List of Research Placements, "Research in Conservation" (CONS 496) Summer 2021

IMPORTANT: You may contact the mentor to ask for more information about the placement. Please DO NOT contact the mentor(s) to arrange for an interview until the faculty instructor of record has given you a list of mentors with whom to interview. Faculty will assign interviews after May 27, 2021. Please be aware that placements are either virtual, in-person, or a mix of both virtual and in-person. You will be responsible for travel to all in-person placements and field sites and following all safety protocols.

1. SCBI-Conservation Ecology Center: Remote sensing, spatial analysis and animal movement

Jared Stabach, PhD, Ecologist and Program Coordinator, Movement of Life, Conservation Ecology Center, Smithsonian Conservation Biology Institute
Lacey Hughey, PhD, Ecologist and Program Manager, Movement of Life, Conservation Ecology Center, Smithsonian Conservation Biology Institute
Jake Wall, PhD, Director of Research and Conservation, Mara Elephant Project, Greater Mara Ecosystem, Kenya

The Conservation Ecology Center (CEC) at the Smithsonian Conservation Biology Institute in Front Royal, VA, is offering a research placement in GIS and spatial analysis, with a focus on editing an existing database created by the Mara Elephant Project to track land-use changes across Kenya's iconic Masai Mara Ecosystem (Mara). Recognized for supporting some of the highest densities of the largest mammals on the plant, the Mara faces a myriad of conservation challenges. Rapid land-cover change, including increases in fencing, roads, and other alternative land-uses has expanded across the region, resulting in the loss and fragmentation of available wildlife habitat. These changes have led to precipitous declines in the animal assemblage, increased human-wildlife conflict, and put the persistence of the entire system into question. To understand how wildlife are responding to rapid change, we are working together with researchers at the Mara Elephant Project to create a database to monitor the changes that are occurring. Through the research experience, the student will be exposed to themes in ecology, GIS, remote sensing, wildlife management, and conservation. The student will gain introductory level experience with software programs, such as ArcGIS, to edit, clean, and provide statistics on how rapidly fencing is changing across the region, resulting in a dashboard to catalog these changes. The student will collaborate with scientists at the Center and at the Mara Elephant Project.

Project Goals:

- Become familiar and proficient in using ArcGIS Online, editing topologies of point, line, and polygon data.
- Summarize and communicate results, providing a dynamic dashboard that will provide compelling information on the changes occurring across the region.

This is a virtual/online placement. Students need to have access to their own computer and high-speed internet. The student will be part of a virtual cohort at the Center with regular online meetings and additional opportunities to interact with fellow interns and researchers. An interview is required for this placement. Email Dr. Jared Stabach at StabachJ@si.edu for any questions about this placement.

2. SCBI-Conservation Ecology Center – Developing a general approach to biodiversity conservation modeling using Google Earth Engine

Ramiro D. Crego, PhD, Conservation Ecology Center, Smithsonian Conservation Biology Institute
Grant Connette, PhD, Conservation Ecology Center, Smithsonian Conservation Biology Institute
Jared Stabach, PhD, Ecologist, Conservation Ecology Center, Smithsonian Conservation Biology Institute

Globally, biodiversity conservation efforts are increasingly shifting from government-run reserves towards greater leadership and involvement of local people in decision-making. Being able to rapidly provide forecasts of changes in biodiversity under alternative management scenarios is critical for informing such decision-making process. This research focuses on the development of an innovative, real-time forecasting biodiversity modeling workflow in Google Earth Engine (GEE), an open-source cloud-based computing platform. The student will have the opportunity to help develop and test this new toolset for rapid scenario modeling that can easily be applied across global ecosystems. In addition to learning basic knowledge on remote sensing, spatial information systems (GIS) and biodiversity models, the student will gain important analytical skills using GEE and critical research and writing skills. Overall, the student will gain an invaluable experience in cutting edge methodologies that are transforming the field of conservation biology.

This is a virtual/online placement. A computer with access to internet is the only requirement (no special software needed for data analysis). An interview is required for this placement. Email Dr. Ramiro D. Crego at CregoRD@si.edu for any questions about this placement.

