





AREA
Indian Knob
AREA

Arroyo Grande
Crown City

Cienega Valley
Arroyo Grande

Willow Lake
Pipitich Lake
Hospital Lake
Big Twin Lake

Mud Lake
Black Lake
Callender

Jack Lake
Lettuce Lake

Bromelia

GUADALUPE
SANTA MARIA VALLEY

SANTA MANUELA

Newsom Ridge

Picacho

Summit

Black Canyon

NIPOMO

SANTA MARIA VALLEY

SANTA MARIA VALLEY

SANTA MARIA VALLEY

Table 1, continued

	<u>D.h.morroensis</u>		<u>D.h.arenae</u>		*Edna kangaroo rats			
	Avg.	Extreme	Avg.	Extreme	#1 ♂	#2 ♀	#3 ♀	#4 ♂
Width of maxillary arch at middle	5.1	4.9-5.5	♂5.2 ♀5.0	4.9-5.4 4.9-5.2	5.0	4.90	5.1	4.6
			♂2.1 ♀2.3	2.0-2.4 1.6-2.7				
Width of supra-occipital			♂14.8 ♀14.7	14.2-15.3 14.2-15.7	(broken)15.0			
	14.4	13.3-14.9					14.3	13.8

Comparison of Edna kangaroo rat skull measurements with the skull measurements of D.h.morroensis and D.h.arenae. * indicates frozen specimens.

Table 1

<u>Body</u>	<u>D.h.morrisonis</u>		<u>D.h.arenae</u>		*Edna kangaroo rats			
	Avg.	Extreme	Avg.	Extreme	#1 ♀	#2 ♀	#3 ♀	#4 ♂
Weight in grams	63.0	60.6-81.0	66.7	59.5-73.9	49.5	49.5	40.5	40.1
Body length	120.		121	113-126	124	118	115.8	112.6
Tail length	176	164-185	177	171-185	182	165	171.9	171.9
Hind foot length	42.6	42-44	41.6	40-43	42	42	40	40
			41.4	40-44				
<u>Skull</u>								
Greatest length	38.9	37.4-40	39.7	38.6-40.5	(broken nasal)	39.3	39	37.4
			39.5	38.4-41.0				
Basal length			28.2	27.7-28.7	(broken nasal)		33	31.5
			28.1	27.2-29.3	nasal)			
Bullae breadth	23.4	22.5-24.3	24.7	24.3-25.2	25.4	24	23	23.4
			24.4	23.2-25.1				
Maxillary breadth	21.9	21.1-23.2	22.6	21.9-23.2	22.9	22.3	20.6	20.9
			21.9	21.5-22.4				
Length of bullae			13.4	12.9-13.7				
			13.2	12.5-13.9				

continued on next page

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Summary

A study of a previously unknown population of kangaroo rats, which exists one mile west of Edna in San Luis Obispo County, was conducted.

It has been determined that the Edna kangaroo rat is of the subspecies Dipodomys heermanni arenae.

The soil in the habitat of the Edna kangaroo rat consists of Arnold sandy loam. Further investigations on sandy loam soils may reveal an interconnecting network of kangaroo rat populations.

tion. It is possible that in very dry years the stream could dry up and allow passage to the opposite side. The south is blocked by hills, except for a narrow strip of sandy soil. The western side is also blocked by hills except for two or three narrow strips of sandy loam soil. These barriers are not immediately adjacent to the borders of the Edna kangaroo rat habitat. This leaves considerable room for expansion within the topographical barriers mentioned above.

Predators are numerous in the Edna kangaroo rat area. Mr. Paul Fishbeck, manager of the turkey ranch in the area, states that there are many foxes and bobcats. I have observed many badger diggings and have also seen one rattlesnake in the area. Mr. John Guidetti, a rancher in the area, has stated that rattlesnakes have been observed before. According to Lloyd Glenn Ingles(1954) "Dr. Henry Fitch, while working on the Experimental Range in Madera County, found that rattlesnakes were by far the most important predator of the kangaroo rat." Coyotes have been trapped in the area adjacent to the habitat. Hawks and owls are other predators. Ingles(1954) states that "18% of the owl pellets collected within the animals' range contained kangaroo rat bones." It is possible then that these predators help keep the population down to a small size.

the coastline. Furthermore, there are sandy loam areas stretching from Avila Beach to the habitat of the Edna kangaroo rat. This information presents the possibility that morroensis and arenae could have originally been one species if they were ever connected at one time through this strip of sandy loam. It would be well worthwhile for someone to investigate the sandy area between Baywood Park and Avila Beach for the presence of kangaroo rats.

