1984 MONITORING REPORT FOR YUHA BASIN AREA OF CRITICAL ENVIRONMENTAL CONCERN AND YUHA DESERT WILDLIFE HABITAT AREA

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INTRODUCTION

The flat-tailed horned lizard (Phrynosoma mcallii) inhabits desert areas of southern Riverside, eastern San Diego, and Imperial Counties in California; southwestern Arizona; and adjacent regions of Sonora and Baja California Norte, Mexico (Rado, n.d.; Turner and Medica, 1982)(Figure 1). The species' normally low density, declining status in some portions of its range, and loss of large acreages of habitat due to greater use and development of desert areas has led to increased protection and concern for the lizard. The flat-tailed horned lizard is a group 3 State-listed Threatened species in Arizona, is fully protected in California, and is under Status Review for Federal listing by the U.S. Fish and Wildlife Service's Office of Endangered Species. In addition, the Bureau of Land Management's Desert Plan (USDI, BLM, 1980) included the lizard in its list of Sensitive Species. It also delineated two Areas of Critical Environmental Concern (ACECs) and two Wildlife Habitat Areas (WHAs) in which management of the flat-tailed horned lizard and its habitat was to be a priority consideration (Figure 2). Management plans have been prepared for the Yuha Basin and Southern East Mesa ACECs (USDI, BLM, 1981, 1982) and the Yuha Desert and East Mesa WHAs (USDI, BLM, 1983b, 1983a).

A crucial element in all four plans was the need to monitor the status of the lizard, both to be able to determine the effectiveness of management actions and to revise management if such actions were to prove ineffective. First priority has been given to assessing the current population status and trend of the flat-tailed horned lizard in the Yuha because potentially conflicting uses are more pervasive there than in East Mesa. This assessment was the purpose of the present study. It is critical that the species' status be known in the Yuha, which is one of four crucial habitat areas identified by Turner and Medica (1982).

METHODS

Pre-field Phase

In order to determine the trend of flat-tailed horned lizard populations in the Yuha, it was necessary to repeat transects which had been performed previously. The previous transect route, work hours of effort, time of year, and number of observers also had to be known accurately, in order for the transects to be repeated as closely as possible. Two groups of transects fulfilled these needs: those performed in 1979 as part of a general investigation of lizard occurrence and abundance (Turner et. al., 1980), and those performed in 1981 in conjunction with the environmental assessment for the La Rosita 230 kV transmission line project (WESTEC, 1981).

The original intent of the current study was to attempt an assessment of impacts of various competing activities (approved casual off-road

REGIONAL LOCATION MAP

Figure 2. Location of East Mesa Wildlife Habitat Area (WHA) and Southern East Mesa Area of Critical Environmental Concern (ACEC), and Yuha Desert WHA and Yuha Basin ACEC.

vehicle use; off-road vehicle competitive events; transmission line, tower pad, and substation construction; and possible combinations of these) on horned lizard relative abundance. A series of transparent overlays were made depicting: 1) approved routes of travel, 2) the Yuha competitive race course and corridors, 3) the 500 kV Southwest Powerlink towers, access/construction roads, and substation, and 4) the 230 kV La Rosita towers and access/ construction roads. These were overlain on a topographic base map upon which the 1979 and 1981 survey routes were portrayed. Transects to be repeated in 1984 were chosen to maximize the number of transects subject to each type of competing activity, while also having had as close to a minimum of 10 horned lizard scats recorded during earlier efforts. Ten control transects, in which no competing uses were anticipated, were also chosen for repetition. Originally, only 36 transects were chosen for repetition. An additional 7 transects were added after severe reductions in scat counts occurred in some areas, in an attempt to verify and further define these problem areas.

Transect routes were marked on 7.5 minute USGS topographic maps to be used in locating transects in the field. Routes of travel shown on BLM internal work maps were also marked on the field maps. Field forms were also devised.

The 43 transects chosen for repetition in the present study are shown on Figure 3.

Field Phase

Surveys began on 1 June, 1984, and ended on 1 July, 1984. Surveys began at sunrise (approximately 0600 hours) and ended by approximately 1030 hours daily.

A Precise Sportach^{R} digital walking tachometer and Silva^{R} compass were used to aid in the accurate repetition of transects.

Information recorded on field forms included date, time the transect was begun and ended, observer(s), USGS quad, and legal description of the transect location. The number and location of all scats and/or horned lizards observed was also recorded, as were location and type of competing uses observed.

Analysis Phase

In order to increase the manageability of the data obtained, each transect was divided into 0.05 mile segments. Numbers of scats and/or lizards, and types of competing uses, within each 0.05 mile segment were aggregated. These data were summarized on enlarged 7.5 minute USGS topographic base maps for each transect.

Data analysis first consisted of standardizing the number of scats observed/hour effort and horned lizards observed/hour effort for each transect. This was necessary because varying amounts of effort had been expended on many of the transects.

Figure 3. Transect locations.

The Wilcoxin Signed-Ranks Test (Armour et. al., 1983) was used to test the significance of changes in numbers of scats observed/hour effort/transect between 1979 or 1981 and 1984. The t'-test (Armour et. al., 1983) was used to evaluate differences in scats observed/hour effort/transect for 1979 vs. 1981.

The Wilcoxin Signed-Ranks Test was also used to analyse differences in the number of horned lizards seen/hour effort/transect in 1979 vs. 1984. There were too few observations to allow statistical analysis of 1981 vs. 1984 data. The percent change in scats observed/hour effort/transect was also calculated.

