Hannah S. Tiffin (née Greenberg), M.S.

# Education

**PhD** The Pennsylvania State University, Entomology & INTAD Expected: May 2022

Dual Title: Entomology and International Agriculture and Development (INTAD) GPA: 3.9/4.0

Dissertation: Ecology of Sarcoptic Mange in Pennsylvania’s Black Bear Population

Advisor: Dr. Erika T. Machtinger

**MS** Texas Tech University, Environmental Toxicology May 2018

Thesis: Species Distribution Modelling of *Aedes aegypti* and *Aedes albopictus* GPA: 4.0/4.0

in the United States with an Emphasis on Current and Predicted Distribution in Texas

Advisor: Dr. Steven M. Presley

Graduated *Summa cum laude*

**BS** Shippensburg University of Pennsylvania, Geography & Biology May 2015

Geography: Human-Environmental Studies; Biology: Ecology and the Environment GPA: 3.7/4.0

Honors Program Graduate, Deans List 2010 - 2015

Graduated *Magna cum laude*

**Study Abroad** Council on International Educational Exchange (CIEE) Program Fall 2012

Sustainability and the Environment; Monteverde, Costa Rica

Internship*:* Developed grey water treatment system at Bajo del Tigre Visitor Center

Presented at Internship Symposium held for Monteverde Community in English and Spanish

Home-stay with a Costa Rican family, including acquisition of Spanish language skills

# Awards & Professional Recognition

**Harold F. Martin Graduate Assistant Outstanding Teaching Award, Nominee** 2020

*“Recognizes graduate assistants for outstanding teaching performance.”*

**ESA 1st Place, Student Competition for the President’s Prize** 2020

Awarded 1st place in the student competition for oral presentation of research at the Entomological Society of America (ESA) 2020 Conference, in the category *Grad 10-minute: Medical, Urban, and Veterinary Entomology (MUVE), Ticks*.

**Michael Duke Memorial Award** 2020

“*The purpose of this award shall be to honor and recognize outstanding academic achievement and given to graduate students enrolled in the Entomology Department who have exhibited exemplary leadership and academic qualities*.”

**Vartkes Miroyan Memorial Award** 2020

“*Established to recognize graduate students enrolled in the entomology graduate program who have achieved exemplary academic achievement and leadership qualities*.”

**Evans Family Award for Graduate Student Extension Achievement, Nominee**  2020

“*The purpose of this award is to recognize graduate students who are excelling in extension educational programming*.”

**ESA 1st Place, Student Competition for the President’s Prize** 2019

Awarded 1st place in the student competition for oral presentation of research at the Entomological Society of America (ESA) 2019 Conference, in the category *Grad 10-minute: Medical, Urban, and Veterinary Entomology (MUVE), Disease Transmission*.

**Vartkes Miroyan Memorial Award** 2019

“*Established to recognize graduate students enrolled in the entomology graduate program who have achieved exemplary academic achievement and leadership qualities*.”

**Texas Tech University YouthMappers Story Map Competition, 3rd Place, $800** 2018

Team Lead. Story map entitled *The Future is Female* earned third place in the Communicating in a Global Society Competition to create informative and interactive story maps using ESRI technology. Travel scholarship awarded to each individual on this team.

**Preston and Ima Smith Graduate Fellowship**  AY 2017 – 2018

Awarded for research with a direct influence in West Texas.

**U.S. Peace Corps, Community Health Volunteer** 2016

Chosen for highly selective position with the U.S. Peace Corps in March 2015. Stationed in Senegal as a Community Health Volunteer in February 2016.

**National Education of Women (NEW) Conference, Nominee** 2012

Nominated for an *“intensive residential leadership and public policy institute designed to educate and empower young women for future political participation and leadership.”*

***Scholarships and Awards for Conferences and Travel***

**ESA MUVE Student Travel Award** 2019

The Entomological Society of America (ESA) recognizes five students that “*demonstrated excellence in Medical, Urban and Veterinary Entomology*” (MUVE) with this award.

**WAAVP 2019 Conference Student Travel Award**  2019

The World Association for the Advancement of Veterinary Parasitology (WAAVP) awards travel grants to aid in student travel for those presenting at the WAAVP Conference.

**AMCA Young Professionals Industry Shadowing Program**  2018

The American Mosquito Control Association’s Young Professional program awards a select number of awards to early career professionals and students to shadow an industry professional and cover conference expenses. Industry Shadow Partner: AMVAC

**Conference Travel Funding, Graduate School of Texas Tech University** 2017

Awarded to support conference travel for graduate students presenting original research.

**Energypath Conference and Exposition, Scholarship Recipient** 2014

All-expenses-paid to attend conference on sustainable energy solutions, with a breakout workshop on biomass energy production; Albright College, PA

**Energypath Conference and Exposition, Scholarship Recipient** 2013

All-expenses-paid to attend conference on sustainable energy solutions, with a breakout workshop on micro-hydro energy production; Villanova University, PA

# Grant Funding Received

**National Center for Veterinary Parasitology**  Sept. 2018

“Genetic Analysis of *Sarcoptes scabiei* in Pennsylvania Black Bears and Canids”

Scope changed due to COVID-19 lab restrictions preventing genetic analysis.

