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A Report

THE COLEOPTEROUS FAUNA OF SELECTED CALIFORNIA SAND DUNES

In Fulfillment of
BUREAU OF LAND MANAGEMENT CONTRACT
CA-960-1285-1225-DEOO

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CORRECTIONS

p. i, at the bottom add
Figures.....129

p. 1, last line, for "hymeropterists" read "hymenopterists".

p. 10, lines 2, 3 V. should be V.

p. 11, line 12, "represented 43 families," should read "represented 42 families,".

p. 11, the chart at the bottom should read:

	Genera	Species
Owens Lake Dunes	40	47
Cadiz Dunes	52	61
Rice Dunes	78	92
Palen Dunes	120	143
Algodones Dunes	150	197

p. 11, the last paragraph should read:
The dominant families of Coleoptera were Scarabaeidae and Tenebrionidae comprising (respectively) 9.4% and 12% of the genera, 14.6% and 9.5% of the species and 24% and 27% of the specimens collected.

p. 17, line 6, for "Croceicollis", read "croceicollis".

p. 18, lines 9 and 10 should read:
"habitats adjacent to the dunes (Horistonotus sp. #4, Ptomaphagus fisus, Papusus sp. #1, Aphodius spp. (several taxa), Eurymetopon sp. #1). Cleonus".

p. 18, line 7, from bottom, for "Horistonotus sp. #1" read "Horistonotus sp. #4".

p. 19, line 8, from bottom, for "Cononotus serricans" read "Cononotus sericans".

p. 21, line 11, R. D. Gordon also determined Glaresis.

p. 21, line 14, A. R. Hardy, in addition to Aphodiinae, did not determine Glaresis.

p. 30, line 8, for "Microrhpala" read "Microrhopala".

p. 40, line 6, for "Rhipiphoridae" read "Rhipiphorus".

p. 43, line 4 from bottom, for "Asida" read "Asidina".

p. 45, line 5, for Zopherus tristis, there should be an "X" in the column under "Algodones".

p. 68, line 13, for "Pristogcelis" read "Pristoscelis".

p. 72, line 7, for "pubenscens" read "pubescens".

p. 72, line 16, for "delcatusus" read "delicatulus".

p. 82, beneath "Ulus crasus LeConte" add the following line:

	Winter	Spring	Summer	Fall
Zopherus tristis LeConte		X		XX

p. 84, line 8 from bottom for:
"COCCINELLIDAE 3/3 4/5 4/5 5/5 4/4 9/11 120" read
"COCCINELLIDAE 3/3 3/5 4/5 5/5 4/4 9/11 120"

p. 85, line 3, for:
"HISTERIDAE 2/2 -/- 2/3 4/6 7/7 7/9 107" read
"HISTERIDAE 2/2 -/- 2/3 4/5 7/7 7/9 107"

p. 85, line 11, for:
"MELYRIDAE -/- -/- 3/5 2/2 -/- 3/7 26" read
"MELYRIDAE -/- 1/1 3/5 2/2 -/- 3/7 26"

p. 85, line 20, for:
"SCARABAEIDAE 5/5 8/9 8/14 9/14 19/37 19/43 2,298" read
"SCARABAEIDAE 5/5 7/9 8/14 9/14 19/37 19/43 2,298"

p. 85, line 24, for:
"TENEBRIONIDAE 7/7 11/12 15/16 18/19 20/23 24/28 2,586" read
"TENEBRIONIDAE 7/7 11/12 15/16 18/19 21/24 24/28 2,586"

p. 85, last line, for:
"TOTAL 38/47 54/61 78/92 120/142 149/196 201/295 9,578" read
"TOTAL 40/47 52/61 78/92 120/143 150/197 201/295 9,578"

p. 88, line 6, for: "investogators" read "investigators"

p. 89, lines 9 and 10, read:
Elateridae - Cardiophorus n. sp. #1
Horistonotus n. sp. #4

p. 92, line 6 from bottom, "Lariversia" should read "Lariversius".

p. 105, line 2 from bottom, for: "Microgramme deserticola" read "Microgramme n. sp. #1".

p. 106, lines 10 to 15, the authors and names are:
"Epicauta lauta (Horn)
Eupompha elegans perpulchra (Horn)
Lytta magister Horn
Phodaga alticeps LeConte
Pleurospasta mirabilis (Horn)"

p. 107, line 16, the author on Creophilus maxilosus is (Linnaeus).

p. 110, Chart 4, for "Tetragonaderus" read "Tetragonoderus".

p. 111, Chart 7, "Wolcott"should be "(Wolcott)".

p. 114, Chart 16, "Troderma" should be "Trogoderma".

p. 117, Chart 27, "Eupompha elegans (LeConte)" should read "Eupompha elegans perpulchra (Horn)".

p. 122, Chart 42, "Craniothus" should be "Craniotus".

p. 125, Chart 50, "Lariversia" should be "Lariversius".

TABLE OF CONTENTS

The present paper is a report based upon a one-year study of Coleoptera from selected sand dunes in California. The project was visualized as a continuation of on-going studies on sand dune Coleoptera of the western United States, and specifically of a study of six dunes in California and Nevada which was undertaken at the request of the Office of Endangered Species of the U. S. Department of the Interior (OES) (results published as "A Final Report to the Office of Endangered Species on Contract 14-16-0008-966," October 1, 1976). The present study was undertaken at the request of the Bureau of Land Management's Desert Planning Staff (BLM) to answer questions concerning sand dune Coleoptera in dunes under BLM jurisdiction. The desired information was of two types: the first was an inventory, to be provided by a faunal survey of five specified dunes; the second type were answers to questions raised by the OES study concerning the distribution of endemic or sand restricted Coleoptera on the dune mass, and into outlying areas. The results of these studies are presented as two parts, below.

PART I

DUNE INVENTORIES

Data from the OES study provided guidelines and background information upon techniques and time periods for sampling which would yield the optimum results. In addition to techniques used previously (excavating and sand sifting, black-light, cereal bowl pit traps, aerial collecting, dune walking at night, rodent burrow excavating), several untried methods were used for the first time at some of the dune sites. These methods were: use of trap-nests, mercury-vapor lights; and anti-freeeze pit traps. The trap-nests were of two types; the first, of the standard wasp trap used by hymeropterists such as Krombein,

Evans, etc., was used in an attempt to collect certain wasp parasitic coleopteran groups; the second consisted of drilled boards with mixed dog food and fruit bait, buried in the sand, for certain Dermestidae and other beetles. The first type was deployed only at Glamis (Algodones Dunes) and succeeded in trapping Hymenoptera, but not their parasites. The second type was deployed at Cadiz, Rice, Palen, and Glamis, and only succeeded in obtaining Diptera.

The Mercury Vapor Light, of 175 watts, was used at Cadiz, Rice, Palen, and Glamis, and was successful in attracting large numbers of Coleoptera, but not of a species composition essentially different from that taken by blacklight. The light was only used during the April trip, since the additional effort necessary (portable power plants, etc.) was not justified by the results.

Anti-freeze pit traps were utilized at Palen and Glamis. It was found that the traps soon filled with drifting sand, but were a source of some information. These traps were used more extensively for Part II of this study.

Former experience had indicated that four visits to each dune were necessary to achieve most effective phenological information. These time periods were: during February, April, July and September; and are referred to as Winter, Spring, Summer and Fall (respectively), below.

The spring trip was taken slightly later than would have been optimum because of bad weather conditions. As a consequence, many of the spring annuals had passed their peak blooming period and it is likely that both the number of specimens and possibly the number of species that are associated with flower blooms were diminished. This was most obvious at the Algodones Dunes, but supplemented by previous years' collections, the data is probably representive.

The field work could not have been completed without the use of a 4WD Dodge Power-Wagon with sand tires. Equipment utilized (at one time 10 blacklights with metal traps and sheets, cords, 1 Mercury Vapor light, a powerplant for the above, in addition to pit traps, etc.) weighed several hundreds of kilograms, and could not have been transported into the needed areas on foot.

Since most sand dune areas are connected by fossil drainage channels, which often include small amounts of sand, it was felt that this could have had a bearing upon dispersal patterns, or possible origin of the fauna. The fossil drainage channels are briefly outlined in the description of each dune area below.

Collections made at the Cadiz, Rice, and Palen dunes represent the first and perhaps only accumulation of specimens and accompanying data for these areas. The investigators had not previously visited these dunes and search of entomological museums for specimens bearing locality labels for these areas was negative.

The Owens Lake Dunes have been collected sporadically by a number of collectors, but never in depth (the principal investigators had previously made short stops to collect the area). The data presented is an accumulation of the visits during this study and the data from previous visits.

The Algodones Dune data is disproportionate to data from the other dunes in that is represents the efforts of a number of years collecting by several entomologists. The principal investigators have each visited the dunes more than 15 times.

THE DUNES STUDIED

OWENS LAKE DUNES

Owens Lake has sand in dune or sheet form around much of the eastern edges of the old shoreline. In some areas, wind action has moved the material onto the sides of rocky outcrops or hillsides. Several of these sites have been visited. On September 17, 1977, one night was spent at drift sand in the wash extending westward downhill from the Malpais Mesa at approximately 30° 25-1/2' N, 117° 47-1/2' W (R.39E, T.17S, S.30). Sporadic visits of shc duration have been made to sand areas north of Keeler, and to drift sand at 36° 24-1/2' N, 117° 49' W (R.39E, T.175, S.32). The main study area was located on the large drift dunes on the flats near Olancha at 36° 17' N, 117° 58-1/2' W (R.37E, T.195, S.9). Sand in this area is generally much coaser than sand at other locations visited. The site is at 1110 m (3640 f in elevation with dunes at least 15 m high. Fossil Owens Lake had ancient drainage connections as follows: from upstream, drainage may have come frc as far away as Mono Lake, which may have flowed into Long Valley Lake befor that route was blocked by volcanic activity which created the Mono Craters. The Long Valley Lake emptied through the Owens River into the Owens Lake. Adobe Lake (E of Long Valley Lake) also drained S into Owens Lake. The Outflow Channel was S into the Indian Wells Basin--Searles Basin, and its large common lake, Searles Lake. (Searles Lake subsequently developed intc two lakes, China Lake and Searles Lake). The outflow from Searles Lake was eastward into the Panamint Basin, where at Wingate Pass the outflow jointed the outflow from Panamint Lake, drained further eastward and entered Lake Manly (Death Valley).

The study area is near marshes at the southern end of Owens Lake, and there is a definite influence on the fauna. Dominant plants are Atriplex (2 sp.

with Sarcobatus in some areas. There were few annuals present. The dunes were visited on September 18, 1977, February 23, 1978, and July 15, 1978. An attempt to collect on April 24, 1978 was stormed out, and a supplemental trip was made on May 17, 1978 by Derham Giuliani. Included are additional records from collections as early as 1972, and material from anti-freeze pit-traps located N. of Keeler and near the study area.

CADIZ DUNES

The "Cadiz Dunes" lie towards the northern extremity of the widespread sand sheet which also includes the "Rice Dunes" (see below for more detailed discussion). The study site was in an area of massive sand mastifs which extend up to 30 meters above the underlying aluvial floor. The study site selected is at 34° 23-1/2' N, 115° 25-1/2' W (R.15E,T.4N,S.32,NE1/4), and is at an altitude of 185 m (600 ft). The site is easily reached by the dirt road from Cadiz, SE along the AT&SF Railway track 21.6 km (13.4 mi) to a dirt road, then SW 5.8 km (3.6 mi) to the site. The area is characterized by massive creosote bushes (Larrea divaricata Cav.) numerous Palo Verde (Cercidium floridum Benth.) and several annuals (several sp. of Oenothera, Coldenia, Ambrosia). The most notable invader was unusually large patches of Russian Thistle (Salsola Kali), which developed in the spring and was dead by summer. The site was on the NW face of the dune mass, and was near several pockets of dense vegetation created where runoff from the NE impounded against the dunes. The dunes were visited on September 18, 1977; February 24, 1978; April 25, 1978; and July 16, 1978. On the February visit, the temperature ranged from 3° to 26° C (38° to 78° F). On the February trip, there were conspicuous numbers of Xeropsamobeus desertus (Scarabaeidae) and Edrodes

errans (Tenebrionidae). During July, there were numerous small beetles, especially Chysomelidae, on Oenothera and other annuals.

RICE DUNES

The "Rice Dunes" are near the southern end of an extensive sand sheet which spreads over 100 km (63 mi) by 13 km (8 mi) which extends from the Cadiz Valley, across the Ward Valley and into the Rice Valley. It was probably derived from Bristol Lake, Cadiz Lake and Danby Lake. Ancient drainage patterns were probably from the Bristol Lake SE to the Colorado River, parallel, but separate from, the Palen-Ford system (below). The sand in the Cadiz-Rice Dunes have moved considerably SE from the dry-lake basins where they were originally deposited. The sand is generally in sheet form in the area of the study site, with dunes 3 to 5 meters in height, with rather well-developed slip faces. The site selected is very difficult to access. It lies to the North of the Big Maria Mountains, on the aluvial slopes of those mountains, and faces North. The site is probably between 335 and 380 meters (1100 feet to 1250 feet) above sea level, and lies at approximately 33° 56' N, 114° 38' W (R.22E, T.3S, S.1). Several routes of ingress and egress were used. The initial attempt was by a dirt road from Grommet, S, to the W of the West Riverside Mountains 26.2 km (16.3 mi) to the site (one attempt). The route S, towards Midland, was extremely difficult to negotiate (one attempt) as was the route E, 14 km (8.5 mi), towards the Colorado River (three attempts). By far the most satisfactory route was from Vidal, along the powerline, through the Riverside Pass in the Riverside Mountains, SW across the Rice Valley until the route was blocked by drift sand, then East ± 1.5 km (1 mi) to the site. This route was used the last three times (of eight) for ingress, egress.

The site slopes to the North, and is characterized by dunes intermixed with hummocks around Palo Verde trees (Cercidium floridum Benth), with scattered annuals (Ambrosia sp., Coldenia sp., Palafoxia sp., Oenothera, several sp.). To the N and W are Creosote (Larrea divaricata Cav.), and hummocks of bunch grass.

The dunes were visited on September 17, 1977; February 25, 1978; April 26, 1978; and July 17, 1978.

During the February visit, the temp ranged from 10.5° to 26° C (51° to 79° F), and the site was marked by unusual numbers of Xeropsamobeus desertus (Scarabaeidae), at lights and on slip faces at dusk. After dark on the April visit, a hard wind created a sandstorm of several hours duration.

PALEN DUNES

The "Palen Dunes" are a large mass of sand generally spread over a greatest length of 75 km (45 miles) and a greatest width of 8 km (5 miles). This sand mass runs roughly from SE to NW and occupies the Chuckwalla Valley. These dunes are low lying and over much of the area are nothing more than a mere sheet of sand on the surface, although in some areas the sand is piled into dunes. At the study site, dune height is rarely more than 3 meters. Most of the sand is associated with (and probably originated at) the Ford Dry Lake and Palen Dry Lake, in the Chuckwalla Valley, and a fossil lake further N, at the E end of Pinto Basin, at the Coxcomb Mountains. Ancient drainage was from the Ord Mountains, Mesquite Lake, Dale Lake, Chuckwalla Valley, and to the Colorado River. The study site selected lies midway between Ford Dry Lake and Palen Dry Lake, and is at an elevation of approximately 125 m (415 feet) above sea level.

The site was reached by traveling W from Blythe on Interstate 10, 58.4 km (36.3 mi) to a conspicuous dry wash, then 4 km (2-1/2 mi) NE to the site at 33° 41' N, 115° 9' 15" W (R.17E, T.6S, S.1 NE 1/4). The site is characterized by low-lying sand, occasionally duning to ± 3 meters high. Depressio are often floored with dried caked mud and scattered lava pebbles. Dominant vegetation is Palo Verde (Cercidium floridum Benth), Creosote (Larrea divaric Cav.), Mesquite (Prosopis juliaflora (SW)DC.), Russian Thistle (Salsola Kali) and several annuals. The site was visited on September 20, 1977; February 26 1978; April 27, 1978; and July 18, 1978.

Histerid activity near the mouth of (but inside) Kangaroo rat burrows was marked during the April visit. During the July visit there were extremely large numbers of Anemia sp. and Eleodes armatus (Tenebrionidae).

ALGODONES DUNES

The Imperial County Sand Hills (also called the Glamis Dunes and Algodones Dunes) are a large mass of sand extending 75 km (47 mi.) in a NW to SE direction, in SE Imperial County, California, and S into Baja California N. The dunes lie on an aluvial substrate at about 60 m (200 feet) elevation and extend as high as 175 m (570 feet) above sea level (dunes 115 m [375 feet] high). The dunes were obviously derived from fossil Lake Cahuilla (also called Lake LeConte), as is well documented by Norris & Norris and others. These dunes have a variety of vegetative cover; dominant plants include Creosote (Larrea divricata), Palo Verde (Cercidum floridum), Hymenoclea salsola (T.& G.), Mesquite (Prosopis juliaflora) and Desert Willow (Chilopis linearis (Cav.)). The area has a profusion of annuals, including Oenothera,

Palafoxia, Spheralcea, Malvastrum, and many others, especially composits. These dunes have been visited many times over a period of 10 years, and much material collected on these trips is included. The major former study site, 3-1/2 miles (5.6 Km) NW of Glamis (33° 1-1/2' N, 115° 8' W or R.17-1/2 E, T.13S, S13), was unavailable to the investigators due to the BLM closure. An alternate site was selected 5.6 Km (3-1/2 miles) SE of Glamis (32° 57-1/2 N, 115° 2-1/2' W or R.19E, T.145, S.5, SW 1/4, SW 1/4), where all of the contract collections were made. This site was visited on September 21, 1977, February 26, 1978, April 28, 1978, and July 19, 1978.

SPECIMEN HANDLING

9,578 specimens were used as the data base for this inventory report. Between eight and nine thousand of this total were collected during this study.

Field collected specimens were placed directly into and stored in 70% alcohol. Specimens of species covered with waxy exudates or notable hirsutness were collected into Cyanide kill jars and field pinned so that the exudates (important in characterizing some species) would not be lost, or hair become matted.

Except for the most abundant and easily recognizable species, every specimen seen was collected and curated. This was done to provide a rough approximation of the relative abundance of a species and to prevent missing species that are similar to common species to the point of being indistinguishable in the field. An example is the similarity of the anthicid beetles Vacusus confinis Le Conte and Vacusus infernus (LaFerte). Both are small (4-5 mm) and of similar shape. They most frequently are collected at blacklight at

night when differences are hard to see. At the Algodones Dunes in September, 97 specimens of Vacusus were collected, 92 were V. confinis. If only a short series had been taken, it is likely that V. infernus would have been missed.

IDENTIFICATION

Sorting and identification of the large numbers of specimens available for this study was not without its problems, including a lack of recent toxonomic works and of contemporary specialists on many desert inhabiting groups. Many taxa found in the western deserts have not been studied taxonomically within 50 or more years. These older taxonomic studies are inadequate for several reasons. First and most important, they were based on few specimens (many species were based upon a single specimen), and frequently, accompanying data was no more than an indication of the state in which it was collected. Second, much taxonomic work did not include illustrations, complete descriptions or taxonomic characters now known to be of importance. Subsequent collections in desert areas have located many undescribed species. Contemporary systematic studies have shown that desert taxa are complex and need in-depth analysis to be adequately monographed.

THE DATA

The data used in the summary that follows is included in four appendices. Appendix A is a listing of the total Coleopteran data base, alphabetically by family, and within each family alphabetically by genus and species. This appendix also indicates at which dune areas a given species was recorded, and its status as a dune inhabitant.

Appendix B is a listing, by dune, of the Coleoptera recorded as occurring there, and the season, with an indication of the number of specimens in the data base for each category. A brief note at the beginning of each family adds to the list that follows.

The numbers of genera, species and specimens representing each family is detailed in Appendix C.

A summary of all coleoptera thought to be endemic to restricted sand areas are summarized in Appendix D.

SUMMARY

Visits to five different dune areas in four separate drainage systems during spring, summer, fall and winter periods, plus additional material, totaled 9,578 coleopterous specimens. These specimens represented 43 families, 201 genera and 295 species of coleoptera. Diversity at both the generic and specific level increased from north to south, as follows (also see Appendix C):

	Genera	Species
Owens Lake Dunes	35	41
Cadiz Dunes	49	54
Rice Dunes	72	82
Palen Dunes	113	132
Algodones Dunes	142	188

The dominant families of coleoptera were Scarabaeidae and Tenebrionidae comprising (respectively) 10% and 12% of the genera, 15% and 10% of the species and 31% and 25% of the specimens collected.

The 295 species were categorized as endemic (nine species, with six others possible), sand obligate (25 species plus the above 15), widespread desert (210 species) and accidental on dune systems (45 species).

Endemism was highest in the Algodones system and in the family Scarabaeida All but one of the endemic or possibly endemic species occur in the Algodo Dunes. Five of the nine species classified as endemic are Scarabaeidae. endemics are:

Chrysomelidae	an undescribed genus and species	Cadiz
Curculionidae	Trigonoscuta rothi Pierce	Algodones
Dermestidae	Novelsis new species	Algodones
Pedilidae	an undescribed genus and species	Algodones
Scarabaeidae	Anomala carlsoni Hardy	Algodones
Scarabaeidae	Anomala hardyorum Potts	Algodones
Scarabaeidae	Cyclocephala wandae Hardy	Algodones
Scarabaeidae	Diplotaxis corbula Vaurie	Algodones
Scarabaeidae	Pseudocotalpa andrewsi Hardy	Algodones

Other potential endemics are:

Scarabaeidae	Leptohoplia testaceipennis Saylor	Algodones
Scydmaenidae	Papusus sp.	Algodones
Tenebrionidae	Areoschizus sp. #1	Algodones
Histeridae	Philothris sp.	Algodones
Curculionidae	Trigonoscuta sp.	Algodones
Tenebrionidae	Eusattus fortineri (Blaisdell)	Algodones

Leptohoplia testaceipennis Saylor and Eusattus fortineri (Blaisdell) are, in addition to the Algodones distribution, known from a single collection

at Borrego, San Diego County. There is a need for a verification of the continued existance of these species in this area, which has been subjected to extreme habitat modification since the single record.

PART II

DISTRIBUTIONAL STUDIES

Questions were raised as a result of the OES study, and the use of a limited number of sampling sites. There was a need to demonstrate if a randomly selected site (or a site selection based upon investigators previous experiences) could be considered representative of a given dune as a whole, and if organisms collected at these sites were predominately restricted to the sand mass, or were distributed independently of the substrate. Two studies were undertaken to answer these questions, they are discussed below. Data from these studies is presented in Appendices E and F, below.

1. DUNE HABITAT UTILIZATION

The initial site chosen for this study was Kelso Dune, but for lack of access permits from the BLM to this closed area, the site was changed to Eureka Valley, and the dunes at the south end of the valley. Through the cooperation of Area Manager Ben Collins, we were allowed access for distribution of equipment. This study was to be undertaken at two different seasons, winter (February) and spring (April), and was to consist of sampling at sites located approximately 100 meters around the dune perimeter, and on two transects across the dune.

THE WINTER SURVEY

The samples were taken on February 22, 1978, during the forenoon. Previous experience had shown that many winter-active Coleoptera were found on the surface during the morning hours. The February survey was completed by three persons, F. Andrews, D. Giuliani, and A. Hardy. Starting from different points, each individual would pace 100 meters, collecting all Coleoptera observed on the surface, preserving them in alcohol. At the end of each 100-meter section, the total number of specimens and species collected for that section were noted on data cards. The procedure was started at 0830 to 0900 and completed shortly after 1200. The low temperature the previous night was 0° C. Some of the northern portions of the dune were continually shaded by the dune mass, and never achieved the high temperature. This may account, in part, for the smaller number of specimens collected on that portion of the dune, although there is some difference in particle size as well. The temperature was gradually increasing during the course of sampling, and this may have also had some effect upon the data taken. The data from this survey are summarized in Appendix E.

Although based upon little information, these results seem to suggest that most species have a wide distribution upon this dune mass, and that sampling at restricted sites may be adequate to obtain species composition information representative of the dune mass as a whole.

THE SPRING SURVEY

The spring survey was conducted on April 5, 6, and 7, 1978, by F. G. Andrews, A. Gilbert, D. Giuliani, A. Hardy, and S. Kuba. During this survey, 140 site

were measured at 100 meter intervals around the perimeter of the dune. At each site, three pitfall traps were placed at a numbered stake. The intended activities at each site were to include pitfall trapping, sand sifting, and visual collecting, both day and night. In addition, selected sites were to be blacklighted.

Site location and pitfall placement occupied the afternoon of April 5, and most of April 6. Blacklighting was to be on the evening of April 6, and sifting and other methods utilized on April 7, at which time the pitfalls would be emptied.

During the afternoon of April 6, the wind began to blow; by evening it had became a respectable sandstorm. The investigators returned to Big Pine for the night, returning the next morning. Rain and snow during the night made access to Eureka Valley difficult, since the roads were extremely muddy. The dunes proper were covered with snow, and the sand wet (See Figs. 12, 14). The day was overcast. Most pitfall traps had filled with sand and/or water, and could be located only by locating the stake. Many stakes had blown down. Alcohol vials containing specimens previously collected at each site (which were left at the site, in one of the pitfalls) were missing, we presume carried off by foxes or coyotes. As the investigators continued to search the area for pittraps to remove, the wind again started to blow, and the project was abandoned. There is, thus, no data from the April survey, and the data from February may be inconclusive.

2. SUBSTRATE PREFERENCE

In order to answer the questions of whether dune species are likely to also be encountered in surrounding areas, a series of transects was established,

running from the dunes into the surroundingg areas, along which sites we located, spaced approximately 150-200 meters apart. At each site was pl a numbered stake, and three antifreeze filled pitfall traps. These trap were covered with masonite lids, and were emptied and replaced once each month for one year. Each antifreeze trap consisted of two nested 960 ml (1 qt.) plastic containers. The nesting permitted the inner cup with it contents to be removed without the hole collapsing. Each cup was 127 mm (5 in.) in height, with a mouth opening of 110 mm (4.33 in.). The inner cup was filled with 200 ml to 300 ml of undiluted Sears brand ethylene gl based antifreeze. These were covered with squares of masonite 150 mm to mm (6-8 in.) with legs made from square blocks of wood on each corner. T cover was held in place by a rock.

The first transect starts at the east side of the dunes, at the midpoint, and runs slightly S of E, and ends at the mouth of a canyon, high on an aluvial fan. Transect #1 includes 10 stations. The second transect starts at the NE corner of the dunes and runs slightly N of E into a salt bush flat. This transect includes 10 stations.

The third transect starts at about the NW 1/2 of the W side of the dunes and heads N of West onto the dry-lake bed. Transect #3 has five stations These transects are plotted on Fig. 16.

Data from this study is presented in Appendix F. A total of 68,366 Arthr pods were collected during the 14 months of this pit-trapping study, of which 61,204 were insects, 15,106 were Coleoptera.

A number of interesting distributional patterns are obvious on the charts Appendix F. Some species seem to prefer no definite substrate, as Saprin

discoidalis (chart 22), Xerosaprinus coerulescens (ch. 23) and Eleodes armata (ch. 45); while others very definitely display preferences, either directly or indirectly, through host plant. Patterns of preference exist, for the Playa Edge (Tanarthrus coruscus, ch. 1; Collops, punctatus complex, ch. 28; Mecysmus angustus, ch. 51); Alkali Scrub (Technophilus croceicollis Croceicollis, ch. 3); Rocky hillside (Eucyllus vagans, ch. 12; Minyomerus sp. #1, ch. 14; Cononotus sericans, ch. 31; Centrioptera muricata LeConte, ch. 39); and Sand dune (Miloderes nelsoni, ch. 13; Chilometopon castaneum, ch. 40; Chilometopon pallidum, ch. 41; Eurymetopon sp. #1, ch. 47; Eusattus muricatus, ch. 48; Lariversius tibialis, ch. 50; Telabis serrata, ch. 54). Exclusionary patterns also seem to demonstrate avoidance of substrate, occurring everywhere but on the rocky hillsides (Tetragonaderus pallidus, ch. 4; Papusus sp. #1, ch. 34; Cryptoglossa verrucosa carinulatus, ch. 43; Edrodes ventricosus, ch. 44), or on the sand (Cryptolepidius cazieri, ch. 11; Esthesopus mitis, ch. 18; Areoschizus sulcicollis, ch. 37; Batuliodes sp. #1, ch. 38).

There are also definite temporal patterns, some species found in the spring (Longitarsis sp. #1, ch. 6; Cryptolepidius cazieri, ch. 11; Esthesopus mitis, ch. 18; Diplotaxis incuria, ch. 33), others in the summer (Tanarthrus coruscus, ch. 1; Saprinus discoidalis, ch. 22), the fall (Eleodes sp. #1, ch. 46), or the winter (Cryptophagus sp. #1, ch. 9; Cardiophorus sp. #1, ch. 17; Horistonotus sp. #4, ch. 19; Ptomaphagus fisus, ch. 24; Ptinus nr. verticalis, ch. 30). Some species have a broad temporal distribution, found in most months of the year (Tetragonaderus pallidus, ch. 4; Areoschizus sulcicollis, ch. 37; Edrodes ventricosus, ch. 44; Eleodes armata, ch. 45; Trogloderus costatus nevadus, ch. 56), or throughout the year (Eucyllus vagans, ch. 12; Eusattus muricatus, ch. 48).

Previous to this study, a number of coleopteran species from Eureka Valley Sand Dunes were identified as sand obligate (see Appendix F). The data seems to confirm the restriction of these species to the sand environment. A number of species were totally or almost totally associated with the sand habitat (these include Tetragonoderus pallidus, Miloderes nelsoni, Cardiophorus sp. #1, Chilometopon castaneum, Chilometopon pallidum, Eusattu muricatus, Lariversia tibialis, Trimytini n. sp. #1). A second group was strongly associated with sand, but was taken in reduced numbers in off dune habitats adjacent to the dunes. Horistonotus sp. #4, Ptomaphagus fisus, Papusus sp. #1, Aphodius spp. (several taxa), Eurymetopon sp. #1, Cleonus albovistitus, Trigonoscuta sp. #1, Anemia californica were sand associated, but occurred in numbers so low that the data was considered inconclusive.

The list below includes all species thought to have been sand obligates, the numbers of specimens collected in sand situations, non-sand situations, the percentage of the total that are sand associated, and a determination of the substrate preference, based upon this percentage.

Taxon	Number of Specimens: Sand Assoc.	Non-Sand Assoc.	% of Total Sand Assoc.	Substr Stat
CARABIDAE				
Tetragonoderus pallidus	4587	117	98	Sand
CURCULIONIDAE				
Cleonus ablovestitus	1	0	100	Inconc
Miloderes nelsoni	18	0	100	Sand
Trigonoscuta sp. #1	2	0	100	Inconc
ELATERIDAE				
Cardiophorus sp. #1	82	0	100	Sand
Horistonotus sp. #1	164	35	88	Sand
HISTERIDAE				
Eremosaprinus sp. #1	0	2	0	Inconc
LEIODIDAE				
Ptomaphagus fisus	86	14	86	Sand
PTINIDAE				
Ptinus nr. verticalis	5	19	21	Non-Sa

Taxon	Number of Specimens: Sand Assoc.	Number of Specimens: Non-Sand Assoc.	% of Total Sand Assoc.	Substrate Status
SALPINGIDAE				
Cononotus sericans	1	19	5	Non-Sand
SCYDMAENIDAE				
Papusus sp. #1	51	20	72	Inconclusive
SCARABAEIDAE				
Aphodius spp.	19	1	95	Sand
TENEBRIONIDAE				
Anemia californica	5	2	71	Inconclusive
Areoschizus sulcicollis	449	1020	31	Non-Sand
Batuliodes sp. #1	6	191	3	Non-Sand
Chilometopon castaneum	41	3	93	Sand
Chilometopon pallidum	43	2	96	Sand
Edrotes ventricosus	517	43	92	Sand
Eurymetopon sp. #1	234	32	88	Sand
Eusattus muricatus	770	1	99	Sand
Lariversius tibialis	10	0	100	Sand
Trimytini n. sp. #1	111	1	99	Sand
Trogloderus costatus nevadus	400	63	86	Sand

Eremosaprinus sp. #1 previously had been taken on the dunes (a single specimen), but in this study the only specimens taken (2) were far removed from the dunes. The small sample size means that the results are still inconclusive.

Ptinus nr. verticalis had previously been known only from the dune area, but in this study it was demonstrated to be primarily a non-sand organism.

Cononotus serricans and Areoschizus sulcicollis were shown to be almost totally off dune in distribution. Both species are commonly taken on sand dunes in cereal bowl pit traps at the bases of plants on hummocks, which are in most cases consolidated and riddled with burrows of arthropods and vertebrates. It is, in a sense, an island of non-dune environment within the dune system. Whether the organisms living on these hummocks should be classified as dune obligates was questioned; this study indicates that they are non-dune organisms utilizing atypical portions of the dune system.

Batuliodes sp. #1 was previously taken on the dunes in small numbers and, with closely related species from Kelso and Algodones dunes (known sand obligates) was thought to be sand associated. The data shows distribution that is almost totally non-dune.

Trogloderus costatus nevadus was thought to be a non-dune species, generally found only at the base of slip-faces at the margins of dunes. This study shows it to be generally associated closely with the dune. Pitfall trapping in diverse desert environments other than the dune habitat have failed to yield specimens. It appears that the species of this genus are sand obligates.

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APPENDIX A

APPENDIX A

Below is a list of all species taken on all dunes during the BLM study. In the list below, an (X) in a column for a given dune indicates a record of that species at that dune. The column "Status" indicates the relative importance of the sand habitat to a particular species, utilizing the following abbreviation:

E - Endemic, known only from a particular dune and dependant upon the sand dune environment.

SO - Sand Obligate, restricted to the sand environment where it may live directly in sand or be restricted to other biotic entities that are themselves restricted to the sand habitat.

WD - Widespread Desert, organisms that are commonly found both in dune and off dune environments.

A - Accidental, normally not a user of the sand dune environment. May have been blown onto the dune by winds, attacted to blacklight etc.

? - Biology and habitat totally unknown or a species that cannot be identified.