The amount and percentage of each transect being impacted by competing uses was calculated, based upon uses observed/0.05 mile segment aggregations.

A statistical analysis of the impact of competing activities on horned lizard relative abundance was not possible in most instances due to differences between anticipated (pre-field phase) and actual (field phase) competing activities. Analysis was performed on data from transects subject only to non-approved ORV use, using the Wilcoxin Signed-Ranks Test.

RESULTS

Figures 4-46 illustrate observed competing uses and distribution of scats and horned lizards along 43 transects performed in 1984, summarized in 0.05 mile intervals. Table 1 summarizes these transect results, as well as those from 1979/1981, in scats and lizards observed/hour effort.

When analyzed using the Wilcoxin Signed-Ranks Test, the overall transect by transect data in Table 1 do not indicate significant differences in scats observed/hour effort for 1979 vs. 1984 ($T+ = 109$, $T- = 142$, $T_{.05} = 75$) or 1981 vs. 1984 ($T+ = 82.5$, $T- = 127.5$, $T_{.05} = 60$). Differences in 1979 vs. 1984 data south of State Highway 98 are also not significantly different ($T+ = 47$, $T- = 19$, $T_{.05} = 14$), although increases generally occurred in this portion of the study area in 1984. However, differences (i.e., decreases) in both 1979 vs. 1984, and 1981 vs. 1984, data from individual transects north of Highway 98 are significantly different ($T+ = 11$, $T- = 55$, $T_{.05} = 14$; $T+ = 30$, $T- = 106$, $T_{.05} = 36$, respectively). The sample size for 1981 vs. 1984 transects south of Highway 98 is too small to permit this type of analysis.

No significant differences were found in scats observed/hour effort in 1979 vs. 1981 transect by transect data, either study area-wide, south of Highway 98 only, or north of Highway 98 only, using the t'-test ($t' = 1.32$, $t'_{.01} = 2.81$; $t' = 1.06$, $t'_{.01} = 4.87$; $t' = 1.53$, $t'_{.01} = 3.12$, respectively).

When evaluated by the Wilcoxin Signed-Ranks Test, the number of horned lizards observed/hour effort/transect in 1979 vs. 1984 was not significantly different ($T+ = 19.5$, $T- = 8.5$, $T_{.05} = 4$). Data for 1981 vs. 1984 included too few observations to allow statistical analysis.

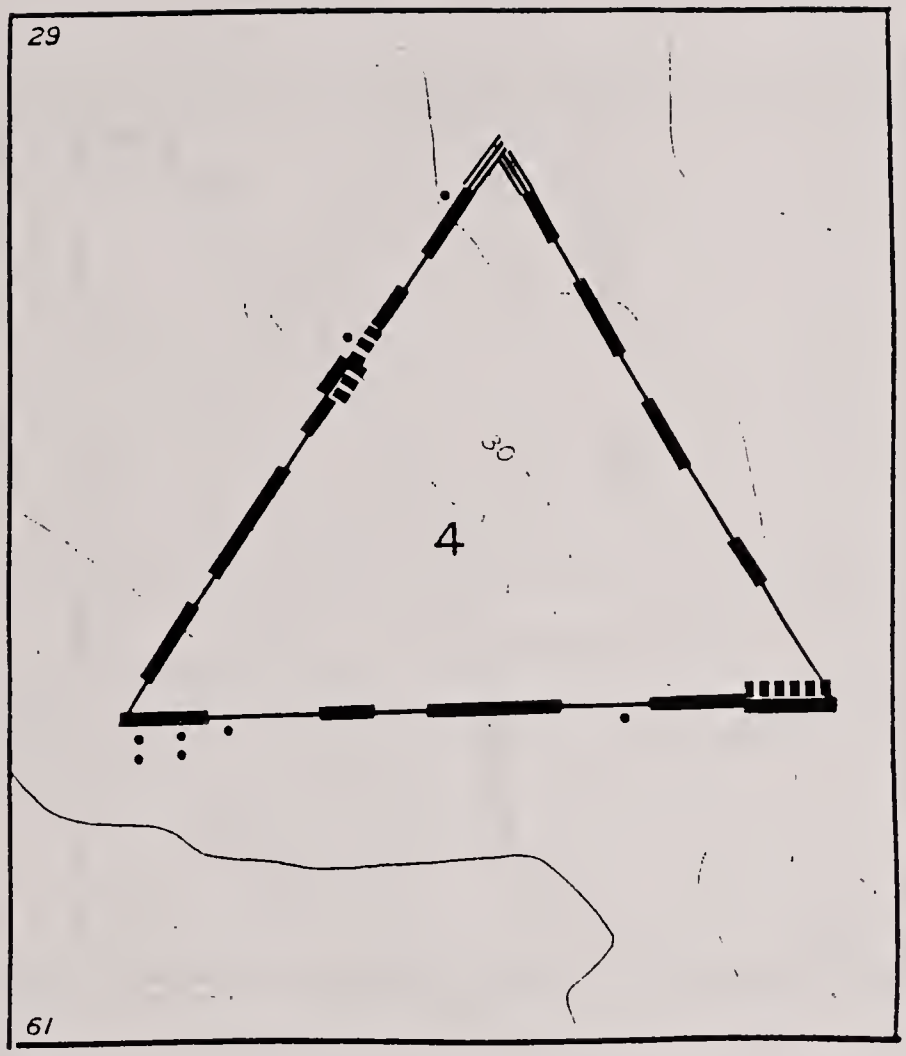


Figure 4. Transect 1 results. Key: ▮▮▮▮=AROT, ——=no use, ▬▬=non-approved ORV use, ═══=transmission line road, •••=lizard scat.