New scope, approved: “Differences in Disease Manifestation to *Sarcoptes scabiei* between historical hosts, canids, and novel hosts, black bears in Pennsylvania.” Funded: $13,864

**Shippensburg University Undergraduate Research Grant Program** Nov. 2014

“Prevalence of *Trichinella* sp. Infections in the American Black Bear, *Ursus americanus*, in Pennsylvania”

Funded: $1,348.25 (UGR2014/2015-52)

**Shippensburg University Undergraduate Research Grant Program**  Nov. 2014

“Extraction of Hydrocortisone from Human Saliva as an Indicator of Positive and Negative Stress Levels”

Funded: $1,456.75 (UGR2014/2015-32)

**Shippensburg University Undergraduate Research Grant Program**  Nov. 2013

“Prevalence of *Trichinella* sp. Infections in the American Black Bear, *Ursus americanus*, in Pennsylvania”

Funded: $1,451.40 (UGR2013/2014-69)

**Shippensburg University Undergraduate Research Grant Program**  Nov. 2013

“Extraction of Hydrocortisone from Human Saliva as an Indicator of Positive and Negative Stress Levels”

Funded: $2,002.56 (UGR2013/2014-78)

# Professional Publications

***Peer-Reviewed Publications***

Peper, S.T., Hoffarth, A., Athanasiou, K., Hawkins, S.L., Wilson-Fallon, A.N., Gibson, A., Reinoso Webb, C., Gaskamp, J.A., Webb, S.L, Haydett, K.M., **Tiffin, H.S.**, and Presley, S.M. 2021. *Brucella* spp. and *Francisella tularensis* from an Invasive Alien Species (*Sus scrofa*) in the Southcentral United States. *Ecosphere,* 12(3):e03426. doi: 10.1002/ecs2.3426

**Tiffin, H.S.**, Cockerill, R., Brown, J., Machtinger, E.T. 2020. A Tissue Digestion Protocol for Measuring *Sarcoptes scabiei* (Astigmata: Sarcoptidae) Density in Skin Biopsies. *Journal of Insect Science*, 20(6): 20; 1-6. doi: 10.1093/jisesa/ieaa105

Fedele, K., Poh, K.C., Brown, J.E., Jones, A., Durden, L.A., **Tiffin, H.S**., Pagac, A., Li, A.Y., Machtinger, E.T. 2020. Host distribution and pathogen infection of fleas (Siphonaptera) recovered from small mammals in Pennsylvania. *Journal of Vector Ecology*, 45(1), 32-44. doi: 10.1111/jvec.12371

**Tiffin, H.S.**, Peper, S.T., Wilson-Fallon, A.N., Haydett, K.M., Cao G., and Presley, S.M. 2019. The Influence of New Surveillance Data on Predictive Species Distribution Modeling of *Aedes aegypti* and *Aedes albopictus* in the United States. *Insects,* 10(11). doi: 10.3390/insects10110400

**Greenberg, H.S.**, Wilson-Fallon, A.N., Peper, S.T., Haydett, K.M., and Presley, S.M. 2019. New Records of *Aedes aegypti* and *Aedes albopictus* in Eight Texas Counties, U.S.A. *Journal of Vector Ecology,* 44(1), 199-200*.* doi: 10.1111/jvec.12345

Peper, S.T., Dawson, D.E., Dacko, N., Athanasiou, K., Hunter, J., Loko, F., Almas, S., Sorensen, G.E., Urban, K.N., Wilson-Fallon, A.N., Haydett, K.M., **Greenberg, H.S.**,Gibson, A.G., and Presley, S.M. 2018. Predictive Modeling for West Nile Virus and Mosquito Surveillance in Lubbock, Texas. *Journal of the American Mosquito Control Association*, 34(1), 18-24. doi: 10.2987/17-6714.1

Peper, S.P., Wilson-Fallon, A., Haydett, K., **Greenberg, H.,** and Presley, S.M. 2017. First Record of Aedes Aegypti and Aedes Albopictus in Thirteen Panhandle Region Counties of Texas, U.S.A. *Journal of Vector Ecology*, 42(2), 352–354. doi:10.1111/jvec.12276

***In preparation, peer-reviewed publications***

**Tiffin, H.S.**, Machtinger, E.T. Tick abundance and life-stage segregation on the American Black Bear (*Ursus americanus*). Target Journal: International Journal for Parasitology: Parasites and Wildlife, 2021.

Wilson-Fallon AN, **Tiffin HS**, Peper ST, Haydett KM, Rendon B, McConnel G, Luna S, Presley SM. CDC bottle bioassay: time-mortality comparison between male and female *Aedes aegypti* and *Aedes albopictus*.

