

JOB FINAL REPORT

State: California Project Number: W-54-R-10

Study and Job Numbers: IV - 1.0

Title: Amargosa Vole Study

Period Covered: July 1, 1977 - June 30, 1978

SUMMARY:

A second survey of Amargosa vole (Microtus californicus scirpensis) distribution in Inyo and San Bernardino counties was conducted 2-6 December 1977. Bulrush (Scirpus olneyi) marshes near Shoshone, Tecopa Hot Springs, and Tecopa, and at Saratoga Springs in Death Valley National Monument, were live-trapped to determine the presence or absence of voles. In 622 trap-periods at seven sites, 15 voles were captured. All but one were captured at a single site. Recommendations for additional field work are included, as is a recommendation that this subspecies be classified as Endangered by the California Fish and Game Commission and by the Secretary of the Interior.

BACKGROUND:

The Amargosa vole (Microtus californicus scirpensis), thought to be extinct since about 1917 (Kellogg 1918), indeed is extant (Bleich 1979). Although this subspecies was collected along the Amargosa River during the 1930's (Allen 1942, Bleich 1979), agencies charged with the protection of threatened or endangered species until recently have remained unaware of Allen's (1942) reference (Bleich 1979). This vole appears to be restricted to a few marshes near Tecopa, Inyo County, California. These marshes are subject to possible natural destruction and human encroachment. Aside from this report, Gould and Bleich (1977) and Bleich (1979) provide the only recent information available on this animal.

The Department of Fish and Game (DFG) conducted the first phase of this study during April 1977 (Gould and Bleich 1977). At that time, investigations were conducted along the Amargosa River from the Nevada state line south into the Amargosa Canyon, in northern San Bernardino County. Trapping was conducted in several bulrush (Scirpus olneyi) marshes in the vicinity of Tecopa and Shoshone, Inyo County, to obtain information on the distribution of this vole in those areas. This report describes the second phase of investigations which DFG has conducted on M. c. scirpensis.

OBJECTIVES:

Based on the recommendations of Gould and Bleich (1977), the following objectives were to be met by this phase of the study: (1) complete a more thorough determination of the distribution and habitat preferences of the Amargosa vole; (2) determine land ownership in the Tecopa-Tecopa Hot Springs area; (3) familiarize the DFG manager of the Desert Wildlife Management Unit (most of San Bernardino County and a small portion of Inyo County) with the Amargosa vole and its habitat.

PROCEDURES:

Areas of apparently suitable vole habitat (Bailey 1900, Gould and Bleich 1977) were investigated in the vicinity of Tecopa and Tecopa Hot Springs, Shoshone, and Saratoga Springs, Death Valley National Monument. A figure (p. 3) illustrates those sites near Tecopa which were investigated during this study, as well as those investigated during Gould and Bleich's (1977) study. In this study, traps were set at one site near Shoshone, at five sites in the vicinity of Tecopa, and at one site near Saratoga Springs. Traps were set in a linear transect and were used to confirm the presence of voles at each site. Absence at a site could not be ascertained, because of the low trapping effort (few trap-periods) per site. Because the marsh vegetation was very dense at some sites, traps were placed along the periphery of the Scirpus habitat. At one site, several M. c. scirpensis were marked individually by toe-clipping prior to being released.

FINDINGS:

During this phase of the study, 15 individual M. c. scirpensis were live-trapped, all in the Tecopa-Tecopa Hot Springs area. Fourteen voles were taken at one site, and an individual was captured at a second site. Five sites which were investigated yielded no voles. Table 1 presents a summary of the habitats at all sites thus far investigated, including the sites investigated during the first phase of the study.

As reported by Gould and Bleich (1977), no single habitat parameter appears to determine vole distribution in the marsh habitat; however, some generalizations about the distribution of this subspecies can be made from data obtained from this and previous survey work.