SPECIES INVENTORY

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
ALLECULIDAE						
Very little is known about the species of this family, either biologically or taxonomically. All specimens collected in this study were taken at blacklight.						
Alleculidae species #1	?			X	X	
Alleculidae species #2	?				X	X
Alleculidae species #3	?	X	X	X	X	
Alleculidae species #4	?				X	X
ANOBIIDAE						
The genus Tricorynus is commonly swept from dune grasses and taken at blacklight. Specimens taken in this inventory indicate much wider distribution for several species than previously known (White, 1965).						
Tricorynus elutus White	WD		X	X	X	
Tricorynus gibbulus pubescens White	WD					X
Tricorynus luteotectus (Fall)	WD					X
Tricorynus vestitus (Fall)	WD					X
Tricorynus species #1	?					X
Stegobium paniceum (Linnaeus)	A				X	
ANTHICIDAE						
Almost all species are collected at blacklight, sometimes in large numbers. Notoxus calcaratus Horn is found in the flower heads of various dune plants while Vacusus confinis (LeConte) and Tanarthrus tartarus Chandler were found feeding on dead specimens of the meloid Phodaga alticeps LeConte. Mecynotarsus delicatulus Horn is a commonly occurring sand obligate species occurring on dune slip-faces, usually at the base of fleshy plants.						
Anthicus cervinus LaFerte	WD			X	X	X
Anthicus cribratus LeConte	WD	X				
Anthicus ephippium LaFerte	WD	X				

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
ANTHICIDAE (continued)						
Anthicus floralis (Linnaeus)	WD					X
Anthicus lutulentus Casey	WD				X	X
Anthicus nanus LeConte	WD				X	
Formicilla munda LeConte	WD				X	X
Mecynotarsus delicatulus Horn.	SO	X			X	X
Notoxus calcaratus Horn	WD	X	X		X	
Notoxus robustus Casey	WD	X				
Tanarthrus alutaceus LeConte	WD					X
Tanarthrus coruscus Chandler	WD	X			X	
Tanarthrus tartarus (Chandler)	WD	X	X		X	
Thicanus annectans (LeConte)	WD					X
Vacusus confinus (LeConte)	WD	X		X	X	X
Vacusus infernus (LaFerte)	WD	X	X		X	X
BOSTRICHIDAE						
Wood borers of general distribution. Most frequently collected at blacklight, but can be reared from dead wood. Amphicerus cornutus (Pallas) and Xyloblaptus prosopidis Fisher reared from mesquite at Algodones Dunes. No special attempts were made to rear Bostrichidae, since in general, they are associated with the wood and not the substrate.						
Amphicerus cornutus (Pallas)	WD					X
Amphicerus simplex (Horn)	WD				X	X
Amphicerus teres Horn	WD			X		
Apatides fortis (LeConte)	WD			X	X	X
Dendrobiella aspera (LeConte)	WD			X		X
Xylobiops parilis Lesne	WD					X

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
BOSTRICHIDAE (continued)						
Xylobiops sextuberculatus (LeConte)	WD					X
Xyloblaptus prosopidis Fisher	WD					X
Xyloblaptus quadrispinosus (LeConte)	WD				X	X
BRUCHIDAE						
The larvae of known species in this group develop in seeds, most commonly in seeds of the family Leguminosae. Adults are collected at blacklight and by sweeping flower heads of legumes and Cruciferae. The species are widespread, and not tied to substrate.						
Acanthoscelides daleae Johnson	WD				X	X
Algarobius prosopis (LeConte)	WD		X			X
Mimosestes amicus (Horn)	WD					X
Stator limbatus (Horn)	WD					X
BUPRESTIDAE						
Wood borers as larvae, adults are occasionally collected on flowers and from vegetation of the larval host plant. Another group tied to host plants, and not substrate.						
Acmaeodera alicia Fall	WD					X
Acmaeodera ephedrae Barr	WD					X
Chrysobothris biramosa calida Knull	WD	X				
Chrysobothris octocola LeConte	WD				X	X
Chrysobothris deserta Horn	WD	X				
Hippomelas dianae Helfer	WD		X			
Hippomelas fulgida Barr	WD	X				
Hippomelas planicosta (LeConte)	WD		X			

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGO
CARABIDAE						
Primarily nondune species collected at blacklight; however, Tetragonoderus pallidus Horn is a common dune inhabitant often living in the burrows of rodents and hunting for prey on the dune surfaces at night. Runoff from the mountains to the east of the Algodones Dunes pool at the bases of the dunes and are colonized by Bembidion impotans Casey and B. timidum LeConte. Calosoma species occur periodically on the dunes when their food, lepidoptera larva, are abundant. Pseudomorpha species likely live with ants.						
Apristus species #1	A					X
Bembidion impotans Casey	WD				X	X
Bembidion nubiculosum Chaudoir	A					X
Bembidion timidum LeConte	WD		X		X	X
Bradycellus (Stenocellus) species #1	A					X
Calosoma affine Chaudoir	WD					X
Calosoma parvicollis Fall	WD	X	X	X	X	X
Clivina dentipes Dejean	A					X
Harpalus pensylvanicus DeGeer	A					X
Harpalus intactus Casey	A	X				
Pseudaptinus horni Chaudoir	A				X	
Pseudomorpha parallela VanDyke	?			X	X	X
Schizogenius falli Whitehead	A			X	X	X
Selenophorus palliatus Fabricius	A					X
Selenophorus semirufus Bates	A				X	
Stenolophus anceps LeConte	A					X
Stenolophus lineola (Fabricius)	A					X
Stenolophus ochropezus Say	A					X
Tachys species #3	A				X	X

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
CARABIDAE (continued)						
Tachys species #4	A			X	X	X
Tachys species #5	A				X	
Tetragonoderus pallidus Honr	SO	X	X	X	X	X
CERAMBYCIDAE						
Another group of wood borers, which, like Buprestids, are often taken on flowers of host plants as well as at blacklight. Not substrate specific.						
Achryson surimanum (Linnaeus)	WD			X	X	X
Derobrachus geminatus geminatus LaConte	WD				X	
Eburia falli Linsley	WD					X
Eustromula validum (LeConte)	WD				X	
Megacyllene antennata (White)	WD				X	
Methia species #1	WD					X
Schizax senax LeConte	WD					X
CHRYSOMELIDAE						
Plant feeders generally taken in association with their host plant. Most desert species of wide distribution. A new and likely endemic genus and species was found at Cadiz Dunes on Coldenia plicata (Torrey).						
Altica torquata LeConte	WD	X	X	X		X
Chaetocnema ectypa Horn	WD			X		X
Diabrotica undecimpunctata undecimpunctata Mannerheim	WD				X	
Epitrix hirtipennis Melsheimer	WD					X
Euryscopa vittata larga Moldenke	WD			X		
Exema deserti Pierce	WD				X	

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALC
CHRYSOMELIDAE (continued)						
Lema trilineaia daturaphila Kogen & Goeden	WD				X	
Longitarsis species #1	?				X	
Metachroma californicum Crotch	WD	X				
Metachroma immaculatum Blake	WD	X				
Microrhpala rubrolineata vulnerata Horn	WD				X	
Myochrous longulus LeConte	WD					
Pachybrachys integratus Fall	WD	X				
Pachybrachys mellitus Bowditch	WD				X	
Pachybrachys xanti Crotch	WD			X		
Pachybrachys species #1	WD				X	
Phyllotreta species #2	WD				X	
Systena blanda Melsheimer	WD				X	
CHRYSOMELIDAE new genus, new species	E		X			
CICINDELIDAE						
In the early spring, Cicindela tranquebarica inyo Fall colonizes the low damp depressions of the Owens Lake Dunes. Other species collected on dunes are atttracted by blacklight from other areas.						
Cicindela lemniscata lemniscata LaConte	A					
Cicindela willistoni pseudosenilis W. Horn	A	X				
Cicindela tranquebarica inyo Fall	WD	X				

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
CLERIDAE						
Members of this family are predaceous on wood boring beetles and nesting bees. The species are widespread and usually collected either on flowers or at blacklight. Not substrate specific.						
Callotillus elegans vafer Wolcott	WD			X		X
Cymatodera fuchsi Schaeffer	WD				X	X
Cymatodera oblita Horn	WD					X
Cymatodera punctata LeConte	WD					X
Enoclerus quadrisignatus (Say)	WD					X
Serriger reichei Spinola	WD			X		
Trichodes ornatus ornatus Say	WD			X	X	
Trichodes peninsularis basilis VanDyke	WD					X
Trichodes peninsularis horni Wolcott	WD					X
COCCINELLIDAE						
The members of this family feed on soft bodied arthropods and are present on dune plants when food sources are available. Most feed on aphids, mites and scales, and are not linked to a given substrate.						
Brumus septentrionis Weise	WD	X				
Chilocorus stigma orbus Casey	WD		X			
Hippodamia convergens Guerin	WD	X	X	X	X	X
Hyperaspidius new species #1	WD		X			
Hyperaspis bensonica bensonica Casey	WD		X	X		X
Hyperaspis pleuralis Casey	WD	X	X			
Lindorus lophanthae Blaisdell	WD			X	X	X

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGC
COCCINELLIDAE (continued)						
Olla abdominalis (Say)	WD				X	
Psyllobora vigintimaculata Say	WD				X	
Scymnus species #1	WD			X	X	
Scymnus species #2	WD			X		
CRYPTOPHAGIDAE						
Associated with decaying vegetable matter where they feed upon fungi.						
Cryptophagus species #1	WD					
CUCUJIDAE						
Ahasverus advena (Waltl) is a cosmopolitan species associated with mouldy sto products which might develop in food stores of ants or rodents on dunes.						
Ahasverus advena Waltl	WD					
CURCULIONIDAE						
An important group of dune inhabitants with many sand associated species. Th taxonomy is difficult since there is great morphological variability and limi collection data available. The genus Trigonoscuta (as monographed by Pierce, 1975) has nominal species or subspecies for almost all dune areas specimens were known from. Weevils from dune areas studied for this report were not contained in Pierce's revision, and it is difficult to know what names would apply. By his criteria, each would likely be considered to need a new name.						
Acanthoscelidius californicus Dietz	WD		X			
Auletobius new species #1	?			X		
Baris interstitialis (Say)	SO				X	
Cleonus albovestitus Casey	SO		X	X	X	
Cryptolepidius cazieri (VanDyke)	WD			X		
Eucilinus aridus aridus (VanDyke)	SO		X	X	X	

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
CURCULIONIDAE (continued)						
Hypera brunneipennis (Boheman)	A					X
Microlarinus sp. #1	WD		X			X
Onychobaris species #1	SO		X	X	X	X
Ophryastes argentatus LeConte	WD					X
Ophryastes geminatus Horn	WD	X	X	X		
Ophryastes mixtus Kissinger	WD		X	X		
Ophryastes robustus Davis	WD					X
Sitona species #1	WD				X	X
Smicronyx imbricatus (Casey)	WD	X	X	X	X	
Trigonoscuta species #1	SO	X	X	X	X	X
DERMESTIDAE						
This family develops on the dry remains of dead animals. The larvae of the Novelsis species are modified for burrowing in the sand. The larvae of one species of Novelsis was collected (rarely) at the Algodones Dunes and finally a single adult was reared on a diet of dead mealworms. This represents a new species which is currently being described by Dr. R. S. Beal.						
Cryptorhopalum fusciclave Casey	WD				X	
Novelsis picta Casey	SO		X	X	X	X
Novelsis uteana Casey	SO		X			
Novelsis new species #1	SO					X
DYTISCIDAE						
A nondune aquatic group, attracted to blacklight from nearby water sources.						
Copelatus chevrolati renovatus Guignot	A					X

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN
DYTISCIDAE (continued)					
Eretes sticticus (Linnaeus)	A		X	X	X
Hygrotus species #1	A				
Hygrotus species #2	A			X	
ELATERIDAE					
All species collected in this study are widespread. Larvae are subterran Adult specimens are not infrequently taken at blacklight. Endemic sand s known from dune areas in the Great Basin.					
Anchastus bicolor LeConte	WD				
Esthesopus mitis (Horn)	WD			X	X
Esthesopus parcus Horn	WD				
Horistonotus simplex LeConte	WD			X	X
Meristhus cristatus Horn	WD				X
HETEROCERIDAE					
Adults and larvae live in the mud at the edge of water. All specimens ta this study were at blacklight, and undoubtedly flew in from nearby water					
Heterocerus gnatho LeConte	A				X
Heterocerus mexicanus Sharp	A			X	X
HISTERIDAE					
Members of this family are predators. As far as we know, the habitat for is the burrows of rodents. Many of these species are rare in collections is not known if sand is a necessary part of their habitat. An undescribe genus, closely related to the North African genus Philothris was taken at and Algodones. It was previously taken at several Great Basin dune sites are differences in the various populations; but it is not yet decided if					

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
HISTERIDAE (continued)						
is a single species or several closely related species; they are free living in the sand and are collected by sifting.						
Eremosaprinus hubbardi Wentzel	WD			X	X	
Eremosaprinus unguiculatus Ross	WD					X
Eremosaprinus new species near unguiculatus	WD			X	X	
Euspilotus socius (Casey)	WD					X
Hypocaccus propensus Casey	WD	X				X
Philothris species #1	SO				X	X
Saprinus discoidalis LeConte	WD	X			X	XX
Teretrius species #1	WD					X
Xerosaprinus (Vastosaprinus) ciliatoides Fall	WD			X	X	X
HYDROPHILIDAE						
Aquatic, when on dunes, adults are usually collected at blacklight. Hydrophilus triangularis (Say) is usually present in the pools at the base of the dunes in the Algodones.						
Berosus californicus Motschulsky	A					X
Berosus infuscatus LeConte	A				X	X
Berosus maculosus Mannerheim	A		X			
Enochrus species #1	A				X	X
Hydrophilus triangularis (Say)	A				X	X

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGOD
LATHRIDIIDAE						
Fungus feeders. A genus previously unreported in North America (Migneauxia) wa taken at Algodones Dunes and Palen Dunes at blacklight in the fall. Corticarin scissa LeConte is restricted to desert areas and associated with marshes and wa taken in numbers at blacklight. The large numbers provided the material for a study to make the determination of its status as a valid species; it was previc carried as a synonym of C. fuscula (Gyllenhal).						
Corticaria species #1	WO			X		
Corticarina cavicollis (Mannerheim)	WD			X		X
Corticarina scissa LeConte	WD					X
Migneauxia species #1	WD			X		X
LEIODIDAE						
Ptomaphagus fisus Horn is a scavenger living on rodent burrows. It is wide-spread and known from a number of dunes.						
Ptomaphagus fisus Horn	WD		X			X
LIMNEBIIDAE						
Another aquatic group taken at blacklight.						
Ochthebius fossatus LeConte	A					X
LYCTIDAE						
Borers in dead wood. Trogoxylon aequale (Wollaston) reared from Cercidium flor Benth. Not restricted to any given substrate.						
Trogoxylon aequale Wollaston	WD					X
MELANDRYIDAE						
Little or nothing is known of this family. During this survey, adults were tal at blacklight.						
Melandryidae species #1	WD	X				
Melandryidae species #2	WD			X		

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
MELOIDAE						
Members of this family are parasitic on wasps and Orthoptera eggs as larve and feed on plants, primarily annuals, as adults. Most adult specimens are collected on plants, but some were only taken at blacklight.						
Cysteodemus armatus LeConte	WD		X	X	X	X
Epicauta lauta (Horn)	WD		X	X	X	X
Epicauta tenella (LeConte)	WD		X		X	
Epicauta tenuilineata (Horn)	WD				X	
Epicauta virgulata LeConte	WD				X	
Eupompha elegans elegans (LeConte)	WD					X
Eupompha imperialis (Wellman)	WD			X		
Lytta (Paralytta) magister Horn	WD				X	
Lytta (Poreospasta) auriculata Horn	WD					X
Negalius marmorata Casey	WD				X	X
Phodaga alticeps LeConte	WD		X	X	X	
Pleuropompha costata (LeConte)	WD				X	
Pseudozonitis species #1	WD				X	
Pyrota concinna Casey	WD			X	X	X
Tegrodera latecincta Horne	WD	X				
Zonitis atripennis terminalis Enns	WD				X	
MELYRIDAE						
Usually associated with flowers. Dasytinae adults often abundant, but larval stages unknown. Malachinae not abundant.						
Attalus atripennis Fall	WD		X			
Attalus lobulatus (LeConte)	WD			X		

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGOI
MELYRIDAE (continued)						
Attalus species #2	WD				X	
Attalus species #5	WD			X		
Attalus species #6	WD			X		
Pristoscelis species #1	WD			X	X	
Trichochorus umbratus (LeConte)	WD			X		
MYCETOPHAGIDAE						
Typhaea stercorea (Linnaeus) has been taken at sap flows on damaged plants bel the sand level.						
Typhaea stercorea (Linnaeus)	WD				X	
NITIDULIDAE						
Sap and pollen feeders, they are frequently taken on the dunes at the top of slip faces where they were forced down by the wind.						
Nitidulidae species #1	WD					
Nitidulidae species #2	WD				X	
Nitidulidae species #3	WD		X		X	
Nitidulidae species #4	WD					
Nitidulidae species #5	WD					
Nitidulidae species #6	WD					
Nitidulidae species #7	WD			X		
OEDEMERIDAE						
Rhinoplatia ruficollis Horn was taken in the flower heads of crucifers. Most species are known only from blacklight collections.						
Oxacis species #1	WD				X	

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
OEDEMERIDAE (continued)						
Oxacis species #2	WD				X	
Oxacis species #3	WD	X			X	
Rhinoplatia ruficollis (Horn)	WD				X	
PEDILIDAE						
An undescribed genus and species is known from blacklight collections at the Algodones Dunes. It is currently being described by investigator Andrews.						
Leptoremus species #1	WD					XX
Steropalpus species #1	WD					X
Undescribed genus and species	E					X
PHALACRIDAE						
Rare on dunes, there is little or nothing known of the biology of the group.						
Phalacrus species #1	WD	X				
Phalacrus species #2	WD		X			
PSELAPHIDAE						
Rarely taken at blacklight. Known desert species live with ants.						
Pilopius occularis (Casey)	WD			X		
Ctenisis species #1	WD				X	
PTINIDAE						
Niptus ventriculus LeConte is commonly associated with hummocks on dunes and is collected in cereal bowl pit traps where the hummock is riddled with small holes. Ptinus species #1 is a species that is known from a number of dune areas and is apparently restricted to dunes.						
Niptus ventriculus Leconte	SO		X	X	X	X
Ptinus species #1	SO					X

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	AI
RHIPIPHORIDAE						
Parasites of hymenopterans, they are uncommonly taken at Algodones on flower heads of Mallow.						
Rhipiphoridae epinomiae Linsley & MacSwain	WD					
SCARABAEIDAE						
The Scarab beetles are a group that in the dunes of the Great Basin show a g deal of endemism and dune adaptation. There were a very high number (43) of species collected during the BLM survey, but most are associated with the Gl Dunes (37). Only 23 species were taken at all of the other dunes combined. the species collected, five (Anomala carlsoni, Anomala hardyorum, Cyclocepha wandae, Diplotaxis corbula, and Pseudocotalpa andrewsi) can be considered en to a single dune, and all of these are found on the Glamis system. of the o two Leptohoplia testaceipennis, Xeropsamobens desertus) are Sand Obligates, widespread species of desertic affinity, and nine accidental.						
The most noteworthy collection of the BLM survey was Xeropsamobeus desertus, was known previous to this survey from about 20 specimens. The reason was e that the species is a winter inhabitant of sand areas. During the BLM surve 600 examples were collected, and many more observed. The species is active late afternoon and evening, when it is found on slip-faces and flying about. readily attracted to blacklight. It is surprising that there were not more or sand obligates encountered on the BLM dunes.						
Acoma glabrata Cazier	WD		X			
Anomala carlsoni Hardy	E					
Anomala flavilla Bates	WD				X	
Anomala hardyorum Potts	E					
Aphodius acutissimus Gordon	WD					
Aphodius fucosus Schmidt	WD		X			
Aphodius granarius (Linnaeus)	A		X			
Aphodius lividus (Olivier)	A					
Aphodius militaris Complex	WD		X			
Ataenius californicus Horn	WD					

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
SCARABAEIDAE (continued)						
Ataenius cognatus (LeConte)	WD					X
Ataenius desertus Horn	WD		X		X	X
Ataenius hesperius Cartwright	WD	X				
Ataenius lobatus Horn	WD					X
Ataenius puncticollis (LeConte)	WD		X	X	X	X
Bolbocerastes regalis Cartwright	WD					X
Bolbocerastes species	WD				X	
Chnaunanthus discolor Burmeister	A			X		X
Chnaunanthus flavipennis Horn	A		X			X
Cyclocephala longula LeConte	WD	X	X	X	X	X
Cyclocephala wandae Hardy	E					X
Diplotaxis corbula Vaurie	E					X
Diplotaxis fimbriata Fall	WD					X
Diplotaxis fossipalpa Fall	WD		X			
Diplotaxis knausii Shaeffer	WD			X	X	X
Diplotaxis moerens LeConte	WD	X	X	X	X	X
Diplotaxis pacata LeConte	WD			X	X	X
Diplotaxis subangulata LeConte	WD			X	X	X
Glaresis clypeata VanDyke	WD					X
Glaresis ecostata Fall	WD				X	X
Glaresis phoenicus Fall	WD					X
Leptohoplia testaceipennis Saylor	SO					X
Ligyrus gibbosus obsoletus LeConte	WD		X	X	X	X

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALG
SCARABAEIDAE (continued)						
Ligyrus ruginasus LeConte	WD			X	X	
Megasoma sleeperi Hardy	WD					
Ochodaeus mandibularis Linell	WD	X			X	
Pachyplectris laevis LeConte	SO ?		X			
Phileurus illatus LaConte	WD					
Phyllophaga mucorea (LeConte)	WD					
Pleurophorus caesus (Crentzer)	A					
Pleurophorus micros (Bates)	WD					
Pseudocotalpa andrewsi Hardy	E					
Xeropsamobeus desertus (VanDyke)	SO	X	X	X	X	
SCOLYTIDAE						
Chaetophloeus parkinsoniae (Blackman) represents another wood boring group which was reared from dead Cercidium floridium Benth.						
Chaetophloeus parkinsoniae Blackman	WD				X	
SCYDMAENIDAE						
A species of the genus Papusus, which was taken in cereal bowls at Algodones, may be undescribed. It is most likely an associate of ants.						
Papusus species #1	WD					
STAPHYLINIDAE						
Most require an off dune habitat and are taken on the dunes at blacklight. Neobisnius species #1 was taken at the edge of drying pools at the edge of th dunes at Algodones in the fall. Acalophaena compacta Casey is a guest with a						
Acalophaena compacta Casey	WD				X	

SPECIES INVENTORY (continued)

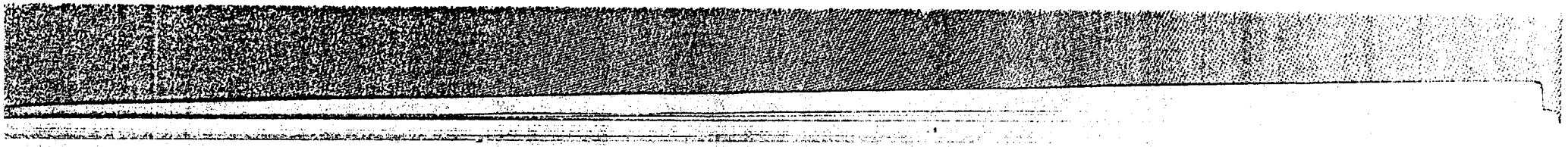
ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
STAPHYLINIDAE (continued)						
Aleocharinae sp. #10	A				X	
Aleocharinae sp. #11	A				X	
Apocellus analis LeConte	A					X
Bledius ferratus LeConte	A					X
Carpelimus species #1	A					X
Carpelimus species #2	A	X		X		
Lobrathium lituarium (LeConte)	A			X	X	X
Neobisnius species #1	WD		X	X	X	X
Philonthus alumnus Erichson	WD				X	X
Platystethus spiculus Erichson	A					X
Scopaeus species #1	A				X	X
TENEBRIONIDAE						
The darkling ground beetles are the most noticeable of the dune inhibiting beetles because of their abundance and in some cases long period of adult activity. Many Many species can be collected at dusk and after dark as they wander over the dune surface. Areoschizus sp. Batulius setosus LeConte, and Cnemeplatia sericea Horn are usually collected in cereal bowl pit traps or are sifted from the sand. At least 14 species are sand dune obligates.						
Anemia californica Horn	SO	X	X	X	X	X
Areoschizus species #1	WD					X
Areoschizus species #2	WD		X	X	X	X
Asida confluens LeConte	SO			X		X
Batulius setosus LeConte	SO				X	X
Blapstinus species #1	?				X	X
Cerenopus concolor LeConte	WD			X		X

SPECIES INVENTORY (continued)

ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN
TENEBRIONIDAE (continued)					
Cnemeplatia sericea Horn	SO	X		X	X
Cnemodius testaceus Horn	SO		X	X	X
Cryptoglossa laevis laevis LeConte	WD				
Cryptoglossa verrucosa verrucosa LeConte	WD		X	X	X
Edrotes arens LaRivers	SO		X	X	X
Edrotes ventricosus LeConte	SO	X	X	X	X
Eleodes armata LeConte	WD	X	X	X	X
Embaphion depressum LeConte	SO			X	X
Eupsophulus castaneus Horn	WD		X	X	X
Eusattus fortineri (Blaisdell)	E				
Eusattus muricatus (LeConte)	SO	X	X	X	X
Latheticus prosopis (Chittenden)	WD				
Mecysmus augustus LeConte	WD	X	X		X
Mycotrogus augustus Horn	WD				X
Nocibiotes granulatus LeConte	WD				
Notibius puberulus LeConte	WD		X	X	X
Trichasida hirsuta (LeConte)	SO				
Triorophus nodiceps LeConte	WD				X
Trogloderus costatus costatus LeConte	SO	X			
Trogloderus costatus mayhewi Papp	SO		X	X	
Trogloderus costatus tuberculatus Blaisdell	SO	X			

SPECIES INVENTORY (continued)

ES	ORGANISM	STATUS	OWENS	CADIZ	RICE	PALEN	ALGODONES
	TENEBRIONIDAE (continued)						
	Ulus crassus LeConte	SO				X	X
	Zopherus tristis LeConte	WD			X	X	
	TROGOSITIDAE						
	Temnochila chloridia (Mannerheim) is a gallery predator of wood boring beetles. Not associated with any given substrate.						
	Temnochila chlorodia (Mannerheim)	WD			X		X



APPENDIX B

APPENDIX B

In the species list below, the season for which we have records is indic by a series of X's placed under the appropriate heading. Although the s varies somewhat from the northern-most dune (Owens) to the southern-most (Algodones), it appears biologically acceptable to use the same calendar periods for all dunes studied. They were defined as follows:

Winter - November through February

Spring - March through early May

Summer - Late May through August

Fall - September and October

The series of X's indicates roughly the number of specimens recorded fro one dune at any one time.

The series of X's indicate:

X - 1 or 2 specimens collected.

XX - 3-9 specimens collected.

XXX - 10 or more specimens.

OWENS LAKE DUNES

ORGANISM	WINTER	SPRING	SUMMER	FALL
ALLECULIDAE				
Alleculidae species #3			X	
ANTHICIDAE				
Anthicus cribratus LeConte			X	
Anthicus ephippium LaFerte			X	
Mecynotarsus delicatulus Horn		XXX	XXX	
Notoxus calcaratus Horn			XX	
Notoxus robustus Casey			X	
Tanarthrus coruscus Chandler			XX	
Tanarthrus tartarus Chandler			X	
Vacusus confinus LeConte			X	
Vacusus infernus (LaFerte)			XX	
BUPRESTIDAE				
Chrysobothris biramosa calida Knull			X	
Chrysobothris deserta Horn			X	
CARABIDAE				
Calosoma parvicollis Fall			XX	
Harpalus intactus Casey				XX
Tetragonoderus pallidus Horn		X		XXX
CHRYSOMELIDAE				
Altica torquata LeConte	XX	X		
Metachroma immaculatum Blake			XXX	
Pachybrachys integratus Fall				X

ORGANISM	WINTER	SPRING	SUMMER
CHRYSOMELIDAE			
Altica torquata LeConte	XX	X	
Metachroma immaculatum Blake			XXX
Pachybrachys integratus Fall			
CICINDELIDAE			
Cicindella willistoni pseudosenilis W. Horn			X
Cicindela tranquebarica inyo Fall			
COCCINELLIDAE			
Brumus septentrionis Weise			XX
Hippodamia convergens Guerin	X	X	X
Hyperaspis pleuralis Casey		X	
CURCULIONIDAE			
Ophryastes geminatus Horn		XXX	XX
Smicronyx imbricatus (Casey)		X	
Trigonoscuta species #1		X	
HISTERIDAE			
Hypocaccus propensus Casey		XX	
Saprinus discoidalis LeConte			XX
MELANDRYIDAE			
Melandryidae species #1			XX

OWENS LAKE DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
MELOIDAE				
Tegrodera latecincta Horn			X	
OEDEMERIDAE				
Oxacis species #3				XXX
PHALACRIDAE				
Phalacrus species #1			X	
SCARABAEIDAE				
Ataenius hesperius Cartwright		XX		
Cyclocephala longula LeConte			XXX	
Diplotaxis moerens LeConte			XX	X
Ochodaeus mandibularis Linell				XX
Xeropsamobeus desertus (VanDyke)	XXX			
STAPHYLINIDAE				
Carpelimus species #2			XX	
TENEBRIONIDAE				
Anemia californica Horn			XXX	
Cnemeplatia sericea Horn			X	
Edrotes ventricosus LeConte	XXX	X		
Eleodes armata LeConte	XX	X	XX	XX
Eusattus muricatus (LeConte)	XXX	XXX	XXX	XX
Mecysmus augustus LeConte			XX	

ORGANISM	WINTER	SPRING	SUMMER
TENEBRIONIDAE (continued)			
Trogloderus costatus costatus LeConte		XX	XXX
Trogloderus costatus tuberculatus Blaisdell		X	XX

CADIZ DUNES

ORGANISM	WINTER	SPRING	SUMMER	FALL
ALLECULIDAE				
Alleculidae species #3				X
ANOBIIDAE				
Tricorynus elutus White		XX		
ANTHICIDAE				
Notoxus calcaratus Horn		XX		
Tanarthrus tartarus Chandler			XX	XX
Vacusus infernus (LaFerte)				X
BUPRESTIDAE				
Hippomelas dianae Helfer			XXX	
Hippomelas planicosta (LeConte)			XX	
BRUCHIDAE				
Algarobius prosopis (LeConte)				X
CARABIDAE				
Bemidion timidum LeConte	X			
Calosoma parvicollis Fall		XXX		
Tetragonoderus pallidus Horn	XXX			XXX
CHRYSOMELIDAE				
Altica torquata LeConte		XXX		
New genus, new species		XXX		

CADIZ DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FA
COCCINELLIDAE				
Chilocorus stigma orbus Casey		X		
Hippodamia convergens Guerin		XX		
Hyperaspidius new species #1		XX		
Hyperaspis bensonica bensonica Casey		XX		
Hyperaspis pleuralis Casey		X		
CURCULIONIDAE				
Acanthoscelidius californicus Deitz		XX		
Cleonus albovestitus Casey		X		
Eucilinus aridus aridus (VanDyke)	XX	XXX		)
Microlarinus species #1		X		
Onychobaris species #1	X	XXX		
Ophryastes geminatus (Horn)	X			
Ophryastes mixtus Kissinger	X	X	X	
Smicronyx imbricatus (Casey)	X			
Trigonoscuta species	XXX	XX		
DERMESTIDAE				
Novelsis picta Casey			X	
Novelsis uteana Casey		X		
DYTISCIDAE				
Eretes sticticus (Linnaeus)				X)
HYDROPHILIDAE				
Berosus maculosus Mannerheim			X	

CADIZ DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
MELOIDAE				
Cysteodemus armatus LeConte		X		
Epicauta lauta (Horn)				XX
Epicauta tenella (LeConte)				X
Phodaga alticeps LeConte		XXX		XX
MELYRIDAE				
Attalus atripennis Fall		X		
NITIDULIDAE				
Nitidulidae species #3		X		
PHALACRIDAE				
Phalacrus species #2				X
PTINIDAE				
Niptus ventriculus (LeConte)	XX	XXX		XXX
SCARABAEIDAE				
Ataenius desertus Horn				X
Ataenius puncticollis (LeConte)				X
Chnaunanthus flavipennis Horn		XX		
Cyclocephala longula LeConte	X			
Diplotaxis fossipalpa Fall			XX	XX
Diplotaxis moerens LeConte			XX	
Ligyrus gibbosus obsoletus LeConte	XX	XX	X	
Pachyplectris laevis LeConte	X			

CADIZ DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FA
SCARABAEIDAE (continued)				
Xeropsamobeus desertus (VanDyke)	XXX			
STAPHYLINIDAE				
Neobisnius species #1	X			
TENEBRIONIDAE				
Anemia californica Horn			XXX	
Aeroschizus species #2	X	X	XXX	X
Cnemodius testaceus Horn		X	XX	
Cryptoglossa verrucosa verrucosa (LeConte)		XX	XXX	X
Edrotes arens LaRivers	XXX	XXX	XX	XX
Edrotes ventricosus LeConte	XXX	XXX	XXX	XX
Eleodes armata LeConte	XXX	XX	XX	X
Eupsophulus castaneus Horn		X		
Eusattus muricatus (LeConte)	XX	XXX	X	X
Mecysmus augustus LeConte		X		
Notibius puberulus LeConte		XX		
Trogloderus costatus mayhewi Papp			X	X

