# Long-term monitoring and experimental manipulation of a Chihuahuan Desert rodent community near Portal, Arizona (1977 – 2013).

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# INTRODUCTION

The long-term data for the rodent community at the Portal Project has been used to address a variety of questions including competition among rodents and with ants, tradeoffs between movement and life history traits, and responses of populations and the entire community to climate. This metadata file describes the field data collection techniques and data structure for the rodent dataset.

# METADATA CLASS I. DATA SET DESCRIPTORS

A. Data set identity:

Title: Long-term monitoring and experimental manipulation of a desert rodent community in the Chihuahuan Desert near Portal, AZ (1977 – 2013).

B. Data set identification code: Portal\_rodent\_19772013.csv

Portal\_rodent\_species.csv

Portal\_rodent\_trapping.csv

C. Data set description

Principal Investigator:

S.K. Morgan Ernest, Department of Biology, Utah State University, Logan UT 84322

**Abstract:** The data set covers a 37 year period (1977-2013) of monthly rodent surveys. Each year rodents are trapped on all 24 experimental plots and information on each captured rodent is contained in this file. The data set should prove useful for studying population dynamics and species interactions. Sampling is ongoing and data will be added over time.

**D.** Key words:  desert rodents, arid ecosystem, climate, competition, LTREB data

# CLASS II. RESEARCH ORIGIN DESCRIPTORS

A. Overall project description

**Identity:** Capture data for every desert rodent caught on the 20 ha study area in the Chihuahuan Desert near Portal, AZ.

**Originators:** Drs. James H. Brown, Diane W Davidson, James Reichman

**Period of Study**: 1977-2013

**Objectives:** To monitor the community- and population-level dynamics of desert rodents and competitive interactions among rodent species.

**Source(s) of funding:** SeePortal\_metadata\_overview.html

B. Specific subproject description

(Because there have been no major changes in protocol, this section is the same as Ernest et al 2009. Any differences are highlighted in italics).

**1. Site description:** Within the 20 ha study area there are 24 experimental plots. Each plot has an area of 0.25 ha and is fenced to regulate rodent access to the plot. Access is regulated using gates cut into the fencing. Large gates (3.7 x 5.7 cm) allow all small mammals to access plots. Small gates (1.9 x 1.9 cm) exclude kangaroo rats (*Dipodomys*) whose inflated auditory bullae make their skulls too large to pass through the gates. Rodent removal plots do not contain any gates and animals caught on those plots are removed and released outside the cattle exclosure fence.

On each plot there are 49 permanent trapping stations marked by rebar stakes forming a 7x7 grid. Every stake on a plot has a unique identifying number denoting the coordinate of that stake on that plot. Rows are numbered 1 through 7 going from the most northern row to the most southern. Columns are numbered 1 through 7 going from the most western column to the most eastern. For example, stake 73 is the third stake on the final (seventh) row (See Portal\_metadata\_overview.html, Fig 1). *Starting in 2005, stakes 16 – 17 no longer exist in plot 24, due to changes to plot shape*.

**Treatments:** See Portal\_metadata\_overview.html, Table 1, for details on treatment assignments for each plot. See the previous data publication (Ernest et al 2009) for a history of plot treatments and methods.

**Data Collection Period, Frequency:** From 1977-2013, plots were trapped around each new moon – which occurs approximately once a month, though occasionally blue moons do occur, resulting in 2 separate surveys in a month. Occasionally, months are missed. Months that are entirely missed are not noted in the database. Sometimes weather or other unforeseen occurrences prevent the complete trapping of a survey, these are noted in the database (see Table 1 below). *Due to intermittent funding, gaps in data collection exist beginning in 2010.*

3. Research Methods

**Field:** The site is surveyed for rodents approximately once each month. The survey occurs as close to the new moon as possible to minimize external effects on trapping success which could be misconstrued as actual changes in populations. During a survey, each plot is trapped for one night with treatments divided evenly between nights to eliminate differences between controls and treatments caused by environmental differences on different nights. When a plot is surveyed, all gates are closed to ensure that only resident individuals are captured. At each stake, one Sherman live-trap is placed and baited with millet seed. Traps are collected the next morning and individuals processed.

Any animal found in a trap is recorded. Non-rodent species are occasionally trapped and so are given species codes. Several flags are included in the species table to restrict the species list to only rodents, only target species, or only granivores. Additionally, the Note2 column in the rodent data table contains a flag for non-target species (=13).