Another area that merits investigation is a place near the road which is known locally as the short-cut to Avila Beach from the 101 highway south of San Luis Obispo. This spot is about 200 yards southeast of a gravel pit and pistol range. This spot is directly adjacent to the road on its north side.

Sandy loam areas in the western part of San Luis Obispo County are indicated on the map which also shows the distribution of kangaroo rats. Through other sources, it may be possible to find sandy loam areas in other portions of the county which are not shown in E.J. Carpenter and R. Earl Storie (1928).

Topographical features may play a part in restricting the range of the Edna kangaroo rat. To the north of the habitat there exists clay adobe soil and steep slopes which are not compatible to kangaroo rats mode of living. To the east there is Pismo Creek, a perennial stream, which may prevent spread of the population in that direc-

Rainfall

The average yearly rainfall in this area is 22 inches.

Discussion

The habitat of the Edna kangaroo rat, as stated previously, is characterized by the presence of Arnold sandy loam. According to E.J. Carpenter and R. Earl Storie (1928) there are several localities in western San Luis Obispo County that are composed of Arnold sandy loam and several other types of sandy loam. It is then apparent that the possibility of discovering another kangaroo rat population is very likely.

Through measurements of skulls, it has been determined that the Edna kangaroo rat is of the subspecies D.h.arenae. The general coloration of the Edna kangaroo rat is close to that of arenae. The occasional obscuration or incompleteness of the white hip stripe of the Edna kangaroo rat is like that of arenae. Arenae is the subspecies that inhabits the sandy area south of Oceano and southward to the Santa Inez Valley. Because of the extensive sandy loam areas between Edna and Oceano, it can be presumed that at one time arenae may have populated some of this intervening area.

An interesting observation is the fact that stretching from Baywood Park, habitat of morroensis, all the way to Avila Beach is a strip of sandy loam along the edge of



Burrow entrance



Burrow entrance



In area A



In area B

ted groups. In area A, brushy types of plants are in evidence throughout the area with black sage being the predominant species. There are some localities in area A that have no brush and closely resemble area B in appearance.

Within area A, there are localities in which the chaparral becomes too thick for the existence of the kangaroo rats.

There are different types of vegetation surrounding the habitat. Many parts of the habitat are bordered by a combination of black sage, Ericameria ericoides, scrub oak (Quercus dumosa), poison oak (Rhus diversiloba), bracken fern (Pteridium aquilinum). Another type is a combination of manzanita (Arctostaphylos), poison oak and bracken fern, with the manzanita being the predominant plant. This type of growth is very thick and almost impossible to penetrate on foot. Oak woodland is in evidence on many borders of the habitat. The predominant plants in this association are live oak, bracken fern and poison oak. The last type in evidence on the borders of the habitat is grazing land which consists of grass and weed species.

Slope

It can be seen on the topographic map that the area is typically of gentle slope.

This soil typically occupies undulating or rolling hill slopes having well-developed surface drainage, but many areas have poor subdrainage.

Arnold sandy loam is extensive. It is especially well developed in a belt of low hills southeast of Edna and on the rolling or undulating terracelike land north of Cambria. The greater part of the agricultural hills bordering the Husana Valley are occupied by this soil, and a small body is at the mouth of Islay Creek south of Morro Bay.

Vegetation

For purposes of convenience in describing the area, the western area of the habitat was labelled area A. The eastern portion of the habitat, which is connected to the western portion by a narrow area, was labelled area B.

The predominant plant throughout both areas A and B is red-stem filaree (Erodium cicutarium). Other less predominant plants in area A are wild oats (Avena fatua), brome-grass (Bromus), Croton californicus, California sagebrush (Artemisia), black sage (Salvia mellifera) and Ericameria ericoides. In area B, other plants less predominant than red-stem filaree, are Croton californicus and Ericameria ericoides.