3. Smithsonian ForestGEO – Role of forests in mitigating climate change

Kristina Anderson-Teixeira, PhD, Leader of ForestGEO Ecosystems & Climate Program, Smithsonian Conservation Biology Institute

The ForestGEO Ecosystems and Climate Lab at SCBI conducts research aimed at understanding how global change is altering forests around the world and how changes to forest ecosystems will either mitigate or exacerbate climate change. We also seek bring high-quality scientific data to forest-based climate change mitigation efforts. In line with the second goal, we will be working with the International Panel on Climate Change (IPCC)—specifically the Technical Support Unit of the IPCC Task Force on Greenhouse Gas inventories—to provide data from our global forest carbon database (ForC, created and maintained by us) to the IPCC emission factor database (EFDB - https://www.ipcc-nggip.iges.or.jp/EFDB/main.php).

We have an opportunity for a student interested in forest ecology and climate change mitigation to assist with database tasks required to make this possible. **Your work will contribute directly to improving the IPCC's and global society's data on the role of forests in climate change mitigation!** Your accompanying project will use the ForC database, to address a question of your choosing and appropriate for your analytical skills.

This is a virtual/online placement. Enthusiasm for the project, competency and high reliability working with data, comfort finding and extracting information from scientific publications, and independent

problem-solving skills are essential for this position. An interview is required for this placement. Email Dr. Kristina Anderson-Teixeira at TeixeiraK@si.edu for any questions about this placement.

4. Smithsonian ForestGEO – Tree mortality survey experience

Kristina Anderson Teixeira, PhD, Leader of ForestGEO Ecosystems & Climate Program, SCBI

Global change is impacting forests worldwide, and understanding how forests respond is critical to forest conservation and climate protection. The Forest Global Earth Observatory (ForestGEO) is the only forest monitoring network making standardized measurements in all of the world's major forest biomes to study forest responses to global change. At the 26 ha ForestGEO plot at SCBI, we are conducting an annual mortality census to understand the drivers of tree mortality and consequent forest change. The student will gain experience with tree identification, forest census methods, and assessing tree health and factors associated with mortality. The census this year will be capturing rapid die-off of IUCN critically endangered ash species from the invasive emerald ash borer, and this would be one potential focal theme for the student project.

This is an in-person placement. Competency in Excel, organizational skills, and the enthusiasm to work outdoors are essential for this position. Our ability to run the 2021 census and host this position will be contingent upon the COVID-19 situation, and remains subject to change. **Transportation is needed to perform census work at the ForestGEO tree plot, located at the Smithsonian Conservation Biology Institute in Front Royal, VA.** An interview is required for this placement. Email Dr. Kristina Anderson-Teixeira at TeixeiraK@si.edu for any questions about this placement.

5. IFAW—Wildlife cybercrime in the US: Monitoring online platforms for wildlife trafficking

Polen Cisneros, Policy Analyst, International Fund for Animal Welfare (IFAW), Washington, D.C.
Mark Hofberg, Campaigns Officer, International Fund for Animal Welfare (IFAW), Washington, D.C.
Tracy Bain, Program Manager, Planning, Monitoring & Evaluation, International Fund for Animal Welfare (IFAW), Washington, D.C.

The illegal trade of live animals and wildlife products is a global crisis, and has increasingly moved to online marketplaces and social media platforms. IFAW has been combating wildlife cybercrime since 2004, and has conducted investigations in Europe, Africa, Oceania, and the US showing that tens of thousands of wild animals and their products are traded online annually. We work with both law enforcement agencies and online technology companies to build their capacity to tackle this form of criminality. As a result of our engagement with the tech sector, more than 30 companies have joined the Coalition to End Wildlife Trafficking Online, which aims to secure an industry-wide approach to reduce wildlife cybercrime.

To determine if the Coalition companies are meeting their goals, we monitor the degree of wildlife trafficking occurring on their websites over time to look for trends and to identify new species in trade. We also monitor platforms outside of the Coalition where wildlife trafficking may occur, tracking and documenting potentially illegal activity. This information helps us to identify new company partners and further this industry-wide approach. The student will have the opportunity to do a desktop research

analysis of online wildlife trafficking on US websites, flagging posts that contain illegal animals or animal products, identifying new emerging trends in wildlife cybercrime, and tracking any recently CITES listed species. The student will learn how to identify protected wildlife species traded online, accurately search for and record wildlife trafficking data, and then conduct a short analysis and comparison of the data. The student will be asked to produce a brief presentation to deliver to the IFAW team.

This is a virtual/online placement. Depending on pandemic restrictions, **students may have the opportunity to travel to the IFAW office** in DC (1400 16th St NW, Suite 510) to engage in occasional training and networking. An interview is required for this placement. Email Polen Cisneros at pcisneros@ifaw.org and Mark Hofberg at mhofberg@ifaw.org for any questions about this placement.

