avgar**. Oral presentation. *The impacts of anthropogenic movement barriers on home range size, shape, and selection*. Utah TWS Annual Conference. Online.
- Winter\*\*, V., and **T. Avgar**. Oral presentation. *Taking it apart and putting it back together: Variability in species habitat selection across space and time*. Utah TWS Annual Conference. Online.
- 2021 **T. Avgar**. Invited lecture. *Reconnecting place-based (Eulerian) and individual-based (Lagrangian) perspectives in animal movement ecology*. Oregon State University's FWCS Winter Seminar Series. Online.
- T. Avgar**. Invited lecture. *Cognitive space-use ecology*. University of Alberta's MathBio Seminar. Online.
- T. Avgar**. Oral presentation. *Using motion-triggered cameras to monitor and study wildlife across space and time: pitfalls and potential*. Utah TWS Annual Conference. Online.

- Bonebrake\*\*, E., C. Check\*\*, and **T. Avgar**. Poster presentation. *Estimating Density of Cattle Using Wildlife Cameras*. USU Fall Student Research Symposium. Logan, Utah, USA.
- Dickie\*, M., R. Serrouya, **T. Avgar**, P. McLoughlin, S. McNay, C. DeMars, S. Boutin, and A. Ford. Oral presentation. *Habitat productivity and linear features interact to collapse wolf home ranges*. North American Caribou Workshop. Online.
- Hart\*\*, R., and **T. Avgar**. Oral presentation. *Quantifying the impacts of anthropogenic movement barriers on ungulate space-use patterns and functional connectivity in Utah*. Utah TWS Annual Conference. Online.
- Smith\*\*, B.J., D. MacNulty, and **T. Avgar**. Oral presentation. *Density-dependent habitat selection in northern Yellowstone elk*. Utah TWS Annual Conference. Online.
- Winter\*\*, V., D. Berger\*\*, and **T. Avgar**. Oral presentation. *Space use and demography: a conceptual framework*. Utah TWS Annual Conference. Online.
- Del Bosco\*\*, T., B.J. Smith\*\*, and **T. Avgar**. Oral presentation. *A population perspective on spring migration in mule deer*. Utah TWS Annual Conference. Online.
- Del Bosco\*\*, T., B.J. Smith\*\*, and **T. Avgar**. Oral presentation. *An Eulerian perspective on spring migration in mule deer*. WAFWA Deer & Elk Workshop. Online.
- Berger\*\*, D., V. Winter\*\*, and **T. Avgar**. Oral presentation. *From individual space-use patterns to metapopulation dynamics: a conceptual framework*. ESA Annual Meeting. Online.
- 2020 **T. Avgar**. Webinar. *10 FAQs in wildlife habitat-selection analysis*. Canadian Section of TWS. Online.
- T. Avgar**. Keynote lecture. *Analysing animal space-use behavior using integrated Step Selection Analysis (iSSA): motivation, benefits, and limitations*. The 3rd Moving2Gather workshop. Rennes, France.
- Hogg\*, J., **T. Avgar**, G. Street, and E. Vander Wal. Poster presentation. *Reconstructing the random encounter and staying time model to determine the mean and variance of species density*. ESA Annual Meeting. Online.
- Handtke\*\*, S., T. Del Bosco\*\*, and **T. Avgar**. Poster presentation. *Vegetation green up: ground-truthing NDVI data using wildlife cameras*. USU Fall Student Research Symposium. Logan, Utah, USA.
- 2019 **T. Avgar**. Short lecture. *Habitat selection patterns are expected to display non-linear availability and density dependencies*. TWS National Annual Conference. Reno, Nevada, USA.
- T. Avgar**. Short lecture. *A minimally sufficient behavioral mechanism for spatial consumer-resource matching*. The Ecology Center's MacArthur Academy Meeting. Logan, Utah, USA.