Wilson-Fallon AN, **Tiffin HS**, Peper ST, Haydett KM, Rendon B, McConnel G, Luna S, Presley SM. Insecticide resistance survey of *Aedes aegypti* and *Aedes albopictus* in Texas Counties.

***Science Communication Publications***

**Tiffin, H.S.**\* and Kansman, J.\* 2021. Engaging with the public through “pub science.” *American Entomologist: Signals column.* Invited to contribute for Fall 2021 edition, title may change. \*Joint first authorship

**Tiffin, H.S.** Itching to know more about bear mange? *Keystone Wardens Magazine.* Invited to contribute for Spring/Summer 2021 edition, title may change*.*

**Tiffin, H.S.** 2021.Using integrated pest management and One Health concepts for the safe re-opening of public schools amid the COVID-19 pandemic. Press Release. *Pennsylvania Integrated Pest Management Program. https://ento.psu.edu/research/labs/rajotte/english/about-1/in-the-news/using-integrated-pest-management-and-one-health-concepts-for-the-safe-re-opening-of-public-schools-amid-the-covid-19-pandemic*

Poh, K.C., **Tiffin H.S.,** Evans, J.R., Brown, J.E., Skvarla, M.J., and Machtinger, E.T. 2021. Tales from the Field: Training Undergraduate Researchers for Fieldwork. *American Entomologist: Field and Bench column.* Spring 2021 edition.

**Tiffin, H.S.** 2021. Philadelphia’s Bed Bug Bill. Press Release. *Pennsylvania Integrated Pest Management Program*.

**Tiffin, H.S.** 2020. Mange girl: Science communication and engagement within a hunter and trapper community. *American Entomologist: Field and Bench column.* Fall 2020 edition.https://academic.oup.com/ae/article/66/3/26/5909258?guestAccessKey=3fc8932a-3317-4152-acd3-cd6771ca3c28

**Greenberg, H.S.** 2019. Potential for New Anti-Malarials Discovered through International Collaborative Study. Research Synopsis, Center for Infectious Disease Dynamics, Pennsylvania State University. http://epidemics.psu.edu/articles/view/potential-for-new-anti-malarials-discovered-through-international-collabora.

***Agency Reports***

Pennsylvania' Statewide Comprehensive Outdoor Recreation Plan (SCORP), 2014 - 2019. Member of the planning and development team, case study contributor. http://www.apps.dcnr.state.pa.us/parecplan/parecplan.pdf

Creating Connections: 2015 Annual Trials Report. ​Report lead, member of the writing and editorial team. http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr\_20031736.pdf

# Presentations and Invited Lectures

***Invited Presentations, Presenter***

**Tiffin, H.S.,** Brown, J., Ternent, M, Mullinax, J.M., and Machtinger, E.T.“Bare Bears: Effects of mange and treatment on black bear survival and movement patterns.” Behaviour, Ecology, & Physiology Seminar Series. Bangor University, Wales UK. Virtual. June 2021. **Seminar Presentation.**

**Tiffin, H.S.,** Niedringhaus, K.D., Carrollo, E., and Pierce, K., Organized and moderated by Justin Brown. “Mange in Bears.” Annual Meeting of the Pennsylvania Association of Wildlife Rehabilitators. Virtual. March 2021. **Panelist for Question and Answer Session.**

**Tiffin, H.S.,** Brown, J., Ternent, M, and Machtinger, E.T.“Mange in bears – who cares? The importance of science communication and community engagement.” Science and Mathematics Colloquium Series. Arizona State University. Attended by senior undergraduates, graduate students, and faculty. Virtual, 80 attendees. January 2021. **Seminar Presentation.**

**Tiffin, H.S.** “Integrated Vector Management.” Invited lecture for 50 undergraduate and graduate students in Penn State’s Integrated Pest Management course. Virtual. October 2020. **Guest Lecture.**

**Tiffin, H.S.,** Brown, J., Ternent, M, and Machtinger, E.T.“Mange in Wildlife.” The Penn State Chapter of the Science Policy Society, Science on Tap monthly series. Virtual. August 2020. **Graduate Research Series.**

**Tiffin, H.S.,** Brown, J., Ternent, M, Mullinax, J.M., and Machtinger, E.T."Sarcoptic Mange and Black Bears.” Opening of Research Center at Adirondack Wildlife Refuge. Wilmington, NY. September 2019. **Keynote Speaker.**

**Tiffin, H.S.,** Brown, J., Ternent, M, Mullinax, J.M., and Machtinger, E.T. "Effects of Sarcoptic Mange on Movement of Pennsylvania’s Black Bear Population.” Center for Infectious Disease Dynamics (CIDD), The Pennsylvania State University. State College, PA. September 2019. **Seminar Presentation.**

**Tiffin, H.S.** and Machtinger, E.T. “Evaluating Tick Distribution and Abundance on the American Black Bear (*Ursus americanus*) in Pennsylvania.” 4th Annual Life Sciences Symposium, Student Competition. State College, PA. May 2019. **Poster Presentation.**

***Oral Presentations, 1st Author Presenter***

**Tiffin, H.S.**, Skvarla, M., and Machtinger, E.T. “Tick distribution and life-stage segregation on the American black bear (*Ursus americanus*), in Pennsylvania.”Take a Walk on the Wild Side: Exploring the Intersection of Wildlife and Entomology Symposium. Eastern Branch, Entomological Society of America 2021. Virtual. March 2021.

