Mariana Castaneda-Guzman

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Research Interests

Data analytics, including remote sensing and big data analysis, optimize the decision-making process regarding ecosystem management and climate change adaptation. Ecological forecast to capture patterns from ecological data and develop simulations to test "what-if" scenarios of landscape and climate change.

Education

Ph.D., Virginia Polytechnic Institute and State University, Frimpong and Angermeier Lab — Aug 2022 - Present
Master of Science in Computational Analysis of a Cryptic Wildlife Disease *(Expected Graduation May 2026)*

MSc., Virginia Polytechnic Institute and State University, Escobar Lab — Jan 2021 – Aug 2022
Master of Science in Computational Analysis of a Cryptic Wildlife Disease *(**Magna Cum Laude**; 3.83 GPA)*

B.S., George Mason University, Volgenau School of Engineering — 2019
Bachelor of Science in Systems Engineering with a concentration in Data Analytics
*(**Magna Cum Laude**; 3.83 GPA)*

Awards

Burd Sheldon McGinnes Graduate Fellowship ($2,500). Virginia Tech, Blacksburg, Virginia USA — 2022
- The Burd S. McGinnes Graduate Fellowship is given annually to deserving graduate students in the Department of Fish and Wildlife Conservation at Virginia Tech.

Distinguished Academic Achievements in Systems Engineering. George Mason University, Fairfax, Virginia, USA — 2019
- Ranked 1st in the entire systems engineering graduating class (60 students)

***Magna Cum Laude*. George Mason University, Fairfax, Virginia, USA** — 2019
- Outstanding grades maintained at the graduation (GPA 3.8-3.9)

Dean's List. George Mason University, Fairfax, Virginia, USA — 2015 - 2019
- Awarded in recognition of outstanding academic performance (3.5 GPA or higher) during **eight consecutive semesters**

1st place. General Donald R. Keith Memorial Capstone Conference United States Military Academy, West Point, New York, USA — 2019
- First place in the Process Modeling and Analysis track with The City of Annapolis Flood Mitigation Trade-off study

Publications

Castaneda-Guzman M; Mantilla-Santos G; Murray K; Escobar LE. A global database of costal conditions. *Scientific Data*. vol. 8, no. 304, 2021. https://doi.org/10.1038/s41597-021-01081-9

Castillo Signor, LC; Edwards, T; Matope, A; Escobar, LE; Donis, E; **Castaneda-Guzman, M**; Adams E; Cuevas, LE. Epidemiology of dengue fever in Guatemala. *PLoS Neglected Tropical Diseases*. vol. 14, no. 8, 2020, pp. 1–12, doi:10.1371/journal.pntd.0008535.

Worsely-Tonks, KEL; Escobar, LE; Biek, R; **Castaneda-Guzman, M**; Craft, ME; Streicker, DG; White, LA; Fountain-Jones, NM. Using host traits to identify unknown bat and carnivore rabies reservoirs. *PLoS Neglected Tropical Diseases*. vol. 14, no. 12, 2020, e0008940. https://doi.org/10.1371/journal.pntd.0008940

Fellowships/Grants Applications

Virginia Sea Grant (VASG) Graduate Fellowship (Submitted)	Dec 2021
Morris Animal Foundation. Wildlife RFP Animal Health in Coastal Wetland Ecosystems. (Declined)	Oct 2021
Virginia Sea Grant (VASG) Professional Development Award (Accepted)	August 2020
Virginia Sea Grant (VASG) Graduate Fellowship (Declined)	Dec 2020
Virginia Sea Grant (VASG) Graduate Fellowship (Declined, Honorary Mention, Invited for resubmission)	Dec 2019