RICE DUNES

ORGANISM	WINTER	SPRING	SUMMER	FALL
ALLECULIDAE				
Alleculidae species #1				X
Alleculidae species #3				X
ANOBIIDAE				
Tricorynus elutus White		XXX		
ANTHICIDAE				
Anthicus cervinus LaFerte				X
Vacusus confinus LeConte		X	X	
BOSTRICHIDAE				
Amphicerus teres Horn			XX	
Apatides fortis (LeConte)			X	
Dendrobiella aspera (LeConte)		X		
CARABIDAE				
Calosoma parvicollis Fall		XX		
Pseudomorpha parallela VanDyke				X
Schizogenius falli Whitehead	XX			X
Tachys species #4	X			
Tetragonoderus pallidus Horn		XXX		XXX
CERAMBYCIDAE				
Achryson surinamum (Linnaeus)				X

ORGANISM	WINTER	SPRING	SUMMER
CHRYSOMELIDAE			
Altica torquata LeConte		XXX	
Euryscopa vittata larga Moldenke		X	
Pachybrachys xanti Crotch		XX	
CLERIDAE			
Callotillus elegans vafer Wolcott		X	
Serriger reichei Spinola		XX	
Trichodes ornatus ornatus Say		X	
COCCINELLIDAE			
Hippodamia convergens Guerin		XX	
Hyperaspis bensonica bensonica Casey		X	
Lindorus lophanthae Blaisdell	X		
Scymnus species #1		X	
Scymnus species #2		X	
CURCULIONIDAE			
Auletobius new species #1		X	
Cleonus albovestitus Casey	XXX		
Crypstolepidius cazieri (VanDyke)		XXX	
Eucilinus aridus aridus (VanDyke)	XX	XX	
Onychobaris species #1		X	
Ophryastes geminatus (Horn)	X		
Ophryastes mixtus Kissinger	X	X	

RICE DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
CURCULIONIDAE (continued)				
Smicronyx imbricatus (Casey)		X		
Trigonoscuta species	XXX	XX		
DERMESTIDAE				
Novelsis picta Casey			X	
DYTISCIDAE				
Eretes sticticus (Linnaeus)				XX
Hygrotus species #2		X		
ELATERIDAE				
Esthesopus mitis (Horn)			XXX	XX
Horistonotus simplex LeConte			X	
HETEROCERIDAE				
Heterocerus mexicanus Sharp	XX			X
HISTERIDAE				
Eremosaprinus hubbardi Wentzel		X		
Eremosaprinus n. sp. nr. *unguiculatus*		X		
Xerosaprinus (V.) *ciliatoides* Fall		XXX		
LEIODIDAE				
Ptomaphagus fisus Horn	X	X		

RICE DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
SCARABAEIDAE (continued)				
Diplotaxis moerens LeConte			XXX	XX
Diplotaxis pacata LeConte			X	X
Diplotaxis subangulata LeConte				X
Ligyrus gibbosus obsoletus LeConte	XX			
Ligyrus ruginasus LeConte				XX
Xeropsamobeus desertus (VanDyke)	XXX	XXX		
STAPHYLINIDAE				
Carpelimus species #2		X		
Lobrathium lituarium (LeConte)		X		X
Neobisnius species #1		X		
TENEBRIONIDAE				
Anemia californica Horn		X		
Areoschizus species #2	XX	X	XX	XX
Asida confluens (LeConte)				XXX
Cerenopus concolor LeConte		X	X	
Cnemeplatia sericea Horn	XXX			
Cnemodius testaceus Horn			X	
Cryptoglossa verrucosa verrucosa (LeConte)		X	XX	XXX
Edrotes arens LaRivers	XXX	XXX	XX	XXX
Edrotes ventricosus LeConte	XXX	XXX	XXX	XXX
Eleodes armata LeConte	XX	XX		XX
Embaphion depressum LeConte	X			

RICE DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
MELOIDAE				
Cysteodemus armatus LeConte		X		
Epicauta lauta (Horn)				X
Eupompha imperialis (Wellman)		X		
Phodaga alticeps LeConte		XX		
Pyrota concinna Casey				XX
MELYRIDAE				
Attalus lobulatus (LeConte)		XX		
Attalus species #5		X		
Attalus speciesl #6		XX		
Pristoscelis species #1		X		
Trichochorus umbratus (LeConte)		XXX		
NITIDULIDAE				
Nitidulidae species #7		X		
SCARABAEIDAE				
Acoma glabrata Cazier				XX
Aphodius fucosus Schmidt	XX	X		
Aphodius granarius (Linnaeus)	XX			
Aphodius militaris Complex	XX			
Ataenius puncticollis (LeConte)				X
Chnaunanthus discolor Burmeister		XXX		
Cyclocephala longula LeConte		X		
Diplotaxis knausii Schaeffer				XX

PALEN DUNES

ORGANISM	WINTER	SPRING	SUMMER	FALL
ALLECULIDAE				
Alleculidae species #1				X
Alleculidae species #2				X
Alleculidae species #3		X		XXX
Alleculidae species #4		X		XX
ANOBIIDAE				
Tricorynus elutus White		XXX		
Stegobium paniceum (Linnaeus)				XX
ANTHICIDAE				
Anthicus cervinus LaFerte				XX
Anthicus lutulentus Casey		XX		XX
Anthicus nanus LeConte		XX		XX
Formicilla munda LeConte				X
Mecynotarsus delicatulus Horn	XXX	XXX		XXX
Notoxus calcaratus Horn		X		XX
Tanarthrus coruscus Chandler				XX
Tanarthrus tartarus Chandler				XX
Vacusus confinus LeConte		XX		XXX
Vacusus infernus (LeFerte)				XXX
BOSTRICHIDAE				
Amphicerus simplex (Horn)			X	
Apatides fortis (LeConte)			X	
Xyloblaptus quadrispinosus (LeConte)				X

RICE DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
TENEBRIONIDAE (continued)				
Eupsophulus castaneus Horn		XX		
Eusattus muricatus (LeConte)	XXX	XX	X	XXX
Notibius puberulus LeConte		X		
Trogloderus costatus mayhewi Papp			X	XXX
Zopherus tristis LeConte				X
TROGOSTITIDAE				
Temnochila chlorodia (Mannerheim)			X	X

RICE DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
TENEBRIONIDAE (continued)				
Eupsophulus castaneus Horn		XX		
Eusattus muricatus (LeConte)	XXX	XX	X	XXX
Notibius puberulus LeConte		X		
Trogloderus costatus mayhewi Papp			X	XXX
Zopherus tristis LeConte				X
TROGOSTITIDAE				
Temnochila chlorodia (Mannerheim)			X	X

PALEN DUNES

ORGANISM	WINTER	SPRING	SUMMER	FALL
ALLECULIDAE				
Alleculidae species #1				X
Alleculidae species #2				X
Alleculidae species #3		X		XXX
Alleculidae species #4		X		XX
ANOBIIDAE				
Tricorynus elutus White		XXX		
Stegobium paniceum (Linnaeus)				XX
ANTHICIDAE				
Anthicus cervinus LaFerte				XX
Anthicus lutulentus Casey		XX		XX
Anthicus nanus LeConte		XX		XX
Formicilla munda LeConte				X
Mecynotarsus delicatulus Horn	XXX	XXX		XXX
Notoxus calcaratus Horn		X		XX
Tanarthrus coruscus Chandler				XX
Tanarthrus tartarus Chandler				XX
Vacusus confinus LeConte		XX		XXX
Vacusus infernus (LeFerte)				XXX
BOSTRICHIDAE				
Amphicerus simplex (Horn)			X	
Apatides fortis (LeConte)			X	
Xyloblaptus quadrispinosus (LeConte)				X

PALEN DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
BRUCHIDAE				
Acanthoscelides daleae Johnson		XXX		
BUPRESTIDAE				
Chrysobothris octocola LeConte				X
CARABIDAE				
Bembidion impotans Casey		X		
Bembidion timidum LeConte		X		
Calosoma parvicollis Fall		XXX		XX
Pseudaptinus horni Chaudoir		X		XX
Pseudomorpha parallela VanDyke		X		
Schizogenius falli Whitehead		X		XXX
Selenophorus semirufus Bates				X
Tachys species #3				XX
Tachys species #4				X
Tachys species #5				X
Tetragonoderus pallidus Horn	XX			XXX
CERAMBYCIDAE				
Achryson surinamum (Linnaeus)		X		X
Derobrachus geminatus geminatus LeConte			X	
Eustromula validum (LeConte)			X	
Megacyllene antennata (White)		X		

PALEN DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
CHRYSOMELIDAE				
Chaetocnema ectypa Horn		XX		
Diabrotica undecimpunctata undecimpunctata Mannerheim				X
Exema deserti Pierce			X	
Lema trilineata daturaphila Kogen & Goeden		X		
Longitarsis species #1				X
Microrhopala rubrolineata vulnerata Horn			XXX	
Pachybrachys mellitus Bowditch			X	
Pachybrachys species #1			X	
Phyllotreta species #1		XXX		
Systena blanda (Melsheimer)		X	XX	
CLERIDAE				
Cymatodera fuchsi Schaeffer				XX
Trichodes ornatus ornatus Say		X		
COCCINELLIDAE				
Hippodamia convergens Guerin		XXX		
Lindorus lophanthae Blaisdell				XXX
Olla abdominalis (Say)		XX		
Psyllobora vigintimaculata Say		X		
Scymnus species #1		X		

PALEN DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
CURCULIONIDAE				
Baris interstitialis (Say)			XXX	
Cleonus albovestitus Casey		X	XXX	
Eucilinus aridus aridus (VanDyke)		XX		XXX
Onychobaris species #1		X	X	
Sitona species #1		X	XXX	
Smicronyx imbricatus (Casey)		XX		
Trigonoscuta species	XX	X		
DERMESTIDAE				
Cryptorhopalum fusciclave Casey		X		
Novelsis picta Casey			XX	
DYTISCIDAE				
Eretes sticticus (Linnaeus)				XX
ELATERIDAE				
Esthesopus mitis (Horn)		XXX		XXX
Horistonotus simplex LeConte			XX	
Meristhus cristatus Horn				X
HETEROCERIDAE				
Heterocerus gnatho LeConte		X		
Heterocerus mexicanus Sharp				XX
HISTERIDAE				
Eremosaprinus hubbardi Wentzel		X		

PALEN DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
HISTERIDAE (continued)				
Eremosaprinus new species near *unguiculatus*	X			
Pilothris species #1		X		
Sparinus dicoidalis LeConte				X
Xerosaprinus (*V.*) *ciliatoides* Fall		XXX		
HYDROPHILIDAE				
Berosus infuscatus LeConte		X		X
Enochrus species #1		X		XX
Hydrophilus triangularis (Say)		X		
LATHRIDIIDAE				
Corticaria species #1				X
Corticarina cavicollis (Mannerheim)				XX
Migneauxia species #1				X
MELANDRYIDAE				
Melandryidae species #2			X	
MELOIDAE				
Cysteodemus armata LeConte		X		
Epicauta lauta (Horn)				X
Epicauta tenella (LeConte)				X
Epicauta tenuilineata (Horn)				X
Epicauta virgulata LeConte				X

PALEN DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
MELOIDAE (continued)				
Lytta (Paralytta) magister Horn		XX		
Negalius marmorata Casey				XXX
Phodaga alticeps LeConte		X		
Pleuropompha costata (LeConte)				X
Pseudozonitis species #1		XXX		
Pyrota concinna Casey				XXX
Zonitis atripennis terminalis Enns		X		
MELYRIDAE				
Attalus species1 #2		X		
Pristogcelis species #1		X		
MYCETOPHAGIDAE				
Typhaea stercorea (Linnaeus)			X	XX
NITIDULIDAE				
Nitidulidae species #2				X
Nitidulidae species #3		X		
OEDEMERIDAE				
Oxacis species #1				X
Oxacis species #2		XXX		
Oxacis species1 #3				X
Rhinoplatia ruficollis Horn		XXX		

PALEN DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
PSELAPHIDAE				
Ctenisis species #1				X
PTINIDAE				
Niptus ventriculus LeConte		X		XXX
SCARABAEIDAE				
Anomala flavilla Bates		XXX		
Ataenius desertus Horn				XXX
Ataenius puncticollis (LeConte)				XXX
Bolbocerastes species		X		
Cyclocephala longula LeConte		XXX	X	
Diplotaxis fimbriata Fall				XX
Diplotaxis knausii Schaeffer			XXX	
Diplotaxis moerens LeConte			XX	
Diplotaxis pacata LeConte				XX
Diplotaxis subangulata LeConte			XX	X
Glaresis ecostata Fall		XXX		
Ligyrus gibbosus obsoletus LeConte		XXX		
Ligyrus ruginasus LeConte			X	X
Ochodaeus mandibularis Linell				X
Xeropsamobeus desertus (VanDyke)		X		
SCOLYTIDAE				
Chaetophloeus parkinsoniae (Blackman)		X		

PALEN DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
STAPHYLINIDAE				
Acalophaena compacta Casey		X		X
Aleocharinae sp. #10				X
Aleocharinae sp. #11				X
Lobrathium lituarium (LeConte)		XXX		XXX
Neobisnius species #1				XX
Philonthus alumnus Erichson		X		XXX
Scopaeus species #1				X
TENEBRIONIDAE				
Anemia californica Horn	XX	XXX	XXX	XXX
Areoschizus species #2				XX
Batulius setosus LeConte		XX		
Blapstinus speciesl #1				X
Cnemeplatia sericea Horn	XX		X	
Cnemodius testaceus Horn		XXX		
Cryptoglossa verrucosa verrucosa (LeConte)			XX	XX
Edrotes arens LaRivers	X	XXX		XX
Edrotes ventricosus LeConte	X	XX		XXX
Eleodes armata LeConte	X	XX	XXX	
Embaphion depressum LeConte			X	X
Eupsophulus castaneus Horn		XXX		
Eusattus muricatus (LeConte)	XX	XX		XXX
Mecysmus augustus (LeConte)			XX	XXX

PALEN DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
TENEBRIONIDAE (continued)				
Mycotrogus augustus Horn				X
Notibius puberulus LeConte	X	XX	X	X
Triorophus nodiceps LeConte		X		XX
Ulus crassus LeConte				XX
Zopherus tristis LeConte				X

ALGODONES DUNES

ORGANISM	WINTER	SPRING	SUMMER	FALL
ALLECULIDAE				
Alleculidae species #2			X	
Alleculidae species #4				XX
ANOBIIDAE				
Tricorynus gibbulus pubenscens White		XX	XXX	XXX
Tricorynus luteotictus (Fall)		X		
Tricorynus vestitus (Fall)				XX
Tricorynus species #1		XX		
ANTHICIDAE				
Anthicus cervinus LaFerte				XXX
Anthicus floralis (Linneaus)		X	XX	X
Anthicus lutulentus Casey			XX	XXX
Formicilla munda LeConte			X	X
Mecynotarsus delcatusus Horn		X		
Tenarthrus alutaceus LeConte				X
Thicanus annectans (LeConte)			X	
Vacusus confinus LeConte			XXX	XXX
Vacusus infernus (LaFerte)			X	XXX
BOSTRICHIDAE				
Amphicerus cornutus (Pallas)		X		
Amphicerus simplex (Horn)		X	X	X
Apatides fortis (LeConte)			X	XX

ALGODONES DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
BOSTRICHIDAE (continued)				
Dendrobiella aspera (LeConte).		X		X
Xylobiops parilis Lesne				X
Xylobiops sextuberculatus (LeConte)				X
Xyloblaptus prosopidis Fisher				X
Xyloblaptus quadrispinosus (LeConte)				XX
BRUCHIDAE				
Acanthoscelides daleae Johnson				X
Algarobius prosopis (LeConte)		X		XXX
Mimosestes amicus (Horn)		X	XX	X
Stator limbatus (Horn)		XXX		X
BURPRESTIDAE				
Acmaeodera alicia Fall				X
Acmaeodera ephedrae Barr	X			XX
Chrysobothris octocola LeConte				X
CARABIDAE				
Apristus species #2		X		
Bembidion impotans Casey				XX
Bembidion nubiculosum Chaudoir				X
Bembidion timidum LeConte				XXX
Bradycellus (Stenocellus) species #1				XXX
Calosoma affine Chaudoir				X
Calosoma parvicollis Fall		X		X

ALGODONES DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
CARABIDAE (continued)				
Clivina dentipes Dejean				X
Harpalus pensylvanicus DeGeer				X
Pseudomorpha parallela VanDyke				X
Schizogenius falli Whitehead				XX
Selenophorus palliatus Fabricius				XX
Stenolophus anceps LeConte				X
Stenolophus lineola (Fabricius)				XX
Stenolophus ochropezus Say		X		
Tachys species #3				XXX
Tachys species #4				X
Tetragonoderus pallidus Horn	XXX	XXX	XXX	XXX
CERAMBYCIDAE				
Eburia falli Linsley				X
Achryson surinamum (Linnaeus)		X		X
Methia species #1				X
Schizax senax LeConte		X		
CHRYSOMELIDAE				
Altica torquata LeConte		XX		
Chaetocnema ectypa Horn				XX
Epitrix hirtipennis (Melsheimer)				X
Myochrous longulus LeConte			X	
Systena blanda (Melsheimer)			XXX	XXX

ALGODONES DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
CICINDELIDAE				
Cicindela lemniscata lemniscata LeConte				XX
CLERIDAE				
Callotillus elegans vafer Wolcott		XX		
Cymatodera fuchsi Schaeffer				X
Cymatodera oblita Horn		X		
Cymatodera punctata LeConte		XX		
Enoclerus quadrisignatus (Say)		X		X
Trichodes peninsularis basilis VanDyke				X
Trichodes peninsularis horni Wolcott				XX
COCCINELLIDAE				
Hippodamia convergens Guerin		XX		
Hyperaspis bensonica bensonica Casey			XX	
Lindorus lophanthae Blaisdell	X			XXX
Scymnus species #2			X	
CRYPTOPHAGIDAE				
Cryptophagus species #1		X		
CUCUJIDAE				
Ahasverus advena (Waltl)		X		
CURCULIONIDAE				
Cleonus albovestitus Casey	XXX	X	X	

ALGODONES DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
CURCULIONIDAE (continued)				
Eucilinus aridus aridus (VanDyke)		XXX		
Hypera brunneipennis (Boheman)		X		
Microlarinus species #1			X	
Onychobaris species #1		XXX		
Ophryastes argentatus LeConte		X	X	
Ophryastes robustus Davis	X	XX		X
Sitona species #1			X	
Trigonoscuta species	XXX	XXX		
DERMESTIDAE				
Novelsis picta Casey			XX	
Novelsis new species #1				X
DYTISCIDAE				
Copelatus chevrolati renovatus Guignot		XX		X
Eretes sticticus (Linnaeus)			X	XXX
Hygrotus species #1				X
ELATERIDAE				
Anchastus bicolor LeConte				X
Esthesopus nitis (Horn)		X		XX
Esthesopus parcus Horn				X
Horistonotus simplex LeConte			XX	XX

ALGODONES DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
HETEROCERIDAE				
Heterocerus gnatho LeConte	X	X	XX	XX
Heterocerus mexicanus Sharp	X			XXX
HISTERIDAE				
Eremosaprinus unguiculatus Ross	X	XX		
Euspilotus socius (Casey)				X
Hypocaccus propensus Casey		XX		
Philothris species #1	X	XX		
Saprinus discoidalis LeConte			XX	
Teretrius species #1		XX		
Xerosaprinus (V.) *ciliatoides* Fall		XX		
HYDROPHILIDAE				
Berosus californicus Motschulsky				X
Berosus infuscatus LeConte	X	XX	XX	XXX
Enochrus species #1				XX
Hydrophilus triangularis (Say)				XX
LATHRIDIIDAE				
Corticarina cavicollis (Mannerheim)		XXX		
Corticarina scissa LeConte				XX
Migneauxia species #1			X	XX
LEIODIDAE				
Ptomaphagus fisus Horn		X		

ALGODONES DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
LIMNEBIIDAE				
Ochthebius fossatus LeConte				X
LYCTIDAE				
Trogoxylon aequale (Wollaston)		XXX		
MELOIDAE				
Cysteodemus armatus LeConte		XX		
Epicauta lauta (Horn)				XXX
Eupompha elegans (LeConte)		XXX		
Lytta (Poreospasta) auriculata Horn		XX		
Negalius marmorata Casey				XX
Pyrota concinna Casey				XXX
MYCETOPHAGIDAE				
Typhaea stercorea (Linnaeus)		X	XX	XXX
NITIDULIDAE				
Nitidulidae species #1			X	
Nitidulidae species #4				X
Nitidulidae species #5			X	
Nitidulidae species #6				X
PEDILIDAE				
Leptoremus species #1		XX		
Steropalpus species #1				X
New genus, new species #1		XX		

ALGODONES DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
PTINIDAE				
Niptus ventriculus LeConte		XXX		X
Ptinus species #1				X
RHIPIPHORIDAE				
Rhipiphorus epinomiae Linsley & MacSwain		XX		
SCARABAEIDAE				
Acoma glabrata Cazier			XX	XXX
Anomala carlsoni Hardy		XXX	XX	
Anomala flavilla Bates			X	X
Anomala hardyorum Potts	XXX	XXX		
Aphodius acutissimus Gordon	X	X		
Aphodius fucosus Schmidt	XX	X		
Aphodius lividus (Olivier)				XXX
Ataenius californicus Horn		XX	XXX	XXX
Ataenius cognatus (LeConte)				X
Ataenius desertus Horn		X	X	XXX
Ataenius lobatus Horn				X
Ataenius puncticollis (LeConte)	X			XXX
Bolbocerastes regalis Cartwright		X		
Chnaunanthus discolor Burmeister		XX		
Chnaunanthus flavipennis Horn		XXX		
Cyclocephala longula LeConte		XXX	X	XX
Cyclocephala wandae Hardy				XX

ALGODONES DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
SCARABAEIDAE (continued)				
Diplotaxis corbula Vaurie	X	XXX	XXX	XXX
Diplotaxis fimbriata Fall	XXX	XXX	X	X
Diplotaxis knausii Schaeffer		X	XXX	XXX
Diplotaxis moerens LeConte			XX	X
Diplotaxis pacata LeConte		XXX		X
Diplotaxis subangulata LeConte		X		
Glaresis clypeata VanDyke		X		
Glaresis ecostata Fall	XXX	XXX		
Glaresis phoenicus Fall		X		
Leptohoplia testaceipennis Saylor	X	XXX	XXX	XXX
Ligyrus gibbosus obsoletus LeConte	XX	XXX	XXX	XX
Megasoma sleeperi Hardy		XX		XXX
Ochodaeus mandibularis Linell				XX
Pachyplectris laevis LeConte	X	XXX		
Phileurus illatus LeConte				X
Phyllophaga mucorea (LeConte)		XXX		
Pleurophorus caesus (Crentzer)		X		
Pleurophorus micros (Bates)	XX	X		XXX
Pseudocotalpa andrewsi Hardy		XXX		
Xeropsamobeus desertus (VanDyke)	XXX	XXX		
SCOLYTIDAE				
Chaetophloeus parkinsoniae (Blackman)		XXX		

ALGODONES DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
SCYDMAENIDAE				
Papusus species #1			X	
STAPHYLINIDAE				
Acalophaena compacta Casey				X
Apocllus analis LeConte		X		X
Bledius ferratus LeConte		X		
Carpelimus species #1				X
Lobrathium lituarium (LeConte)			XX	XXX
Neobisnius species #1	X	XXX		XXX
Philonthus alumnus Erichson		XX		XXX
Platystethus spiculus Erichson	X			XX
Scopaeus species #1				X
TENEBRIONIDAE				
Anemia californica Horn		XX	XXX	X
Areoschizus species #1		XXX	XXX	X
Aeroschizus species #2		XXX	XXX	
Asida confluens (LeConte)				XXX
Batulius setosus LeConte	XXX	XXX	X	
Blapstinus species #1			XX	X
Cerenopus concolor LeConte		X		
Cnemeplatia sericea Horn	XX	XXX	X	
Cnemodius testaceus Horn		XXX		
Cryptoglossa laevis laevis (LeConte)	X	XXX	XX	XX

ALGODONES DUNES (continued)

ORGANISM	WINTER	SPRING	SUMMER	FALL
TENEBRIONIDAE (continued)				
Cryptoglossa verrucosa verrucosa (LeConte)		XX	XX	XX
Edrotes arens LaRivers		XX	X	X
Edrotes ventricosus LaConte	XX	XXX	XX	XXX
Eleodes armata LeConte	X	XXX	XX	XX
Embaphion depressum LeConte	X	XX		XXX
Eupsophulus castaneus Horn		XXX		
Eusattus fortineri (Blaisdell)	X	XXX		XX
Latheticus prosopis Chittenden		X		X
Mecysmus augustus LeConte				XX
Nocibiotes granularis LeConte		XX		
Notibius puberulus LeConte		XXX	X	XX
Trichasida hirsuta (LeConte)	X	X		
Ulus crasus LeConte				X
TROGOSITIDAE				
Temnochila chlorodia (Mannerheim)		XX	X	XX

APPENDIX C

APPENDIX C

Taxonomic diversity of Owens Lake, Cadiz, Palen, Rice, and Algodones Dunes and total number of specimens from each family.

DUNE AREA	OWENS	CADIZ	RICE	PALEN	ALGODONES	ALL DUNES	
NUMBER OF GENERA/SPECIES	G/S	G/S	G/S	G/S	G/S	G/S	NUMBER OF SPECIMENS
ALLECULIDAE	1/1	1/1	1/2	2/4	2/2	2/4	51
ANOBIIDAE	-/-	1/1	1/1	2/2	1/4	2/6	156
ANTHICIDAE	5/9	3/3	2/2	6/10	6/9	7/16	905
BOSTRICHIDAE	-/-	-/-	3/3	3/3	5/8	5/9	48
BRUCHIDAE	-/-	1/1	-/-	1/1	4/4	4/5	53
BUPRESTIDAE	2/3	1/2	-/-	1/1	2/3	3/7	10
CARABIDAE	3/3	3/3	5/5	8/11	12/18	13/22	925
CERAMBYCIDAE	-/-	-/-	1/1	4/4	4/4	7/7	14
CHRYSOMELIDAE	3/4	2/2	3/4	8/9	5/5	15/19	320
CICINDELIDAE	1/2	-/-	-/-	-/-	1/1	1/3	31
CLERIDAE	-/-	-/-	3/3	2/2	4/7	5/9	37
COCCINELLIDAE	3/3	4/5	4/5	5/5	4/4	9/11	120
CRYPTOPHAGIDAE	-/-	-/-	-/-	-/-	1/1	1/1	1
CUCUJIDAE	-/-	-/-	-/-	-/-	1/1	1/1	4
CURCULIONIDAE	3/3	8/9	8/9	7/7	8/9	13/16	404
DERMESTIDAE	-/-	1/2	1/1	2/2	1/1	2/4	19
DYTISCIDAE	-/-	1/1	2/2	1/1	3/3	3/4	81
ELATERIDAE	-/-	-/-	2/2	3/3	3/4	4/5	120
HETEROCERIDAE	-/-	-/-	1/1	1/2	1/2	1/2	60

DUNE AREA	OWENS	CADIZ	RICE	PALEN	ALGODONES	ALL DUNES	
NUMBER OF GENERA/SPECIES	G/S	G/S	G/S	G/S	G/S	G/S	NUMBER OF SPECIMENS
HISTERIDAE	2/2	-/-	2/3	4/6	7/7	7/9	107
HYDROPHILIDAE	-/-	1/1	-/-	3/3	3/4	3/5	48
LATHRIDIIDAE	-/-	-/-	-/-	3/3	2/3	3/4	34
LEIODIDAE	-/-	-/-	1/1	-/-	1/1	1/1	3
LIMNEBIIDAE	-/-	-/-	-/-	-/-	1/1	1/1	2
LYCTIDAE	-/-	-/-	-/-	-/-	1/1	1/1	59
MELANDRYIDAE	1/1	-/-	-/-	1/1	-/-	2/2	5
MELOIDAE	1/1	3/4	5/5	9/12	6/6	11/16	170
MELYRIDAE	-/-	-/-	3/5	2/2	-/-	3/7	26
MYCETOPHAGIDAE	-/-	-/-	-/-	1/1	1/1	1/1	48
NITIDULIDAE	-/-	1/1	1/1	2/2	2/4	2/7	8
OEDEMERIDAE	1/1	-/-	-/-	2/4	-/-	2/4	24
PEDILIDAE	-/-	-/-	-/-	-/-	3/3	3/3	10
PHALACRIDAE	1/1	1/1	-/-	-/-	-/-	1/2	2
PSELAPHIDAE	-/-	-/-	1/1	1/1	-/-	2/2	2
PTINIDAE	-/-	1/1	1/1	1/1	2/2	2/2	92
RHIPIPHORIDAE	-/-	-/-	-/-	-/-	1/1	1/1	15
SCARABAEIDAE	5/5	8/9	8/14	9/14	19/37	19/43	2,298
SCOLYTIDAE	-/-	-/-	-/-	1/1	1/1	1/1	2
SCYDMAENIDAE	-/-	-/-	-/-	-/-	1/1	1/1	12
STAPHYLINIDAE	1/1	1/1	3/3	7/7	9/9	11/12	654
TENEBRIONIDAE	7/7	11/12	15/16	18/19	20/23	24/28	2,586
TROGOSITIDAE	-/-	-/-	1/1	-/-	1/1	1/1	12
TOTAL	38/47	54/61	78/92	120/142	149/196	201/295	9,578

APPENDIX D

APPENDIX D

This section lists, by dune, those species endemic to a single dune or several dunes. In some cases, these taxa are without scientific names, largely because the biological uniqueness of dunes has only recently been recognized and there has not been sufficient time for analysis and descriptive work. A number of the taxa listed were discovered by the principal investogators and have been passed on to specialists, but many will not be described for years because of the lack of specialists in many groups represented.

ALGODONES DUNES

Curculionidae	- Trigonoscuta rothi Pierce
Dermestidae	- Novelsis sp.
Pedilidae	- An undescribed genus and species
Scarabaeidae	- Anomala carlsoni Hardy
	- Anomala hardyorum Potts
	- Cyclocephala wandae Hardy
	- Diplotaxis corbula Vaurie
	- Pseudocotalpa andrewsi Hardy
Tenebrionidae	- Eusattus fortineri (Blaisdell)

Several additional species may be limited to the Algodones Dunes, but they are placed in genera which are so poorly understood that a determination of the correct specific placement is impossible. Included are:

Histeridae	- Philothris? sp.
Scydmaenidae	- Papusus sp.
Tenebrionidae	- Areoschizus sp.
Curculionidae	- Trigonoscuta sp. (additional to T. rothi)

CADIZ DUNES

Chrysomelidae - An undescribed genus and species

DUMONT DUNES

Curculionidae - Trigonoscuta n. sp. (fide E. L. Sleeper)

EUREKA DUNES

Cryptophagidae - Cryptophagus n. sp.

Curculionidae - Miloderes nelsoni Kissinger

- Minyomerus n. sp. (fide E. L. Sleeper)

Elateridae - Cardiophorus n. sp.

- Horistonotus n. sp.

Histeridae - Eremosaprinus n. sp. (fide Veriety)

KELSO DUNES

Curculionidae - Miloderes n. sp. #1 (fide E. L. Sleeper)

- Miloderes n. sp. #2 (fide E. L. Sleeper)

- Eucilinus aridus tinkhami (Tanner)

- Trigonoscuta brunotesselatus Pierce

- Trigonoscuta kelsoensis kelsoensis Pierce

Scarabaeidae - Glaresis arenata Gordon

Tenebrionidae - Batuliodes n. sp.

OWENS LAKE DUNES

No endemics known.

PALEN DUNES

No endemics known.

PANAMINT DUNES

Curculionidae - Trigonoscuta n. sp. (fide E. L. Sleeper)

Scarabaeidae - Phobetus sleeperi Hardy

RICE DUNES

No endemics known.

