

Introduction to GIS and Animal Population Monitoring in R

Wildlife Tourism College
Pardamat Conservation Area
16 – 20 September 2024



EARTH SCIENCE
APPLIED SCIENCES

Award: 80NSSC23K1537

Welcome and Introductions!

- Project Background
- Course Schedule
- Questions/Comments



Please Introduce Yourself

- Name
- Employer
- Reason for Taking the Course

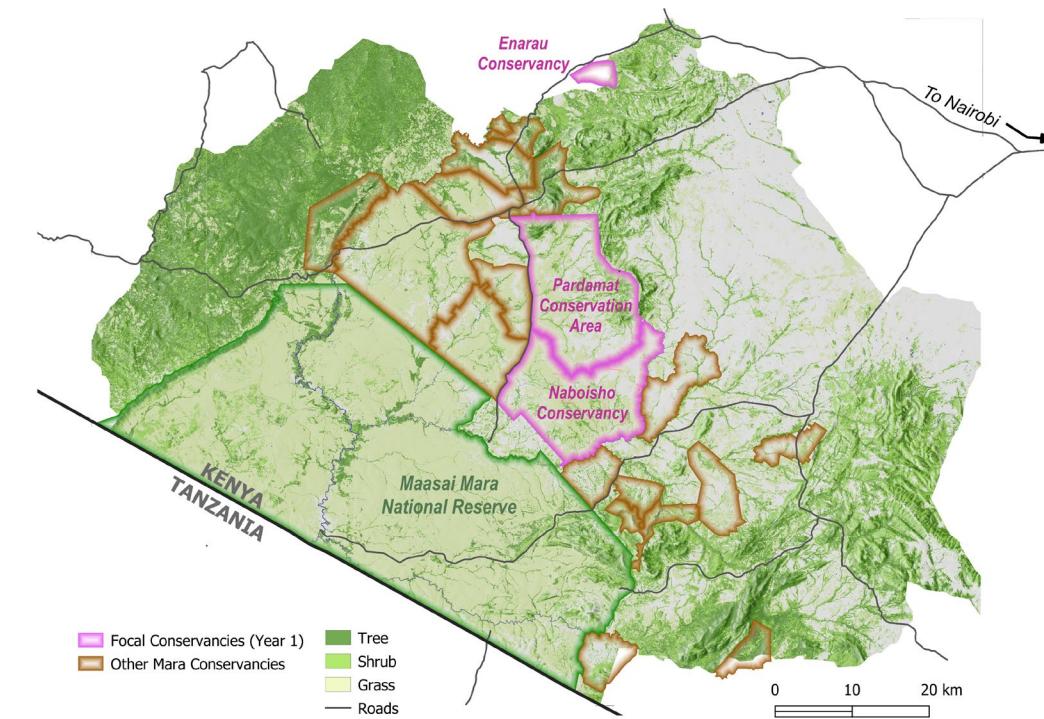
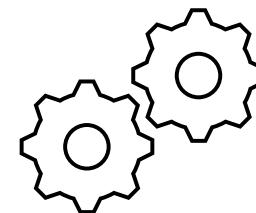