Presentations/Posters

Castaneda-Guzman M; Escobar, LE. Modeling Vibrio cholerae transmission risk in aquatic ecosystems using a density-based clustering algorithm. *CeZAP Infecitious Diseases Symposium: Computational Biology and Disease Modeling*. Blacksburg, Virginia. *Speaker*	Oct 2022
Castaneda-Guzman M; Escobar, LE. Eco-epidemiological model of Chronic Wasting Disease in Virginia. EEID 2022, Atlanta, Georgia, USA. Poster	June 2022
Castaneda-Guzman M; Kirchgessner M; Escobar, LE; . Wildlife Disease in Virginia: What every wildlife professional needs to know about CWD. 2022 Annual Meeting Virginia Virginia Chapter of The Wildlife Society. Waynesboro, Virginia, USA. Speaker.	March 2022
Castaneda-Guzman M; Escobar, LE. BCG Vaccine and Severe COVID-19. *Virginia Drug Discovery Rx: Coronavirus, Therapeutics, Present and Future Symposium.* Virginia Drug Discovery Consortium and Virginia Bio, Virginia Tech, Blacksburg, Virginia, USA*. Poster.*	May 2021
Castaneda-Guzman, M; Ortega, J. The City of Annapolis Flood Mitigation Trade-off Study. *General Donald R. Keith Memorial Capstone Conference.* United States Military Academy, West Point, New York, USA. *Speaker.*	May 2019
Castaneda-Guzman M; Ortega, J; Hamad, R; Albright, N; Donohue, G. The City of Annapolis Flood Mitigation Trade-off Study. *Andrew P. Sage Memorial System Engineering Capstone Design Competition*. George Mason University, Fairfax, Virginia, USA. *Speaker*.	Apr 2019

Castaneda-Guzman M; Ortega, J; Hamad, R; Albright, N; Donohue, G. The City of Annapolis Flood Mitigation Trade-off Study. *Annapolis, Maryland, City Council Meeting*. Speaker. — Apr 2019

Castaneda-Guzman M; Ortega, J; Hamad, R; Albright, N; Donohue, G. The City of Annapolis Flood Mitigation Trade-off Study. *Volgenau School of Engineering Undergraduate Research Celebration Poster Presentation*. George Mason University, Fairfax, Virginia, USA*. Poster.* — Apr 2019

Teaching Experience

Castaneda-Guzman, M. Introduction to R statistical software R. The Wildlife Disease Association (WDA) Virginia Tech Student Chapter. Virginia Tech, Blacksburg, Virginia. Guest Lecturer. Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, Virginia, USA. — Nov 2022

Castaneda-Guzman, M. Software Carpentries Workshop, Instructor, "Version Control with Git/Bash". University libraries workshops, Virginia Tech, Blacksburg, Virginia, USA.. — Jan 2021

Castaneda-Guzman, M. Software Carpentries Workshop, Instructor, "Programming with R". University libraries workshops, Virginia Tech, Blacksburg, Virginia, USA.. — Jan 2021

Castaneda-Guzman, M. Software Carpentries Workshop, Instructor, "Scientific Analysis with R". University libraries workshops, Virginia Tech, Blacksburg, Virginia, USA. — Aug 2021

Castaneda-Guzman, M. Software Carpentries Workshop, Instructor, "Programming with Python". University libraries workshops, Virginia Tech, Blacksburg, Virginia, USA. — Jan 2021

Castaneda-Guzman , M. Advance Biogeography and Macroecology in the Anthropocene (FIW 5984, Fall 2020), Graduate level class, Guest lecturer. "Introduction to R". Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, Virginia, USA. — Aug 2020

Castaneda-Guzman, M. Software Carpentries Workshop, Instructor, "Programming with R". University libraries workshops, Virginia Tech, Blacksburg, Virginia, USA. — Aug 2020

Escobar, LE; **Castaneda-Guzman, M**. Spatial Modeling of Species and Niches (FIW 5774, Spring 2020), Graduate level class, Co-Guest lecturer. "Automated MODIS data collection using R". Department of Fish and Wildlife Conservation Virginia Tech, Blacksburg, Virginia, USA. Guest Lecturer. — May 2020

Escobar, LE; **Castaneda-Guzman, M**. Introduction to R statistical software R. The Wildlife Disease Association (WDA) Virginia Tech Student Chapter. Virginia Tech, Blacksburg, Virginia. Guest Lecturer. Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, Virginia, USA. — Nov 2019