**Tiffin, H.S.** and Machtinger, E.T.“Seasonality of tick abundance and distribution on the American black bear (*Ursus americanus*) in Pennsylvania.” Entomological Society of America 2019 Annual Meeting. Virtual. November 2020. 1st Place in Student Competition.

**Tiffin, H.S.,** Brown, J., Ternent, M, and Machtinger, E.T.“Sarcoptic Mange in PA's Black Bear Population: ​Disease Manifestation & Management Implications.” The Wildlife Society, Pennsylvania Chapter. Virtual. October 2020.

**Tiffin, H.S.,** Brown, J., Ternent, M, Mullinax, J.M., and Machtinger, E.T."Small but Mitey: Investigation into*Sarcoptes scabiei*Infestations in a Novel Host, the American Black Bear (*Ursus americanus*)​.” Entomological Society of America 2019 Annual Meeting. St. Louis, MO. November 2019. 1st Place in Student Competition.

**Tiffin, H.S.,** Brown, J., Ternent, M, Mullinax, J.M., and Machtinger, E.T. “Effects of Sarcoptic Mange on American Black Bear Activity and Movement Patterns in Pennsylvania.”27th Conference of the World Association for the Advancement of Veterinary Parasitology (WAAVP). Madison, WI. July 2019.

**Tiffin, H.S.,** Brown, J., Ternent, M, Mullinax, J.M., and Machtinger, E.T. “Disease spillover among wildlife species: Anthropogenic landscapes and sarcoptic mange in Pennsylvania black bears.” International Urban Wildlife Conference. Portland, OR. June 2019.

**Tiffin, H.S.** and Machtinger, E.T. “Evaluating Tick Distribution and Abundance on the American Black Bear (*Ursus americanus*) in Pennsylvania.” 4th Annual Life Sciences Symposium, Student Competition. State College, PA. May 2019.

**Greenberg, H.S.** “Cost-Effective Predictive Modelling Techniques in Mitigating Vector-Borne Disease Risks.” 95th Annual Meeting of the Entomological Society of Pennsylvania, Student Competition. Millersville, PA. November 2018. Tied 1st Place in Student Competition.

**Greenberg, H.S.**, Peper, S.T., Wilson-Fallon, A.N., Haydett, K.M., Cao G., and Presley, S.M. “Geospatial Predictive Modelling of *Aedes aegypti* and *Aedes albopictus* mosquitoes in Texas.”American Mosquito Control Association, Student Competition. Kansas City, MO. February 2018.

**Greenberg, H.S.**, Wilson-Fallon, A.N., Haydett, K.M., Peper, S.T., and Presley, S.M. “Surveillance for *Aedes aegypti* and *Aedes albopictus* species’ distribution throughout Texas.” Texas Mosquito Control Association. Fredericksburg, TX. October 2017.

**Greenberg, H.S.**, Baer-Lehman, M., and Stewart, J.R.“Prevalence of *Trichinella sp.* Infections in the American Black Bear *Ursus americanus* in Pennsylvania.” Honors Program Symposium, Minds at Work: Celebrating Student Research, Scholarship, and Creativity Conference. Shippensburg, PA. April 2015.

***Poster Presentations, 1st Author Presenter***

**Greenberg, H.S.** and Machtinger, E.T. “Abundance and Distribution of Ticks on the American Black Bear (*Ursus americanus*) in Pennsylvania.” Mid-Atlantic Regional Tick Summit VIII. March 2019.

**Greenberg, H.S.**, Riley, S., Hargrove, M.B., and McCann, R.“Quantitative Analysis of Hydrocortisone Levels in Human Saliva Due to the Effects of Positive and Negative Stressors.” Minds at Work: Celebrating Student Research, Scholarship, and Creativity Conference. Shippensburg, PA. April 2015.

\*Riley, S., **\*Greenberg, H.S.**, Hargrove, M.B., and McCann, R.“Quantitative Analysis of Hydrocortisone Levels in Human Saliva Due to the Effects of Positive and Negative Stressors.” 249th American Chemical Society (ACS) National Meeting and Exposition: Chemistry of Natural Resources. Denver, CO. March 2015. \*co-first author presenters.

**Greenberg, H.S.**, Baer-Lehman, M., and Stewart, J.R.“Prevalence of *Trichinella sp.* Infections in the American Black Bear, *Ursus americanus*, in Pennsylvania.” Celebration of Student Research Conference. Shippensburg, PA. April 2014.

