

Bethany L McGregor

Research Entomologist
USDA-Agricultural Research Service
Center for Grain and Animal Health Research
Arthropod-borne Animal Diseases Research Unit

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Educational Background:

- 2019 *Doctor of Philosophy, Entomology*
University of Florida: Florida Medical Entomology Laboratory
“Ecology of *Culicoides* biting midges and their role as vectors of epizootic hemorrhagic disease virus on Florida big game preserves”
- 2015 *Master of Science, Biology*
University of Louisiana–Monroe
“Inter Simple Sequence Repeats (ISSR) as genetic markers for *Elimia potosiensis* and other pleurocerid snails”
- 2012 *Bachelor of Science, Wildlife and Fisheries Science*
Wildlife Management Concentration
Minors in Forestry and Biological Sciences
University of Tennessee–Knoxville

Courses Taught:

Dodd Short Courses, Florida Mosquito Control Association:

Introduction to *Culicoides* ecology, Classroom, 1 occurrence (2019)

University of Florida, Graduate Assistant:

ENY 4905/6905: Ecology of Vector-borne Disease, Online, 3 semesters

ENY 4660/6665: Medical and Veterinary Entomology, Online, 3 semesters

University of Louisiana, Monroe-Graduate Teaching Assistant:

Biol 1016: Fundamentals of Anatomy and Physiology Lab I, Classroom, 2 semesters

Biol 1017: Fundamentals of Anatomy and Physiology Lab II, Classroom, 2 semesters

Research history:

- May 2020-Present **Research Entomologist:** Investigating various aspects of the ecology of North American *Culicoides* biting midge species, especially in the Great Plains region of the US. This program is aimed at not only investigating these aspects as they pertain to *Culicoides sonorensis*, the confirmed vector of bluetongue virus and epizootic hemorrhagic disease virus, but also identification of additional putative vector species through compelling ecological data. Ongoing studies include investigating seasonality of midges on agricultural and wild lands in northeast Kansas, comparing *Culicoides* communities associated with different livestock host species, and studying larval habitat characteristics of diverse midge species.
- June 2019-May 2020 **ORISE Postdoctoral Fellow:** This position was funded through the Oak Ridge Institute of Science and Education and was conducted at the Centers for Disease Control and Prevention in Fort Collins, Colorado. Primary research objectives included surveillance of a novel *Aedes aegypti* population in Las Vegas with the purpose of developing a control plan to reduce or eradicate the local *Ae. aegypti* population. Additional research included laboratory infection studies to investigate the potential for Oropouche virus to infect local mosquito and *Culicoides* species as well as infection studies investigating the impact of fluctuating temperatures on West Nile virus infections in mosquitoes.
- Aug 2018-May 2019 **Research Grant:** Studied the effects of pesticides on target and non-target organisms as part of a grant written in conjunction with PI Dr. Nathan Burkett-Cadena. Performed CDC bottle bioassays on *Aedes aegypti*, *Culex quinquefasciatus*, and *Bombus impatiens* individuals to determine comparative toxicity to target and non-target organisms. Also performed field application trails in conjunction with the Indian River Mosquito Control District to test the acute and chronic effects of pesticides to non-target organisms including *Bombus impatiens*, *Plecia nearctica*, and *Danaus plexippus*.
- May 2015-May 2019 **PhD Research:** Studied ecology of *Culicoides* biting midges at a big game preserve and neighboring Lake Talquin State Forest in Gadsden county, FL. Collections were made with CDC miniature light traps with LED blacklight arrays as well as directly from tame white-tailed deer using a battery powered aspirator. Research projects included: 1) investigating host use by *Culicoides* using PCR based blood meal analysis to infer preference and avoidance of big game species, 2) Using CDC traps in the tree canopy and on the ground to monitor *Culicoides* presence at different heights, 3) Collecting *Culicoides* on big game preserve and state forest grounds to compare *Culicoides* abundance on lands possessing artificially high numbers of animals to more natural

landscapes, 4) performing vector competency studies for epizootic hemorrhagic disease virus (EHDV) on wild and colonized *Culicoides* species, 5) performing virus detection in pools of *Culicoides* collected during an active EHDV outbreak to implicate new *Culicoides* vectors in the Florida panhandle.

May 2013- May
2015

M.S. Research: Collected snails from locations in Louisiana, Arkansas, and Oklahoma. Performed DNA extraction on each individual, purified and diluted each sample, ran PCR utilizing 4 simple sequence repeat primers, and ran polyacrylamide gel electrophoresis. The objective was to determine whether inter simple sequence repeats (ISSR) can be successfully used in gastropod population genetic analysis, specifically with species in the family Pleuroceridae. Completed as a thesis study for an M.S. degree from the University of Louisiana, Monroe.

