1974

Jornada Validation Site

Walter G. Whitford

1973 PROGRESS REPORT

JORNADA VALIDATION SITE

Walter G. Whitford (Coordinator)
New Mexico State University

US/IBP DESERT BIOME
RESEARCH MEMORANDUM 74-4

Reprint from Reports of 1973 Progress, Volume 2: Validation Studies
Jornada, 110 pp

1973 Proposal No. 2.2.2.4.

MAY, 1974

Citation format: Author(s). 1974. Title.
US/IBP Desert Biome Res. Memo. 74-4. 110 pp.

Ecology Center, Utah State University, Logan, Utah 84322

ABSTRACT

The Jornada Validation Site studies initiated in 1970 continued in 1973 on the bajada and playa portions of a small watershed in the Chihuahuan Desert. Studies of state variables continue to provide the data necessary for analyzing the dynamics of this desert watershed ecosystem. The following paragraphs compare the alluvial fan site (bajada) with the playa site and relate to the salient findings of the major investigations.

Abiotic—Instrumentation to monitor air temperatures in a standard weather bureau shelter was established on the playa bottom in March, 1970 and on the bajada study site in May, 1971. The warmest month for both areas was July, while the coldest month was January. It appears that the playa site has greater extremes than the general climate of the area. When compared to the playa, the bajada site is generally 3 to 6 F warmer on the average in winter months, perhaps reflecting its upland position relative to cold air drainage.

In 1973 the pattern of precipitation did not follow the pattern typical of the Chihuahuan Desert with little rainfall in the winter and spring and most of the rainfall in July, August and September. Other abiotic parameters being monitored include solar radiation, relative humidity, wind, soil temperature, and soil moisture.

Plant Productivity—Highest total densities of annual forbs were recorded in August, 1973 with greatest summed total and reproductive biomass occurring in the same month. In contrast, densities of annual forbs were highest on the bajada in April and May with maximum summed total and reproductive structure biomass occurring at two times corresponding with maximum density.

The small perennial vegetation was sampled concomitantly with the annual vegetation. Data show that the greatest total density of perennial grasses on the playa occurred in August, 1973. Greatest total densities of perennial forbs occurred in August, 1973, whereas the greatest total density of sub-shrubs was in May, 1973. Measurements were taken in the playa edge and playa bottom proper.

Greatest total density and greatest summed total biomass of perennial grasses on the bajada occurred in October, 1973. Perennial forb maximum total density and maximum summed total biomass occurred in May, 1973.

Large perennial vegetation on the playa was studied using forty 5 x 100 m belt transects randomly positioned around the playa fringe. Biomass components were estimated using size characteristics for each species. Off-site destructive sampling was used to obtain regression equations relating biomass to canopy ground cover and canopy volume. Growth patterns, reproductive patterns and biomass estimates were studied for *Yucca elata, Xanthocephalum sarothrae, Ephedra trifurca*, and *Prosopis glandulosa.*

Large perennials on the bajada were also monitored for biomass changes through time using forty 5 x 100 m belt transects. Biomass components were estimated using the size dimensions of the individuals of each species. Again, off-site destructive sampling was used to obtain regression equations relating biomass of component parts of each species to the canopy cover and canopy volume. Estimation equations were developed for *Larrea divaricata, Flourensia cernua, Parthenium incanum, Zinnia pumila, Fallugia paradoxa*, and *Yucca baccata.*

The 1973 data from the Jornada Validation Site demonstrated the importance of rainfall and other variables in a Chihuahuan Desert ecosystem. In 1973, rainfall was above average from January through July. From August to the end of the year, rainfall amounts were below the long-term average. The spring months in 1973 were cooler than normal, but by early summer and through the fall, temperatures were normal. The winter and early spring rains resulted in an abundance of desert annuals, particularly in the species of *Crypthantha, Descurainia* and *Eriogonum.*

Invertebrates—Shrub arthropod populations, taxa and diversity were studied. On the playa, *Prosopis glandulosa* was the only shrub that supported large arthropod populations. The principal taxa involved was Psyllidae, which showed peak populations in July, possibly in response to plant growth. The arthropod populations on the playa bottom showed extreme fluctuations. These fluctuations probably reflect changes in annual flora composition and the phenology of the grasses.

The bajada shrub arthropod populations also showed marked fluctuations. A large peak of Mirids occurred in the spring on *Larrea divaricata.* Small peaks of Chrysomelids occurred in the summer and fall on *Fallugia paradoxa.* The peaks were possibly due to the life cycle of the taxa involved. In the spring and late summer, peaks of Psyllids occurred on *Flourensia cernua* and *Prosopis*, possibly reflecting changes in the phenology of the plants.

Large mobile insect populations were estimated by flush transect methods. On the playa, the predominant insects were grasshoppers and butterflies. The peak populations occurred in the early summer, principally on the playa bottom.

On the bajada, grasshoppers and butterflies showed similar changes, but to a lesser degree. The differences were probably due to the playa's grass bottom and annual production.

Amphibians—Amphibians were primarily sampled on the playa site. The most abundant amphibians were the small Pelobatid species which were typically active in May and June. Most toad activity occurred in the grassy playa bottom, however, *Scaphiopus couchi* and *Bufo cognatus* were seldom observed at this location. *Bufo punctatus* was observed on the bajada site but never on the playa site. Amphibians in general have a restricted number of days when conditions for activity are favorable. Much of the year it is too dry to permit extended activity.

Reptiles—In general the diversity of lizards was higher than during the previous several years. *Cnemidophorous tigris* was the most abundant lizard on both sites and was twice as abundant on the bajada as on the playa. Along with lizards, observations were recorded on snakes.

Birds—In 1973 the timing of census of birds on the playa was revised from that of 1971 and 1972. A weekly schedule was kept as closely as possible until September when the schedule was changed to every other week. The method of census was the same as that used in 1971 and 1972, the strip census method of Emlen (1971).

On the playa site aquatic species were absent and raptors, non-breeding insectivores and miscellaneous species dropped in number. Winter seedeaters were down in the fall and doves and quail were much higher than in previous years. Density of breeding species and numbers of nesting attempts and successes were greater in 1973.

On the bajada site, raptor and non-breeding insectivore numbers were lower. Winter seedeaters were the only groups which increased. Miscellaneous species and breeding species on the bajada declined, nesting attempts seemed to be about the same as in previous years.

Rodents—Trapping procedures for playa rodents in 1973 were essentially the same as those reported in the 1972 US/IBP report for the Jornada Validation Site (Whitford et al., 1973). The procedure was modified to include two pre-census trapping dates and two census trapping dates. It is believed that this method increased the accuracy of estimating population densities.

The year 1973 was a "boom" year for playa rodents. Aided by favorable rain during the latter half of 1972 and throughout 1973, the playa rodent population increased to a mean monthly density of 53.48 animals per hectare and a mean monthly live biomass of 2118.84 g/ha. The density per hectare reflects a marked increase over 1972.

The increase in rodents on the bajada site in 1973 was 529% over the densities reported in 1972. Mean monthly densities of rodents on the bajada increased five times. Prior to 1973 there was very little difference between the playa and bajada sites in total rodent densities. However, 1973 showed an increase of 34.29 more rodents per hectare on the bajada than on the playa.

Lagomorphs—A strip census flushing technique was used to estimate lagomorph densities. On the playa, maximum lagomorph density occurred during October and November. The density pattern displayed on the bajada was similar to that shown on the playa, with lagomorph densities increasing from a minimum in late winter to a maximum in autumn.

Microbial Studies—Due to drought conditions which set in during the summer, the playa did not flood in 1973. As a result, microbiological studies were necessarily limited to decomposition of litter and filter paper. The differences in rate and total decomposition are presumably a reflection of differences in soil types found on the playa. The decomposition found on the bajada site was maximum in July and October. Although soil moisture was adequate from March to July, decomposition activity was limited, presumably due to temperature.

ACKNOWLEDGEMENTS

Throughout the course of this project we have been fortunate to have the able assistance of many people. Individuals contributing to the Jornada Validation Site work in 1973 are listed below as are the authors of the various sections.

Category	Assistance in field or laboratory	Authorship
Introduction		Walter G. Whitford†
Environment	James Edwards*	Walter G. Whitford†
		Norman O. Dronen†
Plant Production	Stanley Smith*	John A. Ludwig†
	Nancy Barnes	Walter G. Whitford†
	Paulette Becker	Norman O. Dronen†
	Dedrian Gibbs	Stanley Smith*
Vertebrates		
Birds	Stuart Pimm*	Wayne Pilz
	Lorenzo Cuesta*	
	Wayne Pilz	
Small Mammals	Jeffrey H. Delson†	Michael Creusere*
	Fenton Kay*	
	James Edwards*	
	Nancy Barnes	
	Thomas Bellows	
	Scott Dick-Peddie	
	Kimberly Johnson	
	William McKinney	
	Wayne Pilz	
	David Walters	
	Aileen Schumacher	
	Ross Zimmerman	
Lagomorphs	James Edwards*	James Edwards*
Reptiles	Michael Creusere*	Michael Creusere*
	James Edwards*	William McKinney
	William McKinney	
	David Walters	
Amphibians	Michael Creusere*	Michael Creusere*
	James Edwards*	
Arthropods	Michael Creusere*	Norman O. Dronen†
	James Edwards*	Michael Creusere*
	Fenton Kay*	Tom Bellows
	Tom Bellows	Aileen Schumacher
	Aileen Schumacher	Kimberly Johnson
	Kimberly Johnson	
	Walter Smith	
	Karen Melick	
	William McKinney	
	Jeannine Riazance	
	David Walters	
	Ross Zimmerman	

Microorganisms and Decomposition	Joy Robbins	Robert T. O'Brien†
Graphic Assistance	David Walters	
Key Punch	Barbara O'Brien	
Secretarial Assistance	Martha Bryant	

†Faculty
*Graduate Students

INTRODUCTION

The Jornada Validation Site studies initiated in 1970 were limited to the playa site. An alluvial fan site on the same watershed and an area treated with herbicide were added to the playa area for study in 1971.

In the Desert Biome program, validation studies were designed to provide initial state of the system values and inventories on which to base models of specific desert ecosystems, e.g., Chihuahuan Desert, Jornada. Subsequently, annual measurements are necessary to provide state of the system values for ecosystem components in order to test models run with the climatic parameters of the site as driving variables. These are the minimum requirements of a validation studies program.

At the Jornada Validation Site, we have conducted measurements of numerous parameters at more frequent intervals than required for validation. These more frequent estimates of primary productivity and population structure of vertebrate and invertebrate animals supply data that provide insights into short-term changes in growth patterns and population structure. They also provide data useful in examining spatial relationships of ecosystem components. With the completion of two or three years of measurements for many ecosystem parameters, some insights into causal relationships emerge and are reported here. Analysis of spatial and temporal relationships among components of the Chihuahuan Desert ecosystems will continue throughout 1974.

The prediction of the results of human perturbations is one goal of the simulation models produced in the Desert Biome program. To validate the performance of such models, an area on the Jornada range was treated with herbicide in 1971, 1972 and 1973. Measurements similar to those made on the other areas were conducted on the herbicide-treated area.

The following sections of this report present summaries of the data collected in 1973. Where applicable, comparisons and generalizations based on the patterns emerging from previous years studies are made.

DATA COLLECTION DESIGN

METEOROLOGICAL

		Page
Air Temperature		
Playa	A3UWJ02	9
Bajada	A3UWJ64	49
Solar Radiation		
Playa	A3UWJ04	9
Bajada	A3UWJ66	49
Precipitation		
Playa	A3UWJ07	9
Bajada	A3UWJ63	49
Relative Humidity		
Playa	A3UWJ03	9
Bajada	A3UWJ65	49

		Page
Wind		
Playa	A3UWJ08	9
Bajada	A3UWJ62	49
Soil Temperatures		
Playa	A3UWJ06	9
Bajada	A3UWJ67	50
Soil Moisture		
Playa	A3UWJ05	9
Bajada	A3UWJ61	50
VEGETATION		
Annuals		
Playa	A3UWJ51, 52, 53, 54	13
Bajada	A3UWJ74	53
Small Perennials		
Playa	A3UWJ51, 52, 53, 54	13
Bajada	A3UWJ74	53
Large Perennials		
Playa	A3UWJ55	13
Bajada	A3UWJ75	53
INVERTEBRATES		
Relative abundance, diversity, family composition	A3UWJ21, 25	18, 59
Mesquite plant-part mortality	A3UWJ01, 02, 03	
Flush transect census	A3UWJ96	32
Pit-fall traps	A3UWJ22	
Termites		
Soil Arthropods		74, 75
VERTEBRATES		
Reptiles and Amphibians		
Playa	A3UWJ13	35
Bajada	A3UWJ69	79
Birds		
Playa	A3UWJ16	39
Bajada	A3UWJ60	81
Rodents		
Playa	A3UWJ11	41
Bajada	A3UWJ68	83
Lagomorphs	A3UWJ15	46
MICROBIOLOGICAL STUDIES		
Soil Microorganisms	A3UWJ30	48, 92

FINDINGS

I. PLAYA

A. ABIOTIC

1. Air temperature 9
2. Solar radiation 9
3. Precipitation 9
4. Relative humidity 9
5. Wind 9
6. Soil temperature 9
7. Soil moisture 9

B. PLANTS

1. Annuals and small perennials 13
2. Large perennials 13
   Yucca elata
   Xanthocephalum sarothrae
   Ephedra trifurca
   Prosopis glandulosa

C. INVERTEBRATES

1. Shrub arthropods 18
   Taxa data 32
2. Insect transects 32

D. VERTEBRATES

1. Amphibians 35
2. Reptiles 36
3. Birds 39
4. Rodents 41
5. Lagomorphs 46

E. CHEMICAL ANALYSIS 47

F. MICROBIOLOGICAL STUDIES 48

II. BAJADA

A. ABIOTIC

1. Air temperature 49
2. Solar radiation 49
3. Precipitation 49
4. Relative humidity 49
5. Wind 49
6. Soil temperature 50
7. Soil moisture 51

B. PLANTS

1. Annuals and small perennials 53
2. Large perennials 53
   Yucca elata
   Yucca baccata
   Xanthocephalum sarothrae
   Larrea divaricata
   Prosopis glandulosa
   Flourensia cernua
   Parthenium incanum
   Chilopsis linearis
   Fallugia paradoxa

C. INVERTEBRATES

1. Shrub arthropods 59
   Taxa data
2. Insect transects 74
3. Ground beetles 74
4. Ground-dwelling arthropods 75

D. VERTEBRATES

1. Reptiles 79
2. Birds 81
3. Rodents 83
4. Lagomorphs 89

E. CHEMICAL ANALYSIS 90

F. MICROBIOLOGICAL STUDIES

1. Decomposition 91
2. Soil microbial counts 92

III. MANIPULATION SITE

A. PLANTS

1. Annuals and small perennials 93
2. Perennial species 93

LITERATURE CITED 94

SUPPLEMENTS

1. Foraging ecology and relative importance of subterranean termites in Chihuahuan Desert ecosystems. K. A. Johnson and W. G. Whitford 95

2. Spatial and temporal variation in Chihuahuan ant faunas. A. M. Schumacher and W. G. Whitford 101

3. The foraging ecology of two species of Chihuahuan Desert ants: *Formica perpilosa* and *Trachymyrmex smithi neomexicanus*. A. M. Schumacher and W. G. Whitford 105

NOTE: Another supplementary study, "Studies on wood borers, girdlers and seed predators of mesquite" by J. Riazance and W. G. Whitford (RM 74-30) appears in the Process Study volume (3).

I. PLAYA

I.A. ABIOTIC

I.A.1. Air Temperature

Air temperature (DSCODE A3UWJ02) was monitored as described in Desert Biome Research Memorandum 73-4 (Whitford et al., 1973).

Monthly means and ranges of maximum and minimum air temperatures are given in Table 1. June and July were the warmest months with means of 77.7 and 79.5 F, respectively. The coldest months were December and January with means of 41.5 and 37.9 F. The minimum temperature of 4 F was recorded in December of 1973.

Weekly means and ranges of maximum and minimum air temperatures for 1971, 1972 and 1973 are given in Table 2. The mean values tended to be low from March 12 to April 22, 1973, averaging 52.4 F compared to 60.7 F in 1971 and 60.4 F in 1972. Similarly, the mean values tended to be low from July 9 to August 5, 1973, averaging 76.8 F compared to 84.0 F in 1971 and 80.7 in 1972. These apparent low mean values are mainly a reflection of lower maximum values during those time periods. The maximum temperature from March 12 to April 22 of 1973 averaged 67.3 F compared to 77.7 F in both 1971 and 1972. The maximum temperature from July 9 to August 5 of 1973 averaged 88.9 F compared to 98.3 F in 1971 and 94.1 F in 1972.

I.A.2. Solar Radiation

Solar radiation has been monitored on the playa study site since April, 1970 (A3UWJ04). Monitoring techniques were those described in Whitford et al., 1973.

Weekly solar radiation on the playa was recorded for 1971, 1972 and 1973 and the mean, minimum and maximum values are given in Table 3.

I.A.3. Precipitation

The pattern of precipitation at the playa weather station in 1973 did not follow the pattern typical of the Chihuahuan Desert with very little rainfall in the winter and spring months and most of the rainfall concentrated in July, August and September. In 1973, the months of January and February were characterized by relatively high amounts of precipitation. In January, the two major precipitation events were in the form of snowfall that persisted over a full day. Peak rainfall events occurred in May and June with July being characterized by rain events a number of days. Over one-third of the days in the month were characterized by this rainfall. The rains in August were mostly light and had very little effect on plant growth; there was virtually no rainfall in the fall months. Effectively, the moisture regime for 1973 was one in which the early part of the year through July was characterized by above average rainfall; but practically every month, except for April and from August to December, was below long-term average in amount of precipitation (Table 4).

I.A.4. Relative Humidity

Relative humidity was recorded as described in Whitford et al., 1973 (A3UWJ03).

Weekly means and ranges of maximum and minimum relative humidity for 1971, 1972 and 1973 are given in Table 5. Mean humidities gradually decreased after January in 1973, reaching lowest values from March through December. In comparison, the lowest mean humidities in 1971 and 1972 occurred from March to June and then increased gradually, reaching a mean of 84.1 (1971) and 86.0 (1972) in December. The lower humidities in the fall of 1973 were reflected in both maximum and minimum values (Table 5).

I.A.5. Wind Data

Wind data was monitored as described in Desert Biome Research Memorandum 73-4 (Whitford et al., 1973) and stored under DSCODE A3UWJ08.

Total miles, mean per day and mean per hour were recorded each week for 1971, 1972 and 1973 and are shown in Table 6.

I.A.6. Soil Temperature

Weekly soil temperatures were monitored for 1971, 1972 and 1973 on the playa as described by Whitford et al., 1973 (A3UWJ06 and 05).

Mean temperatures and the minimum and maximum temperatures were recorded at depths of 10 cm (Table 7) and 50 cm (Table 8).

I.A.7. Soil Moisture

Soil moisture has been monitored on the playa site since March, 1970 (A3UWJ05). Moisture has been estimated as soil water potentials as reported in Whitford et al., 1973.

Soil water potentials for the playa bottom, playa edge and playa fringe during 1970, 1971, 1972, and 1973 are shown in Table 9. Generally, the playa bottom had the least moisture and the playa fringe the most during this three-year period.

Table 1. Air temperatures (deg. F) for the playa in 1973

Month	Min.	Max.	Hourly Mean	Range of Daily Minima	Range of Daily Maxima	Range of Daily Means
January	05	66	37.9	05-43	32-66	28-53
February	22	72	43.6	22-44	38-72	32-56
March	25	80	51.2	25-48	54-80	41-66
April	20	86	56.5	20-60	54-86	43-70
May	36	95	68.6	36-60	60-95	57-79
June	42	107	77.7	42-79	84-107	67-93
July	62	106	79.5	62-76	71-106	67-90
August	50	99	77.6	50-67	84-99	72-85
September	37	98	74.5	37-72	74-98	61-81
October	29	92	60.4	28-56	61-92	49-72
November	14	84	50.4	14-60	52-84	35-66
December	04	73	41.5	04-48	48-73	24-58

Table 2. Weekly air temperature data (deg. F) acquired at the Jornada playa site during 1971, 1972 and 1973

Week	Time Intervals	1971 Mean	1971 Max.	1971 Min.	1972 Mean	1972 Max.	1972 Min.	1973 Mean	1973 Max.	1973 Min.
1	Jan 01-Jan 07	41.9	53.6	29.6	44.7	55.1	35.6	32.7	43.0	22.3
2	Jan 08-Jan 14	24.6	39.7	10.9	36.9	50.9	25.6	38.1	51.7	27.3
3	Jan 15-Jan 21	44.0	63.9	26.9	43.0	61.0	26.6	44.0	60.1	29.1
4	Jan 22-Jan 28	50.4	67.0	23.1	36.4	52.7	21.9	43.6	67.0	23.1
5	Jan 29-Feb 04	47.9	72.0	27.0	48.7	64.4	29.7	38.4	54.1	23.4
6	Feb 05-Feb 11	49.0	63.7	32.0	37.4	51.1	23.9	43.7	56.6	31.9
7	Feb 12-Feb 18	45.3	67.3	21.3	41.9	61.4	24.9	42.9	53.1	32.1
8	Feb 19-Feb 25	52.6	65.6	36.4	48.6	69.1	27.7	42.1	52.7	32.2
9	Feb 26-Mar 04	45.6	60.7	30.1	57.0	74.9	36.1	51.0	69.4	34.4
10	Mar 05-Mar 11	42.4	60.4	22.4	57.1	77.5	33.6	50.0	63.4	34.0
11	Mar 12-Mar 18	56.6	74.9	31.9	59.4	82.6	36.4	48.6	63.6	31.7
12	Mar 19-Mar 25	56.9	77.0	31.3	59.3	79.6	36.9	55.1	67.9	38.9
13	Mar 26-Apr 01	67.0	84.1	46.3	62.7	79.3	43.0	50.6	63.7	33.4
14	Apr 02-Apr 08	59.4	75.3	41.4	53.1	70.4	33.4	48.1	63.1	28.9
15	Apr 09-Apr 15	65.0	81.6	41.3	64.4	74.6	38.0	55.0	73.7	31.7
16	Apr 16-Apr 22	59.3	73.0	43.1	63.4	80.0	39.3	57.0	71.6	38.9
17	Apr 23-Apr 29	61.4	75.9	45.1	59.9	77.9	34.9	62.7	80.7	40.7
18	Apr 30-May 06	66.4	82.3	42.3	64.7	83.4	41.1	65.6	77.9	49.4
19	May 07-May 13	67.1	81.0	48.3	67.7	83.3	48.7	66.7	85.0	44.4
20	May 14-May 20	69.3	82.1	50.6	67.3	84.0	46.1	66.1	81.0	49.6
21	May 21-May 27	69.3	84.0	52.0	73.4	87.6	54.4	73.0	88.1	53.3
22	May 28-Jun 03	75.1	88.6	55.9	70.6	88.3	45.7	72.0	87.1	54.4
23	Jun 04-Jun 10	75.3	91.6	51.6	73.6	85.4	58.9	75.7	93.4	53.1
24	Jun 11-Jun 17	76.9	92.1	55.6	72.0	84.1	59.9	76.1	91.1	58.9
25	Jun 18-Jun 24	82.3	97.9	64.0	75.6	89.3	64.3	76.3	91.1	55.4
26	Jun 25-Jul 01	86.7	101.0	67.9	81.3	95.7	63.9	88.3	103.4	67.9
27	Jul 02-Jul 08	82.6	96.9	65.1	82.3	100.3	58.7	88.0	103.6	68.0
28	Jul 09-Jul 15	87.7	100.9	73.6	83.4	96.6	69.6	80.6	93.4	68.7
29	Jul 16-Jul 22	87.4	100.4	69.1	80.1	94.6	66.6	74.4	83.3	65.4
30	Jul 23-Jul 29	79.9	97.1	68.3	78.6	89.7	67.4	77.6	91.0	66.1
31	Jul 30-Aug 05	80.9	95.0	67.7	80.6	95.4	65.7	74.6	87.9	63.4
32	Aug 06-Aug 12	77.6	91.0	63.1	81.3	94.9	67.4	78.7	94.7	60.9
33	Aug 13-Aug 19	77.1	91.7	63.1	77.4	90.3	63.6	78.4	95.1	61.0
34	Aug 20-Aug 26	79.0	90.7	66.6	74.4	86.3	63.7	79.3	95.1	60.9
35	Aug 27-Sep 02	79.9	91.7	70.1	78.1	90.3	65.6	75.3	90.0	60.0
36	Sep 03-Sep 09	81.0	94.7	67.7	72.6	84.0	63.1	75.1	92.9	56.0
37	Sep 10-Sep 16	81.3	95.4	65.0	74.1	84.1	65.1	77.0	92.3	60.7
38	Sep 17-Sep 23	72.4	86.6	57.7	71.9	81.0	63.9	76.1	92.3	56.6
39	Sep 24-Sep 30	66.7	79.7	51.3	70.0	84.6	55.1	70.6	84.4	55.4
40	Oct 01-Oct 07	70.3	83.7	57.0	67.7	85.0	51.1	65.6	84.4	46.7
41	Oct 08-Oct 14	64.9	76.4	51.4	69.7	85.4	54.9	61.3	79.1	41.4
42	Oct 15-Oct 21	66.4	79.0	54.1	69.9	85.9	55.0	59.1	81.6	37.6
43	Oct 22-Oct 28	56.6	70.9	43.6	63.6	73.4	55.9	60.7	83.6	36.1
44	Oct 29-Nov 04	55.4	67.0	42.7	55.6	66.0	45.6	57.4	74.5	36.4
45	Nov 05-Nov 11	53.7	67.7	37.9	50.6	64.6	37.0	54.9	79.3	31.4
46	Nov 12-Nov 18	54.7	73.0	38.4	51.6	67.3	35.4	54.0	76.7	27.9
47	Nov 19-Nov 25	46.4	58.1	37.4	44.9	60.1	31.7	48.1	61.7	32.1
48	Nov 26-Dec 02	47.4	63.0	32.7	39.9	54.1	28.4	39.6	60.9	21.4
49	Dec 03-Dec 09	44.1	51.1	38.1	43.0	61.4	27.6	41.0	62.3	24.1
50	Dec 10-Dec 16	42.1	54.4	31.7	51.3	63.3	37.1	46.3	67.0	25.0
51	Dec 17-Dec 23	38.0	49.4	28.0	37.1	51.0	24.7	36.6	58.0	14.6
52	Dec 24-Dec 31	44.7	64.4	30.9	42.1	59.9	27.6	39.0	56.9	19.4

Table 3. Weekly solar radiation data acquired at the Jornada playa site during 1971, 1972 and 1973

Week	Time Intervals	1971 Mean	1971 Max.	1971 Min.	1972 Mean	1972 Max.	1972 Min.	1973 Mean	1973 Max.	1973 Min.
1	Jan 01-Jan 07	211	264	150	290	360	264	314	342	162
2	Jan 08-Jan 14	257	293	148	351	390	294	279	360	96
3	Jan 15-Jan 21	295	317	251	357	384	306	333	390	216
4	Jan 22-Jan 28	299	350	268	394	420	240	302	414	150
5	Jan 29-Feb 04	336	400	307	316	420	144	353	438	114
6	Feb 05-Feb 11	359	414	302	386	438	282	399	456	258
7	Feb 12-Feb 18	407	438	360	414	486	318	288	432	182
8	Feb 19-Feb 25	494	498	330	440	546	330	345	492	150
9	Feb 26-Mar 04	548	552	432	507	546	486	394	550	108
10	Mar 05-Mar 11	552	574	522	543	570	510	531	594	348
11	Mar 12-Mar 18	539	636	462	555	606	528	504	618	186
12	Mar 19-Mar 25	609	630	366	551	600	438	617	696	522
13	Mar 26-Apr 01	641	384	498	613	690	588	615	672	510
14	Apr 02-Apr 08	674	738	582	649	672	594	571	718	354
15	Apr 09-Apr 15	601	768	378	650	696	552	634	732	342
16	Apr 16-Apr 22	748	744	420	663	732	636	640	762	450
17	Apr 23-Apr 29	753	792	708	724	756	564	687	749	474
18	Apr 30-May 06	683	792	698	678	744	420	695	768	510
19	May 07-May 13	756	762	514	700	792	666	682	780	456
20	May 14-May 20	756	816	678	718	738	624	670	864	313
21	May 21-May 27	724	758	684	615	804	660	704	756	594
22	May 28-Jun 03	743	762	696	591	762	288	760	792	690
23	Jun 04-Jun 10	756	714	708	674	768	336	803	916	750
24	Jun 11-Jun 17	717	714	660	723	744	473	733	816	618
25	Jun 18-Jun 24	621	768	486	690	762	522	753	816	510
26	Jun 25-Jul 01	675	744	612	696	726	696	766	804	708
27	Jul 02-Jul 08	660	768	402	696	684	557	712	780	642
28	Jul 09-Jul 15	728	744	702	617	684	612	658	756	384
29	Jul 16-Jul 22	709	756	600	686	792	516	496	786	228
30	Jul 23-Jul 29	493	702	138	661	754	542	729	804	564
31	Jul 30-Aug 05	673	702	468	639	654	564	579	678	378
32	Aug 06-Aug 12	634	816	600	642	714	648	682	732	630
33	Aug 13-Aug 19	610	692	540	615	714	306	702	744	672
34	Aug 20-Aug 26	628	696	528	564	660	390	614	702	402
35	Aug 27-Sep 02	558	648	402	544	666	294	663	690	630
36	Sep 03-Sep 09	570	642	468	531	636	354	620	690	498
37	Sep 10-Sep 16	590	618	558	474	600	372	575	642	450
38	Sep 17-Sep 23	494	636	162	495	594	366	563	606	504
39	Sep 24-Sep 30	468	588	336	563	612	528	548	636	504
40	Oct 01-Oct 07	467	576	306	536	558	462	579	612	540
41	Oct 08-Oct 14	443	516	318	501	564	396	525	594	402
42	Oct 15-Oct 21	446	504	222	451	510	372	522	558	492
43	Oct 22-Oct 28	417	516	186	347	480	234	495	522	480
44	Oct 29-Nov 04	444	462	396	373	498	174	456	490	408
45	Nov 05-Nov 11	356	420	144	466	498	444	464	522	414
46	Nov 12-Nov 18	335	408	126	409	450	354	431	582	312
47	Nov 19-Nov 25	362	384	342	363	439	186	440	492	384
48	Nov 26-Dec 02	309	336	252	337	384	154	378	432	288
49	Dec 03-Dec 09	309	402	180	394	420	366	393	420	360
50	Dec 10-Dec 16	324	372	300	328	384	162	357	372	336
51	Dec 17-Dec 23	267	342	96	347	384	294	334	366	258
52	Dec 24-Dec 31	297	342	126	329	378	162	354	402	282

Table 4. Precipitation in inches on the Jornada playa site by month in 1973

Month	Inches	Millimeters
January	0.98	24.5
February	1.14	28.5
March	0.52	13.0
April	-0-	-0-
May	0.65	16.5
June	1.11	28.2
July	3.47	88.1
August	0.87	22.1
September	0.03	0.8
October	-0-	-0-
November	0.11	2.8
December	-0-	-0-

Table 5. Relative humidity on the playa site

Week	Time Interval	1971 Mean	1971 Max.	1971 Min.	1972 Mean	1972 Max.	1972 Min.	1973 Mean	1973 Max.	1973 Min.
1	Jan 01-Jan 07	58.7	84.4	37.1	82.1	100.0	52.1	92.4	99.0	75.1
2	Jan 08-Jan 14	49.2	77.3	29.9	64.0	96.9	33.7	87.6	99.0	61.0
3	Jan 15-Jan 21	49.1	72.3	28.9	71.1	100.0	34.0	73.4	96.1	39.4
4	Jan 22-Jan 28	49.4	67.9	31.7	59.6	91.6	33.0	73.9	98.6	36.9
5	Jan 29-Feb 04	39.7	59.1	26.4	64.1	93.9	36.9	72.4	99.0	40.3
6	Feb 05-Feb 11	42.6	59.3	29.9	68.9	99.7	38.1	76.1	99.0	41.0
7	Feb 12-Feb 18	45.7	66.4	32.9	58.9	96.6	26.9	87.4	99.0	66.4
8	Feb 19-Feb 25	51.0	78.9	31.6	52.7	87.1	31.4	85.4	99.0	62.6
9	Feb 26-Mar 04	38.3	52.4	26.6	49.6	73.4	33.9	77.3	99.0	47.4
10	Mar 05-Mar 11	27.0	37.3	19.7	62.0	93.3	38.0	64.0	98.0	33.7
11	Mar 12-Mar 18	32.7	45.5	24.3	52.1	76.9	33.3	74.4	99.0	42.4
12	Mar 19-Mar 25	25.7	43.4	21.3	54.4	75.3	38.6	62.9	92.4	36.7
13	Mar 26-Apr 01	34.6	43.3	27.6	54.1	78.4	27.2	64.0	97.6	38.6
14	Apr 02-Apr 08	38.7	50.4	30.4	49.0	70.0	35.4	63.6	99.0	37.6
15	Apr 09-Apr 15	44 7	65.0	33.0	45.9	63.9	33.4	57.6	97.0	32.6
16	Apr 16-Apr 22	48.9	79.0	30.7	53.1	71.7	41.3	66.0	91.3	34.7
17	Apr 23-Apr 29	35.6	49.1	26.6	44.0	63.4	32.4	61.7	92.6	39.1
18	Apr 30-May 06	31.7	41.6	24.1	43.6	58.7	33.7	59.3	87.4	39.4
19	May 07-May 13	44.7	62.6	32.1	46.1	67.1	29.6	58.7	86.0	37.9
20	May 14-May 20	21.9	32.7	14.9	56.0	79.0	35.0	72.7	95.1	48.3
21	May 21-May 27	14.6	23.9	08.7	35.1	51.3	26.0	54.0	95.7	30.7
22	May 28-Jun 03	18.1	25.4	11.9	60.3	81.7	41.6	49.3	82.3	35.3
23	Jun 04-Jun 10	07.9	14.9	03.7	78.0	93.4	61.0	54.9	87.9	34.7
24	Jun 11-Jun 17	23.3	39.4	14.1	73.9	100.0	46.3	57.1	83.9	37.7
25	Jun 18-Jun 24	40.1	72.6	21.6	69.4	100.0	43.0	45.7	84.0	25.3
26	Jun 25-Jul 01	39.7	68.9	22.3	55.9	91.3	33.6	48.9	80.6	31.9
27	Jul 02-Jul 08	46.9	77.4	25.7	71.1	96.0	48.6	51.7	79.4	35.9
28	Jul 09-Jul 15	40.0	64.6	26.4	80.7	100.0	52.0	60.9	88.0	44.1
29	Jul 16-Jul 22	46.0	76.0	26.9	85.3	100.0	64.0	88.1	99.1	69.7
30	Jul 23-Jul 29	63.0	94.3	30.3	83.3	99.6	56.7	63.6	94.4	39.7
31	Jul 30-Aug 05	59.3	93.4	30.9	75.0	100.0	48.9	84.0	99.0	55.4
32	Aug 06-Aug 12	63.6	99.7	32.6	89.9	100.0	69.7	66.0	99.0	39.9
33	Aug 13-Aug 19	68.6	99.6	38.1	87.0	99.1	67.3	69.3	98.6	40.3
34	Aug 20-Aug 26	63.4	99.1	37.1	82.7	98.6	62.1	77.6	99.0	38.6
35	Aug 27-Sep 02	62.3	95.6	35.4	94.1	99.9	78.7	59.0	83.7	40.6
36	Sep 03-Sep 09	55.4	86.0	33.3	95.0	100.0	81.7	65.9	99.0	35.9
37	Sep 10-Sep 16	44.9	80.0	26.1	96.3	99.7	82.9	66.6	96.7	41.1
38	Sep 17-Sep 23	75.1	97.7	51.0	83.3	99.3	60.0	66.1	97.7	40.9
39	Sep 24-Sep 30	61.1	92.0	34.4	78.7	99.0	53.6	61.0	87.3	41.4
40	Oct 01-Oct 07	57.9	81.5	36.9	82.4	99.6	53.6	41.6	68.6	21.6
41	Oct 08-Oct 14	64.9	94.0	38.0	85.9	99.6	57.6	45.9	77.6	19.3
42	Oct 15-Oct 21	71.0	96.0	41.1	87.3	98.7	63.9	43.7	79.3	17.6
43	Oct 22-Oct 28	76.9	100.0	45.7	97.3	100.0	86.0	33.4	64.0	11.7
44	Oct 29-Nov 04	62.0	99.1	33.9	91.0	100.0	71.9	39.6	66.6	18.9
45	Nov 05-Nov 11	73.0	98.0	42.4	86.4	99.1	55.7	35.3	60.7	19.3
46	Nov 12-Nov 18	74.3	96.7	50.1	85.4	99.0	56.0	42.1	75.4	17.6
47	Nov 19-Nov 25	75.3	99.4	38.7	90.3	99.0	63.7	35.9	62.9	16.9
48	Nov 26-Dec 02	74.6	95.3	52.3	90.6	99.0	71.1	49.4	81.0	23.6
49	Dec 03-Dec 09	82.7	98.6	54.7	76.4	98.0	46.0	49.3	89.7	14.7
50	Dec 10-Dec 16	74.0	100.0	43.4	91.0	99.0	71.6	45.7	75.0	19.1
51	Dec 17-Dec 23	83.3	97.9	53.1	88.6	99.0	52.6	37.6	67.0	20.4
52	Dec 24-Dec 31	84.1	100.0	47.4	86.0	99.0	56.7	59.3	89.3	32.3

Table 6. Wind data acquired on the Jornada playa site during 1971, 1972 and 1973

Year	Time Interval	Total Miles	Mean per Day	Mean per Hour
1971	May 15-May 22	1395.4	199.3	8.31
	May 23-May 29	1278.3	182.6	7.61
	May 30-Jun 05	1319.1	188.4	7.85
	Jun 06-Jun 12	1215.3	173.6	7.23
	Jun 13-Jun 19	981.0	140.1	5.84
	Jun 20-Jun 26	867.9	124.0	5.17
	Jun 27-Jul 03	1117.0	159.6	6.65
	Jul 04-Jul 10	1045.7	14914	6.22
	Jul 11-Jul 17	877.2	125.3	5.22
	Jul 18-Jul 31	987.3	141.0	5.88
	Aug 01-Aug 06	850.9	121.6	5.07
	Aug 07-Aug 13	803.3	114.8	4.78
	Aug 14-Aug 20	928.5	132.6	5.53
	Aug 21-Aug 27	950.6	135.8	5.66
	Aug 28-Sep 03	854.3	122.2	5.06
	Sep 04-Sep 10	952.6	135.8	5.66
	Sep 11-Sep 17	902.6	128.9	5.37
	Sep 18-Sep 24	1046.3	149.5	6.23
	Sep 25-Oct 01	994.4	142.2	5.92
	Oct 02-Oct 08	1032.3	147.5	6.15
	Oct 09-Oct 15	803.5	114.8	4.78
	Oct 16-Oct 22	1014.5	144.9	6.04
	Oct 23-Oct 29	1243.1	177.6	7.40
	Oct 30-Nov 05	653.3	93.3	3.89
	Nov 06-Nov 12	728.2	102.0	4.34
	Nov 13-Nov 19	1140.1	162.9	6.79
	Nov 20-Nov 26	699.7	100.0	4.17
	Nov 27-Dec 03	990.4	141.5	5.90
	Dec 04-Dec 10	1044.8	149.3	6.22
	Dec 11-Dec 17	1325.3	189.3	7.89
	Dec 18-Dec 24	654.1	93.4	3.89
	Dec 25-Dec 30	866.2	123.7	5.16

Table 6, continued

Year	Time Interval	Total Miles	Mean per Day	Mean per Hour
1972	Dec 31-Jan 05	1140.5	162.9	6.79
	Jan 06-Jan 12	677.0	96.7	4.03
	Jan 13-Jan 20	907.2	129.6	5.40
	Jan 21-Jan 27	974.4	139.2	5.80
	Jan 28-Feb 04	1058.4	151.2	6.30
	Feb 05-Feb 10	692.2	98.9	4.12
	Feb 11-Feb 17	920.6	131.5	5.48
	Feb 18-Feb 24	781.2	111.6	4.65
	Feb 25-Mar 02	818.2	116.9	4.87
	Mar 03-Mar 09	809.8	114.7	4.82
	Mar 10-Mar 16	708.0	101.3	4.22
	Mar 17-Mar 23	782.9	111.8	4.66
	Mar 24-Mar 30	1688.4	241.2	10.05
	Mar 31-Apr 06	930.7	133.0	5.54
	Apr 07-Apr 13	1214.6	173.5	7.23
	Apr 14-Apr 20	1520.4	217.2	9.05
	Apr 21-Apr 27	1137.4	162.5	6.77
	Apr 28-May 04	903.8	129.1	5.38
	May 05-May 11	1088.6	155.5	6.48
	May 12-May 18	1019,8	145.7	6.07
	May 19-May 25	1333.9	190.6	7.94
	May 26-May 31	1157.5	165.4	6.89
	Jun 01-Jun 07	992.9	141.8	5.91
	Jun 08-Jun 14	776.2	110.9	4.62
	Jun 15-Jun 21	1045.0	149.3	6.22
	Jun 22-Jun 28	1083.6	154.8	6.45
	Jun 29-Jul 05	1095,4	156.5	6.52
	Jul 06-Jul 13	940.8	134.4	5.60
	Jul 14-Jul 19	1001.3	143.0	5.96
	Jul 20-Jul 26	868.6	124.1	5.17
	Jul 27-Aug 02	740.9	105.8	4.41
	Aug 03-Aug 09	871.9	124.6	5.19
	Aug 10-Nov 13		missing data	
	Nov 14-Nov 21	786.2	112.3	4.68
	Nov 22-Nov 28	614.9	87.8	3.66
	Nov 29-Dec 05	1019.8	145.7	6.07
	Dec 06-Dec 12	1493.5	213,4	8.89
	Dec 13-Dec 19	554.4	79.2	3.30
	Dec 20-Dec 26	882.0	126.0	5.25
1973	Dec 27-Jan 02	1216.3	173.8	7.24
	Jan 03-Jan 09	621.6	88.7	3170
	Jan 10-Jan 16	670.3	95.8	3.99
	Jan 17-Jan 23	1196.2	170.9	7.12
	Jan 24-Jan 30	764.4	109.2	4.55
	Jan 31-Feb 06	944.2	134.8	5.62
	Feb 07-Feb 13	885.4	126.5	5.27
	Feb 14-Feb 20	742.6	196.1	4.42
	Feb 21-Feb 27	604.8	88.3	3.68
	Feb 28-Mar 06	1060.1	151.4	6.31
	Mar 07-Mar 13	1221.4	174.6	7.27
	Mar 14-Mar 20	1251.6	178.8	7.45
	Mar 21-Mar 27	1401.1	200.2	8.34
	Mar 28-Apr 03	510.7	73.0	3.04
	Apr 04-Apr 10	877.1	125.2	5.22
	Apr 11-Apr 17	898.8	129.4	5.35
	Apr 18-Apr 24	1360.8	194.3	8.10
	Apr 24-May 01	241.9	34.7	1.44
	May 02-May 08	1384.3	197.7	8.24
	May 09-May 15	947.5	135.3	5.64
	May 16-May 22	583.1	83.2	3.47
	May 23-May 29	1182.7	169.1	7.04
	May 30-Jun 05	947.5	135.4	5.64
	Jun 06-Jun 12	705.6	100.7	4.20
	Jun 13-Jun 19	893.8	127.6	5.32
	Jun 20-Jun 26	846.7	120.9	5.04
	Jun 27-Jul 03	762.7	109.0	4.54
	Jul 04-Jul 10	771.1	110.2	4.59
	Jul 11-Jul 17	577.9	82.4	3.44
	Jul 18-Jul 24	611.5	87.5	3.64
	Jul 25-Jul 31	658.6	94.1	3.92
	Aug 01-Aug 07	537.6	76.7	3.20
	Aug 08-Aug 14	646.8	92.3	3.85
	Aug 15-Aug 21	606.5	86.5	3.61
	Aug 22-Aug 28	776.2	110.8	4.62
	Aug 29-Sep 04	635.0	90.6	3.78
	Sep 05-Sep 11	871.9	124.6	5.19
	Sep 12-Sep 18	700.6	100.0	4.17
	Sep 19-Sep 25	992.9	141.8	5.91
	Sep 26-Oct 02	811.4	116.0	4.83
	Oct 03-Oct 09	803.0	114.7	4.78
	Oct 10-Oct 16	656.9	93.8	3.91
	Oct 17-Oct 23	369.6	52.6	2.20
	Oct 24-Oct 29	619.9	88.6	3.69
	Oct 30-Nov 06	986.2	140.9	5.87
	Nov 07-Nov 13	349.4	49.9	2.08
	Nov 14-Nov 20	241.9	34.6	1.44
	Nov 21-Nov 27	1123.9	160.6	6.69
	Nov 28-Dec 04	759.4	108.5	4.52
	Dec 05-Dec 11	438.5	62.7	2.61
	Dec 12-Dec 17	850.1	121.6	5.06
	Dec 18-Dec 24	855.1	122.2	5.09
	Dec 25-Dec 31	1068.5	152.7	6.36
1974	Jan 01-Jun 07	673.7	96.3	4.01

Table 7. Weekly soil temperature data (deg. C) at a depth of 10 cm acquired at the Jornada playa site during 1971, 1972 and 1973

Week	Time Intervals	1971 Mean	1971 Max.	1971 Min.	1972 Mean	1972 Max.	1972 Min.	1973 Mean	1973 Max.	1973 Min.
1	Jan 01-Jân 07				2.4	4.0	1.3	0.7	1.3	0.0
2	Jan 08-Jan 14				3.1	5.1	1.4	2.6	4.1	1.1
3	Jan 15-Jan 21				3.0	5.4	0.7	3.7	6.0	1.7
4	Jan 22-Jan 28				5.3	8.1	2.9	1.6	3.6	0.1
5	Jan 29-Feb 04				3.4	7.1	0.6	1.6	4.1	0.1
6	Feb 05-Feb 11				4.0	6.9	1.7	4.9	7.0	3.0
7	Feb 12-Feb 18				4.9	7.9	1.9	4.9	6.7	2.7
8	Feb 19-Feb 25				9.3	12.4	6.1	4.3	6.4	2.6
9	Feb 26-Mar 04				10.4	13.7	7.3	8.1	11.7	5.1
10	Mar 05-Mar 11				13.3	17.0	9.7	8.3	11.0	5.6
11	Mar 12-Mar 18				14.3	18.1	10.9	8.1	12.4	4.9
12	Mar 19-Mar 25				14.7	18.3	11.9	10.7	14.0	8.0
13	Mar 26-Apr 01				15.0	17.9	12.1	9.4	12.6	6.4
14	Apr 02-Apr 08				16.4	20.4	12.7	9.9	13.6	6.0
15	Apr 09-Apr 15				18.6	21.9	15.4	12.7	17.3	8.7
16	Apr 16-Apr 22				17.9	21.6	14.0	14.3	18.0	10.9
17	Apr 23-Apr 29				19.4	23.6	15.3	17.0	21.7	12.6
18	Apr 30-May 06				20.9	24.7	17.0	18.3	21.9	15.1
19	May 07-May 13				22.4	26.7	18.7	19.1	23;6	15.0
20	May 14-May 20				22.1	26.6	18.7	18.4	22.7	14.6
21	May 21-May 27	22.8	31.8	11.0	23.7	27.3	20.4	21.6	25.6	17.6
22	May 28-Jun 03	26.0	32.4	10.1	23.6	26.6	20.9	22.7	26.9	19.9
23	Jun 04-Jun 10	28.1	33.4	23.4	25.6	30.0	21.4	24.4	29.0	19.9
24	Jun 11-Jun 17	29.6	35.1	24.9	26.9	31.3	22.3	23.7	27.6	20.0
25	Jun 18-Jun 24	32.7	37.6	27.7	27.4	32.1	22.7	23.1	27.3	19.0
26	Jun 25-Jul 01	22.3	35.3	12.1	29.3	32.9	25.4	27.3	31.4	23.4
27	Jul 02-Jul 08	32.1	37.9	24.9	28.3	34.1	23.3	29.4	33.1	26.0
28	Jul 09-Jul 15	34.6	39.4	30.0	26.0	29.1	23.0	28.4	31.4	26.0
29	Jul 16-Jul 22	29.9	36.9	25.1	27.4	31.1	22.9	23.3	26.0	21.1
30	Jul 23-Jul 29	29.9	36.9	25.1	27.4	31.1	22.9	23.3	26.0	21.1
31	Jul 30-Aug 05	30.9	35.6	23.0	28.4	31.7	25.6	24.6	27.3	21.9
32	Aug 06-Aug 12	29.3	33.4	25.9	27.1	31.0	23.6	22.4	25.6	19.9
33	Aug 13-Aug 19	28.3	32.6	24.4	26.1	29.3	23.3	24.1	27.7	20.4
34	Aug 20-Aug 26	26.3	30.0	22.9	27.9	31.7	24.9	25.0	28.9	21.6
35	Aug 27-Sep 02	27.0	31.1	22.9	22.7	27.4	19.7	25.3	28.7	21.9
36	Sep 03-Sep 09	25.3	29.4	19.1	21.3	23.0	20.0	24.3	27.6	21.4
37	Sep 10-Sep 16	26.3	30.9	19.6	21.9	24.4	19.9	22.4	26.0	19.2
38	Sep 17-Sep 23	26.3	30.1	22.4	21.7	25.3	18.1	22.0	24.9	19.1
39	Sep 24-Sep 30	18.4	30.1	15.3	19.9	23.4	16.9	24.9	27.0	20.9
40	Oct 01-Oct 07	19.0	22.6	15.9	20.3	21.3	17.4	23.1	26.3	20.7
41	Oct 08-Oct 14	17.4	20.6	14.7	20.0	23.3	16.9	20.6	23.7	17.7
42	Oct 15-Oct 21	17.7	20.9	14.9	17.0	19.0	15.0	18.3	21.4	15.3
43	Oct 22-Oct 28	12.4	15.0	10.1	11.1	12.4	9.9	16.4	19.7	13.6
44	Oct 29-Nov 04	9.6	13.0	6.9	8.7	11.3	5.9	15.4	18.9	12.7
45	Nov 05-Nov 11	9.4	12.4	6.4	7.4	10.1	4.9	13.0	15.4	10.1
46	Nov 12-Nov 18	9.1	11.3	7.4	5.6	7.9	3.4	11.6	14.3	8.9
47	Nov 19-Nov 25	5.6	8.9	3.0	4.4	7.6	1.7	9.7	11.3	7.4
48	Nov 26-Dec 02	6.0	8.3	4.4	3.9	6.4	1.4	5.3	7.7	3.3
49	Dec 03-Dec 09	4.1	5.9	2.6	5.1	6.9	3.6	4.7	7.0	3.0
50	Dec 10-Dec 16	2.1	4.0	0.9	3.1	4.4	1.9	4.9	7.3	2.7
51	Dec 17-Dec 23	1.9	4.1	0.4	2.3	4.1	0.9	2.6	5.0	0.9
52	Dec 24-Dec 31	5.4	7.1	3.3	2.7	4.3	1.0	2.3	4.1	-0.1

Table 8. Weekly soil temperature data (deg. C) at a depth of 50 cm acquired at the Jornada playa site during 1971, 1972 and 1973

Week	Time Intervals	1971 Mean	1971 Max.	1971 Min.	1972 Mean	1972 Max.	1972 Min.	1973 Mean	1973 Max.	1973 Min.
1	Jan 01-Jan 07				4.0	6.1	5.1	4.6	4.9	3.7
2	Jan 08-Jan 14				4.0	5.0	3.4	3.1	3.9	2.7
3	Jan 15-Jan 21				4.7	5.0	3.4	3.9	4.4	3.0
4	Jan 22-Jan 28				5.3	5.6	3.7	3.0	4.0	2.4
5	Jan 29-Feb 04				3.7	5.7	5.0	4.4	5.1	3.6
6	Feb 05-Feb 11				4.9	4.6	2.7	4.9	5.3	4.4
7	Feb 12-Feb 18				6.1	5.4	3.9	5.0	5.6	4.3
8	Feb 19-Feb 25				8.7	7.1	5.1	5.3	6.0	4.9
9	Feb 26-Mar 04				9.7	9.4	7.7	7.1	7.9	6.3
10	Mar 05-Mar 11				11.7	10/9	8.9	7.6	8.1	6.7
11	Mar 12-Mar 18				12.9	12.7	10.7	7.4	8.3	6.7
12	Mar 19-Mar 25				13.7	13.4	11.9	8.9	9.6	8.4
13	Mar 26-Apr 01				13.1	14.6	13.1	8.7	9.3	8.1
14	Apr 02-Apr 08				15.1	14.0	12.1	8.6	9.4	7.7
15	Apr 09-Apr 15				16.1	16.1	14.0	11.0	11.7	9.6
16	Apr 16-Apr 22				16.3	17.0	15.1	11.9	12.3	10.9
17	Apr 23-Apr 29				17.1	17.1	15.1	14.0	14.7	13.0
18	Apr 30-May 06				18.4	18.0	16.1	14.9	15.4	14.0
19	May 07-May 13				19.3	19.3	17.4	16.1	16.9	15.1
20	May 14-May 20				20.0	20.0	18.4	16.3	17.1	15.4
21	May 21-May 27				20.7	20.7	19.0	17.9	18.7	16.9
22	May 28-Jun 03	15.9	19.1	11.0	21.6	21.6	19.7	19.0	19.9	18.1
23	Jun 04-Jun 10	23.7	24.4	22.9	21.1	22.3	20.6	20.6	21.3	19.6
24	Jun 11-Jun 17	24.9	25.7	23.9	22.6	22.1	20.4	20.7	21.4	19.9
25	Jun 18-Jun 24	26.0	27.1	25.0	23.6	23.0	21.7	23.4	21.1	19.9
26	Jun 25-Jul 01	28.0	28.9	27.4	24.7	24.3	22.7	24.7	24.1	22.3
27	Jul 02-Jul 08	27.7	28.6	26.0	25.4	25.4	23.6	24.3	25.6	23.9
28	Jul 09-Jul 15	29.1	30.1	28.3	25.0	26.1	25.0	22.9	24.7	23.7
29	Jul 16-Jul 22	30.0	30.1	28.9	25.0	26.0	24.6	22.4	23.3	22.1
30	Jul 23-Jul 29	28.1	29.4	24.0	24.4	25.3	24.1	21.4	23.2	21.9
31	Jul 30-Aug 05	27.7	28.6	27.0	25.6	26.3	24.7	22.3	22.0	21.0
32	Aug 06-Aug 12	27.0	27.1	26.1	25.4	26.1	24.7	22.9	23.0	21.7
33	Aug 13-Aug 19	26.0	26.6	25.4	24.9	25.1	24.3	23.0	23.7	22.1
34	Aug 20-Aug 26	24.7	25.1	24.1	24.2	25.0	24.4	22.4	23.9	22.3
35	Aug 27-Sep 02	25.1	25.5	24.4	25.1	25.7	20.7	21.7	23.1	21.9
36	Sep 03-Sep 09	23.0	25.4	20.6	21.7	22.6	21.0	21.9	22.7	20.9
37	Sep 10-Sep 16	19.7	23.6	24.0	21.3	21.4	21.4	23.0	22.6	21.0
38	Sep 17-Sep 23	19.3	20.3	22.1	22.0	22.6	20.3	21.6	23.0	22.4
39	Sep 24-Sep 30	18.0	19.7	19.0	20.7	21.4	20.3	20.3	22.1	20.6

Table 8, continued

Week	Time Intervals	1971 Mean	1971 Max.	1971 Min.	1972 Mean	1972 Max.	1972 Min.	1973 Mean	1973 Max.	1973 Min.
40	Oct 01-Oct 07	17.7	18.6	18.6	19.6	20.6	18.7	18.4	21.3	19.4
41	Oct 08-Oct 14	15.3	18.4	17.3	19.7	20.5	19.0	16.9	19.3	17.6
42	Oct 15-Oct 21	13.3	18.4	17.0	19.6	20.3	18.7	16.6	18.0	15.7
43	Oct 22-Oct 28	11.4	15.9	14.9	15.1	16.1	14.1	15.0	17.6	15.0
44	Oct 29-Nov 04	11.3	13.7	12.3	11.6	12.0	10.9	15.0	15.9	14.0
45	Nov 05-Nov 11	11.4	12.1	10.4	9.4	10.3	9.1	14.3	15.6	13.0
46	Nov 12-Nov 18	11.3	11.9	10.6	8.9	9.6	8.0	13.1	14.1	12.3
47	Nov 19-Nov 25	9.1	9.7	8.6	7.1	8.0	6.7	11.1	12.1	10.4
48	Nov 26-Dec 02	8.0	8.9	7.3	5.6	6.3	5.3	8.7	10.0	7.7
49	Dec 03-Dec 09	7.6	7.7	7.1	5.1	6.0	4.6	7.3	8.6	6.3
50	Dec 10-Dec 16	5.7	6.1	5.3	6.3	6.7	5.4	7.3	8.3	6.1
51	Dec 17-Dec 23	4.3	4.9	3.9	4.7	5.6	4.1	6.1	7.0	4.9
52	Dec 24-Dec 31	5.0	5.7	4.4	4.1	5.0	3.9	5.6	6.6	4.9

Table 9. Soil water potentials on the playa site

Date Yr Mo Da	Playa Bottom 15	Playa Bottom 45	Playa Bottom 90	Playa Edge 15	Playa Edge 45	Playa Edge 90	Playa Fringe 15	Playa Fringe 45	Playa Fringe 90
70 03 28	- 19	- 26	- 7	- 2	- 2	- 4	- 8	- 5	- 4
70 04 04	- 55	- 47	- 20	- 3	- 5	- 7	- 27	- 13	- 8
70 04 11	- 73	- 54	- 32	- 2	- 7	- 5	- 50	- 20	- 15
70 04 18	- 88	- 61	- 37	- 3	- 8	- 4	- 70	- 24	- 15
70 04 25	-100	- 65	- 42	- 4	- 9	- 4	- 81	- 27	- 18
70 05 02	-112	- 70	- 45	- 8	- 10	- 10	- 94	- 29	- 21
70 05 16	-124	- 76	- 50	- 30	- 13	- 5	-105	- 37	- 21
70 05 23	-126	- 80	- 52	- 32	- 16	- 10	-109	- 34	- 32
70 05 30	-127	- 86	- 55	- 64	- 20	- 17	-107	- 43	- 35
70 06 07	-128	- 84	- 61	-106	- 40	- 23	-108	- 51	- 38
70 06 13	-128	- 98	- 61	-110	- 57	- 28	-109	- 56	- 41
70 06 20	-129	-104	- 66	-116	- 70	- 33	-109	- 63	- 48
70 06 27	-129	-109	-68	-120	- 81	- 38	-110	- 69	- 50
70 07 04	-118	-113	- 73	-122	- 73	- 46	- 32	- 76	- 42
70 07 10	-129	-115	- 76	-124	- 92	- 53	- 54	- 77	- 50
70 07 16	-129	-116	- 78	-126	- 97	- 64	-100	- 84	- 60
70 07 24	- 97	-107	- 77	- 91	- 67	- 50	- 14	- 73	- 51
70 07 31	- 1	- 1	- 1	- 1	- 1	- 1	- 2	- 16	- 33
70 08 07	- 1	- 1	- 1	- 1	- 1	- 1	- 9	- 10	- 37
70 08 14	- 1	- 1	- 1	- 15	- 1	- 1	- 32	- 16	- 35
70 08 21	- 1	- 1	- 1	- 42	- 11	- 3	- 40	- 31	- 36
70 09 04	- 12	- 6	- 2	-122	- 78	- 46	-123	- 61	- 52
70 09 18	- 46	- 37	- 28	-127	- 99	- 94	-127	- 83	- 63
70 10 09	- 30	- 55	- 39	- 1	- 1	- 1	- 4	- 69	- 60
70 10 23	- 57	- 65	- 37	- 1	- 1	- 1	- 51	- 63	- 71
70 11 06	- 77	- 69	- 49	- 3	- 1	- 2	- 81	- 76	- 68
70 11 27	- 92	- 79	- 42	- 5	- 1	- 2	- 99	- 74	- 72
70 12 18	-101	- 73	- 51	- 7	- 1	- 3	- 25	- 76	- 66
71 01 15	- 97	- 77	- 52	- 6	- 2	- 3	- 26	- 74	- 74
71 03 12	-114	- 94	- 52	- 34	- 2	- 3	- 97	- 69	- 66
71 04 03	-119	-123	- 53	- 74	- 43	- 5	-116	-110	- 62
71 04 16	-123	-124	- 54	- 81	- 107	- 9	-124	- 85	- 65
71 05 22	-126	-110	- 72	-110	-124	- 67	-127	- 95	- 70
71 07 03	-125	-126	- 90	-113	- 82	-101	-109	-112	- 77
71 07 15	-129	-128	-102	-128	-123	-117	-127	-121	- 88
71 07 25	-129	-127	-107				-116	-122	- 82
71 08 02	-129	-126	-108	-129	-126	-125	-117	-121	- 92
71 08 13	-129	-129	-112	-129	-126	-126	-109	-121	- 82
71 08 21	- 95	-127	-110	- 1	- 1	- 1	- 1	- 97	- 84
71 10 07	- 91	-117	-104	- 31	- 84	- 40	- 40	- 88	- 81
71 10 22	-111	-123	-111	- 60	- 42	- 43	- 16	- 91	- 81
71 10 29	- 1	- 52	- 48	- 1	- 1	- 1	- 1	- 31	- 71
71 12 01	- 21	- 64	- 58	- 1	- 1	- 2	- 20	- 26	- 70
71 12 21	- 36	- 61	- 58	- 1	- 1	- 2	- 1	- 12	- 64
71 12 30	- 8	- 58	- 61	- 1	- 1	- 2	- 1	- 7	- 51
72 02 04	- 12	- 59	- 54	- 1	- 1	- 3	- 8	- 3	- 45
72 03 11	- 40	- 68	- 57	- 2	- 1	- 3	- 46	- 12	- 41
72 04 08	-106	-104	- 73	- 40	- 3	- 5	-104	- 14	- 37
72 05 13	-126	-122	-104	-127	- 72	- 65	-127	- 61	- 41
72 05 16	-126	-117	-102	-101	- 72	- 46	-122	- 46	- 39
72 06 13	- 83	- 65	- 51	- 46	- 43	- 29	- 26	- 55	- 46
72 06 21	- 74	- 94	- 67	- 25	- 13	- 24	- 17	- 42	- 44
72 07 06	- 87	- 97	- 76	-119	- 73	- 41	- 96	- 63	- 58
72 07 28	- 1	- 1	- 1	- 1	- 1	- 1	- 78	- 53	- 55
72 08 16	- 38	- 33	- 28	-107	-110	- 65	-110	- 86	- 68
72 09 21	- 1	- 1	- 11	- 1	- 14	- 1	- 23	- 15	- 39
72 10 10	- 2	- 1	- 1	- 9	- 2	- 1	- 36	- 38	- 34
72 10 28	- 1	- 1	- 1	- 1	- 1	- 1	- 1	- 4	- 28
72 11 21	- 1	- 1	- 1	- 1	- 1	- 1	- 2	- 5	- 17
72 12 16	- 1	- 1	- 1	- 1	- 1	- 1	- 1	- 5	- 17
73 01 20	- 1	- 1	- 1	- 1	- 1	- 1	- 1	- 1	- 4
73 02 17	- 1	- 1	- 1	- 1	- 1	- 1	- 1	- 1	- 2
73 04 12	- 1	- 1	- 1	- 1	- 1	- 1	- 13	- 4	- 6
73 05 06	- 16	- 3	- 1	- 16	- 2	- 1	- 73	- 40	- 37
73 05 17	- 28	- 15	- 4	- 45	- 10	- 1	- 49	- 56	- 44
73 06 09	- 85	- 70	- 52	- 81	- 63	- 53	-110	- 95	- 73
73 06 30	- 92	- 59	- 57	- 65	- 59	- 52	-107	-118	- 99
73 07 10	-101	- 75	- 81	- 87	- 75	- 63	-122	-123	-108
73 07 22	- 65	- 78	- 84	- 55	- 76	- 80	- 15	-104	- 98
73 08 15	-102	- 90	- 84	- 93	-110	- 86	-118	-118	-101
73 09 28	-104	-102	-101	- 93	- 84	- 90	-122	-124	-115
73 10 31	-101	- 98	-106	- 89	- 84	- 91	-121	-123	-118
73 11 17	-121	-108	-102	-115	-102	- 89	-117	-121	-100
73 12 31	-115	-104	- 96	-112	-101	- 84	-108	-107	- 96

I.B. PLANTS

I.B.1. Annuals and Small Perennials

Sampling techniques for playa annuals and small perennials used during 1973 were reported in Whitford et al., 1973 (A3UWJ51, 52, 53, 54).