Each individual of a target species is tagged and data on species, location caught (plot and stake), sex, reproductive condition, weight, and hindfoot length are recorded. It is noted in the database if either an animal escaped before all information was gathered, was removed from the site because it was caught on a plot it was supposed to be excluded from, or died during trapping. Data collection methodology remains consistent with the data from the previous publication (Ernest et al 2009).

**Taxonomy and systematics:** Taxonomy and identification of species is consistent with Mammals of Arizona by Hoffmeister (1986), with the exception that some species identified as *Perognathus* in Hoffmeister (1986) are now a separate genus (*Chaetodipus*).

**4. Project personnel:**  Our current estimate of the number of people who have assisted with the rodent survey is currently well over 100. Many of these people assisted on a volunteer basis and this work would not have been possible without their help.

# CLASS III. DATA SET STATUS AND ACCESSIBILITY

A. Status

Latest Update: December 2013

Latest Archive date: December 2013

**Metadata status**: The metadata are complete and up to date.

**Data verification:** In general, quality control activities are on-going. After every survey, every record for a captured individual from that survey is compared to preexisting records for that tag number to assure that errors have not been made in species or sex identification in the field. For example if a female *Dipodomys merriami* with tag 0001 was captured, previous incidences of that tag number are compared to make sure that it has always been identified as a female *Dipodomys merriami*. Discrepancies are settled using either additional information (i.e. if an individual has been recorded as a non-reproductive female and is now a scrotal male – a trait that is hard to misidentify - the male designation overrides the previous information) or by using the value recorded in the majority of identifications if more than one previous record exists. The tag column is kept up to date with an individual’s latest tag for this purpose. When animals lose a tag and need to be retagged, their tag number is updated in the database. Thus, the tag column alone can be used as an individual identifier. The exception is cases in which all previous tags were lost and the individual was given a new tag with no way of knowing what its previous tag number was. However, the note4 column is used to mark individuals with torn ears, or other indications that they had been previously tagged. Because tag numbers are recycled over the course of 30+ years these comparisons are restricted to the previous 3 years, which is usually less than the tag number recycle rate, and approaches the maximum number of years a rodent would be expected to live.

Data have also been periodically spot checked by people using the database who find oddities or outliers. Questions regarding particular records are answered by referring to the original datasheets. Datasheets for the rodent database currently reside with S.K. Morgan Ernest at the University of Florida.

For the publication of the dataset, an additional and extensive quality control effort was initiated. Information outside the norms (e.g. stake numbers that do not exist, undocumented species codes, plots with no animals recorded, weights either too small or too large for the identified species) was systematically checked and compared to original datasheets. Corrections were made based on datasheets or notes were added to the database if correction was not possible. A list of notes and their meaning is included below (Table 1). In addition, random spot checking of records also occurred during this process.

B. Accessibility

**Storage location and medium:** (Ecological Society of America data archives [Ecological Archives], URL published in each issue of its journals). Original data files reside with S.K. Morgan Ernest on two separate machines. Original datasheets also reside with S.K. Morgan Ernest. Scanned copies of datasheets are maintained on a backed up computer that does not reside at the University of Florida.

**Contact person:** S.K. Morgan Ernest, Department of Wildlife Ecology and Conservation, 110 Newins-Ziegler Hall, PO Box 110430, Gainesville, FL 32611, Phone: 435-797-8751 email:skmorgane@ufl.edu

**Copyright restrictions**: None.

**Proprietary restrictions:** None. However, we do request that authors of publications using the rodent database notify S.K. Morgan Ernest (contact information above) of publication of their study. This helps us by allowing us to make accurate reports to the National Science Foundation and document that the scientific community finds the data from this study to be useful.

**Costs:** None.

# CLASS IV. DATA STRUCTURAL DESCRIPTORS

### RODENT SURVEY

A. Data Set File

**Identity:** Portal\_rodent\_19772013.csv

**Size:** 58173 rows (including header), 3266 kilobytes.

**Format and storage mode:** ASCII text, comma delimited. No compression scheme used.

**Header information:** The first row of the file contains the variable names below.

Alphanumeric attributes: Mixed.