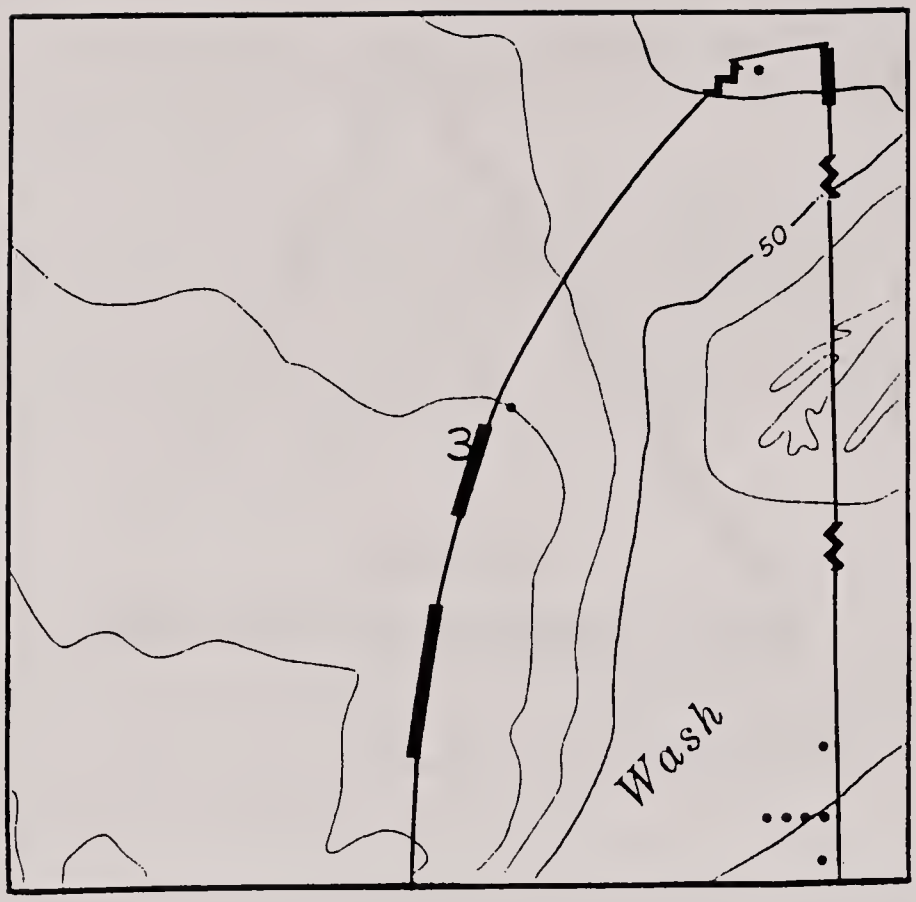


Figure 5. Transect 2 results. Key: —=no use, ▬=non-approved ORV use, ᴡ=racing, •••=lizard scat.