Monthly densities and biomasses for annual forbs, perennial forbs, sub-shrubs, annual grasses and perennial grasses were calculated from 1973 playa sampling data. Biomasses were categorized as vegetative and reproductive and are presented with total biomasses in Table 10.

I.B.2. Large Perennials

Data collection techniques for large perennials were reported in Whitford et al., 1973.

Yucca elata

Monthly biomass estimates of new leaves, new standing dead leaves, standing dead leaves, inflorescence stalks, flowers, and fruits are given for 1971, 1972 and 1973 in Table 11. Also, the percent of plants with an inflorescence were recorded (Table 11).

Xanthocephalum sarothrae

Monthly biomass estimates of leaves, stems, roots, and reproductive parts for *Xanthocephalum sarothrae* are given for 1971, 1972 and 1973 in Table 12.

Ephedra trifurca

Monthly biomass estimates for new stems, reproductive parts, old stems, and roots for long-leaf mormon tea for 1971, 1972 and 1973 are given in Table 13.

Prosopis glandulosa

Monthly growth estimates of leaves, reproductive parts, stems, and roots for mesquite are given for 1971, 1972 and 1973 in Table 14.

Table 10. Total density survey (ind/ha) of playa annuals and small perennials in 1971, 1972 and 1973

Oct. 6, 1971--ind/ha = 8393

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
AMARANTHUS BLITOIDES	54	0.02	0.01	0.03
EUPHORBIA GLYPTOSPERMA	646	0.07	0.00	0.07
EUPHORBIA SERPULA	699	0.06	0.01	0.07
PORTULACA OLERACEA	161	0.02	0.00	0.02
TIDESTROMIA LANUGINOSA	108	0.08	0.03	0.10
TRIBULUS TERRESTRIS	54	0.01	0.00	0.01
ANNUAL FORB TOTALS	1722	0.25	0.05	0.30

Table 10, continued

	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
PERENNIAL FORBS				
ALLIONIA INCARNATA	54	0.01	0.00	0.01
AMMOCODON CHENOPODIOIDES	161	0.05	0.00	0.05
CASSIA BAUHINOIDES	269	0.02	0.00	0.02
CROTON POTTSII	323	0.07	0.00	0.07
EUPHORBIA ALBOMARGINATA	108	0.03	0.00	0.03
PEREZIA NANA	108	0.01	0.00	0.01
SIDA LEPROSA	215	0.01	0.00	0.01
SPHAERALCEA SUBHASTATA	215	0.07	0.00	0.07
TALINUM ANGUSTISSIMUM	430	0.05	0.00	0.05
TRAGIA STYLARIS	54	0.00	0.00	0.01
ZEPHYRANTHES LONGIFOLIA	54	0.03	0.00	0.03
CALLIANDRA HUMILIS	54	0.00	0.00	0.00
PERENNIAL FORB TOTALS	2044	0.34	0.01	0.35
SUBSHRUBS				
KRAMERIA PARVIFLORA	54	0.08	0.00	0.08
SUBSHRUB TOTALS	54	0.08	0.00	0.08
ANNUAL GRASSES				
ARISTIDA ADSCENIONIS	269	0.02	0.01	0.03
BOUTELOUA BARBATA	753	0.06	0.02	0.08
CHLORIS VIRGATA	108	0.00	0.00	0.01
ERAGROSTIS ARIDA	54	0.00	0.00	0.00
ANNUAL GRASS TOTALS	1184	0.08	0.03	0.12
PERENNIAL GRASSES				
ARISTIDA PURPUREA	108	0.29	0.02	0.30
ERIONEURON PULCHELLUM	753	0.06	0.02	0.08
HILARIA MUTICA	538	0.12	0.00	0.13
MUHLENBERGIA PORTERI	592	0.22	0.01	0.23
PANICUM OBTUSUM	161	0.03	0.00	0.03
SCLEROPOGON BREVIFOLIUS	1237	0.37	0.01	0.38
PERENNIAL GRASS TOTALS	3390	1.09	0.05	1.15

Oct. 26, 1972--ind/ha = 73,931

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
AMARANTHUS PALMERI	2054	3.10	4.63	7.73
BOERHAAVIA GRACILLIMA	513	0.20	0.04	0.24
ERIOGONUM ROTUNDIFOLIUM	5134	6.28	2.34	8.62
EUPHORBIA MICROMERA	3080	0.64	0.60	1.23
EUPHORBIA SERPYLLIFOLIA	6161	1.47	0.76	2.23
EUPHORBIA SERRULA	2567	1.27	0.15	1.43
HYMENOXYS ODORATA	2054	0.08	0.00	0.08
IVA AMBROSIAEFOLIA	1027	0.06	0.00	0.06
PORTULACA OLERACEA	5134	1.37	0.64	2.01
TIDESTROMIA LANUGINOSA	2567	13.44	3.23	16.67
TRIBULUS TERRESTRIS	513	1.58	0.32	1.89
ANNUAL FORB TOTALS	30805	29.48	12.71	42.18
PERENNIAL FORBS				
ALLIONIA INCARNATA	2054	26.69	18.36	45.05
AMMOCODON CHENOPODIOIDES	513	0.02	0.00	0.02
ASTRAGALUS TEPHRODES	1027	0.06	0.00	0.06
BAHIA ABSINTHIFOLIA	1027	0.17	0.00	0.17
CASSIA BAUHINOIDES	1540	2.69	0.71	3.39
CROTON POTTSII	2567	3.83	0.00	3.83
EUPHORBIA ALBOMARGINATA	513	0.17	0.01	0.17
PEREZIA NANA	4621	1.49	0.00	1.49
SIDA LEPROSA	1027	0.05	0.00	0.05
SPHAERALCEA SUBHASTATA	513	0.01	0.00	0.01
CALLIANDRA HUMILIS	1027	3.82	0.00	3.82
PERENNIAL FORB TOTALS	16429	39.01	19.07	58.08
SUBSHRUBS				
ZINNIA PUMILA	1027	1.45	0.06	1.50
SUBSHRUB TOTALS	1027	1.45	0.06	1.50
ANNUAL GRASSES				
ARISTIDA ADSCENIONIS	1027	3.34	0.06	3.39
BOUTELOUA BARBATA	9241	2.58	1.65	4.23
ERAGROSTIS ARIDA	1027	0.02	0.01	0.03
ANNUAL GRASS TOTALS	11295	5.94	1.71	7.64
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	8728	2.57	0.92	3.49
SCLEROPOGON BREVIFOLIUS	4621	9.34	1.46	10.81
SPOROBOLUS FLEXUOSUS	513	0.29	0.02	0.31
PERENNIAL GRASS TOTALS	13862	12.20	2.40	14.61

Table 10, continued

June 27, 1972--ind/ha = 98,116

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
AMARANTHUS BLITOIDES	613	0.01	0.00	0.01
BOERHAAVIA SPICATA	7359	0.33	0.00	0.33
CHENOPODIUM INCANUM	14104	16.25	0.72	16.97
ERIOGONUM ABERTIANUM	1226	0.61	0.01	0.61
ERIOGONUM ROTUNDIFOLIUM	4906	5.23	0.32	5.55
ERIOGONUM TRICHOPES	1840	0.18	0.06	0.23
EUPHORBIA GLYPTOSPERMA	9198	0.21	0.00	0.21
EUPHORBIA MICROMERA	6745	0.07	0.00	0.07
EUPHORBIA SERRULA	7359	0.07	0.00	0.07
KALLSTROEMIA PARVIFLORA	1840	0.17	0.00	0.17
LEUCELENE ERICOIDES	1226	0.46	0.01	0.47
PECTIS PAPPOSA	613	0.01	0.00	0.01
PORTULACA OLERACEA	4293	0.08	0.00	0.08
TRIBULUS TERRESTRIS	1226	0.02	0.00	0.02
ANNUAL FORB TOTALS	62549	23.67	1.12	24.79
PERENNIAL FORBS				
ALLIONIA INCARNATA	1226	0.08	0.01	0.09
AMMOCODON CHENOPODIOIDES	1840	0.63	0.02	0.65
CASSIA BAUHINIOIDES	613	0.82	0.25	1.07
CROTON POTTSII	4293	7.57	0.39	7.97
PEREZIA NANA	4906	2.70	0.09	2.80
SIDA LEPROSA	1226	0.61	0.02	0.63
CALLIANDRA HUMILIS	1840	0.41	0.00	0.41
PERENNIAL FORB TOTALS	15944	12.82	0.78	13.60
SUBSHRUBS				
ZINNIA PUMILA	613	0.10	0.00	0.10
SUBSHRUB TOTALS	613	0.10	0.00	0.10
ANNUAL GRASSES				
ARISTIDA ADSCENIONIS	5519	0.07	0.00	0.07
BOUTELOUA BARBATA	5519	0.07	0.00	0.07
ANNUAL GRASS TOTALS	11038	0.13	0.00	0.13
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	2453	0.18	0.00	0.18
SCLEROPOGON BREVIFOLIUS	5519	2.40	0.01	2.40
PERENNIAL GRASS TOTALS	7972	2.58	0.01	2.58

Aug. 22, 1972--ind/ha = 104,140

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
AMARANTHUS PALMERI	4445	1.38	0.02	1.40
AMARANTHUS PUBESCENS	635	0.37	0.04	0.41
BOERHAAVIA SPICATA	5715	8.50	0.37	8.88
CHENOPODIUM INCANUM	4445	5.29	0.48	5.77
ERIOGONUM ABERTIANUM	1905	1.93	0.63	2.56
ERIOGONUM ROTUNDIFOLIUM	6985	13.54	5.67	19.21
ERIOGONUM TRICHOPES	635	0.27	0.11	0.38
EUPHORBIA SERPYLLIFOLIA	15240	5.17	1.70	6.86
EUPHORBIA SERRULA	6350	3.00	1.94	4.94
KALLSTROEMIA PARVIFLORA	3810	5.99	0.37	6.36
SALSOLA KALI	635	1.61	0.00	1.61
TIDESTROMIA LANUGINOSA	8255	3.35	1.44	4.79
TRIBULUS TERRESTRIS	635	0.20	0.01	0.20
UNKNOWN ANNUAL FORBS	2540	0.00	0.00	0.00
ANNUAL FORB TOTALS	62230	50.59	12.77	63.36
PERENNIAL FORBS				
ASTRAGALUS TEPHRODES	635	0.17	0.00	0.17
CASSIA BAUHINIOIDES	2540	0.18	0.01	0.19
CROTON POTTSII	635	1.18	0.01	1.19
PEREZIA NANA	1270	0.51	0.00	0.51
TALINUM ANGUSTISSIMUM	1270	0.29	0.02	0.31
CALLIANDRA HUMILIS	1270	2.07	0.00	2.07
PERENNIAL FORB TOTALS	7620	4.41	0.03	4.44
SUBSHRUBS				
XANTHOCEPHALUM SAROTHRAE	635	0.17	0.00	0.17
SUBSHRUB TOTALS	635	0.17	0.00	0.17
ANNUAL GRASSES				
ARISTIDA ADSCENIONIS	635	0.01	0.00	0.01
BOUTELOUA BARBATA	13970	1.99	0.12	2.11
CHLORIS VIRGATA	635	0.06	0.00	0.06
ANNUAL GRASS TOTALS	15240	2.06	0.12	2.18
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	11430	1.05	0.04	1.09
SCLEROPOGON BREVIFOLIUS	6350	14.72	0.22	14.94
SPOROBOLUS FLEXUOSUS	635	1.19	0.00	1.19
PERENNIAL GRASS TOTALS	18415	16.95	0.27	17.22

April 7, 1973--ind/ha = 152,625

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
APHANOSTEPHUS RAMOSISSIMUS	477	0.09	0.00	0.09
CHENOPODIUM INCANUM	5246	0.07	0.00	0.07
CONYZA COULTERI	954	0.08	0.00	0.08
CRYPTANTHA CRASSISEPALA	4293	1.47	0.00	1.47
DESCURAINEA PINNATA	16216	19.79	0.00	19.79
DITHYREA WISLIZENII	1908	3.73	0.00	3.73
ERIASTRUM DIFFUSUM	954	0.03	0.00	0.03
ERIOGONUM ABERTIANUM	25279	1.59	0.00	1.59
ERIOGONUM ROTUNDIFOLIUM	50557	3.61	0.00	3.61
ERIOGONUM TRICHOPES	12878	1.51	0.00	1.51
ESCHOLTZIA MEXICANA	3339	2.32	0.00	2.32
HYMENOXYS ODORATA	3816	0.00	0.00	0.00
LESQUERELLA GORDONII	477	1.33	0.75	2.08
LEUCELENE ERICOIDES	1431	1.40	0.45	1.85
MENTZELIA ALBICAULIS	2862	3.67	0.00	3.67
MENTZELIA PUMILA	477	0.18	0.00	0.18
NAMA HISPIDUM	2385	3.53	0.08	3.61
OENOTHERA PRIMIVERIS	954	0.41	0.00	0.41
SALSOLA KALI	1431	0.02	0.00	0.02
UNKNOWN ANNUAL FORBS	1431	0.00	0.00	0.00
ANNUAL FORB TOTALS	137363	44.84	1.28	46.12
PERENNIAL FORBS				
BAILEYA MULTIRADIATA	5246	4.76	0.00	4.76
CIRSIUM OCHROCENTRUM	954	0.46	0.00	0.46
CROTON POTTSII	477	0.02	0.00	0.02
EUPHORBIA ALBOMARGINATA	954	0.10	0.00	0.10
SIDA LEPROSA	1908	0.05	0.00	0.05
SPHAERALCEA SUBHASTATA	954	1.02	0.00	1.02
PERENNIAL FORB TOTALS	10493	6.42	0.00	6.42
SUBSHRUBS				
XANTHOCEPHALUM SAROTHRAE	1431	0.19	0.00	0.19
SUBSHRUB TOTALS	1431	0.19	0.00	0.19
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	954	0.10	0.00	0.10
SCLEROPOGON BREVIFOLIUS	1908	0.20	0.00	0.20
SPOROBOLUS FLEXUOSUS	477	0.02	0.00	0.02
PERENNIAL GRASS TOTALS	3339	0.31	0.00	0.31

May 5, 1973--ind/ha = 188,039

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
AMARANTHUS BLITOIDES	603	0.01	0.00	0.01
CHENOPODIUM INCANUM	10246	1.10	0.00	1.10
CONYZA CANADENSIS	1205	0.00	0.00	0.00
CRYPTANTHA CRASSISEPALA	1205	0.31	0.11	0.42
DESCURAINEA PINNATA	7835	28.28	20.27	48.55
DITHYREA WISLIZENII	3013	3.38	0.40	3.77
ERIOGONUM ABERTIANUM	16273	5.00	0.01	5.00
ERIABE VAR. RUBARUM	3013	0.82	0.00	0.82
ERIOGONUM ROTUNDIFOLIUM	74131	15.24	0.70	15.94
ERIOGONUM TRICHOPES	13862	23.43	0.89	24.31
ESCHOLTZIA MEXICANA	1205	1.60	0.01	1.61
HYMENOXYS ODORATA	1205	0.00	0.00	0.00
LEPIDIUM LASIOCARPUM	603	0.85	0.23	1.08
LESQUERELLA GORDONII	1205	8.46	3.53	11.99
LEUCELENE ERICOIDES	1808	1.16	0.16	1.32
MENTZELIA ALBICAULIS	1205	1.28	0.00	1.28
NAMA HISPIDUM	5424	4.11	0.01	4.12
OENOTHERA PRIMIVERIS	1205	15.62	3.68	19.30
PHACELIA COERULA	1205	0.20	0.00	0.20
SALSOLA KALI	6027	0.14	0.00	0.14
UNKNOWN ANNUAL FORBS	1205	0.00	0.00	0.00
ANNUAL FORB TOTALS	153686	110.97	29.97	140.94
PERENNIAL FORBS				
AMMOCODON CHENOPODIOIDES	603	0.00	0.00	0.00
ASTRAGALUS WOOTENI	2411	55.71	11.60	67.31
BAILEYA MULTIRADIATA	3013	6.57	0.13	6.70
CASSIA BAUHINIOIDES	1205	0.27	0.00	0.27
CROTON POTTSII	4219	2.97	0.00	2.97
EUPHORBIA ALBOMARGINATA	603	2.18	0.00	2.18
PEREZIA NANA	2411	0.75	0.00	0.75
SIDA LEPROSA	2411	0.21	0.00	0.21
SPHAERALCEA SUBHASTATA	1808	0.00	0.00	0.00
VERBENA WRIGHTII	2411	10.18	1.67	11.85
CALLIANDRA HUMILIS	1808	0.08	0.00	0.08
PERENNIAL FORB TOTALS	22902	78.91	13.40	92.31
SUBSHRUBS				
XANTHOCEPHALUM SAROTHRAE	9040	9.49	0.00	9.49
SUBSHRUB TOTALS	9040	9.49	0.00	9.49

Table 10, continued

ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	1205	0.64	0.07	0.71
PERENNIAL GRASS TOTALS	1205	0.64	0.07	0.71

Pre

June 5, 1973--ind/ha = 131,954

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
CHENOPODIUM INCANUM	8882	16.45	0.00	16.45
CONYZA CANADENSIS	1692	42.72	0.00	42.72
DITHYREA WISLIZENII	846	1.03	0.00	1.03
ERIOGONUM ABERTIANUM	9304	3.37	0.29	3.66
ERIABE VAR. RUBARUM	846	0.28	0.00	0.28
ERIOGONUM ROTUNDIFOLIUM	52866	37.33	6.96	44.29
ERIOGONUM TRICHOPES	9727	18.00	6.67	24.67
ESCHOLTZIA MEXICANA	423	4.53	2.96	7.49
HYMENOXYS ODORATA	2961	0.00	0.00	0.00
IVA AMBROSIAEFOLIA	1692	3.98	0.00	3.98
LESQUERELLA GORDONII	423	0.11	0.04	0.15
MENTZELIA ALBICAULIS	846	1.27	0.00	1.27
NAMA HISPIDUM	2538	9.62	0.93	10.56
OENOTHERA PRIMIVERIS	423	4.62	6.25	10.87
SALSOLA KALI	3806	3.53	0.00	3.53
TIDESTROMIA LANUGINOSA	423	0.60	0.34	0.94
UNKNOWN ANNUAL FORBS	846	0.00	0.00	0.00
ANNUAL FORB TOTALS	98543	147.44	24.45	171.90
PERENNIAL FORBS				
AMMOCODON CHENOPODIOIDES	423	0.82	0.14	0.96
ASTRAGALUS TEPHRODES	1692	19.30	4.78	24.09
BAILEYA MULTIRADIATA	1692	3.54	0.44	3.98
CASSIA BAUHINIOIDES	1269	0.71	0.00	0.71
CROTON POTTSII	2961	0.91	0.00	0.91
EUPHORBIA ALBOMARGINATA	846	0.56	0.00	0.56
HOFFMANSEGGIA DENSIFLORA	1269	0.12	0.00	0.12
MACHAERANTHERA TANACETIFOL	423	0.48	0.00	0.48
PEREZIA NANA	2961	1.08	0.00	1.08
SIDA LEPROSA	1692	0.22	0.00	0.22
SOLANUM ELEAGNIFOLIUM	423	0.48	0.00	0.49
SPHAERALCEA SUBHASTATA	2115	4.29	0.00	4.29
TRAGIA STYLARIS	423	1.89	0.00	1.89
VERBENA WRIGHTII	1269	24.10	1.32	25.42
CALLIANDRA HUMILIS	846	1.07	0.00	1.07
PERENNIAL FORB TOTALS	20301	59.57	6.71	66.27
SUBSHRUBS				
XANTHOCEPHALUM SAROTHRAE	7190	20.66	0.00	20.66
ZINNIA GRANDIFLORUM	423	0.30	0.00	0.30
SUBSHRUB TOTALS	7613	20.95	0.00	20.95
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ARISTIDA PURPUREA	846	2.69	0.49	3.18
ERIONEURON PULCHELLUM	3806	1.98	0.00	1.98
SCLEROPOGON BREVIFOLIUS	846	0.41	0.00	0.41
PERENNIAL GRASS TOTALS	5498	5.08	0.49	5.57

July 3, 1973--ind/ha = 124,567

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
CHENOPODIUM INCANUM	11626	0.00	0.00	0.00
ERIOGONUM ABERTIANUM	15363	18.50	4.55	23.05
ERIOGONUM ROTUNDIFOLIUM	49412	37.31	5.94	43.25
ERIOGONUM TRICHOPES	5398	25.39	6.18	31.57
ESCHOLTZIA MEXICANA	415	0.02	0.01	0.03
EUPHORBIA SERPYLLIFOLIA	415	0.00	0.00	0.00
HAPLOPAPPUS GRACILIS	415	0.08	0.00	0.08
HYMENOXYS ODORATA	415	2.65	0.01	2.66
IVA AMBROSIAEFOLIA	415	0.75	0.00	0.75
MENTZELIA ALBICAULIS	1246	5.39	3.30	8.69
NAMA HISPIDUM	2076	7.01	0.02	7.03
SALSOLA KALI	3737	8.13	0.00	8.13
TIDESTROMIA LANUGINOSA	830	2.77	0.00	2.77
TRIBULUS TERRESTRIS	830	0.02	0.00	0.02
UNKNOWN ANNUAL FORBS	830	0.00	0.00	0.00
ANNUAL FORB TOTALS	93426	108.01	20.02	128.03
PERENNIAL FORBS				
AMMOCODON CHENOPODIOIDES	830	0.68	0.00	0.68
BAHIA ABSINTHIFOLIA	415	0.05	0.00	0.05
BAILEYA MULTIRADIATA	2907	17.34	0.43	17.77
CASSIA BAUHINOIDES	830	2.85	0.01	2.86
CIRSIUM OCHROCENTRUM	1246	19.34	0.50	19.84
CROTON POTTSII	5813	13.99	0.00	13.99
HELIANTHUS CILIARIS	830	5.99	0.00	5.99
HOFFMANSEGGIA DENSIFLORA	830	2.13	0.00	2.13
PEREZIA NANA	2076	1.23	0.04	1.27
SOLANUM ELEAGNIFOLIUM	2076	9.92	0.00	9.92
SPHAERALCEA SUBHASTATA	1661	4.07	0.00	4.07
TALINUM ANGUSTISSIMUM	415	0.10	0.01	0.12
VERBENA WRIGHTII	415	0.28	0.00	0.28
CALLIANDRA HUMILIS	415	1.59	0.00	1.59
PERENNIAL FORB TOTALS	20761	79.57	0.99	80.56
SUBSHRUBS				
DYSSODIA ACEROSA	1246	0.39	0.00	0.39
XANTHOCEPHALUM SAROTHRAE	3322	20.79	0.00	20.79
SUBSHRUB TOTALS	4567	21.18	0.00	21.18
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ARISTIDA PURPUREA	1661	10.92	0.91	11.83
ERIONEURON PULCHELLUM	3322	3.17	0.01	3.18
HILARIA MUTICA	415	2.71	0.00	2.71
PERENNIAL GRASS TOTALS	5398	16.80	0.92	17.71

Peak

Aug. 7, 1973--ind/ha = 253,155

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
AMARANTHUS PALMERI	5680	2.20	0.29	2.49
APHANOSTEPHUS RAMOSISSIMUS	3246	57.99	4.03	62.02
CHENOPODIUM INCANUM	12171	11.75	5.55	17.30
CONYZA CANADENSIS	811	31.56	0.00	31.56
ERIOGONUM ABERTIANUM	14605	19.97	3.33	23.30
ERIABE VAR. RUBARUM	2434	0.92	0.02	0.94
ERIOGONUM ROTUNDIFOLIUM	99253	122.84	14.36	137.20
ERIOGONUM TRICHOPES	13794	44.57	7.12	51.69
EUPHORBIA MICROMERA	4868	0.02	0.00	0.02
EUPHORBIA SERPYLLIFOLIA	10548	0.21	0.00	0.21
EUPHORBIA SERRULA	2434	0.04	0.00	0.04
HYMENOXYS ODORATA	811	0.00	0.00	0.00
LEUCELENE ERICOIDES	3246	1.78	0.00	1.78
MENTZELIA ALBICAULIS	1623	22.26	1.66	23.92
PORTULACA OLERACEA	12982	3.08	0.00	3.08
SALSOLA KALI	811	3.57	0.00	3.57
TIDESTROMIA LANUGINOSA	12982	0.37	0.00	0.37
TRIBULUS TERRESTRIS	3246	0.12	0.00	0.12
UNKNOWN ANNUAL FORBS	811	0.00	0.00	0.00
ANNUAL FORB TOTALS	196357	323.23	36.37	359.61
PERENNIAL FORBS				
ALLIONIA INCARNATA	9737	0.53	0.00	0.53
BAHIA ABSINTHIFOLIA	811	0.32	0.00	0.32
BAILEYA MULTIRADIATA	7303	47.68	3.28	50.96
CASSIA BAUHINOIDES	1623	3.25	0.00	3.25
CROTON POTTSII	3246	18.92	0.15	19.08
EUPHORBIA ALBOMARGINATA	4057	1.40	0.01	1.40
PEREZIA NANA	5680	4.80	0.06	4.87
SIDA LEPROSA	2434	0.53	0.00	0.53
SOLANUM ELEAGNIFOLIUM	1623	3.12	0.70	3.81
VERBENA WRIGHTII	811	15.94	2.47	18.41
CALLIANDRA HUMILIS	1623	24.28	2.82	27.09
PERENNIAL FORB TOTALS	38947	120.74	9.49	130.24
SUBSHRUBS				
XANTHOCEPHALUM SAROTHRAE	4057	5.03	0.00	5.03
ZINNIA GRANDIFLORUM	811	0.97	0.08	1.05
SUBSHRUB TOTALS	4868	6.00	0.08	6.08
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	10548	30.22	0.58	30.80
SCLEROPOGON BREVIFOLIUS	2434	2.58	0.00	2.58
PERENNIAL GRASS TOTALS	12982	32.80	0.58	33.38

Table 11. *Yucca elata* on the playa site

		INCREMENTS		STANDING BIOMASS				
Year	Date	New Leaves Kg Ha^{-1}	New Standing Dead Leaves Kg Ha^{-1}	Leaves Kg Ha^{-1}	Inflorescence Stalks Kg Ha^{-1}	Flowers Kg Ha^{-1}	Fruits Kg Ha^{-1}	% Plants with An Inflorescence
1971	May 01	1.48	1 00	26.48	0.01	0.0	0.00	<0.1
	Jun 01	0.28	0.50	26.26	0.02	0.006	0.00	<0.1
	Jul 01	0.15	0.47	25.94	0.02	0.00	0.00	<0.1
	Aug 01	0.43	0.19	26.18	0.02	0.00	0.00	<0.1
	Sep 01	2.09	0.38	27.89	0.02	0.00	0.00	<0.1
	Oct 01	0.29	0.13	28.05				<0.1
	Nov 01	0.38	0.04	28.39				0.0
	Dec 01	0.25	0.00	28.64		(Standing Dead)		0.0
1972	Jan 01	0.04	0.03	28.65				
	Feb 01	0.00	0.08	28.57				
	Mar 01	0.76	0.14	29.19				
	Apr 01	1.39	1.54	29.04	0.44	0.01	0.00	19.0
	May 01	0.96	1.88	28.12	4.65	1.37	0.00	19.0
	Jun 01	2.22	0.33	30.01	3.94	1.08	4.20	8.0
	Jul 01	5.25	0.47	34.79				
	Aug 01	4.00	0.40	38.39				
	Sep 01	7 43	0.54	45.28				
	Oct 01	3.35	0.56	48.07		(Standing Dead)		
	Nov 01	0.26	0.00	48.33				
1973	Jan 13	1.16	0.32	49.16				
	Mar 01	0.13	0.16	49.13				
	Apr 01	0.13	0.11	49.15				
	May 01	0.75	0.10	49.80	0.00	0.00	0.00	0.0
	Jun 01	2.35	0.04	52.11	0.72	0.08	0.00	23.67
	Jul 01	3.86	0.75	55.22	15.51	3.52	0.00	19.23
	Aug 01	5.65	0.00	60.87	25.14	6.65	37.09	41.25
1973	Sep 01	3.49	0.07	64.29				
	Oct 01	1.16	0.03	65.42				
	Nov 01	1.07	0.82	65.67		(Standing Dead)		
	Dec 01	0.29	0.13	65.83				

Table 12. Estimates of biomass (kg/ha) for stems, leaves, roots and reproduction in snakeweed (*Xanthocephalum sarothrae*) on the playa site for 1971, 1972 and 1973

Year	Date	Leaves	Stems	Roots	Reproductive Parts
1971	Jul 01	14.2	18.5	6.8	
	Aug 01	17.7	23.0	8.4	
	Sep 01	17.3	22.6	8.3	
	Oct 01	28.2	36.7	13.5	15.6
	Nov 01	19.3	25.1	9.2	10.7
	Dec 01	19.3	25.1	9.2	10.7
1972	Jan 01	16.4	21.3	7.8	9.1
	Feb 08	0	29.7	7.2	
	Mar 01	7.2	9.3	3.4	
	Apr 01	12.2	15.9	5.8	
	May 01	14.3	18.6	6.8	
	Jun 01	15.6	20.3	7.5	
	Jul 01	20.7	26.9	9.9	
	Aug 31	24.9	32.4	11.9	
	Oct 05	27.2	35.4	13.0	15.1
	Nov 09	26.9	35.1	12.9	15.0
	Dec 08	12.2	15.9	5.8	6.8
1973	Mar 10	7.1	9.2	3.4	
	Apr 28	19.7	25.6	9.4	
	May 30	48.5	63.2	23.2	
	Jun 29				
	Jul 30	88.8	115.6	42.5	
	Aug 30	104.2	135.6	49.8	57.8
	Sep 29	110.3	143.8	52.8	61.3
	Oct 29	106.3	138.4	50.8	59.0
	Nov 29	110.6	144.0	52.9	61.4

Table 13. Estimates of biomass (kg/ha) for new stems, reproduction, old stems, and roots in long-leaf mormon tea (*Ephedra trifurca*) on the playa site for 1971, 1972 and 1973

Year	Date	Green Stems New	Green Stems Old	Green Stems Total	Reproductive Parts Buds	Reproductive Parts ♂ Cones	Reproductive Parts ♀ Cones	Corky Stems	Live Roots
1970	Jul 28	*		160					
	Aug 15			183					
	Oct 30			170				216	129
1971	May 01			198					
	Jun 01			231					
	Jul 01			205					
	Aug 01			188					
	Sep 01			190					
	Oct 01			139					
	Nov 01			160					
	Dec 01			144					
1972	Jan 01			128					
	Mar 04	1		189					
	Apr 08	13		202	0	2.7	4.9		
	May 02	45		246					
	Jun 01	84		284					
	Jun 29	120		311					
	Jul 26	173		366					
	Sep 07	132		331					
	Oct 05	82		284					
	Nov 09	57		296					
	Dec 09	51		280					
1973	Jan 13	0	266	266					
	Mar 03	0	186	186					
	Mar 31	6	185	191					
	Apr 28	15	184	199	0	4.0	4.7		
	May 31	99	177	276					
	Jun 29	128	122	250					
	Jul 30	117	75	192					
	Aug 30	127	70	197					
	Sep 29	93	13	106					
	Oct 29	73	12	85					
	Nov 30	59	13	72					

* data not collected

Table 14. Mesquite new growth (kg/ha) at the playa site

Year	Date	Leaves Old Nodes	Leaves New Shoots	Reproductive Parts Inflorescences	Reproductive Parts Fruits	Stems New Standing	Roots
1971	Jun 01	87	6.7	0	0	4.4	
	Jul 01	423	8.3	0	0	5.4	
	Aug 01	387	9.0	0	0	5.8	
	Sep 01	401	0	0	0	0	
	Oct 01	397	0	0	0	0	
	Nov 01	298	0	0	0	0	
	Dec 01	51	0	0	0	0	
1972	Jan 01	7	0	0	0	0	
	Mar 23	33	0	0	0	0	
	May 15	0	0	0	0	0	
	Jun 01	247	34.1	0	0	22.2	
	Jun 29	265				22.9	
	Jul 26	216	37.2			24.2	
	Sep 07	208	21.7	0		14.1	
	Oct 05	174		0	0		
	Nov 09	143		0	0		
	Dec 09	5	9.3	0	0	6.1	
1973	Apr 28	2.6		0	0		
	May 12	240		0	0		
	May 31	295			0		
	Jun 27	270			140.8		
	Jul 30	272		0			
	Aug 30	270		0	22.2		
	Sep 29	256		0	0		
	Oct 29	191		0	0		
	Nov 30	20		0	0		

I.C. INVERTEBRATES

I.C.1. Shrub Arthropods

Shrub arthropod data have been collected from the playa since May, 1971 (A3UWJ21, 25). Samples were collected primarily from three shrubs, *Prosopis glandulosa*, *Larrea divaricata* and *Ephedra* sp., and two grasses, *Panicum obtusum* and *Hilaria mutica*. Some sampling was done on *Xanthocephalum sarothrae* and *Yucca elata*. Samples were collected monthly, except during the winter months; the data presented here represent the samples collected in 1971 and 1972.

The data were collected by D-Vac sampling (Southwood, 1966). One to six samples were taken from each plant species on each sampling date. Entire shrubs were vacuumed without enclosing the plant. Grass species were sampled by placing a plexiglass cylinder 1 m in diameter on the ground and vacuuming the area enclosed by the cylinder. Samples were taken at random.

When a sample had been taken, the contents of the D-Vac net were transferred to a plastic sack containing a killing agent, usually p-dichlorobenzene. Samples were labelled with pertinent field data such as date, plant species, size of shrub, etc.

Samples were processed by hand in the laboratory. Arthropods were separated from plant material by microscopic inspection of samples.

The arthropods collected in each sample were then treated in two ways, identified here as the "taxa method" and the "feeding type method." Both 1971 and 1972 samples were treated by the taxa method; the 1972 samples were also treated by the feeding type method.

The arthropods taken in each sample were grouped by family, and the number of individuals in each family were recorded. The number of arthropods in each family was divided by the canopy volume of the sampled shrub, which was computed from the height and width of the shrub, using the equations noted in Table 15. The data are given as density of arthropods per cubic meter of shrub. For grass samples, sampled area was used instead of volume, and the data are presented as density per square meter of grass. These data have been averaged by season, and are presented in Tables 16 through 27. A description of the taxa code names is given in Table 28.

The arthropods taken in each sample were also grouped into seven feeding categories. The categories, and the important families comprising each category are listed in Table 29. The arthropods in each sample were dried at 60 C for 4 hr; the numbers and dry weight of each category were then recorded.

The biomass of the sampled shrub was estimated from the canopy volume using the equations in Table 15. The numbers and weight of arthropods were divided by the biomass of the sampled shrub, and the resulting numbers were multiplied by the above-ground, standing crop biomass of each shrub to give arthropod data in numbers per hectare and weight per hectare. Data from grass samples were divided by the sampled area and multiplied by 10,000. These data are presented in Table 30 through 34.

Ephedra sp. feeding type results are presented as follows: in April, 1972, the herbivorous biomass was 0.1 $g \cdot ha^{-1}$ and consisted largely of Bombyliids. The carnivorous biomass was 0.6 $g \cdot ha^{-1}$. Important groups were Chalcidoids, Empids and spiders. The herbivorous biomass in May was 0.2 $g \cdot ha^{-1}$, and was composed of Mirids, Lygaeids, Cicadellids, and Flatids. The carnivorous biomass was 0.1 $g \cdot ha^{-1}$; it consisted of Chrysopids and Chalcidoids. In July, the herbivorous biomass, composed mostly of Phleaothripids, Psyllids and Cicadellids was 0.3 $g \cdot ha^{-1}$. The carnivorous biomass, represented by Chrysopids, was 0.1 $g \cdot ha^{-1}$. In August, the herbivorous biomass was 0.1, and was composed of Psyllids and Formicids. The carnivorous biomass which consisted of Chrysopids, Nabids and Braconids was 0.1 $g \cdot ha^{-1}$. The September herbivorous biomass was 0.7, and was composed chiefly of Cicadellids, Formicids and various Diptera. Some Isoptera, which represent a large portion of the month's herbivorous biomass, were taken in one sample. They were probably taken from a colony near the surface of the ground, and do not represent shrub insects. The carnivorous biomass in September, represented by Chrysopids was 0.1 $g \cdot ha^{-1}$.

In April, 1972, the herbivorous biomass of *Hilaria mutica* (Table 31) was 71 $g \cdot ha^{-1}$. The major group was Cicadellidae; some Coccids were present. The carnivorous biomass was 7.6 and consisted mostly of Hemerobiids. In May, the arthropod biomass was 15. Although the biomass is listed in the "carnivore other" category (Table 29), the predominant insects were Cercopids, Formicids and various small moths. In June, the herbivorous biomass was 3.8 $g \cdot ha^{-1}$, and was composed mainly of Halictids. The carnivorous biomass was 210, chiefly spiders. The herbivorous biomass in July was 90. The predominant groups during this month were Psyllidae and Phlaeothripidae. The carnivorous biomass, composed mostly of Chalcidoids and Hemerobiids, was 13 $g \cdot ha^{-1}$. The biomass of both herbivores and carnivores was zero in August. In September the herbivorous biomass was 120, and consisted of Delphacids and various Diptera, probably Chironomids and Culicids. The carnivorous biomss, 5.7, was composed mostly of various Diptera.

In April, 1972, the herbivorous biomass of *Larrea divaricata* was 0.15 $g \cdot ha^{-1}$. It was composed mostly of Mirids and Cercopids. The carnivorous biomass, represented by Chalcidoids, was 0.06. The herbivorous biomass in May was about 0.2, and consisted of Psyllids, Cicadellids and Membracids. The carnivorous biomass was 0.1, and was composed chiefly of spiders. In July, the herbivorous

Table 15. Estimation equations for biomass (B) of large perennials on the playa by their component parts based on canopy ground cover (A) and canopy volume(V)

Species	Component	Equation based on Canopy Area (A)	Equation based on Canopy Volume (V)
Prosopis glandulosa var. *torreyana* (11)*	Leaves	$B = 2.7 + 59.7A + 3.8A^2$	$B = 79.1V$
	Live Stems	$B = 93.6 + 136.2A^2$	$B = 1385.8V$
	Dead Stems	$B = 138.8A^2$	$B = 1313.1V$
	Total Above Grnd	$B = 286.7A^2$	$B = 2778.0V$
	Total Below Grnd	$B = 220.2A^2$	$B = 2130.5V$
Ephedra trifurca (10)	Green Stems	$B = 888.3A - 65.1A^2$	$B = 1239.1V - 160.2V^2$
	Corky Stems	$B = 1220.9A - 180.7A^2$	$B = 1798.5V - 373.7V^2$
	Dead Stems	$B = 129.0A + 56.1A^2$	$B = 211.0V + 53.3V^2$
	Total Above Grnd	$B = 2238.3A - 189.8A^2$	$B = 3248.6V - 480.6V^2$
	Total Below Grnd	$B = 664.0A$	$B = 779.8V$
Ephedra torreyana (10)	Green Stems		$B = 1335.7V$
	Corky Stems		$B = 1056.6V$
	Total Above Grnd		$B = 2392.3V$
	Total Below Grnd		$B = 2251.5V$
Xanthocephalum sarothrae (15)	Leaves		$B = 961.5V$
	Stems		$B = 1251.4V$
	Total Above Grnd		$B = 2212.8V$
	Total Below Grnd		$B = 460.0V$
Yucca elata (10)	Green Leaves		$B = 6218.5V$#
	Dead Leaves		$B = 208750.0V$¢
	Caudex		$B = 545850.0V$¢
	Tuber		$B = 866720.0V + 205.7 \times 10^5 V^2$
Atriplex canescens (3)	Leaves	$B = 150.6A$	$B = 141.6V$
	Live Stems	$B = 1189.6A$	$B = 1117.9V$
	Dead Stems	$B = 526.6A$	$B = 493.8V$
	Total Above Grnd	$B = 1866.8A$	$B = 1753.4V$
	Total Below Grnd	$B = 800.8A$	$B = 752.1V$

\# based on leaf volume
¢ based on caudex volume
* number of plants used in determining coefficients in the equations

biomass was 0.3; the major group was Miridae. The carnivorous biomass, represented mainly by Chalcidoids and Myrmeleontids was 1.4 $g \cdot ha^{-1}$. The August herbivorous biomass was 0.3, and consisted chiefly of Psyllids and Membracids. The carnivorous biomass was 0.3; the major group was spiders. In September, the biomass of herbivores and carnivores was zero.

In April, 1972, the herbivorous biomass of *Panicum obtusum* (Table 33) was 210 $g \cdot ha^{-1}$ and consisted mostly of Cicadellids. The carnivorous biomass, composed mostly of Chalcidoids and Nabids was 8.5 $g \cdot ha^{-1}$. The biomass of herbivores and carnivores in May and June was zero. In July, the herbivorous biomass was 160, and was represented mostly by Phlaeothripids. The carnivorous biomass was 460. It is possible that Formicids were incorrectly grouped with the carnivores for this date. This would imply that the carnivorous biomass was smaller than 460. The August herbivorous biomass was 160, and consisted of Phlaeothripids and various mites. The carnivorous biomass was 17 and consisted of Anthocorids. Formicids were also possibly included in this carnivorous biomass. In September, the herbivorous biomass was 77. The predominant groups were Chironomidae and Phlaeothripidae. Some carnivores were taken, primarily Chalcidoids and Cercopids. Their biomass is not recorded, and was probably less than 0.01 $g \cdot ha^{-1}$.

In May, 1972, the herbivorous biomass on *Prosopis glandulosa* (Table 34) was 7.3 $g \cdot ha^{-1}$. Psyllidae was the predominant group, and continued to be the most important group throughout the year. The carnivorous biomass was zero. In June, the herbivorous biomass was 66. The carnivorous biomass, 7.1, consisted of spiders, Coccinellids, Anthocorids, and Chalcidoids. The July herbivorous biomass was 120. The carnivorous biomass was 0.4, and was composed mostly of Chalcidoids. In August, the herbivorous biomass was 52. The carnivorous biomass was zero. The September herbivorous biomass was 5.6. The carnivorous biomass, represented mostly by spiders and Chalcidoids, was 0.07 $g \cdot ha^{-1}$.

There were two major herbivorous biomass peaks on the playa. In April, the peak was noted only in the grasses; no shrubs were sampled. The predominant group in this peak was Cicadellids. In July and August, shrubs and grasses exhibited a peak, due primarily to Psyllids on the shrubs and Psyllids and Phlaeothripids on the grasses.

Table 16. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the playa on *Ephedra trifurca*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4= other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

		H = 1.6987		H = 2.756		H = 1.702		H = 0.8538	
	FEEDING	MAR-MAY		JUN-AUG		SEP-OCT		NOV-FEB	
TAXON	TYPE	NUMBERS	%	NUMBERS	%	NUMBERS	%	NUMBERS	%
ACA	4	0.0	0.0	0.250	2.1	0.0	0.0	0.0	0.0
ARA	5	0.0	0.0	0.749	6.2	1.142	6.1	0.216	6.7
COL	0	0.287	4.3	0.250	2.1	0.0	0.0	0.0	0.0
COLBUP	2	0.0	0.0	0.062	0.5	0.0	0.0	0.0	0.0
COLCHR	2	0.0	0.0	0.062	0.5	0.0	0.0	0.0	0.0
COLCOC	5	0.0	0.0	0.187	1.5	0.0	0.0	0.0	0.0
COLCUR	2	0.287	4.3	0.125	1.0	0.0	0.0	0.0	0.0
COLMAL	5	0.0	0.0	0.062	0.5	0.0	0.0	0.0	0.0
DIP	0	0.0	0.0	0.562	4.6	3.427	18.2	1.081	33.3
DIPCEC	4	0.0	0.0	0.062	0.5	0.0	0.0	0.0	0.0
DIPMUS	4	0.0	0.0	0.062	0.5	0.0	0.0	0.0	0.0
DIPOTI	4	0.0	0.0	0.062	0.5	0.0	0.0	0.0	0.0
DIPSAR	3	0.0	0.0	0.125	1.0	0.0	0.0	0.0	0.0
DIPTAC	6	0.0	0.0	0.374	3.1	0.0	0.0	0.0	0.0
HEM	0	0.0	0.0	0.062	0.5	0.0	0.0	0.0	0.0
HEMLYG	1	0.0	0.0	0.125	1.0	0.0	0.0	0.0	0.0
HEMMIR	1	0.0	0.0	0.624	5.1	0.571	3.0	0.0	0.0
HOM	1	0.0	0.0	0.062	0.5	0.0	0.0	0.0	0.0
HOMCIC	1	0.287	4.3	0.250	2.1	0.0	0.0	0.0	0.0
HOMFUL	1	0.0	0.0	0.562	4.6	0.0	0.0	0.0	0.0
HOMISS	1	0.0	0.0	0.062	0.5	0.571	3.0	0.0	0.0
HOMMEM	1	2.299	34.8	0.0	0.0	0.0	0.0	0.0	0.0
HOMPSY	1	0.287	4.3	3.494	28.7	0.571	3.0	1.945	60.0
HYM	0	1.150	17.4	0.998	8.2	0.571	3.0	0.0	0.0
HYMAND	3	0.0	0.0	0.0	0.0	0.571	3.0	0.0	0.0
HYMFOR	4	1.725	26.1	0.936	7.7	7.424	39.4	0.0	0.0
HYMHAL	3	0.0	0.0	0.125	1.0	0.0	0.0	0.0	0.0
HYMMEG	3	0.0	0.0	0.062	0.5	0.0	0.0	0.0	0.0
ISO	2	0.0	0.0	0.0	0.0	3.998	21.2	0.0	0.0
LEP	3	0.0	0.0	0.250	2.1	0.0	0.0	0.0	0.0
NEU	5	0.0	0.0	0.062	0.5	0.0	0.0	0.0	0.0
NEUCHR	5	0.287	4.3	0.187	1.5	0.0	0.0	0.0	0.0
NEUHEM	5	0.0	0.0	0.125	1.0	0.0	0.0	0.0	0.0
NEUMYR	5	0.0	0.0	0.686	5.6	0.0	0.0	0.0	0.0
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
THYPLE	0	0.0	0.0	0.062	0.5	0.0	0.0	0.0	0.0
UNKNOW	0	0.0	0.0	0.437	3.6	0.0	0.0	0.0	0.0
FEEDING TYPE	1	2.874	43.5	5.179	42.6	1.713	9.1	1.945	60.0
FEEDING TYPE	2	0.287	4.3	0.250	2.1	3.998	21.2	0.0	0.0
FEEDING TYPE	3	0.0	0.0	0.562	4.6	0.571	3.0	0.0	0.0
FEEDING TYPE	4	1.725	26.1	1.373	11.3	7.424	39.4	0.0	0.0
FEEDING TYPE	5	0.287	4.3	2.059	16.9	1.142	6.1	0.216	6.7
FEEDING TYPE	6	0.0	0.0	0.374	3.1	0.0	0.0	0.0	0.0
FEEDING TYPE	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED	0	1.437	21.7	2.371	19.5	3.998	21.2	1.081	33.3

Table 17. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1972 on the playa on *Ephedra trifurca*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4=other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

TAXON	FEEDING TYPE	H = 1.969 MAR-MAY NUMBERS	%	H = 1.996 JUN-AUG NUMBERS	%	H = 2.030 SEP-OCT NUMBERS	%	NOV-FEB* NUMBERS	%
ACA	4	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
ARA	5	0.885	4.1	0.165	0.8	1.492	2.9	0.0	0.0
CCL	0	0.0	0.0	0.825	4.1	2.985	5.8	0.0	0.0
COLBRU	2	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
CCLCHR	2	0.147	0.7	0.0	0.0	0.0	0.0	0.0	0.0
CCLCOC	5	0.147	0.7	0.0	0.0	0.0	0.0	0.0	0.0
CCLCUR	2	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
DIP	0	0.074	0.3	0.660	3.3	8.954	17.3	0.0	0.0
DIPBOM	3	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
DIPCEC	4	0.221	1.0	0.0	0.0	0.0	0.0	0.0	0.0
DIPCHL	1	0.221	1.0	0.0	0.0	0.0	0.0	0.0	0.0
DIPEMP	5	1.401	6.5	0.0	0.0	0.0	0.0	0.0	0.0
DIPMUS	4	0.442	2.0	0.082	0.4	0.0	0.0	0.0	0.0
DIPMYC	4	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
DIPPHO	4	0.0	0.0	0.082	0.4	0.0	0.0	0.0	0.0
DIPSEP	7	0.737	3.4	0.082	0.4	0.0	0.0	0.0	0.0
DIPTEP	4	0.959	4.4	0.0	0.0	0.0	0.0	0.0	0.0
HEM	0	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HEMANT	5	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HEMBER	5	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HEMLYG	1	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HEMMIR	1	0.295	1.4	0.247	1.2	2.239	4.3	0.0	0.0
HEMNAB	5	0.0	0.0	0.165	0.8	0.0	0.0	0.0	0.0
HEMTIN	1	0.0	0.0	0.0	0.0	0.373	0.7	0.0	0.0
HOM	1	0.0	0.0	0.082	0.4	0.0	0.0	0.0	0.0
HOMAPH	1	0.221	1.0	0.0	0.0	0.0	0.0	0.0	0.0
HOMCIC	1	0.295	1.4	0.660	3.3	4.477	8.6	0.0	0.0
HOMFLA	1	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HOMPSY	1	0.074	0.3	8.164	40.4	0.373	0.7	0.0	0.0
HYM	0	0.0	0.0	0.082	0.4	1.492	2.9	0.0	0.0
HYMBRA	6	0.0	0.0	0.990	4.9	0.0	0.0	0.0	0.0
HYMCHA	6	11.799	54.4	1.320	6.5	2.239	4.3	0.0	0.0
HYMCYN	7	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HYMFOR	4	0.0	0.0	3.711	18.4	5.596	10.8	0.0	0.0
HYMPRO	7	0.147	0.7	0.0	0.0	0.0	0.0	0.0	0.0
ISO	2	0.0	0.0	0.0	0.0	19.027	36.7	0.0	0.0
LEP	3	0.442	2.0	0.165	0.8	0.0	0.0	0.0	0.0
NEU	5	0.074	0.3	0.0	0.0	0.0	0.0	0.0	0.0
NEUCHR	5	1.696	7.8	0.577	2.9	0.373	0.7	0.0	0.0
NEUHEM	5	0.369	1.7	0.0	0.0	0.0	0.0	0.0	0.0
NEUMYR	5	0.0	0.0	0.082	0.4	0.0	0.0	0.0	0.0
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORT	0	0.0	0.0	0.0	0.0	0.746	1.4	0.0	0.0
THYPHL	1	0.0	0.0	2.062	10.2	1.492	2.9	0.0	0.0
THYTHR	1	0.221	1.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 1		1.475	6.8	11.216	55.5	8.954	17.3	0.0	0.0
FEEDING TYPE 2		0.295	1.4	0.0	0.0	19.027	36.7	0.0	0.0
FEEDING TYPE 3		0.516	2.4	0.165	0.8	0.0	0.0	0.0	0.0
FEEDING TYPE 4		1.770	8.2	3.876	19.2	5.596	10.8	0.0	0.0
FEEDING TYPE 5		4.720	21.8	0.990	4.9	1.865	3.6	0.0	0.0
FEEDING TYPE 6		11.799	54.4	2.309	11.4	2.239	4.3	0.0	0.0
FEEDING TYPE 7		0.959	4.4	0.082	0.4	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		0.147	0.7	1.567	7.8	14.177	27.3	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 18. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the playa on *Hilaria mutica*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4=other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

TAXON	FEEDING TYPE	MAR-MAY* NUMBERS	%	H = 1.912 JUN-AUG NUMBERS	%	H = 1.332 SEP-OCT NUMBERS	%	H = 1.566 NOV-FEB NUMBERS	%
ARA	5	0.0	0.0	0.728	19.0	0.637	20.0	0.764	11.1
COLCHR	2	0.0	0.0	0.0	0.0	0.0	0.0	0.255	3.7
COLCOC	5	0.0	0.0	0.0	0.0	0.0	0.0	0.255	3.7
COLMOR	2	0.0	0.0	0.182	4.8	0.0	0.0	0.0	0.0
DIP	0	0.0	0.0	0.546	14.3	0.0	0.0	3.820	55.6
HEM	0	0.0	0.0	0.364	9.5	0.637	20.0	0.255	3.7
HOMCIC	1	0.0	0.0	0.0	0.0	0.0	0.0	0.509	7.4
HOMPSY	1	0.0	0.0	0.0	0.0	0.0	0.0	0.255	3.7
HYMFOR	4	0.0	0.0	0.909	23.8	0.637	20.0	0.255	3.7
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORTACR	2	0.0	0.0	0.182	4.8	0.0	0.0	0.509	7.4
ORTPHA	2	0.0	0.0	0.182	4.8	0.0	0.0	0.0	0.0
THYPLE	0	0.0	0.0	0.0	0.0	1.273	40.0	0.0	0.0
UNKNOW	0	0.0	0.0	0.728	19.0	0.0	0.0	0.0	0.0
FEEDING TYPE	1	0.0	0.0	0.0	0.0	0.0	0.0	0.764	11.1
FEEDING TYPE	2	0.0	0.0	0.546	14.3	0.0	0.0	0.764	11.1
FEEDING TYPE	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE	4	0.0	0.0	0.909	23.8	0.637	20.0	0.255	3.7
FEEDING TYPE	5	0.0	0.0	0.728	19.0	0.637	20.0	1.019	14.8
FEEDING TYPE	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED	0	0.0	0.0	1.637	42.9	1.910	60.0	4.074	59.3

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 19. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1972 on the playa on *Hilaria mutica*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4=other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

TAXON	FEEDING TYPE	H = 1.396 MAR-MAY NUMBERS	%	H = 1.924 JUN-AUG NUMBERS	%	H = 0.8438 SEP-OCT NUMBERS	%	NOV-FEB* NUMBERS	%
ARA	5	0.159	0.8	0.509	2.1	0.0	0.0	0.0	0.0
CCL	0	0.159	0.8	0.255	1.1	1.273	3.0	0.0	0.0
COLMAL	5	0.159	0.8	0.0	0.0	0.0	0.0	0.0	0.0
COLSTA	4	0.0	0.0	0.0	0.0	1.273	3.0	0.0	0.0
DIP	0	0.159	0.8	0.764	3.2	33.741	79.1	0.0	0.0
DIPEMP	5	0.159	0.8	0.0	0.0	0.0	0.0	0.0	0.0
DIPTAC	6	0.0	0.0	0.509	2.1	0.0	0.0	0.0	0.0
HEM	0	0.159	0.8	0.764	3.2	0.637	1.5	0.0	0.0
HEMBER	5	0.159	0.8	0.0	0.0	0.0	0.0	0.0	0.0
HEMPEN	1	0.159	0.8	0.0	0.0	0.0	0.0	0.0	0.0
HEMTIN	1	0.159	0.8	0.509	2.1	0.0	0.0	0.0	0.0
HOMCER	1	0.159	0.8	0.0	0.0	0.0	0.0	0.0	0.0
HOMCIC	1	12.255	63.6	0.0	0.0	0.637	1.5	0.0	0.0
HOMCOC	1	1.751	9.1	0.0	0.0	0.0	0.0	0.0	0.0
HOMDEL	1	0.0	0.0	0.0	0.0	3.820	9.0	0.0	0.0
HOMPSY	1	0.0	0.0	11.714	48.4	1.273	3.0	0.0	0.0
HYMCHA	6	1.432	7.4	2.292	9.5	0.0	0.0	0.0	0.0
HYMFOR	4	0.318	1.7	1.019	4.2	0.0	0.0	0.0	0.0
HYMHAL	3	0.0	0.0	1.019	4.2	0.0	0.0	0.0	0.0
LARVA	0	0.0	0.0	0.255	1.1	0.0	0.0	0.0	0.0
LEP	3	0.159	0.8	0.255	1.1	0.0	0.0	0.0	0.0
NEUCON	5	0.318	1.7	0.0	0.0	0.0	0.0	0.0	0.0
NEUHEM	5	0.955	5.0	0.764	3.2	0.0	0.0	0.0	0.0
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORTACR	2	0.0	0.0	0.255	1.1	0.0	0.0	0.0	0.0
THYPHL	1	0.0	0.0	3.056	12.6	0.0	0.0	0.0	0.0
THYTHR	1	0.477	2.5	0.0	0.0	0.0	0.0	0.0	0.0
UNKNOW	0	0.0	0.0	0.255	1.1	0.0	0.0	0.0	0.0

Table 19, continued

FEEDING TYPE 1	14.961	77.7	15.279	63.2	5.730	13.4	0.0	0.0
FEEDING TYPE 2	0.0	0.0	0.255	1.1	0.0	0.0	0.0	0.0
FEEDING TYPE 3	0.159	0.8	1.273	5.3	0.0	0.0	0.0	0.0
FEEDING TYPE 4	0.318	1.7	1.019	4.2	1.273	3.0	0.0	0.0
FEEDING TYPE 5	1.910	9.9	1.273	5.3	0.0	0.0	0.0	0.0
FEEDING TYPE 6	1.432	7.4	2.801	11.6	0.0	0.0	0.0	0.0
FEEDING TYPE 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0	0.477	2.5	2.292	9.5	35.651	83.6	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 20. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the playa on *Larrea divaricata*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4=other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

TAXON	FEEDING TYPE	MAR-MAY* NUMBERS	%	H = 2.368 JUN-AUG NUMBERS	%	H - 1.469 SEP-OCT NUMBERS	%	H = 1.213 NOV-FEB NUMBERS	%
ARA	5	0.0	0.0	6.082	14.9	0.0	0.0	13.263	25.0
COL	0	0.0	0.0	0.234	0.6	0.0	0.0	6.631	12.5
COLCHR	2	0.0	0.0	0.702	1.7	0.0	0.0	0.0	0.0
COLCLE	5	0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
COLCOC	5	0.0	0.0	1.170	2.9	0.0	0.0	0.0	0.0
COLMEL	2	0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
DIP	0	0.0	0.0	1.403	3.4	0.0	0.0	0.0	0.0
DIPBOM	3	0.0	0.0	0.468	1.1	0.0	0.0	0.0	0.0
DIPCEC	4	0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
DIPTAC	6	0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
HEM	0	0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
HEMANT	5	0.0	0.0	0.702	1.7	0.0	0.0	0.0	0.0
HEMLYG	1	0.0	0.0	0.234	0.6	0.0	0.0	26.526	50.0
HEMMIR	1	0.0	0.0	0.702	1.7	19.423	36.4	0.0	0.0
HEMPEN	1	0.0	0.0	1.871	4.6	0.0	0.0	0.0	0.0
HOMCIC	1	0.0	0.0	0.0	0.0	4.856	9.1	0.0	0.0
HOMFUL	1	0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
HOMMEM	1	0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
HOMPSY	1	0.0	0.0	2.339	5.7	4.856	9.1	6.631	12.5
HYM	0	0.0	0.0	7.017	17.2	0.0	0.0	0.0	0.0
HYMFOR	4	0.0	0.0	3.041	7.5	14.568	27.3	0.0	0.0
HYMHAL	3	0.0	0.0	0.468	1.1	0.0	0.0	0.0	0.0
HYMSPH	5	0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
NEU	5	0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
NEUHEM	5	0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORTACR	2	0.0	0.0	0.0	0.0	9.712	18.2	0.0	0.0
THY	1	0.0	0.0	11.696	28.7	0.0	0.0	0.0	0.0
TRIMYD	4	0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
FEEDING TYPE 1		0.0	0.0	17.309	42.5	29.135	54.5	33.157	62.5
FEEDING TYPE 2		0.0	0.0	0.936	2.3	9.712	18.2	0.0	0.0
FEEDING TYPE 3		0.0	0.0	0.936	2.3	0.0	0.0	0.0	0.0
FEEDING TYPE 4		0.0	0.0	3.509	8.6	14.568	27.3	0.0	0.0
FEEDING TYPE 5		0.0	0.0	8.889	21.8	0.0	0.0	13.263	25.0
FEEDING TYPE 6		0.0	0.0	0.234	0.6	0.0	0.0	0.0	0.0
FEEDING TYPE 7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		0.0	0.0	8.889	21.8	0.0	0.0	6.631	12.5

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 21. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1972 on the playa on *Larrea divaricata*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4=other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