The Amargosa River presents the unique situation of abundant perennial surface water occurring deep in the Mojave Desert. This phenomenon enables a thriving marsh community to exist in one of the most arid regions of the United States (Bleich 1974). Data gathered during past surveys (Bleich 1979, Gould and Bleich 1977) generally support Bailey's (1900) description of the habitat as being the wet ground under the tall "tules." Amargosa voles have been captured at seven of the 18 localities surveyed; water was present at six of those seven localities. Topographic gradients, as subjectively determined, ranged from flat (0% slope) to steep (20% slope). Density of the vegetation, which was predominantly S. olneyi, ranged from high (closed) to low (open). Bradley's (1970) and Bradley and Deacon's (1970) descriptions of the marsh vegetation at Saratoga Springs, Death Valley National Monument, approximate the composition of the marsh community along the Amargosa River. A brief summary of ecological data pertaining to the habitat of M. c. scirpensis is presented in Table 1.

At six of the seven localities which yielded voles, only one animal was taken during a given trapping period (Table 1). This probably is a function of the generally low trapping effort expended at each site (Table 1). At site 15, however, 220 trap-nights and 256 trap-days were expended over four days during December 1977. During that period, 14 voles were captured and recaptured a total of 38 times, for an initial capture rate of 2.94 voles/100 trap-periods (1 trap-period = 1 trap-day or 1 trap-night), and an overall capture rate of 7.98 voles/100 trap periods. The initial capture rate for both phases of the study (1092 trap-periods) was 1.92 voles/100 trap periods.