6. Breeding ecology of grassland birds on working lands

Bernadette Rigley, Research Fellow, Smithsonian's Virginia Working Landscapes

Managed hayfields and pasturelands are valuable nesting habitat for grassland birds, which are among the most imperiled group of birds in North America. However, these working landscapes have deteriorated in their ability to support grassland birds due to more frequent and early hay cuttings and intense grazing in recent decades. This summer, a Smithsonian Research Fellow with Virginia Working Landscapes (https://www.vaworkinglandscapes.org/) will conduct research that will explore the relationships between grazing and haying practices and grassland bird breeding ecology. This research aims to understand how local management practices and other ecological factors are influencing the survival of grassland bird nests. The selected student will develop bird identification and observation skills, and gain experience conducting nest searching and vegetation surveys on private working lands. In this placement, students will also have the opportunity to work with a small data set to examine nest site characteristics.

This is an in-person placement. This project will require that students drive to study sites throughout Warren, Fauquier, and Rappahannock counties. **Transportation is needed to travel to field sites**. An interview is required for this placement. Email Bernadette Rigley at rigleyb@si.edu for any questions about this placement.

7. SCBI-Migratory Bird Center – Avian nest success in the city

Brian S. Evans, PhD, Migratory Bird Ecologist, Migratory Bird Center, SCBI

For this research experience, we are a seeking a student with a strong interest in ornithology to develop an independent research project that explores how urban environments influence avian nest success. The student will use data collected by Smithsonian Neighborhood Nestwatch, a citizen science program in metropolitan Washington, DC. The student will digitize nest data submitted by program participants and use program R to evaluate how urban land cover has influenced the nestling survival of seven species of common backyard birds. The student may also choose to explore how features of urban environments, for example the urban heat island effect, anthropogenic noise, or light pollution, impacts nest success.

This is a virtual/online placement. Previous experience with Program R and GIS is strongly preferred, but training will be provided to motivated students. An interview is required for this placement. Email Dr. Brian Evans at EvansBr@si.edu for any questions about this placement.

8. SCBI-Migratory Bird Center – Songbird tracking technology

Brian S. Evans, PhD, Migratory Bird Ecologist, Migratory Bird Center, Smithsonian Conservation Biology Institute, Washington, DC

For this research experience, we are seeking a student with an interest in wildlife tracking technology to develop an independent research project that explores a unique wildlife tracking system at the National Zoo. Using handheld radio telemetry and GPS units, students will locate radio and GPS tags in the park. They will then use Program R to compare the location data that they gather with data gathered using a fixed Motus tower and receiver array. Dependent on Covid limitations, the student may also be invited to join scientists in attaching LifeTags on wild songbirds. The student will gain valuable experience in radio telemetry, field ornithology, and computer programming. Previous experience with Program R and GIS is strongly preferred, but training will be provided to motivated students.

Mix of virtual and in-person. **Transportation to study site in Washington DC is needed**. An interview is required for this placement. Email Dr. Brian Evans at EvansBr@si.edu for any questions about this placement.

9. SCBI-Center for Conservation Genomics – Understanding skin pathogen defense traits for the conservation of Appalachian salamanders

Randall Jiménez Quirós, PhD, Postdoctoral Fellow, Center for Conservation Genomics, Smithsonian Conservation Biology Institute, Washington, DC

Host skin-associated bacterial communities are complex, consisting of many interacting species, and are known to play key functional roles in animal health, contributing to pathogens defense and host health maintenance. One aspect of my research is investigating the composition and interaction of bacteria on salamanders' skin that influences the likelihood to protect against invading pathogens. I am interested in how microbial communities are structured among salamander species and the interactions between bacteria in uninfected and infected salamanders with the chytrid pathogen *Batrachochytrium dendrobatidis*. In this research experience, the student will develop a short independent project in molecular ecology with potential application to salamander conservation. The student will have the opportunity to learn about amphibians innate immune defenses, microbiomes, processing bacterial sequences with modern bioinformatic tools, networks in microbiome research to study bacterial interactions using Conet/Cytoscape software, robust statistical analyses using R and elaboration of high quality graphics.

This is a virtual/online placement. An interview is required for this placement. Email Dr. **Randall Jiménez Quirós** at JimenezQuirosR@si.edu for any questions about this placement.