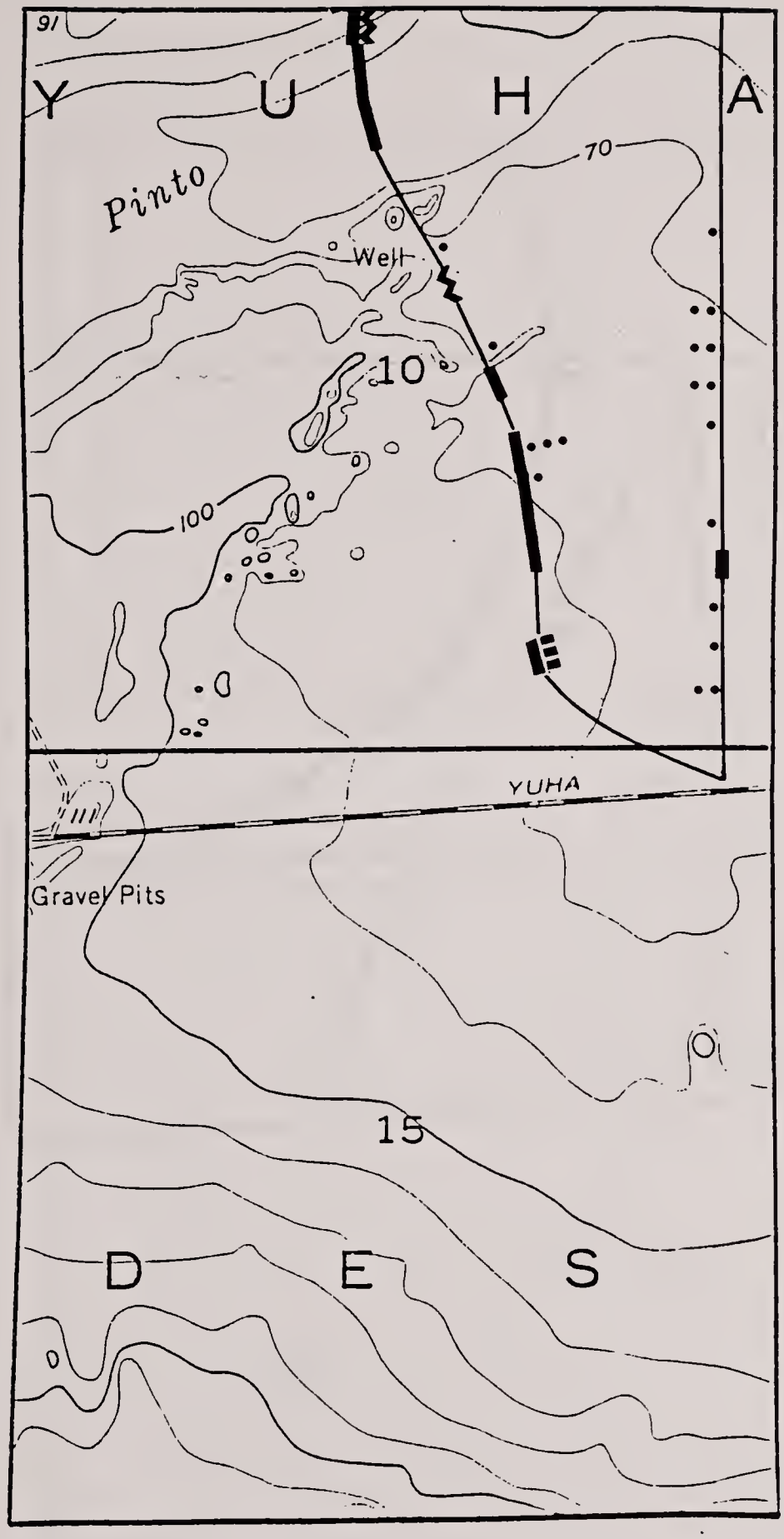


Figure 6. Transect 3 results. Key: ▮▮▮▮=AROT, ——=no use, ▬▬=non-approved ORV use, ᴡᴡ=racing, •••=lizard scat.

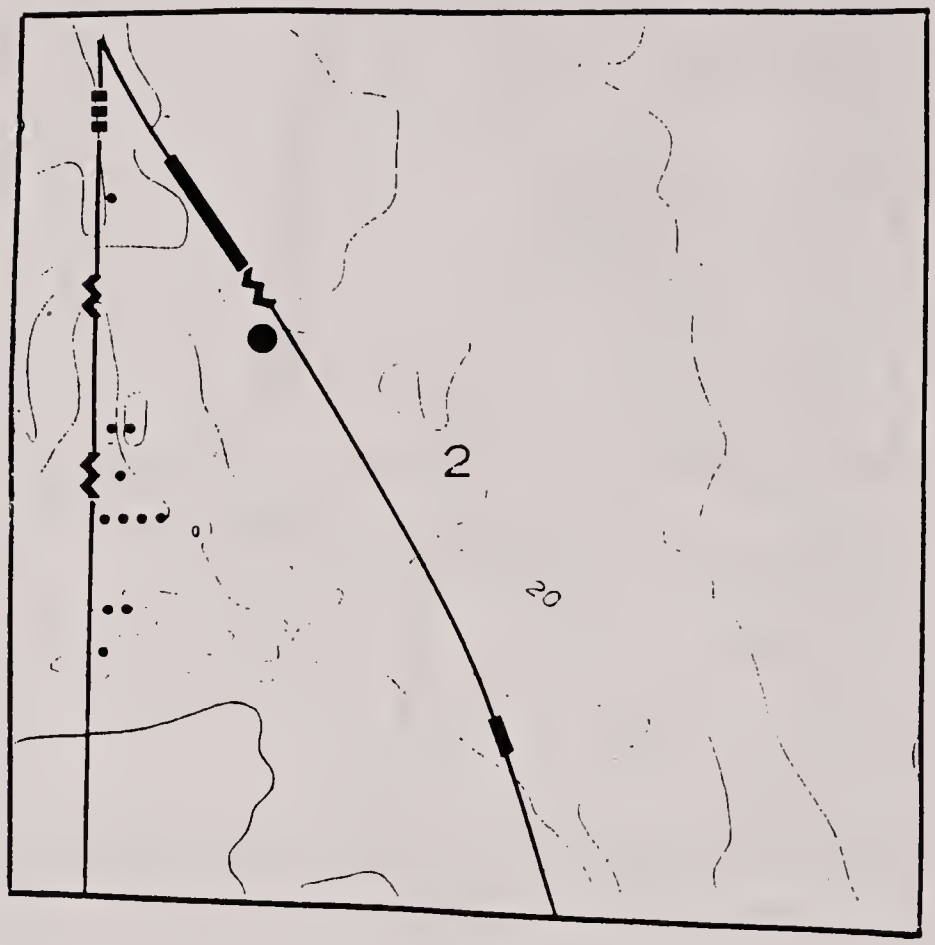


Figure 7. Transect 4 results. Key: ▮▮▮▮=AROT, ——=no use, ▬▬=non-approved ORV use, ∿∿=racing, •••=lizard scat, ●=lizard.

