8/25 Intro to Movement Ecology

Nathan R, Getz WM, Revilla E, Holyoak M, Kadmon R, Saltz D, and Smouse PE (2008) A movement ecology paradigm for unifying organismal movement research. PNAS 105:19052–19059.

Joo R, Picardi S, Boone ME, Clay TA, Patrick SC, Romero-Romero VS, and Basille M (2022) Recent trends in movement ecology of animals and human mobility. Movement Ecology 10:26.

9/1 No Class – Labor Day

9/8 Big Movement Datasets

Tucker MA et al (2018) Moving in the Anthropocene: global reductions in terrestrial mammalian movements. Science 359:466–469.

Davidson SC et al (2020) Ecological insights from three decades of animal movement tracking across a changing Arctic. Science 370:715–715.

Kays et al (2022) The Movebank system for studying global animal movement and demography. Methods in Ecology and Evolution 13:419–431.

9/15 Visual Observations of Movement Tracks

Kareiva PM, and Shigesada N (1983) Analyzing insect movement as a correlated random walk. Oecologia 56:234–238.

Valera A, and Byrn RW (2007) Spider monkey ranging patterns in Mexican subtropical forest: do travel routes reflect planning? Animal Cognition 10:305–315.

Gielen MC et al (2025) Refining population density estimation from track counts: improving daily travel distance estimates through trailing of large herbivores in the Kalahari, Botswana. Movement Ecology 13:53.

9/22 Home Range Estimation

Fieberg J, and Borger L (2012) Could you please phrase "home range" as a question? Journal of Mammalogy 93:890–902.

Fleming CH, Fagan WF, Mueller T, Olson KA, Leimgruber P, and Calabrese JM (2015) Rigorous home range estimation with movement data: a new autocorrelated kernel density estimator. Ecology 96:1182–1188.

Jacobson OT, Crofoot MC, Perry S, Hench K, Barrett BJ, and Finerty G (2024) The importance of representative sampling for home range estimation in field primatology. International Journal of Primatology 45:213–245. (***Student Selection***)

9/29 Identifying Behaviors I: MRW & HMM

Morales JM, Haydon DT, Frair J, Holsinger KE, and Fryxell JM (2004) Extracting more out of relocation data: building movement models as mixtures of random walks. Ecology 85:2436–2445.

McClintock BT and Michelot T (2018) momentuHMM: R package for generalized hidden Markov models of animal movement. Methods in Ecology and Evolution 9:1518–1530.

Guzman HM, and Esteves RM (2025) Movement behavior of a blue whale between the Galapagos Archipelago and the Frontal System off Baja California Peninsula. Marine Mammal Science 41:e13230. (***Student Selection***)

10/6 Identifying Behaviors II: Change Points

Gurarie E, Bracis C, Delgado M, Meckley TD, Kojola I, and Wagner MC (2015) What is the animal doing? Tools for exploring behavioural structure in animal movements. Journal of Animal Ecology 85:69–84.

Gurarie E, Fleming CH, Fagan WH, Laidre KL, Hernandez-Pliego J, and Ovaskainen O (2017) Correlated velocity models as a fundamental unit of animal movement: synthesis and application. Movement Ecology 5:13

Gundermann KP, Diefenbach DR, Walter WD, Corondi AM, Banfield JE, Wallingford BD, Stainbrook DP, Rosenberry CS, and Buderman FE (2023) Change-point models for identifying behavioral transitions in wild animals. Movement Ecology 11:65. (***Student Selection***)

10/13 No Class – Fall Break

10/20 RSFs and SSFs

Johson DH (1980) The comparison of usage and availability measurements for evaluating resource preference. Ecology 61:65–71.

Thurfjell J, Ciuti S, and Boyce MS (2014) Applications of step-selection functions in ecology and conservation. Movement Ecology 2:4.

Dugal CJ, van Beest FM, Vander Wal E, and Brook RK (2013) Targeting hunter distribution based on host resource selection and kill sites to manage disease risk. Ecology and Evolution 3:4265–4277. (***Student Selection***)

10/27 Migration

Jesmer BR et al (2018) Is ungulate migration culturally transmitted? Evidence of social learning from translocated animals. Science 361:1023–1025.

Merkle JA, Gage J, Sawyer H, Lowrey B, and Kauffman MJ (2022) Migration Mapper: identifying movement corridors and seasonal ranges for large mammal conservation. Methods in Ecology and Evolution 13:2397–2403.

Sawyer H, Kauffman MJ, Nielson RM, and Horne JS (2009) Identifying and prioritizing ungulate migration routes for landscape-level conservation. Ecological Applications 19:2016–2025. (***Student Selection***)

11/3 Encounter Rates

Gurarie E and Ovaskainen O (2013) Towards a general formalization of encounter rates in ecology. Theoretical Ecology 6:189–202.

Long JA, Webb SL, Harju SM, and Gee KL (2021) Analyzing contacts and behavior from high frequency tracking data using the wildlifeDI R package. Geographical Analysis 54:648–663.

Alegre VB, Oshima JEdF, Kanda CZ, Jorge MLSP, Keuroghlian A, Morato RG, Ribeiro MC, and Borger L (2025) Predator–prey movement interactions: jaguars and peccaries in the spotlight. Biotropica 57:e13423. (***Student Selection***)

11/10 Biologgers

Williams HJ et al. (2019) Optimizing the use of biologgers for movement ecology research. Journal of Animal Ecology 89:186–206.

Conners MG, Michelot T, Heywood EI, Orben RA, Phillips RA, Vyssotski AL, Shaffer SA, and Thorne LH (2021) Hidden Markov models identify major movement modes in accelerometer and magnetometer data from four albatross species. Movement Ecology 9:7.

Muramatsu D, Vidal LV, Costa ER, Yoda K, Yabe T, and Gordo M (2022) Low-cost thermoregulation of wild sloths revealed by heart rate and temperature loggers. Journal of Thermal Biology 110:103387. (***Student Selection***).

11/17 Movement Corridors (Conservation/Fragmentation)

Aikens EO, Merkle JA, Xu W, and Sawyer H (2025) Pronghorn movements and mortality during extreme weather highlight the critical importance of connectivity. Current Biology 35:1927–1934.

Hilty JA, Chester CC, Wright PA, Zenkewich K (2024) Uniting hearts and lands: advancing conservation and restoration across the Yellowstone to Yukon region. Frontiers in Conservation Science 4:2023.

Brennan A, Beytell P, Aschenborn O, Du Preez P, Funston PJ, Hanssen L, Kilian JW, Stuart-Hill G, Taylor RD, and Naidoo R (2020) Characterizing multispecies connectivity across a transfrontier conservation landscape. Journal of Applied Ecology 57:1700–1710. (***Student Selection***)

11/24 No Class – Thanksgiving Break

12/1 Automated Radio Telemetry Systems

Taylor PD et al. (2017) The Motus Wildlife Tracking System: a collaborative research network to enhance the understanding of wildlife movement. Avian Conservation and Ecology 12:8.

Wallace G, Elden M, Boucher R, and Phelps S (2021) An automated radiotelemetry system (ARTS) for monitoring small mammals. Methods in Ecology and Evolution 13:976–986.

Tran VT, Vitz AC, Bakermans MH (2024) Evaluating habitat-specific interference in automated radio telemetry systems: implications for animal movement studies. Animal Biotelemetry 12:12. (***Student Selection***)

12/8 Final Presentations for Lab Students