TAXON	FEEDING TYPE	H = 1.743 MAR-MAY NUMBERS	%	H = 1.995 JUN-AUG NUMBERS	%	SEP-OCT NUMBERS	%	NOV-FEB* NUMBERS	%
ARA	5	1.514	1.6	9.813	7.7	0.0	0.0	0.0	0.0
COLCUR	2	0.757	0.8	0.0	0.0	0.0	0.0	0.0	0.0
DIP	0	2.271	2.4	39.252	30.8	0.0	0.0	0.0	0.0
DIPMUS	4	2.271	2.4	0.0	0.0	0.0	0.0	0.0	0.0
DIPPIP	4	0.757	0.8	0.0	0.0	0.0	0.0	0.0	0.0
DIPSEP	7	0.757	0.8	0.0	0.0	0.0	0.0	0.0	0.0
DIPTEP	4	3.785	4.0	0.0	0.0	0.0	0.0	0.0	0.0
HEMMIR	1	47.687	50.8	14.720	11.5	0.0	0.0	0.0	0.0
HOMCIC	1	9.083	9.7	0.0	0.0	0.0	0.0	0.0	0.0
HOMMEM	1	1.514	1.6	9.813	7.7	0.0	0.0	0.0	0.0
HOMPSY	1	1.514	1.6	19.626	15.4	0.0	0.0	0.0	0.0
HYMCHA	6	16.653	17.7	19.626	15.4	0.0	0.0	0.0	0.0
HYMHAL	3	0.0	0.0	4.907	3.8	0.0	0.0	0.0	0.0
HYMPRO	7	0.757	0.8	0.0	0.0	0.0	0.0	0.0	0.0
LEP	3	2.271	2.4	4.907	3.8	0.0	0.0	0.0	0.0
NEUCHR	5	0.757	0.8	0.0	0.0	0.0	0.0	0.0	0.0
NEUHEM	5	0.757	0.8	0.0	0.0	0.0	0.0	0.0	0.0
NEUMYR	5	0.0	0.0	4.907	3.8	0.0	0.0	0.0	0.0
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORTPHA	2	0.757	0.8	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 1		59.798	63.7	44.159	34.6	0.0	0.0	0.0	0.0
FEEDING TYPE 2		1.514	1.6	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 3		2.271	2.4	9.813	7.7	0.0	0.0	0.0	0.0
FEEDING TYPE 4		6.812	7.3	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 5		3.028	3.2	14.720	11.5	0.0	0.0	0.0	0.0
FEEDING TYPE 6		16.653	17.7	19.626	15.4	0.0	0.0	0.0	0.0
FEEDING TYPE 7		1.514	1.6	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		2.271	2.4	39.252	30.8	0.0	0.0	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 22. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the playa on *Panicum obtusum*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4=other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

TAXON	FEEDING TYPE	MAR-MAY* NUMBERS	%	H = 0 JUN-AUG NUMBERS	%	SEP-OCT* NUMBERS	%	H = 1.809 NOV-FEB NUMBERS	%
ARA	5	0.0	0.0	0.0	0.0	0.0	0.0	0.318	6.7
COLBRU	2	0.0	0.0	0.0	0.0	0.0	0.0	0.318	6.7
DIP	0	0.0	0.0	0.0	0.0	0.0	0.0	0.318	6.7
HEM	0	0.0	0.0	0.0	0.0	0.0	0.0	0.318	6.7
HOMCIC	1	0.0	0.0	0.0	0.0	0.0	0.0	1.910	40.0
HOMMEM	1	0.0	0.0	0.0	0.0	0.0	0.0	0.637	13.3
HOMPSY	1	0.0	0.0	0.0	0.0	0.0	0.0	0.637	13.3
HYMFOR	4	0.0	0.0	1.273	100.0	0.0	0.0	0.318	6.7
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 1		0.0	0.0	0.0	0.0	0.0	0.0	3.183	66.7
FEEDING TYPE 2		0.0	0.0	0.0	0.0	0.0	0.0	0.318	6.7
FEEDING TYPE 3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 4		0.0	0.0	1.273	100.0	0.0	0.0	0.318	6.7
FEEDING TYPE 5		0.0	0.0	0.0	0.0	0.0	0.0	0.318	6.7
FEEDING TYPE 6		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		0.0	0.0	0.0	0.0	0.0	0.0	0.637	13.3

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 23. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1972 on the playa on *Panicum obtusum*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4=other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

TAXON	FEEDING TYPE	H = 0.5487 MAR-MAY NUMBERS	%	H = 1.380 JUN-AUG NUMBERS	%	H=1.671 SEP-OCT NUMBERS	%	NOV-FEB* NUMBERS	%
ACA	4	0.0	0.0	79.578	49.3	0.0	0.0	0.0	0.0
ARA	5	0.0	0.0	0.424	0.3	0.0	0.0	0.0	0.0
COL	0	0.0	0.0	2.759	1.7	0.0	0.0	0.0	0.0
COLCUR	2	0.106	0.3	0.0	0.0	0.0	0.0	0.0	0.0
COLMAL	5	0.106	0.3	0.0	0.0	0.0	0.0	0.0	0.0
COLSTA	4	0.0	0.0	0.0	0.0	1.273	5.5	0.0	0.0
DIP	0	0.0	0.0	2.971	1.8	1.698	7.3	0.0	0.0
DIPAGR	1	0.0	0.0	0.0	0.0	0.424	1.8	0.0	0.0
DIPCER	6	0.0	0.0	0.0	0.0	2.122	9.1	0.0	0.0
DIPCHI	1	0.0	0.0	0.0	0.0	12.732	54.5	0.0	0.0
DIPMUS	4	0.106	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HEMANT	5	0.0	0.0	1.485	0.9	0.0	0.0	0.0	0.0
HEMBER	5	0.0	0.0	0.212	0.1	0.0	0.0	0.0	0.0
HEMMIR	1	1.698	4.5	0.424	0.3	0.849	3.6	0.0	0.0
HEMNAB	5	0.106	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HEMPEN	1	0.0	0.0	0.212	0.1	0.0	0.0	0.0	0.0
HEMTIN	1	0.0	0.0	0.212	0.1	0.0	0.0	0.0	0.0
HOM	1	0.0	0.0	0.0	0.0	0.424	1.8	0.0	0.0
HOMCIC	1	33.210	88.9	2.759	1.7	0.0	0.0	0.0	0.0
HOMCIX	1	0.212	0.6	0.0	0.0	0.0	0.0	0.0	0.0
HOMDEL	1	0.0	0.0	0.0	0.0	0.424	1.8	0.0	0.0
HOMPSY	1	0.0	0.0	1.698	1.1	0.0	0.0	0.0	0.0
HYM	0	0.0	0.0	0.424	0.3	0.0	0.0	0.0	0.0
HYMCHA	6	0.637	1.7	1.061	0.7	0.424	1.8	0.0	0.0
HYMFOR	4	0.0	0.0	10.186	6.3	0.424	1.8	0.0	0.0
HYMICH	6	0.0	0.0	0.212	0.1	0.0	0.0	0.0	0.0
HYMPRO	7	0.212	0.6	0.0	0.0	0.0	0.0	0.0	0.0
LEP	3	0.106	0.3	0.0	0.0	0.0	0.0	0.0	0.0
NEUHEM	5	0.0	0.0	0.0	0.0	0.424	1.8	0.0	0.0
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORTACR	2	0.0	0.0	0.212	0.1	0.0	0.0	0.0	0.0
THYAEO	1	0.849	2.3	0.0	0.0	0.0	0.0	0.0	0.0
THYPHL	1	0.0	0.0	54.113	33.5	2.122	9.1	0.0	0.0
UNKNOW	0	0.0	0.0	2.546	1.6	0.0	0.0	0.0	0.0
FEEDING TYPE 1		35.969	96.3	59.418	36.8	16.977	72.7	0.0	0.0
FEEDING TYPE 2		0.106	0.3	0.212	0.1	0.0	0.0	0.0	0.0
FEEDING TYPE 3		0.106	0.3	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 4		0.106	0.3	89.764	55.6	1.698	7.3	0.0	0.0
FEEDING TYPE 5		0.212	0.6	2.122	1.3	0.424	1.8	0.0	0.0
FEEDING TYPE 6		0.637	1.7	1.273	0.8	2.546	10.9	0.0	0.0
FEEDING TYPE 7		0.212	0.6	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		0.0	0.0	8.700	5.4	1.698	7.3	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 24. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the playa on *Prosopis glandulosa*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4=other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

		H = 1.244		H = 1.574		H = 1.234		H = 0.1683	
	FEEDING	MAR-MAY		JUN-AUG		SEP-OCT		NOV-FEB	
TAXON	TYPE	NUMBERS	%	NUMBERS	%	NUMBERS	%	NUMBERS	%
ACA	4	0.038	0.1	0.0	0.0	0.0	0.0	0.0	0.0
ARA	5	1.108	2.0	0.600	3.8	0.055	0.2	0.0	0.0
COL	0	0.038	0.1	0.032	0.2	0.0	0.0	0.0	0.0
COLANT	2	0.115	0.2	0.008	0.1	0.0	0.0	0.0	0.0
COLBOS	2	0.038	0.1	0.0	0.0	0.0	0.0	0.0	0.0
COLBRU	2	0.0	0.0	0.032	0.2	0.0	0.0	0.0	0.0
COLBUP	2	0.115	0.2	0.024	0.2	0.0	0.0	0.0	0.0
COLCER	2	0.0	0.0	0.016	0.1	0.055	0.2	0.0	0.0
COLCHR	2	0.191	0.3	0.122	0.8	0.0	0.0	0.0	0.0
COLCLE	5	0.038	0.1	0.0	0.0	0.0	0.0	0.0	0.0
COLCOC	5	0.0	0.0	0.008	0.1	0.055	0.2	0.0	0.0
COLCUR	2	0.0	0.0	0.097	0.6	0.055	0.2	0.0	0.0
COLDER	0	0.0	0.0	0.024	0.2	0.0	0.0	0.0	0.0
COLMAL	5	0.0	0.0	0.041	0.3	0.0	0.0	0.0	0.0
COLMEL	2	0.0	0.0	0.008	0.1	0.0	0.0	0.0	0.0
COLSTA	4	0.0	0.0	0.008	0.1	0.0	0.0	0.0	0.0
DIP	0	0.803	1.5	0.227	1.4	0.221	0.7	0.0	0.0
DIPBOM	3	0.0	0.0	0.073	0.5	0.0	0.0	0.0	0.0
DIPCEC	4	0.0	0.0	0.008	0.1	0.0	0.0	0.0	0.0
DIPMUS	4	0.038	0.1	0.0	0.0	0.0	0.0	0.0	0.0
DIPSAR	3	0.038	0.1	0.016	0.1	0.0	0.0	0.0	0.0
DIPTAC	6	0.0	0.0	0.024	0.2	0.0	0.0	0.0	0.0
HEM	0	0.0	0.0	0.008	0.1	0.0	0.0	0.0	0.0
HEMANT	5	0.038	0.1	0.041	0.3	0.0	0.0	0.0	0.0
HEMLYG	1	0.0	0.0	0.016	0.1	0.0	0.0	0.0	0.0
HEMMIR	1	0.879	1.6	0.138	0.9	0.0	0.0	0.0	0.0
HEMNAB	5	0.0	0.0	0.024	0.2	0.0	0.0	0.0	0.0
HEMRED	5	0.0	0.0	0.008	0.1	0.0	0.0	0.0	0.0
HOM	1	0.0	0.0	0.008	0.1	0.0	0.0	0.0	0.0
HOMAPH	1	0.0	0.0	0.008	0.1	0.0	0.0	0.0	0.0
HOMCIC	1	0.0	0.0	0.016	0.1	5.191	15.9	0.0	0.0
HOMCOC	1	2.523	4.6	0.982	6.3	0.0	0.0	0.0	0.0
HOMISS	1	0.0	0.0	0.008	0.1	0.055	0.2	0.0	0.0
HOMMEM	1	3.402	6.2	1.501	9.6	0.552	1.7	0.062	1.6
HOMPSY	1	38.224	69.5	0.852	5.4	14.799	45.2	3.742	96.8
HYM	0	1.300	2.4	0.487	3.1	0.331	1.0	0.0	0.0
HYMAND	3	0.0	0.0	0.008	0.1	0.0	0.0	0.0	0.0
HYMBRA	6	0.038	0.1	0.016	0.1	0.0	0.0	0.0	0.0
HYMFOR	4	5.542	10.1	10.028	63.9	11.320	34.6	0.062	1.6
HYMHAL	3	0.0	0.0	0.016	0.1	0.0	0.0	0.0	0.0
HYMSPH	5	0.038	0.1	0.008	0.1	0.0	0.0	0.0	0.0
LEP	3	0.038	0.1	0.057	0.4	0.0	0.0	0.0	0.0
NEUCHR	5	0.0	0.0	0.016	0.1	0.0	0.0	0.0	0.0
NEUHEM	5	0.0	0.0	0.008	0.1	0.0	0.0	0.0	0.0
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORTACR	2	0.0	0.0	0.0	0.0	0.055	0.2	0.0	0.0
ORTMAN	5	0.038	0.1	0.008	0.1	0.0	0.0	0.0	0.0
THY	1	0.344	0.6	0.049	0.3	0.0	0.0	0.0	0.0
TRI	4	0.0	0.0	0.008	0.1	0.0	0.0	0.0	0.0
FEEDING TYPE 1		45.372	82.5	3.578	22.8	20.597	62.9	3.804	98.4
FEEDING TYPE 2		0.459	0.8	0.308	2.0	0.166	0.5	0.0	0.0
FEEDING TYPE 3		0.076	0.1	0.170	1.1	0.0	0.0	0.0	0.0
FEEDING TYPE 4		5.619	10.2	10.052	64.1	11.320	34.6	0.062	1.6
FEEDING TYPE 5		1.261	2.3	0.763	4.9	0.110	0.3	0.0	0.0
FEEDING TYPE 6		0.038	0.1	0.041	0.3	0.0	0.0	0.0	0.0
FEEDING TYPE 7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		2.141	3.9	0.779	5.0	0.552	1.7	0.0	0.0

Table 25. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1972 on the playa on *Prosopis glandulosa*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4=other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

TAXON	FEEDING TYPE	H = 0.08612 MAR-MAY NUMBERS	%	H - 0.1138 JUN-AUG NUMBERS	%	H = 0.5865 SEP-OCT NUMBERS	%	NOV-FEB* NUMBERS	%
ARA	5	0.0	0.0	0.195	0.1	0.146	0.6	0.0	0.0
COL	0	0.0	0.0	0.195	0.1	0.0	0.0	0.0	0.0
CCLANT	2	0.0	0.0	0.146	0.0	0.0	0.0	0.0	0.0
COLCHR	2	0.247	1.7	0.0	0.0	0.0	0.0	0.0	0.0
COLCOC	5	0.0	0.0	0.292	0.1	0.0	0.0	0.0	0.0
COLCUR	2	0.0	0.0	0.049	0.0	0.0	0.0	0.0	0.0
COLMEL	2	0.0	0.0	0.049	0.0	0.0	0.0	0.0	0.0
DIP	0	0.0	0.0	0.146	0.0	0.439	1.9	0.0	0.0
DIPCHI	1	0.0	0.0	0.0	0.0	0.732	3.1	0.0	0.0
DIPMUS	4	0.0	0.0	0.0	0.0	0.146	0.6	0.0	0.0
HEMANT	5	0.0	0.0	0.536	0.1	0.0	0.0	0.0	0.0
HEMMIR	1	0.0	0.0	0.049	0.0	0.0	0.0	0.0	0.0
HEMNAB	5	0.0	0.0	0.049	0.0	0.0	0.0	0.0	0.0
HEMTIN	1	0.0	0.0	0.049	0.0	0.0	0.0	0.0	0.0
HOM	1	0.0	0.0	0.195	0.1	0.0	0.0	0.0	0.0
HOMCIC	1	0.0	0.0	0.049	0.0	0.146	0.6	0.0	0.0
HOMCIX	1	0.0	0.0	0.049	0.0	0.0	0.0	0.0	0.0
HOMMEM	1	0.0	0.0	0.049	0.0	0.146	0.6	0.0	0.0
HOMPSY	1	14.347	98.3	372.118	98.3	20.636	88.1	0.0	0.0
HYM	0	0.0	0.0	0.0	0.0	0.146	0.6	0.0	0.0
HYMCHA	6	0.0	0.0	2.045	0.5	0.732	3.1	0.0	0.0
HYMFOR	4	0.0	0.0	1.655	0.4	0.146	0.6	0.0	0.0
HYMHAL	3	0.0	0.0	0.195	0.1	0.0	0.0	0.0	0.0
HYMICH	6	0.0	0.0	0.097	0.0	0.0	0.0	0.0	0.0
HYMPLA	0	0.0	0.0	0.049	0.0	0.0	0.0	0.0	0.0
LEP	3	0.0	0.0	0.243	0.1	0.0	0.0	0.0	0.0
LEPMIC	0	0.0	0.0	0.097	0.0	0.0	0.0	0.0	0.0
NEUCHR	5	0.0	0.0	0.097	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE	1	14.347	98.3	372.557	98.4	21.660	92.5	0.0	0.0
FEEDING TYPE	2	0.247	1.7	0.243	0.1	0.0	0.0	0.0	0.0
FEEDING TYPE	3	0.0	0.0	0.438	0.1	0.0	0.0	0.0	0.0
FEEDING TYPE	4	0.0	0.0	1.655	0.4	0.293	1.3	0.0	0.0
FEEDING TYPE	5	0.0	0.0	1.168	0.3	0.146	0.6	0.0	0.0
FEEDING TYPE	6	0.0	0.0	2.142	0.6	0.732	3.1	0.0	0.0
FEEDING TYPE	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED	0	0.0	0.0	0.487	0.1	0.585	2.5	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 26. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the playa on *Xanthocephalum sarothrae*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4=other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

TAXON	FEEDING TYPE	MAR-MAY* NUMBERS	%	H = 0.3464 JUN-AUG NUMBERS	%	H = 1.878 SEP-OCT NUMBERS	%	NOV-FEB* NUMBERS	%
ACA	4	0.0	0.0	2.042	0.3	0.0	0.0	0.0	0.0
ARA	5	0.0	0.0	4.085	0.5	19.489	3.6	0.0	0.0
COL	0	0.0	0.0	4.085	0.5	0.0	0.0	0.0	0.0
COLCHR	2	0.0	0.0	2.042	0.3	0.0	0.0	0.0	0.0
COLCUR	2	0.0	0.0	0.0	0.0	19.489	3.6	0.0	0.0
COLMAL	5	0.0	0.0	2.042	0.3	0.0	0.0	0.0	0.0
DIP	0	0.0	0.0	16.340	2.2	136.422	25.0	0.0	0.0
HOMCIC	1	0.0	0.0	2.042	0.3	19.489	3.6	0.0	0.0
HYM	0	0.0	0.0	6.127	0.8	97.445	17.9	0.0	0.0
HYMFOR	4	0.0	0.0	714.865	94.1	136.422	25.0	0.0	0.0
HYMHAL	3	0.0	0.0	2.042	0.3	0.0	0.0	0.0	0.0
LEP	3	0.0	0.0	4.085	0.5	77.956	14.3	0.0	0.0
NEUMYR	5	0.0	0.0	0.0	0.0	19.489	3.6	0.0	0.0
UNKNOW	0	0.0	0.0	0.0	0.0	19.489	3.6	0.0	0.0
FEEDING TYPE 1		0.0	0.0	2.042	0.3	19.489	3.6	0.0	0.0
FEEDING TYPE 2		0.0	0.0	2.042	0.3	19.489	3.6	0.0	0.0
FEEDING TYPE 3		0.0	0.0	6.127	0.8	77.956	14.3	0.0	0.0
FEEDING TYPE 4		0.0	0.0	716.908	94.4	136.422	25.0	0.0	0.0
FEEDING TYPE 5		0.0	0.0	6.127	0.8	38.978	7.1	0.0	0.0
FEEDING TYPE 6		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		0.0	0.0	26.552	3.5	253.356	46.4	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 27. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the playa on *Yucca elata*. Percent of the total represented by each taxon is given and feeding types are as follows: 1=plant suckers, 2=plant chewers, 3=nectivores, 4=other herbivores, 5=predators, 6=parasites, 7=other carnivores, 0=unclassified

TAXON	FEEDING TYPE	MAR-MAY* NUMBERS	%	H = 1.724 JUN-AUG NUMBERS	%	SEP-OCT* NUMBERS	%	NOV-FEB* NUMBERS	%
ARA	5	0.0	0.0	5.109	43.3	0.0	0.0	0.0	0.0
COL	0	0.0	0.0	0.393	3.3	0.0	0.0	0.0	0.0
COLCHR	2	0.0	0.0	0.131	1.1	0.0	0.0	0.0	0.0
COLCUR	2	0.0	0.0	0.131	1.1	0.0	0.0	0.0	0.0
COLMAL	5	0.0	0.0	0.262	2.2	0.0	0.0	0.0	0.0
COLMOR	2	0.0	0.0	0.131	1.1	0.0	0.0	0.0	0.0
DIP	0	0.0	0.0	3.275	27.8	0.0	0.0	0.0	0.0
DIPCUL	1	0.0	0.0	0.131	1.1	0.0	0.0	0.0	0.0
DIPSAR	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIPSTR	0	0.0	0.0	0.262	2.2	0.0	0.0	0.0	0.0
HEM	0	0.0	0.0	0.131	1.1	0.0	0.0	0.0	0.0
HOMCIC	1	0.0	0.0	0.131	1.1	0.0	0.0	0.0	0.0
HOMISS	1	0.0	0.0	0.131	1.1	0.0	0.0	0.0	0.0
HOMPSY	1	0.0	0.0	0.131	1.1	0.0	0.0	0.0	0.0
HYMFOR	4	0.0	0.0	1.048	8.9	0.0	0.0	0.0	0.0
LEP	3	0.0	0.0	0.393	3.3	0.0	0.0	0.0	0.0
FEEDING TYPE 1		0.0	0.0	0.524	4.4	0.0	0.0	0.0	0.0
FEEDING TYPE 2		0.0	0.0	0.393	3.3	0.0	0.0	0.0	0.0
FEEDING TYPE 3		0.0	0.0	0.393	3.3	0.0	0.0	0.0	0.0
FEEDING TYPE 4		0.0	0.0	1.048	8.9	0.0	0.0	0.0	0.0
FEEDING TYPE 5		0.0	0.0	5.371	45.6	0.0	0.0	0.0	0.0
FEEDING TYPE 6		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		0.0	0.0	4.061	34.4	0.0	0.0	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 28. Description of taxa code names used in Tables 15-27

ACA	Acarina	HEM	Hemiptera:
ARA	Araneida	HEMANT	Anthocoridae
COL	Coleoptera:	HEMBER	Berytidae
COLANO	Anobiidae	HEMCOR	Coreidae
COLANT	Anthicidae	HEMLYG	Lygaeidae
COLBOS	Bostrichidae	HEMMIR	Miridae
COLBRU	Bruchidae	HEMNAB	Nabidae
COLBUP	Buprestidae	HEMRED	Redwiidae
COLCAR	Carabidae	HEMPEN	Pentatomidae
COLCER	Cerambycidae	HEMPYR	Pyrrhocoridae
COLCHR	Chrysomelidae	HEMTIN	Tingidae
COLCLE	Cleridae	HOM	Homoptera:
COLCOC	Coccinellidae	HOMACA	Acanaloniidae
COLCRY	Cryptophagidae	HOMALE	Aleyrodidae
COLCUR	Curculionidae	HOMAPH	Aphididae
COLMAL	Malachiidae	HOMCER	Cercopidae
COLMEL	Meloidae	HOMCIC	Cicadellidae
COLMOR	Mordellidae	HOMCIX	Cixiidae
COLNIT	Nitidulidae	HOMCOC	Coccidae
COLORT	Orthoperidae	HOMDEL	Delphacidae
COLPHA	Phalacridae	HOMDIC	Dictyopharidae
COLSTA	Staphylinidae	HOMFLA	Flatidae
COLTEN	Tenebrionidae	HOMFUL	Fulgoridae
DIP	Diptera:	HOMISS	Issidae
DIPAGR	Agromyzidae	HOMMEM	Membracidae
DIPBOM	Bombyliidae	HOMPSY	Psyllidae
DIPCEC	Cecidomyiidae	NEU	Neuroptera:
DIPCER	Ceratopogonidae	NEUCHR	Chrysopidae
CIPCHI	Chironomidae	NEUCON	Coniopterygidae
CIPCHL	Chloropidae	NEUHEM	Hemerobiidae
CIPCUL	Culicidae	NEUMYR	Myrmeleontidae
CIPDIA	Diastatidae	LARVAE	Unidentified larvae
DIPDOL	Dolichopodidae	LEP	Various moths
DIPDRO	Drosophilidae	ISO	Isoptera
DIPEMP	Empidae	HYM	Hymenoptera:
DIPMUS	Miscidae	HYMAND	Andrenidae
DIPMYC	Mycetophilidae	HYMAPI	Apidae
DIPOTI	Otitidae	HYMBRA	Braconidae
DIPPHO	Phoridae	HYMCHA	Chalcidoidea
DIPPIP	Pipunculidae	HYMCYN	Cynipidae
DIPSAR	Sarcophagidae	HYMFOR	Formicidae
DIPSCE	Scenopinidae	CHYHAL	Halictidae
DIPSEP	Sepsidae	HYMICH	Ichneumondidae
DIPSYR	Syrphidae	HYMMEG	Megachilidae
DIPTAC	Tachinidae	HYMPOM	Pompilidae
DIPTEP	Tephritidae	HYMPRO	Proctotrupidae
DIPTIP	Tipulidae	HYMSPH	Specidae

Table 28, continued

HYMTIP	Tiphiidae
NONE	None in sample
ODOCOE	Odonata: Coenagriodidae
ORTACR	Orthoptera: Acrididae
ORTGRY	Gryllidae
ORTMAN	Mantidae
ORTPHA	Phasmatidae
THY	Thysanoptera:
THYAEO	Aeolothripidae
THYPHL	Phlaeothripidae
THYTHR	Thripidae
TRI	Trichoptera:

Table 29. Major taxa in the feeding categories of Tables 30 - 34

HERBIVORES

Suckers	Chewers	Nectivores	Others
Culicidae	Chrysomelidae	Bombyliidae	Formicidae
Acarina	Lepidoptera	Halictidae	
Chironomidae	(larvae)	Lepidoptera	
Lygaeidae		(adults)	
Miridae			
Tingidae			
Aphididae			
Cercopidae			
Cicadellidae			
Coccidae			
Flatidae			
Membracidae			
Psyllidae			
Phlaeothripidae			

CARNIVORES

Predators	Parasites	Others
Araneida	Braconidae	Cynipidae
Cleridae	Chalcidoidea	Proctotrupidae
Coccidnellidae	Ichneumonidae	
Empidae		
Anthocoridae		
Nabidae		
Chrysopidae		
Hemerobiidae		

Table 30. Average numbers (ind/ha) and biomass (g/ha) of the feeding types of arthropods sampled by D-Vac in 1972 on the playa on *Ephedra trifurca* with relative percentages of each type

	APR				MAY				JUL			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	0.0	0.0	0.0	0.0	81.4	5.8	0.212	23.4	1931.2	80.9	0.302	29.0
CHEWERS	0.0	0.0	0.0	0.0	81.4	5.8	0.206	22.8	0.0	0.0	0.0	0.0
NECTIVORES	530.1	8.8	0.342	14.5	108.5	7.7	0.209	23.1	35.1	1.5	0.204	19.5
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	280.9	11.8	0.390	37.4
CARNIVORES												
PREDATORS	530.1	8.8	0.197	8.3	596.8	42.3	0.060	6.6	140.5	5.9	0.147	14.1
PARASITES	3048.3	50.4	0.367	15.5	352.6	25.0	0.100	11.1	0.0	0.0	0.0	0.0
OTHERS	1943.9	32.1	1.458	61.7	189.9	13.5	0.117	12.9	0.0	0.0	0.0	0.0
TOTALS												
HERBIVORES	530.1	8.8	0.342	14.5	271.3	19.2	0.627	69.4	2247.3	94.1	0.895	85.9
CARNIVORES	5522.3	91.2	2.021	85.5	1139.3	80.8	0.277	30.6	140.5	5.9	0.147	14.1

	AUG				SEP			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES								
SUCKERS	2311.1	63.0	0.274	31.6	1154.3	17.1	0.368	15.2
CHEWERS	0.0	0.0	0.0	0.0	2913.2	43.1	1.341	55.2
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	677.9	18.5	0.163	18.8	2528.4	37.4	0.517	21.3
CARNIVORES								
PREDATORS	154.1	4.2	0.262	30.1	164.9	2.4	0.203	8.4
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	523.8	14.3	0.169	19.5	0.0	0.0	0.0	0.0
TOTALS								
HERBIVORES	2989.0	81.5	0.438	50.4	6595.8	97.6	2.226	91.6
CARNIVORES	677.9	18.5	0.431	49.6	164.9	2.4	0.203	8.4

Table 31. Average numbers (ind/ha) and biomass (g/ha) of the feeding types of arthropods sampled by D-Vac in 1972 on the playa on *Hilaria mutica* with relative percentages of each type

	APR				MAY				JUN			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	201596.5	81.2	70.877	90.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHEWERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25464.8	50.0	3.820	15.4
CARNIVORES												
PREDATORS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	46685.5	18.8	7.639	9.7	31831.0	100.0	15.279	100.0	25464.8	50.0	21.008	84.6
TOTALS												
HERBIVORES	201596.5	81.2	70.877	90.3	0.0	0.0	0.0	0.0	25464.8	50.0	3.820	15.4
CARNIVORES	46685.5	18.8	7.639	9.7	31831.0	100.0	15.279	100.0	25464.8	50.0	21.008	84.6

	JUL				AUG				SEP			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	286479.3	75.0	23.555	22.8	0.0	0.0	0.0	0.0	38197.2	9.5	31.831	24.4
CHEWERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NECTIVORES	6366.2	1.7	14.642	14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	57295.9	15.0	51.566	50.0	0.0	0.0	0.0	0.0	356507.6	88.9	92.947	71.2
CARNIVORES												
PREDATORS	31831.0	8.3	13.369	13.0	0.0	0.0	0.0	0.0	6366.2	1.6	5.730	4.4
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS												
HERBIVORES	350141.4	91.7	89.763	87.0	0.0	0.0	0.0	0.0	394704.7	98.4	124.778	95.6
CARNIVORES	31831.0	8.3	13.369	13.0	0.0	0.0	0.0	0.0	6366.2	1.6	5.730	4.4

Table 32. Average numbers (ind/ha) and biomass (g/ha) of the feeding types of arthropods sampled by D-Vac in 1972 on the playa on *Larrea divaricata* with relative percentages of each type

	APR				MAY				JUL			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	197.0	61.0	0.146	70.9	54.9	57.1	0.016	14.8	566.6	55.0	0.149	9.0
CHEWERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.5	5.0	0.129	7.8
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CARNIVORES												
PREDATORS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.5	5.0	1.360	82.0
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	126.1	39.0	0.060	29.1	41.2	42.9	0.095	85.2	360.6	35.0	0.021	1.2
TOTALS												
HERBIVORES	197.0	61.0	0.146	70.9	54.9	57.1	0.016	14.8	618.2	60.0	0.278	16.8
CARNIVORES	126.1	39.0	0.060	29.1	41.2	42.9	0.095	85.2	412.1	40.0	1.381	83.2

	AUG				SEP			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES								
SUCKERS	98.9	45.5	0.034	56.7	0.0	0.0	0.0	0.0
CHEWERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CARNIVORES								
PREDATORS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	118.7	54.5	0.026	43.3	0.0	0.0	0.0	0.0
TOTALS								
HERBIVORES	98.9	45.5	0.034	56.7	0.0	0.0	0.0	0.0
CARNIVORES	118.7	54.5	0.026	43.3	0.0	0.0	0.0	0.0

Table 33. Average numbers (ind/ha) and biomass (g/ha) of the feeding types of arthropods sampled by D-Vac in 1972 on the playa on *Panicum obtusum* with percentage of each type

	APR NUMBERS	APR %	APR BIOMASS	APR %	MAY NUMBERS	MAY %	MAY BIOMASS	MAY %	JUN NUMBERS	JUN %	JUN BIOMASS	JUN %
HERBIVORES												
SUCKERS	431628.9	95.0	204.992	95.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHEWERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NECTIVORES	1273.2	0.3	0.764	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CARNIVORES												
PREDATORS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	21645.1	4.8	8.531	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS												
HERBIVORES	432902.2	95.2	205.756	96.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CARNIVORES	21645.1	4.8	8.531	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	JUL NUMBERS	JUL %	JUL BIOMASS	JUL %	AUG NUMBERS	AUG %	AUG BIOMASS	AUG %	SEP NUMBERS	SEP %	SEP BIOMASS	SEP %
HERBIVORES												
SUCKERS	343775.3	39.7	157.882	25.6	2712004.0	94.0	94.644	52.3	44563.4	13.7	10.823	14.0
CHEWERS	0.0	0.0	0.0	0.0	4244.1	0.1	0.0	0.0	6366.2	2.0	0.0	0.0
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	106103.5	3.7	69.604	38.5	273746.8	84.3	66.208	86.0
CARNIVORES												
PREDATORS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	522029.1	60.3	458.367	74.4	63662.1	2.2	16.552	9.2	0.0	0.0	0.0	0.0
TOTALS												
HERBIVORES	343775.3	39.7	157.882	25.6	2822351.0	97.8	164.248	90.8	324676.5	100.0	77.031	100.0
CARNIVORES	522029.1	60.3	458.367	74.4	63662.1	2.2	16.552	9.2	0.0	0.0	0.0	0.0

Table 34. Average numbers (ind/ha) and biomass (g/ha) of the feeding types of arthropods sampled by D-Vac in 1972 on the playa on *Prosopis glandulosa* with percentage of each type

	MAY NUMBERS	MAY %	MAY BIOMASS	MAY %	JUN NUMBERS	JUN %	JUN BIOMASS	JUN %	JUL NUMBERS	JUL %	JUL BIOMASS	JUL %
HERBIVORES												
SUCKERS	25563.5	98.3	4.209	57.7	555677.2	98.4	59.543	81.5	940024.6	98.3	105.384	87.6
CHEWERS	440.7	1.7	3.085	42.3	1728.2	0.3	4.706	6.4	1429.9	0.1	12.354	10.3
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1715.9	0.2	0.658	0.5
OTHERS	0.0	0.0	0.0	0.0	664.7	0.1	1.688	2.3	4289.7	0.4	1.544	1.3
CARNIVORES												
PREDATORS	0.0	0.0	0.0	0.0	1728.2	0.3	6.102	8.4	0.0	0.0	0.0	0.0
PARASITES	0.0	0.0	0.0	0.0	4918.7	0.9	0.997	1.4	8579.5	0.9	0.400	0.3
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS												
HERBIVORES	26004.2	100.0	7.294	100.0	558070.1	98.8	65.937	90.3	947460.3	99.1	119.941	99.7
CARNIVORES	0.0	0.0	0.0	0.0	6646.9	1.2	7.099	9.7	8579.5	0.9	0.400	0.3

	AUG NUMBERS	AUG %	AUG BIOMASS	AUG %	SEP NUMBERS	SEP %	SEP BIOMASS	SEP %
HERBIVORES								
SUCKERS	417520.9	91.4	43.722	84.7	38595.6	90.2	5.476	96.8
CHEWERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	39388.8	8.6	7.878	15.3	3129.4	7.3	0.104	1.8
CARNIVORES								
PREDATORS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	1043.1	2.4	0.078	1.4
TOTALS								
HERBIVORES	456909.7	100.0	51.599	100.0	41724.9	97.6	5.581	98.6
CARNIVORES	0.0	0.0	0.0	0.0	1043.1	2.4	0.078	1.4

The carnivorous biomass showed a general peak in June and July, and was represented largely by spiders.

Plant suckers were consistently the predominant group on the playa. Some of the families of plant suckers pass more plant juice through their bodies than they assimilate. The numbers of plant suckers, then, might be a more appropriate measure of their impact on a plant than their biomass.

Taxa Data

Space does not permit a full discussion of the data. Some general trends, however, should be noted. The diversity index (based on families) was consistently highest in 1971 during the summer. In 1972, it did not show a consistent trend. The highest density of arthropods on the shrubs in 1971 occurred in the fall; in 1972 the densities were highest in the summer for *Larrea divaricata* and *Panicum obtusum*, but on *Ephedra trifurca*, *Hilaria mutica*, and *Prosopis glandulosa*, densities were highest in the fall.

In general, 1972 showed higher arthropod densities on shrubs than did 1971. Presence-absence data for the playa arthropods are given in Table 35.

I.C.2. Insect Transects

Several groups of potentially important insects were inadequately sampled by D-Vac or can-trap methods (A3UWJ96). These groups include various butterflies, grasshoppers, moths, and wasps. To obtain population estimates, a modification of the flush transect technique used for rabbits (Emlen, 1971) was used. An observer walked a transect bisecting the site, and recorded the distance to each insect that was flushed. For flying groups, i.e., butterflies, wasps; each individual sighted within a 10 m corridor was recorded. These data were then corrected to represent numbers of individuals·ha^{-1}. Dry weights were obtained for each group by collecting several individuals, drying and weighing them. The average individual weights were multiplied by the population estimates to obtain biomass·ha^{-1}.

The results obtained for the three major groups are recorded in Table 36.

Estimates were found to be dependent upon temperature. Transects walked early in the morning, or on cool, overcast days, yielded lower estimates than those walked around 11:00 a.m.

In May, the population of these groups was highest. The grasshoppers showed a particularly marked increase over the population size in April. In general, the populations decreased in size through the summer. The increase in the grasshopper population in September was possibly due to the appearance of additional species.

Table 35. Presence/absence data for arthropods sampled by D-Vac with presence indicated as follows: P1 = playa 1971· P2 = playa 1972; B1 = bajada 1971; B2 = bajada 1972

	PANICUM OBTUSUM	HILARIA MUTICA	PROSOPIS GLANDULOSA	EPHEDRA TRIFURCA	XANTHOCEPHLUM SAROTHRAE	LARREA DIVARICATA
ACA	P2		P1	P1 P2	P1	
ARA	P1 P2	P1 P2	P1 P2	P1 P2	P1	P1 P2
COL	P2	P2	P1 P2	P1 P2	P1	P1
COLANO						
COLANT			P1 P2			
COLBOS			P1			
COLBRU	P1		P1	P2		
COLBUP			P1	P1		
COLCAR						
COLCER			P1			
COLCHR		P1	P1 P2	P1 P2	P1	P1
COLCLE			P1			P1
COLCOC		P1	P1 P2	P1 P2		P1
COLCRY						
COLCUR	P2		P1 P2	P1 P2	P1	P2
COLDER			P1			
COLMAL	P2	P2	P1	P1	P1	
COLMEL			P1 P2			P1
COLMOR		P1				
COLNIT						
COLORT						
COLPHA						
COLSTA	P2	P2	P1			
COLTEN						

Table 35, continued

DIP	P1 P2	P1 P2	P1 P2	P1 P2	P1	P1 P2
DIPAGR	P2					
DIPBOM			P1	P2		P1
DIPCEC			P1	P1 P2		P1
DIPCER	P2					
DIPCHI	P2		P2			
DIPCHL				P2		
DIPCUL						
DIPDIA						
DIPDOL						
DIPDRO						
DIPEMP		P2		P2		
DIPMUS	P2		P1 P2	P1 P2		P2
DIPMYC				P2		
DIPOTI				P1		
DIPPHO				P2		
DIPPIP						P2
DIPSAR			P1	P1		
DIPSCE						
DIPSEP				P2		P2
DIPSTR						
DIPSYR						
DIPTAC		P2	P1	P1		P1
DIPTEP				P2		P2
DIPTIP						
HEM	P1	P1 P2	P1	P1 P2		P1
HEMANT	P2		P1 P2	P2		P1
HEMBER	P2	P2		P2		
HEMCOR						
HEMLYG			P1	P1 P2		P1
HEMMEM						
HEMMIR	P2		P1 P2	P1 P2		P1 P2
HEMNAB	P2		P1 P2	P2		
HEMPEN	P2	P2				P1
HEMPYR						
HEMRED			P1			
HEMTIN	P2	P2	P2	P2		
HOM	P2		P1 P2	P1 P2		
HOMACA						
HOMALE						
HOMAPH			P1	P2		
HOMCER		P2				
HOMCIC	P1 P2	P1 P2	P1 P2	P1 P2	P1	P1 P2
HOMCIX	P2		P2			
HOMCOC		P2	P1			
HOMDEL	P2	P2				
HOMDIC						
HOMFLA				P2		
HOMFUL				P1		P1
HOMISS			P1	P1		
HOMMEM	P1		P1 P2	P1		P1 P2
HOMPSY	P1 P2	P1 P2	P1 P2	P1 P2		P1 P2
HYM	P2		P1 P2	P1 P2	P1	P1
HYMAND			P1	P1		
HYMAPI						
HYMBRA			P1	P2		
HYMCHA	P2	P2	P2	P2		P2
HYMCYN				P2		
HYMFOR	P1 P2	P1 P2	P1 P2	P1 P2	P1	P1
HYMHAL		P2	P1 P2	P1	P1	P1 P2
HYMICH	P2		P2			
HYMMEG				P1		
HYMPLA			P2			
HYMPOM						
HYMPRO	P2			P2		P2
HYMSPH			P1			P1
HYMTIP						
ISO				P1 P2		
LEP	P2	P2	P1 P2	P1 P2	P1	P2
LEPGEO						

Table 35, continued

LEPMIC			P2			
NEU				P1 P2		P1
NEUCHR			P1 P2	P1 P2		P2
NEUCON		P2				
NEUHEM	P2	P2	P1	P1 P2		P1 P2
NEUMYR				P1 P2	P1	P2
ODOCOE						
ORT				P2		
ORTACR	P2	P1 P2	P1			P1
ORTGRY						
ORTMAN			P1			
ORTPHA		P1				P2
THY			P1			P1
THYAEO	P2					
THYPHL	P2	P1 P2		P1 P2		
THYTHR		P2		P2		
TRI			P1			
TRIHYD						
TRIMYD						P1

Table 36. Numbers (ind/ha) and biomass (g/ha) estimates for insect populations based on playa transects

		1972					1973		
		JUL	AUG	APR	MAY	JUN	JUL	AUG	SEP
butterflies	numbers	16	72	103	162	54	16	39	13
	biomass	0.42	1.9	2.7	4.3	1.4	0.42	1.0	0.34
small moths	numbers	140	1310	77	210	21	142	29	-0-
		no biomass data is available for these small moths.							
grasshoppers	numbers	512	480	9	770	332	148	40	181
	biomass	65.0	48.0	1.2	98.0	42.0	19.0	51.0	23.0

I.D. VERTEBRATES

I.D.1. Amphibians

An intensive program of sampling playa amphibians was conducted during 1973 to determine their impact on the playa community (A3UWJ13). Two hundred #10 fruit juice cans established previously were utilized for this project. To prevent toads from escaping, the pit-fall traps were deepened to two cans in depth, rather than the previous single can on the playa bottom. The traps were established 15 m apart, forming four grids with dimensions of 60 x 90 m. Each toad was given an unique toe clip to identify recaptures for population estimating. A total of 2500 toads were captured, of which 933 were toe-clipped for identification. Of the animals marked, 108 were recaptured.

A secondary population estimate was determined during mid-June when the cattle tank portion of the playa filled to about three feet in depth, permitting breeding adults of *Scaphiopus bombifrons*, *Scaphiopus couchi* and *Scaphiopus hammondi* to establish tadpoles in the tank. Only 11 *S. couchi* were observed in the cattle tank, so it is doubtful that this species had a major effect on the total tadpole population. Neither of the Bufonid species, *Bufo cognatus* and *Bufo debilis*, bred during 1973 although they were active on the playa bottom and fringe areas. It would seem likely that a flooding of the playa bottom proper is a prerequisite for these species to breed.

Daily sampling was conducted on the trapping grids from early May through mid-September. All animals taken were weighed early each morning to counteract the effects of dehydration. Unless the playa bottom was extremely wet, captured toads would not survive in the traps until the next day, hence daily sampling was necessary. Snout-vent measurements were taken on all toads that were marked for recapture purposes in an effort to determine rate of growth for each species. Population estimates for the flooded cattle tank were determined by marking 100 individuals of each species each night, returning them to the cattle tank the same night. After a 1-hr wait, a random sample was taken from the tank and the number of recaptures was noted. From these recaptures a population estimate was determined using the Lincoln Index procedure (Table 37).

Rain would initiate toad activity on the playa and each species would remain active for an undetermined period thereafter. When the ground appeared to become quite dry, activity would cease until the next rain re-initiated activity. Toads were rarely active more than two days after rain on the sandy soil of the playa fringe, but the activity on the playa bottom's clay soil would continue several days beyond the last rain. Very small juvenile *Scaphiopus* sp. remained active for 55 consecutive days from June 13 through August 6 on the playa bottom. Since it is extremely difficult to distinguish *S. bombifrons* from *S. hammondi* less than 4 g in weight, these species will be combined under the general classification of "small Pelobatids" in the paper. Young *S. couchi* were readily distinguishable from the other two Pelobatid species, hence are not included under this classification.

The most abundant amphibians on the playa site were the small Pelobatids in numbers, total biomass and days of activity (Table 38). The total number of days of activity for each species is an important consideration when noting the amphibian impact on the playa community. While active, toads are found in large numbers on the playa, feeding mainly on insects and spiders. Toads compete with the lizard population for the insect population but avoid competition by nocturnal feeding habits when lizards are not active. There is also a tendency for toads to be very active while the playa is wet, whereas lizards greatly reduce their activity during these periods. However, lizards are less affected by wet conditions favorable to the toads than toads are by dry conditions. The number of active toads steadily declines from a peak initiated by rain as the playa soil dries, whereas lizards are only inactive for a few days after heavy rain. The length of toad activity appears to be directly related to soil moisture content.

Most toad activity occurred in the grassy playa bottom. However, two species, *Scaphiopus couchi* and *Bufo cognatus*, were seldom encountered on the playa bottom. The latter was observed nearly three quarters of a mile from the playa during heavy rain. A third species, *Bufo punctatus* was twice encountered on the bajada site but never on the playa site. This species is normally found near rocky pools in the Dona Ana Mountains rather than near desert playas.

The small Pelobatids were active in large numbers in May and June, steadily declining in numbers through August (Table 38). These animals were the offspring of a very favorable flooding pattern in 1972 and a favorable winter in early 1973 which enabled large numbers to survive. Adults of all species were usually active only a few days after rain, but adult *B. debilis* became increasingly more active in late July through early September (Table 38). It was during this period that the small Pelobatids became less active in numbers.

When active, the amphibian population is very important to the playa as it constitutes the largest vertebrate population. For this reason, considerable examination should be given to the amphibians to determine rate of growth and feeding impact on the insects. The total yearly impact by toads is tempered by the highly restricted number of days of favorable conditions for activity. Much of the year is too dry to permit extended activity. Therefore, the total number of days per year that toads are active should be considered when evaluating amphibian impact on the playa community.

I.D.2. Reptiles

Sampling methods used for lizards were reported in Whitford et al., 1973 (A3UWJ13).

Table 37. Data for breeding adult pelobatids* from cattle tank during June flooding, 1973

	Jun 13	Jun 14	Jun 15	Jun 16
Scaphiopus bombifrons	302.41	303.33	281.20	315.00
Est Density (total)	18.50	18.50	17.37	19.04
Mean Weight (grams)	5594.58	5611.60	4884.44	5997.60
Live Biomass (grams)	1678.37	1683.48	1465.33	1799.28
Dry Biomass (grams)				
Scaphiopus couchi				
Est Density	11.00	0	0	0
Mean Weight	32.33	0	0	0
Live Biomass	355.63	0	0	0
Dry Biomass	106.68	0	0	0
Scaphiopus hammondi				
Est Density	710.11	754.80	770.00	63.00
Mean Weight	13.25	13.46	13.05	12.14
Live Biomass	9408.95	10159.60	10038.50	764.82
Dry Biomass	2822.68	3047.88	3014.55	229.44
Totals for Cattle Tank				
Est Density	1023.52	1058.13	1051.20	378.00
Live Biomass	15359.16	15771.20	14932.94	6762.42
Dry Biomass	4607.73	4731.36	4479.88	2028.72

*There were no breeding adults of either *Bufo cognatus* or *Bufo debilis* during 1973.

In general, the density of lizards on the playa during 1973 was higher than at any other time since this study was initiated. The Teiids reached their greatest densities in June and August (Table 39), while the Iguanids obtained peak densities in August and October. Because of the limited amount of data obtained on the Scincidae during 1973, speculation on their impact on the playa site was not possible. It should be noted that many species of insects also reach their peak densities in June and August. July is normally very wet and lizard activity usually declines during that period.

The utilization of can-traps has varying value as a means of sampling lizards. Can-traps are effective on some species but less effective on others.

Cnemidorphorus inornatus were occasionally observed in grassy areas of the playa, but seldom taken in can-traps. This species is probably undersampled by the can-trap method.

Cnemidophorus tesselatus occur throughout the playa and are more common on the south side of the playa site than the recapture data indicates. This may be due to trap

Table 38. Amphibian data from the playa site, 1973

	Small Pelobatids*	*Scaphiopus bombifrons*	*Scaphiopus couchi*	*Scaphiopus hammondi*	Total Pelobatids	*Bufo cognatus*	*Bufo debilis*	Total Bufonids	Total Anurans
May									
Days Active	15	0	0	0	--	0	6	--	--
Est. Density (/ha)	5582.22	0	0	0	5582.22	0	6.22	6.22	5588.44
Live Biomass (g/ha)	7803.94	0	0	0	7803.94	0	4.04	4.04	7807.98
Dry Biomass (g/ha)	2341.18	0	0	0	2341.18	0	1.21	1.21	2342.39
June									
Days Active	20	4	0	8	--	4	16	--	--
Est. Density	5380.66	0.88	0	24.00	5404.54	1.33	56.00	57.33	5462.87
Live Biomass	7629.77	19.14	0	188.20	7837.11	45.32	304.64	349.96	8187.07
Dry Biomass	2288.93	5.74	0	56.46	2351.13	13.59	91.39	104.98	2456.11
July									
Days Active	31	3	4	9	--	0	14	--	--
Est. Density	3331.77	2.66	0.88	36.00	3371.31	0	165.33	165.33	3536.19
Live Biomass	4967.67	51.41	38.50	366.84	5424.42	0	934.77	934.77	6359.19
Dry Biomass	1490.30	15.42	11.55	110.05	1627.32	0	280.43	280.43	1907.75
August									
Days Active	15	7	1	14	--	0	18	--	--
Est. Density	933.33	6	0.22	31.11	970.66	0	315.33	315.33	1285.99
Live Biomass	1971.19	50.70	0.99	224.30	255.27	0	1178.38	1178.38	3402.56
Dry Biomass	591.35	15.21	0.29	67.29	674.14	0	353.51	353.51	1027.65
September									
Days Active	0	1	0	1	--	0	3	--	--
Est Density	0	0.44	0	37.33	37.33	0	206.22	206.22	243.99
Live Biomass	0	2.55	0	252.72	255.27	0	855.81	855.81	1111.08
Dry Biomass	0	0.76	0	75.81	76.81	0	256.74	256.74	333.31
October									
Days Active	0	0	0	0	--	0	1	--	--
Est. Density	0	0	0	0	0	0	2.66	2.66	2.66
Live Biomass	0	0	0	0	0	0	10.90	10.90	10.90
Dry Biomass	0	0	0	0	0	0	3.27	3.27	3.27

* It is extremely difficult to distinguish *S. bombifrons* from *S. hammondi* less than four grams in weight under field conditions due to hybridization and incomplete boss formation on small *S. bombifrons*. For this reason, both species of this size category are grouped together.

avoidance. This species is slightly more abundant on the fringe areas of the playa than in the playa bottom. Noosing has been found to be effective as a sampling tool and will be utilized with the can-traps in 1974.

Cnemidophorus tigris was the most abundant lizard on the playa site in 1973. This species was twice as abundant on the bajada as on the playa, averaging 27.91 individuals per hectare on the playa. This species was quite abundant on both the fringe and bottom areas of the playa. The largest number of adults was observed in June, while the young reached their maximum densities in late August. Can-trap methods were very effective for *C. tigris*.

During July three individuals of *Eumeces obsoletus* were taken in the sandy fringe near a small arroyo on the north grid of the playa. It is difficult to assess the importance of this species as it is rarely seen on either of the sites.

A young female *Crotaphytus wislizenii* was captured in September on the playa fringe. This species in undoubtedly more abundant than the data would indicate, but its secretive habits reduce the number of observations. Noosing is more effective than can-traps in obtaining data on this species.

Holbrookia maculata are present on the playa site rather than their bajada counterpart *H. texana*. This species was rather common in May and June in the grassy areas of the playa bottom, particularly on the north grid. Adults were quite adept at raiding can-traps which were only one can depth for insects attracted to these cans, and then escaping. When these traps were deepened to two cans, many adults avoided the traps completely. Most records were hand captures on the grids. During June, the adults left the playa bottom and gravid females were observed in the sandy fringe areas off the trapping grids. These lizards were particularly abundant south of the playa site. Young were observed in this area in July, but this species did not return to the playa for the remainder of the year.

Phrynosoma cornutum is the second most abundant playa lizard and is seldom observed on the bajada. Because this species normally avoids can-traps, approximately 90% of the data were hand captures. Although this species normally eats ants, in July individuals were observed feeding on Hemipterans caught in can-traps.

Phrynosoma modestum appeared to be more common near the playa than the can-trap data would indicate. This species' excellent camouflage makes it very difficult to observe. More *P. modestum* are found on the bajada site than the playa site. Those taken on the playa are nearly always found on the sandy fringe areas.

Sceloporus magister adults were occasionally taken in can-traps near mesquite bushes, but many of these escaped when the can-trap lids were raised during inspection. Thus, the data may not reflect an accurate estimation of the number of adults entering the traps. Adult males typically did not frequent the playa bottom, however, some adult females were observed during June and July.

From August through November, young *S. magister* were observed in can-traps, particularly on the playa bottom. Since adult males rarely approach the playa bottom, it is possible the young are able to avoid competition by using this area to feed.

Uta stansburiana were usually encountered in the sandy fringe areas and occasionally on the grassy bottom of the playa. During May and July, adults were rarely observed. Young began to appear in July, with August through October being periods of maximum activity. By December most young had matured. A few individuals of this species remained active throughout the winter. Can traps appeared to be an effective means of securing this species.

More snakes were observed during 1973 on the playa than any previous year of study. Thirty-four *Crotalus viridis* were captured, marked and released from May through July. This species was most commonly found on the playa bottom in the early morning hours, but was observed at other localities and times of the day. *Crotalus atrox*, which had been previously noted from the playa site, was not observed in 1973. However, four records of *Sistrurus catenatus* were obtained from May through August. This is the first confirmed record of this species from this site.

Three *Masticophus flagellum* were taken in the bottom of the playa in the vicinity of the cattle tank and the south grid. One individual was encountered daily from May through August on the south grid. Seven *Pituophis melanoleucus* were observed on the playa from May through July. This species was observed eating both toads and rodents.

In July, two *Arizona elegans*, two *Hypsiglena torquata* and one *Heterodon nasicus* were observed on the playa during the day. Six *Tereapene ornata* were also found on the playa site, usually on the north grid of the playa.

Table 39. Summary of lizard sampling data from the playa site for the period May 6, 1973 through December 28, 1973; sampling dates excluded where no individuals were obtained

Sampling Period	Males	Females	#5g and below	#5.1g and 10 g	#10.1g to 15 g	Estimated Density	Mean Weight	Live bio- mass g/ha	Dry bio- mass g/ha
Cnemidophorus inornatus									
Aug 11-Aug 24	1	0	1	0	0	0.22	1.00	0.22	0.07
Aug 25-Sep 27	1	0	1	0	0	0.22	1.20	0.26	0.08
			#10g and below	#10.1g to 20 g	#20.1g to 30 g				
Cnemidophorus tesselatus									
May 06-May 19	0	2	2	0	0	0.44	6.60	2.90	0.87
May 20-Jun 02	0	2	2	0	0	0.44	5.70	2.50	0.75
Jun 17-Jun 29	0	4	1	3	0	0.88	11.15	9.81	2.94
Jun 30-Jul 13	0	4	0	4	0	0.88	13.00	11.44	3.43
Jul 28-Aug 10	0	1	0	0	1	0.22	26.00	5.72	1.71
Aug 11-Aug 24	0	1	0	0	1	0.22	22.00	4.84	1.45
Aug 25-Sep 07	0	2	1	0	1	0.44	15.10	6.64	1.99
Sep 08-Sep 21	0	1	1	0	0	0.22	4.80	1.05	0.31
Cnemidophorus tigris									
May 06-May 19	6	2	4	2	2	13.00	13.30	172.90	51.87
May 20-Jun 02	9	5	6	7	1	31.11	13.83	430.25	129.07
Jun 03-Jun 16	16	14	7	17	6	56.66	13.34	755.84	226.75
Jun 17-Jun 29	19	15	11	23	0	24.55	13.25	325.28	97.58
Jun 30-Jul 13	19	6	1	23	1	22.22	13.81	306.85	92.05
Jul 14-Jul 27	7	5	1	10	1	16.00	15.65	250.40	75.12
Jul 28-Aug 10	9	3	1	7	4	17.77	16.30	289.65	86.89
Aug 11-Aug 24	12	8	4	10	6	48.88	12.37	604.64	181.39
Aug 25-Sep 07	7	4	9	0	2	48.88	4.27	208.71	62.61
Sep 08-Sep 21	13	7	19	1	0	10.37	3.23	33.49	10.04
Sep 22-Oct 05	5	2	7	0	0	2.66	3.28	8.72	2.61
Crotaphytus wislezenii									
Sep 08-Sep 21	0	1				0.22	7.40	1.63	0.49
Eumeces obsoletus									
Jun 30-Jul 13	2	1				0.66	33.00	21.78	6.53
Holbrookia maculata									
May 06-May 19	1	1				0.66	5.35	3.53	1.05
May 20-Jun 02	0	1				1.11	5.90	6.54	1.96
Jun 03-Jun 16	2	2				2.66	5.75	15.29	4.58
Jun 17-Jun 29	2	1				1.33	5.73	7.62	2.28
Jun 30-Jul 13	0	2				0.44	6.35	2.79	0.83

Sampling Period	Males	Females	#15g and below	#15.1g to 30 g	#30.1g to 45 g	#45.1g and below	Estimated Density	Mean Weight	Live bio- mass g/ha	Dry bio- mass g/ha
Phrynosoma cornutum										
May 06-May 19	3	4	2	1	3	1	2.66	28.92	76.79	23.07
May 20-Jun 02	8	8	6	5	4	1	14.22	26.27	373.55	112.06
Jun 03-Jun 16	8	7	4	5	4	2	13.33	25.60	341.24	102.37
Jun 17-Jun 29	3	3	3	2	1	0	13.33	29.21	389.36	116.80
Jun 30-Jul 13	7	5	2	3	6	1	24.00	37.47	899.28	269.78
Jul 14-Jul 27	5	4	0	0	6	3	11.11	45.53	505.89	151.74
Jul 28-Aug 10	2	3	0	0	1	4	6.66	36.20	241.09	72.32
Aug 11-Aug 24	3	3	2	0	3	1	13.33	28.79	383.77	115.13
Aug 25-Sep 07	5	5	3	1	4	2	2.22	31.21	69.28	20.78
Sep 08-Sep 21	0	1	0	0	0	1	0.22	48.00	10.56	3.16
Oct 06-Oct 19	1	0	0	0	1	0	0.22	36.00	7.92	2.37

continued

Table 39, continued

Phrynosoma modestum

Sampling Period	Males	Females	#5g and below	#5.1g to 10 g	#10.1g to 15 g	Estimated Density	Mean Weight	Live bio-mass g/ha	Dry bio-mass g/ha
May 20-Jun 02	0	1	1	0	0	0.44	4.20	1.84	0.55
Jun 03-Jun 16	0	1	0	0	1	0.44	12.00	5.28	1.58
Jun 17-Jun 29	1	0	0	1	0	0.66	6.50	4.29	1.28
Jun 30-Jul 13	1	1	0	1	1	0.66	9.50	6.27	1.88
Jul 14-Jul 27	0	1	0	0	1	0.22	11.00	2.42	0.72
Aug 11-Aug 24	1	0	1	0	0	0.44	0.70	0.30	0.09
Aug 25-Sep 07	0	1	1	0	0	0.44	2.40	1.05	0.31
Sep 08-Sep 21	0	1	1	0	0	0.22	2.80	0.61	0.18

Sceloporus magister

Sampling Period	Males	Females	#15g and below	#15.1g to 30 g	#30.1g to 45 g	#45.1g and above	Estimated Density	Mean Weight	Live bio-mass g/ha	Dry bio-mass g/ha
May 06-May 19	1	0					0.22	71.00	15.62	4.68
Jun 30-Jul 13	0	1					0.22	37.00	8.14	2.44
Aug 11-Aug 24	1	0					1.33	0.40	0.53	0.15
Aug 25-Sep 07	3	2					3.33	9.92	33.03	9.90
Sep 08-Sep 21	1	2					2.00	6.95	13.90	4.17
Sep 22-Oct 05	3	0					0.88	12.00	10.56	3.16
Oct 06-Oct 19	1	0					0.66	14.76	9.74	2.92
Oct 20-Nov 02	0	2					0.66	1.86	1.22	0.36
Nov 03-Nov 16	1	0					0.22	1.30	0.28	0.08

Uta stansburiana

Sampling Period	Males	Females	#2g and below	#2.1g to 4 g	#4.1g to 6 g	Estimated Density	Mean Weight	Live bio-mass g/ha	Dry bio-mass g/ha
May 06-May 19	1	0	0	0	1	0.22	5.40	1.18	0.35
Jun 03-Jun 16	0	4	0	1	3	0.88	4.27	3.75	1.12
Jun 30-Jul 13	1	0	1	0	0	0.88	1.17	1.02	0.30
Jul 14-Jul 27	1	2	2	1	0	0.88	1.20	1.05	0.31
Jul 28-Aug 10	0	1	1	0	0	3.33	1.47	4.89	1.46
Aug 11-Aug 24	5	9	11	2	1	32.66	1.53	49.96	14.98
Aug 25-Sep 07	15	7	18	4	0	28.00	1.44	40.32	12.09
Sep 08-Sep 21	4	8	10	2	0	18.66	1.84	34.33	10.29
Sep 22-Oct 05	8	6	5	9	0	14.51	2.39	34.67	10.40
Oct 06-Oct 19	10	4	5	8	1	34.22	2.48	84.86	25.45
Oct 20-Nov 02	5	6	5	4	2	22.00	2.62	57.64	17.29
Nov 03-Nov 16	4	5	2	6	1	2.22	2.53	5.61	1.68
Nov 17-Nov 30	0	1	0	1	0	0.66	2.45	1.61	0.48
Dec 01-Dec 14	1	1	0	2	0	1.33	3.08	4.09	1.22
Dec 15-Dec 28	2	1	1	0	2	1.33	3.00	3.99	1.19

I.D.3. Birds

In 1973 the timing of census of birds on the playa was revised from that of 1971 and 1972. A weekly schedule was kept as closely as possible until September when the schedule was changed to every other week. The method of census was the same as in 1971 and 1972, the strip census method of Emlen (1971). The route is 1,600 m long, following a square pathway around the perimeter of the playa bottom. The lateral distance between observer and each bird sighted is recorded in order to calculate a coefficient of detection (CD value) for each species, which is then used to correct actual numbers counted. As in the previous years, searches for nests were made and records kept of their outcome. Data on birds on the playa site are stored under DSCODES A3UWJ16 and 60.