Grants:

Employing color-changing nanomaterials to improve vector-borne disease surveillance.

Laurene Tetard, PI; Bethany McGregor, PI. Research Corporation for Science Advancement. Scialog: Mitigating Zoonotic Threats 2021. Awarded \$50,000/PI (\$100,000 award total).

Enabling comprehensive immunoprofiling in animals through a combination of xenosurveillance and highly-multiplexed serology. Bethany McGregor, PI; Paola Boggiatto, PI; Jason Ladner, PI. Research Corporation for Science Advancement. Scialog: Mitigating Zoonotic Threats 2021. Awarded \$50,000/PI (\$150,000 award total).

Non-target effects of pesticides on native pollinators of Florida. Bethany L. McGregor, Author. Nathan Burkett-Cadena, PI. Florida Department of Agriculture and Consumer Services RFP Mosquito Control 2018-2019 cycle. Awarded \$69,717 grant.

Publications:

McGregor BL, Kenney JL, Connelly CR. 2021. The effect of fluctuating incubation temperatures on West Nile virus infection in *Culex* mosquitoes. *Viruses* 13(9): 1822. DOI: 10.3390/v13091822

Humphreys JM, Pelzel-McCluskey AM, Cohnstaedt LW, **McGregor BL**, Hanley KA, Hudson AR, Young KI, Peck D, Rodriguez LL, Peters DPC. 2021. Integrating spatiotemporal epidemiology eco-phylogenetics, and distributional ecology to assess West Nile disease risk in horses. *Viruses* 13(9): 1811. DOI: 10.3390/v13091811

McGregor BL, Rozo, Lopez P, Davis TM, Drolet BS. 2021. Detection of vesicular stomatitis virus Indiana from insects collected during the 2020 outbreak in Kansas, USA. *Pathogens* 10(9): 1126. DOI: 10.3390/pathogens10091126

- Dinh E, Gómez JP, Orange J, Morris MA, Sayler K, **McGregor BL**, Blosser EM, Burkett-Cadena ND, Wisely SM, Blackburn JK. 2021. Modeling abundance of *Culicoides stellifer*, a candidate Orbivirus vector, indicates nonrandom hemorrhagic disease risk for white-tailed deer (*Odocoileus virginianus*). *Viruses* 13(7): 1328.
- McGregor BL**, Erram D, Alto BW, Lednicky JA, Wisely SM, Burkett-Cadena ND. 2021. Vector competence of Florida *Culicoides insignis* (Diptera: Ceratopogonidae) for epizootic hemorrhagic disease virus serotype-2. *Viruses* 13(3): 410.
- McGregor BL**, Kenney J, Connelly CR. 2021. Infection, dissemination, and transmission potential of North American *Culex quinquefasciatus*, *Culex tarsalis*, and *Culicoides sonorensis* for Oropouche Virus. *Viruses* 13(2): 226.
- Giordano BV, **McGregor BL**, Runkel IV AE, Burkett-Cadena ND. 2020. Distance diminishes the effect of Deltamethrin exposure on the monarch butterfly, *Danaus plexippus*. *Journal of the American Mosquito Control Association* 36(3): 181-188.
- McGregor BL**, Giordano B, Runkel IV AE, Nigg H, Nigg L, Burkett-Cadena N. 2020. Comparison of the effect of insecticides on bumble bees (*Bombus impatiens*) and mosquitoes (*Aedes aegypti* and *Culex quinquefasciatus*) by standard mosquito research methods. *Journal of Economic Entomology* 114(1): 24-32.
- Quaglia AI, Blosser EM, **McGregor BL**, Runkel AE IV, Sloyer KE, Erram D, Wisely SM, Burkett-Cadena ND. 2020. Tracking community timing: pattern and determinants of seasonality in *Culicoides* (Diptera: Ceratopogonidae) in northern Florida. *Viruses* 12(9): 931.
- McGregor BL**, Blackburn JK, Wisely SM, Burkett-Cadena ND. 2020. *Culicoides* (Diptera: Ceratopogonidae) communities differ between a game preserve and nearby natural areas in northern Florida. *Journal of Medical Entomology* 58(1): 450-457.
- McGregor BL** and Connelly CR. 2020. A review of the control of *Aedes aegypti* (Diptera: Culicidae) in the continental United States. *Journal of Medical Entomology* 58(1): 10-25.
- Shults P, Ho A, Martin EM, **McGregor BL**, Vargo EL. 2020. Genetic diversity of *Culicoides stellifer* (Diptera: Ceratopogonidae) in the Southeastern United States compared with sequences from Ontario, Canada. *Journal of Medical Entomology* 57(4): 1324-1327.
- McGregor BL**, Sloyer KE, Sayler KA, Goodfriend O, Krauer JMC, Acevedo C, Zhang X, Mathias D, Wisely SM, Burkett-Cadena ND. 2019. Field data implicating *Culicoides stellifer* and *Culicoides venustus* (Diptera: Ceratopogonidae) as vectors of epizootic hemorrhagic disease virus. *Parasites & Vectors* 12: 258. DOI: 10.1186/s13071-019-3514-8.