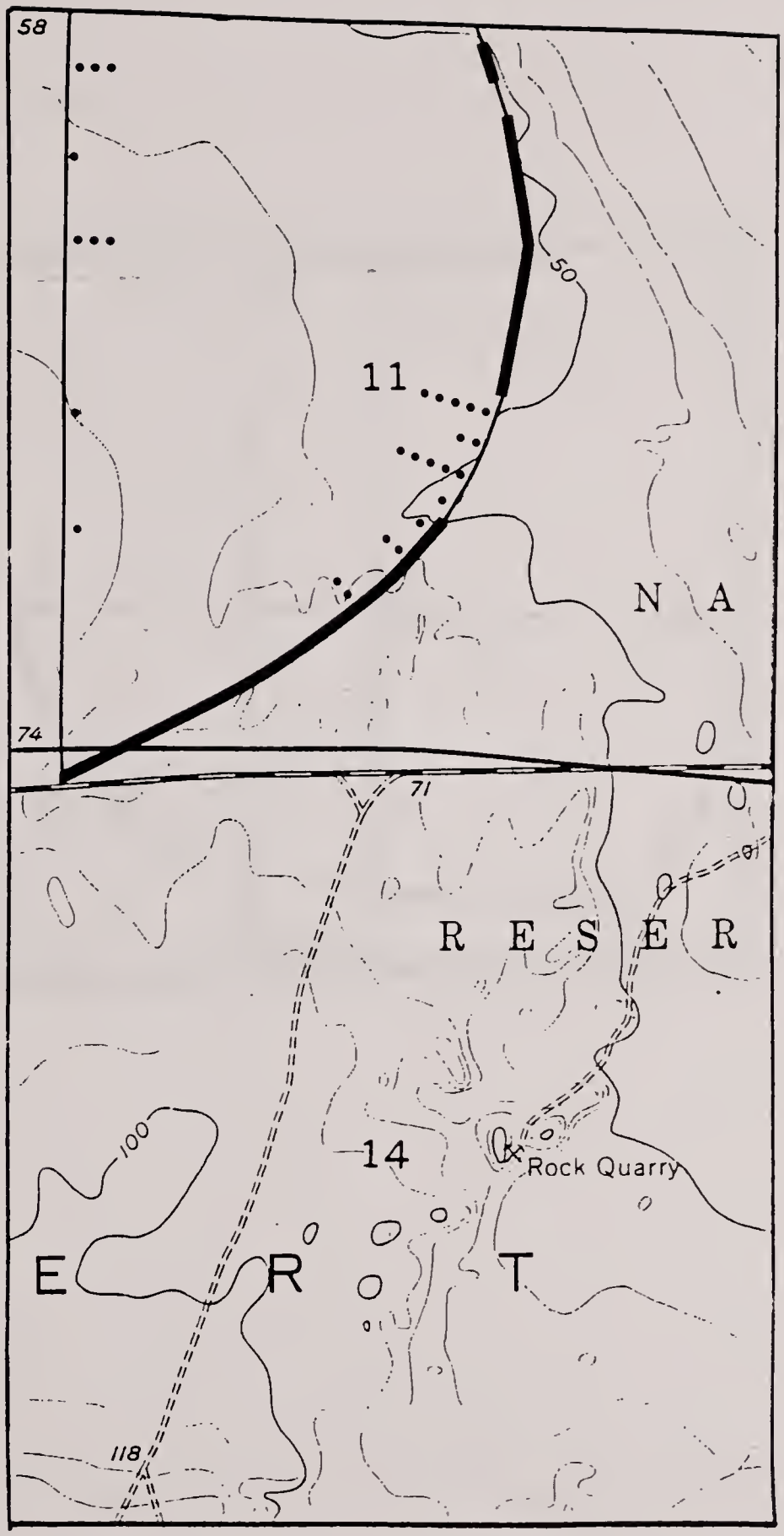


Figure 8. Transect 5 results. Key: ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