# Extension Service

**Vector-Borne Disease Course Development Team,** The Pennsylvania State University, April 2020 – present

Project Lead: Dr. Karen Poh

Helping to transition workshop materials to an online format, and to develop a course and certificate program for education on vector-borne diseases.

**Vector-Borne Disease Extension Team**, The Pennsylvania State University, 2018 – present

Project Lead: Dr. Erika Machtinger

Active participant in the Program Development Process (PDP) for a vector-borne disease program through Penn State Extension.

**Learn Now Video Development,** Penn State Extension, The Pennsylvania State University, December 2019 – present

Development of a Learn Now Video on Integrated Pest Management (IPM) for Fly Control in Livestock and Poultry Facilities.

**Workshop Development Team,** Vector-Borne Disease Workshop, The Pennsylvania State University, 2019 and 2020

Project Lead: Dr. Karen Poh

Workshop speaker and co-organizer for workshop on vector-borne diseases, control, and prevention. Workshop held in October 2019.

May 2020 Workshop cancelled due to COVID-19.

**Ag Progress Days,** Penn State Extension, The Pennsylvania State University, August 2019

Vector-Borne Disease Extension Team

Delivered information and answered questions from the public regarding vector-borne diseases, risk in Pennsylvania, and prevention and control methods available.

# Extension Presentations

**Pennsylvania Farm Show**, live virtual January 2021

**Penn State Extension**, 229 attendees

Top three attended live webinars during the week-long Pennsylvania Farm Show

“*Tick Behavior and Protection from Ticks*.” Lead, co-presented with Jessica Brown and Dr. Karen Poh.

**Tick Webinar Series**,live virtual, recording accessible to the public August 2020

**Penn State Extension**, 104 attendees between two sessions

**“**Tick Control around the Home”, co-presented with Jessica Brown.

**Mid-Atlantic Fruit and Vegetable Convention**, Hershey, PA January 2020  
**Pennsylvania Vegetable Growers Association**, approximately 70 attendees“*Defend Yourself Against Ticks and Vector-Borne Diseases*”, co-presented with Dr. Karen Poh.

**Vector-Borne Disease Workshop**, Pennsylvania Furnace, PA October 2019  
**Penn State Extension,** 15 PSU extension educator attendees  
“*Integrated Vector Management*”, lead educator.

“*Mock Scenario: A Tale of Two Vectors*”, co-lead scenario with Dr. Karen Poh.

**Ag Progress Days 2019**, Pennsylvania Furnace, PA August 2019  
**Penn State College of Agriculture**, approximately 30 presentation attendees  
“*Check Yourself: Ticks and the Diseases They Carry*”, televised on local news channel

**Garden Fest 2019**, Montoursville, PA August 2019  
**Penn State Extension**, approximately 30 attendees  
“*The Dirt on Ticks and Mosquitoes – Protection from These Disease-carrying Pests*!”, co-presented with Dr. Karen Poh.

**Conservation Volunteer Training**, State College, PA June 2019  
**PA Department of Conservation and Natural Resources**, approximately 30 attendees  
“*Check Yourself: Ticks and the Diseases They Carry*”, co-presented with Dr. Karen Poh.

**Homeland Security Conference**, Summerdale, PA March 2019  
**South Central Task Force**, approximately 30 paid conference attendees“*Coping with Ticks and Other Disease-Bearing Insects*”, co-presented with Dr. Karen Poh.

# Teaching Experience

**Graduate Teaching Assistant**, Entomology Department Fall 2018/19

The Pennsylvania State University, State College, PA

Integrated Pest Management (IPM 457)

Supervisor: Dr. Edwin Rajotte, *Fall 2018*

Supervisor: Dr. Sara Hermann, *Fall 2019*

**Graduate School Teaching Certificate** Fall 2019 - present

The Pennsylvania State University, State College, PA

Schreyer Institute Course in College Teaching, *Completed Fall 2019*

Schreyer Institute New Instructor Orientation, *Completed Spring 2019*

SUBJ 602 Supervised Experience in College Teaching (2 req.), *Completed Fall 2018/19*

**Groundwork Program**  January 2018

Texas Tech University, Lubbock, TX

Chosen to participate in highly-selective teacher training program

**Science, It’s a Girls Thing; Shaking Hands with Your Future** Summer 2017

Texas Tech University, Lubbock, Texas

Instructor and mentor for two youth science summer camps. Instructed students on basic scientific principles and conducted lab experiments with participants.