EARTH SCIENCE
APPLIED SCIENCES

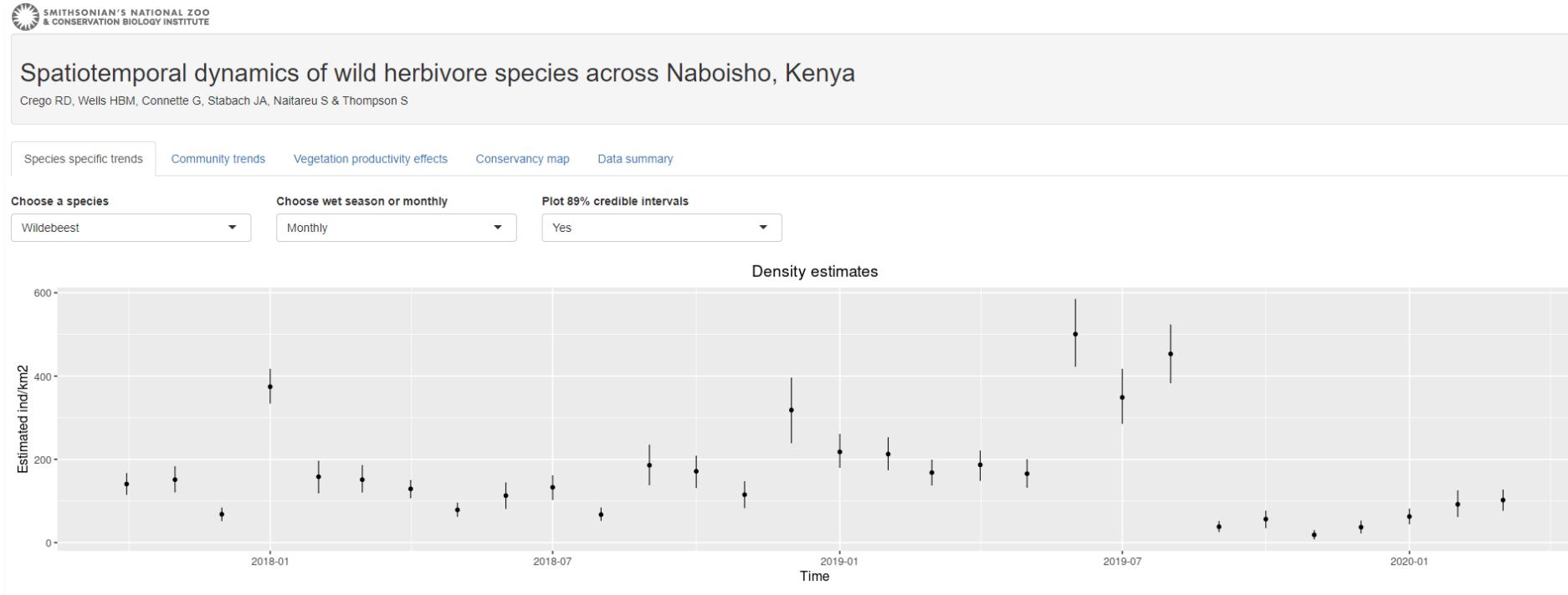
An Ecological Toolbox to Inform Livestock Grazing Allotments Across Wildlife Conservancies in Kenya

Award: 80NSSC23K1537





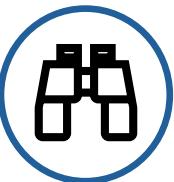
Ramiro D. Crego , Harry B. M. Wells, Grant Connette, Jared A. Stabach, Naitareu Soit, Stewart Thompson



Are Conservancies Working for Wildlife?

GOAL: Provide improved information on wildlife AND livestock abundance

Proposed Activities



In Situ BIOLOGICAL DATA COLLECTION

- Livestock abundance
- Wildlife species detections
- Distance to observation



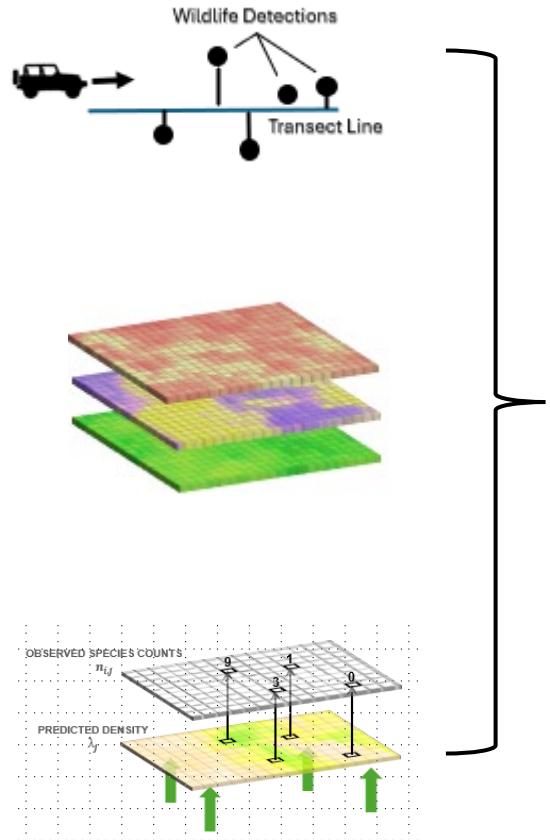
EARTH OBSERVATIONS

- Water availability (OPERA)
- Woody backscatter (ALOS PALSAR)
- Vegetation productivity (MODIS NDVI)