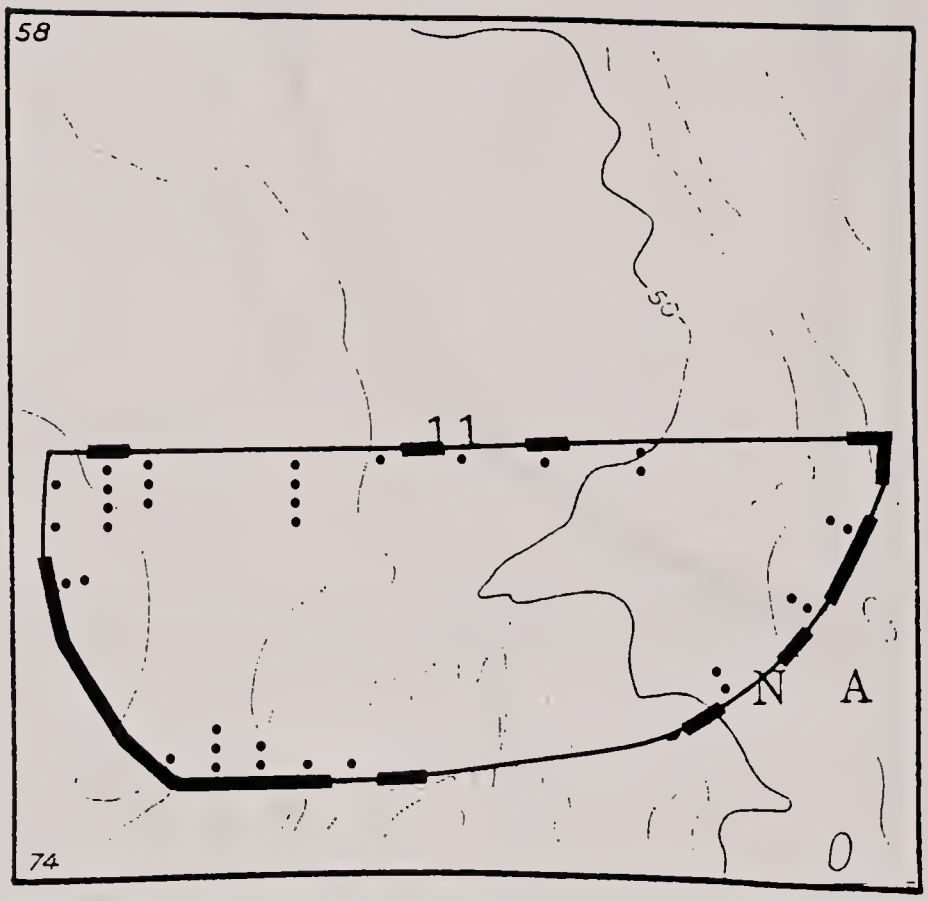


Figure 9. Transect 6 results. Key: ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

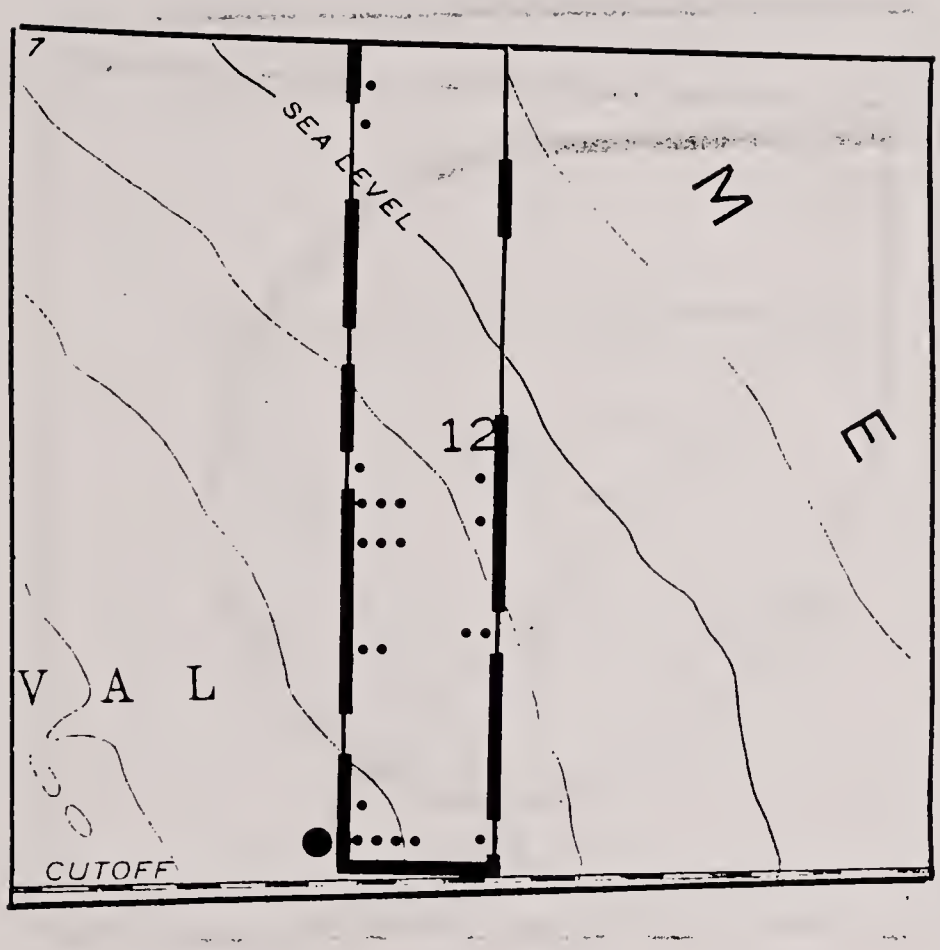


Figure 10. Transect 7 results. Key: ——=no use, ▬▬=non-approved ORV use, •••=lizard scat, ●=lizard.