**Shippensburg University of Pennsylvania**, Shippensburg, PA 2012, 2014

ESTEEM (Exploring Science, Technology, Engineering, Earth Science, and Mathematics) Career Exploration Program for Middle School Girls

Group Leader (May 2012); Workshop Assistant (May 2014)

# Mentoring & Training Experience

**Mentor,** Tissue Digestion Project Summer 2019 – Spring 2020

* Trained four undergraduate students in *S. scabiei* mite identification, and development of tissue digestion techniques and protocols to determine mite density in standardized biopsy samples collected from three different carnivore species in Pennsylvania affected with sarcoptic mange.
* Developed and published manuscript on methodology with lead undergraduate student.

**Mentor,** *S. scabiei* Genetic Analysis Project Spring 2020

* Mentored one undergraduate student in developing methodology for extracting mites from host tissue and purifying mites for use in genetic analysis. Project unable to be completed due to COVID-19.

**Mentor,** Canid Outreach and Sample Collection Project Fall 2019 – Spring 2020

* Mentored and trained two students in engaging with Pennsylvania hunting and trapping community to collect samples from foxes and coyotes captured with mange.

**Training,** Tick Surveys and Mange Sample Collection from Hunter-Harvested Bears Fall 2018/19

* Developed and held in-person trainings for undergraduate and graduate students on proper sample collection and safety in the field. November 2018/19.
* Coordinated with Pennsylvania Game Commission (PGC) to schedule undergraduate and graduate student volunteers at PGC hunter check-stations in North Central Pennsylvania. Coordinated and scheduled 11 volunteers in 2018 and 51 volunteers in 2019.

**Training,** Tick Surveys on Live Bears during Summer Bear Trapping Season Summer 2018/19

* Trained 15 volunteers to aid in conducting standardized tick surveys on live bears during PGC summer research trapping and on bears captured for PSU-PGC mange study.

# Professional Interviews

* **“Black bear mange recovery story”**. Interviewed by Mandy Marconi, video produced by the Pennsylvania Game Commission. March 2020. https://www.youtube.com/watch?v=-APOjVm0V3g
* **“Study seeks to analyze ticks, mange in black bears”**. Interviewed and written by Meredith Peachey. December 2019. http://www.tiogapublishing.com/news/local/study-seeks-to-analyze-ticks-mange-in-black-bears/article\_05d04ddc-adff-5518-ab58-f40cd02fff34.html
* **“Getting a read on bear mange”**. Interviewed and written by Asher Jones. *Pennsylvania Wildlife.* Fall 2019 Issue.
* **“Mange cases on the rise”** in print. “Mange cases increasing in black bears” online. Interviewed and written by David Hart. *Grand View Outdoors, Predator Xtreme*. October 2019. https://www.grandviewoutdoors.com/predator-hunting/mange-cases-increasing-black-bears
* **"Mangy madness: Sarcoptic mange in Pennsylvania"**. Student research spotlight for Penn State Entomology Department written by Makaylee Crone. April 2019. https://ento.psu.edu/news/2019/student-research-spotlight-hannah-greenberg
* **“Study tracks the rise of mange in black bears”**. *On the Pulse*. March 2019. https://onthepulsenews.com/study-tracks-the-rise-of-mange-in-black-bears/
* Interviewed by Mark A. Nale, for *Outdoor News.* February 2019. *Article in revision.*
* **“Mange in bears”**. Interviewed and written by Deborah Weisberg. *Pennsylvania Outdoor News*. October 2018.
* **“Black bears are going bald. It might be even worse than it looks”**. Interviewed and written by Jason Bittel. *Washington Post*. June 2018. https://www.washingtonpost.com/news/animalia

# Research Experience

**Ph.D. Dissertation**, The Pennsylvania State University, State College, PA 2018 - present

**Advisor:** Dr. Erika T. Machtinger

**Veterinary Entomology Laboratory (BSL-2)**

* **Landscape-level movement analysis** of black bears with sarcoptic mange, caused by infestation with *S. scabiei* mange mites, via large mammal trapping, tracking using GPS vertex lite animal collars, radio telemetry, and blood, tissue, fecal, and skin sample collection
* **Health and cytological analysis** of black bears with sarcoptic mange, via blood collection, skin scrapes, and skin biopsies taken from live bears
* **Disease manifestation comparison** of sarcoptic mange in bears and canids, via histological analysis of skin biopsies, quantified mite burden using tissue digestion protocol developed
* **Evaluation of treatment and management protocols,** evaluating efficacy of one dose of ivermectin in resolving sarcoptic mange in black bears, developed quantitative scoring guide for mange severity for field-manager use- in collaboration with the Pennsylvania Game Commission
* **Population-level analysis of *S. scabiei* exposure** in canids and bears, via ELISA of serum samples
* **Assessment of tick species** **and abundance** on live and hunter-harvested bears
* **Pathogen status and ectoparasite abundance on small mammals,** via small mammals live-trapped using Sherman traps and collection of ectoparasites, rodent blood and tissue samples
* **Tick control method evaluation and surveillance,** via camera trap evaluation of small mammal use of tick control tubes and tick dragging along brush-lined trails
* **Canid heartworm and nematode analysis**, via collection of serum, hearts, and fecal samples/intestinal tracts from trapped and hunter-harvested canids
* **Ectoparasite surveys** of keds and ticks on hunter-harvested white-tailed deer

