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PROGRAM

1. **Introduction to Data Management in Animal Ecology** (Urbano & Cagnacci - 3.5 hours)
 - 1.1 Animal ecology data: challenges and opportunities [?]
 - 1.2 Introduction to Data Management and Spatial Database
 - 1.3 Installation of PostgreSQL/PostGIS and pgAdmin
 - 1.4 Connection to the database tracking_db
 - 1.5 Exploration of the main Database Features through pgAdmin Interface
2. **SQL and Spatial SQL** (Urbano & ??? - 15 hours)
 - 2.1 Introduction to SQL
 - 2.2 Overview of the database used for the exercises
 - 2.3 Schemas, tables, data types
 - 2.4 SELECT, FROM, WHERE
 - 2.5 AND, OR, IN, !=, NULL
 - 2.6 ORDER BY, LIMIT, DISTINCT, CASE, CAST, COALESCE
 - 2.7 LIKE
 - 2.8 GROUP BY (COUNT, SUM, MIN, MAX, AVG, STDDEV)
 - 2.9 HAVING
 - 2.10 Joining multiple tables
 - 2.11 LEFT JOIN
 - 2.12 Subqueries used in FROM and WHERE statements, WITH
 - 2.13 WINDOW functions
 - 2.14 INSERT, UPDATE, DELETE
 - 2.15 Temporal data (date, time, timezone), EXTRACT
 - 2.16 Spatial objects in PostGIS
 - 2.17 Create a point from coordinates
 - 2.18 Reference systems and projections
 - 2.19 Visualize spatial data in QGIS
 - 2.20 Create a line from ordered points (trajectory)
 - 2.21 Calculate distance between points and length of a trajectory
 - 2.22 Create a polygon from points (convex hull)
 - 2.23 Views
 - 2.24 Data export
 - 2.25 Roles and permissions
 - 2.26 Database backup and restore
3. **Storing an Ecological Dataset into a Database** (Urbano & ??? - 8 hours)
 - 3.1 Exploring a typical spreadsheet with ecological data collected on the field
 - 3.2 Identification and resolution of problems
 - 3.3 Creation of a table structure in the Database
 - 3.4 Import of dataset

- 3.5 Consolidation of data and creation of constraints
- 3.6 Use of SQL to retrieve information
- 3.7 Creation of views to assemble data for final users
- 3.8 Make a picture of the database data model with DBeaver
- 3.9 Exercise: replicate the process with another dataset

4. **Movement Ecology Data Management in PostgreSQL/PostGIS** (Urbano & ? - 8 hours)

- 4.1 Introduction to the goals and the datasets
- 4.2 Create a database and import sensor data
- 4.3 Create acquisition timestamps, indexes and permissions
- 4.4 Managing and modelling information on animals and sensors
- 4.5 From data to information: associating locations to animals
- 4.6 Manage the location data in a spatial database
- 4.7 From locations to trajectories and home ranges
- 4.8 Integrating spatial ancillary information
- 4.9 Data quality: how to detect and manage outliers
- 4.10 Recap exercises
- 4.11 Raster Data in PostGIS (demo)
- 4.12 Functions and triggers (supplementary material)

5. **Resource Selection Analysis in Movement Ecology with R** (van Loon - 3 hours) [*to be confirmed*]