SALINE VALLEY DUNES

Scarabaeidae - Polyphylla anteronivea Hardy

APPENDIX E

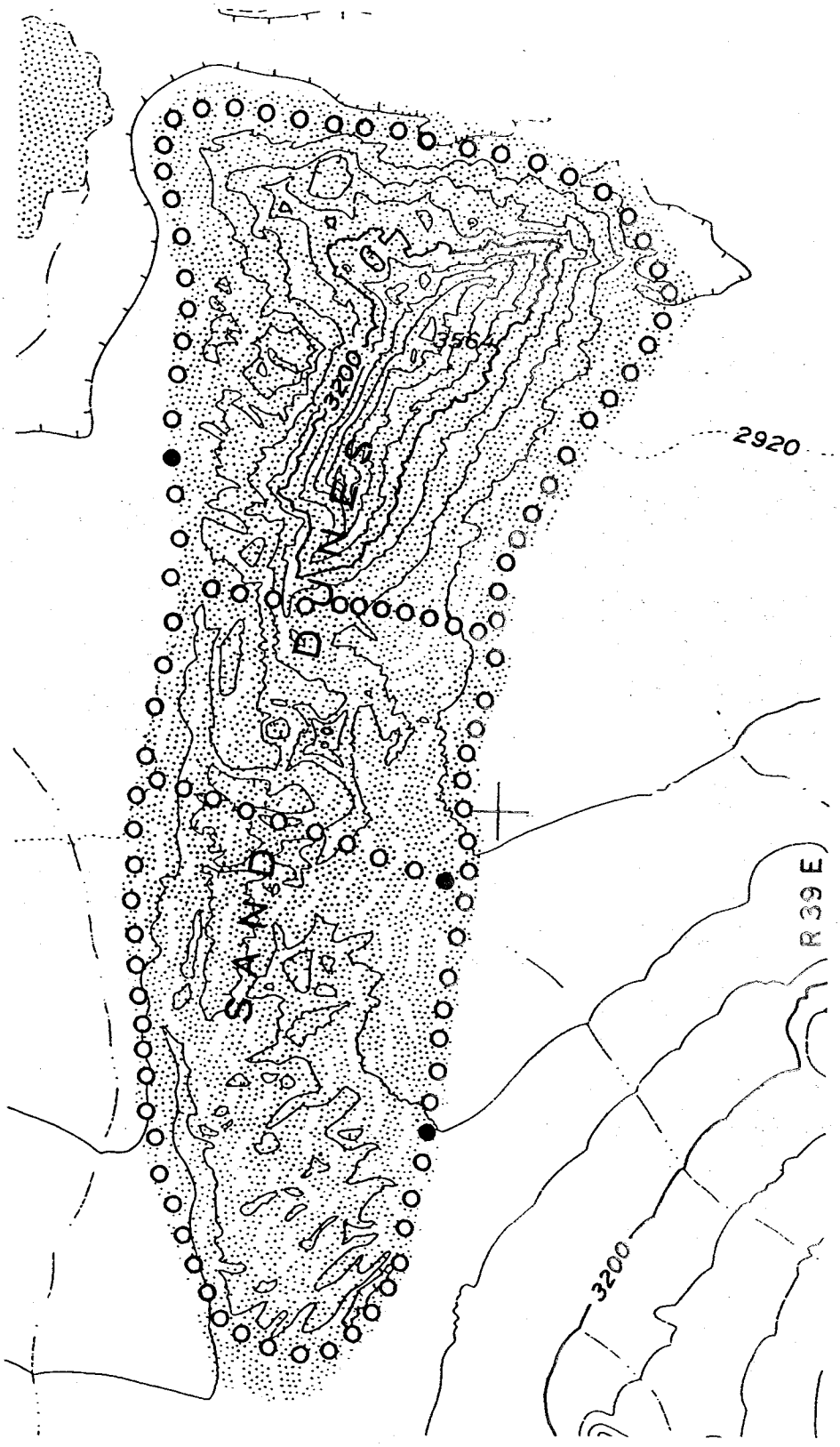
APPENDIX E

DUNE HABITAT UTILIZATION STUDY - WINTER SURVEY

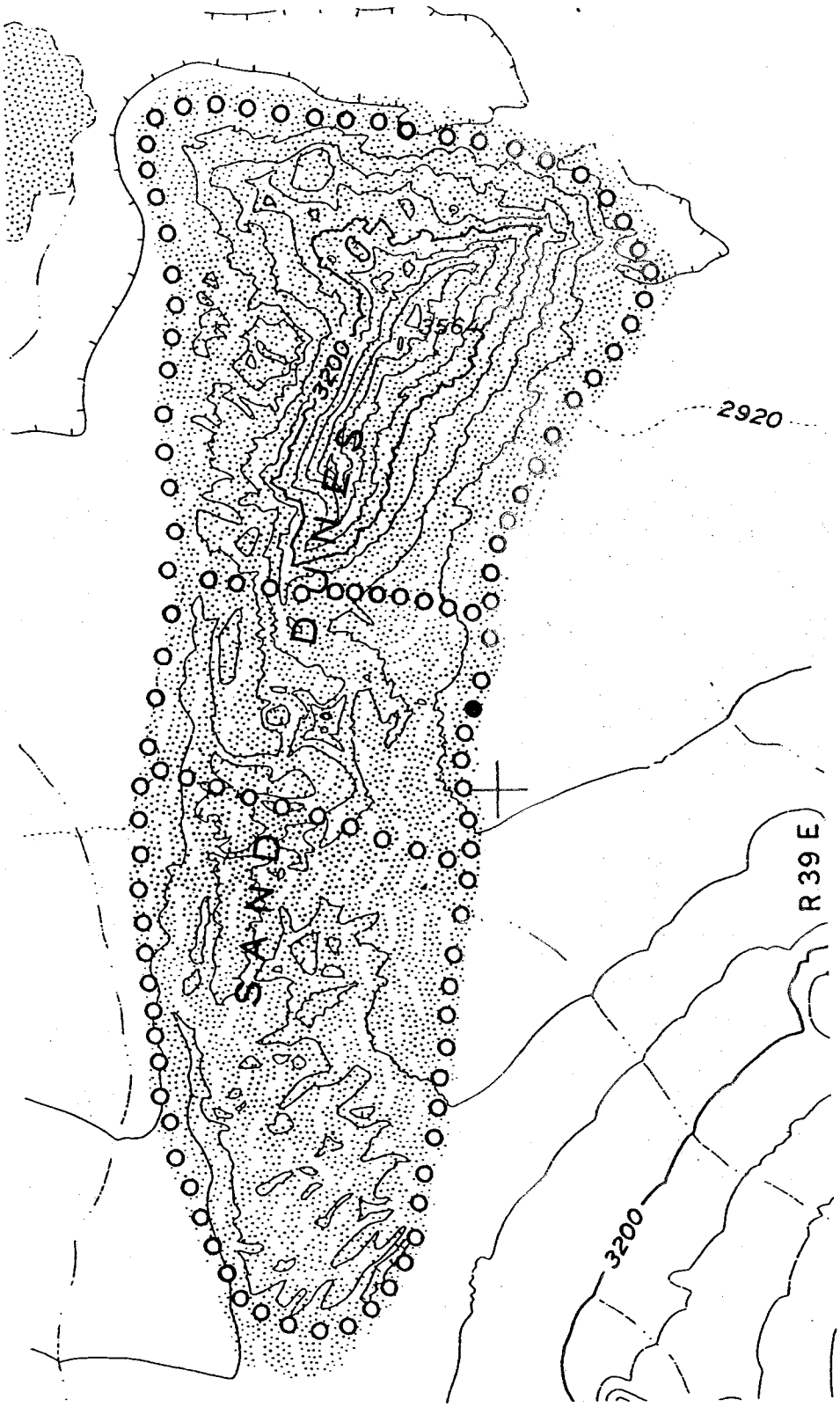
The table below provides a listing of, and the total number of each taxon collected during the winter survey. The plot plans that follow provide a diagrammatic representation of the location each species was encountered.

ORGANISM	COLLECTOR ANDREWS	HARDY	GIULIANI	TOTAL NO. Specimens
CHRYSOMELIDAE				
Altica torquata	2	3	—	5
COCCINELLIDAE				
Hippodamia convergens	—	—	1	1
CURCULIONIDAE				
Miloderes nelsoni	3	2	4	9
Cleonus albovestitus	—	—	2	2
ELATERIDAE				
Horistonotus sp. #4	—	-	1	1
HISTERIDAE				
Spilodiscus sellatus	—	2	6	8
MELOIDAE				
Meloe franciscanus	—	—	4	4
SCARABAEIDAE				
Aegialia conferta	66	143	24	233
Ligyrus gibbosus	—	1	—	1
TENEBRIONIDAE				
Eusattus muricatus	5	41	23	69
Lariversia tibialis	—	3	—	3
Edrotes ventricosus	—	1	—	1
	76	196	65	337

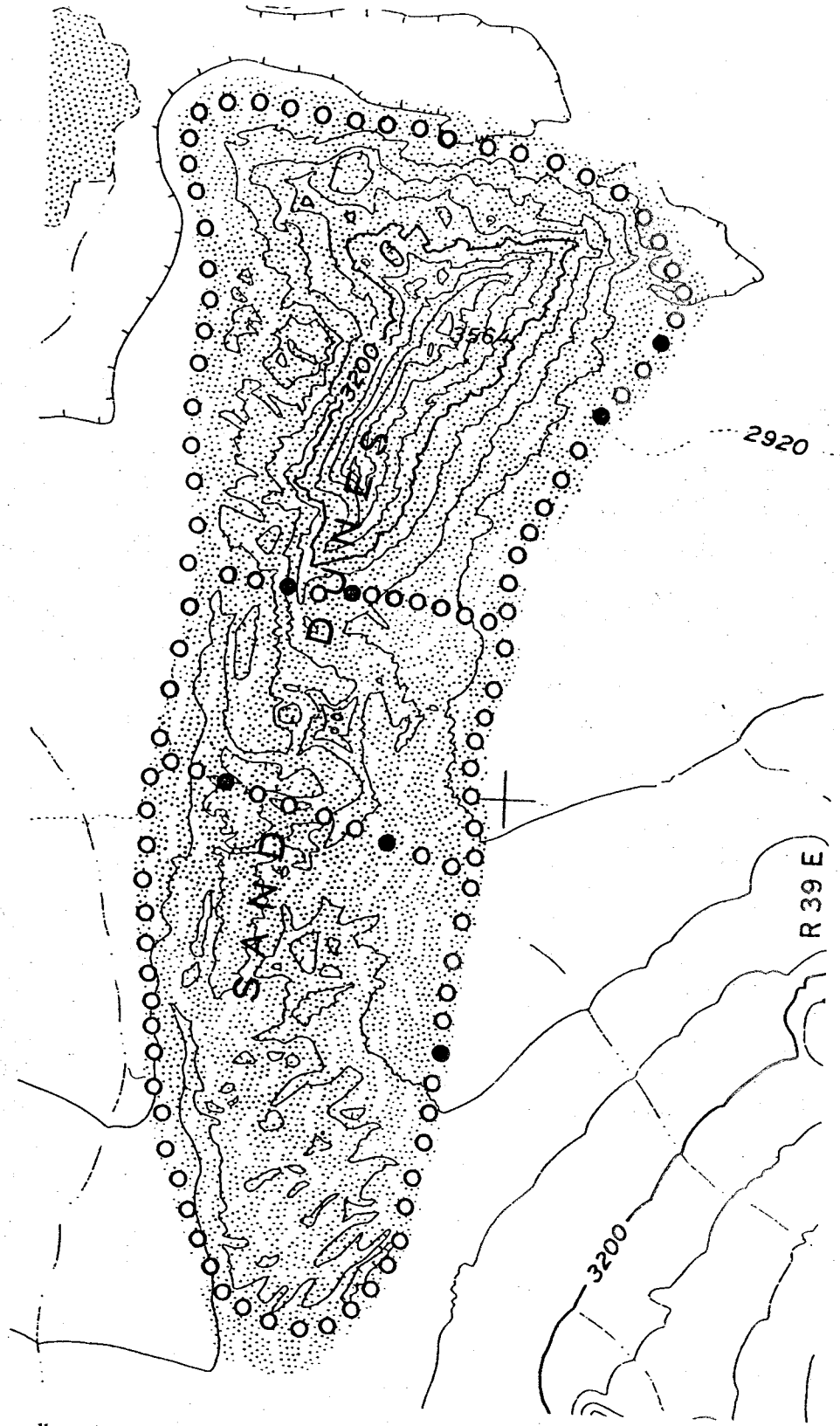
Total collected, 8 families, 12 genera, 12 species. Done on February 22, 1978. Study walked on warm (18°C; 60°-65°F), sunny day. Previous nights low temperature, 0°C, (32°F).



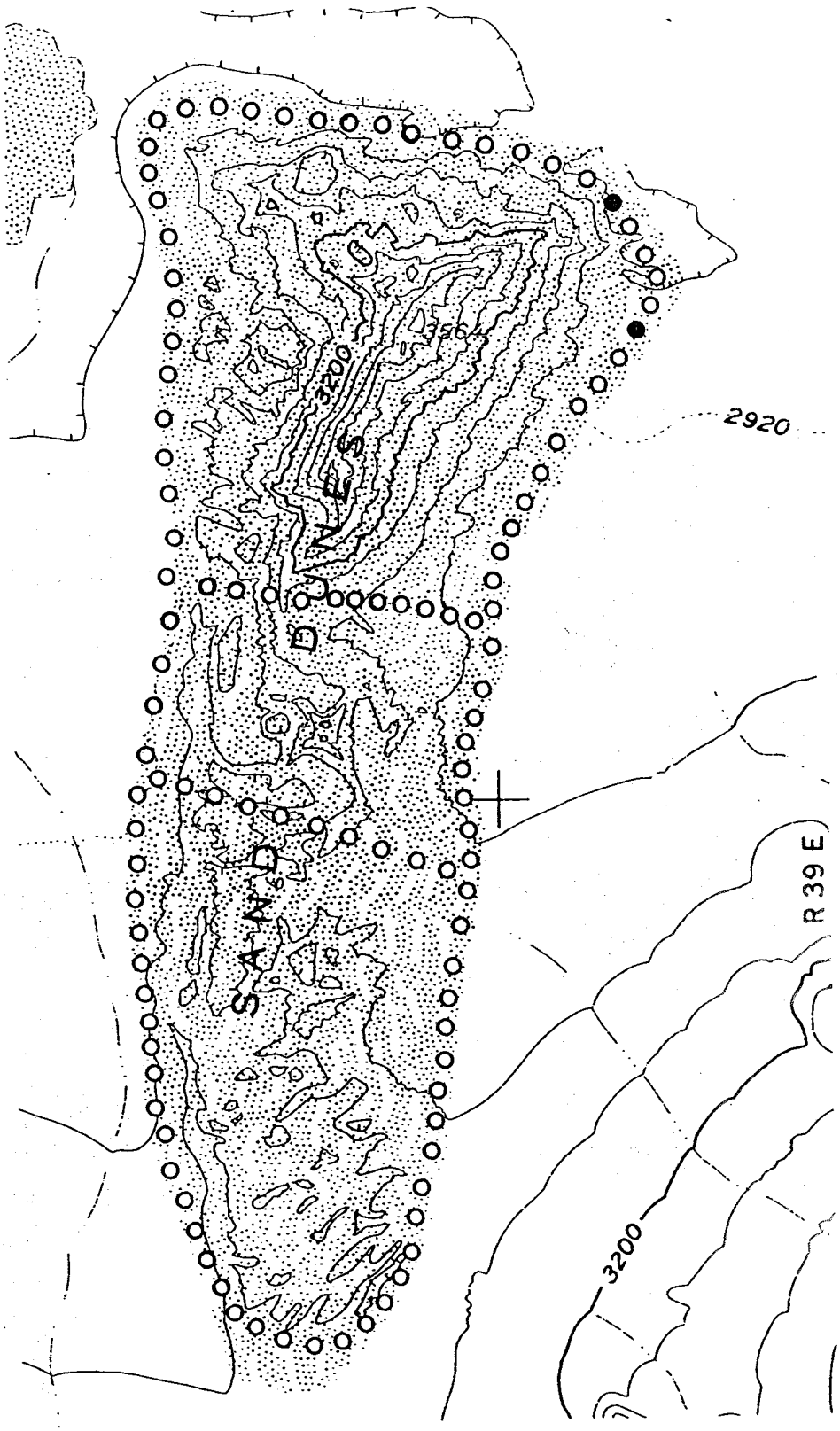
Chrysomelidae collected on the February Dune Habitat Utilization survey. The circles indicate diagrammatically the collection sites. Solid circles indicate collections of *Altica torquata* LeConte.



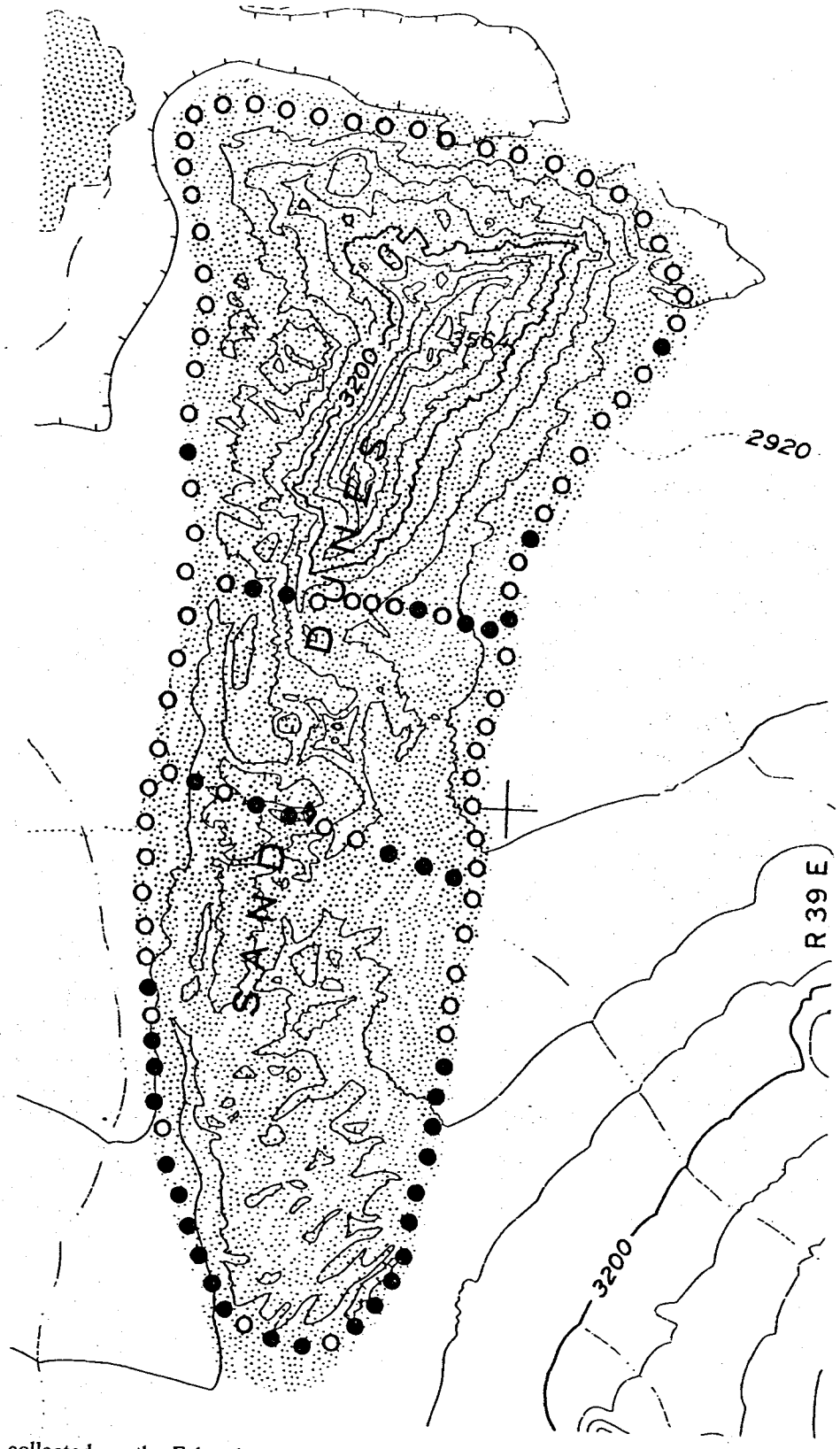
Elateridae collected on the February Dune Habitat Utilization survey. The circles indicate diagrammatically the collection sites. Solid circles indicate collections of *Horistonotus* sp. No. 4.



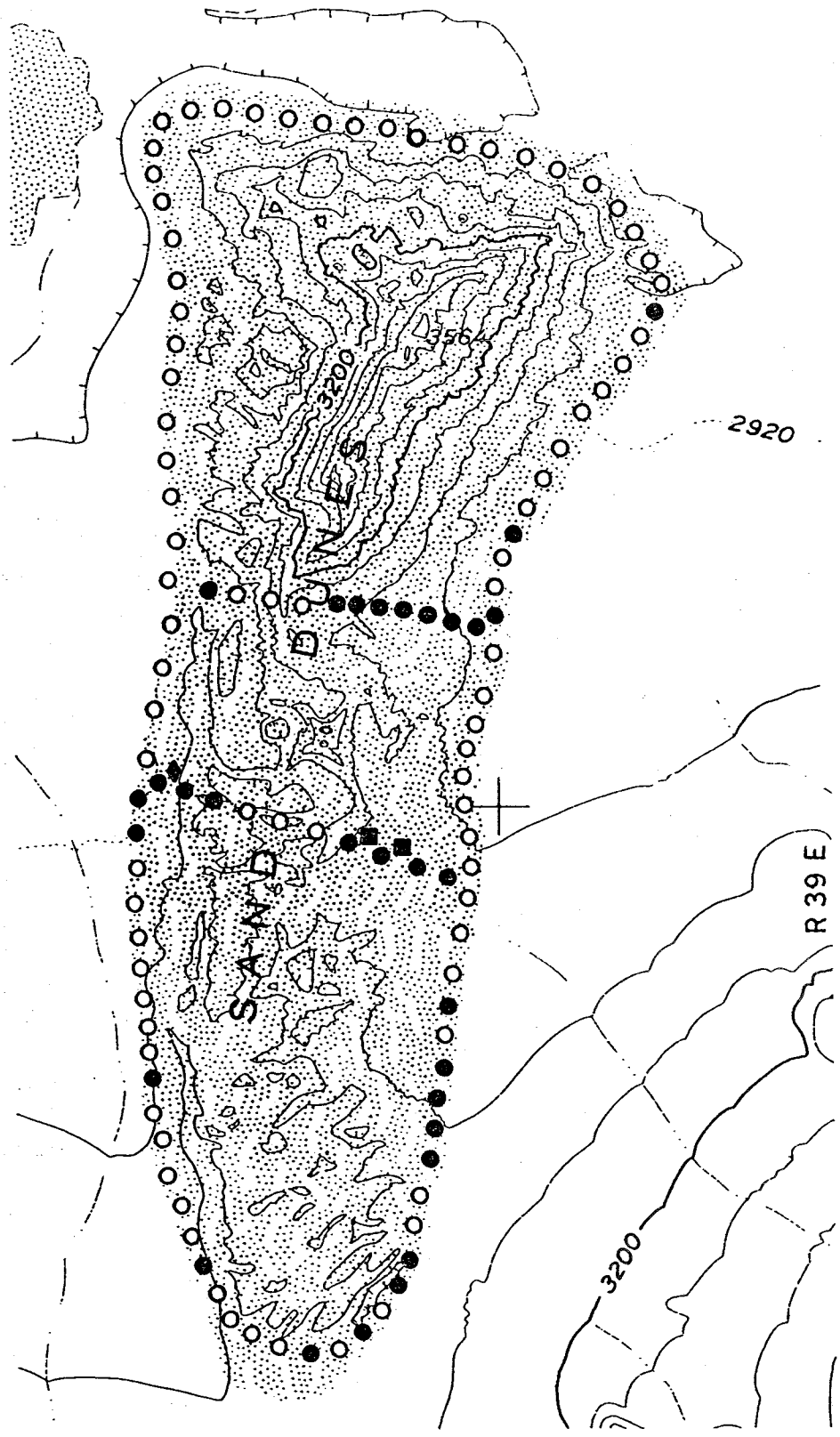
Histeridae collected on the February Dune Habitat Utilization survey. The circles indicate diagrammatically the collection sites. Solid circles indicate collections of *Spilodiscus sellatus* LeConte.



Meloidae collected on the February Dune Habitat Utilization survey. The circles indicate diagrammatically the collection sites. Solid circles indicate collections of *Meloe franciscanus* Van Dyke.



Scarabaeidae collected on the February Dune Habitat Utilization survey. The circles indicate diagrammatically the collection sites. Solid circles indicate collections of *Aegialia conferta* Horn; the diamond represents a collection of *Ligyrus gibbosus* (De Geer).



Tenebrionidae collected on the February Dune Habitat Utilization survey. The circles indicate diagrammatically the collection sites. Solid circles indicate collections of *Eusattus muricatus* LeConte; diamonds indicate collections of *Edrodes ventricosus* LeConte; squares indicate collections of *Lariversia tibialis* Blaisdell.

APPENDIX F

APPENDIX F

SUBSTRATE PREFERENCE STUDY

In the tables below, all specimens of Coleoptera collected in antifreeze pitfall traps are recorded. The numbers reflect the total number of specimens collected at each trap site for every month. The trap sites are numbered as they appear in Fig. 16. In the chart, the shaded areas represent sand substrate.

Trap sites numbered 6 and 15 are in transitional areas, and so are partially shaded. At the bottom of the chart, the sum total of all collections from a given site, is laid out for an easier comparison of sand vs. non-sand preference.

On the charts that follow, the dates as listed are by month. The actual dates for the periods the traps were active is:

N-D = October 26, 1977 - January 3, 1978

J = January 3 - February 1, 1978

F = February 1 - March 4, 1978

M = March 4 - April 5, 1978

A = April 5 - May 8, 1978

M = May 8 - June 8, 1978

J = June 8 - July 5, 1978

J = July 5 - August 6, 1978

A = August 6 - September 1, 1978

S = September 1 - September 27, 1978

O = September 27 - November 6, 1978

N = November 6 - December 8, 1978

D = December 8, 1978 - January 3, 1979

The following is a list of the species taken in the pitfall traps at Eureka Valley. Those species represented in the following list that were represented by 10 or more specimens or taken in 5 or more trap collections are plotted on the diagrams that follow the species list. The other species appear on the list with the number of specimens and collections. The third column represents those that are recorded from a sand substrate, even if in the transitional traps 6 & 15. Column four represents those species recorded from 5 or more specimens, the asterisk indicates that the number of five was only reached with the inclusion of material from traps 6 and/or 15. The final column records species collected in the Office of Endangered Species survey of the Eureka Valley Dunes in 1975-1976. Five species taken then were not included in the pittrap material.

	No. of Specimens	No. of Collections	Sand	More than 5 sand Collections	Ol
ALLECULIDAE					
Alleculidae sp. #5	1	1	x		
ANTHICIDAE					
Anthius punctulatus LeConte	2	2	x		
Tanarthrus coruscus Chandler	CHART #1				
BRUCHIDAE					
Bruchidae sp. #1	2	2	x		
CARABIDAE					
Agonum bruneomarginatum Mannerheim	1	1			
Agonum sp. #1	2	2	x		
Amara sp. #1	4	3	x		
Apristus sp. #2	1	1			
Bembidion henshawi Hayward	1	1	x		
Bembidion obscurellum Motschulsky	2	2	x		
Bembidion rupicola Kirby	1	1	x		
Calosoma parvicollis Fall	CHART #2		x	x	
Calosoma sp. #1	2	2			
Harpalus pennsylvanicus DeGeer	1	1	x		
Harpalini sp. #1	1	1			
Harpalini sp. #2	1	1	x		
Pseudaptinus horni Chandoir	1		x		
Technophilus croceicollis Menetries	CHART #3		x	x*	
Tetragonaderus pallidus Horn	CHART #4		x	x	x
CHRYSOMELIDAE					
Altica torquata LeConte	CHART #5		x	x	
Chaetocnema sp. #1	2	1			
Chrysomelidae sp. #1	1	1	x		
Glyptina sp. #1	3	2	x		
Longitarsis sp. #1	CHART #6		x	x	
Monoxia sp. #1	1	1	x		
Pachybrachis desertus Fall	1	1			
Phyllotreta sp. #1	1	1	x		
Synetocephalus crassicornis (Fall)	6	3			
CLERIDAE					
Cymatodera fuchsi Schaeffer	1	1			x
Cymatodera latefascia Schaeffer	2	2			
Lecontella gnara (Wolcott)	CHART #7		x	x	
COCCINELLIDAE					
Brumus septentrionis Weise	3	3	x		
Hippodamia convergens Guerin-Meneville	CHART #8		x	x	x
Hyperaspidius vittigera (LeConte)	2	2	x		
Psyllobora vigintimacalata Say	1	1	x		
Scymnus sp. #1	2	1	x		

*Total reached by transitional traps 6 and 15.

	No. of Specimens	No. of Collections	Sand	More than 5 sand Collections	OES
CRYPTOPHAGIDAE					
Cryptophagus sp. #1	CHART #9		x		
CUCUJIDAE					
Oryzaephilis surinamensis (Linnaeus)	2	2	x		
CURCULIONIDAE					
Acanthoscelidius nr. *californica*	1	1	x		
Anthonomus sp. #1	CHART #10		x	x	x
Cryptolepidius cazieri (VanDyke)	CHART #11		x	x*	
Cleonus sp. nr. *albovestitus* (Casey)	1	1	x		
Curculionidae #1	1	1	x		
Curculionidae #2	1	1	x		
Curculionidae #3	1	1	x		
Curculionidae #10	1	1			
Eucyllus vagans Horn	CHART #12		x	x	
Eucyllus nr. *carinarostris*	1	1			
Miloderes nelsoni Kissinger	CHART #13		x	x	x
Minyomerus sp. #1	CHART #14				
Ophryastes geminatus (Horn)	CHART #15		x	x	x
Trigonoscuta sp. #1	2	2	x		
DERMESTIDAE					
Dermestes sp. #1	2	2	x		
Trogoderma sternale deserti Beal	1	1			
Trogoderma sp. #1	CHART #16				
ELATERIDAE					
Aeolus dorsalis (Say)	1	1			
Cardiophorus sp. #1	CHART #17		x	x	x
Elateridae sp. #1	1	1			
Esthesopus mitis (Horn)	CHART #18				
Horistonotus sp. #4	CHART #19		x	x	x
Horistonotus simplex Le Conte	CHART #20		x		
HISTERIDAE					
Eremosaprinus opacus (Horn)	CHART #21		x	x	x
Eremosaprinus sp. #2	2	1			
Geomysaprinus suffusus Casey	1	1	x		
Saprinus discoidalis LeConte	CHART #22		x	x	
Saprinus #1	1	1	x		
Spilodiscus sellatus LeConte	2	2	x		x
Xerosaprinus coerulescens (LeConte)	CHART #23		x	x	
Xerosaprinus ciliatoides (Fall)	1	1	x		
HYDROPHILIDAE					
Helophorus sp. #1	1	1	x		
LATHRIDIIDAE					
Corticaria sp.	2	2			
Microgramme deserticola	1	1			

*Total reached by transitional traps 6 and 15.

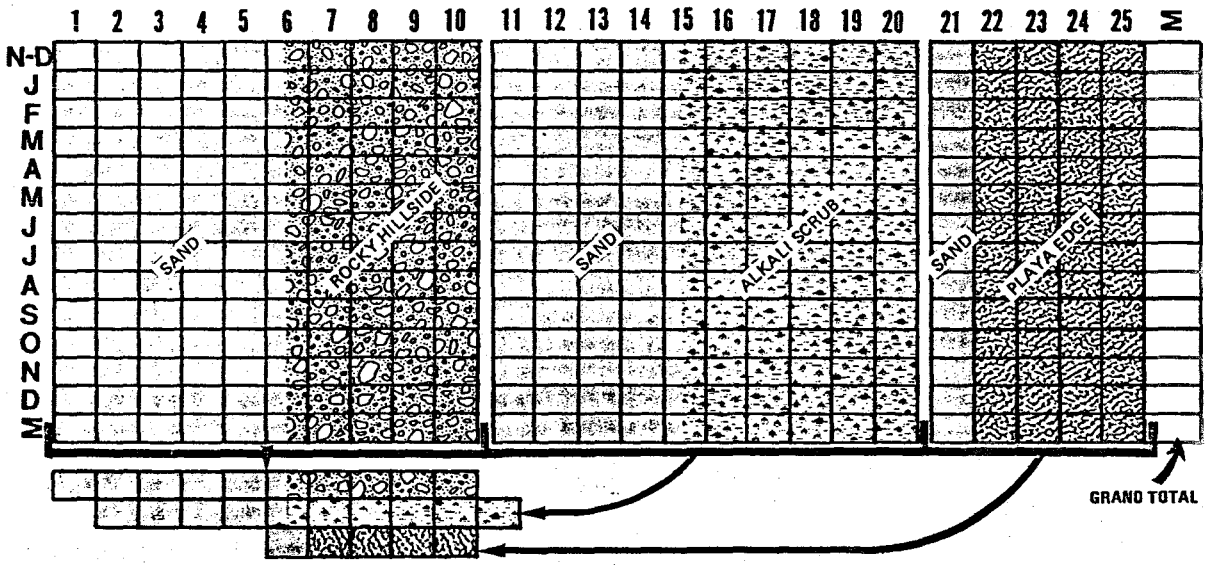
	No. of Specimens	No. of Collections	Sand	More than 5 sand Collections	OE:
LEPTODIRIDAE					
Ptomophagus fisus Horn	CHART #24		x	x	
MELANDRYIDAE					
Melandryidae sp. # 1	1	1			
Melandryidae sp. # 2	CHART #25		x		
Melandryidae sp. # 3	CHART #26		x		
Melandryidae sp. # 4	1	1			
MELOIDAE					
Epicauta lauta	1	1			
Eupompha elegans	CHART #27		x	x	
Lytta magister	6	4	x		
Phodaga alticeps	4	3	x		
Pleurospasta mirabilis	1	1	x		
MELYRIDAE					
Amecocerus sp. #1	4	3			
Attalus sp. #10	1	1	x		
Attalus sp. #12	2	2	x		
Collops sp., punctatus complex	CHART #28				
Dasytinae #1	3	3			
Eudasytes sp. #1	2	2	x		
Eummenotaris sp. #1	CHART #29		x	x	
NITIDULIDAE					
Carpophilus sp. #1	1	1	x		
OEDEMERIDAE					
Oedemeridae sp. #1	6	4			
Oedemeridae sp. #2	4	1	x		
PTINIDAE					
Ptinus nr. verticalis	CHART #30		x	x*	
SALPINGIDAE					
Cononotus sericans LeConte	CHART #31		x		
SCARABAEIDAE					
Aegialia conferta Horn	1	1	x		x
Aphodius acutissimus Gordon	1	1	x		x
Aphodius coquilletti Linell	CHART #32		x	x	
Aphodius fucosus Schmidt	1	2	x		x
Aphodius sp. #1, militaris group	1	1	z		
Aphodius sp. #2, militaris group	2	2	x		
Chuaunanthus nr. flavipennis Horn	2	2	x		
Cremastocheilus opaculus (Horn)	1	1	x		
Cyclocephala longula (LeConte)	4	3	x		x
Diplotaxis incuria Fall	CHART #33		x	x	x
Diplotaxis moerens LeConte	3	3	x		x
Diplotaxis subangulata LeConte	2	2	x		
Glaresis sp. #1	2	2	x		

*Total reached by transitional traps 6 and 15.