**M.S. Thesis**, Texas Tech University, Lubbock, TX 2016 to 2018

**Advisor:** Dr. Steve M. Presley

**Vector-Borne Zoonoses Laboratory (BSL-2)**

**Bioterrorism Response Lab (BSL-3),** Centers for Disease Control and Prevention/Laboratory Response Network – Public Health Emergency Preparedness / Hospital Preparedness / Influenza Surveillance: SRA approved for non-human sample processing

* **Disease vector surveillance**, with specific focus on *Aedes aegypti* and *Aedes albopictus*, via ovitrap use, public outreach, GIS analyses and cartography, and geospatial modeling and analyses (West Texas Panhandle, 2016; Statewide, 2017)
* **Insecticide resistance monitoring**, via insect-rearing, bottle bioassays, and dose-response curve analyses to determine insecticide resistance (Statewide, 2017)
* **Seasonal arbovirus and flavivirus surveillance**, with specific focus on West Nile Virus, via mosquito trapping, RNA extraction, PCR, and gel electrophoresis and imaging (Lubbock, Texas, 2016 – 2017)
* **Feral swine disease surveillance**, via field work including- large mammal tracking and trapping, radio telemetry, tissue and blood-sample collection, and necropsies; via lab work conducting disease screening for *Francisella tularensis, Trypanosoma cruzi, Brucella spp.*, porcine reproductive and respiratory syndrome virus (PRRSV), and pseudorabies virus (PRV) using molecular techniques on blood and tissue samples (Ardmore, Oklahoma, 2016 – 2017)
* **White tail deer vaccine efficacy trials**, via vaccine boosters administered by TTU veterinarian to determine efficacy of commercially available vaccine against Epizootic Hemorrhagic Disease Virus (EHDV); EHDV presence/absence determined via Agar Gel Immunodiffusion (AGID) testing at 24 and 48 hours on serological samples (Lubbock, Texas, 2017)
* **Quail disease surveillance,** via necropsies, disease screening, and molecular test optimizations for new castle disease and quail cholera (Lubbock, Texas, 2016)

**Independent Undergraduate Research**, Shippensburg University of PA 2013 to 2015

**Project Lead,** “Prevalence of *Trichinella* sp. Infections in the American Black Bear *Ursus* *americanus* in Pennsylvania”

* Diaphragm collection from hunter-harvested black bears in Pennsylvania
* Training and deployment of teams to five different hunter check-stations for tissue collection from black bears
* Extracting *Trichinella* sp. from tissue samples, via artificial digestion, use of DNeasy blood and tissue kit, and molecular techniques
* Development of methodology and training of new research team members

**Independent Undergraduate Research**, Shippensburg University of PA 2013 to 2015

**Project Co-Lead,** “Quantitative Analysis of Hydrocortisone Levels in Human Saliva Due to the Effects of Positive and Negative Stressors”

* Competitive ELISA used to determine hydrocortisone levels in human saliva, via a salivary cortisol immunoassay kit (Salimetrics)

# Relevant Work Experience

**Geographic Information Systems (GIS) Specialist** 2015 - 2016

Western Pennsylvania Conservancy Contractor; Pennsylvania Department of Conservation and Natural Resources (DCNR), Bureau of Recreation and Conservation (BRC); Harrisburg, PA

* Authored and edited documents and promotional materials for internal and public use
* Collected stories from trail groups, authored and edited stories for *The* *Annual Trails Report*
* Publicized trails statewide with web pages and interactive maps on www.ExplorePAtrails.com
* Coordinated and led an upgrade and overhaul of the trails’ website
* Published and promoted trail events, developments, and trail gap analyses to the public via social media, brochures, flyers
* Led trail gap database update, including management of summer intern and outreach to Pennsylvania’s trail advocacy groups to encourage data submission
* Created ESRI trail gap map to expedite grant application process for potential grantees and agency staff, and available for public use

**Engineering, Scientific and Technical Intern** 2014 – 2015

Pennsylvania Department of Conservation and Natural Resources (DCNR), Bureau of Recreation and Conservation (BRC); Harrisburg, PA

* Participated in the *Statewide Comprehensive Outdoor Recreation Plan (SCORP)* planning process
* Analyzed DCNR online survey results and wrote reports detailing public opinion to present to inter-agency audiences for inclusion in the five-year plan
* Authored and edited manuscripts for inclusion in the SCORP
* Researched and wrote case studies to promote conservation and recreation best practices and support recreation plan - featured in the SCORP and on DCNR's website
* Provided GIS analysis for BRC’s local park and trail projects
* Provided cartographic and editorial support for *The* *Pennsylvania Land and Water Trail Network Strategic Plan*.