Castaneda-Guzman, M. Introduction to quantitative epidemiology using R. Guest Lecturer. Undergraduate Course: Foundations of Fish and Wildlife Diseases. Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, Virginia, USA. — Nov 2019

Research Projects

Slender Chub — Aug 2022 – Present
Role: Co-lead author. Supervisor(s): Frimpong, E., PhD & Angermeier P.E., PhD

Candy Darter — January 2022 - Present
Role: Co-lead author. Supervisor(s): Frimpong, E., PhD & Angermeier P.E., PhD

Global Climate Change and Vibrio cholerae transmission risk Aug 2021 - Present

Role: Co-lead author. Supervisor: Escobar, LE, PhD

- Curated, pre-processed, and analyzed data, from publication
- Ran hypervolume models, to calculate the increase in suitable areas for Vibrio cholerae globally.
- Compere socioeconomic variables and their effect in the increase/decrease in Vibrio cholerae transmission risk.
- Created graphics to present results using R statistical software.

Spatial Analysis of CWD in VA Jan 2021 – Jan 2022

Role: Lead. Supervisor: Escobar, LE, PhD

- Worked on simulating deer management scenarios to control the spread of Chronic Wasting Disease in Virginia.
- Applied Bayesian methods to estimate prevalence of infectious disease.
- Helped with the sample collection of lymph nodes at DWR to test for CWD and collected DNA samples. Learn how to age deer by the teeth structure.

Using host traits to identify unknown bat and carnivore rabies reservoirs. Dec 2019 - Apr 2020

Role: Co-author. Supervisor: Escobar, LE, PhD

- Curated, pre-processed, and analyzed data from IUCN Red List of Threatened Species for more than 100 species.
- Created and analyzed graphical results for manuscript.
- Co-authored manuscripts published on the journal PLoS Neglected Tropical Diseases journal

Epidemiology of Dengue Fever in Guatemala Oct 2019 - Dec 2019

Role: Co-author. Supervisor: Escobar, LE, PhD

- Explored sixteen years of dengue data in R statistical software
- Develop descriptive plots to represent data distribution
- Ran and develop plots for inferential statistical tests
- Drafted methodology for manuscripts published on the journal PLoS Neglected Tropical Diseases journal

The City of Annapolis Flood Mitigation Trade-Off Study Aug 2018 – May 2019

Role: Project Manager. Supervisor: Prof. George Donohue, PhD

- Project sponsored by the City of Annapolis Government in alliance with RAND corporations and George Mason University to develop a climate change study regarding flooding risk in the City of Annapolis.
- Applied data analysis, programming, and engineering knowledge to a complex coastal-ecosystem phenomenon.
- Presented results to the Annapolis City Council members, and residents (non-scientists, or engineers) technical engineering findings concerning their city's flooding problem.
- Presented in the Process Modeling and Analysis in the General Donald R. Keith Memorial Capstone Conference and Andrew P. Sage Memorial System Engineering Capstone Design Competition.

Optimization Model of a Fast Food Priority Order System Spring 2018

Role: Team Lead. Supervisor: Prof. Jie Xu, PhD

- JAVA-based simulations of a fast-food restaurant system, Chick-Fill-A, to optimize waiting time, order completion, and delivery.
- The model was developed in the Discrete System Modeling and Simulation course
- I learned how to model and simplify complex engineering systems and business processes as discrete-event systems

Re-Design of Public Transportation Payment System Fall 2017

Role: Team Lead. Supervisor: Prof. Katherine Laskey, PhD

- Proposal for the redesign of public transportation, based on the Washington DC metro system. Aimed to provide a convenient way for the customer to be able to add fare to their metro card and get up to date travel information on the back of their receipts about transfer options and delays.
- The systems physical and functional architecture and requirements were models using SysML and CORE following a systems V-model (verification and validation model)

Field Work Experience

Bat sampling in Bogota, Colombia Summer 2022

Role: Lead graduate student.

