Workshops
American Ornithological Society
Anchorage, Alaska
24–28 June 2018

Network Analysis in R

Daizaburo Shizuka, Allison Johnson

1.5 Days (Monday, 24 June, 8 am–5 pm AND Tuesday, 25 June, 8 am–Noon)

Network analysis brings new tools for uncovering structure and dynamics of interactions in many areas of ornithology, including social structure, ecological interactions, connectivity of populations, and the architecture of complex phenotypes. The goal of this workshop is to get students and researchers up and running with network analysis in any of these contexts. This workshop is most appropriate for those researchers that have already collected data that they would like to use for network analysis. Participants should have some familiarity with the R programming language. The workshop will begin with a brief overview of the basics of network theory and relevant data collection methods in ornithological applications through hands-on exercises in network analysis using R. These guided hands-on exercises will cover a wide array of topics including data formatting, network construction, displays of networks, network metrics, temporal dynamics in networks, and hypothesis testing. We will provide time for participants to work independently or in teams with their own data to construct and visualize networks as well as implement some analyses. The course will be capped to 20 participants so that we can provide ample feedback on participant projects. Additional course materials will be posted on a website so that participants can continue to review and further develop their skills beyond the workshop.

Navigating Ornithology as an Early Career Professional: Staying Engaged, Employed, and Energized

Jen Walsh, Brian Trevelline, Emily Williams

Half Day (Tuesday, 25 June, 1–5 pm)

Mentorship, training, and engagement of early career professionals represents an important investment in the future of both AOS and ornithological research. The AOS, with an increasing number of early career members and strong early professional programs in place, is perfectly poised to offer an early professional–mentor workshop at its annual meeting. By pairing early career professionals with a diverse panel of mentors, we can create a forum where attendees can seek advice on pressing topics relevant to this early career stage. Through this panel discussion format, we hope to facilitate the exploration and discussion of possible career paths in ornithology and of professional development topics that may be less transparent to early career members (i.e., the job application process, AOS involvement, advice for seeking alternative funding sources). We also plan to bring together society members from a range of career stages to create the potential for new collaborations, provide learning resources for early professionals, and highlight opportunities for continued involvement in AOS.

This event will be a half-day, pre-conference workshop during the afternoon (starting after lunch). Workshop organizers will additionally plan an optional post-workshop meetup at a local bar for attendees who wish to continue conversation in a more casual setting. Workshop participants will be provided with a short list of panel discussion topics and will be asked to come prepared with relevant questions for panel members. Workshop organizers will be present to help facilitate discussion. In addition, workshop organizers will be responsible for live tweeting and recording panel discussions to make the workshop more accessible and inclusive to all AOS members. A portion of the workshop will be reserved for addressing questions raised by those following along remotely (i.e., twitter). Potential discussion topics include:

- Grants and grant proposal
- Academic job market (search committees, departmental seminars/chalk talks)
- Student mentorship, teaching, advising

- Non-academic job market (NGOs, federal)
- Non-academic career path options
- Becoming a more active member of AOS (serving on subcommittees, leading workshops, judging student presentations)

Get spatial! Using R as GIS

Michael Hallworth, Clark Rushing

Full Day (Tuesday, 25 June, 8 am–5 pm)

"Get spatial! Using R as GIS" is a workshop intended to introduce participants to using the free, open-source program R as a geographic information system, providing participants with an alternative to ArcMap or other proprietary GIS software. The objective of the workshop is to introduce and provide participants with working examples of how to use R for spatial analyses and map making. Specifically, in this full day workshop participants will learn (1) how to create and manipulate spatial layers (points, lines, polygons, rasters, projecting data) in R; (2) where to get spatial data; and (3) how to incorporate spatial data into analyses. The workshop will be comprised of morning and afternoon sessions. The morning session will be devoted to introductory material such as learning how to read, obtain and manipulate, and plot spatial data. Participants will learn how to import and export common types of spatial data (rasters & shapefiles), perform common manipulations (overlay, mask, subset), change projections, and visualize their data. In addition, students will learn how to use common 'tidyverse' packages (dplyr, tidyr, ggplot2) to integrate spatial data into analysis and visualization workflows. The afternoon will focus on applying the techniques learned in the morning session to questions relevant to ornithologists. For example, participants will: (1) create isoscapes and assign individuals to natal origins using stable-hydrogen isotopes; (2) use territory mapping data to create home-ranges, visualize territory boundaries, and extract territory-level environmental data; and (3) obtain, read, and manipulate remotely sensed climate and habitat data to extract environmental covariates at point-count locations and integrate these data into occupancy and abundance models.