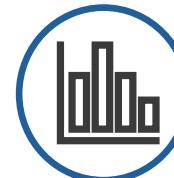
HIERARCHICAL DISTANCE SAMPLING MODEL

- Correct for observation bias
- Predict species abundance



Decision Support Toolbox

- Current wildlife population estimates
- Temporal trends in wildlife populations
- Current vegetation condition (NDVI)
- Temporal trends in vegetation (Δ NDVI)
- Interactive maps and data summaries
- Wildlife population projections and associated livestock stocking rates



Capacity Building

- Annual training workshops
- Annual Smithsonian internships

GOAL: Expand protocol across entire conservancy network by 2027

Monday, 16 September 2024 (Morning)

Introduction to R – Getting Started

- R and R-Studio: Where to Get Them?
- Basic/Fundamental Concepts
 - Setting Your Working Directory
 - Vector Notation [R,C]
- Understanding R Data Structures
 - Matrices and Dataframes
 - Calculations and Arithmetic Operations
- Additional Help
 - SWIRL



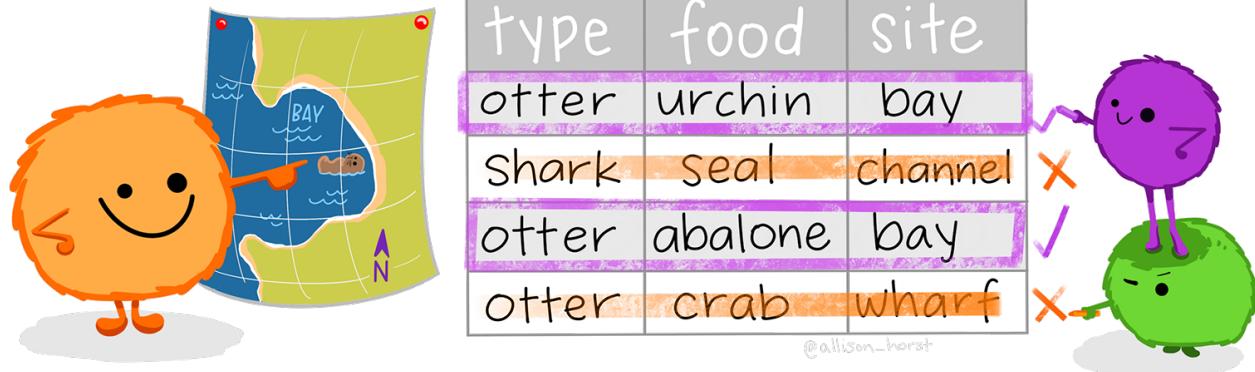
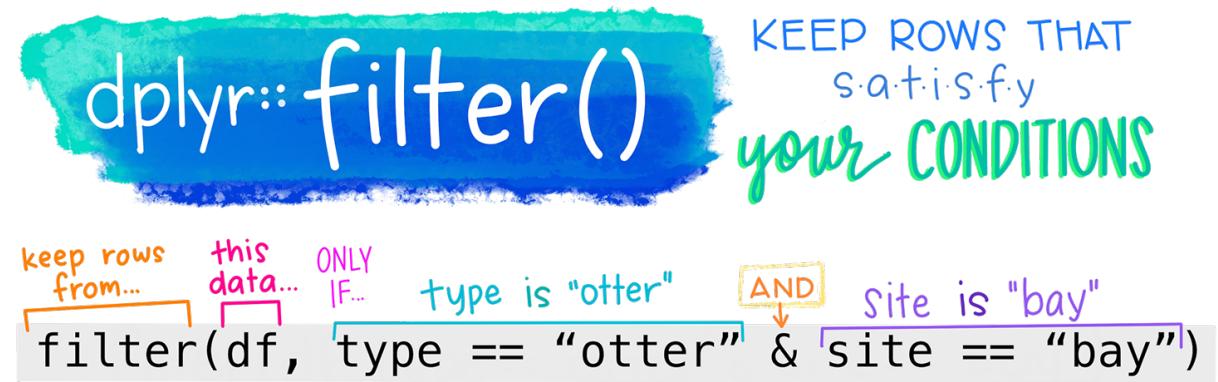
Artwork by Allison Horst