10. Developing quick field survey techniques for hornets and yellowjackets

Sam Droege, Wildlife Biologist, USGS, Patuxent Wildlife Research Center, Laurel MD
Jonathan Mawdsley, PhD, Cooperative Research Units Chief, USGS, Patuxent Wildlife Research Center, Laurel MD

The occurrence of breeding *Vespa mandarinia* (aka Murder Hornets) in the U.S. and Canada has elevated the need for rapid and extensive survey techniques for this group of wasps. Fortunately, this group of wasps are relatively easy to catch, as they are attracted to fermenting liquids. Our lab's past efforts have included testing trapping techniques. One of the most efficient techniques is simply to use a single serving plastic water or soda bottle, fill it partially full of sugar water, and hang from a tree, coming back later and collecting the drowned wasps. Ground level bottles have the advantage of being inconspicuous, looking like litter, and are deployable anywhere (i.e., you don't need something to hang the trap on); that said, capture rates for ground level bottles have not been documented. This project will test ground level traps effectiveness. A number of native and non-native Vespine wasps and hornets are attracted to fermented baits (as are *V. mandarinia*). In these tests, traps will be set on the ground rather than elevated. There are 2 parts to this study: 1) Running sets of paired and unpaired bottles from trees and set on the ground, and 2) Running transects of ground bottles across Maryland as a proof of concept. **There are not stinging issues associated with this project!**

This is an in-person placement. Research will be conducted at various sites in Maryland and at Patuxent Wildlife Research Center in Laurel, MD. **Transportation is needed to travel to the field sites**. An interview is required for this placement. Email Sam Droege at sdroege@usgs.gov and Dr. Jonathan Mawdsley at jmawdsley@usgs.gov for questions about this placement.

11. Smithsonian National Zoo research and clinical nutrition of birds

Mike Maslanka, Head, Department of Nutrition Science, Smithsonian National Zoological Park (NZP) and Smithsonian Conservation Biology Institute, Washington, DC
Erin Kendrick, Clinical Nutritionist, Animal Care Sciences, National Zoological Park (NZP), Washington, DC
Mike Power, PhD, Research Nutritionist and Animal Scientist, Conservation Ecology Center, NZP, Smithsonian Conservation Biology Institute, Washington, DC

As the Smithsonian National Zoo strives to be a leader in the conservation of native migratory birds, we are developing husbandry methods to promote welfare, health and breeding in captivity. The focus of this placement is an ongoing research project, validating the use of a visual fat scoring technique for passerine species with full body composition. This is one tool used to monitor the nutritional welfare of the birds in our care, and ultimately has direct impact on the success of our breeding program should species repopulation become a reality. The selected student will be trained to visually score fat, as well as dissect, prepare and conduct nutritional analyses of wild bird carcasses of multiple species already collected from the DC area, and assist with data entry and analysis of results. There will also be opportunities to investigate clinical nutrition cases, review and analyze animal diets, and learn basic lab techniques for feed analysis. Additionally, several focused lectures covering various zoo nutrition topics will be presented by nutrition department staff throughout the course. At the completion of this course,

the student should be prepared to present their own visual/oral presentation of their contributions to the project, and knowledge gained during the course.

This is an in-person placement. Transportation is needed to the labs in the Science Building at NZP's Rock Creek Campus, Washington, D.C. Email Mike Maslanka (maslankam@si.edu) and Erin Kendrick (kendricke@si.edu) for questions about the placement.

12. Invasive Species Data Research in North America with NatureServe

Lori Scott, Chief Information Officer, NatureServe
Shelley Cooke, Software Support Specialist, NatureServe

This research opportunity focuses on invasive alien species in North America. The placement provides a unique opportunity to work within NatureServe supporting the iMapInvasives Partnership to safeguard environmental resources from the effects of invasive species. iMapInvasives is an online application that facilitates the management and sharing of invasive species information, including the extent of infestations, search efforts, and treatment outcomes.

The student will work closely with iMapInvasives team members from NatureServe and partner organizations to conduct their research project. The research focus for this project is to conduct a horizon scan of priority invasive species datasets that fill taxonomic and geographic gaps in the national records coordinated by the iMapInvasives Partnership. The student will research, procure, analyze, format, and import data from authoritative organizations including NatureServe Network state and provincial partners in the US and Canada, US Federal agencies, and other online data reporting tools such as iNaturalist and EDDMapS.

