Urban Biodiversity Inventory Framework

Protocols for Monitoring Birds

Objective and Purpose

Birds provide multiple services to biological, cultural, and systematic processes in the rural and urban ecosystem. Occupying multiple trophic levels, birds consume and manage populations of primary producers, serve as prey for consumers, and are key predators in the greater food web (Whelan et al., 2008). Birds contribute to seed dispersal and pollination of plants, strengthening their importance in urbanized habitats with increased barriers to biodiversity. Due to their ability to move across habitat patches with little impedance, ease of monitoring, sensitivity to environmental change, wide range of taxonomy and relatively stable populations, birds can be an important indicator of biodiversity in urban settings where patchwork habitats dominate the landscape (Eglington et al., 2012; Gregory, 2006; Whelan et al., 2008).

Protocol Consistency

Standardizing sampling protocols for the Urban Biodiversity Inventory Framework is a critical requirement of designing surveys that are replicable and producing results that are spatially and chronologically comparable (Larsen, 2016). This is especially important for long-term monitoring efforts that aim to measure changes over time. While a standardized approach among all cities using the Urban Biodiversity Inventory Framework is preferable, each city may identify a methodology best suited for their species of interest and resources at hand. It is important to record and report the methodology used and remain consistent in protocols unless modifications are essential to its improvement. It is equally important that site conditions and day-of conditions for sampling are kept as similar across sites as possible to reduce the impacts of confounding factors. All methodology will be improved with the use of non-biased approaches to data collection, appropriate sampling efforts and accurate reporting of data. In addition it is crucial that the survey point locations, time, effort, and observer expertise are replicated for each surveying event. The methodology below follows the assumption that the observers are properly trained, using methods to limit bias, and following designated protocol to ensure consistency among sites and years of sampling efforts.

Appropriate Protocols for Species Groups

The Point Count survey methods discussed below are recommended protocol for land birds including raptors and songbirds and some marsh birds, however, this method is not ideal for all birds. Please note if a ground nesting species is selected, nest surveys are a more suitable method and if a shorebird, cliff-dwelling or colonial species is selected, aerial surveys are preferred (Gregory et al., 2004). It is up to the city's discretion to select a methodology best tailored for their species of interest and resources available.

For cryptic and shy species, tape playback (broadcasting recorded calls) may be beneficial for inciting a response and increasing the chance of identification. It is important to be mindful that broadcasting calls may induce a predatory interaction by enticing predators who recognize calls from prey species. If you see a predatory bird arrive in the study site, immediately stop the tape playback. Additionally, the observers should move with as little sound and dynamic movements as possible to limit fleeing responses from bird species before identification.

Protocols for Monitoring Birds

Track 2
Presence/Absence

Data to be Entered into UBIF Database

- City
- Data Collector(s)
- Date
- Location name
- Ecosystem/habitat of interest
- Taxonomic group
- Species
- GPS coordinates (Lat/Long in decimal degree format)
- Reference or city site
- Target species presence or absence

Additional Required Information to Record (see Data Collection Sheet)

- Start and end time of survey at each point
- Radius of observation

Optional Information to Record (see Data Collection Sheet)

Site:
- Vegetative structure
- Slope
- Substrate/soil type
- Proximity to infrastructure
- Proximity to water
- Noise level

Individual sighting:
- Weather conditions
- Behavior code (See Behavior Codes)
- Physical characteristics
- Broadcast recording information (file name, volume, speaker placement, etc.)
  Note: This information is required if broadcasted calls are used

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Sampling Protocols:

Protocols adapted from those described in Gregory et al. (2004).

Condition Requirements:

Select a time of year and day to perform the presence/absence survey that is most likely to result in a sighting of your selected species. Site qualities such as vegetation structure, slope, substrate, proximity to water, proximity to infrastructure (such as railroads and highways) may influence species presence. Weather, wind, noise level and other day-of site qualities may also influence presence. Therefore, it is crucial that as many of these elements remain consistent across sites to control variability in results. In general, it is recommended that surveys should be performed on low wind, warm, dry days. The hour after sunrise and the hour before sunset are considered prime survey times on a given day.