B. Variable information

**Table 1**. Column information for Portal\_rodent\_20032013.csv

Each row in this dataset is the information collected on an individual rodent during that survey. If an individual is caught multiple times, it has multiple entries in the dataset. For most variables, a blank cell indicates missing data. The exceptions are as follows: reproductive variables (Reprod, Testes, Vagina, Pregnant, Nipples, Lactation) and notes (note1, note2, note3, note4, note5). For reproductive variables, blanks can indicate either missing data or lack of reproductive condition. If the variable ‘Reprod’ = Z then the animal is not in reproductive condition and blanks in the other reproductive condition variable indicate that the individual did not display any of those conditions. If ‘Reprod’ = blank, but at least one other reproductive value is recorded, then blank cells again indicate the individual did not display any of those conditions. If ‘Reprod’ = blank and all other reproductive variables are also blank, then reproductive information was not collected for that individual. For notes, blanks do not denote missing information. Instead, they denote nothing relevant to report.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Variable name* | *Variable definition* | *Units* | *Storage type* | *Precision* | *Variable codes, definitions, and notes* |
| Mo | Month survey occurred | N/A | Integer | N/A | N/A |
| Dy | Day survey occurred | N/A | Integer | N/A | N/A |
| Yr | Year survey occurred | N/A | Integer | N/A | N/A |
| Period | Unique number assigned to each survey period | N/A | Integer | N/A | There are positive and negative period codes. A negative period code indicates a SERIOUS issue with the data (we don’t use it for studying long-term trends and we don’t recommend you do either). See variable Note1 for details. |
| Plot | Plot number animal was caught on | N/A | Integer | N/A | Plot numbers = 1-24 |
| Note1 | Provides additional information about the record, if additional information needed | N/A | Integer | N/A | 1=some missing data (i.e. stake missing, mass, gender) but otherwise record is good, 2=plot trapped, no animals present, 3=stake numbers suspect, 4=plot not trapped (this and note1=2 allows differentiation between real zero abundances and missing data), 5=gates open+non-survey, 6=gates open, 7=animal caught on site, but outside plot, 8=non-survey, 9=outside plot on exterior grid, 10=plot fence down, 11=plot number suspect, 12=mass suspect, 13=not a target animal, no data collected, 14=plot not completely trapped |
| Stake | Stake number where animal was caught | N/A | Integer | N/A | There are stake numbers that are not consistent with the grid. Some of these are from the ring of rebar outside the plot (these records are marked with negative period codes). Single digit stakes not marked with a negative period code denote stakes that occurred on a plot but where part of the stake number is missing on the data sheet. Exception: 99= along with note=2, this is meant to emphasize that this plot WAS trapped and no animals present |
| Species | Species | N/A | Character | N/A | See Table 3 for species codes |
| Sex | Gender of individual | N/A | Character | N/A | M=Male  F=Female |
| Age | Is animal juvenile? | N/A | Character | N/A | J=Juvenile |
| Reprod | Signs of reproductive activity? | N/A | Character | N/A | Z=zero  If blank, reproductive evidence is recorded in next 5 columns |
| Testes | Reproductive condition of males: testes | N/A | Character | N/A | S=Scrotal  M=Minor (testes just descending)  R=Recent (testes recently retracted into abdomen) |
| Vagina | Female reproductive condition: vaginal opening | N/A | Character | N/A | S=Swollen  P=Plugged  B=Both |
| Pregnant | Female reproductive condition: pregnant | N/A | Character | N/A | P=Pregnant |
| Nipples | Female reproductive condition: nipples | N/A | Character | N/A | R=Red  E=Enlarged  B=Both |
| Lactation | Female reproductive condition: lactation | N/A | Character | N/A | L=lactating |
| Hfl | Hindfoot length | mm | Integer | 1 mm | N/A |
| Wgt | Weight | grams | Integer | 1 gram | N/A |
| Tag | Individual’s primary identification tag | n/a | Character | N/A | If this tag is an eartag, this was also the right ear tag |
| Note2 | New tag flag | n/a | Character | N/A | \* = new tag. Often indicates new animal. Sometimes indicates a replacement tag for an old animal. See prevrt and prevlt. |
| Ltag | Secondary identification tag | n/a | Character | n/a | Redundant ear tags were sometimes used. Also, when problems arose with animal’s primary tag, a secondary tag was often affixed. |
| Note3 | New secondary tag flag | n/a | Character | n/a | \*=new secondary tag |
| Prevrt | Previous right ear tag | n/a | Character | n/a | If ear tag looked tenuous, it was sometimes replaced with a new tag. This is the number of the tag that was replaced |
| Prevlet | Previous left ear tag | n/a | Character |  | If ear tag looked tenuous, it was sometimes replaced with a new tag. This is the number of the tag that was replaced |
| Nestdir | Direction of burrow from the nearest stake | n/a | Character |  | E=East  W=West  N=North  S=South  NE=Northeast  NW=Northwest  SW=Southwest  SE=Southeast |
| Neststk | Nearest stake number to burrow | n/a | Integer | n/a |  |
| Note4 | Notes regarding tags or ear condition |  | Character |  | UT=untagged  TE= Torn Ear  TA=tagged animal  TR=torn right ear  TL=Torn left ear  TB=Torn Both ears |
| Note5 | Dead, Removed, Escaped? |  | Character |  | D=Died in trap  E=escaped during handling  R=removed from plot |