All data for 1971-1973 have now been corrected for CD values (Raitt and Pimm, in prep.). In this report, 1973 data are tabulated but the graphs show results of three years. Densities in terms of numbers and biomass are given in Tables 40 and 41, respectively. A cumulative total of 96 species have been recorded on the playa and bajada. For simplicity they have been grouped into ecologically similar assemblages: breeding species (BS), including those primarily insectivorous species which breed on the area; mourning doves and scaled quail (DQ); raptors (RA); non-breeding insectivorous species (OI); non-breeding seedeaters (WS); aquatic species (AQ), which appear when the playa is flooded; and a small number of miscellaneous species (MS).

Table 40. Monthly mean bird densities (birds/100 ha) on the playa, 1973*

Species Categories	Jan	Feb	Mar	Apr	May	Jun	Jul	Sep	Oct	Nov	Dec
AQ	17.1	0	0	0	0	0	0	0	0	0	0
RA	8.6	2.9	5.7	0	1.7	0	0	1.4	1.4	1.4	0
BS	0	1.8	30.2	99.8	49.3	65.6	55.5	37.2	42.6	39.2	57.0
OI	0	25.0	0	9.6	16.7	0	2.9	24.8	6.3	1.4	0
WS	209.2	303.3	34.6	385.4	121.4	0	0	156.3	148.0	150.7	88.2
DQ	1035.4	109.0	155.7	38.1	136.0	1349.7	392.2	87.4	88.8	44.6	125.0
MS	0	0	9.5	0	1.1	0	0	2.9	0	0	0
TOTAL	1270.3	442.0	235.7	532.9	327.1	1415.3	450.6	310.0	287.1	287.3	270.2

* Census omitted for the month of August.

Table 41. Monthly mean bird biomass (g live weight/ha) on the playa, 1973*

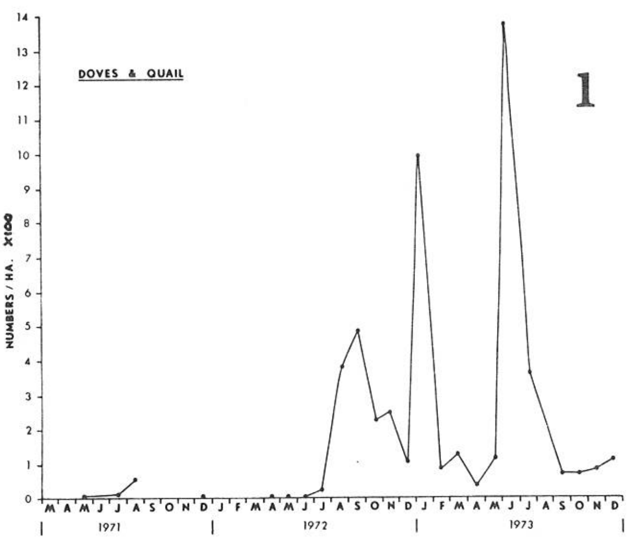
Species Categories	Jan	Feb	Mar	Apr	May	Jun	Jul	Sep	Oct	Nov	Dec
AQ	48.7	0	0	0	0	0	0	0	0	0	0
RA	44.7	9.4	6.6	0	7.2	0	0	7.4	7.4	7.4	0
BS	0	0	11.8	42.7	22.3	29.8	32.8	9.0	13.3	8.6	9.4
OI	0	7.8	0	0.7	2.4	0	0.4	3.5	0.9	1.1	0
WS	42.3	88.2	6.1	122.1	49.4	0	0	20.4	47.4	53.1	22.0
DQ	1221.8	128.6	183.7	50.8	162.6	1593.4	471.3	138.9	162.4	187.4	247.5
MS	0	0	1.9	0	0.4	0	0	2.3	0	0	0
Total	1357.5	234.0	210.1	216.3	244.3	1623.2	504.5	181.5	232.4	257.6	278.9

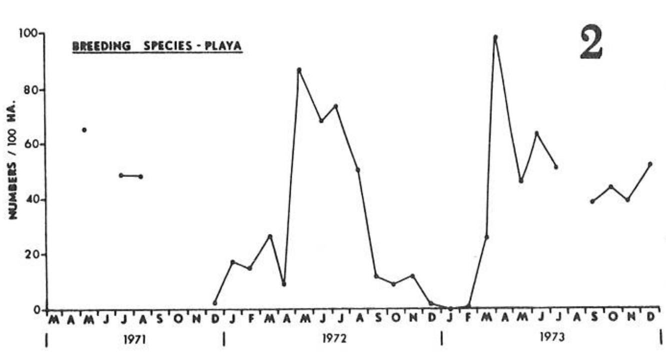
* Census omitted for the month of August.

Aquatic species were absent in 1973 (apart from a flock of teal in February) because the playa failed to flood as it had in previous years. Raptors were lower in 1973 with a mean of 2.1/100 ha as compared to 2.9 and 3.2/100 ha for 1971 and 1972, respectively. Non-breeding insectivores were also lower. For 1973 there were 7.9/100 ha as compared to 7.4 and 9.5/100 ha in the previous years. Miscellaneous species also followed this drop in number from 3.7 and 6.7/100 ha to 1.2/100 ha in 1973. Winter seedeaters were down in the fall of 1973 as compared to previous years. Doves and quail were much higher during the summer of 1973 than in past years, ranging from 62.0/100 ha in 1971 to 1,349.7/100 ha in 1973. This is shown in Figure 1.

Breeding species means for May through July were used as best estimates of breeding densities. These were 58.0, 78.4, and 58.1 per 100 ha for the three years. Density of breeding species in fall and winter of 1973 was much higher than in the past. This was due to a large increase in black-throated sparrows and cactus wrens (Fig. 2).

The results of nesting studies are summarized in Table 42. Numbers of nesting attempts and nesting successes were greater in 1973 than in previous years.





Figures 1 and 2. Mean monthly density of doves and quail and total breeding species on the playa from 1971 through 1973.

Table 42. Breeding birds on the playa--all numbers represent pairs

Species	# Nesting 1970	1971	1972	1973	# Successful 1970	1971	1972	1973
Scaled Quail	1		1+	1	1	0	1	1
Roadrunner	1	0	0	0	1	0	0	0
Cactus Wren	1		1pr2x	3	1?	1	1	3
Loggerhead Shrike	0		2	2	0	1	2	2
Mockingbird	0		1+1pr2x	5	0	0	2	4
Chrissal Thrasher	0	0	1pr2x	1	0	0	2	1
Scott's Oriole	1		2,1pr2x	1pr2x	0	0	2	2
Western Kingbird	0		2,1pr2x	4	0	0	3	2+
Ash-throated Flycatcher	0	0	0	1	0	0	0	0
Say's Phoebe	0*	0*	1	1pr2x	0*	0*	1	2
Meadow Lark Sp.	0	0	1	0	0	0	1	0
Black-throated Sparrow	0		1+	0	0	0	0+	0
Mourning Dove	0	0	0	1pr2x	0	0	0	1
TOTALS	3	0	14+5	20+3	3	2	15+	18+

* This species is an early nester and may have been overlooked in these years of the study.

Where nests have been found in the same part of the playa, and are non-overlapping in time, they have been assumed to be renesting. This leads to a conservative estimate of the number of pairs utilizing the area.

I.D.4. Rodents

Trapping procedures for playa rodents in 1973 were essentially the same as those reported in the 1972 US/IBP report for the Jornada Validation Site (Whitford et al., 1973; A3UWJ11, 68). The procedure was modified to include two pre-census trapping dates and two census trapping dates. It is believed that this method increased the accuracy of estimating population densities. During the colder months of February and November, the rodents were marked and released by 11:00 p.m. each night to prohibit death due to extreme torpor. The warmer months permitted leaving traps out for the entire night, marking and releasing the animals at daybreak. It is believed that there is only a slight increase in accuracy for those samples taken an entire night since most species are active within an hour or so after dusk. However, identification and the amount of time to complete the trapping sessions are greatly enhanced by daytime marking and identification procedures.

The year 1973 was a "boom" year for playa rodents. Aided by favorable rain during the latter half of 1972 and throughout 1973, the playa rodent population increased to a mean monthly density of 53.48 animals/ha and a mean monthly live biomass of 2118.84 g/ha (Table 43). The density per hectare reflects a marked increase over similar estimates for 1972 (17.20), 1971 (29.38) and 1970 (16.63).

Four species, *Neotoma micropus*, *Peromyscus eremicus*, *Peromyscus leucopus*, and *Spermophilus spilosoma*, were taken for the first time in 1973 from the playa site. A total of sixteen species were taken from the playa during 1973 (Table 44). Five of the sixteen were taken exclusively on the playa site. These include *Dipodomys spectabilis*, *Mus musculus*, *Perognathus flavus*, *Sigmodon hispidus*, and *S. spilosoma*, although *S. spilosoma* had occurred on the bajada site prior to 1973. In addition, three species, *Dipodomys ordii* (1.91 times), *P. leucopus* (2.44 times) and *Reithrodontomys megalotis* (2.56 times) were obtained in slightly greater densities than the bajada site in 1973.

Eight of the sixteen species; *Dipodomys merriami* (25.67%), *S. hispidus* (17.18%), *R. megalotis* (15.25%), *Peromyscus maniculatus* (14.09%), *P. leucopus* (7.75%), *Perognathus penicillatus* (7.51%), *D. ordii* (4.84%), and *P. eremicus* (2.39%) collectively represent 94.68% of the total rodent population on the playa. The remaining 5.32% is comprised of eight species: *Neotoma albigula*, *S. spilosoma*, *P. flavus*, *Onychomys torridus*, *Perognathus intermedius*, *M. musculus*, *N. micropus*, and *D. spectabilis*. These eight should be considered as being of marginal importance to the total playa rodent fauna during this year.

Three species have remained important to the total rodent density of the playa throughout the four years this study has been conducted and demonstrate only slight fluctuations of the total playa rodents. These include *D. merriami*, *P. penicillatus* and *D. ordii*, indicating that their importance to the total rodent population changed only in proportion to the total changes in rodent density on the playa each year. Two species, *N. albigula* and *O. torridus* have been marginal playa residents throughout the entire study period and appear unaffected by severe environmental changes.

The changing environmental factors have had effects on the other species. *Peromyscus maniculatus* has been an important resident of the playa every year except 1972, when the drought reduced its numbers to insignificant proportions. It has shown a strong return in 1973 to become the fourth most significant species numerically. *Sigmodon hispidus*, an insignificant member in 1970 and 1971 has been aided by the removal of cattle from the playa site in late 1972. With the increased biomass of grasses, particularly *Hilaria mutica* and *Panicum obtusum*, on the playa bottom, this species has been either the most or second-most important species on the playa during 1972 and 1973.

Reithrodontomys megalotis, *P. leucopus* and *P. eremicus* have become important species on the playa during favorable years of rain after having been of little importance the previous three years of the study. *D. spectabilis*, a significant member of the playa rodent population in 1970 and 1971, crashed in 1972 and has yet to recover from the

Table 43. Summary of monthly rodent data from the playa site

	Feb	Apr	May	Sep	Nov	Yearly Mean
Est Density (per ha)						
Fam Sciuridae	0.22	3.33	0	0	0	0.71
Fam Heteromyidae	18.27	15.71	29.48	29.09	12.29	20.96
Fam Cricetidae	13.20	10.48	33.37	73.94	27.25	31.64
Fam Muridae	0	0.22	0.22	0.44	0	0.17
TOTAL	31.69	29.74	63.07	103.47	39.54	53.48
Live Biomass (g/ha)						
Fam Sciuridae	20.24	357.27	0	0	0	75.50
Fam Heteromyidae	787.81	505.74	1084.99	1143.08	513.19	806.96
Fam Cricetidae	933.00	638.47	1284.35	2497.63	789.98	1228.68
Fam Muridae	0	0.88	2.86	3.96	0	7.70
TOTAL	1741.05	1502.36	2372.20	3644.67	1303.17	2118.84
Dry Biomass (g/ha)						
Fam Sciuridae	6.07	107.18	0	0	0	22.65
Fam Heteromyidae	236.34	151.72	325.49	342.92	153.95	242.08
Fam Cricetidae	279.90	191.54	385.30	749.28	236.99	368.60
Fam Muridae	0	0.26	0.85	1.18	0	0.46
TOTAL	522.31	450.70	711.64	1093.38	390.94	633.79

effects of the drought. *Perognathus flavus* status is not clearly understood at this time. It assumed a role of importance numerically in 1971 and 1972 but was of little significance in 1970 and 1973. More study on this species needs to be conducted in 1974 before any conclusions can be drawn. The favorable climatic changes have increased *P. intermedius* and *M. musculus* from non-existent in 1970 and 1971 to that of being present in 1972 and 1973, but neither forms an important segment of the playa rodents. Both *S. spilosoma* and *N. microps* have been favored by the wet years, but neither has achieved any importance to the total playa rodent population during 1973 after having been non-existent the previous years of the study.

All species, except *P. flavus*, increased their numbers in 1973 over that of 1972. *P. flavus* declined to one-half of its 1972 density and only one-sixth of its 1971 density. The total rodent population on the playa increased 3.1 times that of 1972, but achieved only 60% of the density on the bajada. However, the 1973 density of 53.48 animals/ha is nearly double the density of the previous high achieved in 1971.

Those rodents benefiting the most were members of the genera *Peromyscus* and *Reithrodontomys*. The latter increased 102 times that of 1972, *P. maniculatus* increased 58 times that of 1972 while *P. eremicus* and *P. leucopus* increased to the eighthand fifth most numerous residents on the playa after being virtually non-existent in previous years. Thus, it can be said that these species were greatly enhanced by increased rain, increased grass cover, non-flooding of the playa (possibly a significant population control mechanism), and total elimination of cattle during 1973. *Sigmodon hispidus* and *D. merriami* doubled their populations in 1973 to remain the two most important members of the playa rodents, both in numbers and in biomass. The former declined from 36.43% of the total playa rodents to 17.18% while the latter declined slightly from 33.14% to 25.67% of the total population. Together these two species represent from 43 to 70% of the total playa rodent population during periods of increased rain.

Table 44. Summary of small mammal trapping data from the bajada site, 1973 (weight in grams; biomass in g/ha)

Dipodomys merriami	Feb	Mar	May	Jun	Jul	Sep	Nov	Yearly (X̄* or Tot**)
# males captured	23	26	29	14	26	15	19	152**
% males captured	69.6	47.2	55.7	38.8	60.4	65.2	37.2	51.8
# females captured	10	29	23	22	17	8	32	141**
% females captured	30.4	52.8	44.3	61.2	39.6	34.8	62.8	48.2
# gravid females	0	14	12	8	1	0	0	--
% gravid females	0	48.3	52.1	36.4	5.8	0	0	--
# juveniles	0	3	2	8	9	0	2	--
% juveniles	0	5.5	3.8	22.2	20.9	0	3.9	--
Est density/ha	24.02	45.15	34.52	23.92	35.54	16.56	41.02	31.53*
Mean weight	45.42	42.87	42.60	40.47	40.11	43.13	40.64	42.17*
Tot Live Biomass	1090.98	1935.58	1470.55	986.04	1425.50	714.23	1667.05	1329.62*
Tot Dry Biomass	327.29	580.67	441.16	290.41	427.65	214.26	500.11	398.88*
Dipodomys ordii								
# males captured	0	0	0	1	4	0	0	5**
% males captured	0	0	0	50.0	66.7	0	0	38.5
# females captured	0	0	2	1	2	1	2	8**
% females captured	0	0	100.0	50.0	33.3	100.0	100.0	61.5
#gravid females	0	0	1	1	0	0	0	--
%gravid females	0	0	50.0	100.0	0	0	0	--
# juveniles	0	0	0	0	2	0	0	--
% juveniles	0	0	0	0	33.3	0	0	--
Est density/ha	0	0	1.18	1.18	5.32	0.59	1.18	1.35*
Mean weight	0	0	53.50	41.00	43.83	49.00	53.00	48.06*
Tot live biomass	0	0	63.16	48.38	233.17	28.91	62.54	64.88*
Tot dry biomass	0	0	18.93	14.51	69.95	8.67	18.76	19.46*

Table 44, continued

Neotoma albigula	Feb	Mar	May	Jun	Jul	Sep	Nov	Yearly (X̄*or Tot**)
# males captured	3	1	0	4	3	4	2	17**
% males captured	60.0	33.3	0	55.6	50.0	36.3	16.7	36.1
# females captured	2	2	1	5	3	7	10	30**
% females captured	40.0	66.7	100.0	44.4	50.0	63.7	83.3	63.9
# gravid females	0	0	0	0	0	0	0	--
% gravid females	0	0	0	0	0	0	0	--
# juveniles	0	0	0	6	0	1	0	--
% juveniles	0	0	0	66.7	0	9.0	0	--
Est density/ha	2.95	1.77	0.59	8.28	9.46	7.10	16.56	6.67*
Mean weight	165.40	156.00	186.00	124.66	140.14	152.00	155.11	154.18*
Tot live biomass	487.93	276.12	109.74	1032.18	1325.72	1079.20	2568.62	1028.38*
Tot dry biomass	146.37	82.83	32.92	309.65	397.71	323.76	770.58	308.51*

Neotoma micropus	Feb	Mar	May	Jun	Jul	Sep	Nov	Yearly
# males captured	0	0	0	0	0	1	0	1**
% males captured	0	0	0	0	0	50.0	0	50.0
# females captured	0	0	0	0	0	1	0	1**
% females captured	0	0	0	0	0	50.0	0	50.0
# gravid females	0	0	0	0	0	1	0	--
% gravid females	0	0	0	0	0	100.0	0	--
# juveniles	0	0	0	0	0	0	0	--
% juveniles	0	0	0	0	0	0	0	--
Est density	0	0	0	0	0	1.1	0	0.17*
Mean weight	0	0	0	0	0	160.50	0	160.50*
Total live biomass	0	0	0	0	0	189.39	0	27.06*
Total dry biomass	0	0	0	0	0	56.81	0	8.11*

Onychomys torridus	Feb	Mar	May	Jun	Jul	Sep	Nov	Yearly
# males captured	1	0	4	1	2	7	4	19**
% males captured	25.0	0	66.7	50.0	66.7	70.0	40.0	47.5
# females captured	3	5	2	1	1	3	6	21**
% females captured	75.0	100.0	33.3	50.0	33.3	30.0	60.0	52.5
# gravid females	1	2	1	0	0	0	0	--
% gravid females	33.3	40.0	50.0	0	0	0	0	--
# juveniles	0	2	1	1	2	0	0	--
% juveniles	0	40.0	16.7	50.0	50.0	0	0	--
Est density	1.77	3.55	4.73	1.18	3.55	7.10	6.65	4.07*
Mean weight	22.25	22.20	22.83	17.00	18.25	24.70	20.20	21.06*
Total live biomass	39.38	78.81	107.98	20.06	64.78	175.37	134.33	85.71*
Total dry biomass	11.81	23.64	32.39	6.01	19.43	52.61	40.29	25.71*

Perognathus intermedius	Feb	Mar	May	Jun	Jul	Sep	Nov	Yearly
# males captured	6	4	4	3	3	3	1	24**
% males captured	85.7	80.0	66.7	33.3	50.0	50.0	25.0	55.8
# females captured	1	1	2	6	3	3	3	19**
% females captured	14.3	20.0	33.3	66.7	50.0	50.0	75.0	44.2
#gravid females	0	0	0	3	0	0	0	--
%gravid females	0	0	0	50.0	0	0	0	--
# juveniles	0	0	0	0	1	0	0	--
% juveniles	0	0	0	0	16.7	0	0	--
Est density	4.14	2.95	4.43	9.46	3.55	3.69	3.55	4.53*
Mean weight	14.71	13.60	15.33	15.00	13.33	15.00	14.00	14.42*
Total live biomass	60.89	40.12	67.91	141.90	47.32	55.35	49.70	65.32*
Total dry biomass	18.26	12.03	20.37	42.57	14.19	16.60	14.91	19.59*

Table 44, continued

	Feb	Mar	May	Jun	Jul	Sep	Nov	Yearly
Peromyscus leucopus								
# males captured	0	0	4	1	2	2	0	9**
% males captured	0	0	66.7	50.0	50.0	33.3	0	45.0
# females captured	0	1	2	1	2	4	1	11**
% females captured	0	100.0	33.3	50.0	50.0	66.7	100.0	55.0
# gravid females	0	0	1	0	0	1	0	--
% gravid females	0	0	50.0	0	0	25.0	0	--
# juveniles	0	0	0	1	0	1	0	--
% juveniles	0	0	0	50.0	0	16.7	0	--
Est density	0	0.59	3.69	1.18	2.36	3.54	0.59	1.70*
Mean weight	0	23.00	23.33	19.50	21.50	19.16	20.00	21.08*
Total live biomass	0	13.57	86.08	23.01	50.74	67.82	11.80	35.83*
Total dry biomass	0	4.07	25.82	6.90	15.22	20.34	3.54	10.74*
Peromyscus maniculatus								
# males captured	1	4	13	9	9	14	10	60**
% males captured	50.0	66.7	50.0	45.0	69.2	60.8	50.0	54.5
# females captured	1	2	13	11	4	9	10	50**
% females captured	50.0	33.3	50.0	55.0	30.8	39.2	50.0	45.5
# gravid females	0	0	5	3	0	3	0	--
% gravid females	0	0	38.5	27.2	0	33.3	0	--
# juveniles	0	2	9	11	0	4	5	--
% juveniles	0	33.3	34.6	55.0	0	17.3	25.0	--
Est density	1.18	4.73	16.09	21.30	12.42	14.46	35.79	15.13*
Mean weight	27.50	21.67	18.19	19.25	17.61	19.91	20.15	20.61*
Total live biomass	32.45	102.49	292.67	410.02	218.71	287.89	721.16	311.82*
Total dry biomass	9.73	30.74	87.80	123.00	65.61	86.36	216.43	93.54*
Perognathus penicillatus								
# males captured	8	8	15	9	12	6	8	66**
% males captured	72.7	72.7	83.3	56.2	54.5	60.0	57.1	64.7
# females captured	3	3	3	7	10	4	5	36**
% females captured	27.3	27.3	16.7	43.8	45.5	40.0	42.9	35.3
# gravid females	1	1	2	0	3	0	0	--
% gravid females	33.3	33.3	66.7	0	30.0	0	0	--
# juveniles	0	0	0	0	5	0	0	--
% juveniles	0	0	0	0	22.7	0	0	--
Est density	12.42	20.71	15.38	12.78	19.23	5.91	11.39	13.97*
Mean weight	14.72	13.36	16.28	16.06	15.50	14.70	13.78	14.91*
Total live biomas	182.82	276.68	250.38	205.24	298.06	86.87	156.95	208.29*
Total dry biomass	54.84	83.00	75.11	61.57	89.41	26.06	47.08	62.48*
Peromyscus eremicus								
# males captured	2	4	5	1	1	1	7	21**
% males captured	100.0	66.7	55.6	25.0	50.0	33.3	43.7	50.0
# females captured	0	2	4	3	1	2	9	21**
% females captured	0	33.3	44.4	75.0	50.0	66.7	56.3	50.0
# gravid females	0	1	3	1	0	0	0	--
% gravid females	0	50.0	75.0	33.3	0	0	0	--
# juveniles	1	0	0	0	1	1	0	--
% juveniles	50.0	0	0	0	50.0	3313	0	--
Est density	1.18	3.94	6.31	2.36	1.18	1.77	21.30	5.43*
Mean weight	17.50	20.83	21.33	18.50	22.50	19.00	19.20	19.83*
Total live biomass	20.65	82.07	134.59	43.66	26.55	33.63	408.96	107.67*
Total dry biomass	6.19	24.62	40.37	13.09	7.96	10.08	122.65	32.30*

Table 44, continued

	Feb	Mar	May	Jun	Jul	Sep	Nov	Yearly
Reithrodontomys megalotis								
# males captured	0	0	5	0	0	2	2	9**
% males captured	0	0	50.0	0	0	66.7	66.7	56.2
# females captured	0	0	5	0	0	1	1	7**
% females captured	0	0	50.0	0	0	33.3	33.3	43.8
# gravid females	0	0	3	0	0	0	0	--
% gravid females	0	0	60.0	0	0	0	0	--
# juveniles	0	0	1	0	0	0	0	--
% juveniles	0	0	10.0	0	0	0	0	--
Est density	0	0	18.75	0	0	1.77	1.77	3.18*
Mean weight	0	0	11.90	0	0	11.00	9.00	10.63*
Tot live biomass	0	0	223.12	0	0	19.47	15.93	33.80*
Tot dry biomass	0	0	66.93	0	0	5.84	4.77	10.14*

I.D.5. Lagomorphs

A strip census flushing technique was used to estimate lagomorph densities. The observer walked around the perimeter of the validation site using the corner posts of the hectare plots to estimate flushing distance and to plot locations of rabbits on the data forms. Density (number per hectare) was computed by the equation $D = (N/2\bar{R}L)\cdot 10{,}000$; where N = number of flushes, R = mean flushing distance and L = length of line transversed (A3UWJ15).

Due to the movements and behavior of these animals, the reliability of density estimates based upon single sampling periods may be questioned. Single-sample estimates of *Sylvilagus* densities are particularly unreliable, since these lagomorphs appear to rely mainly on camouflage and usually flush only when approached to within 1 to 5 m. For two of the months in which density estimates are based on the average of two sample periods, the estimated *Sylvilagus* density was zero for one of the periods. An increase in the number of sampling periods per month appears necessary to obtain reliable lagomorph density estimates.

Taking into account the above conditions, the 1973 data (Table 45) indicate maximum lagomorph density on the playa during October and November, due to recruitment of young, with a winter decline beginning in December, probably mostly due to predation. The density appeared to reach a minimum in February. By May the lagomorph density had reached a level which is probably not significantly different from the October and November levels. The minimum densities in the winter appeared to be about one-third to one-half of the summer and autumn densities.

Table 45. Lagomorph densities estimated by flush transects on the playa. Asterisk indicates months in which density estimates are based on a single census. For all other months, densities are the mean of two census periods

Species	Jan*	Feb*	Mar*	Apr*	May	Jun*	Jul	Sep*	Oct	Nov	Dec
Lepus californicus	0.23	0.05	0.47	0.17	0.44	0.09	0.38	0.35	0.54	0.42	0.28
Sylvilagus auduboni	-0-	0.28	-0-	0.03	0.46	0.16	0.24	0.33	0.12	0.50	0.17

I.E. CHEMICAL ANALYSIS

Prosopis glandulosa (mesquite) from the playa were analyzed for 18 elements as shown in Table 46. Plant part categories assayed were leaves (general), leaves on new shoots, leaves on old shoots, new wood, rachis, flowers, litter of leaves, litter of stems, litter of rachis, litter of old wood, litter of bark, standing dead leaves, and standing dead stems.

Table 46. Chemical analysis of *Prosopis glandulosa* on the playa study site.

	leaves (gm)	leaves new shoots	leaves old shoots	new wood	rachis	flowers	litter leaves	litter stems	litter rachis	litter old wood	litter bark	standing leaves	standing dead stems
%													
Phosphorus	0.2030	0.1790	0.1913	0.1763	0.2140	0.2300	0.1857	0.1570	0.0360	0.0520	0.3310	0.4690	0.1600
Potassium	1.4460	0.8290	0.8513	0.7576	1.7830	2.3240	0.7187	0.4625	0.7253	0.4646	0.5386	1.4470	0.2070
Calcium	1.2750	2.9553	3.2065	1.6830	0.8830	1.0150	2.4523	2.3630	1.9273	1.2270	3.4073	1.9250	2.2950
Magnesium	0.2110	0.3396	0.3666	0.2433	0.1930	0.2070	0.2733	0.1325	0.2147	0.0750	0.1537	0.2360	0.0770
Silicon	0.0290	0.2000	0.1807	0.1100	0.0260	0.1070	0.4513	0.5280	0.2420	0.2820	0.8625	0.6870	0.3450
ppm													
Zinc	43.20	26.96	28.93	27.46	24.90	39.80	202.26	66.40	141.83	53.60	208.23	92.30	42.40
Copper	10.30	7.63	21.06	15.53	8.80	15.10	26.33	37.65	24.33	38.80	52.46	29.50	27.80
Iron	75.00	366.00	380.16	322.20	90.00	234.80	535.03	1229.60	616.80	820.80	1576.60	1390.20	781.00
Manganese	31.30	119.83	99.26	43.53	12.80	22.70	120.20	64.05	31.3	46.50	137.20	86.10	45.10
Boron	44.50	110.96	146.46	27.50	24.50	36.30	127.56	21.40	44.36	21.10	21.56	60.70	15.60
Aluminum	46.20	188.60	199.12	124.83	38.80	103.50	337.70	337.25	223.16	242.70	634.40	390.20	283.60
Titanium	10.50	39.63	46.56	24.20	6.10	24.40	80.46	127.90	56.03	70.70	237.93	181.40	69.20
Cobalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.35	0.00	0.00
Molybdenum	1.80	1.53	1.80	0.08	0.70	1.70	2.16	1.05	1.10	0.70	2.50	1.60	0.80
Strontium	111.80	277.40	223.10	262.93	140.10	115.80	202.76	353.25	307.76	285.90	342.40	101.70	191.40
Barium	5.80	20.76	25.30	15.06	5.50	7.60	32.50	35.90	29.10	22.30	41.03	14.40	11.90
Lead	5.00	10.83	11.66	19.06	3.80	3.40	13.16	30.00	11.60	18.40	37.96	21.50	25.50
Sodium	28.70	47.20	53.03	51.86	32.50	115.60	234.13	208.05	95.70	92.80	451.93	589.20	86.80

I.F. MICROBIOLOGICAL STUDIES

Due to drought conditions which set in during the summer, the playa did not flood in 1973. As a result, microbiological studies were necessarily limited to decomposition of litter and filter paper (A3UWJ30).

Microbiological decomposition studies were done at sites located near the center of the playa (P-3-3) and at the fringe (P-5-2). Decomposition substrates were enclosed in very fine nylon mesh in order to exclude termite foraging. Decomposition was determined by ashing as described in previous reports. *Panicum* decomposition was followed in the playa center since this grass is the dominant vegetation in this area. Mesquite and creosote leaves were used as substrates at the fringe site since large amounts of litter from these plants accumulate along the edge.

Filter paper decomposition results are shown in Figure 3. The initial decomposition rates were the same at both sites from March through June. However, from July on, the rate of decomposition at the playa fringe (P-5-2) was considerably higher than at the center (P-3-3). As indicated in Figure 3, total decomposition was more than twice as great at the fringe as compared to the center. The differences in rate and total decomposition are presumably a reflection of differences in soil types. The soil at the fringe is largely sand and is more permeable to moisture than soil in the playa center. Rainfall was sparse during the summer and the moisture rarely penetrated to the 10 cm depth where the substrates were buried. The similarity of the initial rates indicates, however, that with adequate moisture the decomposition rates at both playa sites would be the same.

Decomposition of litter at the playa sites is shown in Figure 4. The data show that decomposition of litter substrates is comparable at both sites. As was the case with decomposition on the bajada, litter decomposition was greater than filter paper in terms of weight loss. The additional nutrients in litter presumably can account for the different results obtained with different substrates. The evidence obtained indicates that natural litter is more rapidly decomposed than filter paper by microorganisms and strongly suggests that litter should be used to determine decomposition rates.

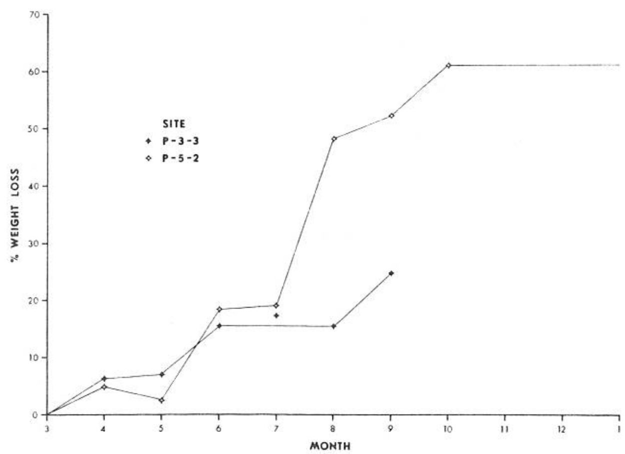


Figure 3. Decomposition of filter paper.

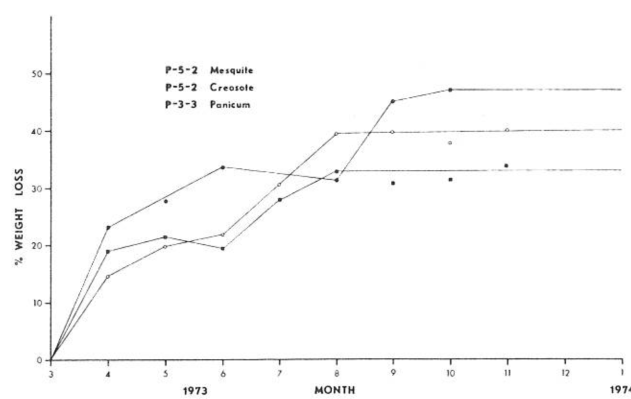


Figure 4. Decomposition of litter.

II. BAJADA

II.A. ABIOTIC

II.A.1. Air Temperature

Air temperature was monitored as described in Whitford et al., 1973 (A3UWJ64).

Monthly means and ranges of maximum and minimum air temperatures are given in Table 47. June and July were the warmest months with means of 82.8 and 82.2 F respectively. The coldest month was January with a mean of 42.6 F. In comparison to the playa, the bajada was generally warmer during 1973.

Weekly means and ranges of maximum and minimum air temperatures for 1971, 1972 and 1973 are given in Table 48.

II.A.2. Solar Radiation

Solar radiation has been monitored on the bajada study site since April, 1970. Monitoring techniques were those described in Whitford et al., 1973 (A3UWJ66).

Weekly solar radiation on the bajada was recorded for 1971, 1972 and 1973, and the mean, minimum and maximum values are given in Table 49.

II.A.3. Precipitation

The pattern of precipitation on the bajada was similar to that on the playa in 1973 with the kind of variations between the playa and bajada that appear each year (A3UWJ63). For example, in February, the bajada showed a higher precipitation than did the playa. The same pattern occurred in July when the bajada had more rainfall events than the playa. There were also rainfall events recorded in October that were not recorded on the playa. On most dates there was slightly more rainfall on the bajada than on the playa (Table 50).

II.A.4. Relative Humidity

Relative humidity was recorded as described in Whitford et al., 1973 (A3UWJ65).

Weekly means and ranges of maximum and minimum relative humidity for 1971, 1972 and 1973 are given in Table 51. Mean humidities gradually decreased after January, reaching the lowest values from February to June.

II.A.5. Wind

Wind data was monitored as described in Whitford et al., 1973 (A3UWJ62).

Total miles, mean per day and mean per hour were recorded each week for 1971, 1972 and 1973 and are shown in Table 52.

Table 47. Air temperatures (deg. F) for the bajada in 1973

Month	Min.	Max.	Hourly Mean	Range of Daily Minima	Range of Daily Maxima	Range of Daily Means
January	23	66	42.6	23-44	34-66	31-55
February	27	71	46.4	27-54	38-71	32-62
March	32	74	52.6	32-50	50-74	43-61
April	32	84	60.8	32-67	56-84	45-73
May	49	97	73.0	49-70	60-97	57-83
June	55	109	82.8	55-86	84-109	71-97
July	66	106	82.2	66-80	73-106	69-93
August	65	101	82.4	65-82	85-101	76-89
September	52	99	78.7	52-75	78-99	65-83
October	39	94	68.5	39-66	64-94	54-80
November	32	85	48.5	20-50	41-73	33-61
December	20	73	48.5	20-50	41-73	33-61

Table 48. Weekly air temperature data (deg. C) acquired at the Jornada bajada site during 1971, 1972 and 1973

Week	Time Intervals	1971			1972			1973		
		Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.
1	Jan 01-Jan 07				38.0	49.3	28.7	36.3	45.0	29.6
2	Jan 08-Jan 14				49.9	62.4	38.1	41.3	49.3	34.9
3	Jan 15-Jan 21				47.3	63.3	47.3	50.3	63.9	38.9
4	Jan 22-Jan 28				54.1	67.4	40.3	41.9	52.1	31.4
5	Jan 29-Feb 04				39.4	49.3	28.9	41.1	53.1	32.0
6	Feb 05-Feb 11				48.3	60.6	36.7	47.6	58.7	38.3
7	Feb 12-Feb 18				51.6	65.9	37.1	44.1	52.6	36.1
8	Feb 19-Feb 25				62.6	76.4	47.3	43.3	51.0	37.1
9	Feb 26-Mar 04				60.1	75.4	44.7	55.0	68.1	43.0
10	Mar 05-Mar 11				66.1	81.9	49.9	52.0	63.0	41.3
11	Mar 12-Mar 18				66.7	82.1	51.1	49.6	60.0	39.1
12	Mar 19-Mar 25				65.7	79.0	50.3	56.1	67.9	43.3
13	Mar 26-Apr 01				58.0	69.9	46.0	51.0	61.4	39.9
14	Apr 02-Apr 08				67.9	81.6	50.6	51.1	63.0	38.4
15	Apr 09-Apr 15				70.3	83.1	55.6	59.1	73.0	42.1
16	Apr 16-Apr 22				63.9	76.7	47.3	62.1	73.1	49.4
17	Apr 23-Apr 29				68.7	83.0	52.7	65.7	79.6	50.0
18	Apr 30-May 06				72.1	85.3	56.3	69.1	81.7	56.7
19	May 07-May 13				71.0	84.0	55.7	71.6	85.6	55.3
20	May 14-May 20	70.6	81.6	57.4	73.1	84.9	60.6	68.1	80.4	57.0
21	May 21-May 27	73.1	84.4	60.4	75.6	87.6	61.6	78.4	90.4	63.1
22	May 28-Jun 03	76.0	88.1	62.3	73.9	86.1	59.7	76.9	89.7	63.4
23	Jun 04-Jun 10	80.6	92.4	64.0	72.7	83.4	64.6	79.3	92.7	62.9
24	Jun 11-Jun 17	82.9	95.7	69.4	77.4	89.9	66.0	80.7	94.1	68.0
25	Jun 18-Jun 24	84.9	98.9	70.3	83.9	97.6	70.0	80.6	93.3	67.4
26	Jun 25-Jul 01	84.4	96.3	72.6	86.1	99.9	69.1	90.1	102.9	75.1
27	Jul 02-Jul 08	86.0	99.7	73.7	75.6	98.1	73.3	91.7	105.1	78.9
28	Jul 09-Jul 15	89.0	100.9	77.4	81.1	95.0	69.4	84.7	96.6	73.6
29	Jul 16-Jul 22	84.7	97.9	72.4	80.4	92.1	70.6	75.9	85.3	69.1
30	Jul 23-Jul 29	80.7	94.1	69.6	84.4	97.1	73.0	82.1	95.3	70.3
31	Jul 30-Aug 05	77.9	89.9	66.1	85.1	98.6	73.7	77.3	88.6	68.7
32	Aug 06-Aug 12	77.1	90.4	65.4	77.4	88.9	65.9	83.4	96.1	70.9
33	Aug 13-Aug 19	78.1	89.7	67.3	76.1	89.1	66.1	83.0	96.1	69.9
34	Aug 20-Aug 26	80.0	91.7	69.4	80.4	92.4	70.1	84.1	96.9	73.1
35	Aug 27-Sep 02	82.3	94.9	71.6	73.9	85.1	65.3	80.6	92.0	68.4
36	Sep 03-Sep 09	82.9	96.3	71.0	75.3	86.3	66.6	80.1	94.3	67.4
37	Sep 10-Sep 16	80.9	94.6	66.4	73.6	82.9	66.4	80.7	93.0	68.3
38	Sep 17-Sep 23	62.6	72.0	53.4	72.9	86.4	59.0	80.0	93.4	64.6
39	Sep 24-Sep 30	73.1	85.0	62.7	73.3	86.3	58.4	75.0	86.9	65.0
40	Oct 01-Oct 07	65.3	76.0	56.0	74.3	88.0	61.6	73.9	87.9	60.0
41	Oct 08-Oct 14	67.6	79.6	56.3	72.7	85.7	60.4	67.7	80.1	54.1
42	Oct 15-Oct 21	58.7	69.9	48.6	67.6	77.3	59.3	68.6	83.9	53.9
43	Oct 22-Oct 28	59.1	69.1	48.1	56.6	66.0	47.4	69.9	85.7	53.6
44	Oct 29-Nov 04	56.0	69.1	43.7	52.6	65.3	41.6	64.0	76.6	50.1
45	Nov 05-Nov 11	56.4	71.0	44.7	53.6	67.9	39.9	66.0	80.9	50.9
46	Nov 12-Nov 18	52.3	61.1	43.9	49.7	61.1	39.9	63.1	77.9	48.3
47	Nov 19-Nov 25	50.3	63.3	38.7	42.7	52.9	33.9	54.9	65.1	45.0
48	Nov 26-Dec 02	48.4	55.9	41.7	45.9	60.4	35.0	47.1	60.3	36.3
49	Dec 03-Dec 09	43.3	52.9	35.1	52.4	64.1	42.0	49.6	63.7	38.9
50	Dec 10-Dec 16	42.7	52.9	34.3	42.7	51.7	35.4	54.1	69.6	39.7
51	Dec 17-Dec 23	45.0	57.3	35.4	44.0	56.7	32.9	46.3	60.3	34.1
52	Dec 24-Dec 31	49.7	60.0	41.1	46.7	58.4	36.9	43.9	56.1	30.7

II.A.6. Soil Temperature

Weekly soil temperatures were monitored for 1971, 1972 and 1973 on the bajada as described in Whitford et al., 1973 (A3UWJ61 and 67).

Mean temperatures and the minimum and maximum temperatures were recorded at depths of 10 cm (Table 53) and 50 cm (Table 54).

II.A.7. Soil Moisture

Soil moisture has been monitored on the bajada site since July of 1971. Moisture has been estimated as soil water potential as reported in Whitford et al., 1973 (A3UWJ61).

Soil water potentials for the bajada uplands, minor arroyos and major arroyos for 1971, 1972 and 1973 are shown in Table 55. Generally, the major arroyos had the least moisture and the bajada uplands the most during this three-year period.

Table 50. Bajada precipitation in 1973 in inches and in mm by month

Month	Inches	Millimeters
January	0.95	23.8
February	1.43	35.8
March	0.61	15.3
April	-0-	-0-
May	0.61	15.3
June	0.92	23.0
July	3.76	94.0
August	1.07	26.8
September	0.03	0.8
October	0.02	0.5
November	0.15	3.8
December	-0-	-0-

Table 49. Solar radiation on the bajada site

Week	Time Interval	1971 Mean	1971 Max.	1971 Min.	1972 Mean	1972 Max.	1972 Min.	1973 Mean	1973 Max.	1973 Min.
1	Jan 01-Jan 07				290	360	258	320	360	96
2	Jan 08-Jan 14				333	360	282	264	390	204
3	Jan 15-Jan 21				345	372	306	360	444	180
4	Jan 22-Jan 28				354	420	192	329	426	216
5	Jan 29-Feb 04				330	420	132	351	444	114
6	Feb 05-Feb 11				355	420	252	322	444	96
7	Feb 12-Feb 18				429	480	300	336	534	228
8	Feb 19-Feb 25				421	522	318	289	534	124
9	Feb 26-Mar 04				483	558	396	502	588	468
10	Mar 05-Mar 11				515	564	462	539	612	246
11	Mar 12-Mar 18				528	600	498	508	618	492
12	Mar 19-Mar 25				525	594	402	597	660	540
13	Mar 26-Apr 01				609	648	606	584	684	456
14	Apr 02-Apr 08				617	660	576	626	714	504
15	Apr 09-Apr 15				602	672	510	610	816	600
16	Apr 16-Apr 22				647	702	588	661	846	486
17	Apr 23-Apr 29				687	738	618	716	762	618
18	Apr 30-May 06				644	744	444	716	816	564
19	May 07-May 13				707	762	648	731	756	624
20	May 14-May 20				660	726	504	612	774	300
21	May 21-May 27	645	762	192	678	744	504	690	774	588
22	May 28-Jun 03	704	780	642	649	780	462	714	816	576
23	Jun 04-Jun 10	685	762	342	562	744	300	763	834	696
24	Jun 11-Jun 17	712	762	648	667	720	510	711	816	414
25	Jun 18-Jun 24	686	720	588	694	738	634	793	822	756
26	Jun 25-Jul 01	676	708	96	734	783	702	743	816	642
27	Jul 02-Jul 08	723	792	577	680	738	564	670	756	642
28	Jul 09-Jul 15	717	744	696	646	702	588	495	786	240
29	Jul 16-Jul 22	630	732	564	670	780	498	687	816	372
30	Jul 23-Jul 29	543*	708	486	706	756	530	592	762	354
31	Jul 30-Aug 05	621	690	474	579	714	402	648	750	493
32	Aug 06-Aug 12	651	744	588	622	694	492	668	732	594
33	Aug 13-Aug 19	612	696	504	569	672	351	652	720	588
34	Aug 20-Aug 26	597	684	468	595	660	318	623	696	528
35	Aug 27-Sep 02	566	618	492	415	535	275	651	768	450
36	Sep 03-Sep 09	585	624	456	520	636	360	567	678	414
37	Sep 10-Sep 16	547	588	540	447	582	330	572	618	498
38	Sep 17-Sep 23	440	612	168	533	594	522	581	618	516
39	Sep 24-Sep 30	522	594	336	543	606	378	591	624	558
40	Oct 01-Oct 07	481	624	336	492	546	360	536	576	444
41	Oct 08-Oct 14	419	504	240	484	540	336	495	576	420
42	Oct 15-Oct 21	447	510	282	395	510	150	491	504	456
43	Oct 22-Oct 28	403	480	264	365	492	174	474	516	438
44	Oct 29-Nov 04	397	444	193	416	511	360	442	522	360
45	Nov 05-Nov 11	371	522	120	424	457	372	412	480	390
46	Nov 12-Nov 18	342	426	114	386	432	258	415	432	396
47	Nov 19-Nov 25	350	366	348	323	414	72	363	426	288
48	Nov 26-Dec 02	218	264	156	357	384	336	365	396	312
49	Dec 03-Dec 09	259	337	95	359	402	330	343	372	330
50	Dec 10-Dec 16	316	330	276	297	348	102	318	348	246
51	Dec 17-Dec 23	247	342	84	327	366	306	309	360	288
52	Dec 24-Dec 31	254	342	102	291	342	168	240	378	240

* based on missing data

Table 51. Relative humidity on the bajada site

Week	Time Interval	1971 Mean	1971 Max.	1971 Min.	1972 Mean	1972 Max.	1972 Min.	1973 Mean	1973 Max.	1973 Min.
1	Jan 01-Jan 07				78.1	99.9	49.0	79.6	96.4	62.1
2	Jan 08-Jan 14				62.7	89.9	40.9	81.4	98.1	62.3
3	Jan 15-Jan 21				56.4	80.4	37.0	70.6	92.6	41.4
4	Jan 22-Jan 28				50.5	76.8	30.0	58.6	84.1	36.1
5	Jan 29-Feb 04				50.7	68.4	35.4	53.3	77.1	33.9
6	Feb 05-Feb 11				45.6	68.4	28.4	53.7	78.1	34.0
7	Feb 12-Feb 18				44.0	68.0	27.4	78.0	97.0	57.6
8	Feb 19-Feb 25				41.4	60.9	27.1	75.1	97.7	46.9
9	Feb 26-Mar 04				37.6	50.1	27.9	69.9	90.9	49.3
10	Mar 05-Mar 11				34.6	45.1	24.7	48.3	66.3	32.6
11	Mar 12-Mar 18				36.4	47.9	26.4	59.0	87.1	35.1
12	Mar 19-Mar 25				36.9	48.9	28.1	54.4	78.9	33.4
13	Mar 26-Apr 01				47.3	69.4	33.9	52.1	80.4	31.1
14	Apr 02-Apr 08				34.0	43.4	27.4	54.4	86.1	32.4
15	Apr 09-Apr 15				32.3	42.9	24.9	42.9	64.1	27.7
16	Apr 16-Apr 22				39.3	53.4	30.4	41.4	61.7	28.6
17	Apr 23-Apr 29				34.7	45.0	27.4	47.9	65.0	35.1
18	Apr 30-May 04				30.1	39.9	23.7	46.9	66.4	33.6
19	May 05-May 11	32.6	39.9	25.3	43.4	67.6	28.0	45.4	67.4	29.6
20	May 12-May 18	13.3	19.3	8.0	39.6	53.1	28.4	54.0	71.7	38.0
21	May 19-May 25	15.3	21.7	9.9	31.6	42.0	23.9	41.3	63.9	27.1
22	May 26-Jun 01	9.4	13.1	6.3	31.6	48.4	22.0	35.3	46.3	28.9
23	Jun 02-Jun 08	10.3	15.0	7.0	55.3	76.9	36.6	44.4	67.6	31.1
24	Jun 09-Jun 15	30.4	51.4	17.4	76.1	100.0	51.7	40.6	56.0	29.3
25	Jun 16-Jun 22	32.4	53.7	19.0	57.7	92.3	34.1	40.6	57.6	26.1
26	Jun 23-Jun 29	40.0	64.9	23.0	47.0	71.7	30.1	36.3	51.3	25.9
27	Jun 30-Jul 06	37.0	58.0	23.9	35.4	52.3	25.3	38.0	53.6	28.1
28	Jul 07-Jul 13	34.4	51.7	23.4	67.0	96.7	42.4	48.9	68.7	37.3
29	Jul 14-Jul 20	58.6	90.0	31.7	66.3	96.1	42.4	77.6	95.1	55.7
30	Jul 21-Jul 27	54.0	83.4	28.6	72.9	97.6	49.3	58.3	88.9	36.4
31	Jul 28-Aug 03	52.7	87.4	30.3	54.7	81.4	34.7	73.7	95.0	47.9
32	Aug 04-Aug 10	61.7	92.6	35.0	67.1	86.0	47.6	59.6	90.0	39.7
33	Aug 11-Aug 17	58.0	82.1	37.1	73.2	97.9	47.4	54.3	77.9	36.1
34	Aug 18-Aug 24	60.1	90.4	35.1	75.1	99.0	50.7	57.7	85.3	36.1
35	Aug 25-Aug 31	44.0	63.6	30.3	74.7	93.1	53.4	42.1	55.9	31.6
36	Sep 01-Sep 07	47.3	71.4	29.6	79.3	99.1	52.7	54.3	79.9	33.6
37	Sep 08-Sep 14	55.9	78.0	35.6	78.3	99.3	52.9	58.4	82.1	38.0
38	Sep 15-Sep 21	58.6	80.3	39.4	75.3	97.7	49.9	51.3	77.4	32.9
39	Sep 22-Sep 28	62.3	84.0	43.3	59.0	79.7	42.4	51.9	75.9	35.3
40	Sep 29-Oct 05	73.7	99.4	46.9	53.7	76.3	37.3	46.9	70.9	29.9
41	Oct 06-Oct 12	66.7	90.3	44.7	69.9	96.4	44.0	39.7	59.4	25.6
42	Oct 13-Oct 19	71.6	97.4	44.0	69.1	96.9	45.6	37.4	54.6	23.6
43	Oct 20-Oct 26	58.7	83.4	39.1	86.7	99.0	63.6	32.4	47.9	20.7
44	Oct 27-Nov 02	60.6	75.9	45.7	78.6	99.0	52.9	32.3	45.6	21.7
45	Nov 03-Nov 09	55.6	73.3	35.7	71.6	99.0	38.6	30.6	40.1	23.6
46	Nov 10-Nov 16	70.6	95.4	45.1	69.3	93.7	43.7	38.0	55.0	25.0
47	Nov 17-Nov 23	56.9	84.3	37.4	75.0	94.3	48.6	35.9	51.3	24.6
48	Nov 24-Nov 30	83.6	99.1	61.7	82.4	99.0	55.7	47.4	70.1	32.9
49	Dec 01-Dec 07	63.4	84.1	42.1	60.7	84.7	37.4	36.4	50.4	24.0
50	Dec 08-Dec 14	71.9	96.0	47.3	77.6	97.7	53.3	39.9	56.1	25.7
51	Dec 15-Dec 23	71.3	97.6	43.0	71.9	95.6	45.9	36.0	51.1	25.9
52	Dec 24-Dec 31	72.6	94.8	47.9	67.6	90.7	46.6	44.3	59.3	31.4

Table 52. Bajada wind data

Year	Month	Days	Total Miles	Mean Per Day	Mean Per Hour
1971	May	15-22	1071.4	154.5	6.44
	May	23-29	1060.1	151.1	6.30
	May	30-Jun 5	1410.1	199.5	8.31
	Jun	6-12	1100.1	159.1	6.63
	Jun	13-19	1021.4	145.9	6.08
	Jun	20-26	890.8	129.2	5.38
	Jun	27-Jul 3	1129.1	160.3	6.68
	Jul	4-10	1033.5	147.6	6.15
	Jul	11-17	872.0	125.3	5.22
	Jul	18-31	1975.9	141.0	5.88
	Aug	1-6	734.4	121.6	5.07
	Aug	7-13	805.3	114.8	4.78
	Aug	14-20	930.3	132.6	5.53
	Aug	21-27	950.6	135.8	5.66
	Aug	28-Sep 3	864.5	122.0	5.09
	Sep	4-10	948.3	136.1	5.67
	Sep	11-17	901.3	128.9	5.37
	Sep	18-24	1049.4	149.5	6.23
	Sep	25-Oct 1	991.4	142.1	5.92
	Oct	2-8	1035.4	147.5	6.15
	Oct	9-15	802.3	114.8	4.78
	Oct	16-22	1020.5	144.9	6.04
	Oct	23-29	1236.9	177.6	7.40
	Oct	30-Nov 5	1054.9	150.2	6.26
	Nov	6-12	761.4	109.1	4.55
	Nov	13-19	971.2	138.0	5.75
	Nov	20-26	996.0	142.6	5.94
	Nov	27-Dec 3	904.6	129.8	5.41
	Dec	4-10	1189.7	169.2	7.05
	Dec	11-17	1517.1	218.6	9.11
	Dec	18-24	899.7	128.2	5.34
	Dec	25-30	811.8	132.9	5.54
1972	Dec	31-Jan 5	1096.6	187.8	7.62
	Jan	6-12	1008.0	142.8	5.95
	Jan	13-20	962.0	121.2	5.05
	Jan	21-27	1051.1	149.3	6.22
	Jan	28-Feb 4	1315.6	164.6	6.86
	Feb	5-10	802.6	132.5	5.52
	Feb	11-17	1126.8	158.9	6.62
	Feb	18-24	908.2	130.6	5.44
	Feb	25-Mar 2	1150.3	164.9	6.87
	Mar	3-9	915.6	131.3	5.47
	Mar	10-16	951.8	135.8	5.66
	Mar	17-23	981.4	138.7	5.78
	Mar	24-30	1448.6	204.5	8.52
	Mar	31-Apr 6	1012.7	145.2	6.05
	Apr	7-13	1153.2	165.6	6.90
	Apr	14-20	1314.5	190.8	7.95
	Apr	21-27	1208.8	173.0	7.21
	Apr	28-May 4	1095.1	156.7	6.53
	May	5-11	1116.3	159.4	6.64
	May	12-18	1164.4	166.8	6.95
	May	19-25	1283.0	184.3	7.68
	May	26-31	977.1	166.3	6.93
	Jun	1-7	1007.4	143.3	5.97
	Jun	8-14	853.4	119.3	4.97
	Jun	15-21	1044.8	148.6	6.19
	Jun	22-28	1134.6	164.4	6.85
	Jun	29-Jul 5	1138.6	161.8	6.74
	Jul	6-13	1129.7	135.8	5.66
	Jul	14-19	877.0	147.8	6.16
	Jul	20-26	951.4	141.6	5.90
	Jul	27-Aug 2	897.4	128.2	5.34
	Aug	3-9	937.3	132.5	5.52
	Aug	10-16	941.4	133.9	5.58
	Aug	17-23	936.6	129.8	5.41
	Aug	24-30	899.6	128.2	5.34
	Aug	31-Sep 6	844.2	121.4	5.06
	Sep	7-12	671.8	115.2	4.80
	Sep	13-19	733.5	104.6	4.36
	Sep	20-26	1031.4	145.2	6.05
	Sep	27-Oct 3	721.3	104.9	4.37
	Oct	4-10	766.6	108.0	4.50
	Oct	11-17	791.2	114.5	4.77
	Oct	18-24	755.9	108.0	4.50
	Oct	25-31	978.9	139.4	5.81
	Nov	1-7	931.9	132.2	5.51
	Nov	8-14	989.3	138.7	5.78
	Nov	15-21	838.6	121.2	5.05
	Nov	22-28	761.1	107.8	4.49
	Nov	29-Dec 5	1018.3	146.9	6.12
	Dec	6-12	2065.2	296.4	12.35
	Dec	13-19	853.0	121.4	5.06
	Dec	20-26	1228.1	173.3	7.22
1973	Dec	27-Jan 2	1263.8	179.0	7.46
	Jan	3-9	820.6	119.0	4.96
	Jan	10-16	1100.7	158.2	6.59
	Jan	17-23	1111.7	159.2	6.63
	Jan	24-30	870.6	125.1	5.21
	Jan	31-Feb 6	949.0	135.8	5.66
	Feb	7-13	849.4	121.7	5.07
	Feb	14-20	761.1	107.9	4.49
	Feb	21-27	486.1	69.5	2.90
	Feb	28-Mar 6			
	Mar	7-13	817.5	117.4	4.89
	Mar	14-20	835.8	120.0	5.00
	Mar	21-27	444.7	63.9	2.66
	Mar	28-Apr 3	1369.6	196.6	8.19
1973	Apr	4-10	1032.4	145.3	6.05
	Apr	11-17	1046.4	150.4	6.27
	Apr	18-24	1377.0	195.9	8.16
	Apr	25-May 1	1225.0	177.8	7.41
	May	2-8	1326.9	189.7	7.90
	May	9-15	993.3	139.7	5.80
	May	16-22	847.8	123.8	5.16
	May	23-29	1247.5	176.6	7.36
	May	30-Jun 5	1168.7	167.4	6.97
	Jun	6-12	904.8	129.3	5.39
	Jun	13-19	1032.0	149.6	6.23
	Jun	20-26	1069.7	151.2	6.30
	Jun	27-Jul 3	1005.0	144.2	6.01
	Jul	4-10	939.3	134.4	5.60
	Jul	11-17	666.2	94.4	3.93
	Jul	18-24	862.0	121.4	5.06
	Jul	25-31	831.1	118.9	4.95
	Aug	1-7	713.6	103.5	4.31
	Aug	8-14	829.2	118.3	4.93
	Aug	15-21	821.4	116.5	4.85
	Aug	22-28	991.2	143.0	5.96
	Aug	29-Sep 4	862.6	119.3	4.97
	Sep	5-11	1013.4	150.0	6.25
	Sep	12-18	920.2	132.2	5.51
	Sep	19-25	1156.7	162.6	6.77
	Sep	26-Oct 2	986.2	141.6	5.89
	Oct	3-9	914.0	131.3	5.47
	Oct	10-16	849.3	122.4	5.10
	Oct	17-23	534.8	76.7	3.20
	Oct	24-29	848.6	120.5	5.02
	Oct	30-Nov 6	1056.1	151.0	6.29
	Nov	7-13	671.1	95.7	3.98
	Nov	14-20	1248.0	177.5	7.40
	Nov	21-27	1135.1	163.1	6.79
	Nov	28-Dec 4	1050.0	147.9	6.16
	Dec	5-11	830.5	119.2	4.97
	Dec	12-17	921.0	131.3	5.47
	Dec	18-24	964.1	136.6	5.69
	Dec	25-31	1160.5	163.9	6.83

Table 53. Weekly soil temperature data (deg. C) at a depth of 10 cm acquired at the bajada site during 1971, 1972 and 1973

		1971			1972			1973		
Week	Time Intervals	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.
1	Jan 01-Jan 07				4.7	7.4	2.1	-0.7	1.0	-1.6
2	Jan 08-Jan 14				0.9	3.3	-1.0	2.1	5.3	0.0
3	Jan 15-Jan 21				4.0	7.9	1.1	5.3	8.3	2.3
4	Jan 22-Jan 28				5.7	9.3	1.9	2.4	5.6	-0.4
5	Jan 29-Feb 04				7.0	10.1	4.0	2.6	6.4	-0.1
6	Feb 05-Feb 11				2.3	5.1	-0.4	5.7	8.7	3.0
7	Feb 12-Feb 18				5.9	10.0	2.9	4.7	7.4	2.1
8	Feb 19-Feb 25				8.3	12.9	4.7	4.3	7.6	1.6
9	Feb 26-Mar 04				13.1	17,0	9.6	9.9	14.9	5.7
10	Mar 05-Mar 11				13.7	18.3	9.4	9.7	13.6	6.0
11	Mar 12-Mar 18				18.0	23.0	13.6	8.4	13.1	4.3
12	Mar 19-Mar 25				18.6	23.0	14.7	12.3	16.6	8.4
13	Mar 26-Apr 01				19.4	24.0	15.1	10.7	15.1	6.9
14	Apr 02-Apr 08				16.3	21.0	12.3	11.7	17.1	7.1
15	Apr 09-Apr 15				21.0	26.4	16.0	16.0	21.4	10.9
16	Apr 16-Apr 22				21.6	26.6	16.7	17.0	21.9	13.0
17	Apr 23-Apr 29				20.4	25.7	15.4	21.0	26.7	15.7
18	Apr 30-May 06				23.0	29.0	17.7	22.0	26.4	17.6
19	May 07-May 13				24.3	29.7	19.4	23.9	29.7	18.1
20	May 14-May 20				25.0	30.4	19.9	23.4	29.9	17.6
21	May 21-May 27				25.0	32.0	18.6	28.1	33.9	22.3
22	May 28-Jun 03	34.7	37.9	21.0	26.9	33.6	20.6	28.6	34.4	23.3
23	Jun 04-Jun 10	24.7	32.7	19.0	27.1	33.4	22.9	31.0	37.7	25.0
24	Jun 11-Jun 17	29.6	35.1	24.1	25.7	32.0	20.3	30.0	37.0	23.7
25	Jun 18-Jun 24	31.1	37.6	22.0	27.0	29.9	24.5	31.9	39.1	25.1
26	Jun 25-Jul 01	34.1	41.3	28.3	32.6	40.0	25.9	36.3	42.7	30.4
27	Jul 02-Jul 08	33.6	39.9	27.7	34.3	41.1	27.9	36.6	43.6	30.6
28	Jul 09-Jul 15	35.6	42.3	29.6	33.9	40.3	28.0	33.3	39.7	27.6
29	Jul 16-Jul 22	36.9	43,6	30.9	30.6	38.0	24.4	26.6	31.4	22.6
30	Jul 23-Jul 29	34.3	45.1	25.0	31.9	37.4	26.6	30.4	36.6	25.9
31	Jul 30-Aug 05	32.1	40.1	25.7	33.9	40.0	28.4	29.1	35.4	23.7
32	Aug 06-Aug 12	30.6	37.4	25.0	33.3	38.6	28.6	32.7	39.6	26.9
33	Aug 13-Aug 19	29.1	37.3	20.0	30.9	37.6	25.2	32.6	39.6	26.4
34	Aug 20-Aug 26	29.9	36.0	23.4	29.9	35.7	24.1	33.0	39.3	28.0
35	Aug 27-Sep 02	29.7	34.9	25.1	30.3	36.6	25.1	29.1	35.7	23.7
36	Sep 03-Sep 09	30.9	37.4	25.7	25.7	31.1	21.3	28.6	34.9	23.9
37	Sep 10-Sep 16	31.3	37.1	26.4	27.6	32.7	23.0	26.4	31.3	21.9
38	Sep 17-Sep 23	26.3	31.7	21.7	27.3	32.6	23/1	29.0	33.9	24.1
39	Sep 24-Sep 30	19.7	25.7	14.3	26.4	32.1	21.7	25.0	30.4	20.9
40	Oct 01-Oct 07	22.6	26.0	20.1	24.6	29.7	20.1	24.4	29.7	20.3
41	Oct 08-Oct 14	20.0	25.3	15.9	24.7	29.9	19.4	21.1	25.9	16.4
42	Oct 15-Oct 21	20.3	24.4	16.6	24.7	30.3	17.0	21.4	25.9	16.4
43	Oct 22-Oct 28	15.1	20.9	10.1	20.0	23.6	9.9	21.3	32.1	15.9
44	Oct 29-Nov 04	12.3	16.7	8.1	13.4	17.7	7.1	17.3	21.3	13.7
45	Nov 05-Nov 11	12.6	17.3	8.7	11.4	16.4	7.1	16.7	21.6	12.6
46	Nov 12-Nov 18	12.6	17.4	8.6	12.3	16.7	8.3	15.3	19.1	11.3
47	Nov 19-Nov 25	7.7	11.6	4.3	8.7	12.3	5.4	9.4	12.9	5.7
48	Nov 26-Dec 02	8.1	12.9	3.4	4.0	6.7	1.9	7.0	11.4	3.3
49	Dec 03-Dec 09	4.7	7.4	3.0	4.7	8.7	1.9	5.6	9.9	2.4
50	Dec 10-Dec 16	2.7	6.1	-0.1	7.6	11.0	4.4	8.0	12.0	4.4
51	Dec 17-Dec 23	1.0	3.9	-0.9	2.9	6.0	0.9	4.0	7.9	0.6
52	Dec 24-Dec 31	4.9	9.3	1.6	3.9	7.3	1.0	4.3	7.9	0.9