Monday, 16 September 2024 (Afternoon)

Introduction to Data Management in R

- Running a Script
- Data Table Manipulation/Wrangling
 - Getting Familiar with Dplyr
 - Using the Pipe Operator
 - Summarizing Data Frames
- **Exercise:** Summarize Naboisho Animal Counts



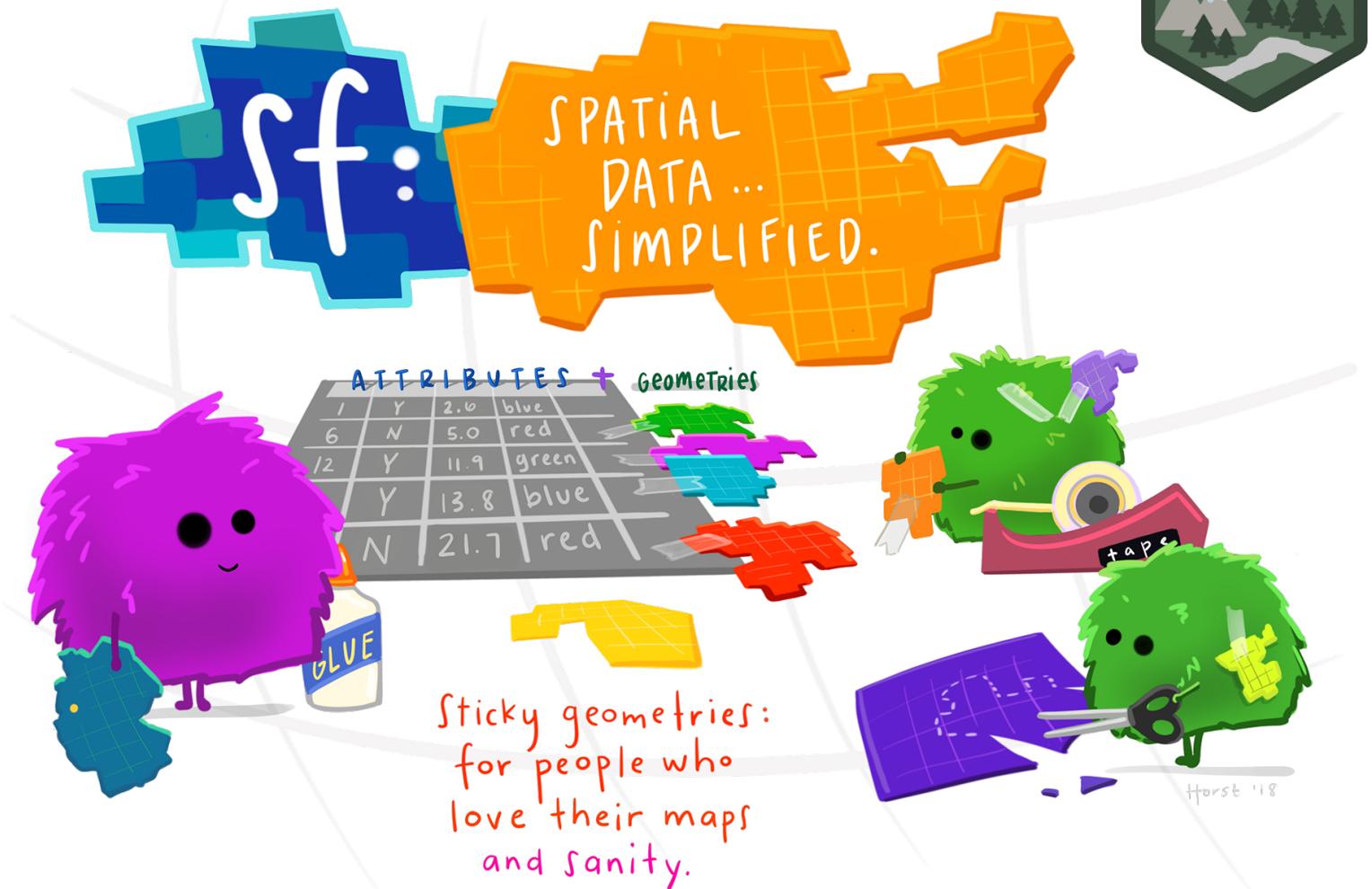
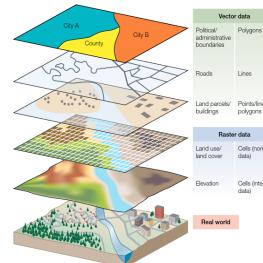
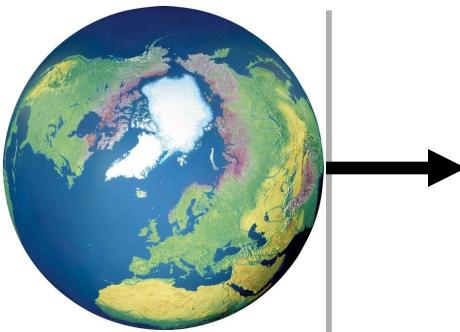
Artwork by Allison Horst



