Tony Cannistra

Climate Change Researcher

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Working to use big data, education, and community to better understand and care for the natural world we depend on.

Education

2016–Present **Ph.D. Candidate, Biology (*ongoing*)**, *University of Washington*, Seattle, WA.
Advised by Dr. Lauren Buckley (Biology) and Dr. Magda Balazinska (Computer Science)
Supported by an NSF IGERT traineeship in Big Data and Data Science at the eScience Institute and an NSF Graduate Research Fellowship.

2011–2015 **B.S., Biology and Computer Science**, *Tufts University*, Medford, MA.

Experience

Applied Conservation

Summer 2018 **Data Analyst Intern**, *Vulcan, Inc.*, Seattle, WA.
Member of Skylight Global (http://www.skylight.global) team, searching for innovative ways to enhance enforcement and documentation of **illegal, unreported, and unregulated fishing** in our oceans with satellite-derived observations and machine learning techniques.

- Developed a **planetary-scale analysis of vessel high-seas "rendezvous"**—a common source of illegal activity—using real-time vessel location database. Informed domain awareness and satellite resource tasking activites.
- Produced maps and other figures for operational domain awareness work in real-time for maritime law enforcement clients.

Scientific Research

2016–Present **Ph.D. Candidate**, *Buckley Lab*, University of Washington.
ML-based prediction of **ecological responses to climate change** for informed decision making.

- Characterizing the influence of species' traits on climate-driven range shifts via nonlinear modeling.
- **Neural-network based snow cover identification** with **high-resolution satellite imagery** (Planet Labs) and airborne lidar (NASA/JPL Airborne Snow Observatory, SnowEx).
- Incorporating biophysical thresholds into species distribution modeling via Bayesian estimation.
- **Coursework**: Machine Learning, Data Management Systems, Big Data Management Systems, Fundamentals of Climate Change, Knowledge Brokering in Climate Change Research, Ecology Seminar, Snow Hydrology

2013–2015 **Research Assistant**, *Hescott Lab*, Tufts University.
Network-based protein function prediction.

- Developed and implemented algorithms in Python that built upon Hescott and Cowen's Diffusion State Distance (DSD) metric to incorporate genetic protein-protein interaction data into function prediction. (Published.)

Education and Outreach

2017-Present **Organizer & Instructor**, *GeoHackWeek UW*.
Participated in organization and teaching of geospatial data analysis workshop. Fall 2017 and 2018.

2018–Present **Founder + Co-Producer**, *Topophilia Podcast*.
Topophilia is a podcast about places, the people who care for them, and the things we love to do in them.

2017-Present **Outdoor School Instructor**, *REI Puget Sound*, Seattle, WA.
I teach paddling, climbing, snowshoeing, and navigation to diverse participants.

2015-2016 **Naturalist / Mentor Naturalist**, *Aspen Center for Environmental Studies*, Aspen, CO.

2012–2015 **Teaching Assistant**, *Tufts University Department of Computer Science*.
- 5 Semesters: Programming Languages, Data Structures, Problem Solving by Computer, Machine Structure and Assembly Language Programming, Introduction to Computer Science.
- Held office hours, labs, and graded programming assignments.

Technologies + Tools

Python dask, xarray, pandas/geopandas, rasterio, shapely, cartopy, subprocess, scipy, numpy, scikit-learn, matplotlib, anaconda, multiprocessing

R dplyr, raster, parallel, ggplot2

Docker container development, deployment

Javascript React, `npm`, deployment

Apache Spark Python and R, AWS cluster deployment

AWS EC2, RDS, S3, Lambda

Unix bash, fish, shell scripting, system configuration

Tableau data analytics, dashboards, interactive visualization, geospatial visualization.

Publications

2018

Cannistra, A.F, Buckley, L.B. 2018. Improving range shift predictions: enhancing the power of traits. *In Preparation.*

Buckley, L.B., **Cannistra, A.F.**, John, P.A. 2018. Leveraging organismal biology to forecast the effects of climate change. Integrative and Comparative Biology. DOI: **10.1093/icb/icy018**

2017

Buckley, L.B., Arakaki, A.J., **Cannistra, A.F.**, Kharouba, H.M., Kingsolver, J.G. 2017. Insect Development, Thermal Plasticity and Fitness Implications in Changing, Seasonal Environments. Integrative and Comparative Biology icx032. DOI: **10.1093/icb/icx032**

Presentations (§ = award)

Lightning Talk (§) **Cannistra, A.F.** 2018. Assessing High-Resolution Satellite Imagery for Detailed Snow Cover Estimation: An Ecological Perspective. UW Data Science Summit. Honorable Mention.

Tutorial **Cannistra, A.F.,** Levesque, R.J. 2017 and 2018. Tools for Visualizing Geospatial Data in Python: A Hands-On Tutorial. GeoHackWeek, eScience Institute, University of Washington, Seattle, WA.

Poster **Cannistra, A.F.,** Buckley, L.B. 2017. Improving range shift predictions: Enhancing the power of traits. Ecological Society of America Meeting, Portland, OR.

Grants and Awards

2018-2020 **Graduate Research Fellowship**, *National Science Foundation*, Three years of support.

2016-2018 **Big Data and Data Science IGERT Ph.D. Fellowship**, *eScience Institute, University of Washington*.
NSF IGERT DGE-1258485. Two years of support.