McGregor BL, Erram D, Acevedo C, Alto BW, Burkett-Cadena ND. 2019. Vector competence of *Culicoides sonorensis* (Diptera: Ceratopogonidae) for epizootic hemorrhagic disease virus serotype 2 strains from Canada and Florida. *Viruses* (11): 367.

McGregor B, Burkett-Cadena N, Lucky A. 2019. Grass-like mantid. University of Florida Entomology & Nematology Department. Featured Creatures. Available at: http://entnemdept.ufl.edu/creatures/MISC/grass_mantid.html

Sloyer KE, Burkett-Cadena ND, Yang A, Corn JL, Vigil SL, **McGregor BL**, Wisely SM, Blackburn JK. 2018. Ecological niche modeling the potential geographic distribution of four *Culicoides* species of veterinary significance in Florida. *PLoS One* 14(2): e0206648.

McGregor BL, Runkel IV AE, Wisely SM, Burkett-Cadena ND. 2018. Vertical stratification of *Culicoides* biting midges at a Florida big game preserve. *Parasites & Vectors* (11): 505.

McGregor BL, Stenn T, Sayler KA, Blosser EM, Blackburn JK, Wisely SM, Burkett-Cadena ND. 2018. Host use patterns of *Culicoides* spp. biting midges at a big game preserve in Florida, USA, and implications for the transmission of Orbiviruses. *Medical and Veterinary Entomology* 33(1): 110-120.

Minton RL, **McGregor BL**, Hayes DM, Paight C, Inoue K. 2017. Genetic structuring in the Pyramid Elimia, *Elimia potosiensis* (Gastropoda: Pleuroceridae), with implications for pleurocerid conservation. *Zoosystematics and Evolution* 93(2): 437-449.

Book Chapters:

Drolet B, **McGregor B**, Cohnstaedt L, Wilson W, McVey DS. Chapter 63: Reoviridae. In: *Veterinary Microbiology*, 4th Ed. In Print.

Presentations:

McGregor BL, Davis TM, Ruder MG, Pfannenstiel B. 2021. Mud, manure, and midges: Investigating the larval ecology of *Culicoides* biting midges in Kansas. Entomological Society of America Annual Meeting (Virtual). Invited speaker.

McGregor BL, Erram D, Acevedo C, Alto BW, Burkett-Cadena ND. 2019. Comparative vector competence of *Culicoides sonorensis* for two strains of EHDV-2. Society for Vector Ecology 49th Annual Conference. Invited speaker.

McGregor BL, Sloyer KS, Sayler KA, Goodfriend O, Campos J, Acevedo C, Zhang X, Mathias D, Wisely S, Burkett-Cadena ND. 2018. Implicating *Culicoides* spp. (Diptera: Ceratopogonidae) vectors in the transmission of epizootic hemorrhagic disease virus in Florida. Entomological Society of America Joint Annual Meeting.

- McGregor BL**, Sloyer KS, Sayler KA, Goodfriend O, Campos J, Acevedo C, Zhang X, Mathias D, Wisely S, Burkett-Cadena ND. 2018. Field data implicating *Culicoides stellifer* and *Culicoides venustus* as vectors of epizootic hemorrhagic disease virus. 1st Annual John Beidler Symposium.
- McGregor BL**, Runkel IV AE, Wisely SM, Burkett-Cadena ND. 2017. Effect of trap height on *Culicoides* (Diptera: Ceratopogonidae) abundance, physiological status, and species composition at a big game preserve in Florida, USA. Florida Mosquito Control Association 89th Annual Meeting.
- McGregor BL**, Runkel IV AE, Wisely SM, Burkett-Cadena ND. 2017. Effect of trap height on *Culicoides* (Diptera: Ceratopogonidae) abundance, physiological status, and species composition at a big game preserve in Florida, USA. Society for Vector Ecology 7th International Congress.
- McGregor BL**, Stenn T, Runkel IV AE, Burkett-Cadena ND, Sayler K, Wisely SM, Blackburn J. 2017. Ecology of host-seeking *Culicoides* spp. biting midges at a big game preserve in Gadsden County, FL. Cervidae Health Research Initiative 1st Annual Science Symposium.
- McGregor BL**, Burkett-Cadena ND, Stenn T, Wisely S, Sayler K, Blackburn J. 2016. Host utilization by *Culicoides* biting midges at a captive deer preserve in Florida. Society for Vector Ecology 47th Annual Conference.
- McGregor BL**, Stenn T, Burkett-Cadena ND. 2016. Host utilization of no-see-ums (*Culicoides* spp.) at a big game preserve in the Florida panhandle. Florida Mosquito Control Association 88th annual meeting.