	No. of Specimens	No. of Collections	Sand	More than 5 sand Collections	OES
SCYDMAENIDAE					
Papusus sp. #1	CHART #34		x	x	
SILPHIDAE					
Nicrophorus guttula Motschulsky	2	2			
Nicrophorus hybridus H. & R.	CHART #35		x	x	
STAPHYLINIDAE					
Aleocharinae sp. #1	5	5**	x		
Aleocharinae sp. #2	1	1			
Aleocharinae sp. #3	1	1	x		
Aleocharinae sp. #4	3	2	x		
Aleocharinae sp. #5	1	1	x		
Aleocharinae sp. #6	5	3	x	x*	
Carpelimnus sp. #3	1	1	x		
Carpelimnus sp. #4	1	1	x		
Creophilus maxilosus	1	1	x		
Lobrathium sp. #2	4	4	x		
Medon sp. #1	3	3	x		
Philonthus sp. #1	1	1	x		
Philonthus sp. #2	1	1	x		
Philonthus sp. #3	1	1	x		
Platystethus spiculus Erichson	1	1	x		
Tachyporus sp. #1	1	1	x		
TENEBRIONIDAE					
Alaephus sp. #1	1	1			
Anemia californica Horn	CHART #36		x	x	
Areoschizus sulcicollis Horn	CHART #37		x	x	
Batuliodes sp. #1	CHART #38		x	x*	
Centrioptera muricata LeConte	CHART #39		x	x*	
Chilometopon castaneum Casey	CHART #40		x	x	x
Chilometopon pallidum Casey	CHART #41		x	x	x
Cnemodius testaceus Horn	6	4		x*	
Craniotus sp. #1	CHART #42				
Cryptoglossa verrucosa carinulata Blaisdell	CHART #43		x	x	x
Edrodes ventricosus LeConte	CHART #44		x	x	x
Eleodes armata LeConte	CHART #45		x	x	x
Eleodes sp. #1	CHART #46				
Eurymetopon sp. #1	CHART #47		x	x	
Eusattus muricatus LeConte	CHART #48		x	x	x
Eusattus sp. #1	CHART #49		x		
Helopinae sp. #1	1	1	x		
Lariversius tibialis Blaisdell	CHART #50		x	x	
Mecysmus angustus LeConte	CHART #51		x		
Metoponium convexicolle LeConte	CHART #52		x		x
Notibius sp. #1	CHART #53		x	x	
Pelecyphorus actuosus (Horn 1870)	1	1			
Steriphanus sp. #1	1	1			x
Telabis serrata LeConte	CHART #54		x	x	x

*Total reached by transitional traps 6 and 15.
**Additional data arrived too late for charting.

	No. of Specimens	No. of Collections	Sand	More than 5 sand Collections
Trimytini n. gen. n. sp. #1	CHART #55		x	x
Trogloderus costatus nevadus LaRivers	CHART #56		x	x
TROGOSITIDAE				
Temnochila edentata Schaeffer 1918	CHART #57		x	



AN EXPLANATION OF THE FOLLOWING CHARTS

This chart is a diagrammatic representation of the three pitfall transects employed in the Part II, Substrate Preference study. The pitfall traps are mapped in Fig. 16. In the chart above, the numbers at the top represent the pitfall site number, corresponding with those on the map. There were three pitfalls per site. They are broken to reflect the three transects. The letters to the left of the chart reflect the month of collection. The first collection was for two months, November and December (N-D). The final column on the right represents a sum total of specimens collected for a given sampling time period, the final (bottom) line in the chart represents the summation of specimens collected at any given site. These are repeated in the smaller chart below, which is aligned to better compare sand *vs.* non-sand preference. There is only one species plotted per chart. The number in each box represents the total number of specimens collected at the site, during that time period. The total number of the species collected for the 14 months is in the box at the lower right corner. The chart above has the substrate symbolically represented. The shaded areas represent sand, and are on all charts. The other substrates are discussed briefly in the text.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A																										0
M																								68	18	86
J																								1	1	2
J																								7	6	13
A																									1	1
S																								1	4	5
O																										0
N																										0
D																										0
M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	77	30	107

-					-	-	-	-	-	
	-					-	-	-	-	-
					-	-	77	30		

1 *Tanarthrus coruscus* Chandler
Anthicidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A									1			1									2			3	1	8
M	2	2	2			1	1				1	19	29	42	38	4	4	5	4	2	10	30	11	88	71	366
J			1									7	4		1				1		8		1	20	15	58
J												1										5	15	96	102	219
A																										0
S																										0
O																										0
N																										0
D																										0
M	2	2	3	-	-	1	1	-	1	-	1	28	33	42	39	4	4	5	5	2	20	35	27	207	189	651

2	2	3	-	-	1	1	-	1	-	
	1	28	33	42	39	4	4	5	5	2
					20	35	27	207	189	

2 *Calosoma parvicollis* Fall
Carabidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																						1				1
J																										0
F																						1				1
M													1		2	3	2	1	1	2						12
A																4	7	3	2	1						19
M												1			1		2	3	2							9
J																			1							1
J															1		3	1	1							6
A																	1	3								4
S																				1						1
O																										0
N																										0
D																										0
M							-	-	-	-		1	1		4	7	15	11	7	4	2	2	-	-	-	54

					-	-	-	-		
					4	7	15	11	7	4
					2	-	-	-		

3 *Technophilus croceicollis* Menetries
Carabidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D			1	1		2						2	3				1			1						11
J																										0
F																										0
M	2	18	6	3	6							10	19	1	4			1			1					71
A	32	60	18	10	56	22	2					14	8	81	18	21	3	2			27					374
M	94	139	58	41	38	26					1	43	179	137	98	10	3									867
J	155	176	58	16	14	16	1				2	119	430	74	35	4	2	4		1	8					1115
J	289	110	46	123	42	29	1				1	155	72	107	79	15	5	1		1	6	1	1			1084
A	106	62	57	110	106	24	3					11	155	37	31	11	4	6			27		1			747
S	48	34	13	22	11	4	1				4	13	73	26	5	2		1	2	3	7					269
O	20	11	9	4	2	5	1					16	56	23	9					1	8					165
N													1													1
D																										0
Σ	746	610	266	330	275	128	9	-	-	-	8	383	992	486	279	63	17	15	2	6	84	1	2	-	-	4704

746	610	266	330	275	128	9	-	-	-	
	8	383	992	486	279	63	17	15	2	6
					84	1	2	-	-	

4 *Tetragonaderus pallidus* Horn
Carabidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D	1																								1	2
J																1										1
F	1																									1
M																										0
A	1																				1					2
M																										0
J											1															1
J																										0
A																										0
S																										0
O													1	1		1										3
N					1						1															2
D		1													1											2
Σ	3	1	-	-	1	-	-	-	-	-	2	-	1	1	1	2	-	-	-	-	1	-	-	-	1	14

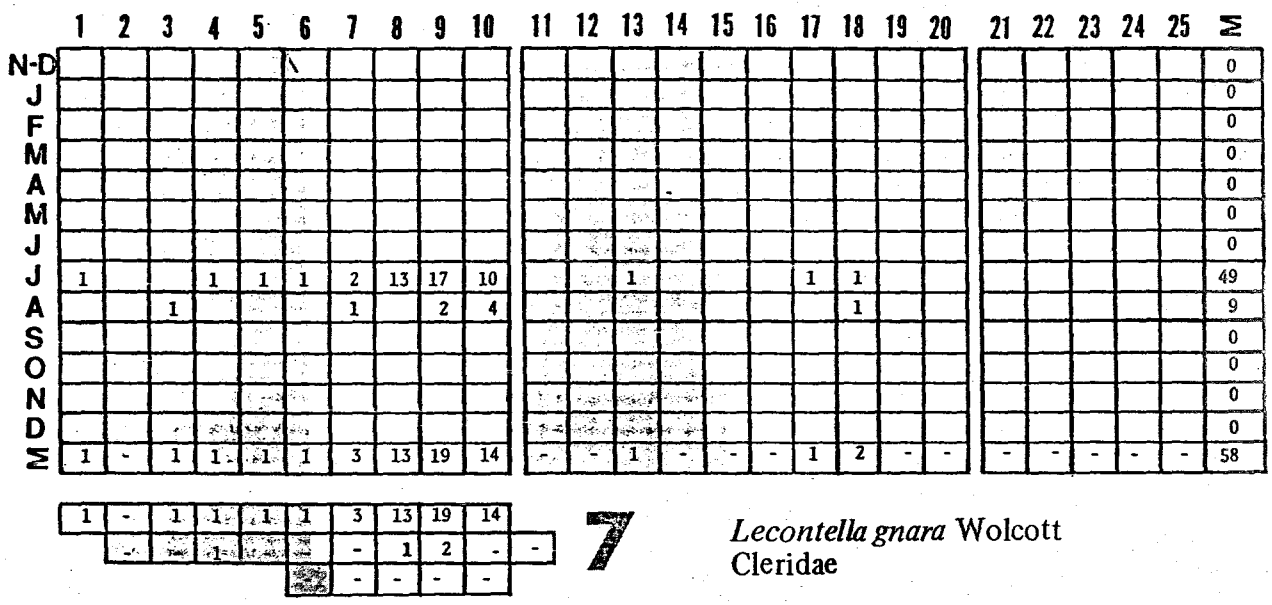
3	1	-	-	1	-	-	-	-	-	
	2	-	-	1	1	2	-	-	-	-
					1	-	-	-	1	

5 *Altica torquata* LeConte
Chrysomelidae

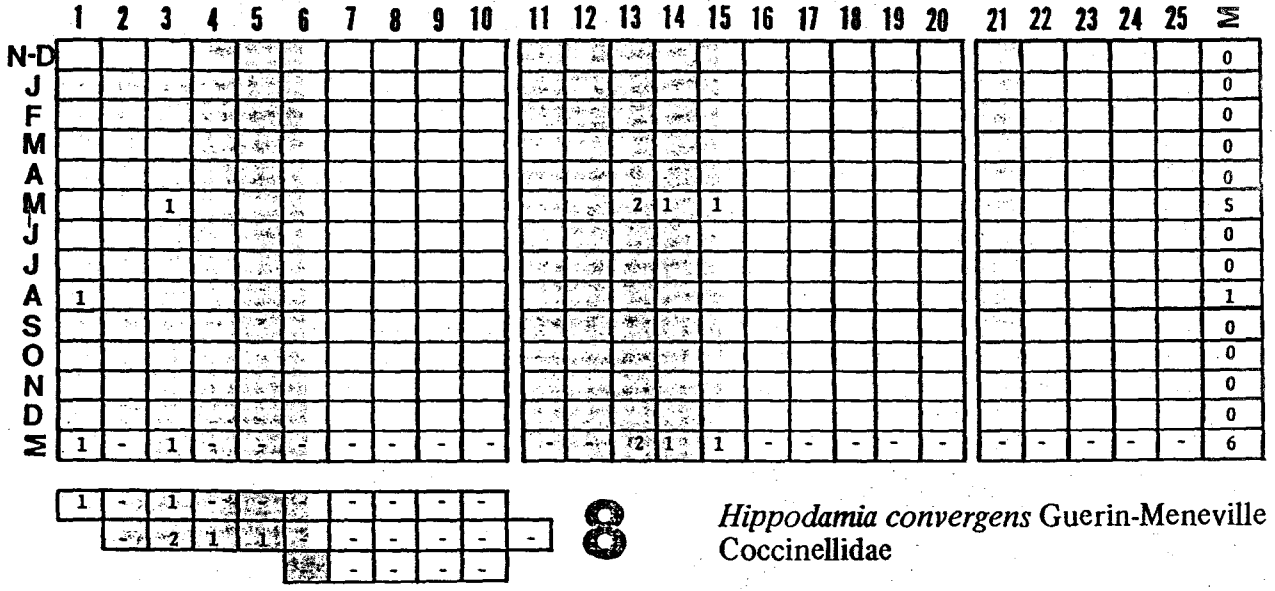
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																					28					28
J																										0
F																					1					1
M																					16					16
A																					43	1				44
M	1		2	2	3						1										12					15
J																1					4					5
J																					3	1				4
A																										0
S																										1
O																										0
N																										0
D																										0
Σ	1	-	2	2	3	-	-	-	-	-	1	-	-	1	-	1	-	-	-	-	97	2	-	-	-	114

1	-	2	2	3	-	-	-	-	-	
	1	-	1	1	-	1	-	-	-	-
					97	2	-	-	-	

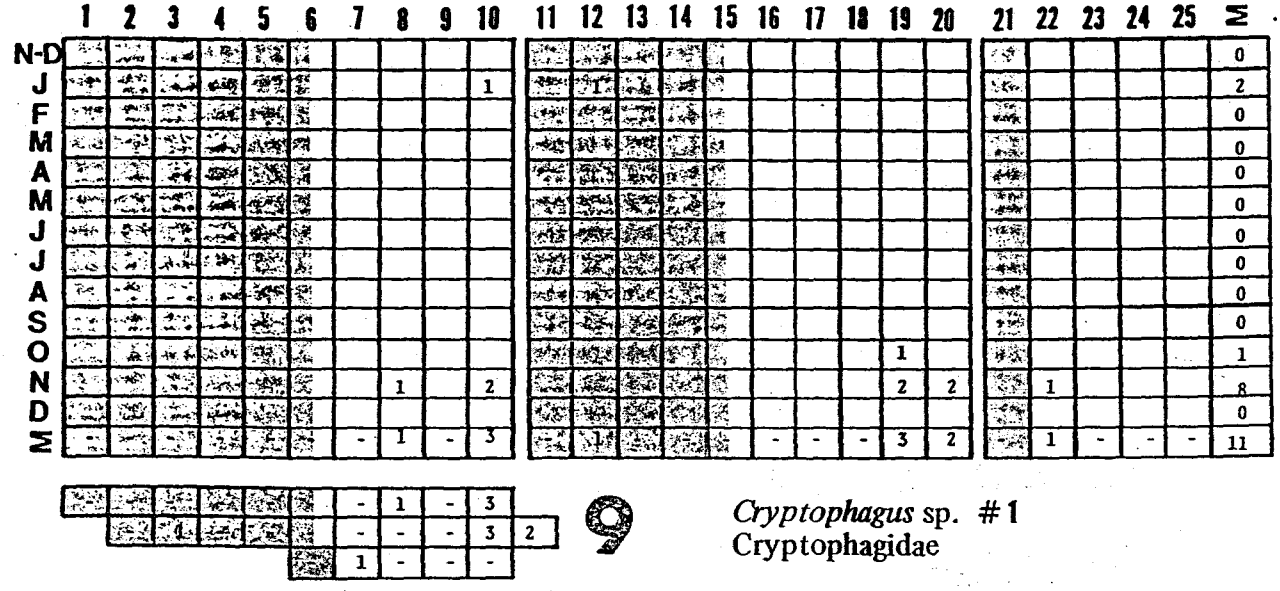
6 *Longitarsis* sp. #1
Chrysomelidae



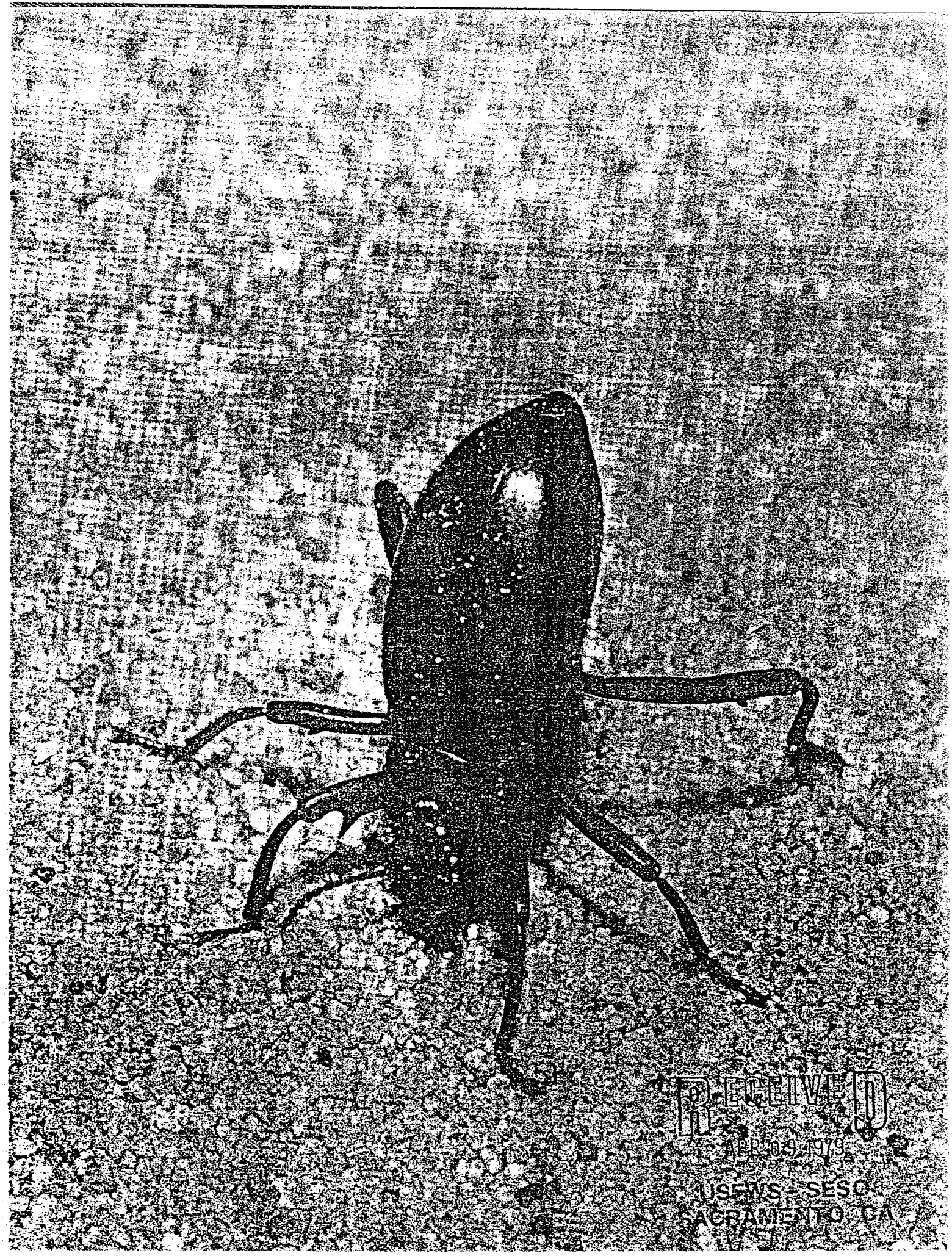
7 *Lecontella gnara* Wolcott
Cleridae



8 *Hippodamia convergens* Guerin-Meneville
Coccinellidae



9 *Cryptophagus* sp. #1
Cryptophagidae



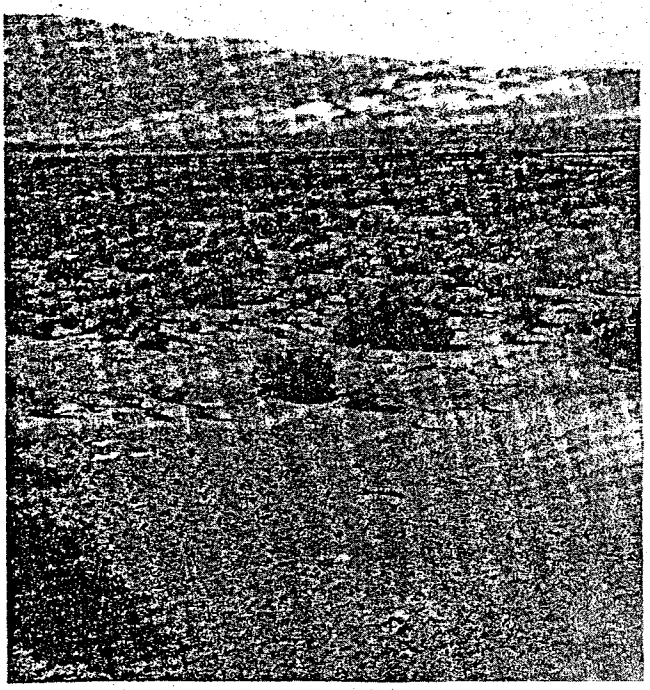


Fig. 21. Site of pitfall traps numbers 21 to 25, in transect #3, looking west, towards dry lake.

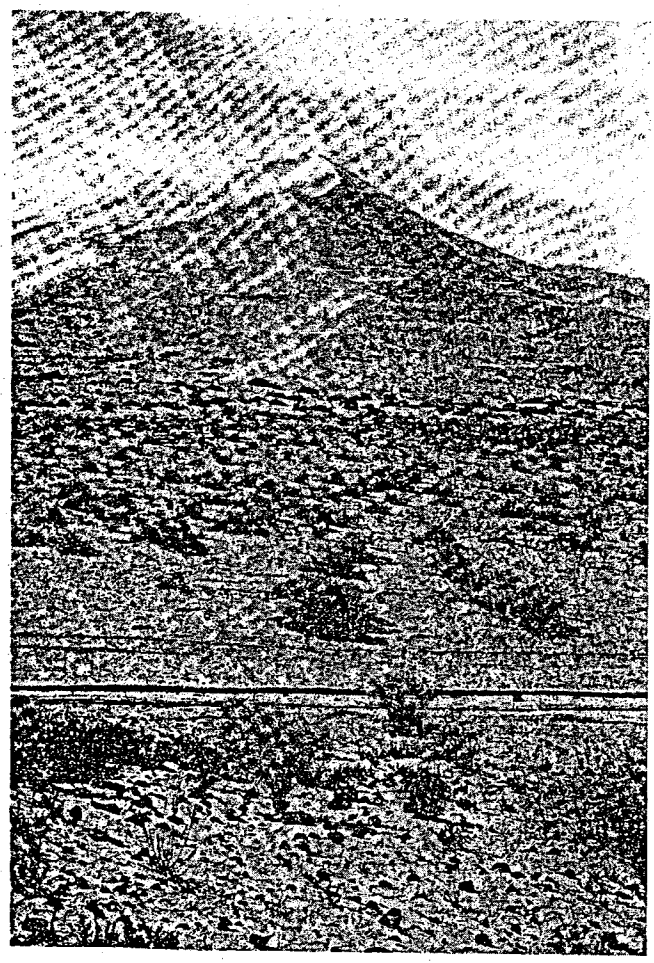


Fig. 19. Site of pitfall traps numbers 11 to 14, in transect #2, looking west, towards dune.

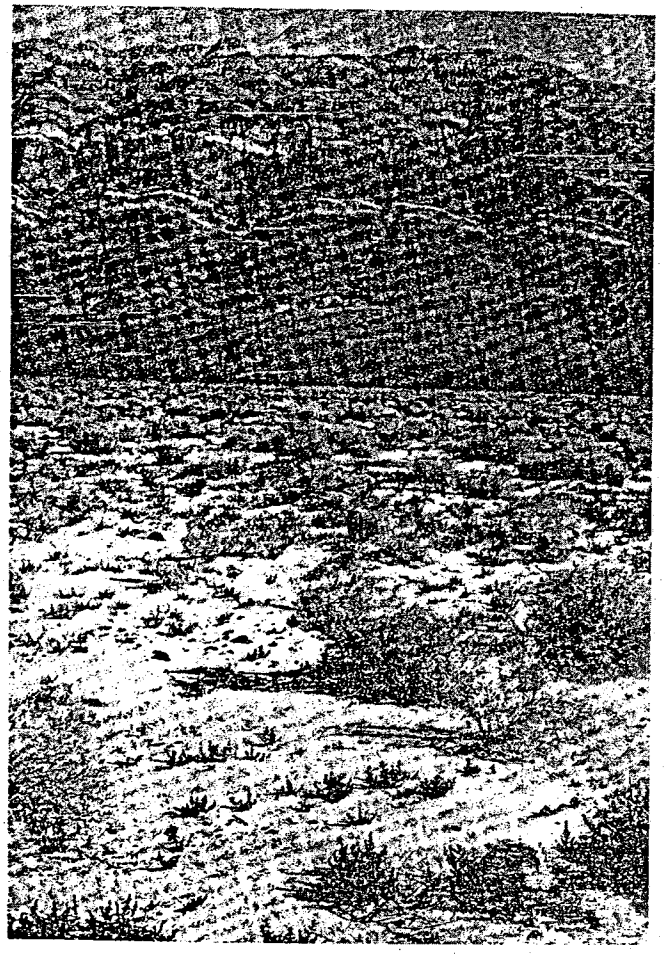


Fig. 20. Site of pitfall traps numbers 15 to 20, in transect #2, looking east towards alkali scrub.

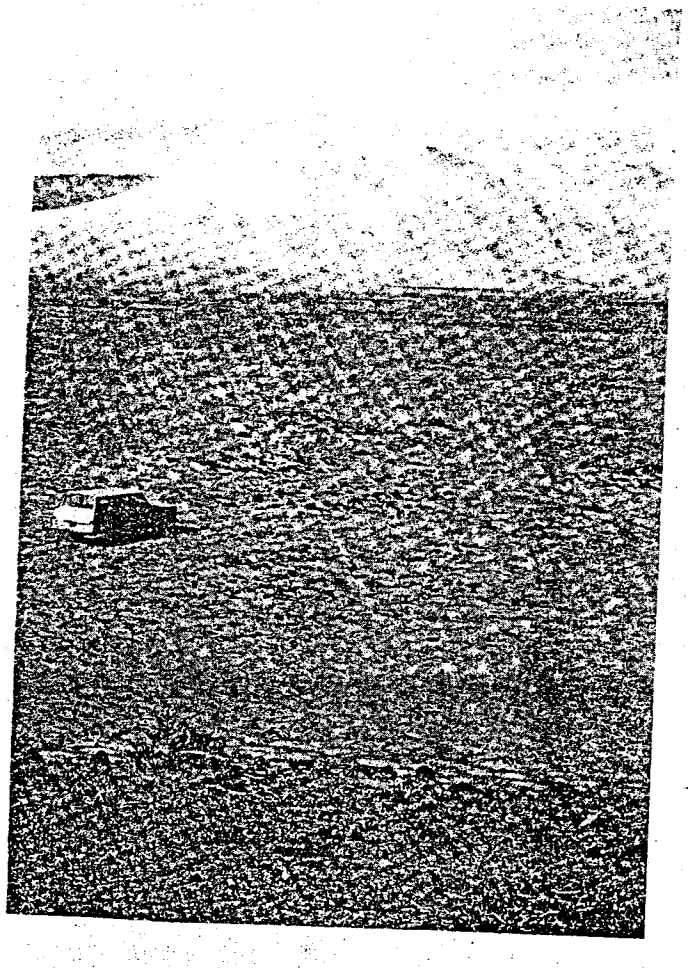


Fig. 17. Site of pitfall traps numbers 1 to 5, in transect #1, looking west, toward dune.

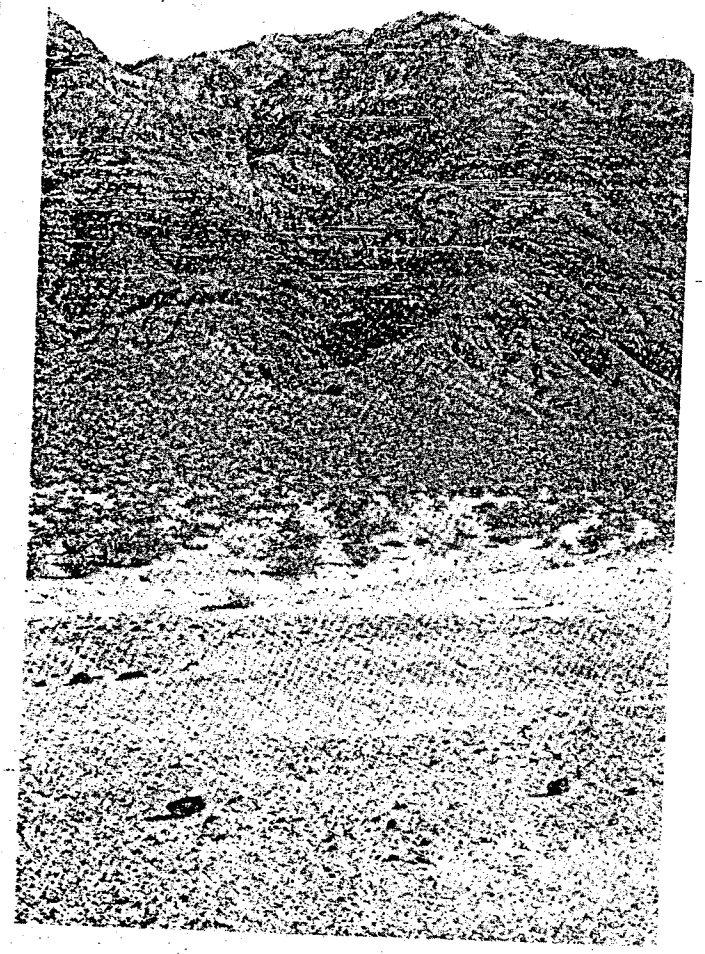


Fig. 18. Site of pitfall traps numbers 6 to 10, in transect #1, looking east, toward rocky hillside.

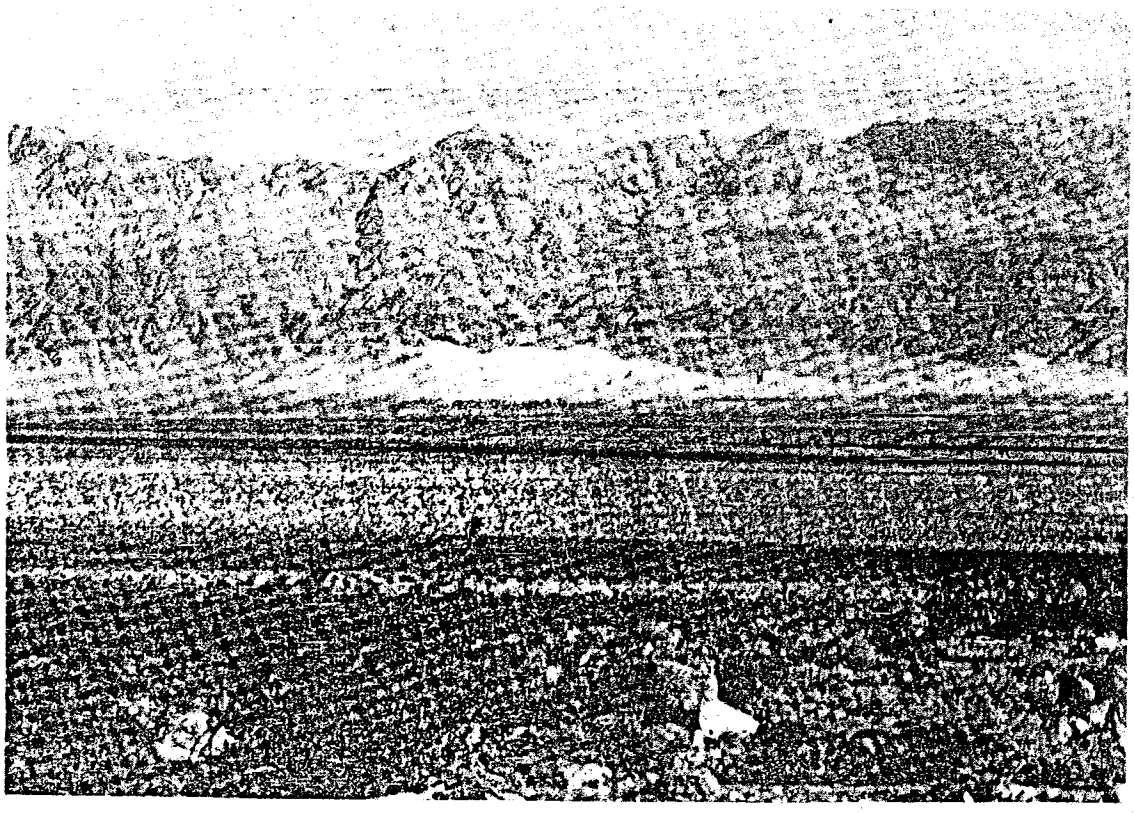


Fig. 11. The Eureka Valley Dunes from the NW. The playa is visible just below the main mass, and to the right.

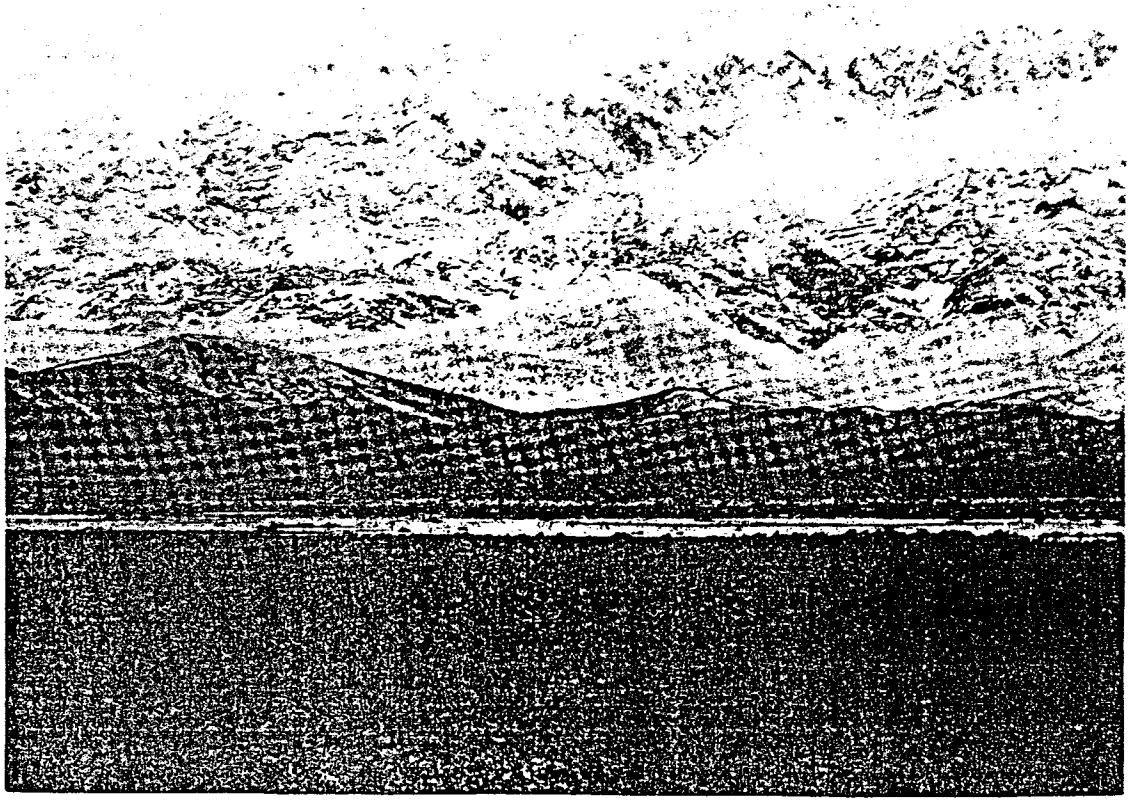


Fig. 12. Eureka Valley Dunes during the April storm discussed in the text. Note snow on the dunes and mountains in the background, and the water on the playa in the middleground.