### RODENT SPECIES LIST

A. Data Set File

**Identity:** Portal\_rodent\_species.csv

**Size:** 38 rows (including header), 3 kilobytes.

**Format and storage mode:** ASCII text, comma delimited. No compression scheme used.

**Header information:** The first row of the file contains the variable names below.

Alphanumeric attributes: Mixed.

B. Variable information

Table 2. Column information for Portal\_rodent\_species.csv. Non-rodent species are occasionally trapped and so are given species codes. Several flags are included in the species table to restrict the species list to only rodents, only target species, or only granivores. Additionally, the Note2 column in Portal\_rodent\_19772013.csv also contains a flag for non-target species (=13).

|  |  |  |  |
| --- | --- | --- | --- |
| *Variable name* | *Variable definition* | *Storage type* | *Variable codes, definitions, and notes* |
| Species Code | Two-letter code | Character |  |
| Scientific Name | Genus species | Character |  |
| Taxa |  | Character | “Rodent”, “Rodent-non censused”, “Bird” or “Reptile” |
| Common Name |  | Character |  |
| Census Target |  | Integer | 0 (non-target) or 1 (target species). Additional data not recorded for non-target species. |
| Unidentified | Unidentified animal, or only identified to Genus | Integer | “1” indicates a species code used when the individual is not completely identified. “0” indicates all regular species codes. |
| Rodent |  | Integer | Since we record all animals caught in traps, some entries are for non-rodents (0). “1” indicates all rodent species codes. |
| Granivore |  | Integer | “1” indicates all species codes for rodents in the granivorous community. “0” indicates all other species codes, including non-rodents and non-granivorous rodents. |

### RODENT TRAPPING SUMMARY

A. Data Set File

**Identity:** Portal\_rodent\_trapping.csv

**Size:** 10128 rows (including header), 192 kilobytes.

**Format and storage mode:** ASCII text, comma delimited. No compression scheme used.

**Header information:** The first row of the file contains the variable names below.

Alphanumeric attributes: Mixed.

B. Variable information

Table 3. Column information for Portal\_rodent\_trapping.csv. Plots are trapped as close as possible to every new moon of the year, over the course of two nights. This table provides a guide to the dates on which those trapping events occur, and cases in which some plots were not trapped during a census. The note2 column in Portal\_rodent\_19772013.csv provides more information about why a plot was not trapped during a census.

|  |  |  |  |
| --- | --- | --- | --- |
| *Variable name* | *Variable definition* | *Storage type* | *Variable codes, definitions, and notes* |
| Day |  | Integer |  |
| Month |  | Integer |  |
| Year |  | Integer |  |
| Period | Unique number given to the two-day trapping event | Integer |  |
| Plot |  | Integer |  |
| Sampled |  | Integer | 1 (trapped during the census) or 0 (not trapped) |

# CLASS V. SUPPLEMENTAL DESCRIPTORS

A. Publications using the data set: See Portal\_metadata\_overview.html

# LITERATURE CITED

Ernest, S. K. Morgan, Thomas J. Valone, and James H. Brown. 2009. Long-term monitoring and experimental manipulation of a Chihuahuan Desert ecosystem near Portal, Arizona, USA. Ecology 90:1708.

Hoffmeister, D.F. 1986. Mammals of Arizona. University of Arizona Press, Tucson, AZ.