Table 54. Weekly soil temperature data (deg C) of 50 cm acquired at the bajada site during 1971, 1972 and 1973

Week	Time Intervals	1971 Mean	1971 Max.	1971 Min.	1972 Mean	1972 Max.	1972 Min.	1973 Mean	1973 Max.	1973 Min.
1	Jan 01-Jan 07				6.7	6.7	6.4	5.0	5.7	4.6
2	Jan 08-Jan 14				5.0	5.6	4.7	3.7	4.4	3.6
3	Jan 15-Jan 21				6.7	7.3	6.0	5.4	6.0	4.9
4	Jan 22-Jan 28				7.9	8.4	7.1	5.4	5.7	4.9
5	Jan 29-Feb 04				7.3	7.6	6.9	4.9	5.3	4.3
6	Feb 05-Feb 11				7.7	6.7	5.4	6.4	7.3	5.9
7	Feb 12-Feb 18				10.4	8.3	7.4	5.7	6.3	5.4
8	Feb 19-Feb 25				13.0	11.0	9.6	6.1	6.7	5.9
9	Feb 26-Mar 04				14.7	13.6	12.3	7.4	7.7	6.7
10	Mar 05-Mar 11				17.0	15.3	13.9	10.3	10.9	10.0
11	Mar 12-Mar 18				17.9	17.6	16.6	10.0	10.3	9.7
12	Mar 19-Mar 25				18.7	18.1	17.0	11.0	11.6	10.7
13	Mar 26-Apr 01				17.4	19.0	18.0	12.1	12.4	11.9
14	Apr 02-Apr 08				20.1	18.0	16.7	11.6	12.1	11.1
15	Apr 09-Apr 15				20.6	21.0	19.4	13.4	15.0	12.6
16	Apr 16-Apr 22				20.4	21.1	19.9	14.1	14.7	13.7
17	Apr 23-Apr 29				22.3	21.0	19.9	15.0	15.4	14.4
18	Apr 30-May 06				23.2	22.6	21.4	20.3	20.9	19.7
19	May 07-May 13				23.3	23.7	22.3	21.0	21.7	20.4
20	May 14-May 20				23.9	24.7	23.0	21.7	22.3	21.0
21	May 21-May 27				25.0	25.7	24.7	22.6	22.7	21.6
22	May 28-Jun 03	20.4	23.7	14.9	25.6	26.0	24.9	23.3	23.4	22.6
23	Jun 04-Jun 10	26.0	26.4	21.7	26.0	26.6	25.4	26.9	27.3	26.3
24	Jun 11-Jun 17	27.0	27.6	26.1	26.7	30.6	23.3	29.1	29.6	28.1
25	Jun 18-Jun 24	28.4	29.6	24.3	29.0	30.1	27.6	28.6	29.0	27.9
26	Jun 25-Jul 01	31.1	31.9	30.7	30.7	31.4	29.9	30.7	31.3	30.0
27	Jul 02-Jul 08	31.1	31.7	30.4	32.1	32.9	31.4	33.1	33.9	32.4
28	Jul 09-Jul 15	32.6	33.4	27.6	20.7	31.3	30.1	33.4	34.1	32.9
29	Jul 16-Jul 22	33.7	34.0	33.0	30.9	31.6	30.4	29.3	29.9	28.6
30	Jul 23-Jul 29	31.6	32.6	27.0	31.9	32.1	31.0	30.3	30.6	29.4
31	Jul 30-Aug 05	31.6	32.1	31.0	33.0	34.0	32,3	28.7	29.1	28.3
32	Aug 06-Aug 12	30.3	31.1	29.9	31.7	32.1	31.0	30.7	31.1	30.3
33	Aug 13-Aug 19	29.6	30.1	29.0	30.6	30.9	29.9	32.0	32.3	31.4
34	Aug 20-Aug 26	29.6	30.9	29.3	30.0	30.6	29.4	31.9	32.4	31.3
35	Aug 27-Sep 02	29.9	31.1	30.0	28.4	28.6	27.6	31.9	32.3	31.3
36	Sep 03-Sep 09	30.4	31.3	30.0	28.0	28.6	27.6	30.4	31.0	29.6
37	Sep 10-Sep 16	30.9	27.6	26.0	27.9	28.4	27.7	28.7	29.6	28.4
38	Sep 17-Sep 23	27.1	24.6	23.6	27.6	27.0	27.3	28.9	29.4	28.3
39	Sep 24-Sep 30	24.0	24.0	23.1	26.1	27.0	25.9	29.0	29.1	28.3
40	Oct 01-Oct 07	23.7	23.4	22.1	26.0	26.1	24.3	26.6	27.1	26.1
41	Oct 08-Oct 14	22.7	22.6	22.1	25.1	25.7	24.3	25.4	26.3	24.6
42	Oct 15-Oct 21	22.3	19.4	21.3	25.1	19.6	24.7	23.3	24.1	23.0
43	Oct 22-Oct 28	18.7	16.9	18.4	19.1	26.9	18.6	23.0	24.0	22.3
44	Oct 29-Nov 04	16.3	16.3	15.9	16.3	14.1	15.9	21.4	22.0	20.9
45	Nov 05-Nov 11	15.9	16.3	15.3	13.0	11.3	12.6	20.0	21.0	19.6
46	Nov 12-Nov 18	11.3	12.1	10.9	10.7	11.3	10.3	19.1	20.0	18.6
47	Nov 19-Nov 25	11.3	11.6	10.6	9.3	10.1	8.9	16.6	17.1	16.1
48	Nov 26-Dec 02	11.7	11.9	10.9	6.6	7.6	5.6	13.6	14.0	12.9
49	Dec 03-Dec 09	8.7	9.4	8.7	8.6	9.7	7.9	10.9	12.6	9.4
50	Dec 10-Dec 16	6.9	7.4	6.9	8.7	9.0	8.4	10.7	11.4	10.0
51	Dec 17-Dec 23	5.4	5.9	5.1	6.0	6.6	5.4	10.9	11.1	10.0
52	Dec 24-Dec 31	8.3	8.6	7.9	7.1	7.7	6.7	7.9	8.7	7.6

Table 55. Soil water potential on the bajada site

Date Yr Mo Da	Bajada uplands 15	Bajada uplands 45	Bajada uplands 90	Minor arroyos 15	Minor arroyos 45	Minor arroyos 90	Major Arroyos. 15	Major Arroyos. 45	Major Arroyos. 90
71 07 15	-105	-91	-83	-128	-87	-75	-11	-6	-45
71 08 02	-76	-109	-98	-41	-86	-93	-1	-49	-27
71 08 13	-60	-119	-101	-32	-87	-77	-6	-39	-29
71 08 21	-52	-119	-102	-32	-85	-80	-1	-37	-31
71 10 07	-54	-115	-102	-29	-69	-85	-1	-29	-24
71 10 22	-52	-112	-106	-34	-95	-93	-1	-27	-25
71 10 29	-2	-108	-100	-1	-32	-61	-1	-24	-14
71 12 01	-6	-78	-94	-2	-4	-31	-1	-2	-13
71 12 21	-3	-68	-90	-1	-6	-30	-1	-1	-13
71 12 30	-4	-69	-94	-1	-6	-3	-1	-1	-13
72 02 04	-5	-62	-86	-1	-6	-28	-1	-1	-10
72 03 11	-46	-57	-74	-28	-9	-25	-15	-3	-11
72 04 08	-120	-86	-81	-92	-50	-35	-63	-24	-26
72 05 13	-129	-107	-84	-126	-109	-102	-129	-47	-53
72 06 13	-26	-98	-82	-18	-56	-61	-1	-12	-30
72 06 21	-37	-90	-79	-25	-52	-59	-2	-10	-30
72 07 06	-115	-105	-81	-85	-82	-78	-28	-42	-53
72 07 28	-118	-107	-85	-106	-95	-85	-53	-59	-55
72 08 16	-114	-112	-89	-78	-102	-92	-7	-66	-64
72 09 21	-45	-48	-76	-8	-2	-1	-1	-1	-1
72 10 10	-103	-94	-74	-15	-16	-18	-1	-3	-1
72 10 28	-1	-35	-66	-1	-1	-1	-1	-1	-1
72 11 21	-14	-41	-67	-1	-1	-1	-1	-1	-1
72 12 16	-12	-44	-78	-1	-1	-1	-1	-1	-1
73 01 20	-1	-11	-52	-1	-1	-1	-1	-1	-1
73 02 20	-1	-9	-58	-1	-1	-1	-1	-1	-1
73 03 20	-6	-3	-18	-1	-1	-1	-1	-1	-1
73 05 08	-65	-24	-14	-76	-6	-2	-23	-1	-1
73 06 02	-110	-88	-42	-53	-18	-9	-29	-13	-3
73 06 30	-128	-124	-68	-77	-30	-38	-27	-21	-8
73 07 10	-129	-125	-77	-113	-76	-59	-73	-34	-17
73 07 22	-3	-82	-47	-1	-1	-28	-1	-1	-1
73 08 15	-120	-115	-63	-25	-7	-13	-2	-13	-2
73 09 20	-128	-126	-77	-98	-76	-78	-42	-45	-34
73 10 31	-125	-122	-81	-110	-99	-101	-89	-66	-54
73 11 17	-116	-120	-82	-94	-94	-97	-68	-67	-57
73 12 31	-113	-112	-77	-95	-93	-96	-49	-66	-55

II.B. PLANTS

II.B.1. Annuals and Small Perennials

Sampling techniques for bajada annuals and small perennials used during 1973 were reported in Whitford et al., 1973 (A3UWJ74).

Monthly densities and biomass for annual forbs, perennial forbs, sub-shrubs, annual grasses, and perennial grasses were calculated from 1973 bajada sampling data and are given in Table 56.

Biomasses were categorized as vegetative and reproductive and are given along with total biomass (Table 56).

II.B.2. Large Perennials

Data collection techniques were reported for large perennials in Whitford et al., 1973.

Yucca elata

Monthly biomass estimates of new leaves, new standing dead leaves, standing dead leaves, inflorescence stalks, flowers, and fruits are given for 1971, 1972 and 1973 for the bajada site in Table 57. Also, the percent of plants with an inflorescence was recorded.

Yucca baccata

Monthly biomass estimates of new leaves, new standing dead leaves, standing dead leaves, leaves, inflorescence stalks, flowers, fruits, and percent plants with an inflorescence are given for 1971, 1972 and 1973 in Table 58.

Xanthocephalum sarothrae

Monthly biomass estimates of leaves, stems, roots, and reproductive parts are given for 1971, 1972 and 1973 for the bajada site in Table 59.

Larrea divaricata

Monthly biomass estimates for new shoots, buds, flowers, fruits, old stems, and roots are given for 1971, 1972 and 1973 in Table 60.

Monthly litter fall increments for stems, leaves, flower buds, flowers, immature fruits, and fruits are given for 1971, 1972 and 1973 in Table 61 for the bajada site.

Prosopis glandulosa

Monthly estimates of new growth for mesquite are given for 1971, 1972 and 1973 on the bajada in Table 62.

Flourensia cernua

Estimates of new growth for tarbush are given for 1971, 1972 and 1973 in Table 63.

Parthenium incanum

Estimates of new growth for mariola are given for 1971, 1972 and 1973 on the bajada in Table 64.

Chilopsis linearis

Estimates of new growth for desert willow are given for 1971, 1972 and 1973 on the bajada site in Table 65.

Fallugia paradoxa

Estimates of new growth are given for 1971, 1972 and 1973 on the bajada site in Table 66.

Table 56. Bajada annual and small perennial survey for total density

Sept. 9, 1971--ind/ha = 662

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
AMARANTHUS FIMBRIATUS	7	0.00	0.00	0.00
BOERHAAVIA SPICATA	7	0.00	0.00	0.00
EUPHORBIA MICROMERA	86	0.01	0.00	0.01
EUPHORBIA SERPYLLIFOLIA	46	0.00	0.00	0.00
PECTIS PAPPOSA	86	0.00	0.00	0.01
TIDESTROMIA LANUGINOSA	7	0.00	0.00	0.00
UNKNOWN ANNUAL FORBS	20	0.00	0.00	0.00
ANNUAL FORB TOTALS	258	0.02	0.00	0.02
PERENNIAL FORBS				
BAHIA ABSINTHIFOLIA	60	0.01	0.00	0.01
PEREZIA NANA	53	0.01	0.00	0.01
TALINUM ANGUSTISSIMUM	7	0.01	0.00	0.01
ZEPHYRANTHES LONGIFOLIA	7	0.01	0.00	0.01
PERENNIAL FORB TOTALS	126	0.04	0.00	0.04
SUBSHRUBS				
DYSSODIA ACEROSA	7	0.02	0.00	0.02
SUBSHRUB TOTALS	7	0.02	0.00	0.02
ANNUAL GRASSES				
ARISTIDA ADSCENIONIS	20	0.00	0.00	0.00
BOUTELOUA BARBATA	7	0.00	0.00	0.00
ANNUAL GRASS TOTALS	26	0.00	0.00	0.00
PERENNIAL GRASSES				
DISTICHLIS STRICTA	7	0.01	0.00	0.01
ERIONEURON PULCHELLUM	99	0.01	0.00	0.01
MUHLENBERGIA PORTERI	85	0.23	0.00	0.24
PERENNIAL GRASS TOTALS	192	0.25	0.00	0.26

Table 56, continued

April 5, 1972--ind/ha = 15586

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
ASTRAGALUS NUTTALLIANUS	312	0.02	0.02	0.03
CHAENACTIS STEVIOIDES	468	0.00	0.00	0.01
CRYPTANTHA ANGUSTIFOLIA	779	0.09	0.10	0.19
CRYPTANTHA CRASSISEPALA	156	0.02	0.00	0.02
CRYPTANTHA MICRANTHA	935	0.02	0.03	0.05
DESCURAINEA PINNATA	4988	0.20	0.18	0.38
ERIOGONUM ABERTIANUM	779	0.00	0.00	0.00
FRIARE VAR. RUBRARUM	312	0.02	0.00	0.02
IVA AMBROSIAEFOLIA	312	0.04	0.00	0.04
LEPIDIUM LASIOCARPUM	1714	0.58	0.28	0.87
PHACELIA COERULA	468	0.03	0.02	0.05
ANNUAL FORB TOTALS	11222	1.03	0.64	1.67
PERENNIAL FORBS				
BAHIA ABSINTHIFOLIA	623	0.05	0.00	0.05
BAILEYA MULTIRADIATA	935	0.08	0.00	0.08
CROTON POTTSII	156	0.01	0.00	0.01
PEREZIA NANA	623	0.05	0.01	0.06
PERENNIAL FORB TOTALS	2333	0.19	0.01	0.20
SUBSHRUBS				
SUBSHRUB TOTALS	0	0.00	0.00	0.00
ANNUAL GRASSES				
BOUTELOUA BARBATA	156	0.01	0.00	0.01
ANNUAL GRASS TOTALS	156	0.01	0.00	0.01
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	1559	0.19	0.00	0.19
MUHLENBERGIA PORTERI	312	1.48	0.07	1.56
PERENNIAL GRASS TOTALS	1870	1.68	0.07	1.75

Oct. 19, 1972--ind/ha = 21330

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
BOERHAAVIA SPICATA	213	0.05	0.00	0.06
DESCURAINEA PINNATA	213	0.00	0.00	0.00
ERIOGONUM ABERTIANUM	640	0.06	0.01	0.07
ERIOGONUM ROTUNDIFOLIUM	2346	0.70	0.37	1.06
EUPHORBIA MICROMERA	4906	0.17	0.16	0.33
EUPHORBIA SERPYLLIFOLIA	1067	0.01	0.00	0.02
IVA AMBROSIAEFOLIA	853	0.01	0.00	0.01
MOLLUGO CERVINA	213	0.00	0.01	0.01
PECTIS PAPPOSA	213	0.04	0.03	0.07
STREPTANTHUS VALIDUS	640	0.01	0.00	0.01
UNKNOWN ANNUAL FORBS	640	0.00	0.00	0.00
ANNUAL FORB TOTALS	11945	1.06	0.58	1.64
PERENNIAL FORBS				
BAHIA ABSINTHIFOLIA	1067	0.04	0.00	0.04
BAILEYA MULTIRADIATA	853	4.32	1.33	5.65
PEREZIA NANA	1280	0.55	0.00	0.55
VERBENA WRIGHTII	213	0.00	0.00	0.00
PERENNIAL FORB TOTALS	3413	4.91	1.33	6.24
SUBSHRUBS				
FALLUGIA PARADOXA	213	0.30	0.00	0.30
LARREA TRIDENTATA	4479	0.02	0.00	0.02
ZINNIA PUMILA	427	0.00	0.00	0.00
SUBSHRUB TOTALS	5119	0.33	0.00	0.33
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	640	0.31	0.17	0.49
PERENNIAL GRASS TOTALS	640	0.31	0.17	0.49

June 28, 1972--ind/ha = 4533

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
DITHYREA WISLIZENII	45	0.00	0.00	0.00
ERIOGONUM ABERTIANUM	771	0.08	0.00	0.08
ERIOGONUM ROTUNDIFOLIUM	816	0.10	0.00	0.11
ERIOGONUM TRICHOPES	136	0.01	0.00	0.01
ERODIUM TEXANUM	91	0.01	0.00	0.01
EUPHORBIA MICROMERA	589	0.00	0.00	0.00
EUPHORBIA SERRULA	136	0.00	0.00	0.00
EUPHORBIA SETILOBA	45	0.00	0.00	0.00
IVA AMBROSIAEFOLIA	45	0.06	0.00	0.06
PECTIS PAPPOSA	181	0.00	0.00	0.00
PORTULACA OLERACEA	91	0.00	0.00	0.00
ANNUAL FORB TOTALS	2946	0.27	0.01	0.28
PERENNIAL FORBS				
BAHIA ABSINTHIFOLIA	317	0.16	0.00	0.16
BAILEYA MULTIRADIATA	317	0.18	0.00	0.18
CROTON POTTSII	45	0.01	0.00	0.01
PEREZIA NANA	363	0.06	0.00	0.06
TALINUM ANGUSTISSIMUM	91	0.01	0.00	0.01
PERENNIAL FORB TOTALS	1133	0.42	0.00	0.42
SUBSHRUBS				
SUBSHRUB TOTALS	0	0.00	0.00	0.00
ANNUAL GRASSES				
BOUTELOUA BARBATA	45	0.00	0.00	0.00
ANNUAL GRASS TOTALS	45	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	363	0.08	0.00	0.08
MUHLENBERGIA PORTERI	45	0.10	0.00	0.10
PERENNIAL GRASS TOTALS	408	0.18	0.00	0.18

April 7, 1973--ind/ha = 128375

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
CRYPTANTHA CRASSISEPALA	8986	1.18	0.01	1.19
CRYPTANTHA MICRANTHA	2567	0.26	0.00	0.26
DESCURAINEA PINNATA	43647	5.69	0.96	6.65
ERIOGONUM ABERTIANUM	5135	0.58	0.00	0.58
ERIOGONUM ROTUNDIFOLIUM	32094	0.73	0.00	0.73
ERIOGONUM TRICHOPES	3851	0.19	0.00	0.19
LEPIDIUM LASIOCARPUM	6419	2.53	0.01	2.54
PHACELIA COERULA	1284	0.04	0.00	0.04
UNKNOWN ANNUAL FORBS	15405	0.00	0.00	0.00
ANNUAL FORB TOTALS	119389	11.19	0.99	12.18
PERENNIAL FORBS				
BAILEYA MULTIRADIATA	5135	0.51	0.00	0.51
PERENNIAL FORB TOTALS	5135	0.51	0.00	0.51
SUBSHRUBS				
SUBSHRUB TOTALS	0	0.00	0.00	0.00
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	3851	2.27	0.81	3.08
PERENNIAL GRASS TOTALS	3851	2.27	0.81	3.08

Table 56, continued

May 5, 1973--ind/ha = 119896

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
CHAENACTIS STEVIOIDES	1798	0.34	0.26	0.59
CRYPTANTHA ANGUSTIFOLIA	599	0.08	0.04	0.12
CRYPTANTHA CRASSISEPALA	4196	3.35	1.04	4.39
CRYPTANTHA MICRANTHA	9592	1.68	0.44	2.12
DESCURAINEA PINNATA	37168	4.15	1.70	5.85
ERIASTRUM DIFFUSUM	5995	1.61	0.01	1.62
ERIOGONUM ABERTIANUM	7793	0.47	0.02	0.50
ERIABE VAR. RUBARUM	1199	0.61	0.01	0.62
ERIOGONUM ROTUNDIFOLIUM	26377	1.98	0.11	2.09
ERIOGONUM TRICHOPES	2997	0.72	0.05	0.77
IVA AMBROSIAEFOLIA	599	0.58	0.00	0.58
LEPIDIUM LASIOCARPUM	3597	10.26	6.82	17.07
PHACELIA COERULA	599	0.01	0.01	0.01
ANNUAL FORB TOTALS	102511	25.83	10.51	36.33
PERENNIAL FORBS				
BAHIA ABSINTHIFOLIA	4196	0.78	0.00	0.78
BAILEYA MULTIRADIATA	10791	6.70	0.34	7.04
PEREZIA NANA	599	0.19	0.00	0.19
PERENNIAL FORB TOTALS	15587	7.67	0.34	8.01
SUBSHRUBS				
XANTHOCEPHALUM SAROTHRAE	599	0.12	0.00	0.12
SUBSHRUB TOTALS	599	0.12	0.00	0.12
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	599	0.14	0.00	0.14
PERENNIAL GRASS TOTALS	599	0.14	0.00	0.14

July 2, 1973--ind/ha = 18686

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
DITHYREA WISLIZENII	187	0.24	0.01	0.25
ERIOGONUM ABERTIANUM	3831	0.77	0.02	0.79
ERIOGONUM ROTUNDIFOLIUM	7568	2.13	0.03	2.16
ERIOGONUM TRICHOPES	561	0.12	0.02	0.14
IVA AMBROSIAEFOLIA	934	0.96	0.00	0.96
MENTZELIA ALBICAULIS	93	0.04	0.00	0.04
ANNUAL FORB TOTALS	13173	4.27	0.08	4.35
PERENNIAL FORBS				
BAHIA ABSINTHIFOLIA	1775	0.81	0.00	0.81
BAILEYA MULTIRADIATA	1682	3.83	0.04	3.87
CROTON POTTSII	93	0.20	0.01	0.21
PEREZIA NANA	654	0.25	0.00	0.25
PERENNIAL FORB TOTALS	4204	5.08	0.06	5.13
SUBSHRUBS				
DYSSODIA ACEROSA	187	0.02	0.01	0.03
XANTHOCEPHALUM SAROTHRAE	187	0.05	0.00	0.05
SUBSHRUB TOTALS	374	0.07	0.01	0.08
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	747	0.64	0.05	0.69
UNKNOWN GRASS	187	0.08	0.00	0.08
PERENNIAL GRASS TOTALS	934	0.72	0.05	0.77

June 5, 1973--ind/ha = 27289

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
CHENOPODIUM INCANUM	136	0.01	0.00	0.01
CRYPTANTHA CRASSISEPALA	136	0.03	0.06	0.10
ERIASTRUM DIFFUSUM	1228	0.11	0.48	0.59
ERIOGONUM ABERTIANUM	3820	0.50	0.06	0.56
ERIABE VAR. RUBARUM	955	0.28	0.01	0.29
ERIOGONUM ROTUNDIFOLIUM	10097	2.03	0.49	2.52
ERIOGONUM TRICHOPES	1364	1.20	0.51	1.71
HAPLOPAPPUS GRACILIS	136	0.03	0.00	0.03
IVA AMBROSIAEFOLIA	409	2.23	0.00	2.23
LEPIDIUM LASIOCARPUM	136	0.07	0.10	0.18
MALACOTHRIX FENDLERI	682	0.29	0.00	0.29
MENTZELIA ALBICAULIS	409	0.19	0.01	0.20
NAMA HISPIDUM	273	0.04	0.00	0.04
UNKNOWN ANNUAL FORBS	273	0.00	0.00	0.00
ANNUAL FORB TOTALS	20057	7.02	1.72	8.74
PERENNIAL FORBS				
BAHIA ABSINTHIFOLIA	2047	0.50	0.00	0.50
BAILEYA MULTIRADIATA	2865	6.19	0.11	6.29
MACHAERANTHERA TANACETIFOL	273	0.00	0.00	0.00
PEREZIA NANA	409	0.27	0.00	0.27
PERENNIAL FORB TOTALS	5594	6.96	0.11	7.07
SUBSHRUBS				
SENECIO LONGILOBUS	136	0.35	0.00	0.35
XANTHOCEPHALUM SAROTHRAE	273	0.01	0.00	0.01
SUBSHRUB TOTALS	409	0.37	0.00	0.37
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	682	0.28	0.02	0.29
PERENNIAL GRASS TOTALS	682	0.28	0.02	0.29

Aug. 7, 1973--ind/ha = 39805

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
ERIOGONUM ABERTIANUM	3249	1.08	0.47	1.55
ERIABE VAR. RUBARUM	3046	2.59	0.17	2.76
ERIOGONUM ROTUNDIFOLIUM	16044	8.73	1.77	10.50
EUPHORBIA MICROMERA	7514	0.10	0.00	0.10
EUPHORBIA SETILOBA	609	0.00	0.00	0.00
IVA AMBROSIAEFOLIA	1219	2.35	0.00	2.35
ANNUAL FORB TOTALS	31681	14.84	2.41	17.25
PERENNIAL FORBS				
BAHIA ABSINTHIFOLIA	1015	0.64	0.02	0.66
BAILEYA MULTIRADIATA	1015	2.21	0.19	2.39
PEREZIA NANA	812	0.59	0.00	0.59
PERENNIAL FORB TOTALS	2843	3.44	0.21	3.65
SUBSHRUBS				
DYSSODIA ACEROSA	609	0.29	0.00	0.29
SENECIO LONGILOBUS	203	0.16	0.00	0.16
XANTHOCEPHALUM SAROTHRAE	1219	0.93	0.00	0.93
SUBSHRUB TOTALS	2031	1.38	0.00	1.38
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	1219	1.00	0.00	1.00
MUHLENBERGIA PORTERI	203	0.00	0.00	0.00
PERENNIAL GRASS TOTALS	1422	1.00	0.00	1.01

Table 56, continued

Sept. 12, 1973--ind/ha = 31246

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
ERIOGONUM ABERTIANUM	3605	1.31	0.43	1.74
ERIABE VAR. RUBARUM	901	0.33	0.09	0.42
ERIOGONUM ROTUNDIFOLIUM	10065	2.81	2.88	5.69
EUPHORBIA MICROMERA	5258	0.23	0.09	0.32
EUPHORBIA SERPYLLIFOLIA	451	0.00	0.00	0.00
EUPHORBIA SERRULA	150	0.01	0.00	0.01
EUPHORBIA SETILOBA	451	0.16	0.03	0.19
IVA AMBROSIAEFOLIA	300	0.50	0.00	0.50
NAMA HISPIDUM	150	0.01	0.01	0.02
PECTIS PAPPOSA	601	0.03	0.01	0.03
PORTULACA OLERACEA	150	0.00	0.00	0.00
ANNUAL FORB TOTALS	22083	5.40	3.54	8.94
PERENNIAL FORBS				
BAHIA ABSINTHIFOLIA	2404	0.03	1.24	1.28
BAILEYA MULTIRADIATA	1953	2.51	0.29	2.80
CROTON POTTSII	150	0.08	0.00	0.09
PEREZIA NANA	1502	0.55	0.00	0.55
SPHAERALCEA SUBHASTATA	150	0.01	0.00	0.01
PERENNIAL FORB TOTALS	6159	3.19	1.54	4.72
SUBSHRUBS				
DYSSODIA ACEROSA	300	0.06	0.00	0.06
SENECIO LONGILOBUS	150	0.01	0.00	0.01
XANTHOCEPHALUM SAROTHRAE	150	0.02	0.00	0.02
SUBSHRUB TOTALS	601	0.09	0.00	0.09
ANNUAL GRASSES				
BOUTELOUA BARBATA	1202	0.02	0.00	0.02
ANNUAL GRASS TOTALS	1202	0.02	0.00	0.02
PERENNIAL GRASSES				
ARISTIDA PURPUREA	150	0.00	0.00	0.00
ERIONEURON PULCHELLUM	751	2.30	0.16	2.46
MUHLENBERGIA PORTERI	150	0.10	0.00	0.10
PERENNIAL GRASS TOTALS	1052	2.40	0.16	2.56

Oct. 13, 1973--ind/ha = 21700

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
ERIOGONUM ABERTIANUM	2170	0.30	0.04	0.34
ERIABE VAR. RUBARUM	2278	0.84	0.03	0.88
ERIOGONUM ROTUNDIFOLIUM	10199	5.57	0.79	6.36
EUPHORBIA MICROMERA	759	0.03	0.00	0.03
IVA AMBROSIAEFOLIA	759	3.05	0.41	3.45
ANNUAL FORB TOTALS	16166	9.78	1.27	11.05
PERENNIAL FORBS				
BAHIA ABSINTHIFOLIA	976	0.20	0.00	0.20
BAILEYA MULTIRADIATA	868	4.07	0.67	4.73
CROTON POTTSII	108	0.16	0.00	0.16
EUPHORBIA ALBOMARGINATA	108	0.02	0.00	0.02
PEREZIA NANA	1085	0.58	0.00	0.58
SPHAERALCEA SUBHASTATA	217	0.07	0.00	0.07
PERENNIAL FORB TOTALS	3363	5.10	0.67	5.77
SUBSHRUBS				
DYSSODIA ACEROSA	108	0.00	0.00	0.00
XANTHOCEPHALUM SAROTHRAE	325	0.00	0.00	0.00
ZINNIA PUMILA	108	0.01	0.00	0.01
SUBSHRUB TOTALS	542	0.01	0.00	0.01
ANNUAL GRASSES				
BOUTELOUA BARBATA	108	0.00	0.00	0.00
ANNUAL GRASS TOTALS	108	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	1519	0.36	0.07	0.44
PERENNIAL GRASS TOTALS	1519	0.36	0.07	0.44

Table 57. *Yucca elata* **on the bajada site**

		INCREMENTS		STANDING BIOMASS				
Year	Date	New Leaves Kg Ha^{-1}	New Standing Dead Leaves Kg Ha^{-1}	Leaves Kg Ha^{-1}	Inflorescence Stalks Kg Ha^{-1}	Flowers Kg Ha^{-1}	Fruits Kg Ha^{-1}	% Plants with An Inflorescence
1971	May 01	0.00	0.00	55.00	0.025	0.007	0.0	0.1
	Oct 01	1.18	0.04	56.13				
	Nov 01	0.29	0.21	56.21				
	Dec 01	0.45	0.05	56.61		(Standing Dead)		
1972	Jan 01	0.14	0.02	56.73				
	Feb 01	0.29	0.06	56.96				
	Mar 01	2.47	0.80	58.63	0.0	0.0	0.0	0.0
	Apr 01	0.59	3.01	56.21	0.97	0.03	0.0	52.0
	May 01	0.09	4.21	52.09	2.57	0.76	0.0	13.0
	Jun 01	1.04	0.67	52.46				
	Jul 01	4.00	1.00	55.46				
	Aug 01	5.03	0.47	61.02		(Standing Dead)		
	Sep 01	7.26	0.36	67.92				
	Oct 01	2.21	0.19	69.94				
	Nov 01	0.65	0.02	70.59				
	Dec 01	1.50	0.24	71.85				
1973	Jan 13	0.02	0.20	71.67				
	Mar 01	0.18	0.54	71.31				
	Apr 01	0.85	0.06	72.12	0.0	0.0	0.0	0.0
	May 01	0.67	0.00	72.79	0.08	0.0	0.0	12.67
	Jun 01	1.18	2.48	71.49	20.06	5.42	0.0	67.0
	Jul 01	1.38	0.42	72.47	26.71	0.0	30.08	67.0
	Aug 01	2.47	0.20	74.74	21.08	0.0	16.51	67.0
	Sep 01	2.05	0.15	76.64				
	Oct 01	0.36	0.06	76.94				
	Nov 01	0.21	0.12	77.03		(Standing Dead)		
	Dec 01	0.07	0.03	77.07				
1974	Jan 01	0.16	0.40	76.83				

Table 58. *Yucca baccata* on the bajada site

Date	Increments		Standing Biomass				% Plants with an Inflorescence
	New leaves kg/ha	New standing dead leaves kg/ha	Leaves kg/ha	Inflorescence stalks kg/ha	Flowers kg/ha	Fruits kg/ha	
71 Apr 1	0	0	20.6	0	0	0	0
May 1	0.1	2.4	18.3	0	0	0	0
Jun 1	0.1	0.1	18.2	0	0	0	0
Jul 1	0.2	0	18.4	0	0	0	0
Aug 1	0.6	0.3	18.7	0	0	0	0
Sep 1	0.1	0	18.8	0	0	0	0
Oct 1	0.2	0	18.9	0	0	0	0
Nov 1	0.1	0	18.9	0	0	0	0
Dec 1	0	0.1	18.9	0	0	0	0
72 Feb 1	0.3	0.1	19.1	0	0	0	0
Mar 1	0.2	0.4	18.9	0	0	0	0
Apr 1	0	0.3	18.6	0	0	0	0
May 1	0.1	0.7	17.9	0	0	0	0
Jun 1	0.1	0.2	17.7	0	0	0	0
Aug 1	0.5	0.3	18.0	0	0	0	0
Sep 1	0.5	0.7	17.8	0	0	0	0
Oct 1	0.2	0.1	17.9	0	0	0	0
Nov 1	0	0.1	17.8	0	0	0	0
Dec 1	0	0.1	17.7	0	0	0	0
73 Jan 13	0	0.1	17.6	0	0	0	0
Mar 1	0.1	0	17.6	0	0	0	0
Apr 1	0.4	0.1	18.0	1.35	0	0	20
May 1	0.7	0	18.7	9.0	12.5	0	39
Jun 1	0.7	0.4	19.0	9.7	13.5	0	34
Jul 1	0.7	0.1	19.6	9.7	0	0	36
Aug 1	0.5	0.2	19.9				
Sep 1	0.1	0	20.1				
Oct 1	0	0.1	20.0		(Standing Dead)		
Nov 1	0	0.3	19.7				
Dec 1	0	0.3	19.4				

Table 59. Estimates of biomass (kg ha^{-1}) for stems, leaves, roots and reproduction in snakeweed (*Xanthocephalum sarothrae*) on the bajada site for 1971, 1972 and 1973

Year	Date	Leaves	Stems	Roots	Reproductive Parts
1971	Apr 01		54.6	20.1	
	May 01	32.0	41.6	15.3	
	Jun 01	29.7	38.6	14.2	
	Jul 01	29.6	38.5	14.1	
	Aug 01	31.7	41.2	15.1	
	Sep 01	33.3	43.3	15.9	
	Oct 01	33.3	43.4	16.0	18.5
	Nov 01	31.4	40.8	15.0	17.4
	Dec 01	29.2	38.1	14.0	16.2
1972	Jan 01	26.8	34.8	12.8	14.9
	Mar 01	13.0	16.9	6.2	
	Apr 01	17.3	22.6	8.3	
	May 01	18.0	23.5	8.6	
	Jun 01	19.1	24.9	9.1	
	Jul 01	20.1	26.1	9.6	
	Sep 05	22.5	29.2	10.8	
	Oct 12	25.3	32.9	12.1	14.0
	Nov 09	24.0	31.2	11.5	13.3
	Dec 09	13.5	17.6	6.4	7.5
1973	Mar 24	9.6	12.6	4.6	
	Apr 28	13.7	17.8	6.5	
	May 30	24.1	31.4	11.6	
	Jun 29	34.4	44.8	16.5	
	Jul 30	44.8	58.3	21.4	
	Sep 06	45.4	59.0	21.7	25.2
	Oct 02	60.2	78.3	28.8	33.4
	Oct 30	58.8	76.5	28.1	32.7
	Nov 29	60.6	78.8	29.0	32.6

Table 60. Estimates of biomass (kg ha^{-1}) for new shoots reproduction, old stems and roots in creosotebush (*Larrea divaricata*) on the bajada site for 1971, 1972 and 1973

Year	Date	New Shoots		Reproductive Parts			Old Stems*		Live*
		Leaf	Stem	Buds	Flowers	Fruits	Live	Dead	Roots
1971	Apr 01	0.0	0.0	0.0	0.0	0.0	2080	1160	1760
	May 01	0.4	1.5	0.0	0.0	0.0			
	Jun 01	0.9	2.0	0.0	0.0	0.0			
	Jul 01	3.0	4.6	0.0	0.0	0.0			
	Aug 01	22.0	26.0	0.0	0.0	0.0			
	Sep 01	38.0	44.0	0.0	0.0	149.0			
	Oct 01	81.0	92.0	0.0	1.3	94.0			
	Nov 01	93.0	105.0	0.0	0.0	111.0	2150	1200	1820
	Dec 01	82.0	92.0	0.0	0.0	73.0			
	Dec 31	65.0	74.0	0.0	0.0	43.0			
1972	Feb 05	0.0	0.0	0.0	0.0	0.0			
	Mar 04	2.3	2.6	0.0	0.0	0.0			
	Apr 01	18.0	20.0	42.0	0.9	0.0			
	May 01	19.0	22.0	6.6	1.3	5.8			
	Jun 01	23.0	26.0	20.0	3.5	9.0			
	Jun 30	78.0	87.0	8.7	32.0	52.0			
	Jul 27	114.0	128.0	3.4	0.4	43.0			
	Sep 07	197.0	221.0	6.9	1.3	24.0			
	Oct 12	302.0	338.0	0.0	0.0	28.0			
	Nov 09	324.0	363.0	0.0	0.0	25.0	2420	1350	2060
	Dec 09	328.0	367.0	0.0	0.0	19.0			
1973	Feb 01	0.0	0.0	0.0	0.0	0.0			
	Mar 03	0.0	0.0	0.0	0.0	0.0			
	Mar 31	2.9	4.3	0.0	0.0	0.0			
	Apr 28	12.0	14.0	25.0	0.0	0.0			
	May 31	36.0	40.0	5.6	7.4	107.0			
	Jun 28	45.0	50.0	0.0	0.0	40.0			
	Jul 31	104.0	116.0	3.5	3.1	18.0			
	Aug 31	125.0	140.0	0.0	0.0	14.0			
	Sep 30	117.0	132.0	0.0	0.0	10.0			
	Oct 27	107.0	120.0	0.0	0.0	10.0	2580	1440	2196
	Nov 30	102.0	114.0	0.0	0.0	9.2			
	Dec 29	95.0	106.0	0.0	0.0	7.5			

* Biomass estimates based on canopy size at the end of the growing season.

Table 61. Creosotebush litter on the bajada site

Date	Total Stems kg/ha	Mean Leaf Biomass kg/ha	Mean Flower Buds kg/ha	Mean Mature Flower kg/ha	Mean Immature Fruits kg/ha	Mean Mature Fruits kg/ha
71 0902	81.1	5.6	0.0	0.0	2.3	1.1
71 1002	15.8	12.3	0.0	0.0	2.8	1.4
71 1101	10.8	5.2	0.0	0.0	0.5	0.5
71 1201	5.1	4.0	0.5	0.0	0.0	0.5
72 0101	3.6	3.2	0.0	0.0	0.2	1.4
72 0201	4.4	5.9	0.0	0.0	0.0	0.8
72 0301	5.5	11.9	0.0	0.0	0.1	1.5
72 0401	8.4	6.6	0.2	0.0	0.0	1.3
72 0501	7.7	8.5	3.7	0.0	0.0	0.8
72 0601	12.6	11.6	2.6	0.0	0.2	1.3
72 0630	18.7	13.1	2.6	2.4	0.5	0.9
72 0727	9.0	22.9	0.5	0.2	3.9	0.9
72 0907	13.0	40.0	0.9	0.2	1.5	7.3
72 1012	9.8	69.5	0.3	0.0	0.1	2.1
72 1109	12.9	28.8	0.4	0.0	0.3	2.9
72 1209	5.9	21.3	0.1	0.0	0.4	2.6
73 0106	2.8	18.0	0.0	0.0	0.1	0.4
73 0201	8.0	21.2	0.0	0.0	0.1	0.9
73 0303	4.1	20.1	0.0	0.0	0.0	0.6
73 0331	11.6	30.2	0.0	0.0	0.1	1.3
73 0428	9.8	9.6	0.0	0.0	0.0	0.9
73 0531	50.0	45.9	2.1	1.9	0.2	0.9
73 0628	16.9	33.2	0.7	0.1	3.7	1.2
73 0731	13.2	25.1	0.3	0.0	0.9	5.3
73 0831	8.3	91.5	0.0	0.0	0.0	0.3
73 0930	15.5	68.6	0.0	0.0	0.0	3.3
73 1031	9.2	45.4	0.0	0.0	0.0	3.9
73 1130	8.4	53.1	0.0	0.0	0.0	1.9
73 1229	4.9	13.0	0.0	0.0	0.0	3.0

Table 63. *Flourensia cernua* new growth on the bajada site

DATE YR MO DAY	LEAVES (KG/HA)	STEMS (KG/HA)	REPRODS (KG/HA)	LVS@OLD NODES (KG/HA)
71 9 2	6.62	1.13	0.00	0.00
71 10 2	10.27	1.92	0.36	0.00
71 11 1	10.54	3.10	1.36	0.00
71 12 1	7.55	2.36	1.93	0.00
72 1 1	5.64	2.24	0.94	0.00
72 4 1	4.87	0.56	0.00	0.00
72 5 1	4.81	0.77	0.00	0.00
72 6 2	3.25	0.70	0.00	0.00
72 7 3	5.98	2.20	0.00	0.00
72 7 28	9.71	4.35	0.00	0.00
72 9 12	15.44	4.01	0.00	0.00
72 10 12	14.04	6.27	0.00	0.00
72 11 9	17.81	8.76	16.92	0.00
72 12 9	12.24	13.79	3.29	0.00
73 1 13	9.73	15.05	15.63	0.00
73 3 31	2.28	5.22	1.14	0.00
73 5 3	1.24	0.00	0.00	0.00
73 5 31	8.37	1.47	0.00	0.00
73 7 5	24.68	17.03	0.00	0.00
73 7 31	26.69	24.36	0.00	0.00
73 9 3	65.84	42.46	0.00	0.00
73 10 4	21.79	43.65	0.00	0.00
73 11 3	35.81	73.77	0.00	0.00
73 12 1	40.79	62.35	0.00	0.00
74 5 17	1.09	0.33	0.00	0.00

Table 65. *Chilopsis linearis* new growth on the bajada site

DATE YR MO DAY	LEAVES (KG/HA)	STEMS (KG/HA)	REPRODS (KG/HA)	LVS@OLD NODES (KG/HA)
71 9 2	3.11	1.02	0.20	0.00
71 11 1	2.81	0.92	0.18	0.00
71 12 1	0.40	0.19	0.14	0.00
72 4 3	0.21	0.00	0.00	0.00
72 5 1	1.78	0.42	0.00	0.00
72 6 2	1.95	0.59	0.00	0.00
72 7 3	2.94	1.03	1.05	0.00
72 7 28	4.66	2.33	0.83	0.00
72 9 12	4.03	2.41	0.18	0.00
72 10 17	2.10	1.58	0.49	0.00
72 11 9	0.19	0.54	0.36	0.00
73 5 3	0.11	0.00	0.00	0.00
73 6 4	1.14	0.41	0.33	0.00
73 7 5	3.48	1.42	0.22	0.00
73 7 31	8.21	2.51	0.36	0.00
73 9 3	6.24	3.80	2.32	0.00
73 10 4	6.50	8.76	0.37	0.00
73 11 3	4.34	10.96	0.82	0.00
74 4 27	0.49	0.05	0.00	0.00
74 5 17	1.17	0.22	0.00	0.00

Table 62. Mesquite new growth (kg/ha) at the bajada site

Year	Date	Leaves: Old Nodes	Leaves: New Shoots	Reproductive Parts: Inflorescence	Reproductive Parts: Fruits	Stems: New Standing	Roots
1971	Apr 03			0	0	0	
	May 01		0	0	0	0	
	Jun 01		0.69	0	0	0.46	
	Jul 01		0.69	0	0	0.46	
	Aug 01		0.86	0	0	0.58	
	Sep 01		0	0	0	0	
	Oct 01		0	0	0	0	
	Nov 01		0	0	0	0	
	Dec 01		0	0	0	0	
1972	Mar 23	33.8	0		0	0	
	Apr 03	24.4	0.14		0	0.09	
	May 02	51.3	0.41		0	0.28	
	Jun 02	83.9	0.75		0	0.51	
	Jun 30	71.2	0.88		0	0.60	
	Jul 27	84.6	1.02		0	0.69	
	Sep 12	80.2	0.68		0	0.46	
	Oct 12	72.9	0.61		0	0.42	
	Nov 09	49.8	0.61		0	0.42	
	Dec 09		0.55		0	0.37	
1973	Mar 24	0	0		0	0	
	Apr 28	5.8	0.29		0	0.14	
	May 12	25.7	1.01		0	0.59	
	May 31	23.5	2.27		0	1.67	
	Jun 28	23.2	2.15		27.8	1.56	
	Jul 30	22.6	3.71			3.01	
	Aug 31	20.9	3.76		0.25	3.06	
	Oct 04	16.6	1.88		0	1.32	
	Oct 31	11.2	0		0	0	
	Dec 01	5.9	0		0	0	

Table 64. *Parthenium incanum* new growth on the bajada site

DATE YR MO DAY	LEAVES (KG/HA)	STEMS (KG/HA)	REPRODS (KG/HA)	LVS@OLD NODES (KG/HA)
71 9 2	0.89	0.43	0.48	0.00
71 10 2	0.90	0.39	0.46	0.00
71 11 1	1.02	0.68	0.87	0.00
71 12 1	0.86	0.56	0.26	0.00
72 1 1	0.64	0.56	0.42	0.00
72 4 1	0.72	0.08	0.00	0.00
72 5 1	0.83	0.13	0.00	0.00
72 6 2	0.82	0.15	0.00	0.00
72 7 3	1.38	0.40	0.00	0.00
72 7 28	2.24	1.01	0.00	0.00
72 9 12	1.55	0.79	0.00	0.00
72 10 12	1.69	1.70	0.00	0.00
72 11 9	1.69	1.57	0.00	0.00
72 12 9	2.08	1.83	0.00	0.00
73 5 3	0.46	0.00	0.00	0.00
73 5 31	1.34	0.24	0.00	0.00
73 7 5	2.87	1.35	0.00	0.00
73 7 31	3.24	1.80	0.36	0.00
73 9 3	7.54	5.57	1.29	0.00
73 10 4	2.21	1.82	0.00	0.00
73 11 3	7.15	12.32	0.00	0.00
73 12 1	2.37	3.83	0.00	0.00
74 5 17	0.15	0.00	0.00	0.00

Table 66. *Fallugia paradoxa* new growth on the bajada site

DATE YR MO DAY	LEAVES (KG/HA)	STEMS (KG/HA)	REPRODS (KG/HA)	LVS@OLD NODES (KG/HA)
71 9 2	3.25	1.88	0.47	0.00
71 10 2	5.75	3.11	0.11	0.00
71 11 1	3.14	2.55	0.14	0.09
71 12 1	4.32	3.37	0.26	0.15
72 1 1	4.06	3.04	0.77	0.12
72 4 1	3.97	2.14	0.77	1.04
72 5 1	5.81	3.72	1.22	0.22
72 6 2	4.93	3.27	0.91	0.11
72 7 3	4.26	3.52	0.12	0.28
72 7 28	7.22	6.26	0.21	0.09
72 9 12	8.31	4.31	0.00	0.46
72 10 17	7.04	4.02	1.45	0.43
72 11 9	6.71	5.96	1.54	0.78
72 12 16	2.44	4.86	0.21	0.31
73 1 13	4.89	8.41	0.05	0.31
73 3 31	0.00	0.00	0.00	0.00
73 5 3	2.36	1.62	0.00	1.94
73 6 4	5.49	4.39	3.22	0.00
73 7 5	2.98	3.37	1.03	0.60
73 7 31	30.93	45.56	0.71	1.87
73 9 3	46.19	60.55	8.42	4.59
73 10 4	15.22	15.94	0.18	3.70
73 11 3	57.11	95.30	0.22	1.10
73 12 1	13.99	19.95	0.00	0.80
74 4 13	1.06	0.54	0.00	0.00
74 5 17	1.60	0.60	0.00	1.13

II.C. INVERTEBRATES

II.C.1. Shrub Arthropods

Shrub arthropod data (A3UWJ21, 25) has been collected from the bajada since May, 1971. Samples were collected monthly, except during the winter months, from five shrub species: *Fallugia paradoxa*, *Flourensia cernua*, *Larrea divaricata*, *Prosopis glandulosa*, and *Xanthocephalum sarothrae*. Some samples were taken from *Ephedra trifurca* in 1971. The data presented here represent samples collected in 1971 and 1972.

Sampling and sample-handling methods are described in the section on shrub arthropods for the playa. Taxa data are presented in Tables 67 through 77; feeding type data are presented in Tables 78 through 82.

Fallugia paradoxa (Table 78) feeding type data is presented below: the herbivorous arthropod biomass in March, 1972 was 1.3 $g{\cdot}ha^{-1}$, consisting mostly of aphids. The carnivorous biomass was 2.4, consisting of spiders, Coccinellids and Chalcidoids. No samples were taken in April. In May, the herbivorous biomass was 4.2, made up largely of Murids. The carnivorous biomass was 3.7, consisting mostly of spiders. In June, the herbivorous biomass reached a peak of 25; the most prominent insect was a Chrysomelid (*Altica* sp.). Carnivorous biomass was 2.3, primarily spiders. In July and August, herbivorous biomass fell to 0.7, the predominant insect was the beetle, *Altica* sp. The carnivorous biomass also dropped, and consisted mainly of spiders. In September, the herbivorous biomass rose to 17 $g{\cdot}ha^{-1}$, consisting of *Altica* sp. larvae. Carnivorous biomass was 0.3, primarily spiders.

The herbivorous arthropod biomass of *Flourensia cernua* (Table 79) was 9.8 $g{\cdot}ha^{-1}$ in March, 1972. The predominant group was Psyllidae. The carnivorous biomass was 1.3, composed of Chalcidoids and spiders. No samples were taken in April. In May, herbivorous biomass was 3.1, consisting of Psyllids, Coccids and Tingids. The carnivorous biomass was 0.6, chiefly spiders. The June herbivorous biomass, made up of Psyllids and Tingids, was 5.7. In July and August the herbivorous biomass was about 0.3, composed of Tingids, Psyllids and Formicids. The carnivorous biomass was 0.1 during this period; the predominant groups were spiders and Chrysopidae. In September the herbivorous biomass, represented mostly by Psyllids was 5.7. The carnivorous biomass was 0.1 $g{\cdot}ha^{-1}$, represented mostly by spiders.

In March, 1972, the herbivorous biomass of *Larrea divaricata* (Table 80) was 17 $g{\cdot}ha^{-1}$, represented mostly by Mirids. The carnivorous biomass was 9.9; the major groups were Chalcidoids, Ichneumonoids and spiders. In April, the herbivorous biomass was 43.7, consisting largely of Mirids. The carnivorous biomass was 29, mostly spiders. In May, the herbivorous biomass was 13. Important groups were Mirids, Cicadellids and Issids. The carnivorous biomass, represented largely by Chrysopids and spiders, was 5.4. In June, no samples were taken. In July, the herbivorous biomass, composed chiefly of Psyllids, Mirids and Cicadellids, was 5.9. The carnivorous biomass was 0.5, mostly spiders. In August, the herbivorous biomass, 6.5, was made up of Cicadellids, Cercopids and variou Coleoptera. The carnivorous biomass, represented mostly by spiders, was 0.4. In September, the herbivorous biomass was 6.0, composed of various Homoptera and Diptera. The carnivorous biomass was zero.

The biomass of herbivorous arthropods on *Prosopis glandulosa* (Table 81) in May and July, 1972 was about 1.2 $g{\cdot}ha^{-1}$. No samples were taken in June. The most important group was Psyllidae. The carnivorous biomass was 0.3 in May, composed mostly of Chalcidoids, and zero in July. In September the herbivorous biomass was 0.1; the important groups were Psyllids and Cicadellids. The carnivorous biomass was 0.5, composed mainly of Coleoptera of various types. It is possible that Formicids were incorrectly grouped with the carnivores for this date. This would cause the carnivorous biomass to appear larger than it actually is.

In May, 1972, the herbivorous biomass of *Xanthocephalum sarothrae* (Table 82) was 20 $g{\cdot}ha^{-1}$. Important groups were Psyllidae, Cicadellidae and Formicidae. The carnivorous biomass was 4, composed chiefly of Chalcidoids and Hemerobiids. In July, the herbivorous biomass was 8, made up of Tingids, Cicadellids and Formicids. The carnivorous biomass was 2, composed mostly of spiders and Chalcidoids. In August, the biomass of both the herbivorous and carnivorous groups was nearly zero. The herbivorous biomass in September was 8, made up largely by Cicadellids and Mirids. The carnivorous biomass, represented by spiders mostly, was 1.

There were three major herbivorous biomass peaks on the bajada. In April, the peak on *Larrea divaricata* was probably due to the emergence of overwintering stages of Mirids. Other shrubs possibly showed similar peaks, although there is no data available to verify this. In June, the peak was represented by *Altica* sp. (Chrysomelidae) adults on *Fallugia paradoxa*. This probably reflects the emergence of overwintering stages of this beetle, which was found only on *F. paradoxa*.

The peak in September represented large numbers of *Altica* sp. larva; the progeny of the previous adult population of this species.

The carnivorous biomass showed a peak in April, probably due in part to the emergence of overwintering stages of Chalcids and in part to the response of the spider population to the herbivore peak.

Plant suckers were the most consistently predominant group on the bajada shrubs. It should be noted that many groups of suckers pass much more plant juice through their bodies than they assimilate. In light of this, the numbers of suckers on a shrub, rather than their biomass, might be a more appropriate measure of their impact on the shrub.

Taxa Data

Space does not permit a full discussion of the data. Some general trends, though, are worth noting. The diversity index (based on families) was consistently highest in 1971 during the summer. In 1972, it was also highest during the summer with the exceptions of *Prosopis glandulosa* and *Xanthocephalum sarothrae*, where it was highest in the fall.

In 1971, the density of insects showed no consistent seasonal trend, although a general spring peak might have been evident if all the shrubs had been sampled during that time. In 1972, densities were highest in the spring.

There was no large difference in shrub arthropod densities between the two years.

Presence-absence data for the bajada arthropods are given in Table 83.