Tuesday, 17 September 2024

Introduction to GIS

- Working with Vector Data
 - Introduction to the sf package
- Working with Raster Data
 - Projections
 - Raster Math Operations
 - Image Plotting
 - Raster Extraction
- Simple Spatial Analyses
- Making a Dynamic Map with tmap
- **Exercise:** Make your own map

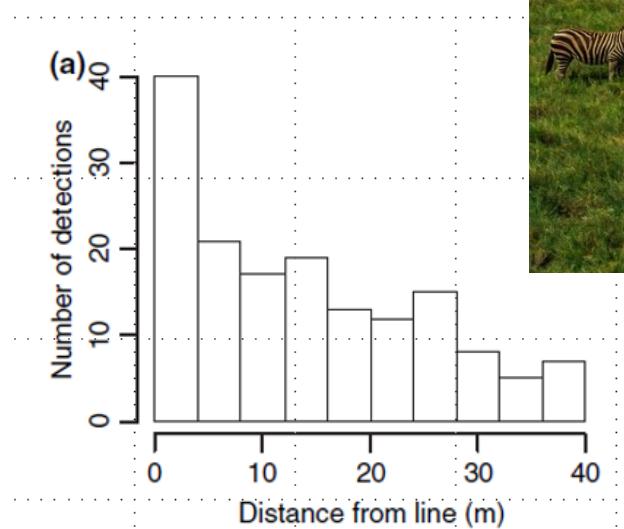


Artwork by Allison Horst

Wednesday, 18 September 2024

Introduction to Distance Sampling

- How to count wildlife
 - Total Count
 - Strip Transects
- Basics of Distance Sampling
 - Survey Assumptions & Limitations
 - Estimating Detection Probability
- **Exercise:** Conduct a Sample Count



