Summary of camera trap data, SAGW, 2022

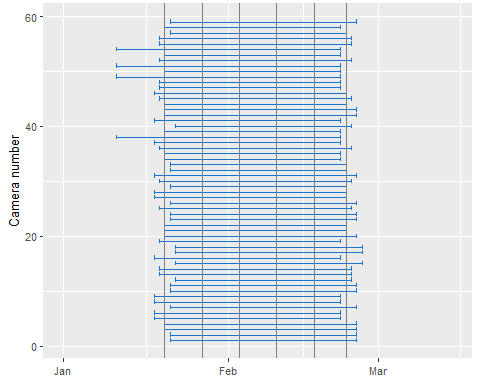
2023-06-06

# Effort

A total of 59 cameras were deployed in SAGW between 2022-01-11 and 2022-01-22 and were retrieved between 2022-02-22 and 2022-02-26. We delineated a total of 5 sampling occasions that were each 7 days long.

| Occasion | Start | End |
| --- | --- | --- |
| 1 | 2022-01-20 | 2022-01-26 |
| 2 | 2022-01-27 | 2022-02-02 |
| 3 | 2022-02-03 | 2022-02-09 |
| 4 | 2022-02-10 | 2022-02-16 |
| 5 | 2022-02-17 | 2022-02-23 |

In the figure below, each horizontal blue line represents a camera deployment. The gray vertical lines denote the beginning and end of the 5 consecutive sampling occasions.



# Detections

We detected a total of 11 mammal species on the 59 cameras during the 5 sampling occasions. For each species in the table below, we list the total number of photographs obtained (multiple photos may occur at the same camera location in the same day), the number of detections to be used in an occupancy modeling framework (maximum of one detection per location per sampling period), and unique number of camera locations where the species was photographed.

| Common name | Scientific name | No. photos | No. detections | No. locations |
| --- | --- | --- | --- | --- |
| Javelina | *Peccary tajacu* | 685 | 53 | 26 |
| Mule deer | *Odocoileus hemionus* | 548 | 68 | 36 |
| Black-tailed jackrabbit | *Lepus californicus* | 191 | 36 | 15 |
| Coyote | *Canis latrans* | 188 | 68 | 31 |
| Gray fox | *Urocyon cinereoargenteus* | 170 | 67 | 31 |
| Desert cottontail | *Sylvilagus audubonii* | 117 | 56 | 21 |
| Unknown jackrabbit | *Lepus sp.* | 113 | 31 | 12 |
| Bobcat | *Lynx rufus* | 48 | 23 | 15 |
| Feral dog | *Canis familiaris* | 9 | 3 | 2 |
| American badger | *Taxidea taxus* | 3 | 3 | 3 |
| Unknown skunk | *Mephitidae* | 1 | 1 | 1 |

# Modeling approach

## Occupancy models

For each species with a sufficient number of detections (% detection rate), we used single-season occupancy models to estimate the probability of occurrence and the probability of detection given occurrence (MacKenzie et al. 2002). To estimate these parameters, we generate encounter histories for each camera location, where a “1” denotes that the species was detected at least once during a sampling occasion and a “0” indicates that the species was not detected. For example, an encounter history of “10011” would indicate that a species was photographed at least once during the 1st, 4th, and 5th sampling occasions and was not photographed during the 2nd and 3rd sampling occasions.

We used a Bayesian framework to estimate model parameters as this made it easier to estimate derived parameters (e.g., proportion of area occupied across the entire park) with associated uncertainties and incorporate random effects to account for uncertainties beyond that explained by covariates in the model. We ran analysis in R using the spOccupancy package (CITES).

For each model, we used 3 chains, each with 8000 samples including 4000 burn, thinning by 8. Left with 1500 samples across all chains for posterior inference.

## Model selection

We characterized …

We extracted a number of spatial covariates for Saguaro National Park - Tucson Mountain District that could explain variation in occurrence probabilities, detection probabilities, or both.

* candidate model set (general)
* how a model for inference was selected

# Species 1 (create species sections in a loop since the number of species will change across parks and years?)

| Parameter | Covariate | Mean | SD | Lower95% | Median | Upper95% | Rhat | ESS | f | exclude0 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occurrence | (Intercept) | 1.177 | 0.614 | 0.045 | 1.135 | 2.416 | 1.010 | 1,375 | 0.980 | yes |
| Occurrence | elev\_z | -1.629 | 0.674 | -3.044 | -1.590 | -0.450 | 1.009 | 1,294 | 0.997 | yes |
| Occurrence | vegclass2 | -2.081 | 0.991 | -4.028 | -2.077 | -0.189 | 1.007 | 1,379 | 0.985 | yes |
| Occurrence | vegclass3 | -1.428 | 0.923 | -3.257 | -1.401 | 0.337 | 1.012 | 1,500 | 0.942 | no |
| Detection | (Intercept) | -0.375 | 0.175 | -0.733 | -0.372 | -0.045 | 1.004 | 1,500 | 0.988 | yes |

## Model used for inference

Brief description

Table with parameter estimates (along with generic caption)

Table with overall estimate (or estimates by vegclass)

## Estimated occurrence probabilities

Map

## Estimated covariate effects on occurrence and/or detection probabilities

Figures with captions

Two examples of how to do things in a loop: