Remote Camera Decision Support Tool – Recommendation Report

**Version:** v0.1 (Demo)

**Date/time obtained:** [2024-10-04 20:45]

**NOTE:** The Remote Camera Decision Support Tool is meant to serve as a supplementary tool while designing your camera program. The recommendations provided are not a replacement for investigation into the optimal study design for your remote camera program. Instead, they are meant to serve as a starting point grounded in western science best practices; additional research is recommended.

# 1.0 Question summary

| **Level of design** | **Question** | **Potential options** | **Field** | **Question posed\*** | **User answer** |
| --- | --- | --- | --- | --- | --- |
| Objectives & Resources | Are you looking to design a new remote camera project, or analyze data that was already collected? | - Design a new remote camera project  - Analyze data that was already collected | Entry point | TRUE | Design a new remote camera project |
| Objectives & Resources | What state variable do you hope to measure? Select "Unknown" if you're not sure. | - Species inventory  - Species diversity & richness  - Occupancy  - Relative abundance  - Absolute abundance  - Density  - Vital rates  - Behaviour  - Unknown | State variable | TRUE | Occupancy |
| Objectives & Resources | Do you have a limited number of cameras?  If so, how many? | - YES; [numeric]  - NO | Number of cameras | TRUE | 40 |
| Study area & Site selection constraints | Do you plan to use data from multiple study areas? | - YES  - NO | Single vs multiple study areas | TRUE | Multiple |
| Study area & Site selection constraints | Will you place Camera Locations across a known density gradient? | - YES  - NO | Cameras placed on density gradient | FALSE | - |
| Study area & Site selection constraints | Do you plan to strategically place camera locations to include multiple habitats or otherwise differing categories (e.g., different land cover types, or near vs. far from a disturbance)  If so, how many covariates? (e.g., 5 different habitat types would be 5 covariates) | YES; [numeric]  NO | Stratification by chosen number of covariates | TRUE | YES ; 4 covariates |
| Duration & Timing | Is there a minimum number of months you can sample in total?  If so, how many? | - YES  - NO | Minimum survey months | TRUE | NO |
| .... | ..... |  |  |  |  |

**\*Question posed:** whether the question was posed to the user based on their previous selections.

# 2.0 Appropriate modelling approaches

[list of models and why a model was/was not appropriate; consideration within each modelling approach]

| **Modelling approach** | **Selection code** | **Because you chose…**[text version of "selection code"] | **Question posed\*** | **User answer** |
| --- | --- | --- | --- | --- |
| Occupancy | num\_cams\_avail>=40 | Number of cameras available ≥ 40 | TRUE | >= 40 (minimum) |
| Occupancy | cam\_independent=="TRUE" | Each camera location will be treated as an independent sample. | TRUE | TRUE |
| …. |  |  |  |  |

# 3.0 Sampling design recommendations

## Occupancy

### Recommendations - overview

| **Camera arrangement** | **Camera spacing** | **Number of cameras** | **Camera days per camera location** | **Total number of camera days** | **Survey duration** |
| --- | --- | --- | --- | --- | --- |
| - Ideally random  - Targeted  - Clustered  - Stratified random | ≥ 1 km | ≤ 30 | ≥ 30 | Species-dependent | - Species-dependent  - Ideally < 6 months |

### Recommendations - rationale

The rationale related to the modelling approach above; the "Applicable to user" column indicates whether the recommendation is applicable to the user based on their answers. Bold indicates options that are either "minimum", "maximum" or "ideal"

| **Selection code** | **Because you chose…**[text version of "selection code"] | **Applicable to user** | **Camera arrangement** | **Camera spacing** | **Number of cameras** | **Camera days per camera location** | **Total number of camera days** | **Survey duration** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NULL\*** | **-** | **TRUE** | **Ideally random** | - | - | - | - | - |
| **NULL\*** | **-** | **TRUE** | **Targeted** | - | - | - | - | - |
| **NULL\*** | **-** | **TRUE** | **Clustered** | - | - | - | - | - |
| **NULL\*** | **-** | **TRUE** | **Stratified random** | - | - | - | - | - |
| data\_hr=="FALSE" | Home range size information not known | FALSE |  | ≥ 1 km is typical |  |  |  |  |
| **data\_hr=="TRUE"; [e.g., 2 km]** | **Home range size information known; entered as 2 km diameter** | **TRUE** |  | **> 2 km** |  |  |  |  |
| sp\_rarity=="unknown" | **-** |  |  |  | > 40 |  |  |  |
| NULL\* | **-** | TRUE |  |  | > 60; species-dependent |  |  |  |
| sp\_rarity=="unknown" | Target Species rarity is "Unknown" | TRUE |  |  | Ideally ≥ 100 |  |  |  |
| sp\_rarity=="common" | Target Species rarity is "Common" |  |  |  | ≤ 30 |  |  |  |
| sp\_rarity=="less common" | Target Species rarity is "Less Common" |  |  |  | 30-60 |  |  |  |
| sp\_rarity=="rare" | Target Species rarity is "Rare" |  |  |  | > 150 |  |  |  |
| **sp\_detprob\_cat %in% c("med", "high")** | **Detection probability of Target Species is "Medium" or "High"** |  |  |  |  | **≥ 30** |  |  |
| sp\_detprob\_cat=="low" | Detection probability of Target Species is "Low" | TRUE |  |  |  | 80-100 |  |  |
| NULL\* | - | TRUE |  |  |  |  | Species-dependent |  |
| NULL\* | **-** | TRUE |  |  |  |  | > 1200 |  |
| sp\_detprob\_cat=="low" OR sp\_rarity="rare" | Target Species detection probability is "Low" OR  Target Species rarity is "Rare" | TRUE |  |  |  |  | > 5000 |  |
| NULL\* | - | TRUE |  |  |  |  |  | Species-dependent |
| NULL\* | **-** | TRUE |  |  |  |  |  | Ideally < 6 months |

\*Selection code = "NULL"; these recommendations are not tied to a particular question / are related to the modelling approach.

### Considerations

Consider how the following aspects of recommendations may change when considering your study:

* Home range size information is going to vary based on geographic location, nearby disturbances, etc., etc, etc… consider how the home range size of the species in your study may change and adjust accordingly.
* …..

It is always important to keep the models' assumptions in mind at all stages of your study.

Occupancy model assumptions:

* Occupancy is constant[3](abundance is constant)4
* Camera locations are independent4
* Detections are independent4
* The probability of occupancy and detection are constant across all camera locations within a stratum or can be modelled using covariates4
* Species are not misidentified4

# 4.0 Other considerations (not model specific)

| **Selection code** | **Because you chose…** [text version of "selection code"] | **Consider the following in your analysis** |
| --- | --- | --- |
| study\_area\_mult=="TRUE" | Multiple study areas | Include latitude, topography, temp, and or NVDI as covariates in analysis (Hofmeester et al., 2019). |
| seaons\_mult=="TRUE" | Multiples study seasons | Correct for multiple seasons by including season or temperature as covariates (Hofmeester et al., 2019). |
| bait\_lure\_cam\_subset=="TRUE" | Bait/lure placed at a subset of cameras | If placing bait/lure at a subset of cameras, correct for variability in bait/lure effects by including bait/lure presence as a covariate. |
| cam\_setting\_mult=="TRUE" | Variable camera settings | Include each setting that differs as a covariate. |
| fov\_target\_feature\_mult=="TRUE" | Targetting multiple features | Correct for variable placement on detection probability by including FOV Target Feature "type" as a covariate. |