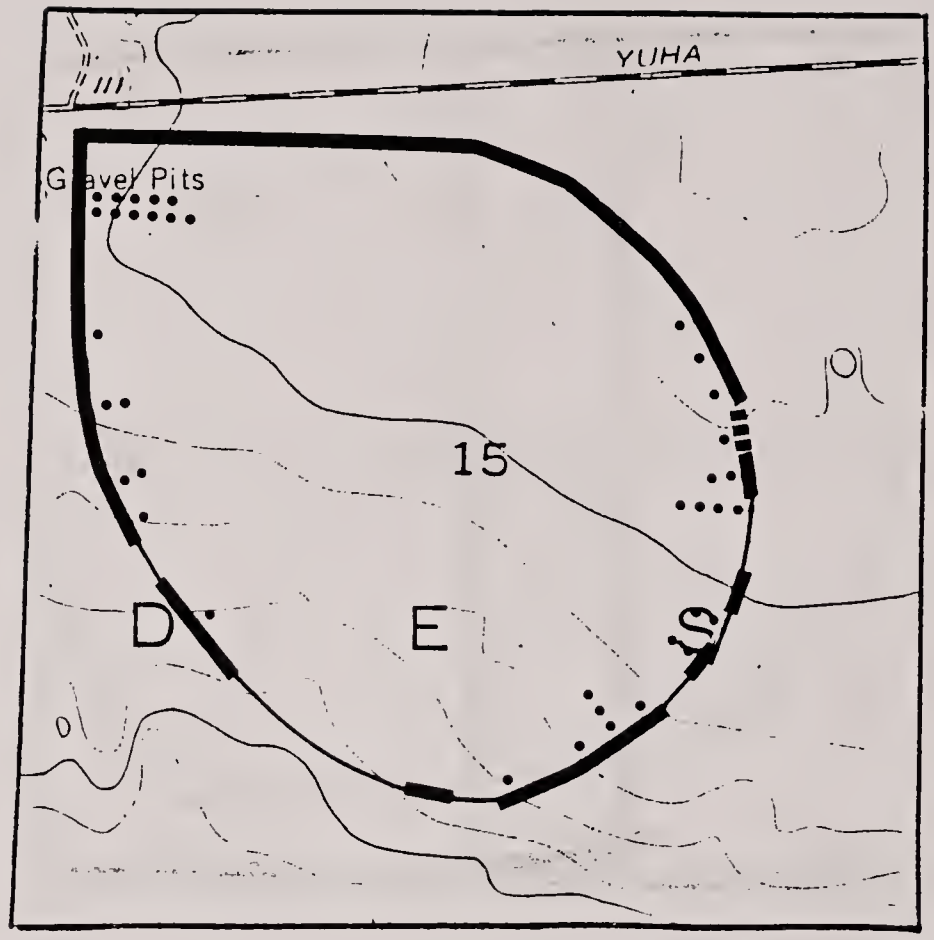


Figure 11. Transect 8 results. Key: ▪▪▪▪=AROT, ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

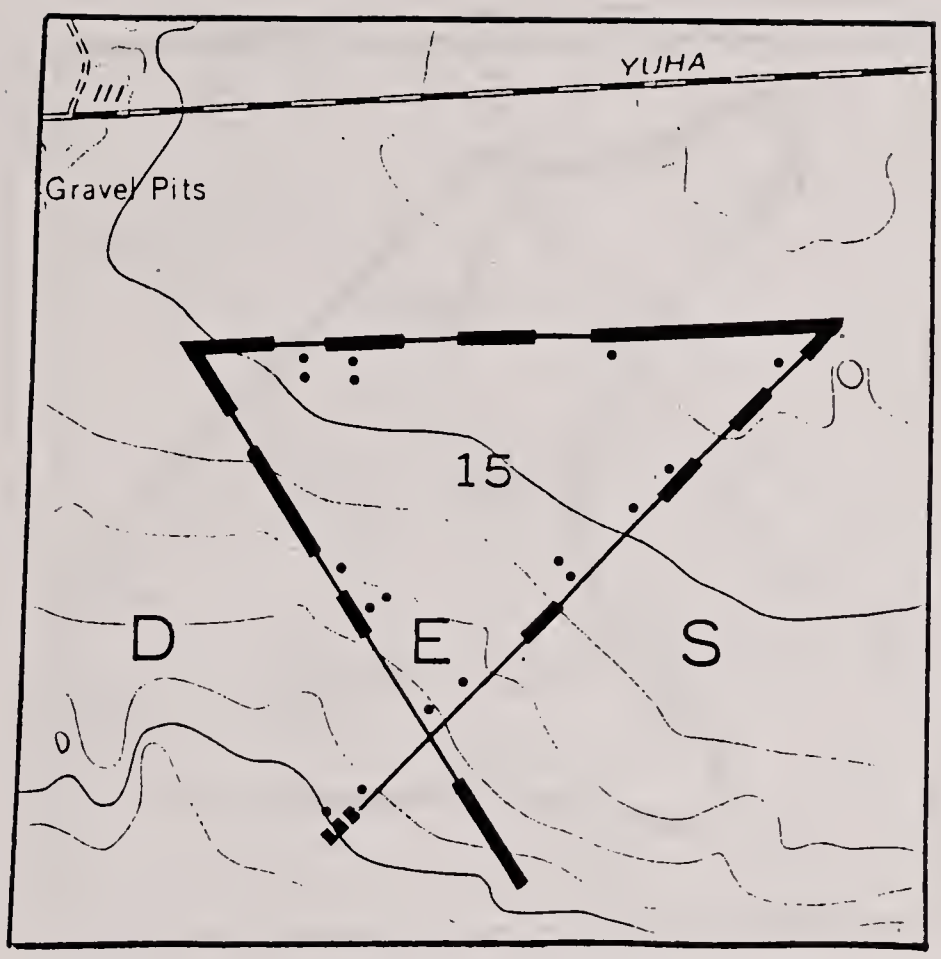


Figure 12. Transect 9 results. Key: ▪▪▪=AROT, ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