Taking the Next Step with R: Data Management, Publication Quality Graphics and Function Building

Auriel Fournier, Matt Boone

Full Day (Tuesday, 25 June, 8 am–5 pm)

Our goal is to guide learners who are already using R to be able to automate daily tasks, manage their data in a reproducible framework (using 'tidyverse' R packages dplyr and tidyr), make publication ready graphs (using R package ggplot2), and write their own functions. Anyone with questions about what exactly the workshop will cover or if they have the appropriate skillset can contact Auriel Fournier (aurielfournier@gmail.com). Materials from a similar workshop offered at the 2018 AOS meeting can be found here: https://github.com/aurielfournier/AOS18AZ.

Data Management—We will cover how to script the cleaning, management and manipulation of data within R, using the R packages dplyr and tidyr, so that every change that is made to a file is recorded, and small or big adjustments can be made to data, and how it is summarized, without hours of copying and pasting.

Graphing—We will cover how to use the R package ggplot2, how to make publication quality graphics, how to customize them to fit specific criteria set out by a journal or other entity and how to script them so the production of the figure is documented from reading in the raw data file to creating the image file.

Writing Functions—Functions are the core of R functionality. We will teach how to make functions for common repeatable tasks, build a toolset of these functions, and teach the basics of writing error checking and warning messages.

Survival Analysis for Avian Ecologists: Moving Beyond Mayfield

Jim Rivers, Carl Schwarz

Full Day (Tuesday, 25 June, 8 am–5 pm)

Proper estimation of survival rates is critical for understanding many topics that are the focus of research undertaken by avian ecologists, yet the methods for obtaining such estimates can be challenging to learn. In addition, survival analyses require different assumptions and considerations relative to other types of modeling approaches that are commonplace in avian ecology. In this workshop, participants will receive hands-on instruction in modern statistical approaches for quantifying survival during two critical periods of the avian annual cycle: the nesting period, and the post-fledgling period.

In the first half of the course, modern approaches for developing and testing nest survival models will be taught using Program MARK and RMark, in addition to implementing logistic exposure models in R. In the second half, survival analyses with Cox Proportional Hazards models using R will be the focus, including instruction on the use of fixed and time-varying covariates, and discussion of approaches for dealing with censoring. Discussion of common study design considerations (e.g., sample sizes, sampling frequency) will be included for each component of the course.

Workshop participants should have a general background in statistical modeling and working knowledge of R. Attendees are expected to bring their own laptop loaded with relevant open source software and their own dataset(s) for use in the course. All participants will receive a set of course notes and annotated programs for worked examples.

Analysis of Point-Count Data in the Presence of Variable Survey Methodologies and Detection Error

Péter Sólymos

Full Day (Tuesday, 25 June, 8 am–5 pm)

This course is aimed towards ornithologists analyzing field observations, who are often faced by data heterogeneities due to field sampling protocols changing from one project to another, or through time over the lifespan of projects, or trying to combine “legacy” data sets with new data collected by recording units. Such heterogeneities can bias analyses when data sets are integrated inadequately, or can lead to information loss when filtered and standardized to common standards. Accounting for these issues is important for better inference regarding status and trends of bird species and communities.

Analysts of such “messy” data sets need to feel comfortable with manipulating the data, need a full understanding the mechanics of the models being used (i.e. critically interpreting the results and acknowledging assumptions and limitations), and should be able to make informed choices when faced with methodological challenges.

The course emphasizes critical thinking and active learning. Participants will be asked to take part in the analysis: first-hand analytics experience from start to finish. We will use publicly available data sets to demonstrate the data manipulation and analysis. We will use freely available and open-source R packages.

The expected outcome of the course is a solid foundation for further professional development via increased confidence in applying these methods for field observations.

<u>Syllabus</u>

1. Introductions

2. Overview of database relations and operations

3. An overview of regression techniques

Short break

4. Estimating nuisance variables (detection error and its components)

Lunch break

5. Estimating occupancy, abundance, and density

6. Accounting for methodological biases

7. Statistical inference and prediction

Short break

8. Q/A related to participants' own projects

Dismissal, optional follow-up at a nearby watering hole

Best Practices for eBird Data I: Accessing and Preparing eBird Data for Analysis in R

Matt Strimas-Mackey

Half Day (Tuesday, 25 June, 8 am–Noon)