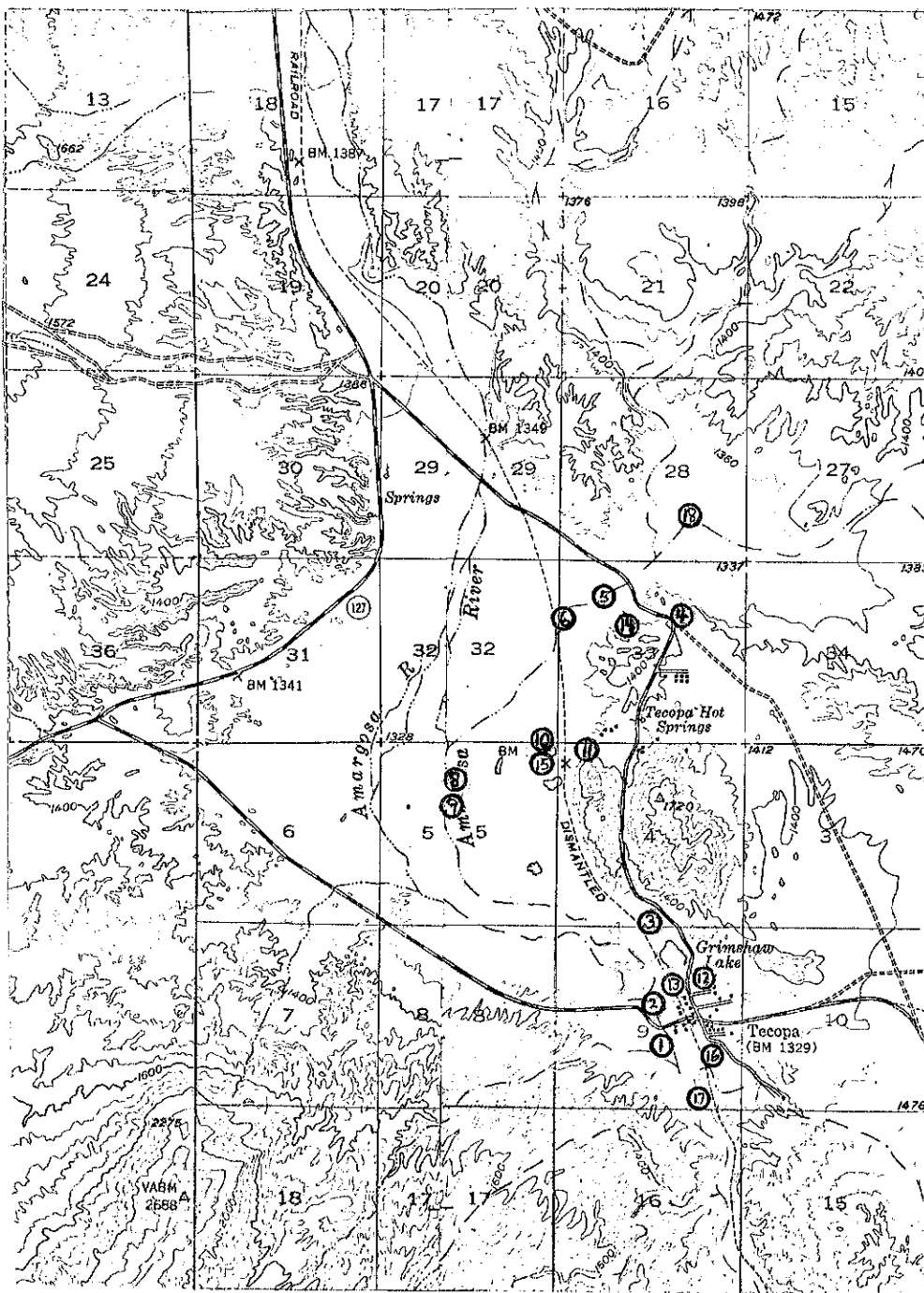


Figure. Trapping sites in the vicinity of Tecopa and Tecopa Hot Springs, Inyo County. Numbers correspond to those in Tables 1 and 2. Site 7 is located near the town of Shoshone, which is not shown in this figure.

TABLE 1. Ecological characteristics of Microtus californicus scirpensis habitat.

Trapping Site	Date	No. Initial Captures	Trap-Periods	Scirpus Density	Topographic Relief	River Course
1	2/75	0	11	high	steep	incised
	3/71	0	100			
	4/77	1	16			
2	4/77	0	0	low	steep	incised
3	4/77	0	30	high	flat	spread out
4	4/77	1	16	moderate	steep	spread out
5	4/77	0	30	moderate	flat	incised
6	4/77	0	10	high	flat	pool
7	4/77	0	20	high	shallow	spread out
	12/77	0	20			
8	2/75	1	21	moderate	steep	incised
	4/77	1	82			
9	4/77	0	26	moderate	steep	no water
10	4/77	1	20	high	flat	pool
	12/77	0	56			
11	4/77	0	21	moderate	steep	spread out
12	4/77	1	46	high	shallow	spread out
13	4/77	0	21	low	shallow	spread out
14	12/77	0	24	moderate	shallow	spread out
15	12/77	14	476*	moderate	flat	incised
16	12/77	1	16	high	flat	no water
17	12/77	0	20	open	flat	spread out
18	12/77	0	10	absent**	steep	incised
		21	1092			

* includes 220 trap-nights and 256 trap-days

** this site supported a dense stand of Juncus sp. (sedges)

Over 53% (20/38) of the captures at site 15 occurred during daylight hours, suggesting a substantial amount of diurnal activity. All but four individuals captured during December were juveniles, which suggests that a substantial amount of reproductive activity occurs during the late fall. Juveniles also have been captured during April (Gould and Bleich 1977).

All traps at site 15 were set within an area measuring approximately 20 x 30 m. Home ranges of at least 14 individuals (11 of them juveniles) overlapped at least part of that area. It is likely that dispersal of the juveniles will lower the high density suggested by the trapping data. At least two juveniles demonstrated movements of approximately 25 m between captures. Because voles were always observed to scramble into matted Scirpus when released, these movements tend to support Bailey's (1900) description of voles using runways constructed through mud and water.

Rodent species associated with the voles include the western harvest mouse (Reithrodontomys megalotis) (2 localities) and cactus mouse (Peromyscus eremicus) (1 locality). Other species captured at sites where voles were not taken were the desert woodrat (Neotoma lepida), deer mouse (Peromyscus maniculatus), and house mouse (Mus musculus). The latter species was very common at Shoshone.