- Lead a team of 3 American and 3 Colombian undergraduate students
- Captured bats with mist nest
- Set up acoustic sensors

Lymph node remove for Chronic Wasting Disease (CWD) testing, Virginia Department of Wild Resource (VDWR) Fall 2021

- Collect from hunters or roadkill deer heads the left and right lymph nodes for CWD testing, as well as, tongue samples for DNA.
- Learn how to age a deer by examining the wear and replacement of the premolars and molars of the lower jaw

Work Experience

Department of Fish and Wildlife Conservation Virginia Tech, Blacksburg, Virginia, USA Oct 2019 – Oct 2020

Role: Laboratory Technician (Intern). Supervisor: Luis E. Escobar, PhD

- Curated, pre-processed, and analyzed data from diverse sources, including web repositories and published literature for projects of infectious diseases (e.g., COVID-19 and BCG vaccination, dengue, cholerae, and rabies)
- Developed protocols in the statistical software R for graduate students.
- Manuscript preparation as co-author and first author with faculty at Virginia Tech, other US universities, and international collaborators
- Contribution on the development of grant proposals led by Dr. Escobar and submitted to Virginia Sea Grant, NSF, Virginia Tech COVID-19 grants, NIH, Jeffress Foundation

Mac's Donut Food Truck, Courthouse Farmers Market, Arlington VA, USA Jun 2017 – Dec 2020

Role Sales Team Member. Employer: Mac's Donuts, Arlington, VA.

- Interaction with customers, cash transactions, stock, and supplies management
- Team management to optimize productivity and handle products and equipment following safety and sanitation guidelines.
- Improved communication, multitasking, problem solving, and teamwork skills

Additional Training

CPR (Cardiopulmonary Resuscitation) Certificated Certified April 2022

Certified

- Completed basic CPR Training and learned to apply chest compression and use an Automated External Defibrillator (AED) machine.

Wilderness First Aid Certified April 2022

Certified

- Completed 10-hours of online materials and 6-hours of vigorous in person training.
- Learn the right set of action to assess and approach an emergency in the wilderness.
- Engaged in real-life mock-up emergency scenarios to put knowledge of lectures into practice and practice how to react under pressure.

Safe-Zone Training October 2021

Certified

- 5-week intensive course with weekly readings, writings, and a live discussion lab. Learned information regarding gender, sexual, and romantic minorities, and active allyship.
- Contextualize this new/refreshed knowledge with some of the complexity and nuanced characteristics of these elements
- Engaged in introspective and reflective thinking

Carpentries Instructor Training. Apr 2020

Certified Instructor

- I gained skills for efficient ways of teaching-intensive one to two-day workshops of basic computing and data skills to researchers with The Carpentries curriculum.
- Co-instructed three Software Carpentry workshop (Scientific Analysis with R (2); Programming with R (4); Programing with Python (1); Version Control (1) to date).

QPR Suicide Prevention Gatekeeper Program. Virginia Tech, Blacksburg, Virginia, USA Nov 2019

Participant

- Engaged and participated in a practical and proven suicide prevention training to recognize a crisis and the warning signs that someone may be contemplating suicide
- Learned the QPR technique to help save a life from suicide (Question, Persuade, and Refer)

Institute for Agriculture, Natural Resources, and the Environment (IARNA), Guatemala City, Guatemala May - Jul 2019

Role: Strategic Information Department (Intern). Supervisor: Adolfo Ottoniel Monterroso, PhD

- Developed a work plan following and agile methodology for the duration of the internship. (Agile methods consist of weekly meetings with daily meetings called scrums)
- Interacted and met with environmental economist and consultants to determine requirements for software for data analyses in the decision making process.
- Created an algorithm using the software R that sorted through 10-years of data outputting a relational database in SQL; it that can easily be updated with new yearly data.
- Began the initial phase of the front and back-end development of a system which communicates with the created database and presents the information in a comprehensible way for the user to input and access information directly from the database.

Service

Latin American and Iberian Graduate Student Association (LAIGSA) 2021-Present

Vice President

- Delegate tasks to executive board members, plan monthly meetings.
- Facilitate meeting an events when the president is unable to attend.

Fish and Wildlife Graduate Student Association (FiWGSA) 2022-Present

Treasurer

- Apply for funding through the graduate student funding board
- Manage FiWGSA bank account balance.
- Apply for funding for the EBB Annual Speaker
- Aid with fundraising and outreach events.