This research opportunity will enable the student to interact with invasive species biologists and rare species conservationists as well as developers of cutting-edge conservation software applications. In addition to direct collaboration with NatureServe and its Network of Natural Heritage Programs, the student may engage with other leading university and government conservation experts. The student will gain hands-on experience working with conservation database and GIS systems, and working through scientific research challenges including translating data from multiple sources, formats, and taxonomic frameworks.

This is a virtual/online placement. Regular meetings with the NatureServe mentor and the research project team will be conducted via Zoom. An interview is required for this placement. Email Shelley Cooke at shelley_cooke@natureserve.org for any questions about this placement.

13. Aligning Taxonomic Concepts for Data Aggregation with NatureServe

Maggie Woo, Senior Software Engineer, NatureServe
Lori Scott, Chief Information Officer, NatureServe

NatureServe and its Network collectively manage data on species and ecosystems. We share our data online on NatureServe Explorer, and we have an internal system for aligning and re-aligning taxonomic

concepts between the central database and our Network of natural heritage partners. The goal of this research project is to create a prototype of a simple system in which one can "drop in" a list of their taxonomic concepts (that meets some necessary criteria) and align them with the concepts in the NatureServe database. Once aligned, the same user can drop in the same list, and the alignment will happen "automatically." An advanced goal for the prototype is to allow another user to "drop in" a list of their taxonomic concepts and align them with the concepts from the first user, and thereby to the NatureServe database. Some implementation ideas for the prototype include the use of a graph database to "translate" between taxonomic concepts and the use of graphical tools to let a user manually drag and drop (map) their concepts to ours.
Resources available for the student to complete this project include:

- Lineage tracking (relationships between taxonomic concepts and treatment within NatureServe's own databases). This can supply part of the graph of relationships between taxonomic concepts NatureServe has used.
- State and Province "lists" as they relate to NatureServe central database concepts.

This is a virtual/online placement. Regular meetings with the NatureServe mentor and the research project team will be conducted via Zoom. Required skills and aptitude for this project include willingness to dive into a code/database implementation (or learn how to). An interview is required for this placement. Email Maggie Woo at maggie_woo@natureserve.org for questions about this placement.

14. IUCN – Reverse the Red assessment of conservation successes

Nahomy De Andrade, Partnerships and Grants Coordinator, International Union for Conservation of Nature (IUCN) Species Survival Commission (SSC)

In order to more effectively show how the IUCN Species Survival Commission's Species Conservation Cycle (Assess-Plan-Act model) is working at an international level and to demonstrate there are resources and practices applied with success in Reversing the Red, we are compiling success stories in conservation – find more information about Reverse the Red case studies here. Working with the SSC Chair's Office team, the research placement student will collaborate on researching species with improved conservation status in the IUCN Red List, documenting what are the key factors in these reversed trends, and the main taxonomic groups represented in these successes. We will be also researching who are the stakeholders involved as well as some lessons learned as valuable input for Reverse the Red implementation.

This is a virtual/online placement. Student should have the ability to work independently. Knowledge of IUCN Red List is helpful. A reliable internet connection and computer is needed. An interview is required for this placement. Email Nahomy De Andrade at sscreversethered@iucn.org for questions about this placement.

15. Beyond the Brook Trout: Connecting stream data and fish population in Virginia's Blue Ridge

Claire Catlett, Rappahannock Land Conservation Field Representative, Piedmont Environmental Council (PEC), Warrenton VA

The Piedmont Environmental Council (PEC) (https://www.pecva.org/) wishes to host a 2021 summer research student that will work closely with our Land Conservation and Communications staff to further our outreach and research efforts for our Trout Stream Restoration Program. During this research placement, the student will work to: (1) Maintain a database for PEC's fish population data; (2) Design a CSV database system that is compatible with ArcGIS Online mapping tools; (3) Research regional climate data for the Blue Ridge Mountains and Piedmont regions, and develop a unique hypothesis that expands upon the current relationship between fish populations over time and climate based on Shenandoah National Park, Virginia Department of Game and Inland Fisheries, and PEC data; and (4) Create outreach and educational materials as online resources for PEC's website that showcase PEC's Trout Stream Restoration Initiative. The student will gain experience in project management and working with a diverse array of stakeholders.

This is a virtual/online placement. There may be opportunity for local site visits to trout streams located in Rappahannock, Madison, Greene, and Albemarle Counties (VA). **Transportation needed for site visits**. An interview is required for this placement. Email Claire Catlett at ccatlett@pecva.org for any questions about this placement.