J. H. Brown (pers. comm.) reported capturing three voles in 10 trap-nights using Museum Special traps. During DFG investigations, proportionately more voles were captured in Sherman live traps than in snap traps, although this difference was not significant ($P > .05$; $\chi^2 = 2.75$). This is of interest because live-trapping apparently can be utilized effectively to further our knowledge of the distribution and ecological relationships of this uncommon animal.

Following the recommendation made by Gould and Bleich (1977), data on land ownership in the vicinity of Tecopa and Tecopa Hot Springs were gathered during November 1977. These data are presented in Table 2, and are cross-referenced by trapping locality. As is readily apparent from these data, 85% (6/7) of the known vole populations are on private land. Indeed, most of the sites having apparently suitable vole habitat are privately owned. Only the poorer quality lands (those consisting of steep, rocky cliffs or alkali flats) in the vicinity of most sites are in public ownership. The principal public landowner in the vicinity of Tecopa Hot Springs is the U. S. Bureau of Land Management (BLM). BLM lands in this area are administered by the Bakersfield District Office.

In order to accomplish Gould and Bleich's (1977) third recommendation, the Department of Fish and Game's Desert Unit Manager participated in the December 1977 field work. The Desert Unit Manager assisted with the habitat surveys and the trapping. Through his participation, he has become aware of the problems facing the vole, and is familiar with what presumably is "suitable" vole habitat.

ANALYSIS:

Certain areas in the vicinity of Tecopa Hot Springs support relatively high populations of M. c. scirpensis. Other marshy areas which appear to be uninhabited also may support this subspecies. Further intensive field work

TABLE 2. Ownership* of sites known to support populations of Microtus californicus sciirpensis (*not legally surveyed).

<u>Site</u>	<u>Legal Description</u>	<u>Owner</u>
1	NW 1/4 SE 1/4 Sec. 9, T20N R7E	Private
4	SE 1/4 NE 1/4 Sec. 33, T21N R7E	Public
8	NW 1/4 NE 1/4 Sec. 5, T20N R7E	Private
10	NE 1/4 NE 1/4 Sec. 5, T20N R7E	Private
12	NE 1/4 NE 1/4 Sec. 9, T20N R7E	Private
15	NE 1/4 NE 1/4 Sec. 5, T20N R7E	Private
16	NE 1/4 SE 1/4 Sec. 9, T20N R7E	Private

is necessary to confirm the occurrence and determine the density of voles at sites already investigated, as well as at yet unstudied sites.

Although Gould and Bleich (1977) suggested that a capture-mark-recapture method of estimating population sizes would not be practical, data from this study have shown it to be so. It must be realized, however, that any derived population estimates will be valid only for a short time, as M. c. scirpensis likely undergoes radical population fluctuations similar to those exhibited by many other microtine rodents.

All investigations have been restricted to the area north of the Amargosa Canyon. Most of the apparently suitable habitat in the canyon is in private ownership, although BIM does have extensive holdings in the canyon.

RECOMMENDATIONS:

1. Investigate the possible occurrence of M. c. scirpensis on BIM and private property in the Amargosa Canyon south of Tecopa.
2. Locate and map all apparently suitable vole habitat along the Amargosa River, from the California-Nevada border downstream into Death Valley National Monument, through the use of fixed-wing aircraft. Live-trap for voles in all mapped marsh areas not previously investigated.
3. Prepare recommendations for listing as "endangered" by the California Fish and Game Commission and by the Secretary of the Interior. Develop an essential habitat recommendation as a result of habitat studies (addressed in recommendation #2 above).
4. Prepare a detailed ownership map for all lands known to support the Amargosa vole, so that acquisition of private holdings may proceed.
5. Continue investigations of apparently suitable habitat in the vicinity of Tecopa Hot Springs, especially in those areas only cursorily surveyed thus far, to determine positively the presence or absence of this subspecies at the time of the survey.
6. Quantitatively define the vegetation structure and composition at all sites known to be inhabited by voles.

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