The citizen science project eBird has generated a database of over 500 million bird observations, with broad spatial and taxonomic coverage. The unique size and scope of this open dataset makes it a valuable resource for studying a range of scientific questions. However, both the large volume of data and the unstructured nature of the observations present computational challenges not typically encountered with conventional scientific data. This workshop will introduce attendees to a set of best practices for accessing eBird data and preparing them for further analyses, using hands-on examples in R. After this workshop, attendees will have an understanding of the structure and content of the eBird data, and be comfortable using the R package 'auk' to extract subsets of the data, using the concept of the 'complete checklist' to produce presence-absence data from eBird data, understanding which variables in the dataset are important predictors of variation in the probability of detecting birds, and preparing data for modeling species distribution and abundance. This is the first of two workshops on eBird best practices. The second workshop, "Best Practices for eBird Data II: modeling distribution and abundance using eBird," will cover using the data prepared in this workshop for modeling the distribution and abundance of species. Experience and familiarity with R is required for this workshop.

Best Practices for eBird Data II: Modeling Distribution and Abundance Using eBird Data

Orin Robinson

Half Day (Tuesday, 25 June, 1–5 pm)

The citizen science project eBird has generated a database of over 500 million bird observations, with broad spatial and taxonomic coverage. The unique size and scope of this open dataset makes it a valuable resource for modeling the distribution and abundance of birds. However, the semi-structured nature of the observations—including varying observer effort and detection probabilities, spatial bias, and habitat-selection bias—present challenges not typically encountered with data collected using structured surveys. This workshop will introduce attendees to a set of best practices for modeling bird distribution, occupancy, and relative abundance, using hands-on examples in R. In this workshop, attendees will gain experience modeling bird distributions while accounting for spatially biased data and following best practices to account for variation in observation effort when using semi-structured citizen science data in species distribution models. The methods covered will include occupancy models with the R package 'unmarked,' and machine learning approaches (e.g., Random Forests). This workshop is the second of two workshops on eBird best practices, with the first, "Best Practices for eBird Data I: accessing and preparing eBird data for analysis in R," covering how to access and prepare eBird data for uses that include distribution and abundance models. For those not attending "Best Practices for eBird Data," we will provide the data to be used in this workshop, but will not spend time showing how to filter the raw eBird data to obtain the provided dataset. Experience and familiarity with R is required for attendees at this workshop.

Introduction to Motus WTS: Project Planning, Equipment, and Data Management

Luke DeGroote, Lisa Kiziuk, Allison Fetterman, Todd Alleger

Half Day (Tuesday, 25 June, 8 am–Noon)

The Motus Wildlife Tracking System has revolutionized how we record animal movements in nature using miniaturized VHF radio telemetry technology involving tiny nanotags coupled with a rapidly expanding network of automated receiver stations. This workshop is aimed towards those with little or no experience installing automated receiving stations, using digitally coded transmitters, and connecting to the Motus Network. Our discussions will focus on three main topics: project planning, equipment, and data. Our discussion of project planning will include development of local or regional networks, optimal locations for automated receiving stations, insurance, liability, and landowner permission (e.g. MOUs). Equipment includes parts of automated receiving stations, tower options, transmitter attachment methods, and transmitter options (i.e. choosing the appropriate transmitter for your project). Finally, we'll discuss metadata necessary for both station and transmitter deployment as well as data retrieval and processing using Program R. Our presenters from Powdermill Avian Research Center and Willistown Conservation Trust, members of the Northeast Motus Collaboration, will draw on their experience installing a network of more than 30 Motus receiving stations across Pennsylvania to help you avoid pitfalls, plan, and implement a project using the Motus WTS.

Sensorgnome for Motus WTS Techniques: Construction and Troubleshooting

Todd Alleger, Luke DeGroote

Half Day (Tuesday, 25 June, 1–5 pm)

Become familiar with a sensorgnome automated radio telemetry receiver for use in the Motus WTS. Get hands-on experience building and testing a fully functional, weatherproof sensorgnome using the Raspberry Pi microcomputer. Additionally, we will cover basic troubleshooting and maintenance techniques in order to keep your sensorgnome running consistently and efficiently in the field. There is an optional add-on fee to cover the cost of the sensorgnome if you would like to take yours home ($225, Funcube Dongles not included). Payment instructions for this optional, add-on material fee will be provided to registered participants ahead of the workshop.

Working with Science Journalists 101

Rebecca Heisman

Midday (Thursday, 27 June, Noon–2 pm)

This short, lunch-hour workshop will provide basic media training for ornithologists who may not have access to a resource like this through their home institutions, so that they will feel empowered to promote their work to the science news media and will be better prepared in the event that a science journalist contacts them about their own or someone else's work. The presenter, Rebecca Heisman, was a freelance science journalist and communications consultant for several years before joining AOS as their full-time Communications Specialist.