- T. Avgar.** Invited lecture. *Cognitive space-use ecology*. USU's WILD seminar series. Logan, Utah, USA.
- T. Avgar.** Invited lecture. *Integrated Step Selection Analysis (iSSA): bridging the gap between habitat selection and animal movement*. USU's Applied Math seminar series. Logan, Utah, USA.
- T. Avgar.** Invited lecture. *Using movement-ecology research to advance wildlife management and conservation*. UDWR's Brown-Bag seminar series. Salt-Lake City, Utah, USA.
- Smith\*\*, B.J., J. Fieberg, J. Signer, and **T. Avgar.** Full day workshop. *Advances in Habitat-Selection Modeling*. TWS National Annual Conference. Reno, Nevada, USA.
- Del Bosco\*\*, T., and **T. Avgar.** Poster presentation. *Towards a population perspective on green-wave surfing*. TWS National Annual Conference. Reno, Nevada, USA.
- McBride\*\*, R., and **T. Avgar.** Poster presentation. *Spatial interactions between elk and big game hunting guides*. TWS National Annual Conference. Reno, Nevada, USA.
- Smith\*\*, B.J., D. MacNulty, and **T. Avgar.** Oral presentation. *Linking individual movement behavior with demographic patterns in a multi-prey, multi-predator system*. The Ecology Center's MacArthur Academy Meeting. Logan, Utah, USA.
- Newediuk\*, L.J., C.M. Prokopenko\*, **T. Avgar**, and E. Vander Wal. Oral presentation. *Animal movement behaviour reveals fine-scale relationships between resources and conspecific density in complex landscapes*. CSEE Annual Conference. Fredericton, Nova Scotia, Canada.
- 2018 **T. Avgar.** Invited short lecture. *Adaptive patterns of habitat selection vary with resource availability and competitor density*. The Ecology Center's Interdisciplinary Research Forum. Logan, Utah, USA.
- T. Avgar.** Invited short lecture. *Integrated Step Selection Analysis (iSSA): bridging the gap between habitat selection and animal movement*. SSC annual meeting. Montreal, Quebec, Canada.
- T. Avgar.** Short lecture. *Adaptive patterns of habitat selection vary with resource availability and competitor density*. CSEE Annual Meeting. Guelph, Ontario, Canada.
- T. Avgar.** Short lecture. *Connecting dots to lines: using integrated Step Selection Analysis (iSSA) to understand the impacts of linear features on wildlife*. NACCB. Toronto, Ontario, Canada.
- Prokopenko\*, C., **T. Avgar**, A. Ford, and E. Vender Wal. Invited oral presentation. *Trait-mediated functional response: antipredator traits drive prey switching in multi-prey systems*. CSEE Annual Conference. Guelph, Ontario, Canada.
- Prokopenko\*, C.M., **T. Avgar**, A. Ford, and E. Vander Wal. Oral presentation. *Wolf predation in a multi-prey system*. CSEE Annual Conference. Guelph, Ontario, Canada.

## Journal Review Activities

- ⊕ American Naturalist (3)
- ⊕ Animal Behaviour (4)
- ⊕ Animal Conservation (1)
- ⊕ Basic and Applied Ecology (1)
- ⊕ Behavioral Ecology (5)
- ⊕ Biological Conservation (2)
- ⊕ Biological Reviews (1)
- ⊕ Conservation Biology (1)
- ⊕ Ecology (4)
- ⊕ Ecology Letters (11)
- ⊕ Ecology and Evolution (1)
- ⊕ Ecological Applications (2)
- ⊕ Ecological Modelling (1)
- ⊕ Ecological Monographs (2)
- ⊕ Forest Ecology and Management (1)
- ⊕ Functional Ecology (3)
- ⊕ Global Ecology and Conservation (1)
- ⊕ Israeli Journal of Ecology and Evolution (1)
- ⊕ Journal of Animal Ecology (10)
- ⊕ Journal of Applied Ecology (1)
- ⊕ Journal of Biological Research (1)
- ⊕ Journal of Ecology (1)
- ⊕ Journal of Mammalogy (1)
- ⊕ Journal of Mathematical Biology (1)
- ⊕ Journal of the Royal Society Interface (1)
- ⊕ Journal of Wildlife Management (1)
- ⊕ Methods in Ecology and Evolution (6)
- ⊕ Movement Ecology (4)
- ⊕ Oecologia (3)
- ⊕ Oikos (2)
- ⊕ Philosophical Transactions of the Royal Society B (1)
- ⊕ PLoS ONE (2)
- ⊕ Proceedings of the Royal Society B (1)
- ⊕ Royal Society Open Science (2)
- ⊕ Science (1)
- ⊕ Scientific Reports (3)
- ⊕ Theoretical Ecology (1)
- ⊕ Wildlife Biology (1)

## Editorial Activities

- 2021-2022 Topic editor (together with E. Gurarie), *Cognitive Movement Ecology*, Frontiers in Ecology and Evolution.

## Funding Review Activities

- 2020-2021 National Science Foundation panelist
- 2019 Undergraduate Research and Creative Opportunities grants, Utah State University
- 2018 Deutsche Forschungsgemeinschaft (German Research Foundation)

## USU Service Activities

- 2020-2022 Panelist, USU's Hearing Council  
Alternate Faculty Senator, Quinney College of Natural Resources

## Professional Service Activities

- 2021-2022 Education-committee member, The Wildlife Society's Nutritional Ecology Working Group
- 2021-2023 Elected board member, Utah chapter of The Wildlife Society