Table 67. Average numbers (individuals/m^3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the bajada on *Ephedra trifurca*. Percent of the total represented by each taxon is also given. Feeding types are indicated as follows: 1-plant suckers; 2-plant chewers, 3-nectivores; 4-other herbivores; 5-predators; 6-parasites; 7-other carnivores; O-unclassified

TAXON	FEEDING TYPE	H = 1.900 MAR-MAY NUMBERS	%	H = 0.2996 JUN-AUG NUMBERS	%	SEP-OCT* NUMBERS	%	NOV-FEB* NUMBERS	%
ARA	5	0.582	4.5	0.0	0.0	0.0	0.0	0.0	0.0
CCLCHR	2	0.388	3.0	0.0	0.0	0.0	0.0	0.0	0.0
COLCOC	5	0.388	3.0	0.0	0.0	0.0	0.0	0.0	0.0
COLDER	0	0.194	1.5	0.0	0.0	0.0	0.0	0.0	0.0
COLMAL	5	0.194	1.5	0.0	0.0	0.0	0.0	0.0	0.0
DIP	0	0.194	1.5	0.0	0.0	0.0	0.0	0.0	0.0
HEMLYG	1	0.194	1.5	0.0	0.0	0.0	0.0	0.0	0.0
HEMMIR	1	0.582	4.5	0.0	0.0	0.0	0.0	0.0	0.0
HOMCIC	1	0.194	1.5	0.0	0.0	0.0	0.0	0.0	0.0
HOMCIX	1	0.388	3.0	0.0	0.0	0.0	0.0	0.0	0.0
HOMFUL	1	0.0	0.0	0.150	50.0	0.0	0.0	0.0	0.0
HOMMEM	1	0.388	3.0	0.0	0.0	0.0	0.0	0.0	0.0
HOMPSY	1	2.523	19.4	0.0	0.0	0.0	0.0	0.0	0.0
HYM	0	6.017	46.3	0.0	0.0	0.0	0.0	0.0	0.0
HYMFOR	4	0.388	3.0	0.0	0.0	0.0	0.0	0.0	0.0
LEP	3	0.388	3.0	0.0	0.0	0.0	0.0	0.0	0.0
ORTMAN	5	0.0	0.0	0.150	50.0	0.0	0.0	0.0	0.0
FEEDING TYPE 1		4.270	32.8	0.150	50.0	0.0	0.0	0.0	0.0
FEEDING TYPE 2		0.388	3.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 3		0.388	3.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 4		0.388	3.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 5		1.165	9.0	0.150	50.0	0.0	0.0	0.0	0.0
FEEDING TYPE 6		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		6.405	49.3	0.0	0.0	0.0	0.0	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 68. Average numbers (ind/m^3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the bajada on *Fallugia paradoxa*. Percent of the total represented by each taxon is also given. Feeding types indicated as in Table 67

TAXON	FEEDING TYPE	MAP-MAY* NUMBERS	%	H = 2.517 JUN-AUG NUMBERS	%	H = 1.099 SEP-OCT NUMBERS	%	H = 0.9111 NOV-FEB NUMBERS	%
ARA	5	0.0	0.0	2.926	18.1	0.0	0.0	0.296	2.8
COL	0	0.0	0.0	0.152	0.9	0.0	0.0	0.099	0.9
CCLCHR	2	0.0	0.0	3.040	18.8	0.0	0.0	8.497	79.6
CCLCOC	5	0.0	0.0	0.152	0.9	0.0	0.0	0.0	0.0
CCLCUR	2	0.0	0.0	0.038	0.2	0.0	0.0	0.0	0.0
COLDER	0	0.0	0.0	0.076	0.5	0.0	0.0	0.0	0.0
CCLMAL	5	0.0	0.0	0.076	0.5	0.0	0.0	0.0	0.0
COLMOR	2	0.0	0.0	0.038	0.2	0.0	0.0	0.0	0.0
DIP	0	0.0	0.0	1.938	12.0	0.494	33.3	0.692	6.5
DIPCEC	4	0.0	0.0	0.114	0.7	0.0	0.0	0.0	0.0
DIPTAC	6	0.0	0.0	0.038	0.2	0.0	0.0	0.0	0.0
HEM	0	0.0	0.0	0.152	0.9	0.0	0.0	0.0	0.0
HEMCOR	1	0.0	0.0	0.038	0.2	0.0	0.0	0.0	0.0
HEMLYG	1	0.0	0.0	0.076	0.5	0.0	0.0	0.099	0.9
HEMMIR	1	0.0	0.0	0.076	0.5	0.0	0.0	0.0	0.0
HEMNAB	5	0.0	0.0	0.038	0.2	0.0	0.0	0.0	0.0
HEMPEN	1	0.0	0.0	0.0	0.0	0.0	0.0	0.099	0.9
HEMPYR	1	0.0	0.0	0.038	0.2	0.0	0.0	0.0	0.0
HEMTIN	1	0.0	0.0	0.342	2.1	0.494	33.3	0.198	1.9
HOM	1	0.0	0.0	0.0	0.0	0.0	0.0	0.099	0.9
HOMCIC	1	0.0	0.0	0.836	5.2	0.0	0.0	0.395	3.7
HOMFLA	1	0.0	0.0	0.304	1.9	0.0	0.0	0.0	0.0
HOMFUL	1	0.0	0.0	1.216	7.5	0.0	0.0	0.0	0.0
HOMISS	1	0.0	0.0	0.076	0.5	0.0	0.0	0.0	0.0
HOMPSY	1	0.0	0.0	1.444	8.9	0.0	0.0	0.099	0.9
HYM	0	0.0	0.0	0.798	4.9	0.0	0.0	0.0	0.0
HYMAPI	3	0.0	0.0	0.038	0.2	0.0	0.0	0.0	0.0
HYMCHA	6	0.0	0.0	0.038	0.2	0.0	0.0	0.0	0.0
HYMFOR	4	0.0	0.0	1.520	9.4	0.0	0.0	0.0	0.0
LEP	3	0.0	0.0	0.228	1.4	0.0	0.0	0.099	0.9
LEPGEO	0	0.0	0.0	0.076	0.5	0.0	0.0	0.0	0.0
NEUCHR	5	0.0	0.0	0.0	0.0	0.494	33.3	0.0	0.0
THYPLE	0	0.0	0.0	0.076	0.5	0.0	0.0	0.0	0.0
UNKNOW	0	0.0	0.0	0.152	0.9	0.0	0.0	0.0	0.0
FEEDING TYPE	1	0.0	0.0	4.446	27.5	0.494	33.3	0.988	9.3
FEEDING TYPE	2	0.0	0.0	3.116	19.3	0.0	0.0	8.497	79.6
FEEDING TYPE	3	0.0	0.0	0.266	1.6	0.0	0.0	0.099	0.9
FEEDING TYPE	4	0.0	0.0	1.634	10.1	0.0	0.0	0.0	0.0
FEEDING TYPE	5	0.0	0.0	3.192	19.8	0.494	33.3	0.296	2.8
FEEDING TYPE	6	0.0	0.0	0.076	0.5	0.0	0.0	0.0	0.0
FEEDING TYPE	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED	0	0.0	0.0	3.420	21.2	0.494	33.3	0.790	7.4

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 69. Average numbers (ind/m^3 of shrub) of the insect taxa sampled by D-Vac in 1972 on the bajada on *Fallugia paradoxa*. Percent of the total represented by each taxon is also given. Feeding types are indicated as in Table 67

		H = 1.777		H - 2.257		H = 2.069			
	FEEDING	MAR-MAY		JUN-AUG		SEP-OCT		NOV-FEB*	
TAXON	TYPE	NUMBERS	%	NUMBERS	%	NUMBERS	%	NUMBERS	%
ACA	4	0.0	0.0	0.0	0.0	1.093	1.1	0.0	0.0
ARA	5	8.264	4.8	1.311	5.1	4.009	3.9	0.0	0.0
COL	0	0.0	0.0	0.419	1.6	44.103	43.2	0.0	0.0
COLBRU	2	0.129	0.1	0.0	0.0	0.0	0.0	0.0	0.0
COLBUP	2	0.129	0.1	0.0	0.0	0.0	0.0	0.0	0.0
COLCHR	2	1.291	0.7	8.650	33.8	1.822	1.8	0.0	0.0
COLCOC	5	3.745	2.2	0.052	0.2	0.0	0.0	0.0	0.0
COLCRY	4	0.0	0.0	0.052	0.2	0.0	0.0	0.0	0.0
COLCUR	2	1.291	0.7	0.0	0.0	0.364	0.4	0.0	0.0
COLORT	5	0.0	0.0	0.0	0.0	1.458	1.4	0.0	0.0
COLPHA	2	0.646	0.4	0.052	0.2	0.0	0.0	0.0	0.0
DIP	0	1.291	0.7	0.419	1.6	1.093	1.1	0.0	0.0
DIPCEC	4	0.775	0.4	0.0	0.0	0.0	0.0	0.0	0.0
DIPCHI	1	0.387	0.2	0.0	0.0	0.0	0.0	0.0	0.0
DIPCHL	1	0.129	0.1	0.0	0.0	0.0	0.0	0.0	0.0
DIPDIA	4	0.258	0.1	0.0	0.0	0.0	0.0	0.0	0.0
DIPDRO	1	0.129	0.1	0.0	0.0	0.364	0.4	0.0	0.0
DIPMUS	4	0.129	0.1	0.0	0.0	0.364	0.4	0.0	0.0
DIPPIP	4	0.129	0.1	0.0	0.0	0.0	0.0	0.0	0.0
DIPTEP	4	0.387	0.2	0.0	0.0	0.0	0.0	0.0	0.0
DIPTIP	1	0.129	0.1	0.0	0.0	0.0	0.0	0.0	0.0
HEM	0	7.102	4.1	0.052	0.2	0.0	0.0	0.0	0.0
HEMANT	5	0.258	0.1	0.0	0.0	0.729	0.7	0.0	0.0
HEMBER	5	0.129	0.1	0.052	0.2	0.364	0.4	0.0	0.0
HEMLYG	1	0.0	0.0	0.052	0.2	0.0	0.0	0.0	0.0
HEMMIR	1	31.893	18.4	2.412	9.4	12.393	12.1	0.0	0.0
HEMNAB	5	0.0	0.0	0.052	0.2	0.0	0.0	0.0	0.0
HEMPEN	1	0.0	0.0	0.105	0.4	0.729	0.7	0.0	0.0
HEMTIN	1	0.387	0.2	0.210	0.8	1.093	1.1	0.0	0.0
HOMACA	1	0.0	0.0	0.262	1.0	0.0	0.0	0.0	0.0
HOMALE	1	4.519	2.6	0.0	0.0	1.093	1.1	0.0	0.0
HOMAPH	1	89.095	51.5	0.105	0.4	0.0	0.0	0.0	0.0
HOMCIC	1	6.973	4.0	0.786	3.1	8.748	8.6	0.0	0.0
HOMFLA	1	0.129	0.1	0.0	0.0	0.0	0.0	0.0	0.0
HOMISS	1	0.258	0.1	0.157	0.6	0.0	0.0	0.0	0.0
HOMPSY	1	1.162	0.7	0.629	2.5	1.093	1.1	0.0	0.0
HYM	0	0.129	0.1	1.049	4.1	0.364	0.4	0.0	0.0
HYMAND	3	0.129	0.1	0.0	0.0	0.0	0.0	0.0	0.0
HYMCHA	6	9.813	5.7	0.839	3.3	4.374	4.3	0.0	0.0
HYMCYN	7	0.258	0.1	0.0	0.0	0.0	0.0	0.0	0.0
HYMFOR	4	0.0	0.0	4.561	17.8	4.009	3.9	0.0	0.0
HYMHAL	3	0.0	0.0	0.052	0.2	0.364	0.4	0.0	0.0
HYMICH	6	0.516	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HYMSPH	5	0.258	0.1	0.0	0.0	0.0	0.0	0.0	0.0
LARVA	0	0.0	0.0	0.157	0.6	11.664	11.4	0.0	0.0
LEP	3	0.0	0.0	0.210	0.8	0.364	0.4	0.0	0.0
NEU	5	0.129	0.1	0.0	0.0	0.0	0.0	0.0	0.0
NEUCHR	5	0.129	0.1	2.464	9.6	0.0	0.0	0.0	0.0
NEUHEM	5	0.258	0.1	0.0	0.0	0.0	0.0	0.0	0.0
ORTACR	2	0.0	0.0	0.105	0.4	0.0	0.0	0.0	0.0
ORTMAN	5	0.0	0.0	0.262	1.0	0.0	0.0	0.0	0.0
ORTPHA	2	0.0	0.0	0.052	0.2	0.0	0.0	0.0	0.0
THYTHR	1	0.129	0.1	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE	1	135.320	78.3	4.718	18.4	25.514	25.0	0.0	0.0
FEEDING TYPE	2	3.486	2.0	8.860	34.6	2.187	2.1	0.0	0.0
FEEDING TYPE	3	0.129	0.1	0.262	1.0	0.729	0.7	0.0	0.0
FEEDING TYPE	4	1.679	1.0	4.614	18.0	5.467	5.4	0.0	0.0
FEEDING TYPE	5	13.170	7.6	4.194	16.4	6.561	6.4	0.0	0.0
FEEDING TYPE	6	10.330	6.0	0.839	3.3	4.374	4.3	0.0	0.0
FEEDING TYPE	7	0.258	0.1	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED	0	8.522	4.9	2.097	8.2	57.224	56.1	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 70. Average numbers (ind/m^3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the bajada on *Flourensia cernua*. Percent of the total represented by each taxon is also given. Feeding types are indicated as in Table 67.

TAXON	FEEDING TYPE	MAR-MAY* NUMBERS	%	H = 1.990 JUN-AUG NUMBERS	%	H = 0.7272 SEP-OCT NUMBERS	%	NOV-FEB* NUMBERS	%
ACA	4	0.0	0.0	0.052	0.1	0.0	0.0	0.0	0.0
ARA	5	0.0	0.0	1.084	3.0	0.0	0.0	0.0	0.0
COL	0	0.0	0.0	0.052	0.1	0.0	0.0	0.0	0.0
COLANO	2	0.0	0.0	0.052	0.1	0.0	0.0	0.0	0.0
COLBOS	2	0.0	0.0	0.052	0.1	0.0	0.0	0.0	0.0
COLBRU	2	0.0	0.0	0.052	0.1	0.0	0.0	0.0	0.0
COLCHR	2	0.0	0.0	0.877	2.4	0.0	0.0	0.0	0.0
COLCOC	5	0.0	0.0	0.155	0.4	0.0	0.0	0.0	0.0
COLCUR	2	0.0	0.0	0.206	0.6	0.0	0.0	0.0	0.0
COLMOR	2	0.0	0.0	0.052	0.1	0.0	0.0	0.0	0.0
DIP	0	0.0	0.0	2.064	5.7	6.186	1.0	0.0	0.0
DIPCEC	4	0.0	0.0	0.052	0.1	0.0	0.0	0.0	0.0
DIPOTI	4	0.0	0.0	0.103	0.3	0.0	0.0	0.0	0.0
HEM	0	0.0	0.0	0.052	0.1	0.0	0.0	0.0	0.0
HEMLYG	1	0.0	0.0	0.155	0.4	0.0	0.0	0.0	0.0
HEMMIR	1	0.0	0.0	0.155	0.4	0.0	0.0	0.0	0.0
HEMTIN	1	0.0	0.0	1.084	3.0	0.0	0.0	0.0	0.0
HOM	1	0.0	0.0	0.929	2.6	0.0	0.0	0.0	0.0
HOMCIC	1	0.0	0.0	0.258	0.7	2.062	0.3	0.0	0.0
HOMFLA	1	0.0	0.0	0.516	1.4	0.0	0.0	0.0	0.0
HOMFUL	1	0.0	0.0	0.413	1.1	0.0	0.0	0.0	0.0
HOMISS	1	0.0	0.0	1.032	2.9	0.0	0.0	0.0	0.0
HOMPSY	1	0.0	0.0	14.756	41.0	376.312	62.1	0.0	0.0
HYM	0	0.0	0.0	2.115	5.9	0.0	0.0	0.0	0.0
HYMBRA	6	0.0	0.0	0.103	0.3	0.0	0.0	0.0	0.0
HYMFOR	4	0.0	0.0	8.720	24.2	221.663	36.6	0.0	0.0
HYMPOM	3	0.0	0.0	0.052	0.1	0.0	0.0	0.0	0.0
LEP	3	0.0	0.0	0.206	0.6	0.0	0.0	0.0	0.0
NEUCHR	5	0.0	0.0	0.052	0.1	0.0	0.0	0.0	0.0
ORTACR	2	0.0	0.0	0.103	0.3	0.0	0.0	0.0	0.0
THY	1	0.0	0.0	0.103	0.3	0.0	0.0	0.0	0.0
THYPLE	0	0.0	0.0	0.310	0.9	0.0	0.0	0.0	0.0
FEEDING TYPE 1		0.0	0.0	19.400	53.9	378.373	62.4	0.0	0.0
FEEDING TYPE 2		0.0	0.0	1.393	3.9	0.0	0.0	0.0	0.0
FEEDING TYPE 3		0.0	0.0	0.258	0.7	0.0	0.0	0.0	0.0
FEEDING TYPE 4		0.0	0.0	8.926	24.8	221.663	36.6	0.0	0.0
FEEDING TYPE 5		0.0	0.0	1.290	3.6	0.0	0.0	0.0	0.0
FEEDING TYPE 6		0.0	0.0	0.103	0.3	0.0	0.0	0.0	0.0
FEEDING TYPE 7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		0.0	0.0	4.592	12.8	6.186	1.0	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 71. Average numbers (ind/m^3 of shrub) of the insect taxa sampled by D-Vac in 1972 on the bajada on *Flourensia cernua*. Percent of the total represented by each taxon is also given. Feeding types are indicated as in Table 67

TAXON	FEEDING TYPE	H = 1.485 MAR-MAY NUMBERS	%	H - 1.703 JUN-AUG NUMBERS	%	H = 1.107 SEP-OCT NUMBERS	%	NOV-FEB* NUMBERS	%
ACA	4	0.564	0.1	0.270	0.4	0.664	0.2	0.0	0.0
ARA	5	6.489	1.2	0.946	1.3	0.664	0.2	0.0	0.0
COL	0	0.282	0.1	2.297	3.0	2.655	0.7	0.0	0.0
COLCHR	2	0.282	0.1	0.0	0.0	0.0	0.0	0.0	0.0
COLCUR	2	0.564	0.1	0.405	0.5	1.991	0.6	0.0	0.0
COLMAL	5	1.129	0.2	0.0	0.0	0.0	0.0	0.0	0.0
COLNIT	2	0.282	0.1	0.0	0.0	0.0	0.0	0.0	0.0
DIP	0	1.975	0.4	0.946	1.3	1.328	0.4	0.0	0.0
DIPCEC	4	0.282	0.1	0.0	0.0	0.0	0.0	0.0	0.0
DIPTEP	4	2.821	0.5	0.0	0.0	0.0	0.0	0.0	0.0
HEM	0	12.978	2.3	0.0	0.0	2.655	0.7	0.0	0.0
HEMANT	5	2.257	0.4	0.135	0.2	0.0	0.0	0.0	0.0
HEMMIR	1	0.564	0.1	0.0	0.0	1.328	0.4	0.0	0.0
HEMPEN	1	0.282	0.1	0.0	0.0	0.0	0.0	0.0	0.0
HEMTIN	1	113.415	20.1	31.622	41.9	5.310	1.5	0.0	0.0
HOM	1	0.0	0.0	0.946	1.3	36.506	10.1	0.0	0.0
HOMACA	1	0.0	0.0	0.270	0.4	0.0	0.0	0.0	0.0
HOMAPH	1	0.282	0.1	0.0	0.0	0.0	0.0	0.0	0.0
HOMCER	1	0.282	0.1	0.0	0.0	0.0	0.0	0.0	0.0
HOMCIC	1	1.411	0.3	1.622	2.1	17.921	5.0	0.0	0.0
HOMCOC	1	76.739	13.6	0.0	0.0	0.0	0.0	0.0	0.0
HOMFLA	1	0.0	0.0	0.135	0.2	0.0	0.0	0.0	0.0
HOMISS	1	1.411	0.3	0.946	1.3	0.664	0.2	0.0	0.0
HOMPSY	1	307.237	54.5	24.325	32.2	258.863	72.0	0.0	0.0
HYM	0	0.0	0.0	0.405	0.5	0.0	0.0	0.0	0.0
HYMBRA	6	0.282	0.1	0.0	0.0	0.0	0.0	0.0	0.0
HYMCHA	6	21.442	3.8	0.811	1.1	1.991	0.6	0.0	0.0
HYMFOR	4	5.078	0.9	6.487	8.6	25.886	7.2	0.0	0.0
HYMHAL	3	0.0	0.0	1.081	1.4	0.664	0.2	0.0	0.0
HYMICH	6	0.282	0.1	0.0	0.0	0.0	0.0	0.0	0.0
LEP	3	0.564	0.1	0.135	0.2	0.664	0.2	0.0	0.0
NEUCHR	5	0.0	0.0	0.135	0.2	0.0	0.0	0.0	0.0
CRTGRY	2	0.282	0.1	0.0	0.0	0.0	0.0	0.0	0.0
THYPHL	1	2.257	0.4	1.351	1.8	0.0	0.0	0.0	0.0
THYTHR	1	1.693	0.3	0.0	0.0	0.0	0.0	0.0	0.0
UNKNOW	0	0.0	0.0	0.270	0.4	0.0	0.0	0.0	0.0
FEEDING TYPE 1		505.573	89.7	61.217	81.0	320.592	89.1	0.0	0.0
FEEDING TYPE 2		1.411	0.3	0.405	0.5	1.991	0.6	0.0	0.0
FEEDING TYPE 3		0.564	0.1	1.216	1.6	1.328	0.4	0.0	0.0
FEEDING TYPE 4		8.746	1.6	6.757	8.9	26.550	7.4	0.0	0.0
FEEDING TYPE 5		9.874	1.8	1.216	1.6	0.664	0.2	0.0	0.0
FEEDING TYPE 6		22.006	3.9	0.811	1.1	1.991	0.6	0.0	0.0
FEEDING TYPE 7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		15.235	2.7	3.919	5.2	6.638	1.8	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 72. Average numbers (ind/m^3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the bajada on *Larrea divaricata*. Percent of the total represented by each taxon is also given. Feeding types are indicated as in Table 67

TAXON	FEEDING TYPE	H = 2.244 MAR-MAY NUMBERS	%	H = 2.899 JUN-AUG NUMBERS	%	H - 2.265 SEP-OCT NUMBERS	%	H = 1.981 NOV-FEB NUMBERS	%
DRY	0	0.0	0.0	0.177	0.5	0.0	0.0	0.0	0.0
ARA	5	2.780	4.8	3.894	12.0	2.243	8.7	2.075	11.5
COL	0	1.390	2.4	0.354	1.1	0.0	0.0	0.0	0.0
COLBRU	2	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
COLCHR	2	0.0	0.0	0.177	0.5	1.121	4.3	0.0	0.0
COLCLE	5	1.390	2.4	0.088	0.3	0.0	0.0	0.0	0.0
COLCOC	5	4.170	7.1	0.177	0.5	1.121	4.3	0.0	0.0
COLCUR	2	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
COLMAL	5	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
COLMEL	2	2.780	4.8	0.0	0.0	0.0	0.0	0.0	0.0
DIP	0	0.0	0.0	2.212	6.8	2.243	8.7	1.038	5.8
DIPBOM	3	0.0	0.0	0.354	1.1	0.0	0.0	0.0	0.0
DIPDOL	5	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
DIPSTR	0	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
DIPSYR	5	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
DIPTAC	6	1.390	2.4	0.088	0.3	0.0	0.0	0.0	0.0
HEM	0	0.0	0.0	0.619	1.9	0.0	0.0	0.0	0.0
HEMLYG	1	0.0	0.0	0.354	1.1	3.364	13.0	0.0	0.0
HEMMIR	1	1.390	2.4	2.832	8.7	2.243	8.7	6.917	38.5
HEMPEN	1	0.0	0.0	0.088	0.3	0.0	0.0	0.346	1.9
HOM	1	0.0	0.0	2.212	6.8	0.0	0.0	0.0	0.0
HOMAPH	1	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
HOMCIC	1	2.780	4.8	4.955	15.2	4.486	17.4	1.038	5.8
HOMCOC	1	0.0	0.0	0.531	1.6	0.0	0.0	0.0	0.0
HOMFUL	1	0.0	0.0	2.124	6.5	0.0	0.0	0.0	0.0
HOMISS	1	0.0	0.0	2.832	8.7	0.0	0.0	0.0	0.0
HOMMEM	1	6.950	11.9	1.858	5.7	1.121	4.3	2.075	11.5
HOMPSY	1	8.340	14.3	0.265	0.8	2.243	8.7	1.038	5.8
HYM	0	1.390	2.4	2.212	6.8	4.486	17.4	1.383	7.7
HYMAND	3	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
HYMBRA	6	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
HYMFOR	4	18.070	31.0	1.062	3.3	1.121	4.3	1.383	7.7
HYMHAL	3	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
HYMICH	6	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
LEP	3	0.0	0.0	0.177	0.5	0.0	0.0	0.346	1.9
NEUCHR	5	0.0	0.0	0.0	0.0	0.0	0.0	0.346	1.9
ORTACR	2	4.170	7.1	1.150	3.5	0.0	0.0	0.0	0.0
ORTGRY	2	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
ORTMAN	5	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
ORTPHA	2	1.390	2.4	0.265	0.8	0.0	0.0	0.0	0.0
THY	1	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
TRIHYD	4	0.0	0.0	0.088	0.3	0.0	0.0	0.0	0.0
UNKNOW	0	0.0	0.0	0.177	0.5	0.0	0.0	0.0	0.0
FEEDING TYPE 1		19.460	33.3	18.229	56.0	13.458	52.2	11.414	63.5
FEEDING TYPE 2		8.340	14.3	1.858	5.7	1.121	4.3	0.0	0.0
FEEDING TYPE 3		0.0	0.0	0.708	2.2	0.0	0.0	0.346	1.9
FEEDING TYPE 4		18.070	31.0	1.150	3.5	1.121	4.3	1.383	7.7
FEEDING TYPE 5		8.340	14.3	4.513	13.9	3.364	13.0	2.421	13.5
FEEDING TYPE 6		1.390	2.4	0.265	0.8	0.0	0.0	0.0	0.0
FEEDING TYPE 7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		2.780	4.8	5.840	17.9	6.729	26.1	2.421	13.5

Table 73. Average numbers (ind/m^3 of shrub) of the insect taxa sampled by D-Vac in 1972 on the bajada on *Larrea divaricata*. Percent of the total represented by each taxon is also given. Feeding types are indicated as in Table 67

		H = 2.494		H = 1.937		H = 0.6730			
	FEEDING	MAR-MAY		JUN-AUG		SEP-OCT		NOV-FEB*	
TAXON	TYPE	NUMBERS	%	NUMBERS	%	NUMBERS	%	NUMBERS	%
ARA	5	8.011	9.9	2.662	10.0	0.0	0.0	0.0	0.0
COL	0	0.0	0.0	1.331	5.0	0.0	0.0	0.0	0.0
COLCHR	2	0.243	0.3	0.0	0.0	0.0	0.0	0.0	0.0
COLCLE	5	0.243	0.3	0.0	0.0	0.0	0.0	0.0	0.0
COLCUR	2	0.485	0.6	0.0	0.0	0.0	0.0	0.0	0.0
COLPHA	2	0.243	0.3	0.0	0.0	0.0	0.0	0.0	0.0
DIP	0	1.699	2.1	0.666	2.5	2.147	40.0	0.0	0.0
DIPCEC	4	1.214	1.5	0.0	0.0	0.0	0.0	0.0	0.0
DIPDIA	4	0.971	1.2	0.0	0.0	0.0	0.0	0.0	0.0
DIPDRO	1	0.243	0.3	0.0	0.0	0.0	0.0	0.0	0.0
DIPEMP	5	0.243	0.3	0.0	0.0	0.0	0.0	0.0	0.0
DIPTEP	4	0.243	0.3	0.0	0.0	0.0	0.0	0.0	0.0
EGGS	0	1.699	2.1	0.0	0.0	0.0	0.0	0.0	0.0
HEM	0	4.127	5.1	1.331	5.0	0.0	0.0	0.0	0.0
HEMMIR	1	29.857	37.0	1.331	5.0	0.0	0.0	0.0	0.0
HEMPEN	1	0.243	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HEMTIN	1	0.0	0.0	0.666	2.5	0.0	0.0	0.0	0.0
HOM	1	1.942	2.4	0.0	0.0	3.220	60.0	0.0	0.0
HOMALE	1	0.243	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HOMAPH	1	0.485	0.6	0.0	0.0	0.0	0.0	0.0	0.0
HOMCER	1	0.485	0.6	0.0	0.0	0.0	0.0	0.0	0.0
HOMCIC	1	7.525	9.3	3.328	12.5	0.0	0.0	0.0	0.0
HOMCOC	1	0.243	0.3	0.0	0.0	0.0	0.0	0.0	0.0
HOMDIC	1	0.728	0.9	0.0	0.0	0.0	0.0	0.0	0.0
HOMISS	1	0.485	0.6	0.0	0.0	0.0	0.0	0.0	0.0
HOMMEM	1	1.214	1.5	1.331	5.0	0.0	0.0	0.0	0.0
HOMPSY	1	3.884	4.8	1.331	5.0	0.0	0.0	0.0	0.0
HYM	0	0.0	0.0	1.331	5.0	0.0	0.0	0.0	0.0
HYMBRA	6	0.728	0.9	0.0	0.0	0.0	0.0	0.0	0.0
HYMCHA	6	5.098	6.3	0.0	0.0	0.0	0.0	0.0	0.0
HYMFOR	4	1.699	2.1	11.314	42.5	0.0	0.0	0.0	0.0
HYMICH	6	1.214	1.5	0.0	0.0	0.0	0.0	0.0	0.0
LEP	3	1.699	2.1	0.0	0.0	0.0	0.0	0.0	0.0
NEUCHR	5	0.485	0.6	0.0	0.0	0.0	0.0	0.0	0.0
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORTACR	2	1.214	1.5	0.0	0.0	0.0	0.0	0.0	0.0
THYAEO	1	0.728	0.9	0.0	0.0	0.0	0.0	0.0	0.0
THYPHL	1	0.243	0.3	0.0	0.0	0.0	0.0	0.0	0.0
THYTHR	1	0.485	0.6	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE	1	49.034	60.8	7.987	30.0	3.220	60.0	0.0	0.0
FEEDING TYPE	2	2.185	2.7	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE	3	1.699	2.1	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE	4	4.127	5.1	11.314	42.5	0.0	0.0	0.0	0.0
FEEDING TYPE	5	8.982	11.1	2.662	10.0	0.0	0.0	0.0	0.0
FEEDING TYPE	6	7.040	8.7	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED	0	7.525	9.3	4.659	17.5	2.147	40.0	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 74. Average numbers (ind/m3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the bajada on *Prosopis glandulosa*. Percent of the total represented by each taxon is also given. Feeding types are indicated as in Table 67

		H = 1.496		H = 2.033		H = 0.2562		H = 0.9365	
	FEEDING	MAR-MAY		JUN-AUG		SEP-OCT		NOV-FEB	
TAXON	TYPE	NUMBERS	%	NUMBERS	%	NUMBERS	%	NUMBERS	%
ACA	4	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
ARA	5	0.758	7.5	0.609	8.0	0.0	0.0	0.0	0.0
COL	0	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
COLANT	2	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
COLBRU	2	0.0	0.0	0.082	1.1	0.0	0.0	0.0	0.0
COLBUP	2	0.084	0.8	0.012	0.2	0.0	0.0	0.0	0.0
COLCHR	2	0.0	0.0	0.047	0.6	0.0	0.0	0.0	0.0
COLCOC	5	0.0	0.0	0.023	0.3	0.0	0.0	0.0	0.0
COLCUR	2	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
COLDER	0	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
COLMAL	5	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
COLMEL	2	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
COLTEN	4	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
DIP	0	0.084	0.8	0.281	3.7	0.265	7.1	0.078	11.1
DIPBOM	3	0.0	0.0	0.188	2.5	0.0	0.0	0.0	0.0
DIPCEC	4	0.0	0.0	0.047	0.6	0.0	0.0	0.0	0.0
DIPEMP	5	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
DIPSCE	4	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
DIPSYR	5	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
HEM	0	0.0	0.0	0.023	0.3	0.0	0.0	0.0	0.0
HEMLYG	1	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
HEMMEM	0	0.0	0.0	0.035	0.5	0.0	0.0	0.0	0.0
HEMMIR	1	0.337	3.3	0.023	0.3	0.0	0.0	0.0	0.0
HOM	1	0.0	0.0	0.035	0.5	0.0	0.0	0.0	0.0
HOMCOC	1	1.937	19.2	0.0	0.0	0.0	0.0	0.0	0.0
HOMFLA	1	0.0	0.0	0.070	0.9	0.0	0.0	0.0	0.0
HOMFUL	1	0.0	0.0	0.035	0.5	0.0	0.0	0.0	0.0
HOMISS	1	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
HOMMEM	1	0.758	7.5	0.105	1.4	0.0	0.0	0.0	0.0
HOMPSY	1	0.084	0.8	0.281	3.7	3.448	92.9	0.392	55.6
HYM	0	0.505	5.0	3.071	40.2	0.0	0.0	0.0	0.0
HYMAND	3	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
HYMBRA	6	0.0	0.0	0.070	0.9	0.0	0.0	0.0	0.0
HYMFOR	4	5.390	53.3	2.110	27.6	0.0	0.0	0.235	33.3
HYMPOM	3	0.0	0.0	0.023	0.3	0.0	0.0	0.0	0.0
HYMSPH	5	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
HYMTIP	5	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
LEP	3	0.084	0.8	0.023	0.3	0.0	0.0	0.0	0.0
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORTPHA	2	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
THY	1	0.084	0.8	0.223	2.9	0.0	0.0	0.0	0.0
TRIHYD	4	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
TRIMYD	4	0.0	0.0	0.012	0.2	0.0	0.0	0.0	0.0
FEEDING TYPE	1	3.201	31.7	0.797	10.4	3.448	92.9	0.392	55.6
FEEDING TYPE	2	0.084	0.8	0.188	2.5	0.0	0.0	0.0	0.0
FEEDING TYPE	3	0.084	0.8	0.246	3.2	0.0	0.0	0.0	0.0
FEEDING TYPE	4	5.390	53.3	2.215	29.0	0.0	0.0	0.235	33.3
FEEDING TYPE	5	0.758	7.5	0.691	9.0	0.0	0.0	0.0	0.0
FEEDING TYPE	6	0.0	0.0	0.070	0.9	0.0	0.0	0.0	0.0
FEEDING TYPE	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED	0	0.590	5.8	3.434	44.9	0.265	7.1	0.078	11.1

Table 75. Average numbers (ind/m3 of shrub) of the insect taxa sampled by D-Vac in 1972 on the bajada on *Prosopis glandulosa*. Percent of the total represented by each taxon is also given. Feeding types are indicated as in Table 67

TAXON	FEEDING TYPE	H = 0.9757 MAR-MAY NUMBERS	%	H = 0.7314 JUN-AUG NUMBERS	%	H = 1.388 SEP-OCT NUMBERS	%	NOV-FEB* NUMBERS	%
ARA	5	0.0	0.0	0.120	0.2	0.0	0.0	0.0	0.0
CCL	0	0.158	0.2	0.120	0.2	0.520	3.8	0.0	0.0
COLCHR	2	0.158	0.2	0.0	0.0	0.0	0.0	0.0	0.0
COLCUR	2	0.158	0.2	0.0	0.0	0.0	0.0	0.0	0.0
DIP	0	0.0	0.0	0.060	0.1	0.520	3.8	0.0	0.0
DIPDIA	4	0.158	0.2	0.0	0.0	0.0	0.0	0.0	0.0
HEMANT	5	0.158	0.2	0.0	0.0	0.0	0.0	0.0	0.0
HEMMIR	1	1.426	1.5	0.0	0.0	0.0	0.0	0.0	0.0
HEMTIN	1	0.158	0.2	0.0	0.0	0.0	0.0	0.0	0.0
HOMACA	1	0.0	0.0	0.120	0.2	0.0	0.0	0.0	0.0
HOMAPH	1	0.158	0.2	0.0	0.0	0.0	0.0	0.0	0.0
HOMCIC	1	0.792	0.8	0.0	0.0	4.158	30.8	0.0	0.0
HOMFLA	1	0.0	0.0	0.120	0.2	0.0	0.0	0.0	0.0
HOMMEM	1	0.0	0.0	0.060	0.1	0.0	0.0	0.0	0.0
HOMPSY	1	69.422	72.5	39.976	74.6	5.717	42.3	0.0	0.0
HYM	0	0.0	0.0	0.120	0.2	0.520	3.8	0.0	0.0
HYMAND	3	0.158	0.2	0.0	0.0	0.0	0.0	0.0	0.0
HYMCHA	6	14.582	15.2	1.257	2.3	0.0	0.0	0.0	0.0
HYMFOR	4	6.498	6.8	11.430	21.3	2.079	15.4	0.0	0.0
LEP	3	0.0	0.0	0.060	0.1	0.0	0.0	0.0	0.0
NEU	5	0.0	0.0	0.060	0.1	0.0	0.0	0.0	0.0
THYPHL	1	0.0	0.0	0.060	0.1	0.0	0.0	0.0	0.0
THYTHR	1	1.743	1.8	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 1		73.702	77.0	40.335	75.3	9.874	73.1	0.0	0.0
FEEDING TYPE 2		0.317	0.3	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 3		0.158	0.2	0.060	0.1	0.0	0.0	0.0	0.0
FEEDING TYPE 4		6.657	7.0	11.430	21.3	2.079	15.4	0.0	0.0
FEEDING TYPE 5		0.158	0.2	0.180	0.3	0.0	0.0	0.0	0.0
FEEDING TYPE 6		14.582	15.2	1.257	2.3	0.0	0.0	0.0	0.0
FEEDING TYPE 7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0		0.158	0.2	0.299	0.6	1.559	11.5	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 76. Average numbers (ind/m3 of shrub) of the insect taxa sampled by D-Vac in 1971 on the bajada on *Xanthocephlum sarothrae*. Percent of the total represented by each taxon is also given. Feeding types are indicated as in Table 67

TAXON	FEEDING TYPE	MAR-MAY* NUMBERS	%	H = 2.261 JUN-AUG NUMBERS	%	H = 1.838 SEP-OCT NUMBERS	%	NOV-FEB* NUMBERS	%
ARA	5	0.0	0.0	2.470	6.8	38.181	16.2	0.0	0.0
COL	0	0.0	0.0	1.235	3.4	0.0	0.0	0.0	0.0
COLCAR	5	0.0	0.0	0.0	0.0	3.471	1.5	0.0	0.0
COLCHR	2	0.0	0.0	0.618	1.7	3.471	1.5	0.0	0.0
COLCUR	2	0.0	0.0	1.853	5.1	3.471	1.5	0.0	0.0
DIP	0	0.0	0.0	4.323	11.9	17.355	7.4	0.0	0.0
DIPDOL	5	0.0	0.0	0.618	1.7	0.0	0.0	0.0	0.0
DIPMUS	4	0.0	0.0	0.618	1.7	0.0	0.0	0.0	0.0
HEMLYG	1	0.0	0.0	1.853	5.1	0.0	0.0	0.0	0.0
HEMMIR	1	0.0	0.0	0.0	0.0	90.246	38.2	0.0	0.0
HEMNAB	5	0.0	0.0	1.235	3.4	0.0	0.0	0.0	0.0
HEMTIN	1	0.0	0.0	0.618	1.7	6.942	2.9	0.0	0.0
HOMCIC	1	0.0	0.0	9.881	27.1	10.413	4.4	0.0	0.0
HOMPSY	1	0.0	0.0	0.0	0.0	6.942	2.9	0.0	0.0
HYM	0	0.0	0.0	3.088	8.5	3.471	1.5	0.0	0.0
HYMFOR	4	0.0	0.0	6.793	18.6	48.594	20.6	0.0	0.0
LEP	3	0.0	0.0	0.618	1.7	0.0	0.0	0.0	0.0
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ODOCOE	5	0.0	0.0	0.618	1.7	0.0	0.0	0.0	0.0
ORTMAN	5	0.0	0.0	0.0	0.0	3.471	1.5	0.0	0.0

Table 76, continued

FEEDING TYPE 1	0.0	0.0	12.351	33.9	114.543	48.5	0.0	0.0
FEEDING TYPE 2	0.0	0.0	2.470	6.8	6.942	2.9	0.0	0.0
FEEDING TYPE 3	0.0	0.0	0.618	1.7	0.0	0.0	0.0	0.0
FEEDING TYPE 4	0.0	0.0	7.411	20.3	48.594	20.6	0.0	0.0
FEEDING TYPE 5	0.0	0.0	4.941	13.6	45.123	19.1	0.0	0.0
FEEDING TYPE 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED 0	0.0	0.0	8.646	23.7	20.826	8.8	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 77. Average numbers ind/m3 of shrub) of the insect taxa sampled by D-Vac in 1972 on the bajada on *Xanthocephlum sarothrae.* Percent of the total represented by each taxon is also given. Feeding types are indicated as in Table 67

TAXON	FEEDING TYPE	H = 2.024 MAR-MAY NUMBERS	%	H - 2.071 JUN-AUG NUMBERS	%	H = 2.525 SEP-OCT NUMBERS	%	NOV-FEB* NUMBERS	%
ACA	4	0.0	0.0	0.0	0.0	1.065	1.3	0.0	0.0
ARA	5	1.417	1.1	2.706	3.7	4.260	5.1	0.0	0.0
COL	0	1.417	1.1	2.706	3.7	7.454	9.0	0.0	0.0
DIP	0	4.723	3.6	2.706	3.7	5.324	6.4	0.0	0.0
DIPMUS	4	0.0	0.0	0.0	0.0	1.065	1.3	0.0	0.0
HEMANT	5	0.945	0.7	0.0	0.0	0.0	0.0	0.0	0.0
HEMBER	5	1.417	1.1	0.0	0.0	0.0	0.0	0.0	0.0
HEMCOR	1	2.361	1.8	0.0	0.0	0.0	0.0	0.0	0.0
HEMMIR	1	2.361	1.8	1.804	2.5	7.454	9.0	0.0	0.0
HEMPEN	1	0.945	0.7	0.0	0.0	0.0	0.0	0.0	0.0
HEMTIN	1	0.945	0.7	10.823	14.8	5.324	6.4	0.0	0.0
HOM	1	1.417	1.1	0.902	1.2	1.065	1.3	0.0	0.0
HOMACA	1	0.0	0.0	0.902	1.2	0.0	0.0	0.0	0.0
HOMAPH	1	0.945	0.7	0.0	0.0	0.0	0.0	0.0	0.0
HOMCIC	1	34.949	26.7	24.352	33.3	12.779	15.4	0.0	0.0
HOMDEL	1	0.0	0.0	0.0	0.0	3.195	3.8	0.0	0.0
HOMISS	1	4.251	3.2	0.902	1.2	0.0	0.0	0.0	0.0
HOMPSY	1	44.395	33.9	0.902	1.2	6.389	7.7	0.0	0.0
HYM	0	2.361	1.8	0.0	0.0	1.065	1.3	0.0	0.0
HYMBRA	6	0.0	0.0	0.0	0.0	1.065	1.3	0.0	0.0
HYMCHA	6	1.417	1.1	4.510	6.2	2.130	2.6	0.0	0.0
HYMFOR	4	19.364	14.8	15.333	21.0	17.038	20.5	0.0	0.0
HYMHAL	3	1.889	1.4	0.0	0.0	3.195	3.8	0.0	0.0
HYMPRO	7	0.472	0.4	0.0	0.0	0.0	0.0	0.0	0.0
LARVA	0	0.945	0.7	1.804	2.5	2.130	2.6	0.0	0.0
LEP	3	0.0	0.0	0.902	1.2	0.0	0.0	0.0	0.0
NEUCHR	5	0.0	0.0	0.902	1.2	0.0	0.0	0.0	0.0
NONE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORTACR	2	0.472	0.4	0.0	0.0	0.0	0.0	0.0	0.0
ORTGRY	2	1.417	1.1	0.0	0.0	0.0	0.0	0.0	0.0
THYPHL	1	0.0	0.0	0.902	1.2	0.0	0.0	0.0	0.0
UNKNOW	0	0.0	0.0	0.0	0.0	1.065	1.3	0.0	0.0
FEEDING TYPE	1	92.567	70.8	41.488	56.8	36.206	43.6	0.0	0.0
FEEDING TYPE	2	1.889	1.4	0.0	0.0	0.0	0.0	0.0	0.0
FEEDING TYPE	3	1.889	1.4	0.902	1.2	3.195	3.8	0.0	0.0
FEEDING TYPE	4	19.364	14.8	15.333	21.0	19.168	23.1	0.0	0.0
FEEDING TYPE	5	3.778	2.9	3.608	4.9	4.260	5.1	0.0	0.0
FEEDING TYPE	6	1.417	1.1	4.510	6.2	3.195	3.8	0.0	0.0
FEEDING TYPE	7	0.472	0.4	0.0	0.0	0.0	0.0	0.0	0.0
UNCLASSIFIED	0	9.446	7.2	7.215	9.9	17.038	20.5	0.0	0.0

* NO SAMPLES WERE TAKEN DURING THIS PERIOD

Table 78. Average numbers (ind/ha) and biomass (g/ha) of the feeding types of arthropods sampled by D-Vac in 1972 on the bajada on *Fallugia paradoxa*. Percent of the total represented by each type is also given

	MAR				MAY				JUN			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	1553.5	82.1	0.134	35.7	2060.5	81.5	0.392	49.0	93.5	13.4	0.039	1.4
CHEWERS	0.0	0.0	0.0	0.0	19.8	0.8	0.032	4.0	381.9	54.7	2.428	89.5
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.5	2.8	0.006	0.2
CARNIVORES												
PREDATORS	53.8	2.8	0.036	9.5	151.9	6.0	0.211	26.4	202.7	29.1	0.240	8.8
PARASITES	69.1	3.7	0.011	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	215.1	11.4	0.194	51.7	297.2	11.7	0.165	20.6	0.0	0.0	0.0	0.0
TOTALS												
HERBIVORES	1553.5	82.1	0.134	35.7	2080.3	82.2	0.424	53.0	495.0	70.9	2.472	91.2
CARNIVORES	338.0	17.9	0.241	64.3	449.1	17.8	0.376	47.0	202.7	29.1	0.240	8.8

	JUL				AUG				SEP			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	42.2	14.0	0.033	6.5	2.6	12.5	0.0	0.0	260.4	27.0	0.263	14.7
CHEWERS	118.7	39.4	0.418	81.6	18.5	87.5	0.077	100.0	571.1	59.1	1.430	79.9
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4	0.9	0.013	0.7
OTHERS	113.8	37.8	0.029	5.7	0.0	0.0	0.0	0.0	84.0	8.7	0.050	2.8
CARNIVORES												
PREDATORS	18.6	6.2	0.029	5.6	0.0	0.0	0.0	0.0	37.8	3.9	0.029	1.6
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	7.3	2.6	0.002	0.5	0.0	0.0	0.0	0.0	4.2	0.4	0.005	0.3
TOTALS												
HERBIVORES	274.6	91.2	0.481	93.9	21.1	100.0	0.077	100.0	923.9	95.7	1.755	98.1
CARNIVORES	26.5	8.8	0.031	6.1	0.0	0.0	0.0	0.0	42.0	4.3	0.034	1.9

Table 79. Average numbers (ind/ha) and biomass (g/ha) of the feeding types of arthropods sampled by D-Vac in 1972 on the bajada on *Flourensia cernua*. Percent of the total represented by each type is also given

	MAR				MAY				JUN			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	66848.9	91.4	9.425	84.5	26092.9	88.5	3.078	83.7	11602.5	91.4	2.654	47.0
CHEWERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	310.4	2.4	2.515	44.5
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	271.6	2.1	0.407	7.2
OTHERS	910.9	1.2	0.406	3.6	0.0	0.0	0.0	0.0	504.5	4.0	0.074	1.3
CARNIVORES												
PREDATORS	0.0	0.0	0.0	0.0	364.9	1.2	0.310	8.4	0.0	0.0	0.0	0.0
PARASITES	3293.4	4.5	0.203	1.8	1064.4	3.6	0.027	0.7	0.0	0.0	0.0	0.0
OTHERS	2102.2	2.9	1.114	10.0	1976.7	6.7	0.262	7.1	0.0	0.0	0.0	0.0
TOTALS												
HERBIVORES	67759.9	92.6	9.831	88.2	26092.9	88.5	3.078	83.7	12689.0	100.0	5.650	100.0
CARNIVORES	5395.6	7.4	1.317	11.8	3406.1	11.5	0.599	16.3	0.0	0.0	0.0	0.0

	JUL				AUG				SEP			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	2274.6	74.1	0.265	53.8	440.7	30.4	0.041	14.3	58280.8	96.2	3.565	61.0
CHEWERS	22.1	0.7	0.020	4.0	94.4	6.5	0.022	7.7	0.0	0.0	0.0	0.0
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	485.8	15.8	0.097	19.7	692.6	47.8	0.164	57.1	1576.4	2.6	2.135	36.5
CARNIVORES												
PREDATORS	44.2	1.4	0.046	9.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	242.9	7.9	0.064	13.0	220.4	15.2	0.060	20.9	716.6	1.2	0.148	2.5
TOTALS												
HERBIVORES	2782.5	90.6	0.382	77.6	1227.8	84.8	0.227	79.1	59857.3	98.8	5.704	97.5
CARNIVORES	287.1	9.4	0.110	22.4	220.4	15.2	0.060	20.9	716.6	1.2	0.148	2.5

Table 80. Average numbers (ind/ha) and biomass (g/ha) of the feeding types of arthropods sampled by D-Vac in 1972 on the bajada on *Larrea divaricata*. Percent of the total represented by each type is also given

	MAR				APR				MAY			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	39027.1	74.7	16.865	63.0	53022.2	67.5	43.665	60.1	16708.3	47.9	9.939	53.0
CHEWERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	864.2	2.5	0.835	4.5
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2304.6	6.6	2.564	13.7
CARNIVORES												
PREDATORS	0.0	0.0	0.0	0.0	3638.8	4.6	2.859	3.9	3456.9	9.9	3.601	19.2
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	13241.3	25.3	9.896	37.0	21832.7	27.8	26.147	36.0	11522.9	33.1	1.815	9.7
TOTALS												
HERBIVORES	39027.1	74.7	16.865	63.0	53022.2	67.5	43.665	60.1	19877.1	57.0	13.338	71.1
CARNIVORES	13241.3	25.3	9.896	37.0	25471.5	32.5	29.006	39.9	14979.8	43.0	5.416	28.9

	JUL				AUG				SEP			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	7986.6	47.4	4.792	75.0	2199.1	15.8	0.440	6.5	1295.0	50.0	0.842	14.1
CHEWERS	0.0	0.0	0.0	0.0	1466.1	10.5	2.859	41.9	0.0	0.0	0.0	0.0
NECTIVORES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	6211.8	36.8	1.065	16.7	9529.4	68.4	3.152	46.2	1295.0	50.0	5.115	85.9
CARNIVORES												
PREDATORS	2662.2	15.8	0.532	8.3	733.0	5.3	0.367	5.4	0.0	0.0	0.0	0.0
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS												
HERBIVORES	14198.4	84.2	5.857	91.7	13194.5	94.7	6.451	94.6	2590.0	100.0	5.957	100.0
CARNIVORES	2662.2	15.8	0.532	8.3	733.0	5.3	0.367	5.4	0.0	0.0	0.0	0.0

Table 81. Average numbers (ind/ha) and biomass (g/ha) of the feeding types of arthropods sampled by D-Vac in 1972 on the bajada on *Prosopis glandulosa*. Percent of the total represented by each type is also given

	MAY				JUL				AUG			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	9981.0	76.9	1.166	80.6	2173.7	61.9	0.617	47.0	7235.5	72.8	4.285	93.7
CHEWERS	0.0	0.0	0.0	0.0	48.3	1.4	0.039	2.9	0.0	0.0	0.0	0.0
NECTIVORES	0.0	0.0	0.0	0.0	16.1	0.5	0.043	3.3	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	1272.0	36.2	0.613	46.7	2700.1	27.2	0.286	6.3
CARNIVORES												
PREDATORS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PARASITES	1957.9	15.1	0.094	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	1042.8	8.0	0.187	12.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS												
HERBIVORES	9981.0	76.9	1.166	80.6	3510.0	100.0	1.312	100.0	9935.6	100.0	4.571	100.0
CARNIVORES	3000.7	23.1	0.281	19.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	SEP			
	NUMBERS	%	BIOMASS	%
HERBIVORES				
SUCKERS	1450.6	77.8	0.145	24.1
CHEWERS	0.0	0.0	0.0	0.0
NECTIVORES	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0
CARNIVORES				
PREDATORS	0.0	0.0	0.0	0.0
PARASITES	0.0	0.0	0.0	0.0
OTHERS	414.5	22.2	0.456	75.9
TOTALS				
HERBIVORES	1450.6	77.8	0.145	24.1
CARNIVORES	414.5	22.2	0.456	75.9

Table 82. Average numbers (ind/ha) and biomass (g/ha) of the feeding types of arthropods sampled by D-Vac in 1972 on the bajada on *Xanthocephlum sarothrae*. Percent of the total represented by each type is also given

	MAY				JUL				AUG			
	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%	NUMBERS	%	BIOMASS	%
HERBIVORES												
SUCKERS	3648.0	75.4	1.663	69.9	1655.7	65.3	0.550	60.5	0.0	0.0	0.0	0.0
CHEWERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NECTIVORES	166.8	3.4	0.167	7.0	35.2	1.4	0.169	18.6	0.0	0.0	0.0	0.0
OTHERS	416.9	8.6	0.129	5.4	387.5	15.3	0.035	3.9	581.3	100.0	0.026	100.0
CARNIVORES												
PREDATORS	125.1	2.6	0.175	7.4	140.9	5.6	0.078	8.5	0.0	0.0	0.0	0.0
PARASITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	479.5	9.9	0.246	10.3	317.0	12.5	0.078	8.5	0.0	0.0	0.0	0.0
TOTALS												
HERBIVORES	4231.7	87.5	1.959	82.3	2078.4	81.9	0.754	82.9	581.3	100.0	0.026	100.0
CARNIVORES	604.5	12.5	0.421	17.7	458.0	18.1	0.155	17.1	0.0	0.0	0.0	0.0

	SEP			
	NUMBERS	%	BIOMASS	%
HERBIVORES				
SUCKERS	1023.2	50.6	0.165	18.9
CHEWERS	74.9	3.7	0.022	2.6
NECTIVORES	0.0	0.0	0.0	0.0
OTHERS	424.3	21.0	0.581	66.6
CARNIVORES				
PREDATORS	174.7	8.6	0.047	5.4
PARASITES	0.0	0.0	0.0	0.0
OTHERS	324.4	16.0	0.057	6.6
TOTALS				
HERBIVORES	1522.4	75.3	0.769	88.0
CARNIVORES	499.1	24.7	0.105	12.0

Table 83. Presence/absence data for arthropods sampled by D-Vac. Presence is indicated by the following legend: P1-playa 1971; P2-playa 1972; B1-bajada 1971; B2-bajada 1972

	PROSOPIS GLANDULOSA	EPHEDRA TRIFURCA	XANTHOCEPHLUM SAROTHRAE	FLOURENSIA CERNUA	FALLUGIA PARADOXA	LARREA DIVARICATA
ACA	B1		B2	B1 B2	B2	
ARA	B1 B2	B1	B1 B2	B1 B2	B1 B2	B1 B2
COL	B1 B2		B1 B2	B1 B2	B1 B2	B1 B2
COLANO				B1		
COLANT	B1					
COLBOS				B1		
COLBRU	B1			B1	B2	B1
COLBUP	B1				B2	
COLCAR			B1			
COLCER						
COLCHR	B1 B2	B1	B1	B1 B2	B1 B2	B1 B2
COLCLE						B1 B2
COLCOC	B1	B1		B1	B1 B2	B1
COLCRY					B2	
COLCUR	B1 B2		B1	B1 B2	B1 B2	B1 B2
COLDER	B1	B1			B1	
COLMAL	B1	B1		B2	B1	B1
COLMEL	B1					B1
COLMOR				B1	B1	
COLNIT				B2		
COLORT					B2	
COLPHA					B2	B2
COLSTA						
COLTEN	B1					
DIP	B1 B2	B1	B1 B2	B1 B2	B1 B2	B1 B2
DIPAGR						
DIPBOM	B1					B1
DIPCEC	B1			B1 B2	B1 B2	B2
DIPCER						
DIPCHI					B2	
DIPCHL					B2	
DIPCUL						
DIPDIA	B2				B2	B2
DIPDOL			B1			B1
DIPDRO					B2	B2

Table 83, continued

DIPEMP	B1					B2
DIPMUS			B1 B2		B2	
DIPMYC						
DIPOTI				B1		
DIPPHO						
DIPPIP					B2	
DIPSAR						
DIPSCE	B1					
DIPSEP						
DIPSTR						B1
DIPSYR	B1					B1
DIPTAC					B1	B1
DIPTEP				B2	B2	B2
DIPTIP					B2	
HEM	B1			B1 B2	B1 B2	B1 B2
HEMANT	B2		B2	B2	B2	
HEMBER			B2		B2	
HEMCOR			B2		B1	
HEMLYG	B1	B1	B1	B1	B1 B2	B1
HEMMEM	B1					
HEMMIR	B1 B2	B1	B1 B2	B1 B2	B1 B2	B1 B2
HEMNAB			B1		B1 B2	
HEMPEN			B2	B2	B1 B2	B1 B2
HEMPYR					B1	
HEMRED						
HEMTIN	B2		B1 B2	B1 B2	B1 B2	B2
HOM	B1		B2	B1 B2	B1	B1 B2
HOMACA	B2		B2	B2	B2	
HOMALE					B2	B2
HOMAPH	B2		B2	B2	B2	B1 B2
HOMCER				B2		B2
HOMCIC	B2	B1	B1 B2	B1 B2	B1 B2	B1 B2
HOMCIX		B1				
HOMCOC	B1			B2		B1 B2
HOMDEL			B2			
HOMDIC						B2
HOMFLA	B1 B2			B1 B2	B1 B2	
HOMFUL	B1	B1		B1	B1	B1
HOMISS	B1		B2	B1 B2	B1 B2	B1 B2
HOMMEM	B1 B2	B1				B1 B2
HOMPSY	B1 B2	B1	B1 B2	B1 B2	B1 B2	B1 B2
HYM	B1 B2	B1	B1 B2	B1 B2	B1 B2	B1 B2
HYMAND	B1 B2				B2	B1
HYMAPI					B1	
HYMBRA	B1		B2	B1 B2		B1 B2
HYMCHA	B2		B2	B2	B1 B2	B2
HYMCYN					B2	
HYMFOR	B1 B2	B1	B1 B2	B1 B2	B1 B2	B1 B2
HYMHAL			B2	B2	B2	B1
HYMICH				B2	B2	B1 B2
HYMMEG						
HYMPLA						
HYMPOM	B1			B1		
HYMPRO			B2			
HYMSPH	B1				B2	
HYMTIP	B1					
ISO						
LEP	B1 B2	B1	B1 B2	B1 B2	B1 B2	B1 B2
LEPGEO					B1	
LEPMIC						
NEU	B2				B2	
NEUCHR			B2	B1 B2	B1 B2	B1 B2
NEUCON						
NEUHEM					B2	
NEUMYR						
ODOCOE			B1			
ORT						
ORTACR			B2	B1	B2	B1 B2
ORTGRY			B2	B2		B1
ORTMAN		B1	B1		B2	B1
ORTPHA	B1				B2	B1
THY	B1			B1		B1
THYAEO						B2
THYPHL	B2		B2	B1 B2	B1	B2
THYTHR	B2			B2	B2	B2
TRI						
TRIHYD	B1					B1
TRIMYD	B1					

II.C.2. Insect Transects

Potentially important insects which could not be adequately sampled by the D-Vac or can-trap methods on the bajada were observed using the insect transect method as described previously in this report for insects on the playa.

Results on butterflies, small moths and grasshoppers obtained from these transect studies are shown in Table 84.

As was noted for the playa, estimates were dependent upon temperature. Transects walked early in the morning or on cool, overcast days yielded lower estimates than those walked around 11:00 a.m.

In 1973 the populations of butterflies and small moths were higher in April while for grasshoppers the high was in May. In general these populations decreased through the summer.

II.C.3. Ground Beetles

Population densities of ground beetles (*Eleodes longicollis*, *Stenomorpha* sp. and *E. caudatum*) were estimated using recapture data collected from the pit-fall trapping grids established on the bajada. Captured beetles were marked on the pronotum with enamel paint for ease of identification. Colors used were changed after each successive two-week sampling period. Densities were calculated using the Lincoln Index on a per hectare basis.

Monthly population density estimates for ground beetles from June to November of 1973 are given in Table 85.

Table 85. Population density estimates for ground beetles on the bajada site

Date	#Precensus	#Census	#Recaptured	Density Estimate*± Standard Error †
Eleodes longicollis				
Jun 01	17	10	01	100.60 ± 30.18
Jul 01	07	13	00	53.85 ± 14.35 †
Aug 01	12	14	00	99.40 ± 25.62 †
Sep 01	12	53	05	75.15 ± 4.40
Oct 01	42	45	02	559.17 ± 57.63
Nov 01	41	54	01	1310.10 ±176.63
Stenomorpha sp.				
Jun 01	01	07	00	4.14 ± 1.45 †
Jul 01	06	116	02	205.92 ± 13.40
Aug 01	103	14	00	853.25 ±219.76 †
Sep 01	13	23	00	176.92 ± 36.08 †
Oct 01	18	01	00	10.65 ± -0- †
Nov 01	01	02	00	1.18 ± 0.59 †
Eleodes caudatum				
Jun 01	01	01	00	0.59 ± -0- †
Jul 01	01	01	00	0.59 ± -0- †
Aug 01	01	01	00	0.59 ± -0- †
Sep 01	01	02	00	1.18 ± 0.59 †
Oct 01	02	02	00	2.37 ± 1.18 †
Nov 01	02	00	00	-0- ± -0- †

* Density estimates with recaptures equal to 0 were calculated using 1, and are per hectare.
† Standard error calculated using T=1 for all T=0.

Table 84. Insect population estimates based on transects on the bajada. Numbers given in individuals per hectare; biomass in grams per hectare

		1972		1973					
		Jul	Aug	Apr	May	Jun	Jul	Aug	Sep
butterflies	numbers	9	1	29	7	12	2	9	1
	biomass	0.24	-0-	0.77	0.19	3.2	0.05	0.24	0.03
small moths	numbers	40	40	81	65	32	3	40	-0-
		no biomass data is available for these small moths.							
grasshoppers	numbers	682	80	0	199	78	145	100	88
	biomass	86.0	10.0	-0-	25.0	9.8	145.0	100.0	11.0

Eleodes longicollis was the largest of the three ground beetle populations. The population density of this species decreased from 100.6 in June to a low of 53.9 in July, then increased by a facor of almost 26 to 1310.1 by November.

In comparison to *E. longicollis*, *Stenomorpha* sp. increased from 4.14 in June to 853.3 in August, then decreased by a factor of almost 854 to a low of 1.18 by November.

Eleodes caudatum represents the smallest population of these three species. The population density of this species increased from 0.59 in June to 2.37 in October, then decreased to a low of 0 in November.

II.C.4. Ground-Dwelling Arthropods

Densities of ground arthropods other than *Eleodes longicollis*, *E. caudatum* and *Stenomorpha* sp. were estimated using recapture data from a pit-fall grid established on the bajada. Captured arthropods were marked with enamel paint as described in Whitford et al., 1973. Biomass was determined by dry-weighting samples of arthropods which had been stored in 70% ethanol.

Monthly densities and biomass estimations of ground arthropods captured from May to December, 1973 are given in Table 86. Many arthropod groups are only present during short periods of time during the year. Phalangida, Phalicidae, Thelatrodectus, Therapsidae, Scorpionidae, Polyphagidae, Gryllacridae, Gryllidae, Pompalidae, Multillidae, Tenebrionidae, and others are active over a longer period of time. The appearance of some species appear to be at least partially correlated with the first summer rains.

Table 86. Densities and biomass of ground arthropods captured on the one-hectare bajada pit-fall grid. The top number equals the density and the bottom the dry weight biomass

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dermistidae, *Dermistis* sp.		1 0.02						
Lepidoptera, larvae		1 0.04		1 0.03	2 0.142			
Coleoptera, Histeridae, *Reninus* sp.		11 0.19						
Araenida, spider unknown		5 0.07	4 0.10	4 0.04				
Coleoptera, Scarabidae, *Trox* sp.		5 0.83	1 0.17					
Phalangida, daddy long-legs		4 0.046						
Diptera, Sarcophagidae		1 0.01						
Hymenoptera, Crysididae		1 0.004						
Araenida, Salticidae		1 0.004	2 0.18					
Coleoptera, Scarabidae BRD ETH			1 1.03	3 0.25				
Coleoptera Meloidae				2 0.05				

Table 86, continued

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Coleoptera, Meloidae, EPI LAU			2 0.09					
Coleoptera, Meloidae, CYS WIS		1 0.25						
Araneida, Losascasceledae			1 0.009					
Coleoptera, Tenebrionidae, RUG ELY				10 1.5				
Orthoptera, B11								
Hymenoptera, Sphierdae, BLU MET				1 1.1				
Coleoptera, Melordae, Pyralch				2 0.13				
Hymenoptera, Halicidae				1 0.0097				
Araneida, Thomisidae					2 0.02			
Orthoptera, Gryllacrididae					4 1.04	12 1.74		
Arachnida, Phalangida				2 0.01	25 0.112	9 0.064	8 0.062	
Hemiptera (lt. brown)								
Hemiptera, Lygaeidae				1 0.0044				
Araneida, Phalicidae	33 0.084	144 0,30	100 0.34	91 0.16	40 0.067	16 0.023	2 0.002	
Araneida Lycosidae								
Araneida, Thelatrodectus Macitans (black widow)		1 0.02	2 0.024	8 0.15	2 0.0145			
Araneida Clubionedae	1 0.01				3 0.0156			
Araneida, Lycosidae		4 0.49			1 0.07			
Arachnida, Mastigoproctus gigantea Thelypisida (vinegaroon)			3 3.0	2 5.26	1 2.126			
Arachnida, Theraphosidae (tarantula)		1,1 .1, .21	4 4.45	7 6.51	3 2.9			
Acari, red		1 0.004						
Acari, brown, wooly mites								
Arachnida, Sulpugida		3 0.32	2 0.22				1 0.029	

Table 86, continued

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Scorpionidae, Vejovis fla.	1 0.15		1 0.04	4 0.37	14 0.95	3 0.161	1 0.08	
Orthorpus, ornata		1 0.29	7 16.8	6 12.1				
Chilpoda, Scolopendromorpha, Centipede		2 0.21				1 0.75		
Orthoptera, Polyphagidae (sand cockroach)	6 0.08	6 0.09	12 0.52	7 0.23	18 1.03	1 0.033	3 0.16	
Orthoptera, Gryllacrididae	2 0.04	5 0.25	22 0.56	31 3.04	21 2.27	5 0.407	3 0.078	
Orthoptera, Acrididae	1 0.01	1 0.01						1 0.124
Orthoptera, Gryllidae	3 0.05		0.02	2 0.02		6 0.188		
Hymenoptera, Pompulidae(tarantula hawk)		10 1.72	7 2.12	8 2.51	6 2.35		1 0.234	
Hymenoptera, Pompulidae		1 1 0.25				1 0.02		
Hymenoptera, Sphecidae		3 0.012					1 0.024	1 0.01
Hymenoptera, Multillidae		2 0.019	15 0.99	2 0.216		1 0.0886		
Coleoptera, Cerambycidae					1 0.75			
Coleoptera, Carabidae					3 0.078	1 0.028		
Coleoptera, Carabidae, Chlineans								
Coleoptera, Carabidae								
Coleoptera, Carabidae			1 0.04	3 0.08				
Coleoptera, Chrysomelidae								
Coleoptera, Scarabidae			1 0.01	1 0.01				
Coleoptera, Chrysomelidae								
Coleoptera, Tenebrionidae		4 0.016	4 0.98	2 0.05		1 0.41	3 0.47	
Coleoptera, Tenebrionidae			1 0.07			1 0.076		
Coleoptera, Carabidae								
Coleoptera, Elateridae, Lantater		2 0.01	1 0.06					

Table 86, continued

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Coleoptera, Coccinelidae	1 0.003			1 ---				
Orthoptera, Gryllidae	1 ---	2 0.30	2 0.18	17 2.1				
Orthoptera, Gryllidae	7 0.024	1 0.17	25 0.45					
Orthoptera, Gryllidae, Nemabinae	3 0.01							
Hemiptera, Largidae		1 0.002		1 0.0014				
Hemiptera, Pentatomidae, Accintosomitanae							1 0.074	
Araneida, Loxoscelidae						3 0.018		
Orthoptera, Gyllacrididae							2 0.058	

II.D. VERTEBRATES

II.D.1. Reptiles

Lizards on the bajada, with the exception of *Phrynosoma modestum* and *P. cornutum*, were sampled by using a 100 trap pit-fall grid. The traps were spaced 10 m apart over a 1 ha area. Mark and recapture techniques were used to estimate population densities. Each lizard was given a unique identification number by toe clipping. Other data taken included weight, sex and snout-vent length.