**Summer Research Assistant** Summer 2013

Harrisburg Care Research Laboratory; Harrisburg, PA

Project: *Attachment and Emotion-Regulation in Diverse Mother-Infant Relationships*

* Assisted project coordinator with camera operation during lab, lab set up/tear down
* Assisted with protocol planning
* Explained procedures to mothers and helped soothe infants

**Assistant, Carlisle Area Small Animal Veterinary Clinic** 2009 – 2010

Carlisle, PA

* Prepared and autoclaved surgical tool kits
* Assisted with animal care and provision of a soothing environment

# Professional Affiliations

* Entomological Society of America (ESA), 2019 - present
* American Society of Mammologists, 2019 - present
* American Mosquito Control Association (AMCA), 2016 - 2019
* American Chemical Society (ACS), 2015 – 2019; South Plains Texas Chapter, 2016 – 2019
* Gamma Theta Upsilon (GTU), International Geographical Honor Society, 2011 – present

# Professional Service

**Social Media Marketing Professional**, Center for Infectious Disease Dynamics (CIDD)

The Pennsylvania State University, November 2020 – present

* Assist the CIDD Director in promoting center activities and accomplishments via Twitter.
* Use Twitter to deliver scientific information and research to the broader scientific community and the public during COVID-19.

**Symposium Co-Organizer.** Take a Walk on the Wild Side: Exploring the Intersection of Wildlife and Entomology. Eastern Branch of the Entomological Society of America. Virtual. March 2021. Co-organized with Jessica Brown and Dr. Karen Poh.

**CGSA Officer, Synopsis Coordinator**

Center for Infectious Disease Dynamics (CIDD) Graduate Student Association (CGSA)

The Pennsylvania State University, 2020 – 2021.

* **Synopsis Writer:** Write short informative articles for the CIDD website to promote research published by researchers associated with the CIDD at Penn State.

**Coordinator for Science on Tap, Science Policy Society, Penn State Chapter**

The Pennsylvania State University, June 2019 – present

* Coordinate speakers for *Science on Tap* series that hosts scientists and professionals at a public location every month to connect the public with scientific research and pursuits.
* Moved live events to online platform, 30 – 50 attendees via Zoom at monthly events.

**Awards Committee Member, Department of Entomology**

The Pennsylvania State University, 2019 – 2020

Working with Drs. Christina Grozinger and Gary Felton to create an EGSA-run Awards Committee for a Faculty and Staff award.

**Judge, Penn State Life Sciences Symposium, Poster Session**

The Pennsylvania State University, May 2019

**Chair,** South Plains Texas Chapter**,** American Chemical Society

Lubbock, Texas, 2018

* Organized annual banquet and award presentation for elementary – high school Science Fair Award Winners
* Organized programming and events for the community to connect community to science, with special focus on opioid use
* Science Fair Judge

**Chair-Elect,** South Plains Texas Chapter**,** American Chemical Society

Lubbock, Texas, 2017

* Aided in organizing annual banquet, organized programming, and involved in decision-making regarding chapter spending
* Science Fair Judge

# Community Service & Leadership

* Centre County COVID-19 Community Response (4CR), contact person for Centre Hall, Curtin, Liberty, and Howard Townships. Contact person for those without internet access or need help navigating the website to direct them to appropriate resources (April 2020)
* Insect Outreach, Coordinated PSU Entomology Department’s outreach with live insects at Nittany Gymnastics Summer Camp (July 2019)
* Wild About Animals Event, Coordinated PSU Entomology Department’s participation, hosted by Centre Wildlife Care, State College, PA (Apr. 2019; April 2020 *Cancelled due to COVID-19*)
* Entomology Department Recruitment Weekend, Volunteer, State College, PA (Feb. 2018)
* Great Insect Fair, Volunteer, State College, PA (Sept. 2018/19)
* Inside Out Foundation, Board Member; Lubbock, TX (2016 – 2018)
* Llano-Estacado Student Chapter of the Society of Environmental Toxicology and Chemistry (LE-SETAC), Vice President (2017 – 2018), member (2016 – 2018)
* The Department of Environment Toxicology's Graduate Student Association, Chair - Green Committee (2017 – 2018), member (2016 – 2018)
* Shippensburg University (SU) Ecology Club, Secretary (2014 – 2015)
* SU Environmental Organization, member and volunteer (2012 – 2015)
* Gamma Theta Upsilon (International Geographical Honor Society), Vice President (2013 – 2014), Treasurer (2014 – 2015), and member (2011 – present)
* Gamma Theta Upsilon – SU Geography/Geo-Environmental Department, tutor (2011 – 2015)
* Carlisle Area Resource and Emergency Shelter (CARES), Carlisle, PA, overnight volunteer (2011 – 2016)
* Note-Taker (Principles of Biology course) for the SU Office of Disabilities (Fall 2011)
* Better Days Animal League, Shippensburg, PA, volunteer (2008 – 2011)
* Project Share Food Bank, Carlisle, PA, volunteer (2003 – 2016)