Posters:

- McGregor BL**, Sloyer KS, Sayler KA, Goodfriend O, Acevedo C, Wisely S, Burkett-Cadena N. 2018. Implicating *Culicoides* spp. vectors in the transmission of epizootic hemorrhagic disease virus in Florida. 2018 Society for Vector Ecology Annual Conference.
- McGregor BL**, Sloyer K, Sayler KA, Goodfriend O, Acevedo C, Wisely S, Burkett-Cadena N. 2018. Implicating *Culicoides* spp. vectors in the transmission of epizootic hemorrhagic disease virus in Florida. 2018 Wildlife Disease Association Conference.
- McGregor B**, Stenn T, Sayler K, Blosser E, Blackburn J, Wisely S, Burkett-Cadena N. 2017. Host preferences for white-tailed deer and other big game by suspected vectors of hemorrhagic disease viruses on a Florida big game preserve. 2017 Wildlife Disease Association International Congress.

Sayler KA, Blosser E, **McGregor B**, Burkett-Cadena N, Wisely SM. 2016. Overwintering of epizootic hemorrhagic disease virus in white-tailed deer in Florida, USA: Unanticipated seroconversion and the case for alternative vectors. International Meeting on Emerging Diseases and Surveillance 2016. Abstract available at: International Journal of Infectious Diseases 53S: 66-67.

Alonzo FL, Creech CC, Graham DL, Hufford EL, Jones JD, **McGregor BL**, Meyer AD, Madedor OJ, Mohamed LA, Rivera OJ, Simmons CM, Turner AM, Minton RL. 2014. Diversity of soil bacteria from a managed wildlife refuge in northeastern Louisiana. Louisiana Academy of Sciences.

Professional Services:

- Chair of the Communications Committee for the Entomological Society of America's Medical, Urban, and Veterinary Entomology (ESA MUVE) section, 2020-Present
- Leader of the MUVE Mentorship Network initiative through the ESA MUVE section which established a mentoring program for members of MUVE Professions, 2020-Present
- Founding member and secretary for the Treasure Coast Graduate Student Organization, 2018-19
- Student representative to the governing board of the Society for Vector Ecology, 2018-19
- Organizer and moderator for the student symposium at the Society for Vector Ecology 49th annual conference
- Co-organizer and moderator for the North American student symposium at the 7th International Society for Vector Ecology conference in Palmas de Mallorca, Spain, 2017
- Scientific reviewer: *Journal of Medical Entomology*, *Viruses*, *Insects*, *Acta Tropica*, *Microorganisms*, *Pathogens*, *Medical and Veterinary Entomology*, *Parasites & Vectors*, *International Journal of Environmental Research and Public Health*, *Scientific Reports*

Professional Associations:

- American Mosquito Control Association (2018-present)
- Entomological Society of America (2015-present)
- The Society for Vector Ecology (2015-present)
- Wildlife Disease Association (2012-present)
- The Wildlife Society (2011-present)
 - The Wildlife Society Wildlife Diseases Working Group (2012-present)
 - The Wildlife Society Early Career Professionals Working Group (2020-present)

Honors:

- Named as a Scialog fellow to participate in the Scialog: Mitigating Zoonotic Threats, cosponsored by the Research Corporation for Science Advancement and the USDA.
- Awarded the “Award of Excellence for Graduate Research” and “Outstanding PhD Student Award” by the University of Florida Entomology and Nematology Department in 2019
- Recognition of service award from the Society for Vector Ecology awarded in 2018
- Winner of the first annual John Beidler FMEL Graduate Student Symposium, \$500 award
- Awarded the A.S. Herlong, Sr. Scholarship by the College of Agricultural and Life Sciences at the University of Florida in 2018.
- Received a \$1,400 travel grant from the Society for Vector Ecology to attend and present at the 2017 annual meeting in Palmas de Mallorca, Spain.
- Received a \$300 travel grant from the Society for Vector Ecology to attend and present at the 2016 annual meeting in Anchorage, Alaska