Cnemidophorus tigris was the dominant species on the bajada in terms of both population estimates and biomass. *C. tigris* population for September, however, consisted almost entirely of juveniles and none was sampled from the middle of October through December 1. Thus, after August, the importance of *C. tigris* in the bajada ecosystem decreased to a minor role as compared to *Holbrookia texana* and *Uta stansburiana* (Table 87.).

Holbrookia texana exhibited a fairly constant relatively low density throughout the sampling period. The *H. texana* population showed a sizable increase in the month of September and then decreased to a level slightly higher than June, July and August. The increase in September and subsequent months represented hatchlings being recruited into the population (Table 88).

Uta stansburiana population estimates through August were consistently low. In late July, August and early September, hatchlings were being recruited into the population. Thus, the population estimates for the months of September, October and November are much higher. During these months, *U. stansburiana* was the dominant species on the bajada in both population numbers and biomass (Table 89).

The number of *Phrynosoma modestum* sampled during the entire sampling period was insufficient to draw any conclusion concerning this species in the ecosystem. Two *P. cornutum* were sampled during 1973 on the bajada (Table 90).

Densities based on home ranges for *C. Tigris*, *H. texana* and *U. stansburiana* are given in Table 91.

The snakes sighted on the bajada included one rattlesnake (*Crotalus atrox*), one bull snake (*Pituophis melanoleucus*, 87 cm snout-vent length) and one night snake (*Hypseglena torquata*, 31 cm snout-vent length, 16 g).

Table 87. *Cnemidophorus tigris* on the bajada study site in 1973. Density per hectare is based on home ranges of the lizard

	28 May	11 Jun	25 Jun	09 Jul	23 Jul	06 Aug
# males captured			23	23	18	16
# females captured			15	17	9	9
Density ± S. E.	73.97± 7.25	45.86± 1.5	45.74± 3.08	121.30±18.70	51.48± 6.52	106.50±19.12
Live biomass	970.27	562.13	539.37	1516.27	712.22	1884.73
Dry biomass	291.08	168.64	161.81	454.88	216.37	553.42

	20 Aug	03 Sep	17 Sep	01 Oct	15 Oct	29 Oct
# males captured	11				--	--
# females captured	7				--	--
Density ± S. E.	63.90±14.64	11.83± 2.37	23.67± 7.83	14.20± 6.15	--	--
Live biomass	930.89	59.88	63.91	47.15	--	--
Dry biomass	279.27	17.96	19.17	14.14	--	--

	12 Nov
# males captured	--
# females captured	--
Density ± S. E.	--
Live biomass	--
Dry biomass	--

Table 88. *Holbrookia texana* on the bajada study site in 1973. Density per hectare is based on home ranges

	28 May	11 Jun	25 Jun	09 Jul	23 Jul	06 Aug
# males captured	6	5	1	3	4	2
# females captured	3	1	6	2	1	1
Density ± S. E.	6.66± 0.83	7.10± 2.64	8.28± 2.90	4.14± 1.45	7.10± 2.64	3.55± 0.83
Live biomass	37.72	56.09	53.25	40.58	39.76	30.53
Dry biomass	11.31	16.83	15.98	12.10	11.93	9.16
	20 20 Aug	**03 Sep**	**17 Sep**	**01 Oct**	**15 Oct**	**29 Oct**
# males captured	11	8	13	4	6	1
# females captured	3	6	5	7	6	4
Density ± S.E.	8.87± 2.20	14.50± 1.64	63.90±14.64	22.78± 4.40	9.94± 4.40	8.88± 3.55
Live biomass	50.91	59.74	312.43	61.09	25.51	12.87
Dry biomass	15.27	19.72	93.73	18.33	7.66	3.86
	12 Nov					
# males captured	0					
# females captured	1					
Density ± S.E.	0.59 ± 0.00					
Live biomass	0.59					
Dry biomass	0.18					

Table 89. *Uta stansburiana* on the bajada study site in 1973. Density per hectare is based on home ranges of the lizard

	28 May	11 Jun	25 Jun	09 Jul	23 Jul	06 Aug
# males captured	0	0	0	1		
# females captured	2	1	3	1		
Density ± S. E.	3.55± 1.67	1.18± 0.00	3.55± 1.33	15.97± 1.33	7.10± 3.55	1.18± 0.59
Live biomass	13.61	4.14	11.64	65.50		
Dry biomass	4.08	1.24	3.49	19.65		
	20 Aug	**03 Sep**	**17 Sep**	**01 Oct**	**15 Oct**	**29 Oct**
# males captured	6	7	7	3	6	16
# females captured	7	7	9	6	7	9
Density ± S.E.	4.14± 0.72	36.86± 4.69	40.24± 5.11	47.93±15.06	30.77± 8.20	73.76±14.49
Live biomass	9.91	45.96	64.63	102.25	84.36	226.63
Dry biomass	2.97	13.97	19.39	30.67	25.29	67.99
	12 Nov					
# males captured	4					
# females captured	5					
Density ± S. E.	47.93±15.06					
Live biomass	157.30					
Dry biomass	47.13					

Table 90. Density estimates for *Phrynosoma modestum*

Date	Density Estimates	Estimated Weight	Live Biomass	Dry Biomass
Jun 15	8.875	6.67	100.12	30.04
Jun 29	4.73	8.80	70.53	21.16
Jul 13	0.59	4.73	4.73	1.42
Jul 27	1.18	4.38	8.76	2.63
Aug 10	0.59	5.90	5.90	1.77
Aug 24	1.18	3.10	6.20	1.86
Sep 07	--	--	--	--
Sep 21	0.59	2.48	2.48	0.74
Oct 05	--	--	--	--

Density estimates for Phrynosoma cornutum

Dates	Density Estimates	Estimated Weight	Live Biomass	Dry Biomass
Jun 29-Aug 13	1.18	10.06	20.12	6.03

II.D.2. Birds

As on the playa, the birds of the bajada were censused weekly from January to September, and every other week through December. Emlen's census method (1971) was followed on the bajada; the route is 2,200 m long, 800 of which follows the course of the main arroyo that bisects the plot.

The census data have been corrected with CD values for 1971-1973 (Raitt and Pimm, in prep.). Functional groupings are the same as those used on the playa. The results for 1973 for numbers and biomass per 100 ha are tabulated in Tables 92 and 93 respectively.

Raptor numbers were lower in 1973 with 0.6/100 ha versus 1.6 and 4.7 for 1971 and 1972, respectively. Non-breeding insectivores were lower also with 6.4/100 ha versus 6.3 and 10.9. The winter seedeaters were the only group which increased over the past years with 66.8/100 ha. In 1971 and 1972 there were 16.9 and 20.1/100 ha, respectively. Miscellaneous species declined from 1.8 and 19.2/100 ha to 3.6 in 1973.

Table 91. Bajada lizard density per hectare based on home ranges

Species	28 May	11 Jun	25 Jun	09 Jul	23 Jul	06 Aug
Cnemidophorus tigris	73.97± 7.25	45.86± 1.5	45.74± 3.08	121.3±18.7	51.48± 6.52	106.5±19.12
Holbrookia texana	6.66± 0.83	7.1 ± 2.64	8.28± 2.9	4.14±1.45	7.1 ± 2.64	3.55±0.83
Uta stansburiana	3.55± 1.67	1.18± 0	3.55± 1.33	15.97±5.02	7.1 ± 3.55	1.18±0.59

Species	20 Aug	03 Sep	17 Sep	01 Oct	15 Oct	29 Oct
C. tigris	63.9 ±14.64	11.83± 2.37	23.67± 7.83	14.2 ± 6.15	-0-	-0-
H. texana	8.87± 2.2	14.5 ± 1.64	63.9 ±14.64	22.78± 4.4	9.94± 0.98	8.88± 3.55
U. stansburiana	4.14± 0.72	36.86± 4.69	40.24± 5.11	47.93±15.06	30.77± 8.2	73.76±14.49

Species	12 Nov
C. tigris	-0-
H. texana	0.59± 0
U. stansburiana	47.93±15.06

In contrast to the playa, the breeding species on the bajada declined. This year there were 63.1/100 ha as compared to 40.5 and 78.5 for 1971 and 1972, respectively (Fig. 5).

As on the playa, searches for nests were conducted in 1973. Results of nest studies are presented in Table 94. They were essentially the same as in 1972; 11 nesting attempts with 7+ successes as compared to 14 attempts and 8+ successes for 1972. The playa had more attempts and more successful nests than the bajada.

Table 92. Monthly mean bajada bird densities (birds per 100 hectares), 1973*

Species Categories	Jan	Feb	Mar	May	Jun	Jul	Sep	Oct	Nov	Dec
AQ	0	0	0	0	0	0	0	0	0	0
RA	0	0	0	0	3.6	1.0	1.4	0	0	0
BS	41.9	23.9	61.5	60.4	84.8	107.0	104.0	76.4	52.8	18.9
OI	0	9.5	9.5	3616	0.7	0	0	14.3	0	0
WS	111.3	167.3	163.9	46.2	18.6	17.2	31.3	68.8	10.7	33.3
DQ	0	3.2	39.6	69.2	39.8	63.9	66.6	0	0	0
MS	10.0	10.7	7.1	1,0	0	1.1	0	6.4	0	0
TOTAL	163.2	214.6	281.6	213.4	147.5	190.2	203.3	165.9	63.5	52.2

* Census omitted for the months of April and August.

Table 93. Monthly mean bajada bird biomass (grams live weight per hectare), 1973*

Species Categories	Jan	Feb	Mar	May	Jun	Jul	Sep	Oct	Nov	Dec
AQ	0	0	0	0	0	0	0	0	0	0
RA	0	0	0	0	10.4	5.4	7.4	0	0	0
BS	14.2	5.2	7.7	13.8	18.9	33.9	31.6	33.1	7.7	1.4
OI	0	0.6	0.6	4.4	0.1	0	0	0.9	0	0
WS	15.4	28.1	30.3	8.9	6.0	5.5	6.5	13.3	2.1	8.3
DQ	0	3.8	52.4	85.1	46.9	75.3	121.4	0	0	0
MS	4.3	2.1	1.4	0.3	0	0.3	0	2.4	0	0
TOTAL	33.9	39.8	92.4	112.5	82.3	120.4	166.9	49.7	9.8	9.7

* Census omitted for the months of April and August.

Table 94. Bajada breeding species (all numbers represent pairs of birds)

Species	# Nesting 1971	# Nesting 1972	# Nesting 1973	# Successful 1971	# Successful 1972	# Successful 1973
Cactus Wren		3	5	0	2+	2+
Black-throated Sparrow	1	3	1	1	2+	1
Verdin	1	3	0	0	1+	0
Black-tailed Gnatcatcher	1	2	1	0	1+	0
Scott's Oriole	1	1	0	0	1	0
Gambel's Quail		0	1	0	0	1
Crissal Thrasher		1	1	0	1	1
Loggerhead Shrike		0	2	0	0	2
Mourning Dove		0	1	0	0	0+
TOTALS	4	13	12	1	8+	7+

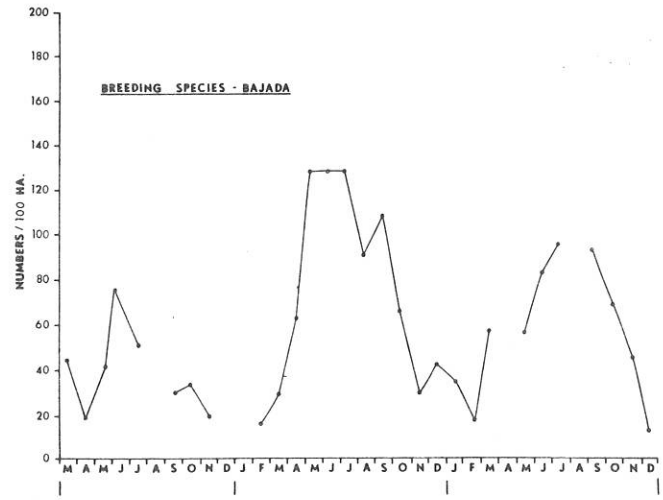


Figure 5. Mean monthly density of breeding species from 1971-1973 on the bajada.

II.D.3. Rodents

The trapping methods used on the bajada site were the same as those used on the playa site in 1973 (see playa section of this report). The increase in rodents on the bajada site in 1973 was 529% over the densities reported in 1972. The mean monthly density of the bajada site rose from 16.59 rodents/ha in 1972 to 87.77 rodents/ha in 1973. Prior to 1973 there was very little difference between the playa and bajada sites in total rodent densities. However, in 1973, there were 34.29 more rodents per hectare on the bajada as compared to the playa and nearly 1,100 more grams of live rodent biomass/ha on the bajada. The monthly mean live biomass of 3,218.81 g/ha reflects an increase from 1915.10 g/ha in February, 1973 to 5797.04 g/ha in November, 1973 (Table 95).

All of the eleven species of rodents on the bajada also occur on the playa, but seven of these species occur in greater densities on the bajada site. *Perognathus intermedius* (25.16x), *Onychomys torridus* (13.12x), *Neotoma albigula* (7.41x), *Peromyscus eremicus* (4.24x), *Perognathus penicillatus* (3.47x), *Dipodomys merriami* (2.29x), and *Peromyscus maniculatus* (2x), were the seven species favored by the bajada habitat. There was no significant difference between sites in *Neotoma micropus*, while *Reithrodontomys megalotis*, *Peromyscus leucopus* and *Dipodomys ordii* demonstrated a reduction in density on the bajada compared to the playa. Five species occurring on the playa site, *Dipodomys spectabilis*, *Mus musculus*, *Perognathus flavus*, *Sigmodon hispidus*, and *Spermophilus spilosoma*, did not occur on the bajada in 1973.

The bajada had members of two families, Heteromyidae and Cricetidae, but lacked the Sciurids and Murids found on the playa. The Cricetids represented an increase of about 25% over the same members on the playa in numbers and live biomass. The Heteromyids were two and one-half times the density of those on the playa and about double the live biomass of those found on the playa. It appears the bajada in 1973 provided a very favorable habitat for the Heteromyids.

Three species, *D. merriami* (35.92), *P. maniculatus* (17.23), and *P. penicillatus* (15.91) represent 69.06% of the bajada rodent density. *Neotoma albigula* (7.59), *P. eremicus* (6.18), *P. intermedius* (5.16), *O. torridus* (4.63), and *R. megalotis* (3.62) comprise an additional 26.85% of the rodent density, while the remaining 4.09% includes *P. leucopus*, *D. ordii*, and *N. micropus*. Two species, *D. merriami* and *N. albigula* comprise 73% of the total mean monthly live biomass with a combined mean monthly biomass of 2358 g/ha (Table 96). While *P. maniculatus* and *P. penicillatus* represent a third of the bajada numerical density, they comprise only 16% of the total mean monthly live biomass on the bajada.

All bajada species, except *S. spilosoma*, underwent population size increases from those obtained in 1972. *Spermophilus spilosoma* was not obtained in any of the samples taken in 1973 after having occurred on the bajada during 1972. Those species showing the greatest increases over 1972 were: *P. maniculatus* (116x), *P. eremicus* (60x), *D. ordii* (34x), *O. torridus* (31x), and *P. intermedius* (25x). In addition, two new species, *P. leucopus* and *R. megalotis* were taken in significant numbers in 1973 after having been absent in 1972 collections. Thus, it appears that 1973 was a very beneficial year for all species of bajada rodents in numbers and biomass.

Table 95. Summary of monthly rodent data from the bajada site, 1973

	Feb	Mar	May	Jun	Jul	Sep	Nov	Yearly Mean
Est. Density (per ha)								
Fam. Heteromyidae	40.58	68.81	55.51	47.34	63.64	26.75	57.14	51.39
Fam. Cricetidae	7.08	14.58	50.16	34.30	28.97	36.92	82.66	36.38
Total	47.66	83.39	105.67	81.64	92.61	63.67	139.80	87.77
Live Biomass (g/ha)								
Fam. Heteromyidae	1334.69	2252.38	1851.97	1363.56	2004.05	885.36	1936.24	1661.17
Fam. Cricetidae	580.41	552.06	1030.44	1528.93	1686.50	1663.38	3860.80	1557.64
Total	1915.10	2805.44	2882.41	2892.49	3690.55	2548.74	5797.04	3218.81
Dry Biomass (g/ha)								
Fam. Heteromyidae	400.40	657.71	555.59	409.06	601.21	265.60	580.87	498.34
Fam. Cricetidae	174.12	165.91	309.13	458.67	505.95	499.01	1158.24	467.29
Total	574.52	841.62	864.72	867.73	1107.16	764.61	1739.11	965.63

Table 96. Summary of 1973 small mammal trapping data from the playa site

Dipodomys merriami	Feb	Apr	May	Sep	Nov	Yearly ($\bar{X}$* or Tot.**)
# males captured	24	18	16	23	27	108**
% males captured	54.5	56.2	53.3	62.1	81.8	61.3
# females captured	20	14	14	14	6	68**
% females captured	45.5	43.8	46.7	37.9	18.2	38.7
# gravid females	7	8	5	1	0	--
% gravid females	35.0	57.1	35.7	7.1	0	--
# juveniles	2	1	1	8	0	--
% juveniles	4.5	3.1	3.3	21.6	0	--
Est density (per ha)	16.07	8.94	15.16	19.55	8.97	13.73*
Mean weight (g)	45.04	44.25	46.66	41.86	41.78	43.91*
Total live biomass (g/ha)	733.79	395.59	707.36	818.36	374.76	602.88*
Total dry biomass (g/ha)	217.13	118.67	212.20	245.50	112.42	180.86*
Dipodomys ordii						
# males captured	2	0	5	5	4	16**
% males captured	50.0	0	50.0	45.4	57.1	48.4
# females captured	2	1	5	6	3	17**
% females captured	50.0	100.0	50.0	54.6	42.9	51.6
# gravid females	0	0	3	2	0	--
% gravid females	0	0	60.0	33.3	0	--
# juveniles	0	0	2	1	0	--
% juveniles	0	0	20.0	9.0	0	--
Est density (per ha)	0.88	0.22	3.88	5.33	2.66	2.59*
Mean weight (g)	55.50	74.00	48.88	50.18	50.14	55.74*
Total live biomass (g/ha)	48.84	16.28	189.65	267.45	133.37	144.36*
Total dry biomass (g/ha)	14.65	4.88	56.89	80.23	40.01	43.30*

Table 96, continued

Dipodomys spectabilis	Feb	Apr	May	Sep	Nov	Yearly
# males captured	0	0	1	0	0	1**
% males captured	0	0	100.0	0	0	100.0
# females captured	0	0	0	0	0	0**
% females captured	0	0	0	0	0	0
# gravid females	0	0	0	0	0	--
% gravid females	0	0	0	0	0	--
# juveniles	0	0	0	0	0	--
% juveniles	0	0	0	0	0	--
Est density (per ha)	0	0	0.22	0	0	0.04*
Mean weight (g)	0	0	105.00	0	0	105.00 *
Total live biomass (g/ha)	0	0	23.10	0	0	4.20*
Total dry biomass (g/ha)	0	0	6.93	0	0	1.26*
Mus musculus						
# males captured	0	0	1	1	0	2**
% males captured	0	0	100.0	50.0	0	50.0
# females captured	0	1	0	1	0	2**
% females captured	0	100.0	0	50.0	0	50.0
# gravid females	0	0	0	0	0	--
% gravid females	0	0	0	0	0	--
# juveniles	0	1	0	1	0	--
% juveniles	0	100.0	0	50.0	0	--
Est density (per ha)	0	0.22	0.22	0.44	0	0.17*
Mean weight (g)	0	4.00	13.00	9.00	0	8.66*
Total live biomass (g/ha)	0	0.88	2.86	3.96	0	1.47*
Total dry biomass (g/ha)	0	0.26	0.85	1.18	0	0.44*
Neotoma albigula						
# males captured	0	0	2	1	0	3**
% males captured	0	0	28.5	25.0	0	18.7
# females captured	2	0	5	4	2	13**
% females captured	100.0	0	71.5	75.0	100.0	81.3
# gravid females	0	0	0	0	0	--
% gravid females	0	0	0	0	0	--
# juveniles	0	0	2	1	1	--
% juveniles	0	0	28.5	20.0	50.0	--
Est density	0.44	0	1.85	1.77	0.44	0.90*
Mean weight	155.50	0	164.14	196.00	111.50	156.78*
Total live biomass	68.42	0	303.65	346.92	49.06	141.10*
Total dry biomass	20.52	0	91.09	104.07	14.71	42.33*

Table 96, continued

Neotoma micropus	Feb	Apr	May	Sep	Nov	Yearly
# males captured	1	0	0	0	0	1**
% males captured	50.0	0	0	0	0	50.0
# females captured	1	0	0	0	0	1**
% females captured	50.0	0	0	0	0	50.0
# gravid females	0	0	0	0	0	--
% gravid females	0	0	0	0	0	--
# juveniles	0	0	0	0	0	--
% juveniles	0	0	0	0	0	--
Est density	0.44	0	0	0	0	0.09*
Mean weight	263.50	0	0	0	0	263.50*
Total live biomass	115.94	0	0	0	0	115.94*
Total dry biomass	34.78	0	0	0	0	7.11*
Onychomys torridus						
# males captured	1	0	0	0	2	3**
% males captured	100.0	0	0	0	100.0	42.8
# females captured	0	0	0	4	0	4**
% females captured	0	0	0	100.0	0	57.2
# gravid females	0	0	0	0	0	--
% gravid females	0	0	0	0	0	--
# juveniles	0	0	0	1	0	--
% juveniles	0	0	0	25.00	0	--
Est density	0.22	0	0	0.88	0.44	0.31*
Mean weight	28.00	0	0	19.25	18.50	21.91*
Total live biomass	6.16	0	0	16.94	8.14	6.79*
Total dry biomass	1.84	0	0	5.08	2.44	2.03*
Perognathus flavus						
# males captured	1	1	1	2	2	7**
% males captured	50.0	100.0	100.0	66.7	100.0	77.8
# females captured	1	0	0	1	0	2**
% females captured	50.0	0	0	33.3	0	22.2
# gravid females	0	0	0	0	0	--
% gravid females	0	0	0	0	0	--
# juveniles	0	0	0	0	1	--
% juveniles	0	0	0	0	50.0	--
Est density	0.44	0.22	0.22	0.66	0.44	0.39*
Mean weight	7.00	8.00	9.00	6.33	4.00	6.89*
Total live biomass	3.08	1.76	1.98	4.17	1.76	2.67*
Total dry biomass	0.92	0.52	0.59	1.25	0.52	0.80*

Table 96, continued

Perognathus intermedius	Feb	Apr	May	Sep	Nov	Yearly
# males captured	1	1	0	2	0	4**
% males captured	100.0	100.0	0	100.0	0	100.0
# females captured	0	0	0	0	0	0**
% females captured	0	0	0	0	0	0
# gravid females	0	0	0	0	0	--
% gravid females	0	0	0	0	0	--
# juveniles	0	0	0	0	0	--
% juveniles	0	0	0	0	0	--
Est density	0.22	0.22	0	0.44	0	0.18*
Mean weight	14.00	16.00	0	17.50	0	15.66*
Total live biomass	3.08	3.52	0	7.70	0	2.81*
Total dry biomass	0.92	1.05	0	2.31	0	0.84*
Perognathus penicillatus						
# males captured	3	9	8	7	0	27**
% males captured	100.0	64.2	47.0	70.0	0	60.0
# females captured	0	5	9	3	1	18**
% females captured	0	35.8	53.0	30.0	100.0	40.0
# gravid females	0	1	3	1	0	--
% gravid females	0	20.0	33.3	33.3	0	--
# juveniles	0	0	0	0	0	--
% juveniles	0	0	0	0	0	--
Est density	0.66	6.11	10.00	3.11	0.22	4.02*
Mean weight	13.67	14.50	16.29	14.60	15.00	14.81*
Total live biomass	9.02	88.59	162.90	45.40	3.30	59.53*
Total dry biomass	2.70	26.57	48.87	13.62	0.99	17.85*
Peromyscus eremicus						
# males captured	0	1	0	2	5	8**
% males captured	0	50.0	0	20.0	71.5	40.0
# females captured	0	1	1	8	2	12**
% females captured	0	50.0	100.0	80.0	28.5	60.0
# gravid females	0	0	1	0	0	--
% gravid females	0	0	100.0	0	0	--
# juveniles	0	0	0	1	0	--
% juveniles	0	0	0	10.0	0	--
Est density	0	0.44	0.22	3.11	2.66	1.28*
Mean weight	0	24.50	30.00	24.60	21.71	25.20*
Total live biomass	0	10.78	6.60	76.50	57.74	32.25*
Tota dry biomass	0	3.23	1.98	22.95	17.32	9.67*

Table 96, continued

Peromyscus leucopus	Feb	Apr	May	Sep	Nov	Yearly
# males captured	1	2	5	19	12	39**
% males captured	100.0	100.0	38.4	73.0	66.7	65.0
# females captured	0	0	8	7	6	21**
% females captured	0	0	61.6	27.0	33.3	35.0
# gravid females	0	0	4	2	0	--
% gravid females	0	0	50.0	28.5	0	--
# juveniles	0	0	3	4	1	--
% juveniles	0	0	23.1	15.3	5.6	--
Est density	0.22	0.44	6.22	8.57	5.33	4.15*
Mean weight	31.00	27.50	23.61	22.73	21.84	25.35*
Total live biomass	6.82	12.10	146.85	194.79	116.94	105.20*
Total dry biomass	2.04	3.63	44.05	58.43	35.08	31.56*
Peromyscus maniculatus						
# males captured	4	9	16	16	19	64.00**
% males captured	80.0	90.0	50.0	72.7	67.8	65.9
# females captured	1	1	16	6	9	33.00**
% females captured	20.0	10.0	50.0	27.3	32.2	34.1
# of gravid females	0	1	8	3	0	--
% of gravid females	0	100.0	50.0	50.0	0	--
# juveniles	0	0	16	0	2	--
% juveniles	0	0	50.0	0	7.1	--
Est density	1.11	2.72	14.93	5.25	13.72	7.54*
Mean weight	23.60	19.10	18.93	22.57	20.46	20.93*
Total live biomass	26.19	51.95	282.62	118.49	280.71	157.81*
Total dry biomass	7.85	15.58	84.78	35.53	84.21	47.34*
Reithrodontomys megalotis						
# males captured	1	4	6	14	3	28**
% males captured	50.0	57.2	75.0	58.3	100.0	63.6
# females captured	1	3	2	10	0	16**
% females captured	50.0	42.8	25.0	41.7	0	36.4
# gravid females	0	1	0	8	0	--
% gravid females	0	33.3	0	80.0	0	--
# juveniles	0	0	2	7	0	--
% juveniles	0	0	25.0	34.2	0	--
Est density	0.22	1.33	4.44	34.22	0.66	8.17*
Mean weight	10.00	11.14	9.25	9.16	9.33	9.77*
Total live biomass	2.20	14.81	41.07	313.45	6.15	79.82*
Total dry biomass	0.66	4.44	12.32	94.04	1.84	23.94*

Table 96, continued

Sigmodon hispidus	Feb	Apr	May	Sep	Nov	Yearly
# males captured	23	7	13	27	16	86**
% males captured	92.0	36.8	61.9	50.0	100.0	63.7
# females captured	2	12	8	27	0	49**
% females captured	8.0	63.2	38.1	50.0	0	36.3
# gravid females	0	12	3	7	0	--
% gravid females	0	100.0	37.5	25.9	0	--
# juveniles	1	0	7	27	11	--
% juveniles	4.00	0	33.3	50.0	68.7	--
Est density	10.55	5.55	5.71	20.14	4.00	9.19*
Mean weight	67.04	98.89	88.o9	71.03	67.81	78.59*
Total live biomass	707.27	548.83	503.56	1420.54	271.24	722.24*
Total dry biomass	212.18	164.64	151.06	429.16	81.37	216.67*
Spermophilus spilosoma						
# males captured	1	5	0	0	0	6**
% males captured	100.0	71.5	0	0	0	75.0
# females captured	0	2	0	0	0	2**
% females captured	0	28.5	0	0	0	25.0
# of gravid females	0	0	0	0	0	--
% of gravid females	0	0	0	0	0	--
# juveniles	0	0	0	0	0	--
% juveniles	0	0	0	0	0	--
Est density	0.22	3.33	0	0	0	0.71*
Mean weight	92.00	107.29	0	0	0	99.64*
Total live biomass	20.24	357.27	0	0	0	70.74*
Total dry biomass	6.07	107.18	0	0	0	21.22*

II.D.4. Lagomorphs

Density estimates of bajada lagomorphs were obtained using the flush transect techniques described for playa lagomorphs. The data (Table 97) indicate a pattern similar to that on the playa, with lagomorph densities increasing from a minimum in late winter to a maximum in autumn. The estimated mean densities of both *Lepus californicus* (0.7/ha) and *Sylvilagus auduboni* (0.4/ha) for 1973 were about two times as great as those on the playa (0.3 and 0.2/ha, respectively). The only explanation for the difference in densities seems to be the possibility of greater cover on the bajada. This is suggested since forb and grass production was higher on the playa. In addition, mid-morning census accounts for rabbits in forms and/or shelter and not where these animals are feeding.

Table 97. Lagomorph densities estimated by flush transects on the bajada. Asterisk indicates months in which density estimates are based on a single census. For all other months densities are the mean of two census periods

Species	Jan*	Feb*	Apr	May	Jun	Jul*	Sep	Oct	Nov	Dec
Lepus californicus	0.34	0.10	0.09	0.40	0.52	1.65	1.24	0.55	0.66	0.59
Sylvilagus auduboni	-0-	0.08	0.09	0.19	0.43	1.81	0.16	0.13	0.36	0.07

II.E. CHEMICAL ANALYSIS

Larrea divaricata (creosotebush) from the bajada was analyzed for 18 elements as shown in Table 98. Plant part categories assayed were leaves (general), very small stems, small live stems, old wood stems, crown stems, roots larger than 40 cm, roots smaller than 20 cm, roots between 20 and 40 cm, standing dead, litter of leaves, litter of bark, litter of fruit, litter of stems, new wood, standing dead stems, and litter of old wood (dead stems).

Table 98. Chemical analysis of *Larrea divaricata* on the bajada study site

	leaves (gm)	very small stems	small live stems	old wood	crown stems	roots larger 40 cm	roots smaller 20 cm	roots between 40-20 cm	fruit
%									
Phosphorus	0.34116	0.5650	0.3120	0.0900	0.2520	0.2090	0.2170	0.2210	0.2965
Potassium	1.6570	1.3560	0.9530	0.5700	0.4810	0.4550	0.6550	0.5350	1.3630
Calcium	1.7550	1.4570	1.1980	1.2560	1.4530	2.7250	1.8580	1.8440	1.1730
Magnesium	0.1968	0.2340	0.1310	0.0390	0.0700	0.0850	0.0800	0.8400	0.1690
Silicon	0.4134	0.7480	0.4740	0.1170	0.5440	0.2880	0.3040	0.2200	0.2992
ppm									
Zinc	28.20	66.40	90.70	37.50	59.10	53.20	38.00	30.5	41.90
Copper	22.11	48.90	63.80	36.50	31.70	34.10	20.10	20.40	26.55
Iron	823.97	1235.30	1111.30	366.30	1169.90	462.80	715.40	301.30	646.57
Manganese	64.37	74.80	44.70	18.00	46.40	23.70	34.60	24.01	39.38
Boron	54.40	26.00	48.10	15.10	20.40	26.50	18.70	3.40	44.65
Aluminum	239.94	384.90	277.10	106.90	294.10	199.00	195.60	151.30	202.10
Titanium	116.24	225.90	147.70	26.20	134.00	73.60	134.40	44.00	74.15
Cobalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molybdenum	0.92	1.60	1.20	0.00	1.10	1.50	1.00	1.10	0.73
Strontium	117.46	106.10	96.50	92.20	108.50	164.00	121.60	131.00	85.35
Barium	12.07	22.00	16.40	8.70	18.70	28.00	15.30	17.60	9.00
Lead	13.16	30.50	33.10	9.90	38.80	76.90	14.90	12.50	29.12
Sodium	467.46	877.90	416.80	31.00	287.80	145.40	203.50	105.60	211.77

	standing dead	litter leaves	litter bark	litter fruit	litter stems	new wood	standing dead stems	litter old wood
%								
Phosphorus	0.0610	0.5562	0.6438	0.3730	0.3260	0.1935	0.1330	0.2620
Potassium	0.1840	1.2070	0.6413	1.0540	0.7297	1.5180	0.2330	0.5110
Calcium	0.5480	3.1430	3.6520	1.3420	1.4140	1.4360	0.3030	1.0450
Magnesium	0.0270	0.3700	0.1865	0.1860	0.2080	0.1910	0.0360	0.0600
Silicon	0.1550	0.7480	0.916	0.6298	0.6840	0.4765	0.3670	0.5880
ppm								
Zinc	95.50	278.3	331.58	307.60	182.22	42.82	126.90	165.30
Copper	50.70	65.65	55.30	66.72	58.15	20.65	75.80	56.50
Iron	527.80	1405.75	1653.45	1262.60	1589.80	953.82	1294.60	1394.70
Manganese	49.40	162.87	149.57	101.30	100.72	49.42	67.30	65.60
Boron	6.90	90.57	42.45	43.07	24.57	28.80	9.80	21.90
Aluminum	133.20	558.93	624.35	366.72	414.42	260.65	229.00	356.70
Titanium	20.50	240.42	300.63	131.15	170.12	87.95	64.70	125.65
Cobalt	0.00	0.00	2.70	0.00	0.00	0.00	0.00	0.00
Molybdenum	0.00	1.85	1.62	1.00	1.33	0.88	0.80	1.00
Strontium	56.10	158.60	231.75	89.95	10.97	128.02	51.20	82.80
Barium	7.40	26.97	42.52	19.05	24.65	14.17	12.30	21.35
Lead	9.20	25.9	45.75	55.73	31.90	12.70	29.10	34.70
Sodium	27.30	1079.52	639.22	479.57	520.80	411.53	88.10	289.45

II.F. MICROBIOLOGICAL STUDIES

II.F.1. Decomposition

Microbial decomposition studies were carried out at four locations in the bajada area. Sites were established on each side of the main arroyo (B-3-1 and B-3-4) in the main arroyo proper and at a site near the weather station (B-0-2). Burial materials included standard filter papers, mesquite leaves and creosote leaves, all buried 10 cm deep.

Results from the filter paper experiments are shown in Figure 6. The data show that, for the most part, decomposition was maximum between July and October. This is not surprising since this time period has the optimal combination of temperature and moisture which favor microbial activity. It should be noted that although soil moisture was adequate from March to July, decomposition activity on filter paper was limited, presumably due to temperature. Initial decomposition rates in the arroyo were slightly higher than in the bajada areas since there was appreciable decomposition from March to July. However, as the data show, decomposition was highest during July through September. The rather abrupt cessation of decomposition of filter paper and other substrates after October can be explained by the drought conditions prevailing during late summer and fall.

Decomposition of creosote (*Larrea divaricata*) and mesquite (*Prosopis glandulosa*) leaves is shown in Figure 7. Qualitatively the results are similar to those shown in Figure 6. However, for reasons which are not clear, creosote leaves appear to be more readily decomposed than mesquite leaves. Furthermore, the actual amounts of creosote and mesquite litter decomposed were roughly six times the amount of filter paper decomposed. The litter bags contained 10-12 g of material compared to 2 g of filter paper. This suggests that use of the latter as substrate does not reflect microbial decomposition activities as accurately as natural substrates. The differences in the amounts of substrate decomposed can presumably be explained by the higher nutrient content of natural litter compared to filter paper. For example, mesquite leaves contain an average of about 3% nitrogen which would stimulate microbial growth and related decomposition activities. Additional experimental evidence for this possibility will be discussed below.

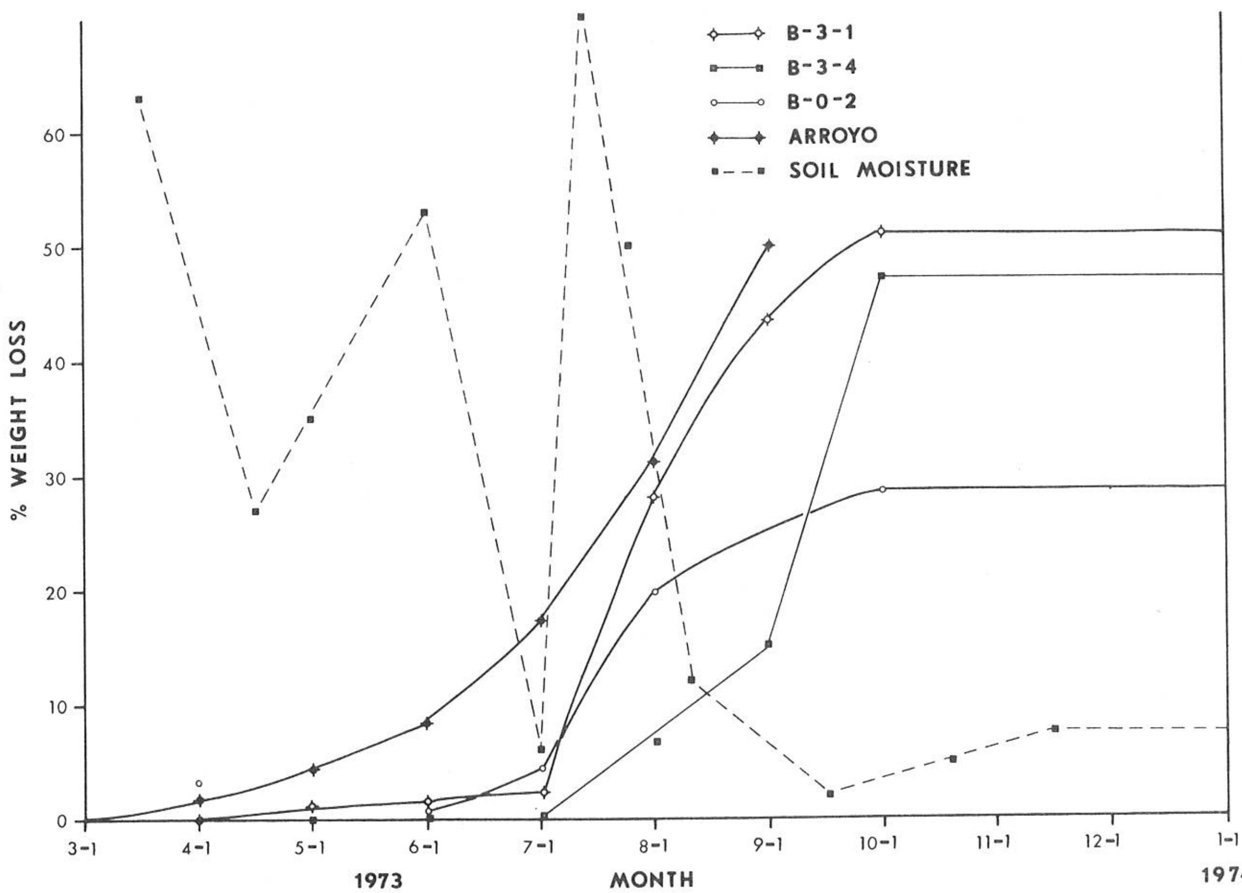


Figure 6. Decomposition of filter paper.

Filter paper decomposition studies were also done in a manipulation site in which soil moisture was maintained at approximately field capacity. Papers to which N as NH_4Cl was added were compared with regular papers. Results are shown in Figure 8. The data clearly show the effect of added nitrogen under conditions in which moisture was not limiting. Decomposition was accelerated by the more rapid establishment of microorganisms on the paper substrate through roughly doubling the total weight loss during the experiment. The effects of nitrogen amendment suggest that decomposition of plain filter paper as an index of litter decomposition may very well give low estimates of decomposition. Better results would be obtained using natural litter. In this case uniform mass and configuration of litter bags would be desirable so that data from different areas could be compared.

II.F.2. Soil Microbial Counts

As shown in Figure 9, the viable most probable number (MPN) microbial counts decreased more or less continuously during the period March to November, 1973. It must be presumed at this time that the reduction in viable count was related to the drought conditions which prevailed most of the year. The data in Figure 6, which represent mean values from a transect across the middle of the bajada, show the result of continued drought on the microbial population in the 0-10 cm soil horizon. These results contrast with the decomposition data shown in Figures 6 and 7, in that decomposition activity continued until August through October. However, microbial MPN samples were not taken for the sites where decomposition bags were buried. In addition, the bags were more moist than surrounding soil, indicating better moisture retention in and around the decomposition bags. In current experiments, we are comparing the moisture content of the decomposition bags and surrounding soil to determine if the substrates in the bags do indeed retain moisture.

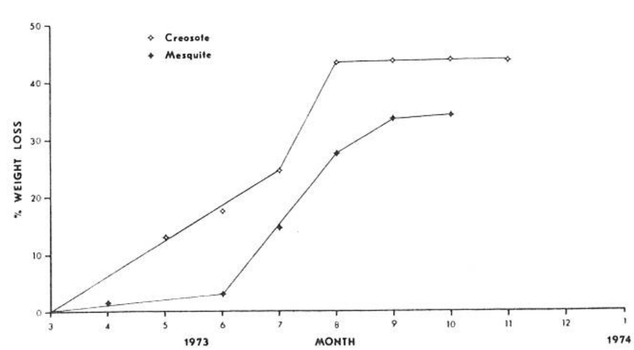


Figure 7. Decomposition of creosote and mesquite litter.

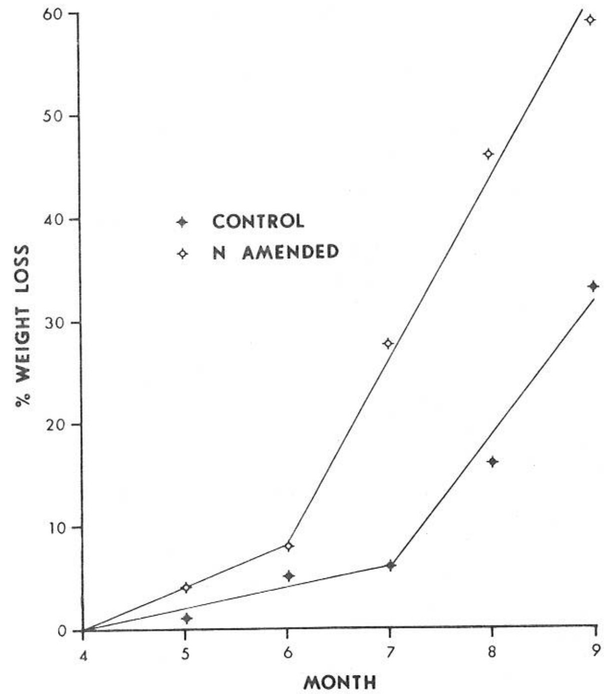


Figure 8. Decomposition of nitrogen amended filter paper in a watered bajada plot.

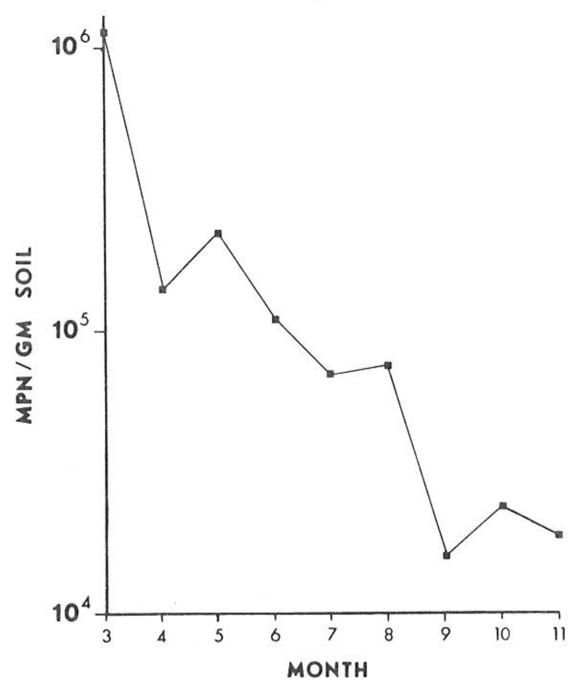


Figure 9. Soil bacterial counts.

III. MANIPULATION SITE

III.A. PLANTS

III.A.1. ANNUALS AND SMALL PERENNIALS

Densities for annual forbs, perennial forbs, sub-shrubs, annual grasses, and perennial grasses were recorded during April and July of 1973 on the manipulation site (Table 99). Sampling techniques were the same as those used on the playa and bajada sites (Whitford et al., 1973).

In March, 1973, the manipulation site showed a total density of 179,377 (ind/ha), the playa a total density of 152,625 and the bajada a total density of 128,375. In July, 1973, the total densities for these sites were 71,269, 124,567 and 19,797, respectively. The major difference between the manipulation site and the other sites during March appeared to be in the annual forbs. In July differences were apparent in the perennial forbs and grasses, as well as in the annual forbs.

III.A.2. PERENNIALS

Vegetational characteristics for perennials on the Jornada Manipulation Site are shown for 1971 (before herbicide treatment), 1972 and 1973 (after herbicide treatments). Sampling techniques were the same as those used on the playa and bajada sites (Whitford et al., 1973; Table 100).

Table 99. Total density (ind/ha) of annuals and small perennials on the manipulation site

April 30, 1973--ind/ha = 179377

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
CHENOPODIUM INCANUM	32388	0.00	0.00	0.00
DESCURAINEA PINNATA	52318	0.00	0.00	0.00
ERIOGONUM ABERTIANUM	7474	0.00	0.00	0.00
ERIOGONUM ROTUNDIFOLIUM	67266	0.00	0.00	0.00
ERIOGONUM TRICHOPES	9965	0.00	0.00	0.00
NAMA HISPIDUM	2491	0.00	0.00	0.00
TIDESTROMIA LANUGINOSA	2491	0.00	0.00	0.00
ANNUAL FORB TOTALS	174394	0.00	0.00	0.00
PERENNIAL FORBS				
PERENNIAL FORB TOTALS	0	0.00	0.00	0.00
SUBSHRUBS				
SUBSHRUB TOTALS	0	0.00	0.00	0.00
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	2491	0.00	0.00	0.00
PERENNIAL GRASS TOTALS	2491	0.00	0.00	0.00

July 9, 1973--ind/ha = 71269

SPECIES	DENSITY IND/HA	VEGET KG/HA	REPROD KG/HA	TOTAL KG/HA
ANNUAL FORBS				
CHENOPODIUM INCANUM	31675	0.00	0.00	0.00
DITHYREA WISLIZENII	495	0.00	0.00	0.00
ERIOGONUM ABERTIANUM	2970	0.00	0.00	0.00
ERIOGONUM ROTUNDIFOLIUM	28211	0.00	0.00	0.00
ERIOGONUM TRICHOPES	3959	0.00	0.00	0.00
NAMA HISPIDUM	990	0.00	0.00	0.00
UNKNOWN ANNUAL FORBS	495	0.00	0.00	0.00
ANNUAL FORB TOTALS	68795	0.00	0.00	0.00
PERENNIAL FORBS				
BAILEYA MULTIRADIATA	495	0.00	0.00	0.00
PERENNIAL FORB TOTALS	495	0.00	0.00	0.00
SUBSHRUBS				
XANTHOCEPHALUM SAROTHRAE	495	0.00	0.00	0.00
SUBSHRUB TOTALS	495	0.00	0.00	0.00
ANNUAL GRASSES				
ANNUAL GRASS TOTALS	0	0.00	0.00	0.00
PERENNIAL GRASSES				
ERIONEURON PULCHELLUM	495	0.00	0.00	0.00
PERENNIAL GRASS TOTALS	495	0.00	0.00	0.00

Table 100. Vegetational characteristics for perennial species on the Jornada manipulation site in 1971 (before herbicide treatment), in 1972 (after first herbicide treatment) and in 1973 (after second herbicide treatment)

Species	Density (ind/ha)			Canopy Cover (%)			Leaf (kg/ha)			Live Stems (kg/ha)		
	1971	1972	1973	1971	1972	1973	1971	1972	1973	1971	1972	1973
Shrubs:												
Larrea divaricata	1017	862	491	9.3	2.8	1.4	106	23	13	1055	234	125
Prosopis glandulosa	77	77	86	2.6	2.0	0.4	24	17	13	415	301	46
Flourensia cernua	980	77	31	2.9	0.1	<0.1	12	0.14	0.02	238	11	4
Lycium pallidum	1800	240	55	1.6	0.1	<0.1	*	*	*	*	*	*
Condalia lycioides	26	3	8	0.1	<0.1	<0.1	*	*	*	*	*	*
Grasses:												
Hilaria mutica	171	77	251	0.2	0.1	0.5	*	*	*	*	*	*
Muhlenbergia porteri	642	796	1113	0.8	1.3	4.3	*	*	*	*	*	*
Scleropogon brevifolius	222	700	371	<0.1	<0.1	<0.1	*	*	*	*	*	*
Sporobolus flexiosus	26	144	900	<0.1	0.1	1.0	*	*	*	*	*	*
Succulents:												
Opuntia sp.	4	7	24	<0.1	<0.1	<0.1	*	*	*	*	*	*

* equation to estimate biomass not available.

LITERATURE CITED

EMLEN, J. T. 1971. Population densities of birds derived from transect counts. Auk 88:323-342.

POLK, L. K., and D. N. UECKERT. 1973. Biology and ecology of a mesquite twig girdler, *Onicideres rhodestica*, in west Texas. Ann. Ent. Soc. Amer. 66(2):411-417.

SOUTHWOOD, T. R. E. 1966. Ecological methods. Methuen & Co. London. 391 pp.

UECKERT, D. N., L. K. POLK, and C. R. WARD. 1971. Mesquite twig girdler; a possible means of mesquite control. J. Range Manage. 24(2):116-118.

WHITFORD, W. G. (Coordinator), et al. 1973. Jornada Validation Site Report. US/IBP Desert Biome Res. Memo. 73-4.

IV. SUPPLEMENTS

SUPPLEMENT 1

Foraging Ecology and Relative Importance of Subterranean Termites in Chihuahuan Desert Ecosystems*

Introduction

It appears likely that where they are abundant, termites may be one of the most important groups of organisms in a desert ecosystem. A wide variety of plant material serves as food for termites, including living and dead wood, grasses, herbaceous plants and their debris, fungi, humus, and dung (Lee and Wood, 1971). In habitats where most of these food sources are found, a large proportion of the energy resource of the ecosystem is potentially available to termites. Little competition is encountered with other soil animals, since only a minority feed on freshly fallen plant debris or living plants (Lee and Wood, 1971).

Unlike most poikilotherms, termites have extremely efficient digestive systems. It is not known if they are efficient producers, that is, if annual population production is greater than annual population respiration. However, if termites should prove to be efficient producers like other poikilotherms, they could have a significant impact on the rate and direction of energy flow in many ecosystems, including those that large mammals appear to dominate (Lee and Wood, 1971).

The role of termites in a Chihuahuan Desert ecosystem has never been extensively studied. To obtain information about the importance of the subterranean termites in Chihuahuan Desert ecosystems, studies of foraging activity and consumption rates were conducted over a period of several months. The most numerous termite species in the area and the only one positively identified in our studies was *Gnathamitermes perplexus* Banks, but *Amitermes wheeleri* Desneux and *Reticulitermes tibiulis* Banks have been collected from the study areas. The studies reported here provide insights into these questions and serve as the basis for future experimental studies designed to further quantify and qualify the role of termites in the Chihuahuan Desert.

The study was conducted from June, 1972, through November, 1973, at the US/IBP Jornada Validation Site in Dona Ana County, New Mexico. Two sites were studied. The playa site is a dry lake bed with a clay-loam to solid clay bottom, surrounded by a fringe of sandy loam. A caliche (calcium carbonate deposition) layer is found approximately 50 cm beneath the soil surface on the fringe. *Prosopis glandulosa* (mesquite) and *Ephedra trifurca* (Mormon tea) are the most common shrubs on the site, occurring at estimated densities of $468 \cdot ha^{-1}$ (Whitford and Ludwig, 1972).

The second site (bajada) is on an alluvial fan on the upper portion of the watershed draining into the playa. On this site, the soils vary from sandy gravels to sandy loam, with a caliche layer 10 to 40 cm beneath the soil surface. The bajada is dissected by arroyos (dry water courses) which have somewhat deeper soil than the rest of the area. *Larrea divaricata* (creosotebush) is the dominant vegetation of the drained areas. Along the edges of the arroyos, the principal vegetation includes *Prosopis glandulosa* (mesquite), *Chilopsis linearis* (desert willow), *Yucca baccata* (banana yucca), and *Opuntia violacea* (prickly pear cactus); Whitford and Ludwig, 1972.

Methods

Consumption data were obtained by adaptation of a technique developed at the IBP Santa Rita and Silverbell sites in Arizona (LaFage et al., 1973). Each plot consisted of 100 toilet paper rolls, 1 m apart on a grid. The rolls were tied with string to prevent unwinding and placed over metal stakes so that one end was in direct contact with the ground. Arranged in this manner, the rolls were a readily acceptable food source for termites. Eight identical grids were located at representative areas on the playa and bajada (Figs. 1 and 2).

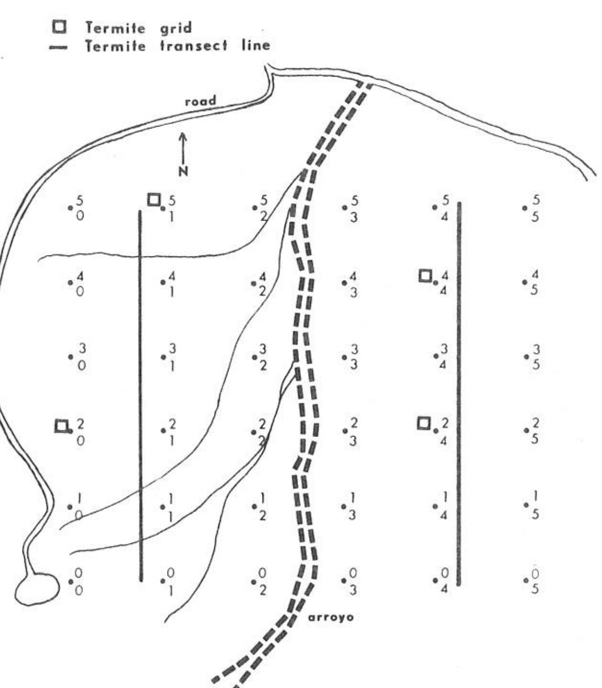


Figure 1. The location of sampling grids and sampling transects on the bajada study site.

*Kimberly A. Johnson and Walter G. Whitford
New Mexico State University
Las Cruces, New Mexico 88003

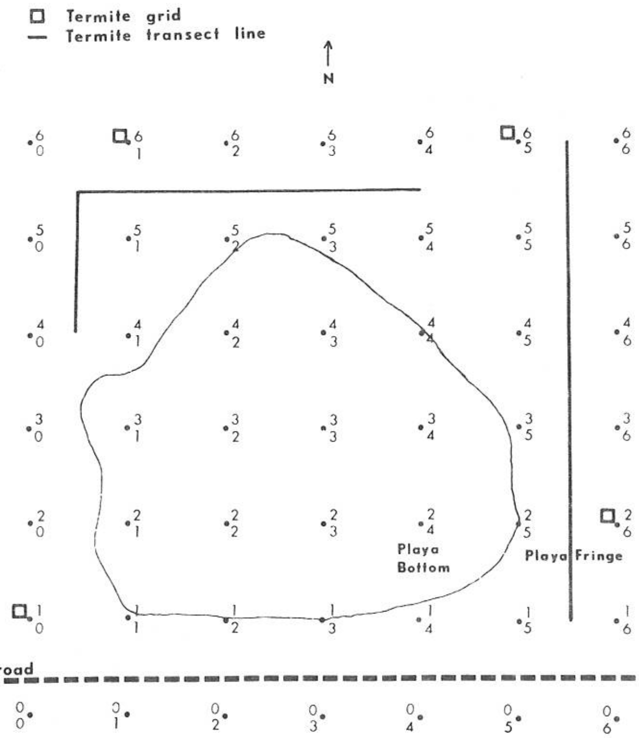


Figure 2. The location of sampling grids and sampling transects on the playa study area.

The original rolls were removed and replaced in March, 1973, after nine months of exposure, to estimate total consumption by the termites. Rate of consumption was measured during the 1973 growing season by removing and replacing the same 10 randomly chosen rolls at identical locations on each grid once each month. Casings and litter were cleaned from the food surface, and plaster casts were made of the consumed portions of the rolls. The weight of paper consumed was determined from the dry weight of plaster using the conversion factor, 0.11 g paper = 1 g plaster. The caloric equivalent of the consumed paper was calculated from the standard caloric content of paper, 4.5 calories/g.

Foraging activity of termites was measured using two techniques. The first method involved visual examination of the surface of the roll in contact with the ground; numbers of termites active on the roll were counted and the roll quickly replaced. Diurnal activity was studied by examining all the rolls on a grid at 2-hr intervals, beginning at 0500 (MST) and continuing until 1700 hours. This technique was later modified to eliminate variation due to prior disturbance: three rolls which were known to be sites of frequent activity were checked at each time interval so that no roll was handled more than once a day. Soil moisture and soil temperature were measured at the time of each observation by gypsum soil blocks and thermistors buried in the soil of the grids.

The second method, designed to provide an estimate of normal surface foraging activity, consisted of walking two 500 m transects on both the playa and bajada between 0700 and 1000 hours, MST (Figs. 1 and 2). All potential food sources in a 2 m belt were examined for activity; the species of the food source and the number of termites in the foraging group were recorded. Available food sources were tabulated on both sites according to species and weight by recording each piece of woody material in 10 randomly chosen 10 x 2 m strips along the transect lines.

Results and Discussion

Consumption data for the period of June, 1972, through March, 1973, in kilograms and kilocalories per hectare are presented in Table 1. Activity varied considerably between grids, with a range from zero on some bajada grids to the extensive consumption on the playa grids. Cellulose consumption rates peaked during July and rapidly declined to a trace amount by September. Variation in activity at different locations is evident in Table 1.

Twelve-hour activity checks of the toilet paper grids provided an indication of surface foraging activity as a function of soil temperature and moisture. The method of examining all rolls on a grid bi-hourly was modified so that only three rolls of known activity were checked each time. This change was made when it was noted that after disturbing the foragers at 0500 hours, surface activity on a roll was greatly diminished for the remainder of the day. We obtained a more accurate estimate of foraging activity with the modified technique. The results of the studies during the period extending from May 18 to August 15, 1973, are presented in Figure 3. Some surface foraging was noted through mid-November. Surface foraging ceased at soil temperatures ranging between 3 and 10 C at 10 cm.

These data suggest that soil temperature at some depth probably close to the surface represents a threshold for surface foraging. The lower threshold temperature appears to be between 3-5 C at 10 cm but is impossible to pinpoint due to diurnal fluctuations in temperature at that depth. There was no consistent variation in activity at different soil moisture-temperature regimes (Fig. 3).

Soil moisture appears to be of less importance as the threshold for foraging near the soil surface than temperature. This finding is not surprising since the relative humidity in the soil interstices only drops to 90% with the change from 0 to -140 bars water potential. At 30 C this represents a saturation deficit of only 3.4 $g \cdot m^{-3}$ as compared to 24.3 $g \cdot m^{-3}$ in air at 30 C and relative humidity at 20%, which represent average mid-day conditions in summer. The relative humidity in soil interstices was calculated from the following equation:

$$\psi = \frac{RT \ln \frac{e}{e_0}}{\bar{V}}$$

Table 1. Cellulose consumption by termites on toilet paper grids, expressed as $kg \cdot ha^{-1}$ and as $kilocalories \cdot ha^{-1}$

	Jun72-Mar73		Mar73-Jun73		Jul 1973		Aug 1973		Sep 1973	
	kg	kcal	kg	kcal	kg	kcal	kg	kcal	kg	kcal
PLAYA										
1/0	15.5	69.8	4.6	20.7	24.8	111.6	4.9	22.3	-0-	
2/6	.76	3.4	1.5	6.7	10	45	10	45.6	-0-	
6/1	9.6	43.4	2.7	12.2	1.8	8.1	.6	2.6	-0-	
6/5	3	13.5	.8	3.6	9.2	41.4	2.2	9.9	-0-	
BAJADA										
0/0	2.9	13.3	.7	3.1	.6	2.7	.2	.9	-0-	
2/4	4.8	21.7	3.9	17.5	1.8	8.1	-0-		-0-	
4/4	4.2	18.8	.7	3.3	2.9	13.1	-0-		-0-	
5/1	11.8	53.2	.01	.04	2.3	10.4	1.4	6.2	-0-	

where $\frac{e}{e^0}$ = relative humidity, $\overline{V}$ = partial molal volume of water (0.018 $liters \cdot mole^{-1}$), R = gas constant = 0.082 $liters \cdot {}^{\circ}K^{-1}$, T = absolute temperature, ψ = water potential in bars (Slayter, 1967).

On several occasions, rolls which showed high surface activity at 0800 hours were often overrun with ants by 1000 hours. The few termites which were visible had been stung by these ants; it appeared that the ants were foraging at the surface of the termite colony, causing the termites to withdraw. Sheppe (1970) reported that ants were the most common predators of African Savannah termites and that harvester ants of the genus *Pheidole* were the most common of the predators. These data suggest a strong interaction between ants and termites that requires further investigation.

Activity checks indicate that these termites also forage at the soil surface during the night. On one occasion, as many as 95 termites per square meter of food surface were recorded at 2000 hours.

Marked spatial heterogeneity in suitable habitat for subterranean termites was documented both in studies with toilet paper grids (Fig. 4) and transect studies (Figs. 1 and 2, Table 2). Playa grids 6/5 and 6/1 were located in areas of sandy loam approximately 50-90 cm above the caliche layer and had heavy consumption on more than 50% of the rolls on the grid (Fig. 4). Playa grids 1/0 and 2/6 were located in areas which had an overwash of clay-silt varying from depths of 5-10 cm. Termites apparently avoid these finer, dense soils, as the grids on these soils had less than 25% of the rolls with significant consumption. The transect data from the playa showed the same pattern. Foraging groups were numerous on the sandy soil on the north and east sides of the playa (Fig. 1) but were virtually absent in the other areas. There was no apparent difference in the availability of food materials on any of these areas. Consequently, soil properties appear to be the most important factor affecting the density of termite foraging groups on the playa area.