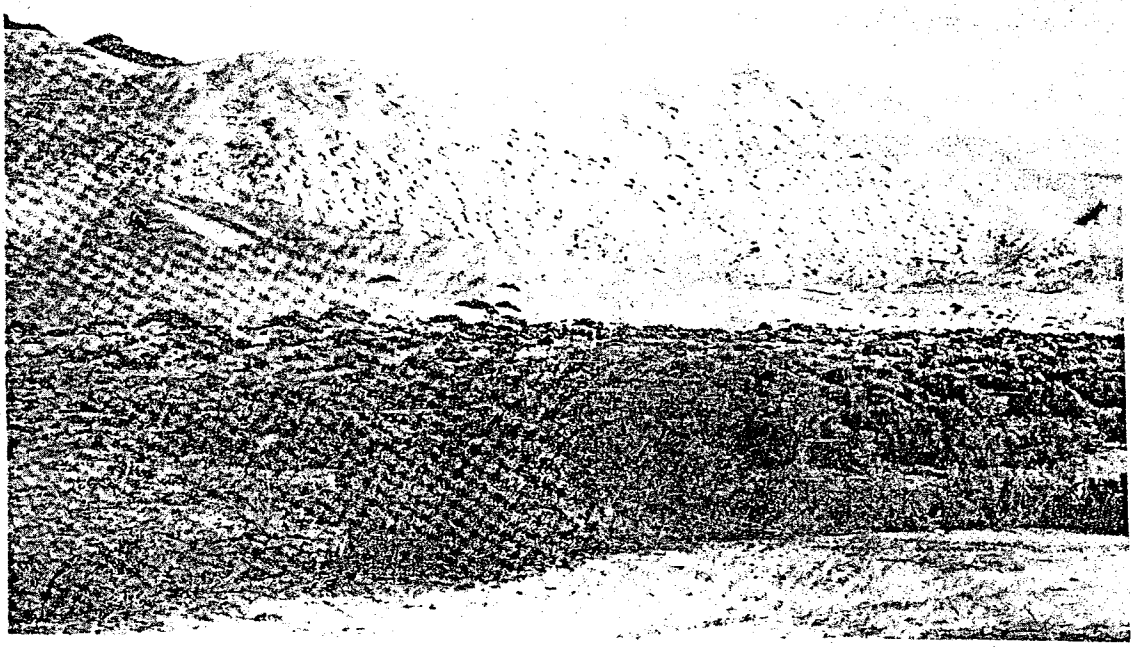


Fig. 13. Eureka Valley dunes from the NW tip, looking SE. Note the dense vegetation in the foreground, which borders the playa. The dark areas on the dunes are clumps of *Swallenia Alexandrae* Swall., an endemic genus of grass found in this area.

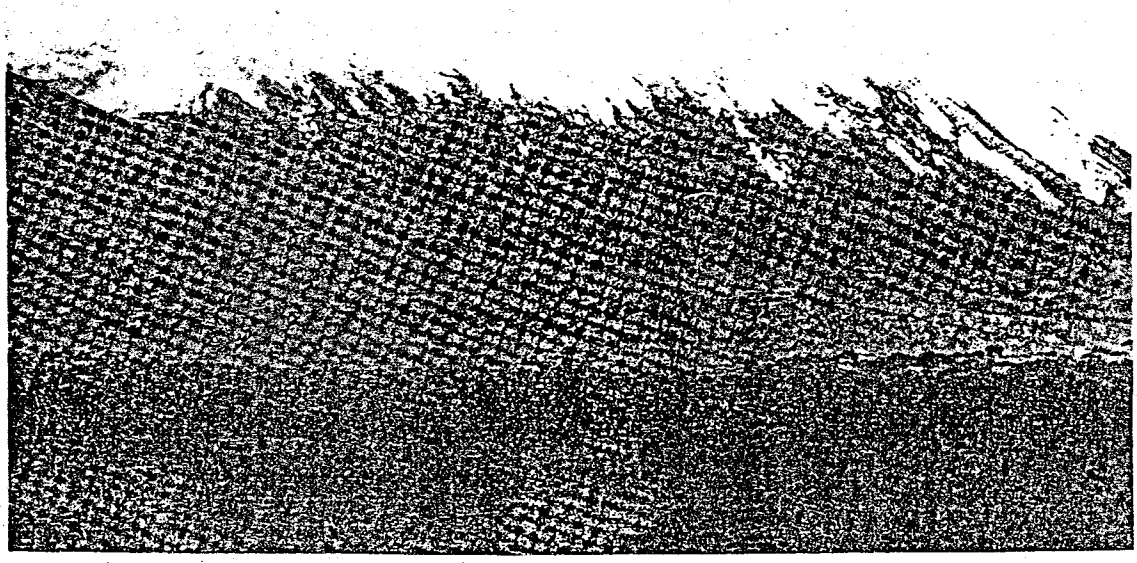


Fig. 14. Eureka Valley Dunes from near the same spot as Fig. 13, during the "ill-fated" April trip. Note standing water in the portion of the playa in the foreground, and the wet sand.

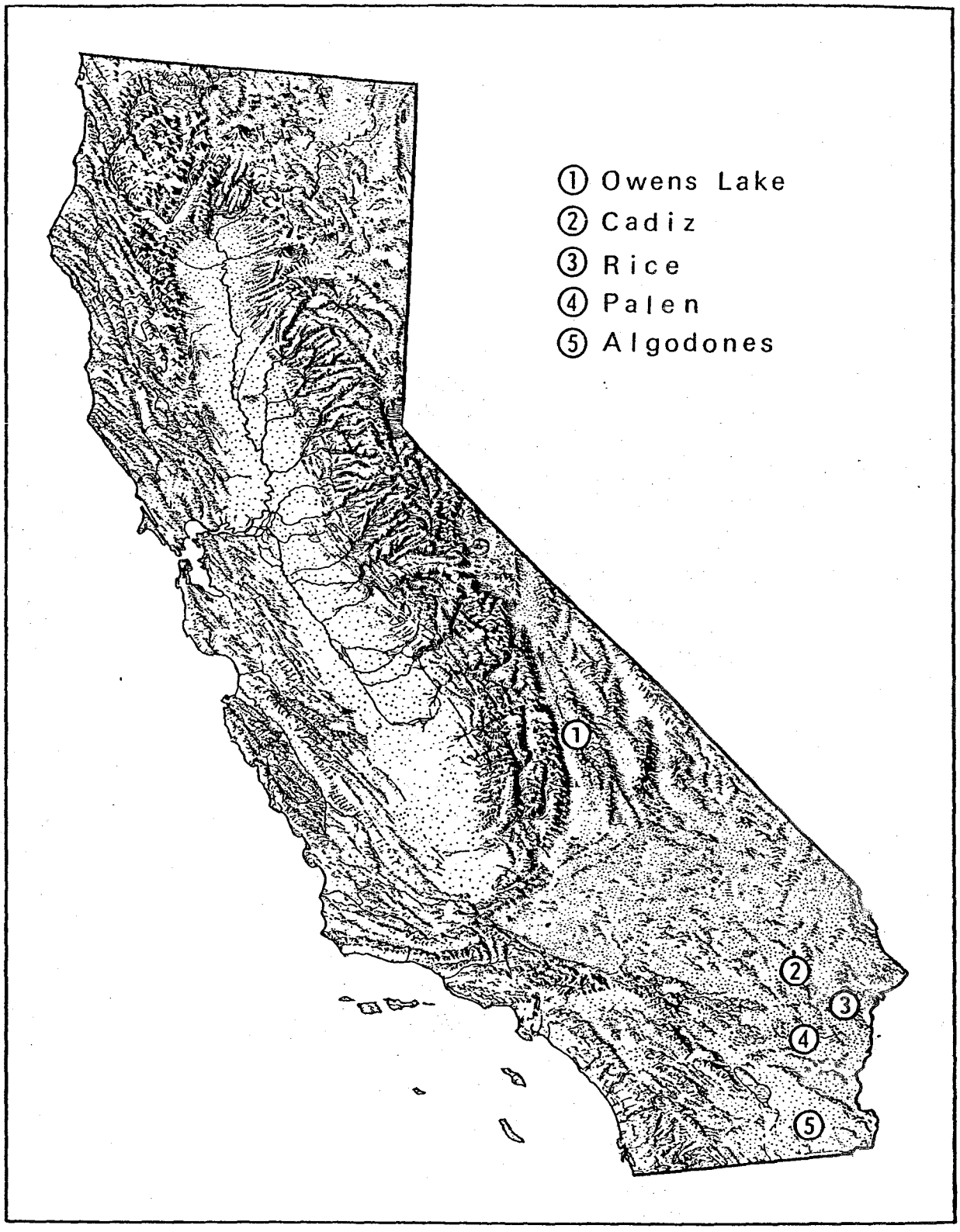


Fig. 15. The approximate location of the five dunes surveyed for Part I.

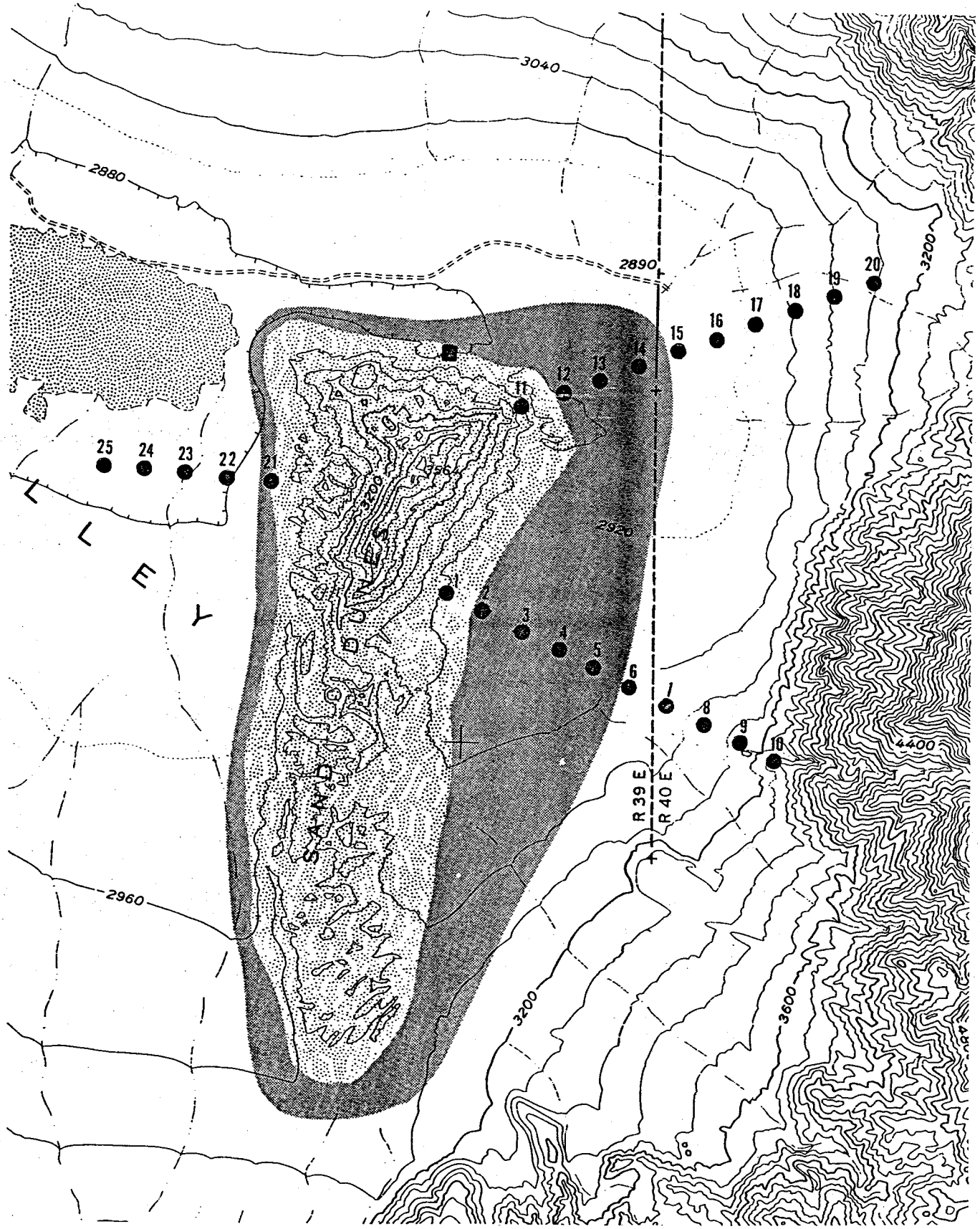
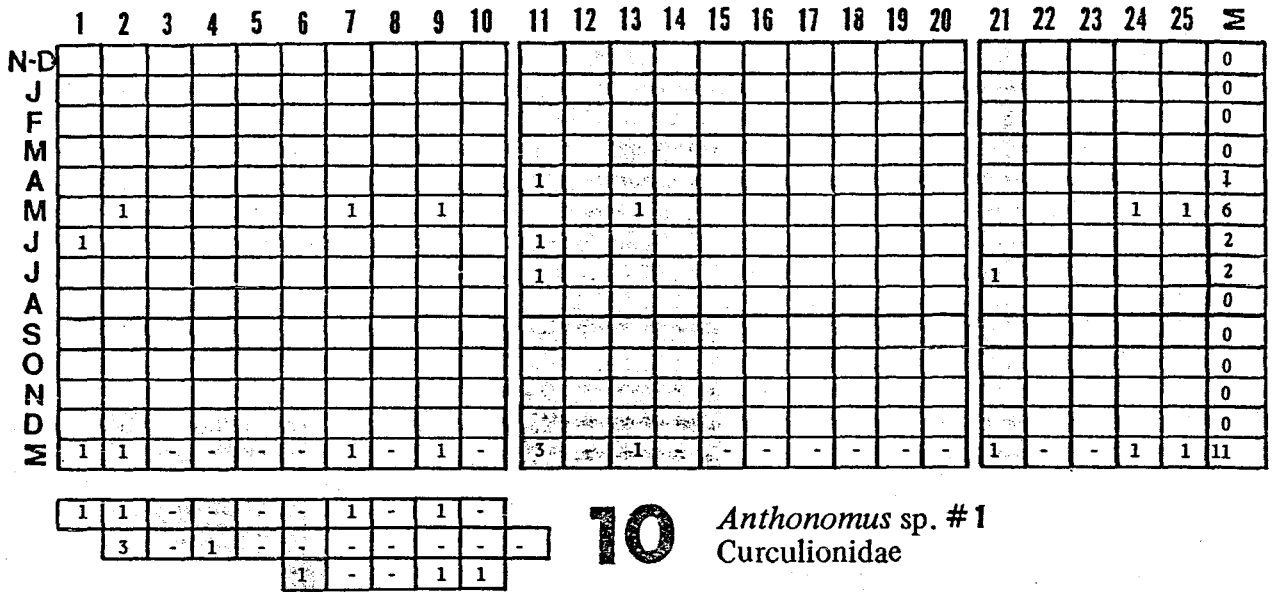


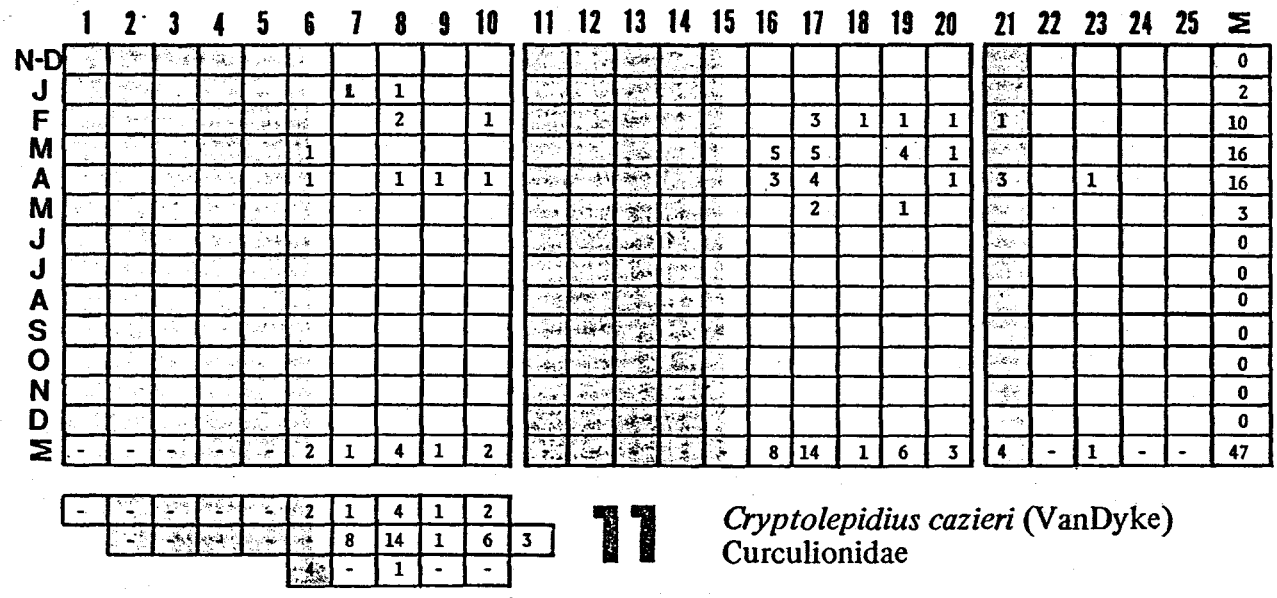
Fig. 16. The Eureka Valley sand dune, showing the locations of study areas. The site for the Office of Endangered Species study is indicated by the square. The stippled area around the dune indicates the extent of a thin sand sheet. The numbers 1–10 represent transect No. 1, with the sites extending from the dune to the rocky aluvial fan. Numbers 11–20 represent transect No. 2, extending from the dune into the *Artemesia* flat. Numbers 21–25 represent transect No. 3, which extends from the dune into the playa margin.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A											1															1
M		1					1		1				1											1	1	6
J	1										1															2
J											1										1					2
A																										0
S																										0
O																										0
N																										0
D																										0
M	1	1	-	-	-	-	1	-	1	-	3	-	1	-	-	-	-	-	-	-	1	-	-	1	1	11

1	1	-	-	-	-	1	-	1	-	
	3	-	1	-	-	-	-	-	-	-
					1	-	-	1	1	

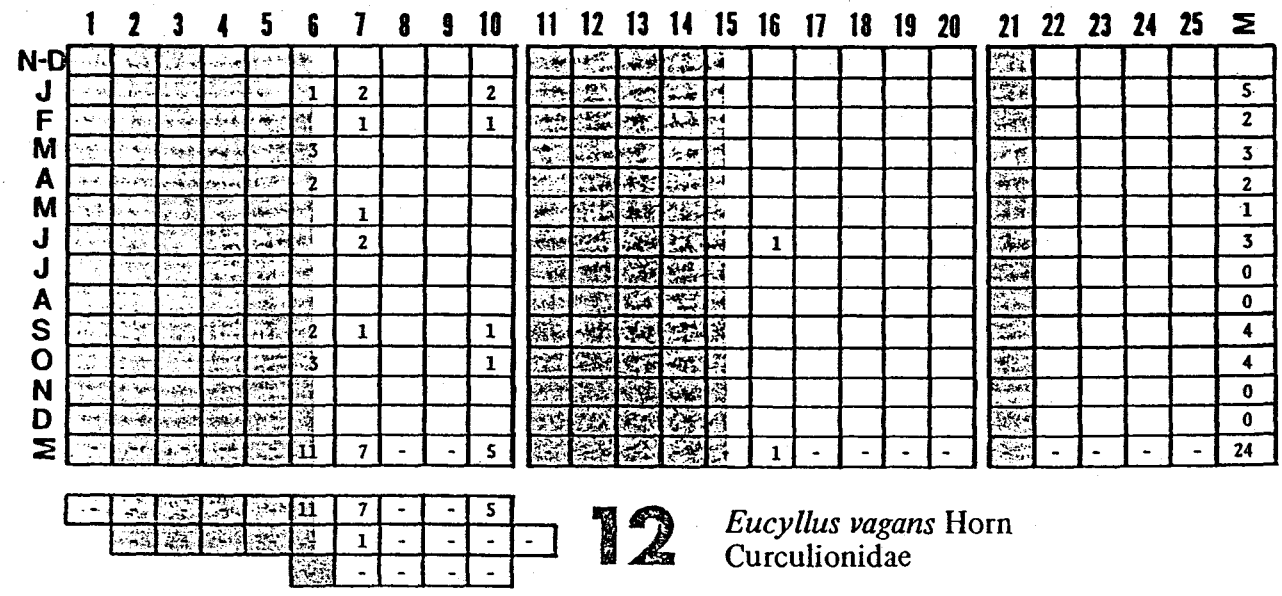
10 *Anthonomus* sp. #1
Curculionidae



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J							1	1																		2
F								2		1							3	1	1	1	1					10
M						1										5	5		4	1						16
A						1		1	1	1						3	4			1	3		1			16
M																	2		1							3
J																										0
J																										0
A																										0
S																										0
O																										0
N																										0
D																										0
M	-	-	-	-	-	2	1	4	1	2						8	14	1	6	3	4	-	1	-	-	47

-	-	-	-	-	2	1	4	1	2	
	-	-	-	-	-	8	14	1	6	3
					4	-	1	-	-	

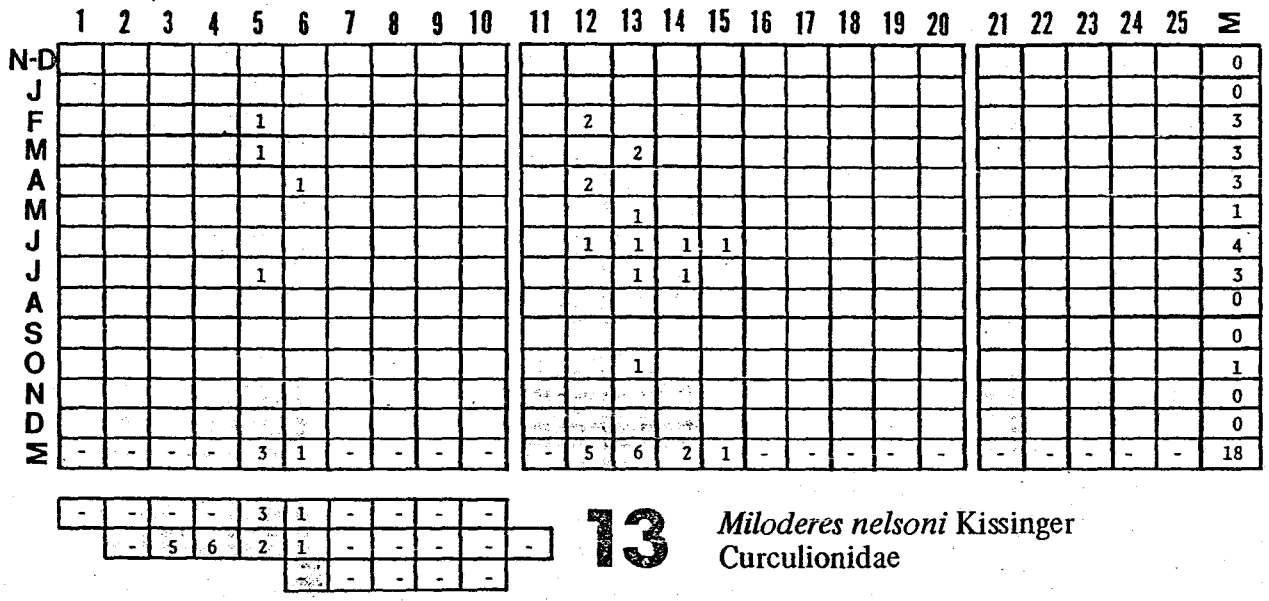
11 *Cryptolepidius cazieri* (VanDyke)
Curculionidae



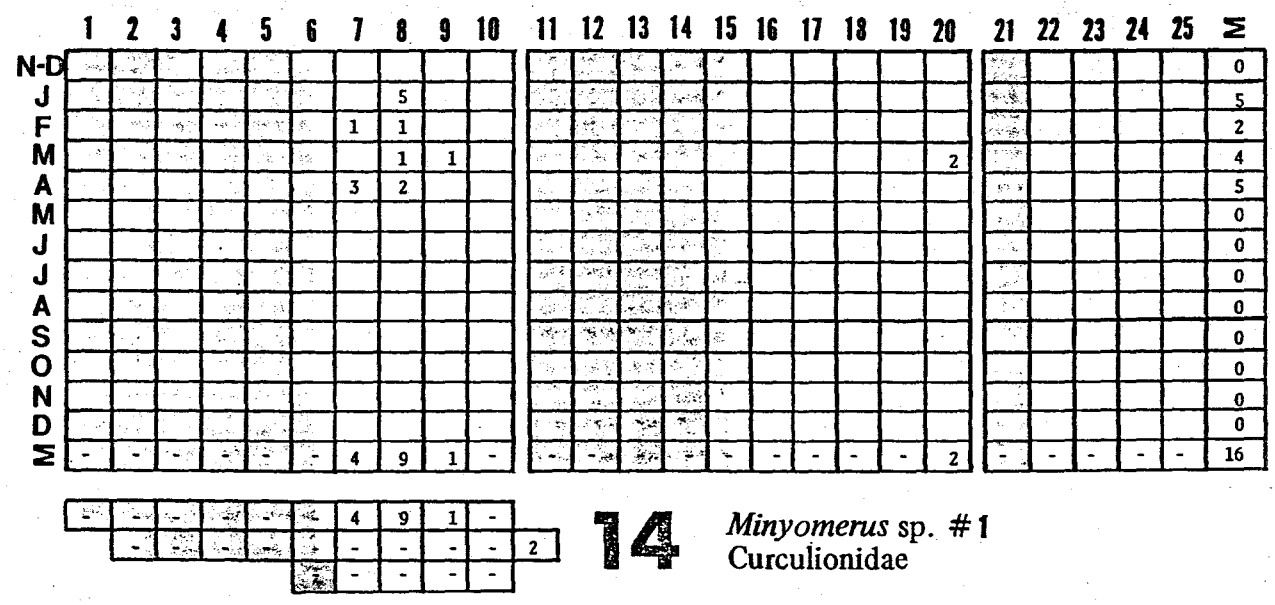
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										
J						1	2			2																5
F							1			1																2
M						3																				3
A						2																				2
M							1																			1
J							2									1										3
J																										0
A																										0
S						2	1			1																4
O						3				1																4
N																										0
D																										0
M	-	-	-	-	-	11	7	-	-	5						1	-	-	-	-	-	-	-	-	-	24

-	-	-	-	-	11	7	-	-	5	
	-	-	-	-	1	-	-	-	-	-
					-	-	-	-		

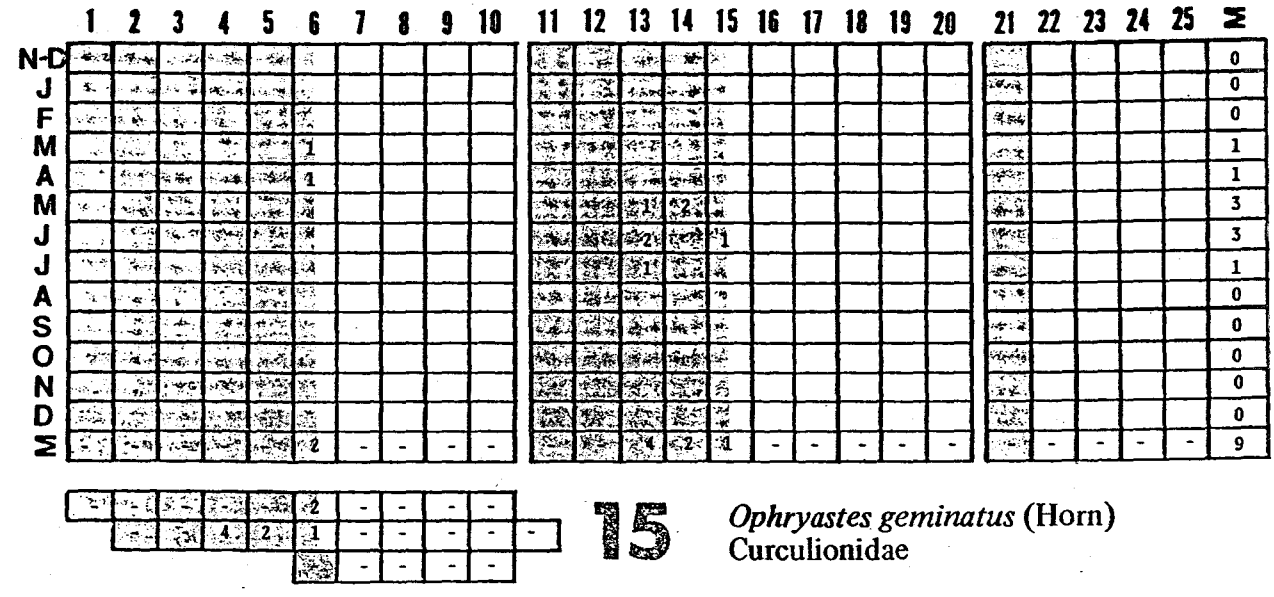
12 *Eucyllus vagans* Horn
Curculionidae



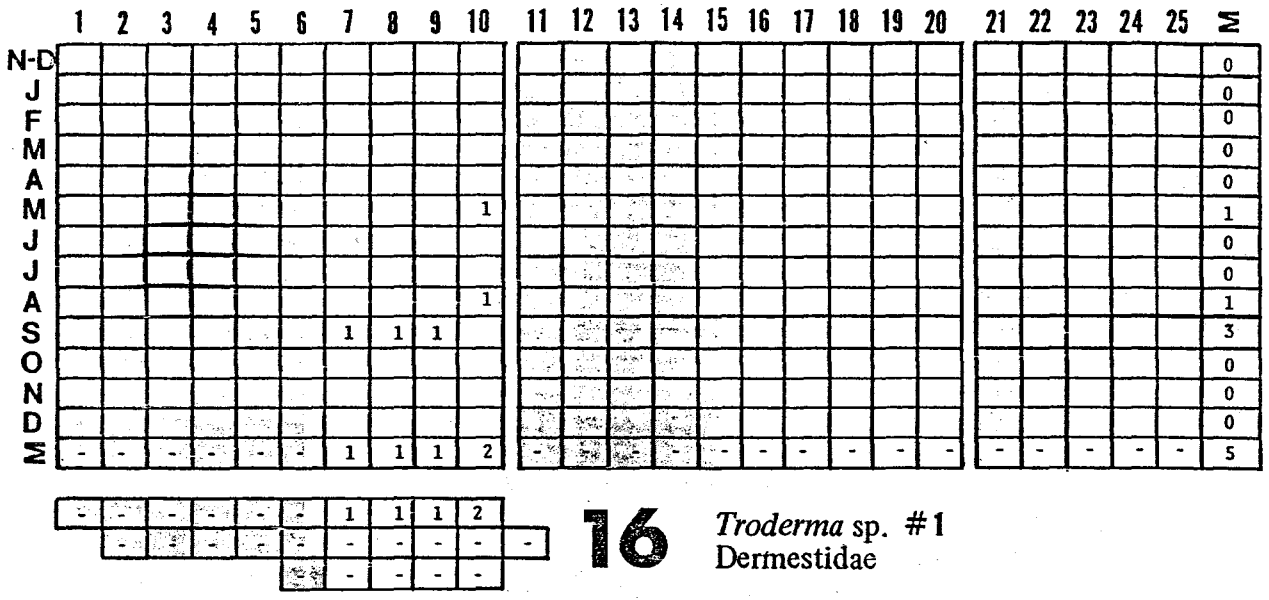
13 *Miloderes nelsoni* Kissinger
Curculionidae



14 *Minyomerus* sp. #1
Curculionidae



15 *Ophryastes geminatus* (Horn)
Curculionidae



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A																										0
M										1																1
J																										0
J																										0
A										1																1
S							1	1	1																	3
O																										0
N																										0
D																										0
M	-	-	-	-	-	-	1	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5

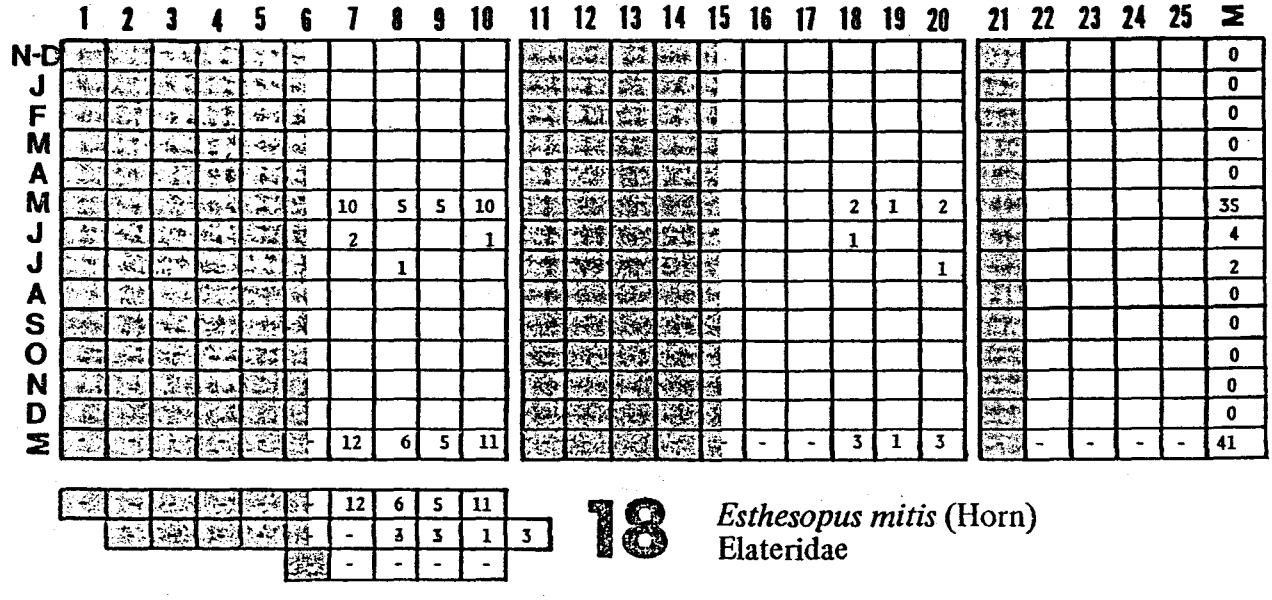
	-	-	-	-	-	-	1	1	1	2
		-	-	-	-	-	-	-	-	-
						-	-	-	-	