Fish and Wildlife Graduate Student Association (FiWGSA) 2021-2022

Social Chair and Diversity and Inclusion (DEI) sub-committee

- Think, plan, budget and coordinate social events for the graduate student of the Fish and Wildlife Conservation department
- Coordination with other members of the FiWGSA, particularly the president, VP and treasurer.

Journal Article Reviewer Dec 2021

Reviewer

- Reviewer for two (2) manuscripts for the Wiley journal Zoonoses and Public Health.
- Provided detailed comments on manuscript content, relevance and novelty.

Undergraduate Proposal 2022 Fralin SURF Spring-Fall 2021

Reviewer

- Acted as a reviewer of proposals for the Fralin SURF program, a 10-week training program designed to give motivated Virginia Tech undergraduates the opportunity to engage in full time research in life science disciplines and related professional development activities that mirror graduate training.
- Evaluated the proposals based on a rubric, prioritizing those students we no previous experience.

Computer Science Undergraduate Capstone Projects (CS4624) 2020-2021

Mentor/Client

- Help undergraduate students in CS4624 by Dr. Ed Fox, with their capstone hand on project.
- Organized six different groups in the span of two semesters, in projects intertwining computer programming and ecology, more specifically infectious disease.
- Provided them base code and with a learning material to learn how to code in R. As well as introduction to ecological concepts.
- Met with them weekly to discuss deliverables, and milestones.

The Society of Hispanic Professional Engineers (SHPE) George Mason University Chapter. 2018 - 2019

President

- Guided the organization to create strategies that will lead to the success of the organization.
- Implemented the use of a RACI matrix to map out every task, milestone, or critical decisions to be made throughout the year. Assigns which roles are

Responsible for each action item, who will be Accountable, and who needs to be Consulted or Informed.
- Planned and lead weekly meetings and retreats once a semester to encourage teamwork and professionalism

The Society of Hispanic Professional Engineers (SHPE) George Mason University Chapter. 2017 - 2018

Treasurer
- Collected dues form new and current members.
- Filled-out weekly applications to access student funding, as well as reimbursements forms when necessary.
- Kept detailed documentation of any transactions performed.
- Created a budget tracking google spreadsheet, automated according to organization needs to keep a detailed description of spending and new revenue of the three different accounts

Other organization

Latin American and Iberian Graduate Student Association (LAIGSA) 2021-Present

Active Member

Salsa Tech at Virginia Tech 2021-Present

Active Member

Languages

Spanish:	Mother Language
English:	Fluent, Advanced Reading, Professional Writing

Skills

Modeling and Simulation:	C++ (object oriented programming) JAVA (loops, methods, data structure), Python (data structures, dictionaries), Matlab (Simulink, Wi-Fi, GUIs), CORE (model systems processes), Arena (Simulation of discrete-event systems) Git/Bash
Data Analysis and Statistics:	R (data curation, pre-processing, web-scrapping, and analysis; must use packages: ggplot2, tidyverse, stringr, dplyr, rgdal, raster),
Web Development:	HTML, JavaScript, R Shiny, R Markdown
Geographic tools:	ArcGIS, MODIS R tool raster R tool
Additional Hardware and Software:	Arduino (Sensors and other components, such as a thermistor, LED lights, capacitor, resistor, jumper wires, ultrasound, and motors), Processing Development tool (GUI)
Databases:	MODIS (NASA; Spatial data)

GBIF (Governmental Program; Biodiversity data)
NEON (NSF program; Environmental data)
ERDDAP (NOAA Server; Spatial data)
EOSDIS Worldview (NASA; Spatial data (Night-light))
COVID-19 (John Hopkins University; Corona virus cases data)
BCG World Atlas (Public Health Agency of Canada; Global BCG vaccination policies and practices)
World Bank Open Data (World Bank; Demographic data)
Wikipedia (Open Source)
IUCN Red List (IUCN; Endangered species data)
Ithchymaps (Fish database)
NHDPlus (National Hydrography Dataset Plus)

References

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