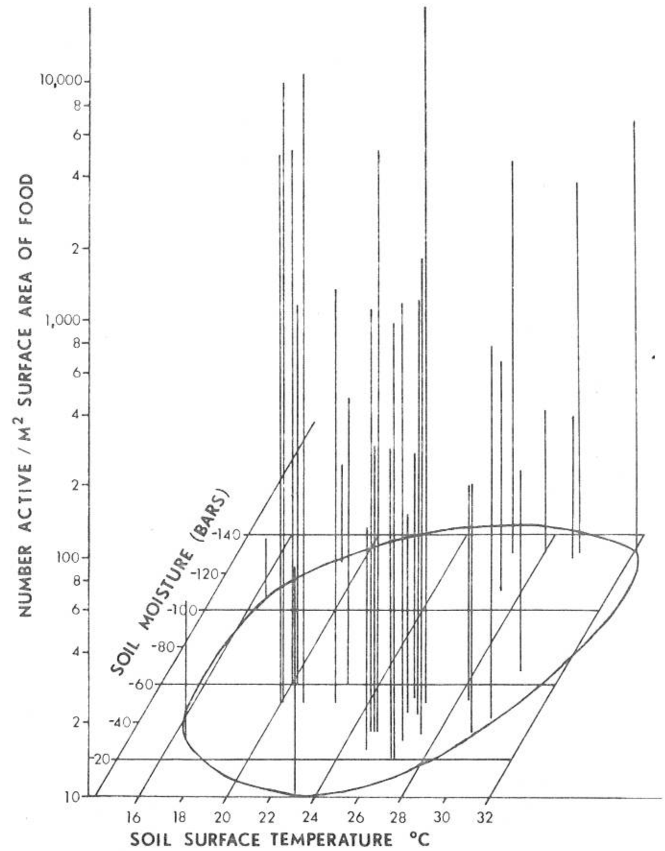


Figure 3. The effect of soil surface temperature at 1 cm and soil moisture at 10 cm on the number of subterranean termites in the toilet paper roll grids.

A similar pattern was obvious on the bajada site. Grids 2/0 and 2/4 were located on shallow soil with the caliche at approximately 10-20 cm (Figs. 1 and 4). Grids 4/4 and 5/1 had small arroyos diagonally transecting the grids; the patterns of consumption were associated with these drainage areas of deep soils and discontinuity in the caliche. On the bajada most activity in natural food sources was found in areas of deep soil. In areas where termite activity was absent in the transect, active termites were found under similar food items in arroyos near the sampling area.

The relative preferences of subterranean termites for forage materials is presented in Table 2. *Yucca elata* was the favorite food source on the bajada. Nearly all the termites found actively foraging in the transect areas were associated with *Yucca elata*, *Yucca baccata* and the prickly pear cactus, *Opuntia violacea*. Creosote bush (*Larrea divaricata*) was rarely attacked and mesquite (*Prosopis glandulosa*), though abundant, was never found to host termites. The standing crop of dead wood on the soil surface (Table 2) indicates that certain species of woody materials are avoided as a food source by subterranean termites.

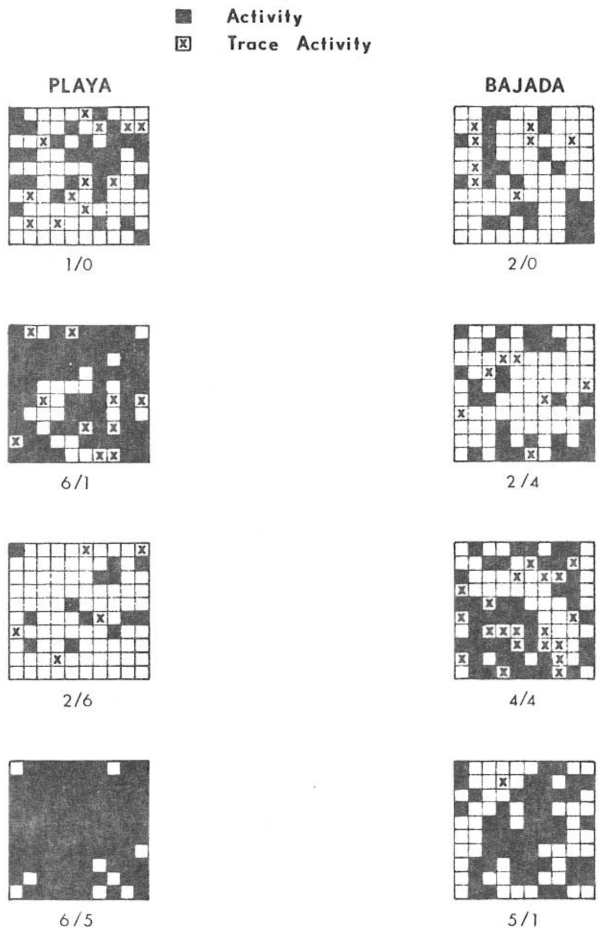


Figure 4. The distribution of foraging groups of subterranean termites on the toilet paper roll grids as determined by evidence of consumption or active groups in toilet paper rolls recorded during activity surveys.

On the playa, termites were most often found foraging on *Yucca elata* and cattle dung, which was abundant on the site in early summer of 1973. Cattle were last grazed on the site in October, 1972; no new dung had been added since that time. The number of dung pads present on the playa had decreased considerably by August and had virtually disappeared by the end of November, 1973. These findings are similar to those of Ferrar and Watson (1970), who report that an average-sized bovine dung pad disintegrated in approximately three months in studies conducted in northern Queensland, Australia. O'Brien (unpubl. data) determined that microbial decomposition in the area is limited by soil moisture. These data, coupled with the findings of Anderson and Coe (1974), who reported that microbial activity in elephant dung is progressively limited by lack of moisture after the initial 48 hours following deposition, suggest that the disappearance of the old (dry) dung pads over the summer is almost entirely due to termite activity.

The playa supported greater numbers of foraging groups per hectare and more termites per foraging group than the bajada (Table 2). The decrease in foraging group density in mid-summer was probably related to the dry conditions in July and August. Drying conditions result in a humidity barrier at the soil-food unit interface unless the food unit is partially buried. The late summer *Yucca elata* logs and dung pads inhabited by foraging groups were those which were partially buried. The variability in numbers of individuals in a foraging group was primarily a function of the size of the food unit and secondarily of the prevailing environmental conditions.

Table 2. Seasonal shifts in food sources, foraging groups per food source per hectare (FG), and an average number of termites per foraging group (N). A + indicates casings around standing dead or procumbent dead plants. Total density of annuals equaled 209,357 per hectare in August, 1973. Foraging group activity can be compared to standing crop biomass of woody material on the two sites indicated in the standing crop column

PLAYA															
Food Source	Standing	May		Jun		Jul		Aug		Sep		Oct		Nov	
Genus Species	Crop	FG	N	FG	N	FG	N	FG	N	FG	N	FG	N	FG	N
Cattle dung	350 units·ha^{-1}	120	7	200	16.3	45	9.9	3	3.5	35	4.4	20	13.3	15	14
Yucca elata	72 kg·ha^{-1}	5	4	35	10.4	5	6	5	2	5	2	5	2	5	4
Aristida Purpurea		--	--	--	--	--	--	--	--	--	--	--	--	+	5
Hilaria mutica		--	--	--	--	--	--	--	--	--	--	--	--	+	5
Astragalus sp.		--	--	--	--	--	--	--	--	--	--	--	--	+	12
Eriogonum sp.		--	--	--	--	--	--	--	--	--	--	--	--	+	--
Perezie nana		--	--	--	--	--	--	--	--	--	--	--	--	+	--
Prosopis glandulosa	31 kg·ha^{-1}	--	--	--	--	--	--	--	--	--	--	--	--	+	--
Ephedra trifurca	6.4 kg·ha^{-1}	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2, continued

BAJADA																
Food Source	Standing	May		Jun		Jul		Aug		Sep		Oct		Nov	
Genus Species	Crop	FG	N	FG	N	FG	N	FG	N	FG	N	FG	N	FG	N
Cattle dung		5	100	--	--	--	--	--	--	--	--	--	--	--	--
Yucca baccata		5	2	--	--	--	--	--	--	5	1	--	--	--	--
Yucca elata	94 $kg \cdot ha^{-1}$	5	6	5	50	20	6.5	--	--	--	--	--	--	--	--
Opuntia violacea	4 $kg \cdot ha^{-1}$	--	--	--	--	5	3	--	--	10	1	--	--	--	--
Larrea divaricata	150 $kg \cdot ha^{-1}$	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Prospis glandulosa	67 $kg \cdot ha^{-1}$	--	--	--	--	--	--	--	--	--	--	--	--	--	--

The toilet paper rolls applied to the ground surface constituted an artificial food source for termites, yet they provided a valid means of estimating consumption as a function of surface area of food applied to the ground and of estimating the number of termite foraging groups per unit soil surface area. The surface area in contact with the soil was much larger than that of small twigs and plant litter. The environment beneath the roll was sufficiently modified to allow termite activity, whereas such activity is limited on small plant litter by necessary exposure of the termites to direct sunlight and drying effects of the air. This modified environment resembles that provided beneath *Yucca* logs and cow chips, which the data show are favorite food sources of the termites.

Termite preference for larger pieces of wood and cattle dung over small twigs and surface litter reflects the fact that the modified environment under a large object on the soil surface is a necessary factor in food suitability. It appears that most small woody material cannot be utilized, at least during the months of June, July and August, at the soil surface. These observations support the contention that while soil moisture may not limit access to the soil surface, the moisture content of the air is important. Large objects provide a continuous environment with the soil, thus reducing or eliminating exposure to the drying ambient environment. Factors such as wind and water may be important in modifying the immediate environment around small twigs and annuals. Burial of such detritus presumably enhances its consumption, since a soil covering of 2-3 cm should allow considerable termite activity.

Late in the fall, annuals and grasses were preferred food sources for the termites. By late November, soil casings surrounded standing dead annuals above the surface of the ground and were abundant on the playa. Consumption of dead annuals surrounded by these casings was extensive at this time, indicating altered availability of plants. While most of the annuals had died by August, termites did not attack them until air and soil temperatures dropped considerably, accompanied by corresponding decreases in the nighttime saturation deficits with high relative humidity. The limiting factor of atmospheric dryness was considerably reduced in the fall with nighttime saturation deficits less than 3 $g \cdot m^{-3}$, allowing termite activity above ground at least during the night. These observations are similar to those of Sheppe (1970), who found that *Odontotermes latericius* was most active at night. Since there are no other major consumers of dead annuals, it is not unreasonable to attribute the yearly disappearance of most annuals to termite consumption.

Peak activity was in July, which possibly reflects an increase in available food sources due to accumulation of buried litter following summer rains. Increased activity in July is also a result of rises in soil moisture during the rainy season. LaFage et al. (1973) report similar increased foraging intensity in *G. perplexus* in southern Arizona following rain. The data indicate, however, that soil temperature is more limiting to foraging activity than soil moisture. Soil dryness of -140 bars did not have a severe effect on surface activity, presumably because desiccation is a threat to survival only upon direct exposure to dry air rather than on contact with dry soils. Soil temperature, in contrast, was responsible for limiting the duration and intensity of activity. During summer months, nearly all surface foraging ceased between 1000 and 1800 hours (MST), when soil temperatures were highest. These data are more quantitative than those reported by Bodot (1967) and Sheppe (1970), who found rough correlation between temperature and humidity and activity in African Savannah termites. Daytime air temperatures up to 32 C, and nighttime temperatures as low as 5 C, were not so extreme as to completely eliminate activity, although the duration of activity was limited. Air temperature is apparently a less critical determinant of foraging activity.

One reasonable explanation for the fact that termites do not attack wood of certain species (such as *Larrea divaricata* and *Prosopis glandulosa*) for a considerably long period of time is the possibility of the presence of chemical inhibitory substances in newly fallen woody materials. This might also explain the delay in termite foraging activity in newly fallen *Yucca* logs which has been noted on both sites; termites prefer smaller pieces of *Yucca* which are noticeably older than larger, newer logs. Feeding on older, partially decomposed plant material is likely to be influenced by the growth of fungi and other microorganisms on these substrates. Lee and Wood (1971) suggest that fungi may render wood more digestible and may possibly decompose repellent or toxic substances. Experimental studies designed to evaluate the importance of inhibitory chemicals in food sources are required to test this hypothesis.

Mature colony size for *G. perplexus* has been estimated at between 5,000 and 10,000 individuals (Nutting, pers. comm.). Haverty and Nutting (1974) reported that the laboratory consumption rate of the subterranean termite *Heterotermes aureus*, which may be comparable to our field experiments, was 5 mg wood/hr/g dry weight of termite on natural woods. Estimated consumption of a colony of 10,000 individuals weighing 0.5 mg/termite is 18 g wood/colony/month. Consumption estimates (± one standard error) for the playa and bajada respectively during the months of July and August were 7.9 ± 2.8 and 1.2 ± 0.4 $kg \cdot ha^{-1}$. The great variability of the consumption rates (Table 1) and the presence of zero consumption rates on some grids are consistent with the premise that these rates reflect the densities of termites before the grids were established rather than densities due to the attraction of termites to the grids. Therefore, it appears that the densities of termites in an area are independent of the densities of the rolls, and a valid correlation exists between the number of foraging groups per grid (100 m^2) and the true densities of termite colonies. This gives estimated foraging group densities of 440 and 61 per ha on the playa and bajada, respectively. Although any estimates of densities are clearly subject to many sources of error, these density estimates do not appear unreasonable.

Estimates of addition to the detritus pool of the two areas are available from other work done on these sites as part of the Desert Biome Program. The estimated input of wood and leaves from perennials, stems and leaves of annuals and rabbit and cattle dung on the playa was 10.3×10^6 $cal \cdot ha^{-1}$, in 1972. The estimated consumption by subterranean termites during that period was 5.3×10^6 $cal \cdot ha^{-1}$. On the bajada, woody detritus production in 1972 was estimated at 3.72×10^6 $cal \cdot ha^{-1}$ and the estimated consumption by termites was 3.4×10^6 $cal \cdot ha^{-1}$. The bajada litter production estimates did not include samples from the arroyos which have higher productivity than the remaining area. Considering these estimates it is apparent that subterranean termites consume at least 50% of the net productivity in these Chihuahuan Desert ecosystems. The movement of this amount of material through one group of detritivores attests to the importance of these insects in energy flow and nutrient turnover in Chihuahuan Desert ecosystems.

Acknowledgements

We thank Tom Bellows, Aileen Schumacher and Ross Zimmerman for assistance in the field. John Ludwig provided assistance with calibration of gypsum blocks and measurements of soil moisture. We also thank William Nutting, Jeff LaFage and Stuart Pimm for reviewing the manuscript and for their helpful discussions. This study is a contribution of the Jornada Validation Site of the US/IBP Desert Biome Program supported by Grant Number GB15886 of the National Science Foundation.

Literature Cited

Anderson, J. M., and M. J. Coe. 1974. Decomposition of elephant dung in an arid, tropical environment. Oecologia (Berlin) 14:111-125.

Bodot, P. 1967. Cycles saisonniers d'activite collective des termites des savanes de basse Cote-D'Ivoire. Insectes Sociaux 14:359-388.

Haverty, M. E., and W. L. Nutting. 1974. Natural wood consumption rates and survival of a dry wood and a subterranean termite at constant temperatures. Ann. Entomol. Soc. Amer. 67:153-157.

LaFage, J. P., W. L. Nutting, and M. I. Haverty. 1973. Desert subterranean termites: a method for studying foraging behavior. Environ. Entom. 2:954-956.

Lee, K. E., and T. G. Wood. 1971. Termites and soils. Academic Press, New York. 251 pp.

Ludwig, J. A., and W. G. Whitford. 1974. Short-term water and energy flow in arid ecosystems. *In* I. Noy-Meir (Ed.) Ecosystems dynamics, Vol. V. IBP Arid lands synthesis volumes. In press.

Sheppe, W. 1970a. Invertebrate predation on termites of the African savannah. Insectes Sociaux 17:205-281.

Sheppe, W. 1970b. Daily and seasonal patterns of construction activity by *Odontotermes latericius* (Isoptera: Termitidae). Insectes Sociaux 17:225-232.

Slayter, R. O. 1967. Plant water relationships. Academic Press. London. 366 pp.

Whitford, W. G., and J. A. Ludwig. 1971. The Jornada Validation Site report. US/IBP Desert Biome Res. Memo. 71-5.

SUPPLEMENT 2

Spatial and Temporal Variation in Chihuahuan Desert Ant Faunas *

Abstract

Density estimates of active ant colonies were made at frequent intervals throughout the year in two Chihuahuan Desert communities: a creosotebush bajada and a mesquite-mormon tea playa fringe community. Densities of harvester ants, *Pogonomyrmex*, were higher on the playa site and seed harvesters, *Pheidole*, were higher on the bajada. Some ant species exhibited specific habitat requirements with regard to soil type and/or plant cover: *Formica perpilosa, Pogonomyrmex imberbiculus* and *Trachymyrmex smithi neomexicanus.* Other species were more generally distributed. Two congeneric species pairs exhibited differences in seasonal activities suggesting competitive interactions. Peak densities of active ant colonies exceeded 4,000 colonies·ha^{-1} on the playa and 2,000 colonies·ha^{-1} on the bajada.

Studies of North American ant communities have been largely limited to relationships with plant communities (Conklin, 1972; Gregg, 1963; Wheeler and Wheeler, 1973). Most studies in which densities of ant colonies have been estimated have limited their scope to one or two species and to estimates made during mid-summer (Talbot, 1943; Rogers et al., 1972). The interpretation of the functional role of an animal community in an ecosystem requires analysis of the spatial and temporal relationships between the species in the community. Therefore, we initiated studies designed to: (1) test methods which would provide reliable estimates of colony densities of different species of ants; and (2) evaluate factors affecting spatial and temporal fluctuations in species densities of actively foraging ants.

Site Description

The data for this study were collected during the 11-month period of January, 1973 through November, 1973 on the Jornada Validation Site. The Jornada Validation Site is a watershed draining two slopes of a mountain in the Dona Ana Range located on the New Mexico State University Ranch, 40 km NNE of Las Cruces, Dona Ana County, New Mexico. Two sites were selected for study at the validation site: the playa fringe (ca. 36 ha) and the bajada (ca. 25 ha).

On the playa fringe, mesquite (*Prosopis glandulosa*) and soap tree yucca (*Yucca elata*) are the dominant species on the basis of biomass, with densities of approximately 480 individuals per hectare and 150 individuals per hectare, respectively. Sub-dominant shrub species include snakeweed (*Xanthocephalum sarothrae*) and long leaf mormon tea (*Ephedra trifurca*). All species show spatial differences in distribution; mesquite exhibits its greatest cover on the north fringe of the playa and mormon tea on the south and east fringes.

Most of the soils on the playa fringe are sandy with a caliche (calcium carbonate deposition) layer about 100 cm from the surface (soils I, III, IV, and V, Figure 1). On the west side of the playa (soil VI), sandy soil has an over-layer of dark silt clay (Fig. 1).

On the bajada, creosotebush (*Larrea divaricata*) is found at a density of 4,800 individuals per hectare, and mesquite (*Prosopis glandulosa*) at a density of 27 individuals per hectare. Of the grasses, bush-muhley (*Muhlenbergia porteri*) is found at the greatest density and of the succulents, soap tree yucca (*Yucca elata*) contributed the greatest biomass.

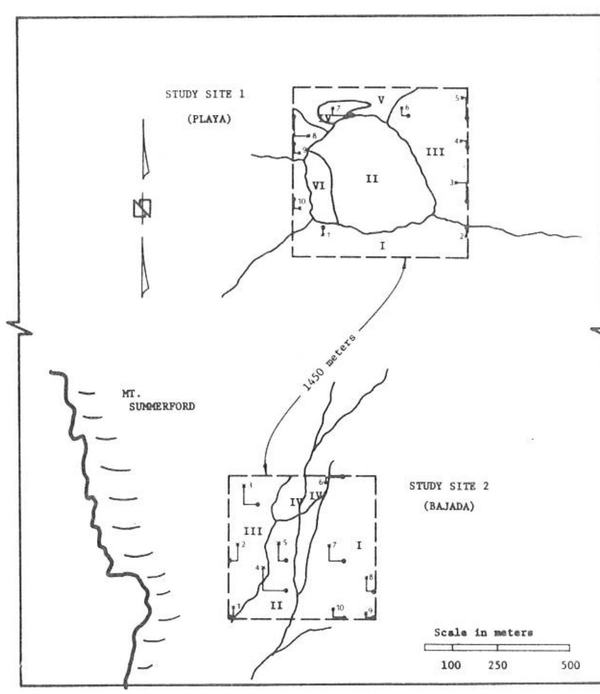


Figure 1. Map of the Jornada Validation Site showing locations of ant census stakes and soil types. Playa soils I, III, IV, and V are variously colored sands, soil II is a silt-clay and soil VI is a sand with an overlayer of dark silt. Bajada soils II and III are shallow sands with caliche less than 100 cm from the surface. Bajada soils I and IV are deeper sands.

*Aileen Schumacher and Walter G. Whitford
New Mexico State University
Las Cruces, New Mexico 88003

The bajada soils vary greatly. The soils on the east of the arroyo (Soil I, Fig. 1) are deeper sand with caliche at depths of over 100 cm. Soils on the west side of the arroyo are light colored shallow sands with caliche layer varying from 30 cm to 100 cm (Soils II and III, Fig. 1). Soil IV (Fig. 1) is a sand alluvium with caliche at greater than 100 cm.

Methods

Ten stakes were randomly located on each site. Using the stake as a center point, each area was divided into four quadrants. In each quadrant, a square meter frame was placed on the ground and the colonies of smaller ant species were recorded. These quadrant samples were located 4 m from the stake. This provided a total sample area of 40 m^2 for each site.

For population estimates of the larger species, the quarter method was used (Cottam and Curtis, 1956). The nest nearest the stake in each quadrant was located and the distance to the stake recorded. An average distance was then computed. This distance squared yielded the area containing one nest. This was then converted to number of nests per hectare.

Field identifications of ant species were made whenever possible. Otherwise, individual workers were brought into the laboratory and identified there. No distinction was made in the survey data between *Myrmecocystus depilis* and *Myrmecocystus mimicus*, as distinguishing these two species always requires microscopic examination and was not considered feasible for a field study such as this. *Pheidole* colonies could not be identified to species level, as it was often not possible to obtain both major and minor workers from a colony. *Pheidole* species recorded as being present at the Jornada Validation Site include *P. desertorum*, P. *militicida*, *P. rugulosa* and *P. xerophila* (Kay, pers. comm.).

Because of the sparseness of ant colonies, only the quadrant method was employed on the bajada. Estimates of numbers of colonies of large ant species on the bajada were from direct counts. Both types of census techniques were employed on the playa fringe.

Results and Discussion

The major differences in species composition in the ant faunas of the two areas studied involved the larger harvester ants of the genus *Pogonomyrmex* and *Formica* (Fig. 2). Although colony densities were greater on the playa fringe than on the bajada, the small body size species (*Conomyrma, Iridomyrmex* and *Pheidole*) were represented on both sites (Fig. 3).

The small omnivorous ant species, *Iridomyrmex pruinosum*, *Conomyrma bicolor* and *Conomyrma insana* achieved high densities on both the playa and bajada. These three species combined reached estimated peak densities of

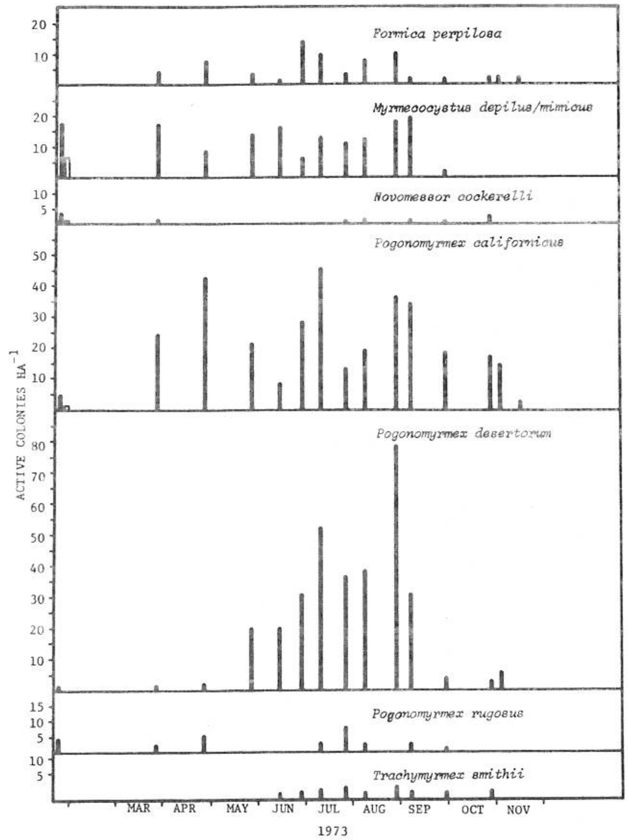


Figure 2. Seasonal variation in densities of active colonies of ant species with large conspicuous nests and large body size foragers. Densities were estimated by the point-quarter method (Cottam and Curtis, 1956).

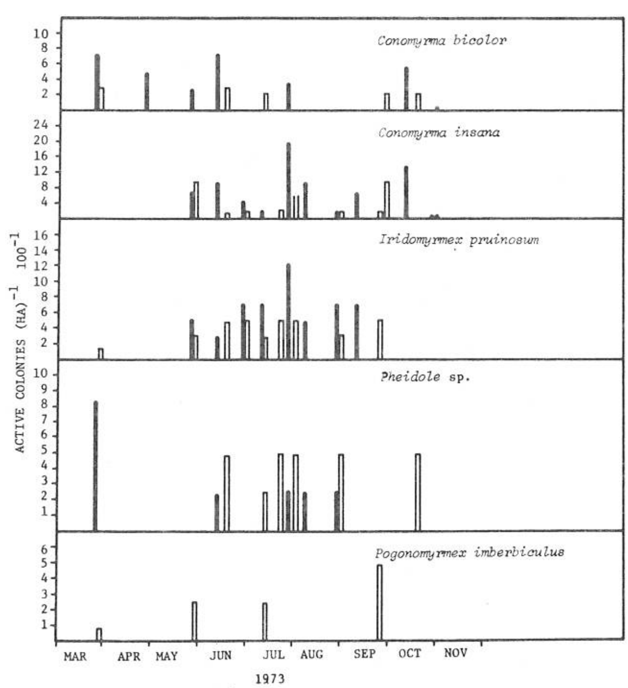


Figure 3. Seasonal variation in densities of active colonies of ant species with small nests and small body size. Densities were estimated by square meter quadrats.

2,800 colonies per hectare on the playa and 1,100 colonies per hectare on the bajada. Peak densities of seed foraging species (*Pogonomyrmex* and *Pheidole*) were much lower on both the playa and bajada reaching estimated peak densities of 340 colonies per hectare on the playa and 520 colonies per hectare on the bajada. However, *Pheidole* species accounted for nearly the entire seed harvesting fauna on the bajada (Figs. 2 and 3).

Rainfall events seemed to affect individual species on the playa to a greater extent than those on the bajada. The largest numbers of total colonies recorded on the playa were observed during two censuses taken immediately after rainfall events; on July 9 and August 8. Species exhibiting greatest response to such events were the harvesters, *Pogonomyrmex californicus* and *Pogonomyrmex desertorum*. Also responding with a meaningful increase in density were the small species of *C. insana* and *I. pruinosum*.

The largest numbers of total colonies on the bajada were recorded one day after rainfall events on June 13 and August 1.

Rainfall events at this site appeared to result in a more general increase in active colonies of small species instead of dramatically influencing populations in one or two species as on the playa. This difference could be accounted for by the difference in soil types between the two sites. The bajada represents an area of water run-off and the playa an area of water run-on. In addition, the finer sands of the playa fringe have greater water retention than do the bajada soils. Therefore, the effect of a rainfall event on soil moisture on the bajada was not as long lasting as the effect on the playa.

Patterns of distribution varied with individual species. *Formica perpilosa* was found at the base of mesquite shrubs in areas where soils were loamy with an overwash layer of dark silt. *Pogonomyrmex imberbiculus* nests were invariably found at the bases of shrubs on the edges of small arroyos. *Trachymyrmex smithi neomexicanus* nests were found at the base of shrubs on the playa, often in the same areas inhabited by *F. perpilosa*. On the bajada, the nests of *T. s. neomexicanus* were usually located on arroyo banks.

The harvesters *P. californicus* and *P. desertorum* inhabited deeper sandy soils which support annual vegetation. These harvester ants prefer seeds of annual buckwheats which are limitied to these deeper soils.

I. pruinosum and *C. insana* were found to be generally distributed over the entire area of both sites. Neither of these species exhibits specialized food preferences. *I. pruinosum* forages on plant exudates, attacks lone foragers of other species, and exhibits extensive scavenger behavior. *C. insana* also forages on plant exudates and other insects.

The presence of colonies of *Crematogaster* sp., *Pogonomyrmex apache* and *Solenopsis xyloni* were recorded but numbers were not appreciable enough to yield any conclusive data.

Species never located in quadrant samples but recorded as present at the Jornada Validation Site include *Componotus* sp., *Leptothoras* sp., *Myrmecocystus mexicanus*, *Mrymecocystus navajo*, *Neivamyrmex nigrescens*, *Solenopsis aurea*, and *Solenopsis drockowi* (Kay, pers. comm.). The absence of some species in survey data can be explained by their activity times. For example, *M. navajo* and *M. mexicanus* are both nocturnal species. Other species probably did not appear on the surveys due to their rarity and the concealment of colony sites.

The ant fauna could be divided into groups on the basis of seasonal activity patterns. Species that were principally mid-summer active species included *P. desertorum*, *C. insana*, *M. depilus*, *M. mimicus*, and *I. pruinosum* (Figs. 2 and 3). Other species were active over the year when air temperatures exceeded 20 C and soil temperatures at 20 cm ranged between 5 and 10 C. Species active earliest in the year included *Novomessor cockerelli*, *P. rugosus*, *P. californicus*, *P. imberbiculus*, and *F. perpilosa* which exhibited periodic activity from mid-February when environmental conditions were favorable.

Significantly fewer colonies of *C. bicolor* were active during July and August when *C. insana* had the greatest number of active colonies.

A similar pattern was observed in *P. californicus* and *P. desertorum*. Although *Pogonomyrmex* species exhibited no physiological difference in thermal tolerance range (Whitford, unpubl. data), these species exhibited differences in both seasonal and daily foraging activity patterns. *P. californicus* foraging in mid-summer is largely limited to periods of highest temperature around mid-day when *P. desertorum* foraging is reduced or has ceased. In spring and fall, *P. californicus* was active over the entire day.

These observations provide indirect evidence of competition between *P. californicus* and *P. desertorum* and between *C. insana* and *C. bicolor*. These species have similar habitat requirements, almost completely overlap in food requirements (Whitford, unpubl. data), but coexist by dividing these resources by temporal separation of peak foraging on a seasonal basis.

These densities of active ant colonies suggest that the ant community may have an important function in energy flow and nutrient turnover in desert ecosystems. Many species are omnivorous (*Conomyrma*, *Myrmecocystus* and *Iridomyrmex*) and thus may be important as predators of other arthropods as has been demonstrated in a meadow ecosystem (Kajak et al., 1971). We have estimated forager numbers of over 1,000 per colony in *Pogonomyrmex*, *Novomessor* and *F. perpilosa* (Whitford, Ettershank, Schumacher, unpubl. data), and based on our observations of foraging in *Conomyrma*, *Myrmecocystus* and *Iridomyrmex*, we would estimate similar forager numbers as minimum values for these species. Seed harvesting ants have been shown to account for the removal of a significant fraction of the seeds produced in a given year (Ludwig and Whitford, 1974). Ants represent the most numerous insects in Chihuahuan Desert ecosystems with the possible exception of termites. They are important as seed consumers, predators and scavangers, thus operating at several trophic levels in the system.

Although we did not intensively study the nocturnal ant fauna, we did collect some data on nocturnal species. One species, *Myrmecocystus mexicanus* occurs at densities of one colony per hectare on both the playa and bajada. These estimates were obtained by direct counts of the very distinctive nest cones of this species. This species is strictly nocturnal and active much of the year whenever soil surface temperatures are above freezing (C. A. Kay, pers. comm.). *N. cockerelli* and *T. s. neomexicanus* are primarily nocturnal foragers in mid-summer as are some species of *Pheidole*. Another strictly nocturnal species which is rare on the sites is *M. navajo*. Therefore, the data presented in this paper represent an accurate picture of seasonal variation in densities of active ant colonies in spite of a lack of intense effort to make density estimates at night.

Acknowledgements

This research was sponsored by the Desert Biome Program as part of the Jornada validation studies under Grant GB15886 from the NSF. We thank Kim Johnson, Tom Bellows, Jeannine Riazance, Karen Melick, and Angela Wallace for field assistance and Carol A. Kay for assistance in identification and reviewing the manuscript.

Literature Cited

Conklin, A. 1972. A study of ant populations at the Plains-Foothill border, Colorado. Southwest. Nat. 17:43-54.

Cottam, G., and J. Curtis. 1956. The use of distance measures in phytosociological sampling. Ecology 37:457-460.

Gregg, R. 1963. The ants of Colorado. Univ. of Colo. Press, Boulder. 792 pp.

Kajak. A., A. Breymeyer, and J. Petal. 1971. Productivity investigation of two types of meadows in the Vistula Valley. XI. Predatory arthropods. Ekologia Polska 19: 223-233.

Ludwig, J. A., and W. G. Whitford. 1974. Short term water and energy flow in arid ecosystems. *In* I. Noy-Meir (Ed.) Ecosystem dynamics. Volume V. IBP Arid Lands Synthesis Volumes. In Press.

Rogers, L., R. Lavigne, and J. Miller. 1972. Bioenergetics of the western harvester ant in the shortgrass plains ecosystem. Environ. Entom. 1:763-768.

Talbot, M. 1943. Population studies of the ant *Prenolepis imparis*. Ecology 24:31-44.

Wheeler, G., and J. Wheeler. 1973. Ants of Deep Canyon. Philip L. Boyd, Deep Canyon Desert Research Center. Riverside, Calif. 151 pp.

SUPPLEMENT 3

The Foraging Ecology of Two Species of Chihuahuan Desert Ants: *Formica perpilosa* and *Trachymyrmex smithi neomexicanus* (Hymenoptera:Formicidae)*

Abstract

The foraging ecology of two ant species inhabiting the same area in the Chihuahuan Desert was investigated by study of conditions and magnitude of forager activity, estimation of forager population numbers, determination of critical maximum and minimum temperatures, and observation of foraging behavior.

The foraging activity of *Formica perpilosa* was relatively independent of soil temperature and saturation deficits, probably because of their ability to lose water without detriment and the fact that they forage in plants. Foraging activity in *Trachymyrmex smithi neomexicanus* ceased at saturation deficits greater than 35 g/m^3 and soil surface temperatures greater than 50 C. The mean critical thermal maxima and minima in *F. perpilosa* were 45.2 C and 5.2 C and in *T. s. neomexicanus* were 36.7 C and 9.7 C.

The estimated forager population size in *F. perpilosa* ranged from 2,000 to 3,500 per colony. We estimated that the average forager population size in *T. s. neomexicanus* was about one half that of *F. perpilosa.*

F. perpilosa forage on both honey dew and insects. *T. s. neomexicanus* forage on leaf litter, and appear to exhibit a seasonal change in forage preference.

Introduction

Formica perpilosa and *Trachymyrmex smithi neomexicanus* are two ants commonly found inhabiting the same areas in the Chihuahuan Desert in southern New Mexico. There is little published concerning the biology of either of these two species. This study was designed to provide data concerning the foraging ecology of the two species by studying foraging activity, estimating forager population numbers, determining critical maximum and minimum temperatures, and observing foraging behavior.

Formica perpilosa is southwestern in distribution in the United States, with general habitats including sagebrush, greasewood desert and saltbush-greasewood desert (Gregg, 1963). In the Chihuahuan Desert in southern New Mexico, this species inhabits areas such as the fringes of dry lake basins where it is associated with large shrubs like the mesquite, *Prosopis glandulosa juliflora.*

*Aileen Schumacher and Walter G. Whitford
New Mexico State University
Las Cruces, New Mexico 88003

Trachymyrmex smithi neomexicanus is one of the less specialized genera of the fungus growing attines. This genus uses insect droppings or slivers of decayed vegetation for their gardens rather than engaging in leaf cutting (Weber, 1972a). *T. s. neomexicanus* has only been reported from the United States (Weber, 1972b) but the genus is found in the Nearctic and Neotropical regions.

This study was conducted during the months of June, July and August, 1973, on a site approximately 40 km NNE of Las Cruces, New Mexico.

The Chihuahuan Desert in this area of southern New Mexico varies in elevation from ca. 2000 m at the summits of the small mountains to approximately 1000 m in the plains and drainages of these mountains. Rainfall is variable, occurring predominantly in the summer months, June through September, and averages 228 mm per year. Summer temperatures often reach 38 C at mid-day and temperatures below 0 C frequently occur at night from November through February.

Three nests of each species were studied in an area of approximately one-half ha. The soil in this area is a sandy loam, with a caliche (calcium carbonate deposition) layer approximately 50 cm from the soil surface. *Prosopis glandulosa juliflora* (mesquite) and *Ephedra trifurca* (mormon tea) are the most common shrub species in the area. These shrubs occur at estimated densities of 468 individuals per hectare, with a total cover of 21,075 m^3/ha, in mesquite and 318 individuals per hectare with a total cover of 314 m^3/ha in *Ephedra* (Whitford and Ludwig, 1971).

Methods

Foraging Activity

Foraging activity was recorded for three separate daytime intervals from 0600 until 1800, and for one night from 1900 until 0500. At each observation, soil surface temperatures, air temperatures and relative humidity were recorded.

The large size of *F. perpilosa* nests made direct counts of numbers of ants entering or leaving the colony impossible. Therefore, three *F. perpilosa* nests located in mesquite bushes were ringed with stakes and segments of string in 1 m lengths (Fig. 1). In each hour interval, ants returning to the nest crossing under a randomly selected segment of string were counted for two, 2-minute periods. We were interested in the rate of foraging, not total activity, so counts were confined to returning foragers only. However, the rate at which ants left the nest appeared to be similar to the rate at which foragers returned. Foraging activity was calculated by multiplying the number of ants returning by the number of string segments required to ring the entire nest, and dividing by the number of minutes observed. By selecting segments at random, and making counts of four separate segments each period, we were able to account for the variability in numbers of ants returning to the nest from different directions and were able to obtain an accurate estimate of the foraging activity of the entire colony.

Three *T. s. neomexicanus* nests were also located at the base of shrubs, but the nest openings were easily visible. A wire ring 6 inches in diameter was situated over the nest opening of each colony (Fig. 2). In each hour interval, ants returning to the nest crossing under the wire ring were counted for two, 2-minute intervals. Foraging activity was calculated by dividing the number of ants returning by the number of minutes observed.

Population Estimation

Since differences in population size influence variation in forager activity, we estimated the numbers of foragers in the colonies using the Lincoln method (Chew, 1959). Between 100 and 300 foragers were collected by aspirator, marked with a dot of fingernail polish on the gaster after being immobilized on ice, and then released at the nest site. Recaptures were done within 24 hr of marking since ant grooming tends to eliminate these marks (Brian, 1971). Forager numbers were estimated by the equation: $N = (P \times C) \div R$, where N = number of foragers; P = number of ants marked in the precensus; C = total number of ants captured in the census; and R = the number of marked ants collected in C. The reliability of this method is dependent on the retention of the mark, no difference in probability of mortality between marked and unmarked individuals and the proportion of recaptures to total numbers of ants censused.

This method was fairly successful with *F. perpilosa*, however, marked *T. s. neomexicanus* were discovered dead and deposited in a heap near the nest opening upon attempting to recapture. Whether the marked ants were rejected and killed by their nestmates or whether mortality resulted because of handling is not known. There was continuing difficulty throughout the study in trying to bring *T. s. neomexicanus* in from the field, as they appeared to be very susceptible to temperature changes and to the handling of capture and transport.

In an effort to obtain a population estimate of *T. s. neomexicanus*, excavation of a nest was attempted. The excavation was not completed, as the direction of the nest tunnel was lost in a layer of caliche about 1 m from the soil surface.

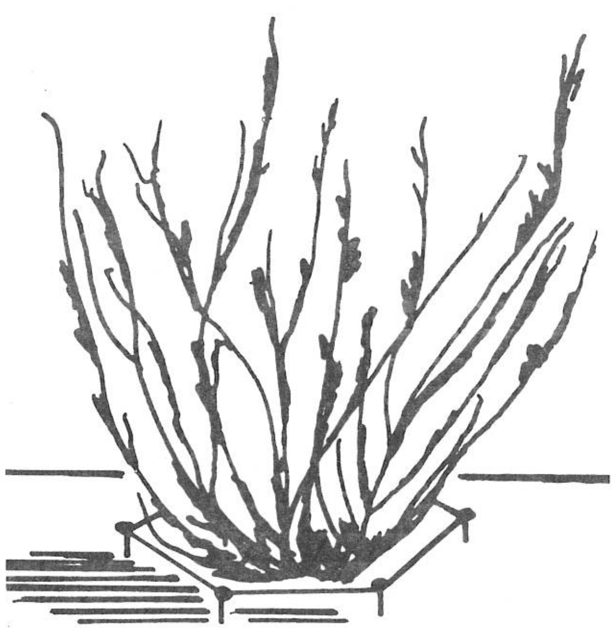


Figure 1. The relationship of a reference ring and mesquite shrub containing a *Formica perpilosa* nest used in activity studies.

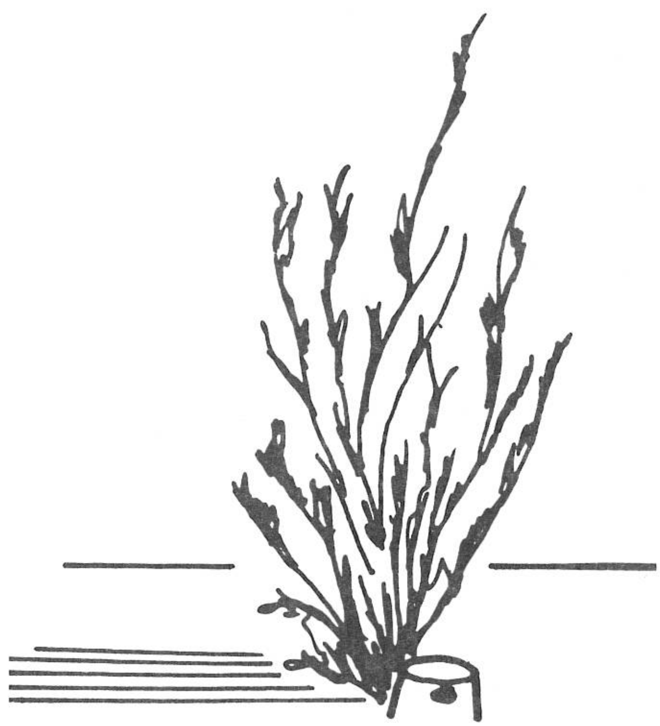


Figure 2. The relationship of a reference ring on the nest opening of *Trachymyrmex smithi neomexicanus* used in activity studies.

Critical Maximum and Minimum Temperatures

To correlate possible physiological differences of the two species with differences in activity times and conditions critical maximum and minimum temperatures of both species were measured.

Critical maximum (CTMax) and minimum (CTMin) temperatures are not lethal temperatures as used by Delye (1969). CTMax and CTMin are defined as the statistical mean of those temperatures at which the individuals within a population become immobilized and thus incapable of escaping conditions which will result in death when those individuals are heated or cooled at a constant rate. Thus, the CTMax and CTMin are ecological lethals, not physiological lethal temperatures. The use of CTMax and CTMin are justified in studies of ants because these small animals will quickly equilibrate with the temperature of their immediate environment. The CTMax and CTMin, while not exactly comparable to lethal temperatures, do set the ecological limits for activity of a species but are usually several degrees higher than the upper and lower lethal temperatures.

In each measurement, four ants were placed in a 200 ml beaker containing an inch of soil. Temperatures were measured by a YSI (Yellow Springs Instrument) thermistor and a telethermometer. The thermistor tip and the inside of the beaker were coated with silicon oil to prevent the ants from leaving the soil surface.

For critical maximum temperatures, the beaker was placed in an electrical heating mantle and the current was adjusted with a variable transformer to obtain an increase of 1 C per minute. Critical minimum temperatures were obtained by placing the beaker in a mixture of ice and NaCl.

Critical temperature was recorded as that temperature at which an individual ant no longer appeared capable of movement, even with stimulation.

RESULTS AND DISCUSSION

Foraging Activity

The effects of soil surface temperature and saturation deficit on the foraging activity of *F. perpilosa* and *T. s. neomexicanus* are presented in Figures 3 and 4, and the relationship between soil surface temperature in sun and shade and foraging activity of *F. perpilosa* are shown in Figure 5. At soil surface temperatures of 55 C and above, foraging activity was restricted to shaded soil areas or within the canopy of plants. Air temperatures at 1 m above the soil surface rarely exceed 40 C on our study site. During most of the summer, ants foraging on plants would be exposed to maximum temperatures ranging between 30 C and 40 C. Thus, *F. perpilosa* can continue to forage during mid-day in plants utilizing honey dew or plant exudates and forage for animal carcasses, etc., when soil surface temperatures drop below 50 C. *T. s. neomexicanus*, however, forages on the soil surface and thus its foraging time is restricted to periods of the day when soil surface temperatures and saturation deficits are low.

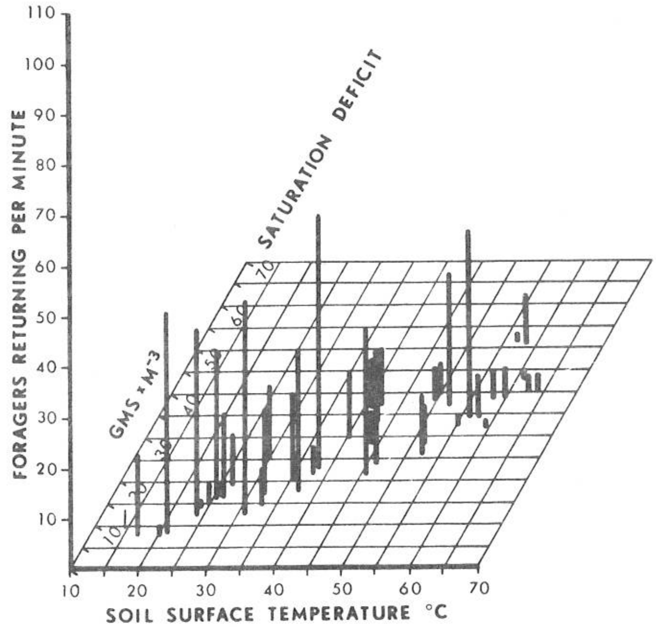


Figure 3. The effects of soil surface temperature and saturation deficit on the foraging activity of *Formica perpilosa*. The height of bars above the plane represents the number to the nest per minute.

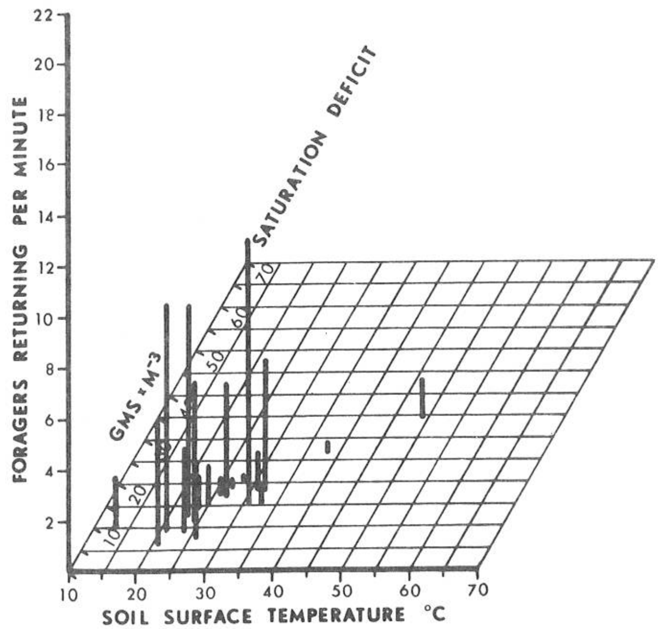


Figure 4. The effects of soil surface temperature and saturation deficit on the foraging activity of *Trachymyrmex smithi neomexicanus*.

F. perpilosa has greater tolerance than *T. s. neomexicanus* in which activity ceased at soil surface temperatures above 58 C. *F. perpilosa* were active at a maximum saturation deficit of 52 g/m^3, as compared to *T. s. neomexicanus* in which activity ceased at a maximum saturation deficiency of 35 g/m^3.

Formica perpilosa may be able to lose more body moisture during foraging activity. *F. perpilosa* feed on honey dew, a liquid-based substance, whereas *T. s. neomexicanus* feeds exclusively on fungus. *T. s. neomexicanus* may need to conserve its body moisture in order to assure a sufficient amount of excretion to be applied to the fungus garden. Constant application of excretion is necessary to maintain the fungus gardens, and to weed out alien organisms which might contaminate the culture (Weber, 1972b).

Figures 6 and 7 show that activity is not a function of time except in the respect that time of day determines temperature. This is especially evident in Figure 7, where *T. s. neomexicanus* is shown as being active at 1500 hours. This is usually the time of day when the soil surface temperature reaches its maximum and normally *T. s. neomexicanus* would not be active under these conditions. However, these data were obtained during a rain which produced a substantial drop in soil surface temperature and a rise in relative humidity.

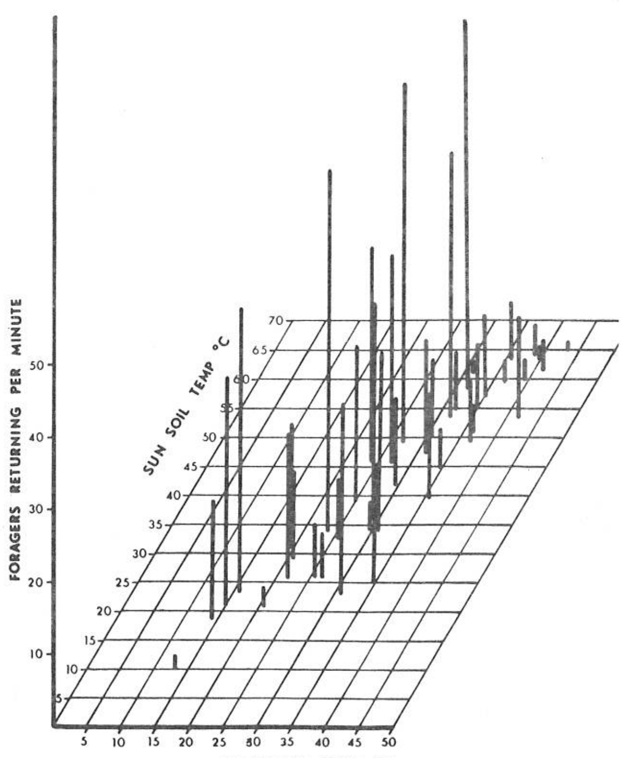


Figure 5. The effects of soil surface temperature in the shade and soil surface temperature in full sun on the foraging activity of *Formica perpilosa.*

Critical Maximum and Minimum Temperatures

The mean CTMin and CTMax plus or minus the 95% confidence interval in *F. perpilosa* were 5.2±0.3 C and 45.2 0.6 C respectively. The mean CTMin and CTMax plus or minus the 95% confidence interval in *T. s. neomexicanus* were 9.7±1.5 C and 36.7±1.7 C, respectively.

The narrower temperature tolerance of *T. s. neomexicanus* corresponds to their lack of activity when soil surface temperatures are high. The fact that *F. perpilosa* cannot tolerate soil surface temperatures higher than 45.17 C, yet are active at 69 C supports the hypothesis that foraging in plants allows the forager to avoid lengthy periods of contact with the soil's surface and therefore continue foraging at mid-day.

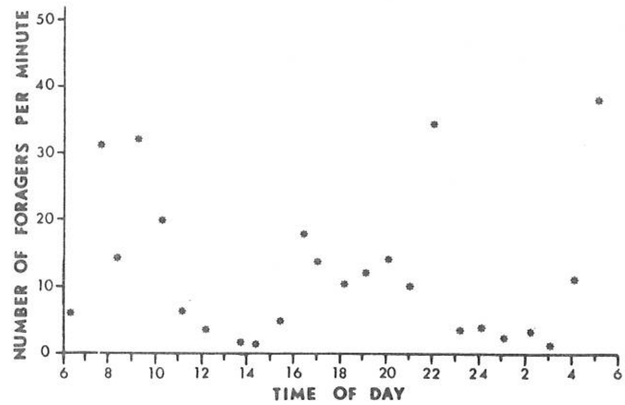


Figure 6. The effect of time of day on the foraging activity of *Formica perpilosa.*

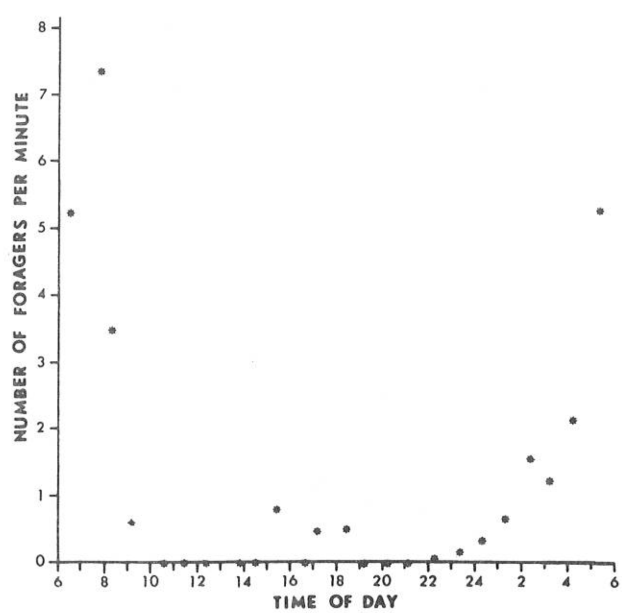


Figure 7. The effect of time of day on the foraging activity of *Trachymyrmex smithi neomexicanus.* Data at 1500 hours taken during a rain.

Delye (1969) found that the upper lethal temperatures in most species of Saharan ants did not exceed 45 C but that some species had upper lethal temperatures near 60 C. We have found that several members of the genus *Pogonomyrmex* have CTMax close to 60 C, but the *Novomessor cockerelli* has a CTMax of 51.7 C. These results support the conclusion of Delye that upper lethal temperatures or, in our studies, CTMax of most desert ant species do not exceed 45 C, a common value in many insects. These studies reinforce the idea that many desert species have few if any special physiological adaptations to the desert and survive in the desert by behaviorally selecting periods of activity or micro-climates that are not severe. *F. perpilosa* and *T. s. neomexicanus* provide good examples of this type of behavioral adaptation.

There was greater variance in CTMax and CTMin among individuals of *T. s. neomexicanus* than *F. perpilosa*. This can probably be attributed to the difficulty in bringing *T. s. neomexicanus* into the lab. Some of the ants were probably in a weakened condition resulting in a greater amount of variability between individuals.

Population Estimation

The most reliable estimates of forager population size in *F. perpilosa* colonies indicate an average size between 2,000 and 3,500 (Table 1). Because of the large standard error associated with several of our estimates we feel the conservative estimates of forager population size between 2,000 and 3,500 to be more reasonable than some of the higher estimates in Table 1. It should be emphasized that these estimates apply only to that portion of the colony that is actively engaged in foraging and does not reflect the total numbers of ants in the colony. Forager population numbers are an index of total colony numbers only as forager numbers reflect the requirements for food by the whole colony.

We were able to obtain few recaptures in colony #2 (7 out of 162 marked and 188 collected on the census data). These estimates give an indication of the relative size of forager population numbers, but because of the size of the error they must be treated with caution.

Table 1. Estimates of forager population numbers in *Formica perpilosa* colonies

Date	Colony Number	Forager population estimate	Standard error of estimate
June 8	1	2,176	± 953
June 8	2	6,100	± 4,277
June 12	1	3,284	± 602
June 20	2	4,350	± 1,613
July 31	3	1,976	± 396

Since mark-recapture estimates of forager numbers in *T. s. neomexicanus* proved not to be feasible, we attempted to excavate a colony to obtain an estimate of forager numbers. The excavation was not completed because the nest tunnels were lost in a hardpan caliche layer about 1 m from the surface. We recovered 168 foragers and 85 larvae.

The larvae were in a chamber 20 cm below the surface of the caliche which was 50 cm from the soil surface. The fact that the larval brood chamber was at 70 cm whereas larvae and pupae for harvester ant species we have investigated are within 10 cm of the surface has implications concerning the thermal ecology of *T. s. neomexicanus*. The average soil temperature during the summer at a depth of 10 cm is 35 C, as compared to a temperature of 25 C at 50 cm. Soil moisture is more stable at 50 cm than at 10 cm. The developmental rate of harvester ants could be as much as twice that of *T. s. neomexicanus* if one assumes that developmental rate is a simple Q_{10} phenomena. This slower rate of development could in part account for the smaller forager population size of *T. s. neomexicanus*.

Although we were unable to obtain estimates of forager numbers of *T. s. neomexicanus* by mark-recapture, we can estimate the forager population by comparing the rate of return of each species to the nest and correcting for speed of movement. We determined relative speed of movement of individuals of each species over a fixed distance. We then calculated forager population size by the proportion: average number of foragers of *F. perpilosa* ÷ number to the nest·min^{-1} = average number of forager of *T. s. neomexicanus* ÷ number to the nest·min^{-1} s (2.5), solving for forager population size. *F. perpilosa* moved about 2.5 times faster than *T. s. neomexicanus*, which gives an estimate of 1,250 foragers per colony as compared to 3,000 in *F. perpilosa*. This estimate must be considered even more tenuous than that of *F. perpilosa* because of the indirect means necessary to obtain it.

The larger forager population size and extended foraging period would seem to imply that *F. perpilosa* has greater impact on the desert ecosystem we are studying than does *T. s. neomexicanus*. However, colonies of *F. perpilosa* are found in a limited area where large mesquite, *Prosopis glandulosa*, are found at the edge of a dry lake, a playa. *T. s. neomexicanus* is found associated with several plant species and is generally distributed over the entire ecosystem (Whitford and Schumacher, unpublished data). Although *T. s. neomexicanus* are limited by forager population size and foraging time, a greater colony density and general distribution indicate this species may be of greater importance in a Chihuahuan Desert ecosystem than *F. perpilosa*.

Behavioral Observations

Formica perpilosa were observed foraging extensively in both *Prosopis glandulosa juliflora* and *Eriogonum trichopes*. They were also observed foraging on dead insects. In an effort to conduct a forage preference test, an area of about 4 m^2 was cleared of vegetation, and samples of cracked wheat, sugar solution, dead insects, and peanut butter were placed in the cleared area. However, the test area was overrun by *Iridomyrmex pruinosum*, which are found at high density in the area of the study site. The *F. perpilosa* avoided the area in which the *I. pruinosum* were congregating.

In mid-June the forage of *T. s. neomexicanus*, collected by aspirator, yielded mesquite leaflets, *Ephedra trifurca* buds, *Nama hispida* flowers, *Eriogonum rotundifolia* leaves, and unknown legume seeds. In early August, another sample was taken, which consisted entirely of *Eriogonum trichopes* buds. Forage preference in this species apparently changes with the season, but more data are necessary to confirm and generalize on these observations.

When presented with termites, a favorite prey of many species of ants, *T. s. neomexicanus* ignored them and continued to forage on fallen vegetation.

The sexuals of *T. s. neomexicanus* were observed swarming at the study site at 0850 on July 31. July 29 had a maximum temperature of 29 C with a minimum relative humidity of 65%, and July 30 had a maximum temperature of 33 C with a minimum relative humidity of 50%. Rainfall of 0.72 inches were recorded for the evening of July 29.

When disturbed, *T. s. neomexicanus* exhibited death-feigning behavior characteristics of the genus (Creighton, 1950:319-320). The stimulus required to elicit this response differed from one individual to another. For some, a mere touch sufficed and the individual would curl up and remain motionless for periods of up to three minutes. Others had to be repeatedly touched and moved around before the response was elicited. This defensive behavior was elicited in interactions with *F. perpilosa*, which on some days were very active around the nest openings of *T. s. neomexicanus*. Nests of *F. perpilosa* and *T. s. neomexicanus* were less than 15 m apart. Although they never appeared to actually injure *T. s. neomexicanus* individuals, the *F. perpilosa* would handle them, cause them to drop their forage, and sometimes pick them up and carry them for 5 to 10 cm. The *T. s. neomexicanus* would feign death, and eventually the *F. perpilosa* would appear to lose interest in them and leave them alone. As the *F. perpilosa* were not preying on the *T. s. neomexicanus* and were not interested in their forage, no benefit of this type of behavior can be discerned.

Lone *F. perpilosa* foragers were observed being preyed upon by *Iridomyrmex pruinosum* on several occasions. The strategy consisted on ten or more *I. pruinosum* attacking a *F. perpilosa*, eventually exhausting the victim and carrying it off.

This study provided a comparison of the behavioral mechanisms by which two species of ants live in a desert. One species, *T. s. neomexicanus* confines its foraging to periods when temperatures are moderate and saturation deficits are low. *F. perpilosa* forages at high soil surface temperatures (above the CTMax of the species) and high saturation deficits by foraging in the canopy of large plants which provide a moderate thermal environment and supplies liquid food which allows this species to lose water at high saturation deficits which can be readily replaced by this liquid food. The large numbers of foragers in *F. perpilosa* may reflect the differences in diet, i.e., liquid food vs. culturing fungi which may require that a larger fraction of the colony forage than is necessary in *T. s. neomexicanus*.

ACKNOWLEDGEMENTS

This study was supported in part by the US/IBP Desert Biome Program under Grant No. GB15886 from the National Science Foundation. The authors are also indebted to the following individuals for laboratory and field assistance: Kim Johnson, Jeannine Riazance, Angela Wallace, and Karen Melick; assistance with excavation, Tom Bellows, Brett Whitford and Eric Whitford; identification of forage, Stan Smith; assistance with computer analysis of data, James Lyon and Ken Day; for identification of ant species, Carol Kay; and for invaluable discussion of techniques and the data obtained, Helen Hart, Carol Kay, Fritz Taylor, and a reviewer whose comments were extremely valuable.

LITERATURE CITED

Brian, M. V. 1971. Ants and termites. pp. 247-261 *in* J. Phillipson (ed.), Methods of study in quantitative soil ecology population, production and energy flow. IBP Handbook, No. 18, Blackwell, London.

Chew, R. M., 1959. Estimation of ant colony size by the Lincoln index method. J. New York Entom. Soc. 67:157-161.

Creighton, W. S. 1950. The ants of North America. Bull. Mus. Comp. Zool., 104. Cambridge. 585 pp.

Délye, G., 1969. Recherches sur l'écologie, la physiologie et l'éthologie des Fourmis du Sahara. Thèses de L'université D'Aix-Marseille. 155 pp.

Gregg, R. E. 1963. The ants of Colorado. Univ. of Colo. Press. Boulder. 792 pp.

Weber, N. A. 1972a. The attines: the fungus-culturing ants. Amer. Sci. 60:448-456.

Weber, N. A. 1972b. Gardening ants, the attines. The Amer. Philosophical Soc. Philadelphia.

Whitford, W. G., and J. A. Ludwig. 1971. The Jornada Validation Site report. US/IBP Desert Biome Res. Memo. 71-5. 86 pp.