16 *Troderma* sp. #1
Dermestidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D					1	1																				2
J	3		2								1		3	1	4											14
F			1									1	1													3
M																										0
A																										0
M																										0
J																										0
J																										0
A																										0
S																										0
O																										0
N	35											1	1													37
D	21	1		2									2													26
M	59	1	3	2	1	1	-	-	-	-	1	2	7	1	4	-	-	-	-	-	-	-	-	-	-	82

	59	1	3	2	1	1	-	-	-	-
		1	2	1	1	1	-	-	-	-
						1	-	-	-	

17 *Cardiophorus* sp. #1
Elateridae



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A																										0
M							10	5	5	10								2	1	2						35
J							2			1								1								4
J								1												1						2
A																										0
S																										0
O																										0
N																										0
D																										0
M	-	-	-	-	-	-	12	6	5	11	-	-	-	-	-	-	-	3	1	3	-	-	-	-	-	41

	-	-	-	-	-	-	12	6	5	11
		-	-	-	-	-	-	3	3	1	3
						-	-	-	-	

18 *Esthesopus mitis* (Horn)
Elateridae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D		1		1																						2
J	2	1	3	2	1	1	1			2		1		2	1											17
F	43	11	7	40	19	13				4				3												140
M				2	2	5			1	2				1												13
A							1								1	3	6	2	1	6						26
M																										0
J																										0
J																										0
A																										0
S																										0
O																										0
N																										0
D	1																									1
M	46	13	10	45	22	19	2	-	1	13	-	1	-	6	2	3	6	2	1	6	-	-	-	-	-	199

46	13	10	45	22	19	2	-	1	13	
	-	1	-	6	2	3	6	2	1	6
						-	-	-	-	

19 *Horistonotus* sp. #4
Elateridae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A																										0
M																										0
J								1																		1
J	1						1	1		2																5
A																										0
S																										0
O																										0
N																										0
D																										0
M	1	-	-	-	-	-	1	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6

1	-	-	-	-	-	1	2	-	2	
	-	-	-	-	-	-	-	-	-	-
						-	-	-	-	

20 *Horistonotus simplex* LeConte
Elateridae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																			1	1					1	3
J																										0
F												1														1
M																				1						2
A										1		1														2
M																										0
J																										0
J																										0
A																										0
S													1				5		3	1		2				12
O															1					4						6
N																										0
D																										0
M							-	-	-	1	1	2	2	1	-	5	-	4	7		1	2	-	-	-	26

						-	-	-	1	
	1	2	2	1	1	-	5	-	4	7
					1	2	-	-	-	

21 *Eremosaprinus opacus* (Horn)
Histeridae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A										1																1
M		1							10							5									6	22
J	22	126	8			13	12							1	42		1	4	2			57	24		4	316
J	11			90		4				2	1			1	1	16	16		3		1	1				147
A				205		1	2							6	29									14		257
S				18		6						3	1		24											52
O																				1						1
N																										0
D																										0
M	33	127	8	313	-	24	14	-	10	3	1	3	1	8	96	21	17	4	5	1	1	58	24	14	10	796

33	127	8	313	-	24	14	-	10	3	
	1	3	1	8	96	21	17	4	5	1
					1	58	24	14	10	

22 *Saprinus discoidalis* LeConte
Histeridae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A																										0
M								1	35							7			12						17	72
J	16	86	25	1		33	53	4							40		8	37	4			51	12		1	371
J		5	2	40		1		1	12	5				1		15	43	4	23	5	1	2				160
A		2		145	5		5					1		11	9			4	1	3			1	1		188
S				10		1																				11
O															1			1								2
N																										0
D																										0
M	16	93	27	196	5	35	58	6	47	5		1		12	50	22	51	46	40	8	1	53	13	1	18	804

16	93	27	196	5	35	58	6	47	5	
	-	1	-	12	50	22	51	46	8	1
					1	53	13	1	18	

23 *Xerosaprinus coerulescens* (LeConte)
Histeridae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D				1		1				1																4
J				1	7	3	3				1	1		2		1		1		1						21
F				2	2	3	1	1				3	1	2	1			1			1					18
M			1	2	2	1					1	3	2	5			1				1					19
A							1				3	2	2	1							1					8
M					1	1					1	1	2	1	1											6
J																										0
J																										0
A																										0
S																						1				1
O						1							1	1			1									4
N				1		1	2				1	5		5												13
D					1		1				1	1	1								1					6
M			1	7	13	11	8	1	-	1	7	15	7	15	2	1	2	2	-	1	5	1	-	-	-	100

		1	7	13	11	8	1	-	1	
	7	15	7	15	2	1	2	2	-	1
					5	1	-	-	-	

24 *Ptomaphagus fisus* Horn
Leptodiridae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A																										0
M									1																	1
J															1	1	2		1							5
J																				1						1
A																										0
S																										0
O																										0
N																										0
D																										0
M	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1	2	-	1	1	-	-	-	-	-	7

-	-	-	-	-	-	-	-	1	-	
	-	-	-	-	1	1	2	-	1	1
					-	-	-	-		

25 Melandryidae sp. #2
Melandryidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A																										0
M						1																				0
J						2		1					1							1						5
J						1	5	4		7					1			1	1							20
A				1		3	1		1	4			1													11
S																										0
O																										0
N																										0
D																										0
M	-	-	-	1	-	6	6	5	1	11	-	-	2	-	1	-	-	1	1	1	-	-	-	-	-	36

-	-	-	1	-	6	6	5	1	11	
	-	-	2	-	1	-	-	1	1	1
					-	-	-	-		

26 Melandryidae sp. #3
Melandryidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A																										0
M														12												12
J																										0
J																										0
A																										0
S																										0
O																										0
N																										0
D																										0
M	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-	-	-	12

						-	-	-	-	
				12		-	-	-	-	-
						-	-	-	-	

27 *Eupompha elegans* (LeConte)
Meloidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																										0
J																										0
F																										0
M																										0
A																										0
M																						12	1			13
J																						2		2	2	6
J																								1	2	3
A																						3		1		4
S																										0
O																										0
N																										0
D																										0
Σ	-	-	-	-	-	-	-	-	-	-					-	-	-	-	-	-	-	17	1	4	4	26

-	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	-
					-	17	1	4	4	

28 *Collops* sp., *punctatus* complex
Melyridae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																										0
J																										0
F																										0
M																										0
A																										0
M														2	3	2										7
J											1	1		1	1		1									5
J														1												1
A																										0
S																										0
O																										0
N																										0
D																										0
Σ	-	-	-	-	-	-	-	-	-	-	1	1		4	4	2	1	-	-	-	-	-	-	-	-	13

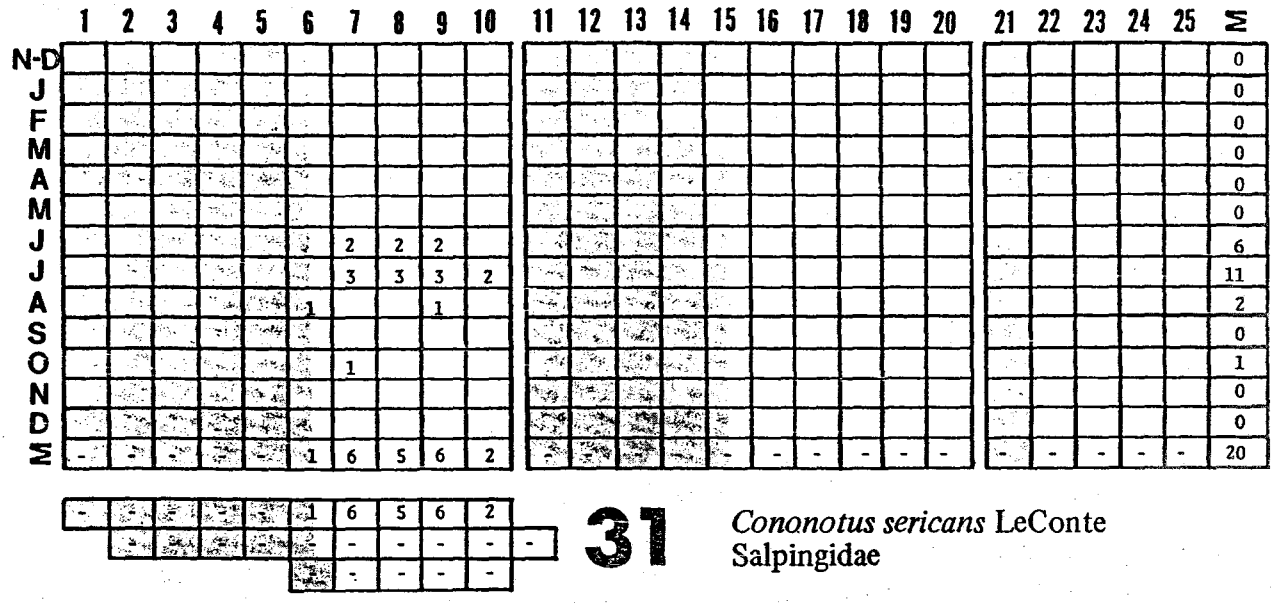
-	-	-	-	-	-	-	-	-	-	
	1	1	-	4	4	2	1	-	-	-
						-	-	-	-	

29 *Eummenotaris* sp. #1
Melyridae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																										0
J							1			1									1							3
F					1												1	1								3
M															1				1				1			3
A									1							1	1				1			1		5
M							1	1													1		2			5
J																										0
J																										0
A																										0
S																										0
O																										0
N																1	1			2						5
D																										0
Σ	-				1	1	2	1	1	1					1	2	3	1	2	2	2	-	3	1	-	24

-	-	-	-	1	1	2	1	1	1	
	-	-	-	-	1	2	3	1	2	2
					2	-	3	1	-	

30 *Ptinus* nr. *verticalis*
Ptinidae



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A																										0
M																										0
J							2	2	2																	6
J							3	3	3	2																11
A						1			1																	2
S																										0
O							1																			1
N																										0
D																										0
M	-	-	-	-	-	1	6	5	6	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20

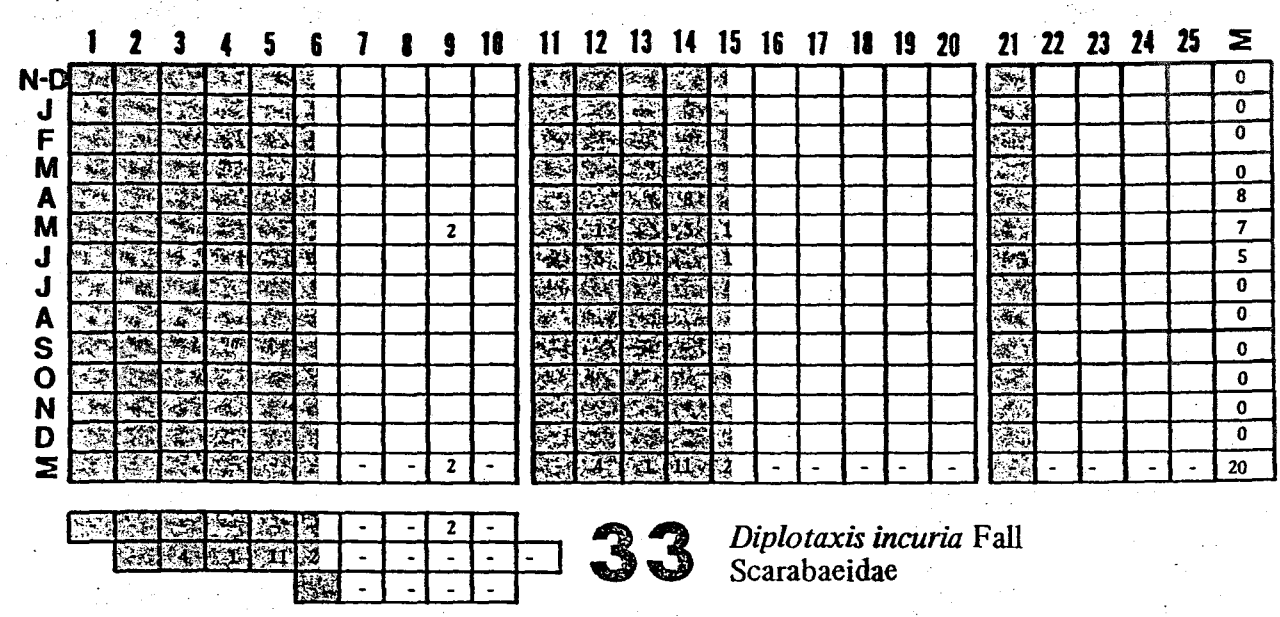
-					1	6	5	6	2	
	-					-	-	-	-	-
		-				-	-	-	-	

31 *Cononotus sericans* LeConte
Salpingidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D	1				1							1			1											4
J	1									1					1											3
F												1														1
M																										0
A					1																					0
M																										0
J																										0
J																										0
A																										0
S																										0
O																										0
N															2											2
D	1											1														2
M	3	-	-	-	1	-	-	-	-	1	1	2	-	-	4	-	-	-	-	-	-	-	-	-	-	12

3				1		-	-	-	1	
	1	2			4	-	-	-	-	-
						-	-	-	-	

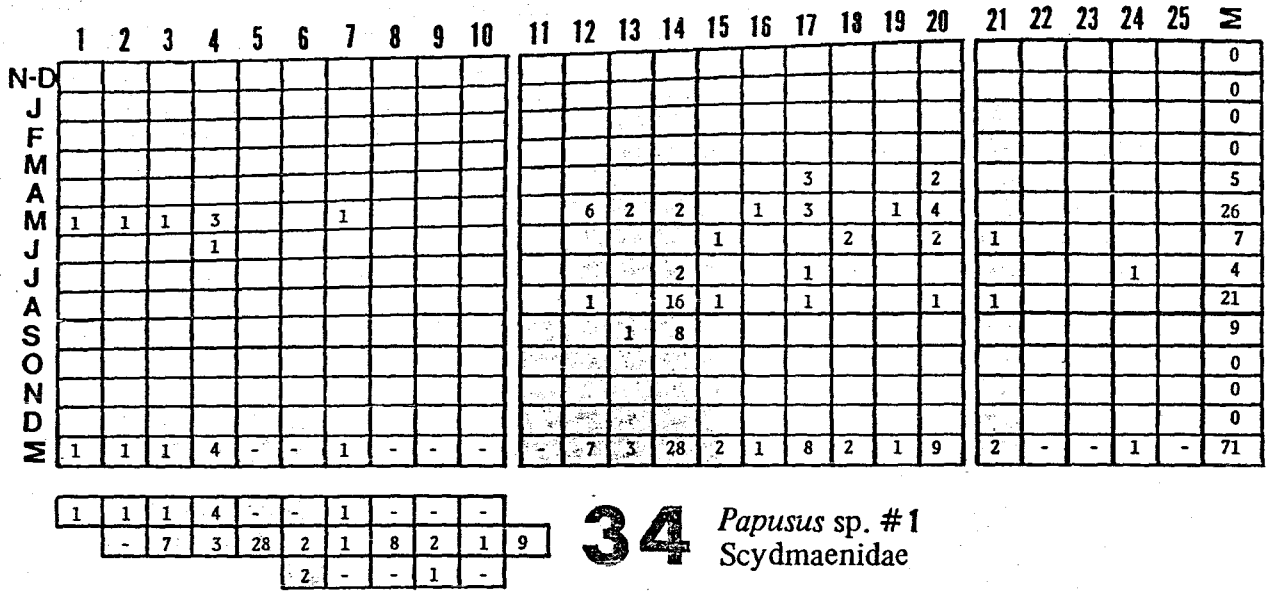
32 *Aphodius coquilletti* Linell
Scarabaeidae



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A																										8
M									2						1											7
J															1											5
J																										0
A																										0
S																										0
O																										0
N																										0
D																										0
M									2						1											20

						-	-	2	-	
			1	11	2	-	-	-	-	-
						-	-	-	-	

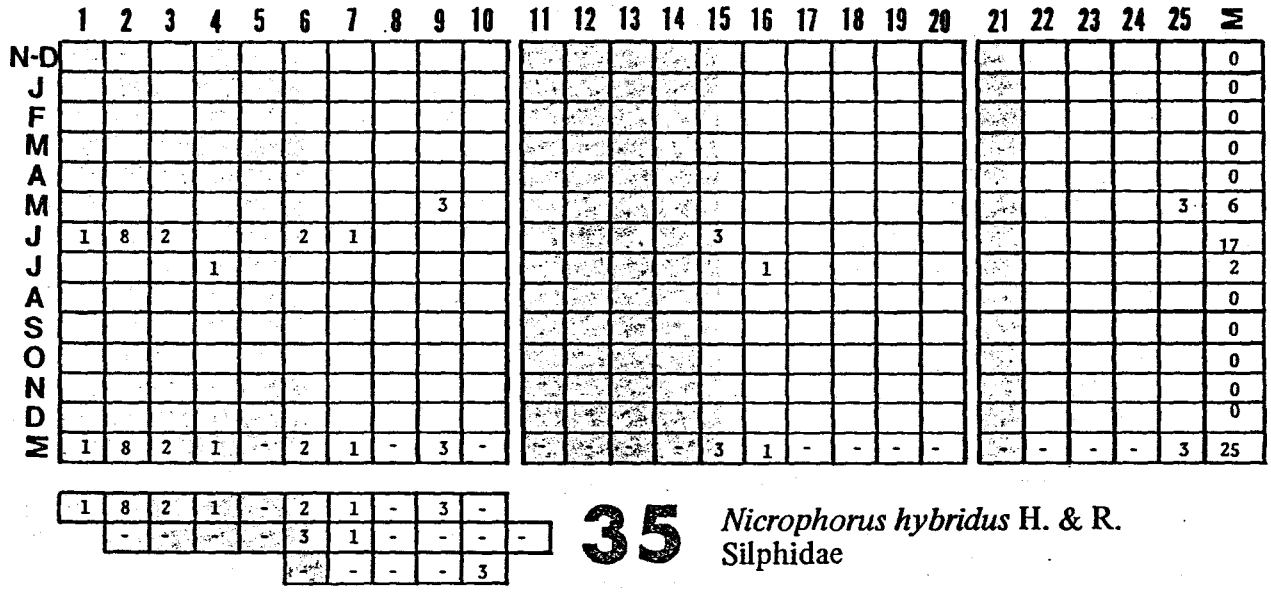
33 *Diplotaxis incuria* Fall
Scarabaeidae



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																										0
J																										0
F																										0
M																										0
A																	3			2						5
M	1	1	1	3			1					6	2	2		1	3		1	4						26
J				1											1			2		2	1					7
J														2			1							1		4
A												1		16	1		1			1	1					21
S													1	8												9
O																										0
N																										0
D																										0
Σ	1	1	1	4	-	-	1	-	-	-	-	7	3	28	2	1	8	2	1	9	2	-	-	1	-	71

1	1	1	4	-	-	1	-	-	-		
	-	7	3	28	2	1	8	2	1	9	
					2	-	-	1	-		

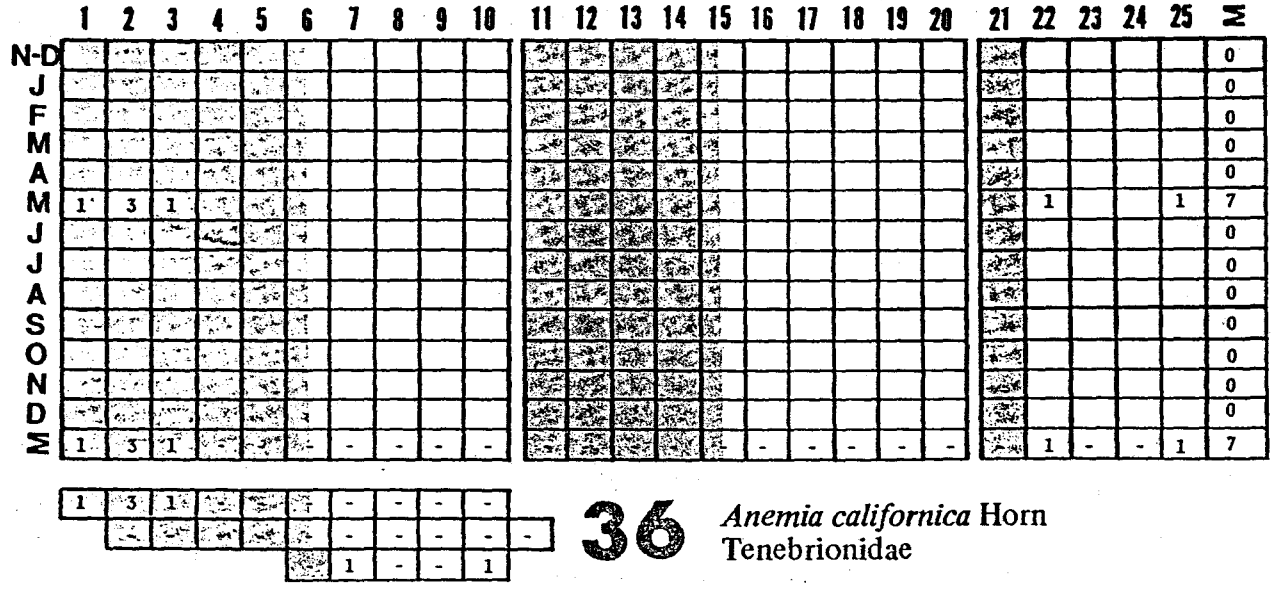
34 *Papusus* sp. #1
Scydmaenidae



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																										0
J																										0
F																										0
M																										0
A																										0
M									3																3	6
J	1	8	2			2	1								3											17
J				1												1										2
A																										0
S																										0
O																										0
N																										0
D																										0
Σ	1	8	2	1	-	2	1	-	3	-	-	-	-	-	3	1	-	-	-	-	-	-	-	-	3	25

1	8	2	1	-	2	1	-	3	-		
	-	-	-	-	3	1	-	-	-	-	
					-	-	-	-	3		

35 *Nicrophorus hybridus* H. & R.
Silphidae



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																										0
J																										0
F																										0
M																										0
A																										0
M	1	3	1																			1			1	7
J																										0
J																										0
A																										0
S																										0
O																										0
N																										0
D																										0
Σ	1	3	1				-	-	-	-						-	-	-	-	-		1	-	-	1	7

1	3	1				-	-	-	-		
	-					-	-	-	-	-	
						1	-	-	1		

36 *Anemia californica* Horn
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D						1	1										4	3								9
J																										0
F						1		1																		2
M						10	5	5	3	7							10	13								53
A						11	12	4	2	12						1	78	38	3	3						164
M		1			1	64	51	6	14	16					1		79	46	2	9						290
J					1	63	57	12	2	4		2			4		62	49	4	2						262
J					1	181	59	6	4	7				1	2	2	100	84	9	4						460
A						59	6	2		1						1	14	28		2						113
S						22	11	5		4							9	5	1							57
O						22	7	2		2							7	12	4	1						57
N						1	1																			2
D																										0
M	-	1	-	-	3	435	210	43	25	53	-	2	-	1	7	4	363	278	23	21	-	-	-	-	-	1469

-	1	-	-	3	435	210	43	25	53	
	-	2	-	1	7	4	363	278	23	21
					-	-	-	-	-	

37 *Areoschizus sulcicollis* Horn
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D										1																1
J																										0
F																										0
M							2											1		1						4
A							8	1		1								1	1	2						14
M						4	13	1		3								3	19	15						58
J						1	22	3										3	4	2						35
J							13	5		3								2	5	14						42
A							11	4	2	4								3	2	5						31
S						1	1		1							1		2	1	5						12
O																										0
N																										0
D																										0
M	-	-	-	-	-	6	70	14	3	12	-	-	-	-	-	1	-	15	32	44	-	-	-	-	-	197

-	-	-	-	-	6	70	14	3	12	
	-	-	-	-	-	1	-	15	32	44
					-	-	-	-	-	

38 *Batuliodes* sp. #1
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A								1																		1
M						1		4	9	2																16
J						3	7	6	3	6										1						26
J						2	9	6	5	5																27
A						1	2	9	1	1																13
S																										0
O									1																	1
N																										0
D																										0
M						6	18	26	19	14							-	-	-	1		-	-	-		84

					6	18	26	19	14	
					-	-	-	-	-	1
					-	-	-	-	-	

39 *Centrioptera muricata* LeConte
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																										0
J																										0
F																										0
M																										0
A																										0
M																										0
J			1			1																				2
J		1		8	1	1	1				1	3			4											20
A	2	1		1	1		1					2	1		4											13
S	1	1		1	1							2		1	1								1			9
O																										0
N																										0
D																										0
Σ	3	3	1	10	3	2	2	-	-	-	1	7	1	1	9	-	-	-	-	-	-	-	1	-	-	44

3	3	1	10	3	2	2	-	-	-	
	1	7	1	1	9	-	-	-	-	-
					3	-	1	-	-	

40 *Chilometopon castaneum* Casey
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																										0
J																										0
F																										0
M																										0
A																										0
M																										0
J						1																			1	2
J	16	2	1	2	5	2					7	2	2						1							40
A			1									1		1												3
S																										0
O																										0
N																										0
D																										0
Σ	16	2	2	2	5	3	-	-	-	-	7	3	2	1	-	-	-	-	1	-	-	-	-	-	1	45

16	2	2	2	5	3	-	-	-	-	
	7	3	2	1	2	-	-	-	1	-
					1	-	-	-	1	

41 *Chilometopon pallidum* Casey
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																		2	1							3
J																										0
F																										0
M																										0
A																										0
M																										0
J																										0
J																										0
A																										0
S																										0
O																		1	1							2
N																		1								1
D																										0
Σ							-	-	-	-						-	1	4	1	-	-	-	-	-	-	6

						-	-	-	-	
						-	1	4	1	-
						-	-	-	-	

42 *Craniothus* sp. #1
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																										0
J																										0
F																										0
M						1																				1
A													1													1
M	1	6		1		10						1	1	18	15	13	3	3	3		1	1	1	3	1	82
J	8	4	4			2						1	12	4	10	11	4		2	1	3	1	1			68
J	7	13	4	7		4					1	6	3	15	17	17	3	2	1	2	3	1	2		1	109
A	6	7	4	9	4	5							7	13	13	7	13	7			1					96
S	1	4	1			2							2	9	5	3	8	7	2							44
O		2	1			1								3	1	1	1									10
N																										0
D																										0
Σ	23	36	14	17	4	25	-	-	-	-	1	8	26	62	61	52	32	19	8	3	8	3	4	3	2	411

23	36	14	17	4	25	-	-	-	-	
	1	8	26	62	61	52	32	19	8	3
					8	3	4	3	2	

43 *Cryptoglossa verrucosa carinulata* Blaisdell
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D													1													1
J													1													1
F		4		1								2	14			1	2									24
M	2	3	1	2	2							4	19	2		1					1					37
A	2	3									17	6	2	1	1						1					33
M	5	2	2								56	71	18	2	1	1		3					4	1	3	169
J	1	1									43	60	30			7	1	1			4	4				152
J	1										22	32	9		1	5	1	1			4					76
A	2										3	13	14			4	2				3				1	42
S		2	2								3	2	9	1												19
O	1		1									2	1													5
N											1															1
D																										0
Σ	14	15	6	3	2	-	-	-	-	-	145	192	118	6	3	19	6	5	-	-	13	4	4	1	4	560

14	15	6	3	2	-	-	-	-	-	
	145	192	118	6	3	19	6	5	-	-
					13	4	4	1	4	

44 *Edrodes ventricosus* LeConte
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D						4	2				1	1	1			2			2		1	6	1		1	22
J																										0
F		1			1	4						2	2			2	1		1		1					9
M		2		1		8	5		2		1	3	7	7	4	13	11	7	8	17	8	2	9	1	1	117
A						4	4				2		1		2	7	12	4	3	7	17	10	7		1	81
M						5	3	1				3	3	1	1	2	5	6	7	4	8	1	7	2	2	58
J		1				3	1	2				2	18	5	5	14	14	8	4	7	21	4	5	3	3	120
J	1	1				12	2		1		5	17	8	5	6	29	7	8	9	4	22	5	4	3	9	158
A	1	1	1			9	3					7	83	46	12	36	28	25	26	65	75	39	30	4	5	496
S	4	3	1			7	7		2		13	21	72	39	8	32	37	22	51	57	52	34	18	20	17	517
O		4	3	2		4	7				10	1	10	8	3	18	15	6	29	37	5	7	5	2		175
N															1	1	1									5
D																										0
Σ	6	13	5	3	1	55	34	3	5	-	35	54	203	111	41	156	131	86	140	198	210	108	86	35	39	1758

6	13	5	3	1	55	34	3	5	-	
	35	54	203	111	41	156	131	86	140	198
					210	108	86	35	39	

45 *Eleodes armata* LeConte
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																										0
J																										0
F																										0
M																										0
A																										0
M																										0
J																										0
J									1																	1
A						2	4	9	2										1							18
S								11	2																	13
O																										0
N																										0
D																										0
Σ	-	-	-	-	-	2	4	20	5	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	32

	-	-	-	-	-	2	4	20	5	-
		-	-	-	-	-	-	-	1	-
						-	-	-	-	

46 *Eleodes* sp. #1
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D																										0
J																										0
F																										0
M																										0
A																										0
M																										0
J		1		1		9	2										1		1		11		4			30
J	3	10	3	26	6	31	14				1	9	3	1	9			1			3		3		1	124
A	4	4	5	7	9	12	1					7	7	4	2	2					16					80
S	2	3	4		1	4	2				4	3	3	3	2											31
O												1														1
N																										0
D																										0
Σ	9	18	12	34	16	56	19	-	-	-	5	20	13	8	13	2	1	1	1	-	30	-	7	-	1	266

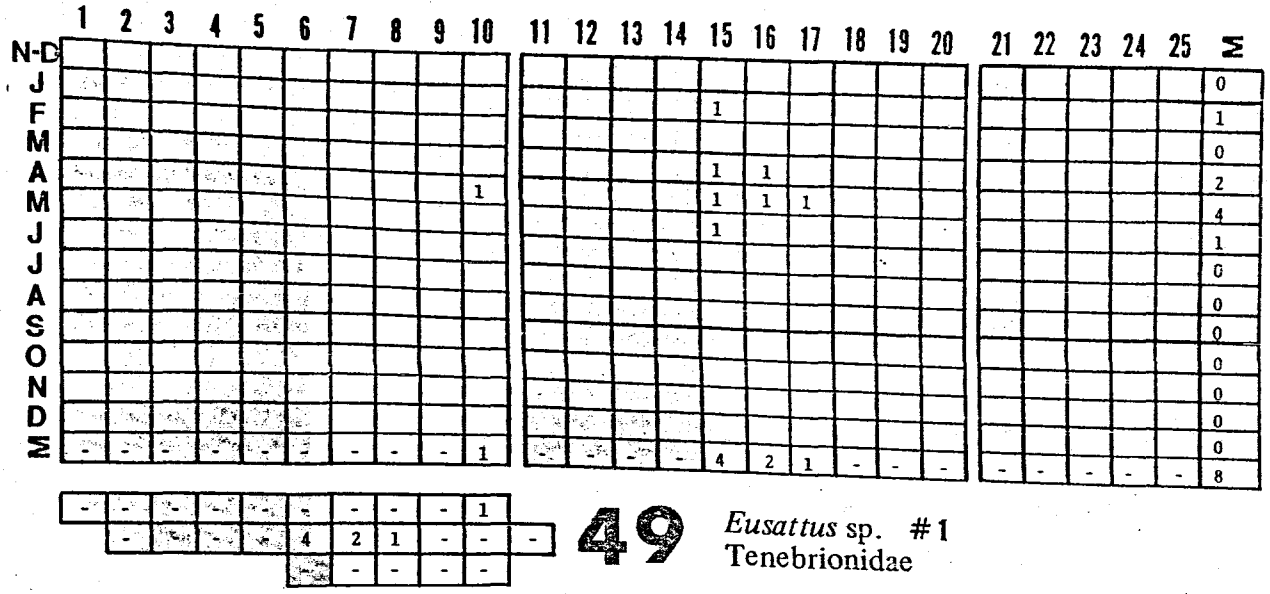
	9	18	12	34	16	56	19	-	-	-
		5	20	13	8	13	2	1	1	1
						30	-	7	-	1