Thursday, 19 September 2024

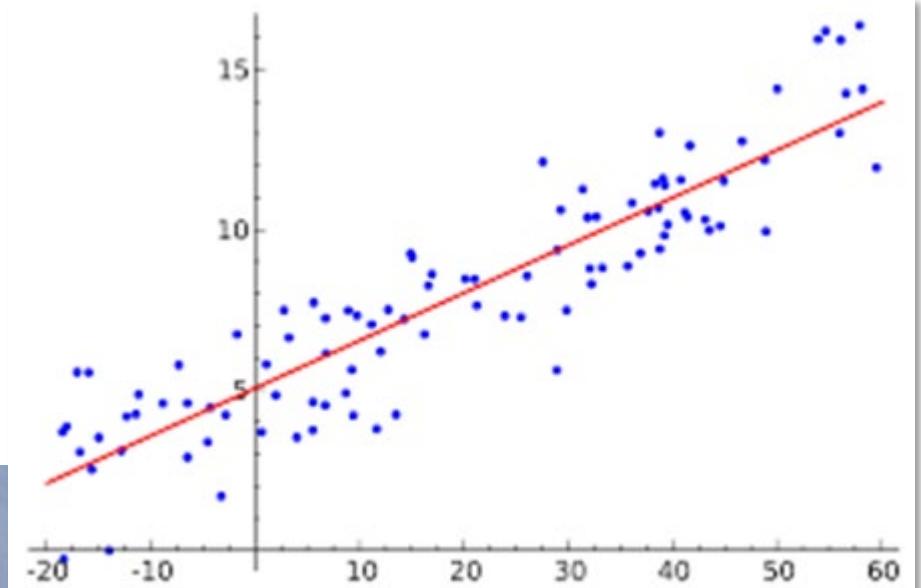
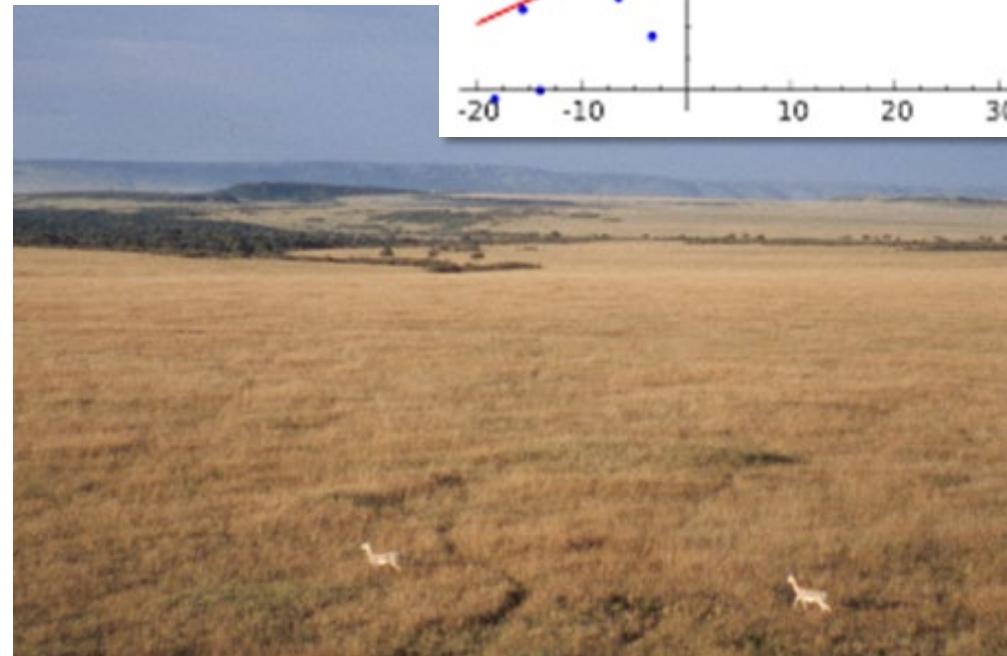
Introduction to Linear Regression + Poisson Regression

- Correlation vs. Regression
- Basics of Model Structure
- Working with Count Data
- Model Assumptions
- Model Selection and Interpretation

Exercises:

Choosing the Best Linear Regression Model

Analyzing Count Data



Friday, 20 September 2024

Introduction to Distance Sampling Models

- Importing Your Own Data
- Setting Up and Running Distance Sampling Models in R
- Interpreting Model Outputs
- Comparing Models
- **Exercises:**
 - Distance Sampling Demo App
 - Report on Golf Tee Transect Surveys

