

## 1. Harmonization Steps

- **Units:** Ensure all measurements (e.g., pellet counts, area surveyed) use the same units. Convert as needed.
- **Taxonomic Resolution:** If data sources record different taxonomic levels (e.g., species vs. genus), standardize them to the most relevant level.
- **Spatial Granularity:** Align spatial data (e.g., GPS coordinates, grid size) so all observations are at the same resolution.
- **Temporal Granularity:** Standardize time formats (e.g., date formats, time intervals) and aggregate or interpolate data if needed.
- **Survey Methodology Differences:** If different survey techniques were used, normalize results by adjusting for effort, detection probability, or area surveyed.

## 2. Wrangling Needs

- **Cleaning & Filtering:** Remove duplicates, correct errors, handle missing values, and standardize categorical labels.
- **Index Metrics:** Calculate pellet density per unit area and analyze seasonal trends.
- **Reshaping Data:** Convert between long and wide formats for efficient analysis (e.g., pivoting survey periods).
- **Aggregation:** Summarize data by time intervals (monthly/seasonal) or spatial units (plots/quadrants).

## 3. Efficiency & Future-Proofing

- **Automate Tasks:** Use Python/R scripts for cleaning and calculations.
- **Reduce Repetition:** Store common functions separately for reuse.
- **Improve Maintenance:** Use version control (Git) and document your workflow.

**Research Question:**

- How does white-tailed deer pellet density vary across different areas of Black Rock Forest, and what environmental factors influence this variation?

**Response Variables:**

- **Pellet group density** (e.g., pellets per square meter or hectare)
- **Environmental factors** (e.g., vegetation cover, elevation, soil type)

**Replication & Sample Size:**

- **Unit of replication:** Individual survey plots or transects
- **Number of replicates:** Total number of surveyed plots/transects

**Answer for this question**

**Existing Data:** Pellet counts, survey locations, and collection dates