Selecting Survey Points:

- Using random stratified sampling, select survey points within the site of interest. Be sure to sample a number of sites sufficient to confidently confirm presence or absence, taking territory and habitat/vegetation preference for your species into account.
- Perform a preliminary visit to your selected GPS points, and mark each with a stake or other stable marker for future reference.
- If broadcasting calls over speakers, create a list of sound files used and establish an order of use. This will be repeated at each survey point as well as future surveys.

Collecting Presence/Absence Data:

- If using speakers to broadcast calls, arrange at 90° angles and begin broadcasting the sound recordings.
- Determine a radius of observation (50-100 m recommended, depending on detectability of species of interest) to record all birds in. Keep this consistent across points, sites and time. Alternatively, cities can pre-emptively survey with multiple radii ahead of scheduled surveys and determine the range of detectability for the target species.
- Record individuals seen within a defined time period, including flyover sightings (at least 5-10 minutes recommended).
    - Discernible descriptive features (eg. age, unique features, sex) and current behavior (see Behavior Codes) may be recorded, but is not required for presence/absence surveys.
- Presence/absence will be determined for each survey point at city and reference sites.
    - If target species is observed at a survey point, the species is considered present. If target species is not seen at a survey point, the species is considered absent.
- Repeat at remaining survey points

Note: Example field sheets for point count surveys can be found in the USDA Handbook of Field Methods for Monitoring Landbirds.

Track 3
Relative Abundance

Note: Track 3 data can be collected from the same sites and survey points surveyed in Track 2. If Track 2 is not used, refer to Track 2: "Selecting Survey Points" for information on survey point selection within city and reference sites.

Data to be Entered into UBIF Database

- City
- Data Collector(s)
- Date
- Location name
- Ecosystem/habitat of interest
- Taxonomic group
- Species
- GPS coordinates (Lat/Long in decimal degree format)
- Reference or city site
- Relative Abundance (%)

Additional Required Information to Record (see Data Collection Sheet)

- Start and end time of survey at each point
- Radius of observation

Optional Information to Record (see Data Collection Sheet)

Site:

- Vegetative structure
- Slope
- Substrate/soil type
- Proximity to infrastructure
- Proximity to water
- Noise level

Individual sighting:

- Weather conditions
- Behavior code (See Behavior Codes)
- Physical characteristics
- Broadcast recording information
  Note: This information is required if broadcasted calls are used

Protocols for Monitoring Birds

Sampling Protocol:

Sampling protocols were adapted from those described in Reynolds et al. (1980).

Data Collection

- Arrange speakers (if using) at 90° angles, note position and sound level, and begin broadcasting the sound recordings.
- Determine a radius of observation (50-100 m recommended, depending on detectability of species of interest) to record all birds in. Keep this consistent across points, sites and time. Alternatively, cities can pre-emptively survey with multiple radii ahead of scheduled surveys and determine the range of detectability for the target species.
- Record individuals seen within a defined time period, including flyover sightings (at least 5-10 minutes recommended) within the defined radii. Discernible descriptive features and current behavior may be recorded, but is not required for presence/absence surveys (e.g. age, unique features, sex, Behavior Codes).
- Record all instances of calls identified as the target species
  - Make note if the call is confirmed with a visual sighting.
- Repeat at remaining survey points.

Note: Example field sheets for point count surveys can be found in the USDA Handbook of Field Methods for Monitoring Landbirds.

Calculating Relative Abundance

- Total the number of positive sightings for all species at each survey point.
- Relative abundance (%) will be calculated for each survey point by dividing the number of target species counted by the total number of birds counted to generate a percentage.

$$\text{Relative Abundance (\%)} = \frac{\text{Number of target species}}{\text{Number of target species + Number of non-target}} \times 100$$

Citations and Additional Resources

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