47 *Eurymetopon* sp. #1
Tenebrionidae

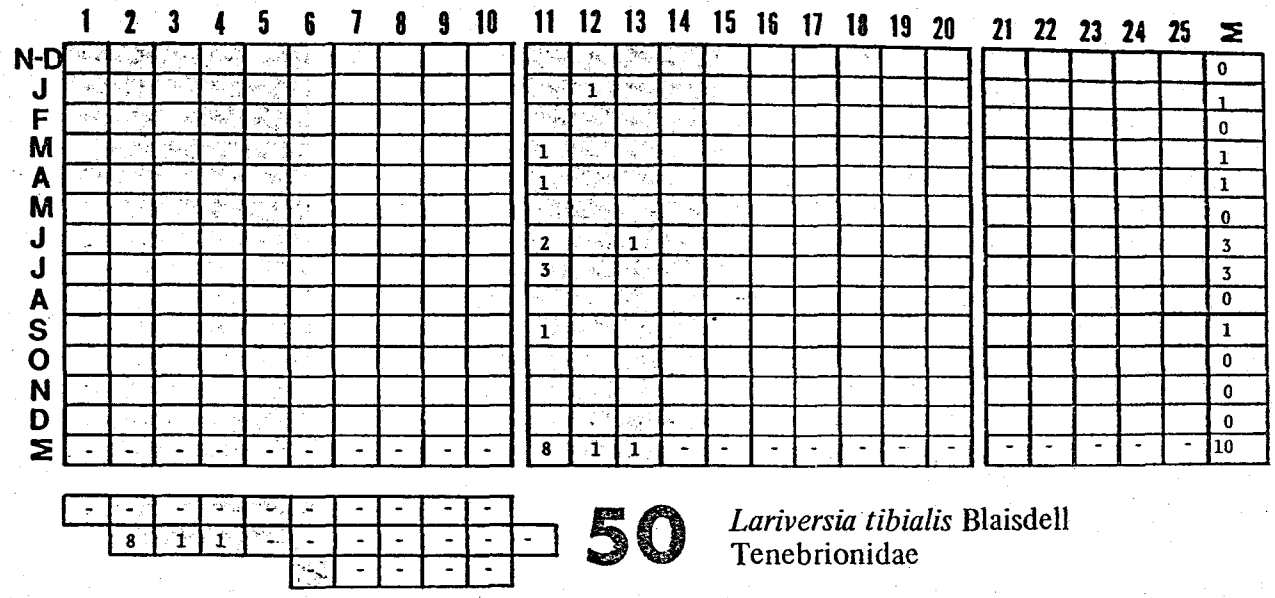
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Σ
N-D	50	32	3	4	2							1	6													98
J	6	7		3									2													18
F	18	12	3	2	7	1					4	12	5		2											65
M	53	21	5	8	7	3					35	31	27	2	2											191
A	27	20	3	1	1	2					5	1	1	2				1			1					65
M	8	8	1	1		1					1	4	5	2												31
J	8	12	4		1	2						4	24		1											56
J	15	2		4	5						3	20	11	1	4						1					64
A	2	2	1	3	6							14	11		2											41
S	3	1	2	6	4	3					2	4	75	3	3											103
O	8		2	5	1						1	6	7	1	5											36
N	1				1							1			1											3
D																										0
Σ	197	117	24	37	35	8	-	-	-	-	51	98	174	11	16	-	-	1	-	-	2	-	-	-	-	771

	197	117	24	37	35	8	-	-	-	-
		51	98	174	11	16	-	-	1	-
						2	-	-	-	-

48 *Eusattus muricatus* LeConte
Tenebrionidae



49 *Eusattus* sp. #1
Tenebrionidae



50 *Lariversia tibialis* Blaisdell
Tenebrionidae

51 *Mecysmus angustus* LeConte
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																	1									1
M																										0
A										1						1	1									3
M							1	1		1	1					2	2	4	2							14
J							3			1						1		8	1							14
J							2										3	1	1							7
A							1	1									1		1							4
S								1																		1
O																										0
N																										0
D																										0
M	-	-	-	-	-	-	7	3	-	3	1	-	-	-	-	4	8	13	5	-	-	-	-	-	-	44

-	-	-	-	-	-	7	3	-	3		
	1	-	-	-	-	4	8	13	5	-	
					-	-	-	-	-		

52 *Metoponium* sp. #1
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D					2											1										3
J																										8
F																										0
M														2		1				1						4
A		2	1		1	2					1	1	4	3	1	1			1	1						19
M	1	1	1			1					1	18	48	6	12	14	1		2	8						114
J	1					3						4	17	2		4	4			17						52
J	1			1								5	3	8		9	7	3	14	3						54
A			2			1							3	2	2	2	2	2	1	2						19
S											1	1	1				2			1						6
O												1	1	2			1	1								6
N																										0
D																										0
M	3	3	4	1	3	7	-	-	-	-	3	30	77	25	15	32	17	6	18	33	-	-	-	-	-	277

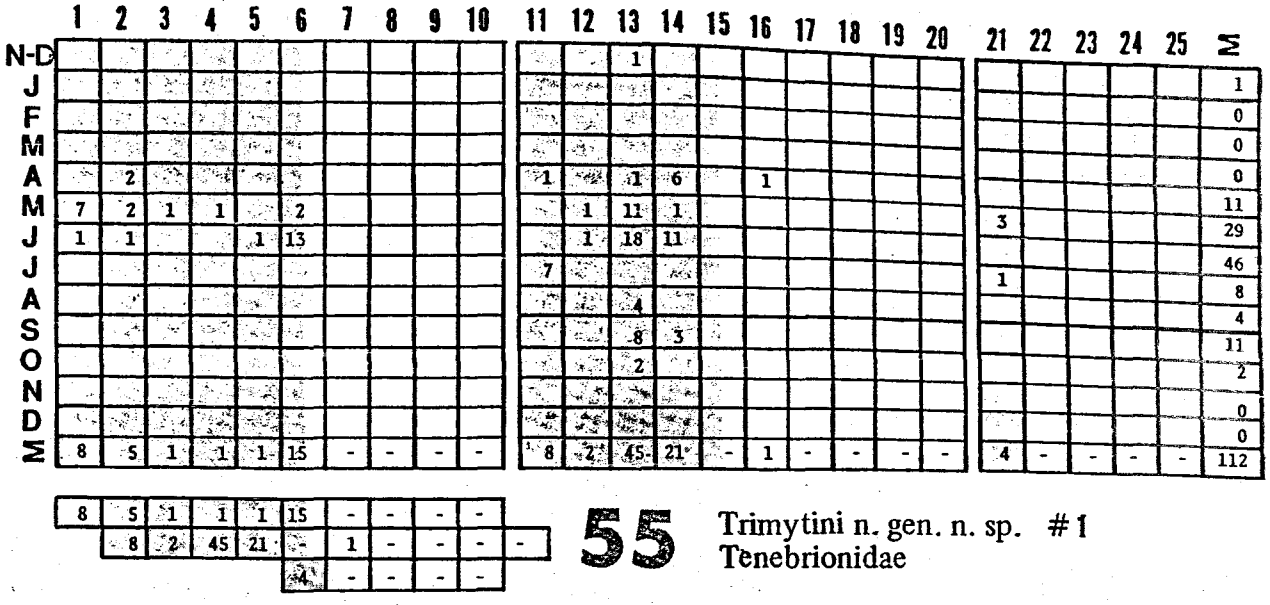
3	3	4	1	3	7	-	-	-	-		
	3	30	77	25	15	32	17	6	18	33	
					-	-	-	-	-		

53 *Notibius puncticollis* LeConte
Tenebrionidae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A																										0
M					3																					3
J		1	1	1									2	1	1											7
J	1		1	1	1							4		1												9
A														1												1
S																										0
O																										0
N																										0
D																										0
M	1	1	2	2	4	-	-	-	-	-	-	4	2	3	1	-	-	-	-	-	-	-	-	-	-	20

1	1	2	2	4	-	-	-	-	-		
	-	4	2	3	1	-	-	-	-	-	
					-	-	-	-	-		

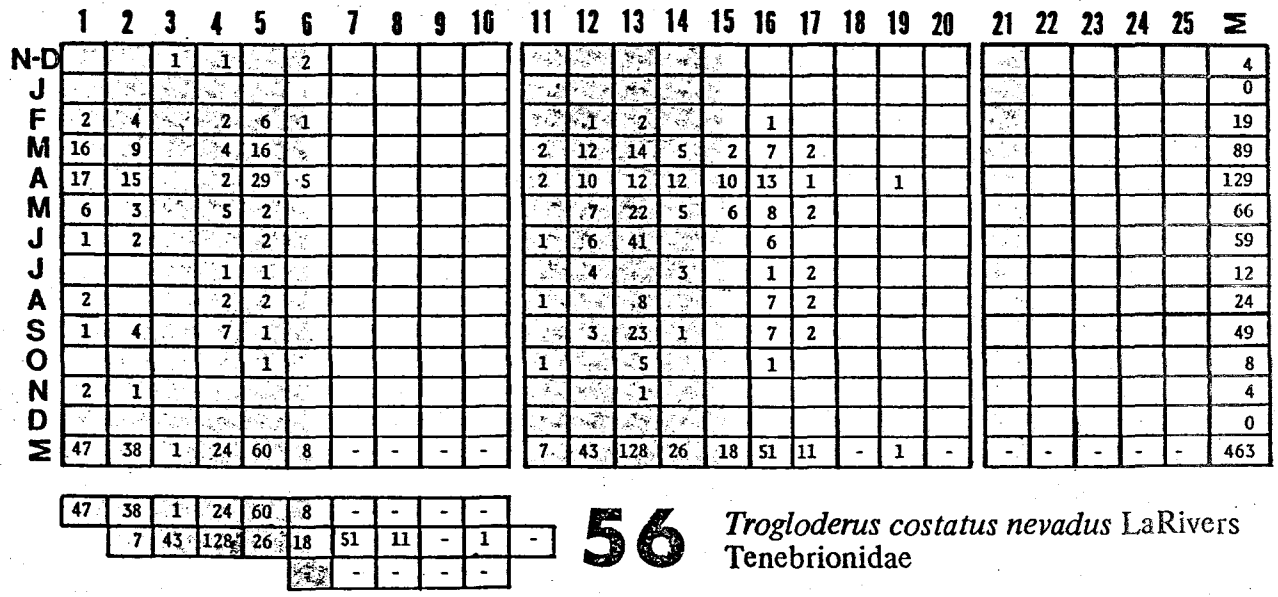
54 *Telabis serrata* LeConte
Tenebrionidae



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D													1													1
J																										0
F																										0
M																										0
A		2									1		1	6		1										11
M	7	2	1	1		2						1	11	1							3					29
J	1	1			1	13						1	18	11												46
J											7										1					8
A													4													4
S													8	3												11
O													2													2
N																										0
D																										0
M	8	5	1	1	1	15	-	-	-	-	8	2	45	21	-	1	-	-	-	-	4	-	-	-	-	112

8	5	1	1	1	15	-	-	-	-	
	8	2	45	21	-	1	-	-	-	-
					4	-	-	-	-	

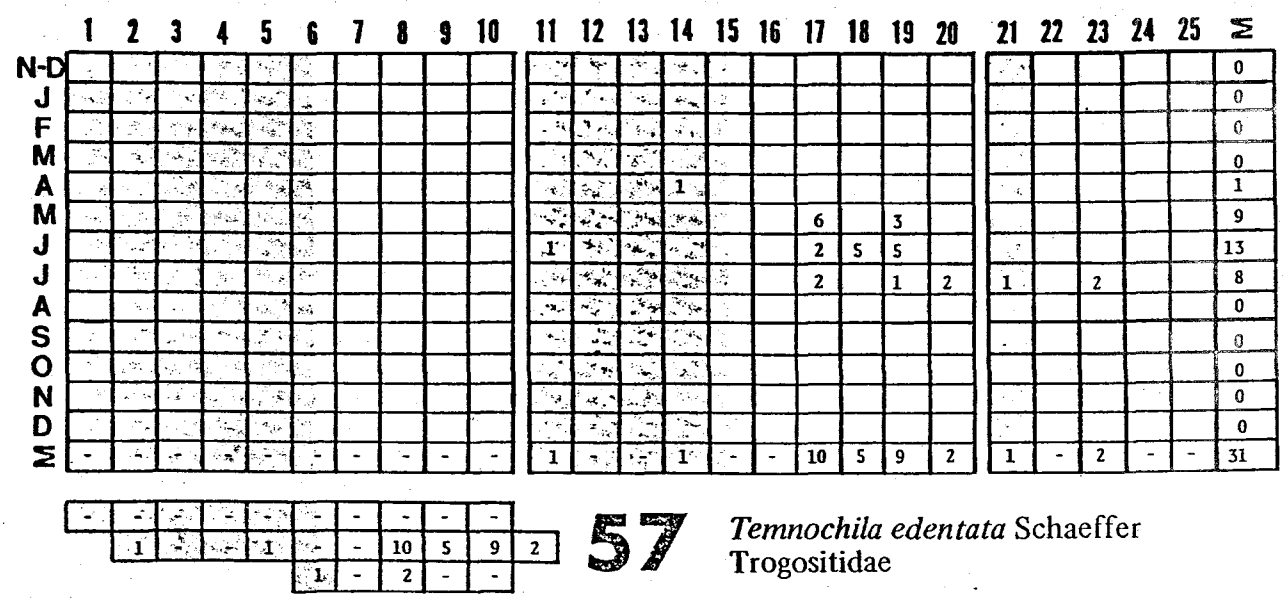
55 Trimytini n. gen. n. sp. #1
Tenebrionidae



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D			1	1		2																				4
J																										0
F	2	4		2	6	1						1	2			1										19
M	16	9		4	16						2	12	14	5	2	7	2									89
A	17	15		2	29	5					2	10	12	12	10	13	1		1							129
M	6	3		5	2							7	22	5	6	8	2									66
J	1	2			2						1	6	41			6										59
J				1	1							4		3		1	2									12
A	2			2	2						1		8			7	2									24
S	1	4		7	1							3	23	1		7	2									49
O					1						1		5			1										8
N	2	1											1													4
D																										0
M	47	38	1	24	60	8	-	-	-	-	7	43	128	26	18	51	11	-	1	-	-	-	-	-	-	463

47	38	1	24	60	8	-	-	-	-	
	7	43	128	26	18	51	11	-	1	-
					4	-	-	-	-	

56 *Trogloderus costatus nevadus* LaRivers
Tenebrionidae



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M
N-D																										0
J																										0
F																										0
M																										0
A														1												1
M																	6		3							9
J											1						2	5	5							13
J																	2		1	2	1		2			8
A																										0
S																										0
O																										0
N																										0
D																										0
M	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	10	5	9	2	1	-	2	-	-	31

-	-	-	-	-	-	-	-	-	-	
	1	-	-	1	-	-	10	5	9	2
					1	-	2	-	-	

57 *Temnochila edentata* Schaeffer
Trogositidae

FIGURES

Fig. 1. The sand dunes at the S end of Owens Lake, near Olancha, looking NE from the dune interior. Note the gravelly deflation area in the middleground, and the large hummocks of *Artemesia* spp.

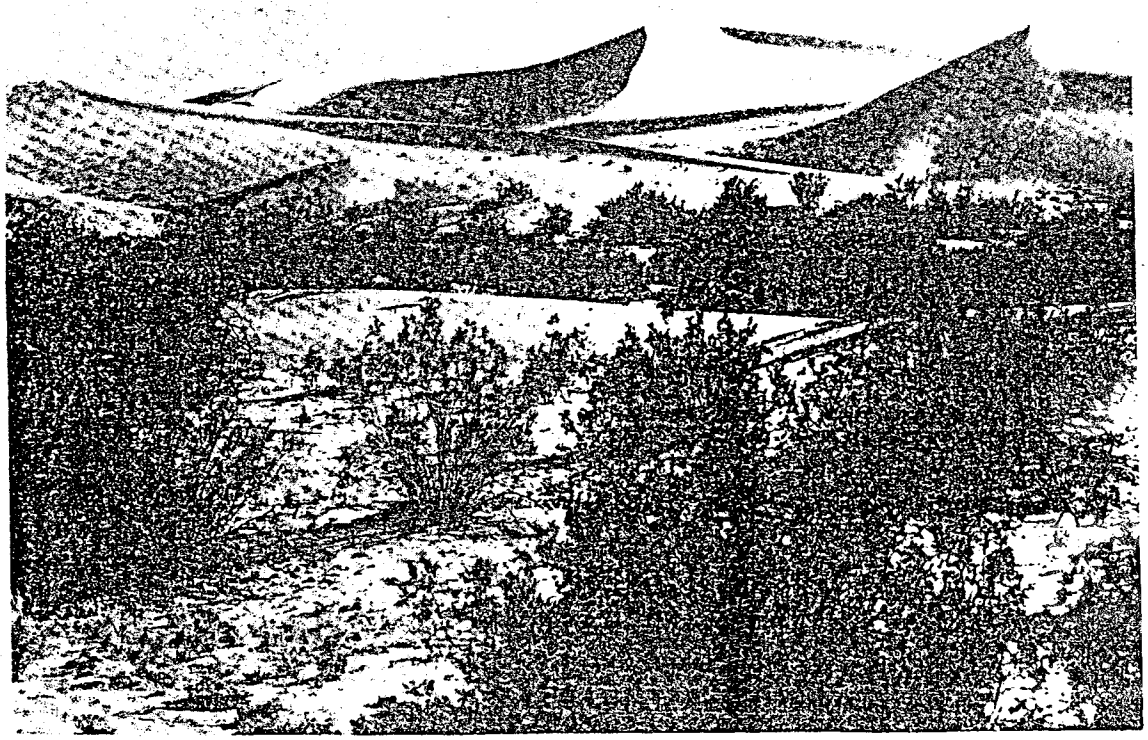


Fig. 2. Sand dunes S of Cadiz, looking SW from the dune edge. Creosote stands in foreground, with numerous annuals.

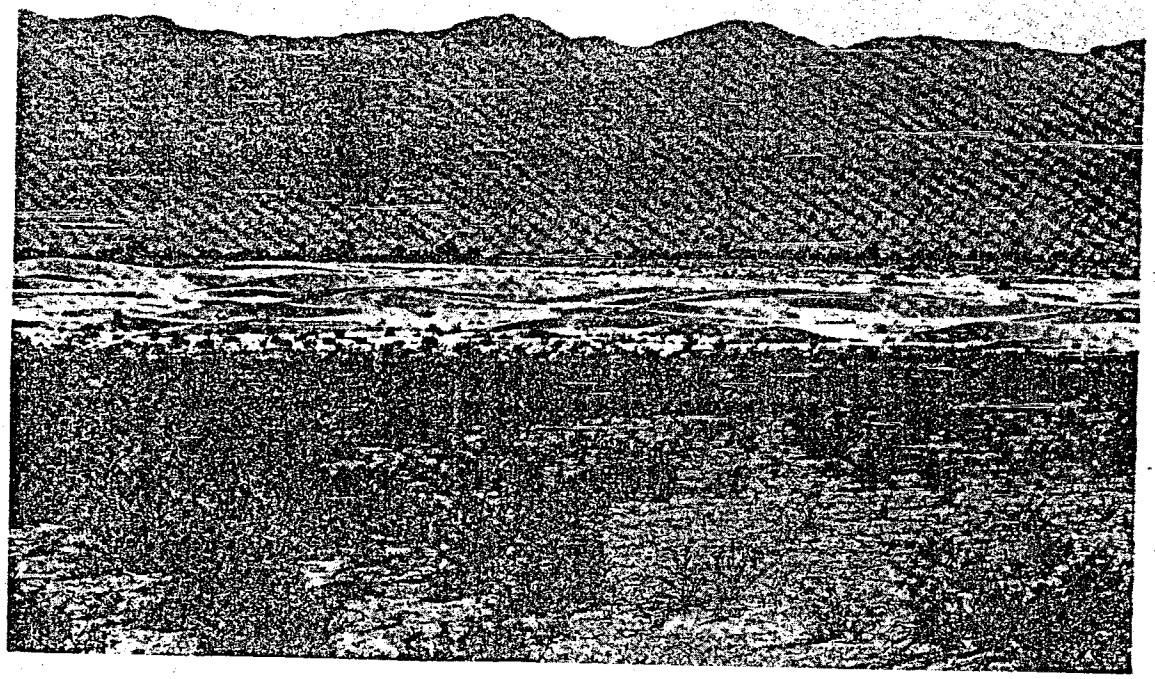


Fig. 3. Low sand dunes SE of Rice. Creosote in foreground, Palo Verde along wash in background.

Fig. 4. Low sand dunes SE of Rice, looking N from dune mass at study site. *Ambrosia* and Palo Verde on the dunes in foreground.

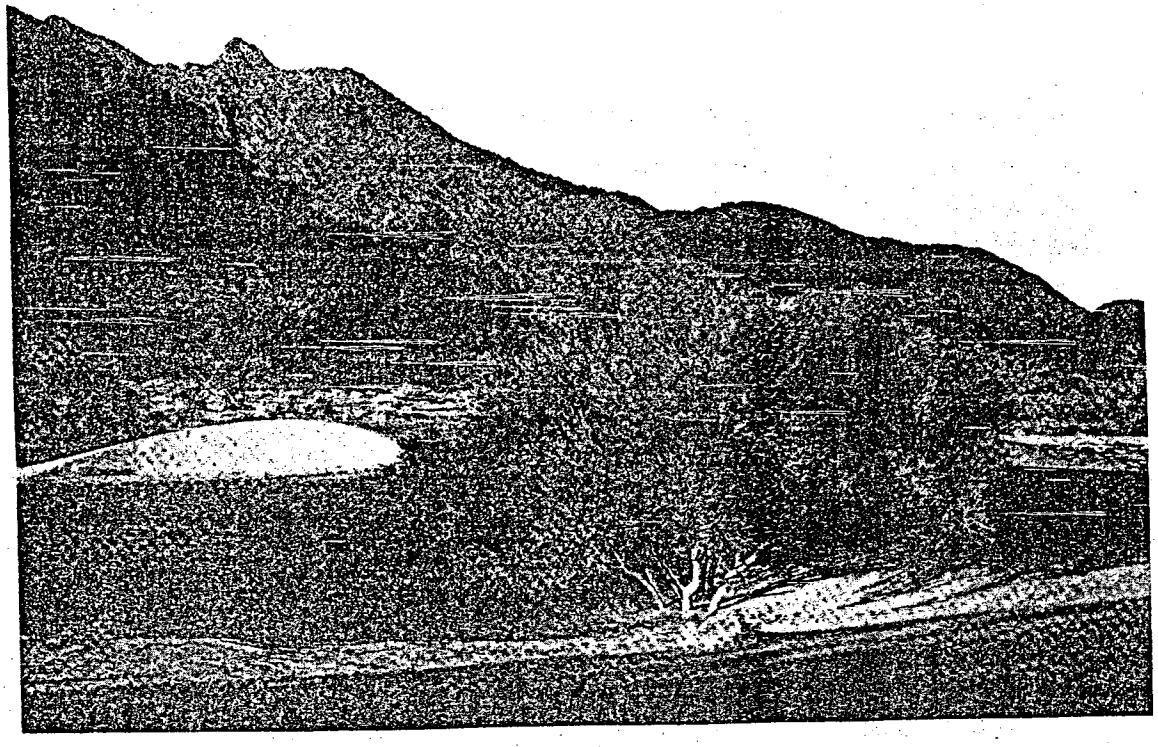


Fig. 5. Sand dunes SE of Rice. Palo Verde being covered by encroaching sand. Looking S from study area.

Fig. 6. Low dunes at SE of Palen Lakebed. Palo Verde and *Ambrosia* in foreground. View NE from near S edge of dunes.

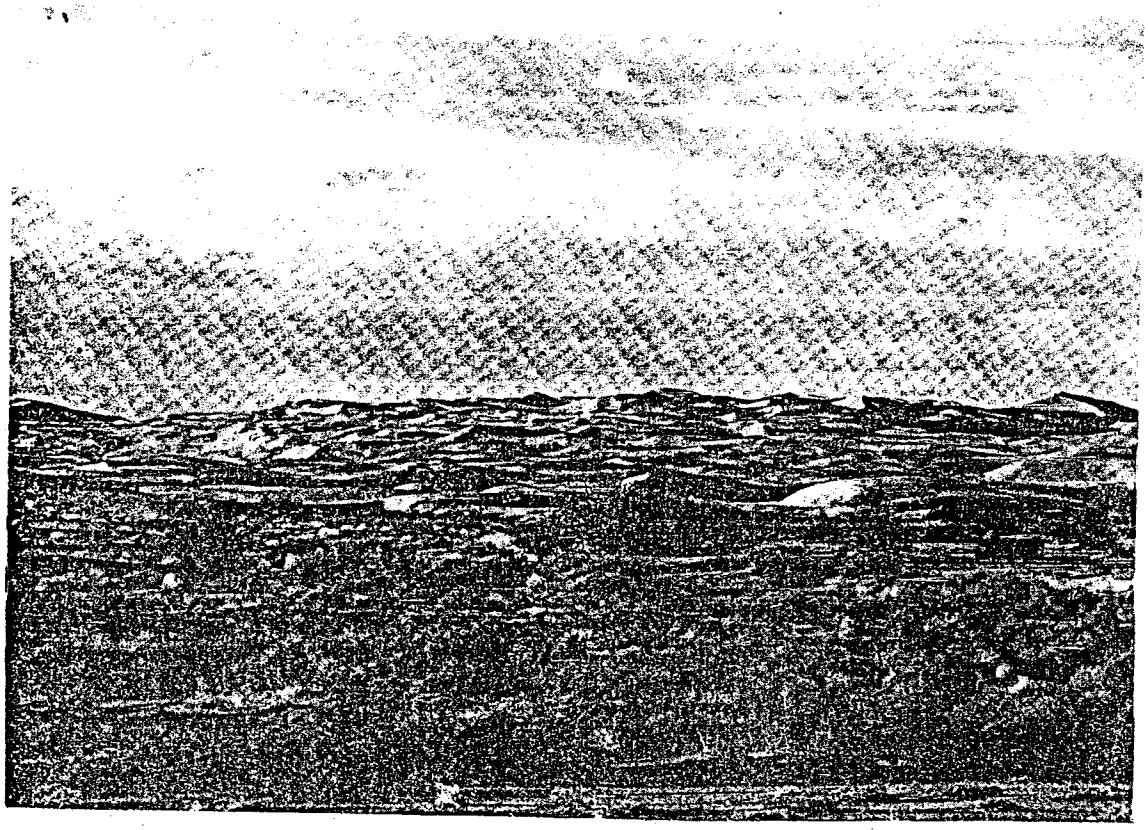


Fig. 7. Dune mass of Algodones dunes from E edge, looking SW. Mixed sclerophyll (including Creosote) in foreground, main dune mass two miles in background.

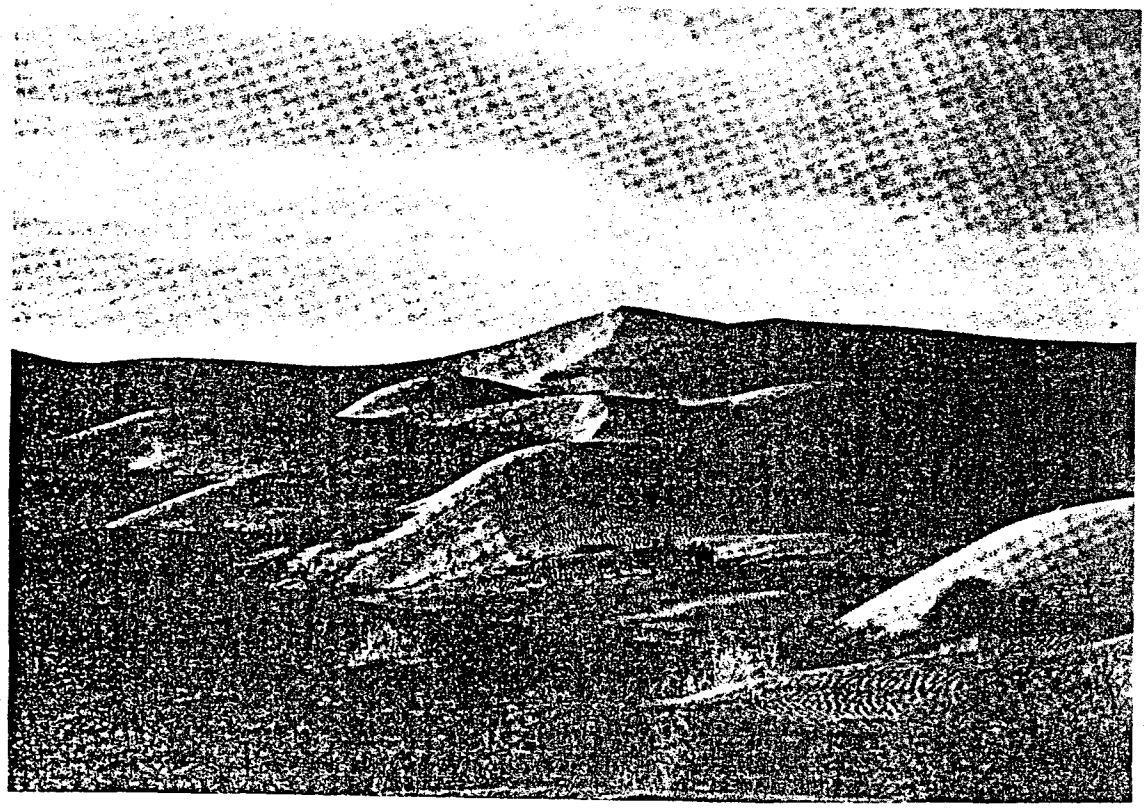


Fig. 8. Main dunes in the Algodones dune system. Note vegetated low-lying areas. From near the E edge of the dunes.

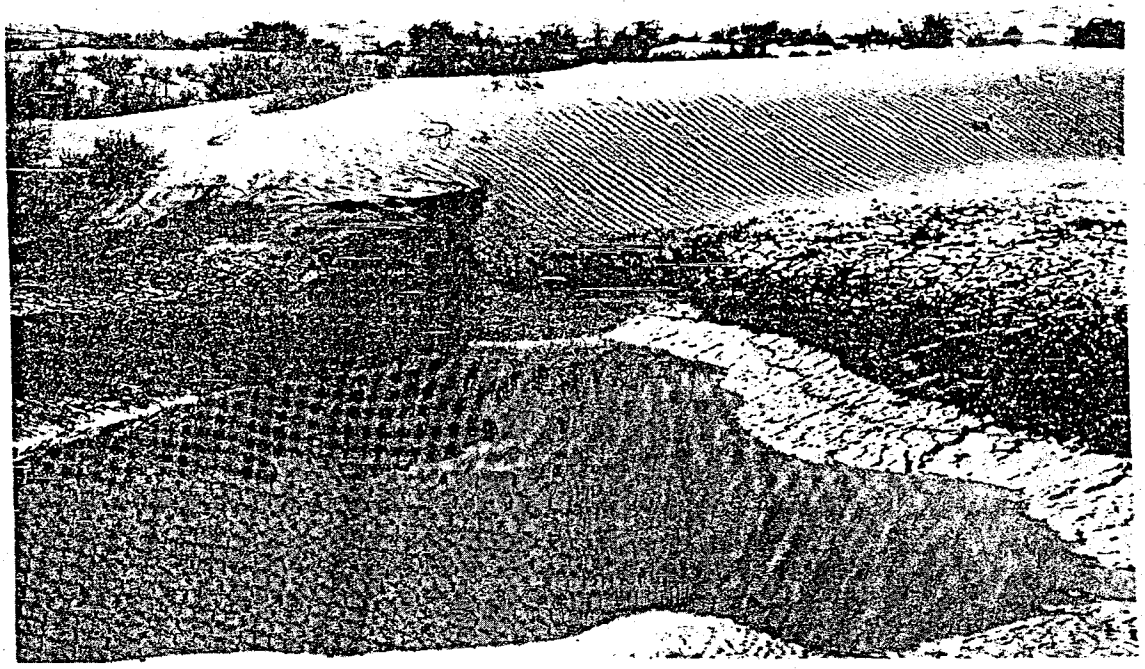


Fig. 9. A small pool of runoff water backed up against the E side of the Algodones dunes. Many of these areas become dense thickets of mixed vegetation, as was present nearby. These small pools are rapidly colonized by aquatic Coleoptera (see listing for Algodones Dunes in Appendix A).

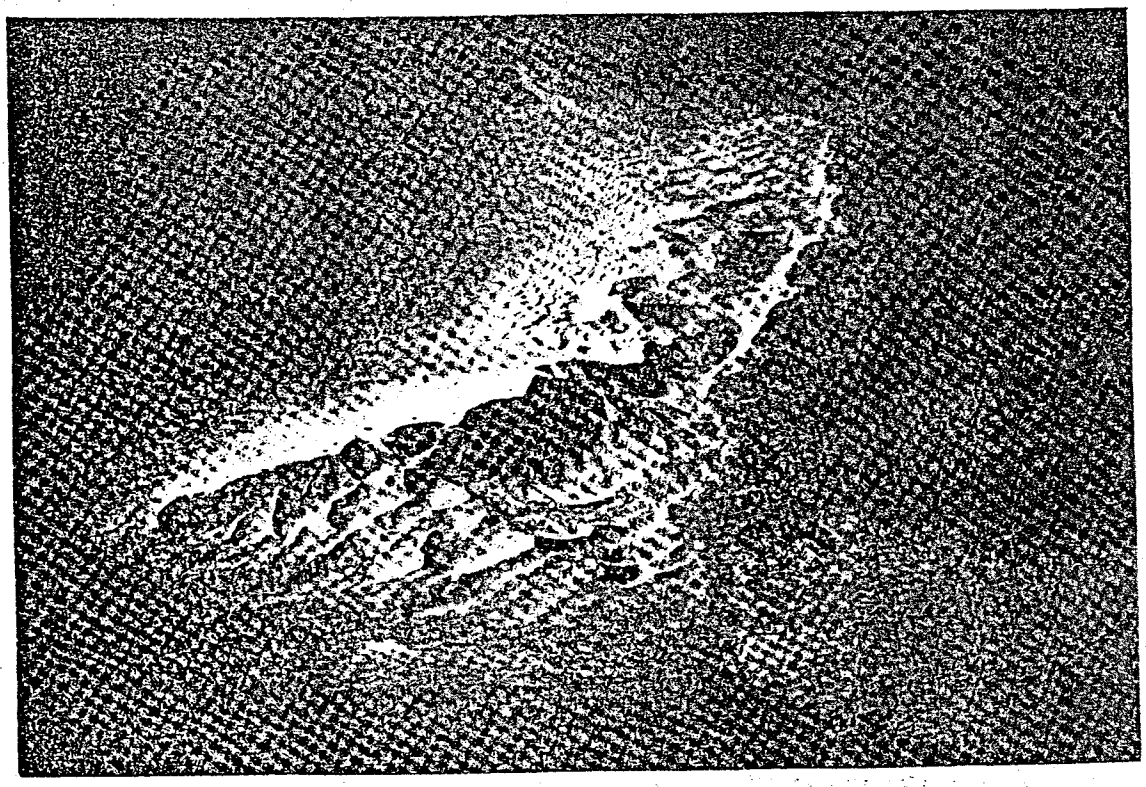


Fig. 10. Aerial view of the Eureka Valley Dunes, site of the studies in Part II. View looking S. The site for the 1976 study was at the edge of the dunes in the foreground. The 1978 transects ran from the middle-left portion of the dune onto the rocky area towards the top left corner of the picture, from the tip of the dune at the left of the picture onto the flats out of sight to the left; and from the right edge of the dune onto the dry lakebed to the lower right. (See Fig. 16)