The vegetation in area B differs from the vegetation in area A. In area B, red-stem filaree forms a mat on the soil. There is very little brush except for small isola-

This involved the inspection of the soil for the typical burrows of the kangaroo rat. When burrows were found in an area, traps were set in the area so that definite proof of the presence of the kangaroo rats would be obtained.

The materials used were twenty Spencer live traps, a glove, meter rule, 7x50 binoculars, maps, compass and an automobile.

Results

Kangaroo rats were found in only one additional area and this proved to be an extension of the original area of discovery. Upon determination of the area of known habitat it was found that the total acreage was only 350 acres. (See accompanying maps)

Description of the Area

Soil

The soil in this area is an Arnold sandy loam. According to E.J. Carpenter and R. Earl Storie(1928) Arnold sandy loam is characterized by a light brownish-gray or dull dark brownish-gray surface soil, from 10 to 20 inches thick. The subsoil consists of light grayish-brown or, in places, of dull grayish-brown or dark brownish-gray sandy clay loam, or sandy clay, which rests on bedrock usually at a depth ranging from 30 to 40 inches.

Arnold sandy loam is residual from light-colored sandstone.

Peachtree, in Monterey County, south at least to Creston, in San Luis Obispo County; west to Jolon. The range of D.h. morroensis is sandy ground in the immediate vicinity of Morro Bay, San Luis Obispo County. The area of known habitat is less than four miles square. According to a recent study of the D.h. morroensis population, Glenn Stewart (1958) determined the area of known habitat to be approximately 4.8 square miles.

Grinnell (1922) gives the range of D.venustus sanctiluciae as the Santa Lucia Mountain region, namely the mountainous area of west-central California lying between the Salinas Valley and the seacoast, and between Monterey Bay and San Luis Obispo.

Methods and Materials

Soil Conservation aerial photos of the area between Oceano and Edna, and of the area between Avila Beach and Lopez Canyon were investigated. The purpose of this map work was to locate areas that were similar in soil color and vegetation patterns comparable to the area near Edna where kangaroo rats existed.

Next, these similar areas were indicated on a U.S. Geological Survey topographic map (contour map). The reason for this was to give a clear idea of the area's topography and to make these areas easily located and identified during fieldwork.

The promising areas were then investigated on foot.

the population to the south near Oceano?

I agreed to conduct a study of this population as a senior project. At this time I would like to express my gratitude for the advice and criticism offered by Dr. A. I. Roast^{and} also to Mr. Glenn Stewart for the fieldwork which led to the discovery of the Edna kangaroo rat.

The Problem

The purpose was to determine the distribution of kangaroo rats between Edna and Oceano and between Avila Beach and Lopez Canyon, and to determine their affinities with neighboring populations.

Distribution of Kangaroo Rats In Western San Luis Obispo County

In western San Luis Obispo County, there are two species of kangaroo rats. One species is D. heermanni represented by three subspecies; D.h. arenae, D.h. jolonensis, and D.h. morroensis. The other species is D. venustus santiluciae.

According to Boulware (1943) the range of D.h. arenae is the Pacific slope of San Luis Obispo and Santa Barbara counties from Oceano southward to the Santa Inez River and up the Santa Inez River valley at least as far as Buellton.

Grinnell (1922) reports the range of D.h. jolonensis as the upper (southern) end of the Salinas Valley and tributary valleys, from the vicinity of King City and

DISTRIBUTION OF THE EDNA KANGAROO RAT POPULATION

By Larry J. Souza

History

In August of 1957, Dr. Aryan I. Roest, instructor in the biological science department at California State Polytechnic College, was investigating a soils map of San Luis Obispo County. His intention was to locate areas similar in soil properties to those characteristic of the habitat of Dipodomys heermanni morroensis near Morro Bay. It was possible that there existed a previously unknown kangaroo rat population.

Glenn Stewart, a biological science student who was conducting a senior project on the D.h. morroensis population, was requested by Dr. Roest to investigate a likely area approximately 1 mile west of Edna. Mr. Stewart investigated the area unsuccessfully until he hiked over a hill to a sloping sandy area. This area was immediately south of the one that Dr. Roest had felt might be productive. In this sandy area a new population of kangaroo rats, previously unknown to science, was discovered!

Here was an intriguing situation which presented questions that should be answered. Was this an isolated population? If so, what area of distribution did this population cover? Was this a new species, or was it related to the population to the north at Baywood Park or to

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