Topics that will be covered include

- How to tell if your research is newsworthy
- How press releases and media embargoes work
- A science journalist's typical process for covering a new study
- What to expect (and what not to expect) if a science journalist contacts you
- What science journalists are looking for in an interview.

There will also be plenty of time for Q & A.

Crafting an Effective CV/Resume for Careers Inside and Outside Academia

Autumn Iverson, Jennifer Houtz, Amelia-Juliette Demery

Midday (Thursday, 27 June, Noon–2 pm)

In today's competitive job market, your Curriculum Vitae (CV) or resume is one of the most important marketing materials. A professional CV/resume can provide access to numerous opportunities and ultimately deliver exactly what it is designed for—elevating your application as a more competitive candidate for your discipline. This workshop is designed to help students and early professionals craft a top-quality CV/resume for positions inside and outside academia. The workshop will begin with a 30-minute presentation that covers how audience, and discipline-specific conventions impact a CV's effectiveness. We will discuss appropriate style and format, key elements of a successful CV/resume and their respective content. We will assess strong versus weak CVs and allow participants to identify the elements that strengthen/weaken each example. We will emphasize the idea of a "flexible" CV, one which can be recrafted in a format appropriate to the position to which you're applying by highlighting transferable skills (e.g., leadership, organization, collaboration, etc.).

After the presentation, we will break out into small, discipline-specific groups for 30 minutes, each group consisting of participants whose career objectives represent multiple employment sectors including academia, field/lab technician jobs, government agencies, and non-profits. For 30 minutes, we will have an open discussion across all disciplines to discuss what these different sectors expect to see on a CV and how participants can fill in more deficient sections of their application. Lastly, we will offer a peer-review session whereby participants are given the chance to bring their own CV for review by their peers and workshop organizers. A survey will be sent out before and after the workshop to assess how participants feel regarding what they hoped to gain from the workshop and their experience/thoughts after attending the workshop.

This workshop will be facilitated by multiple members of the AOS Student Affairs Committee in collaboration with the Early Professionals Committee. It serves to promote professional development and career advancement of AOS members via production of a marketable, discipline-specific CV.

Writing Successful Proposals for Small Grants

Shailee Shah, Amelia-Juliette Demery

Midday (Friday, 28 June, Noon–2 pm)

Small grants often form the backbone to funding student-led projects. Learning to write concise, effective grant proposals is thus integral to winning these awards. The AOS, with its own small grants program, is perfectly poised to offer a grant-writing workshop at its annual meeting, focusing on small grants in particular. We will start with a 30-minute presentation by a member of the AOS Awards Committee (invited speaker) on the characteristics of grant proposals that make them more likely to get funded. Each section of a grant proposal will be discussed—such as abstract, proposal, budget, and timeline—with best practices highlighted for each. We will then break up into groups of 5-6 people. Led by workshop co-organizers with experience writing successful grant proposals, each group will discuss either sample grant proposals provided by co-organizers or willing workshop participants. After about 45 minutes, the groups will reconvene to share writing guidelines and tips discussed and demonstrate how they developed a section of the sample grant proposal to make it more effective. For our sample grant proposals, we will reveal which were funded and which were not, and discuss actual reviewer feedback. We will conclude by writing out "do's and don'ts" of grant writing and making a list of small grants that are available for students in the fields of ornithology, and, more broadly, ecology and evolutionary biology. The list will be shared with participants via email after the workshop. Additionally, we will send each participant a survey before and after the workshop to get a sense of how the workshop affected participants' perception of what makes a successful grant proposal and their ability to do so.

Working with eBird Status and Trends Data Products in R

Tom Auer, Daniel Fink

Midday (Friday, 28 June, Noon–2 pm)

In 2018 the Cornell Lab of Ornithology released information on the status and trends of 107 North American species. Seasonal estimates of each species' range, relative occupancy, relative abundance, and trends were derived from over 500 million bird observations and produced with a scalable, machine-learning modeling workflow. These eBird Status and Trends products are available as visualizations and data products on the eBird website.

This workshop will introduce attendees to the data products and the 'ebirdst' R package developed specifically for working with these data. We will describe the data products, how they were created, and how to access them. Then we will demonstrate how to use the 'ebirdst' R package to access and analyze them. This will include instruction on how to select and analyze specific combinations of regions, seasons, and species with the goal of aiding applied research and conservation efforts.

Some experience with R will be helpful in following along with the demonstration, although no hands-on practice will be required as part of this short workshop. Participants will be sent materials ahead of the workshop to develop their understanding of the eBird Status and Trends products and 'ebirdst' R package.