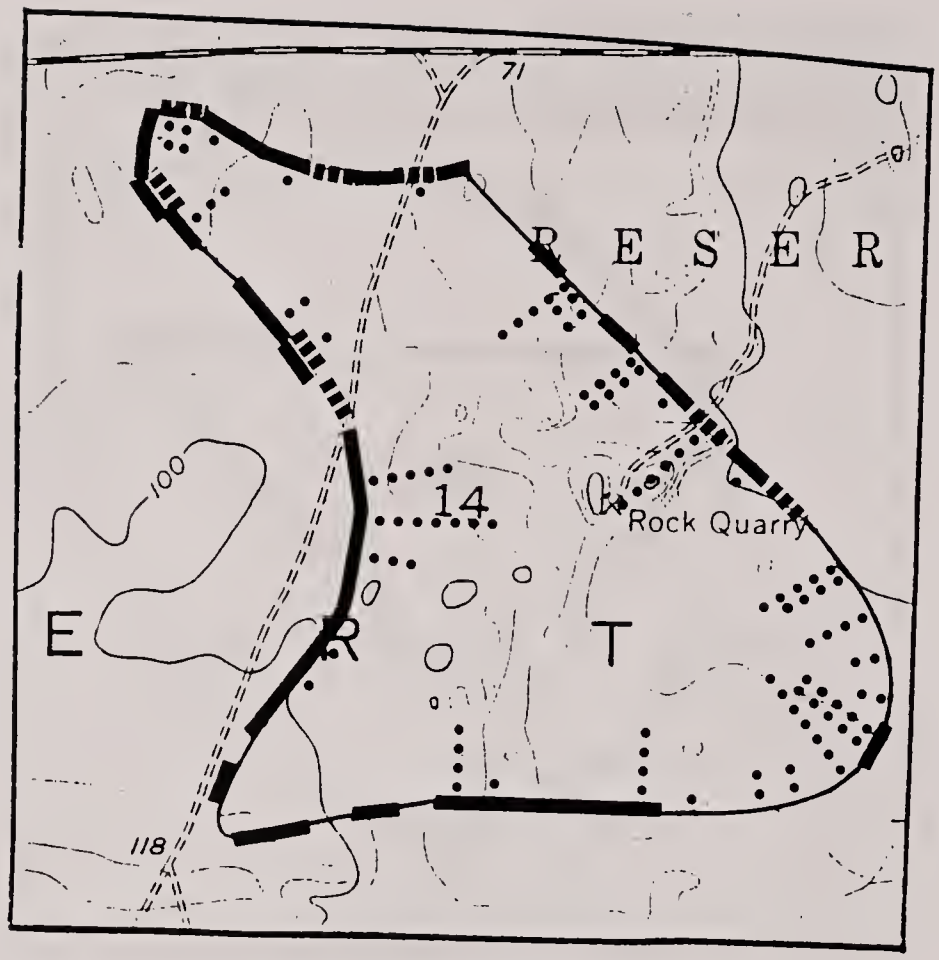


Figure 13. Transect 10 results. Key: ▪▪▪▪=AROT, ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

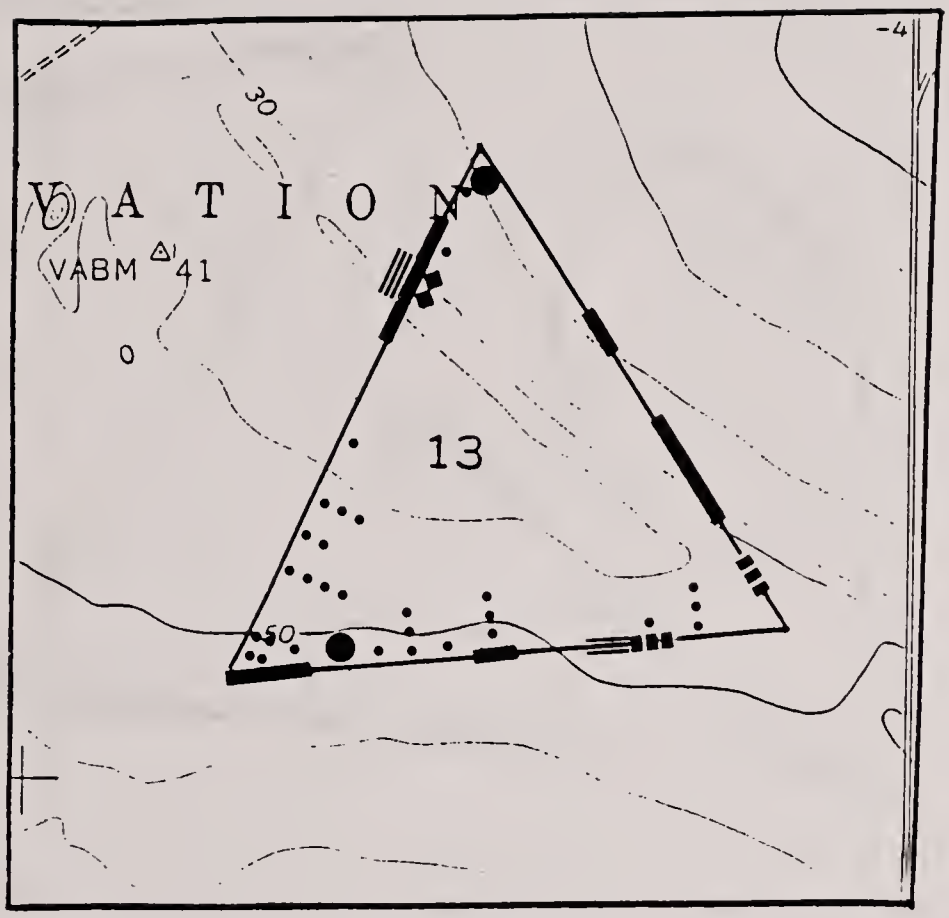


Figure 14. Transect 11 results. Key: ▪▪▪▪=AROT, ◆◆◆=electrical transmission facility, ——=no use, ▬▬=non-approved ORV use, ═══=transmission line road, •••=lizard scat, ● =lizard.

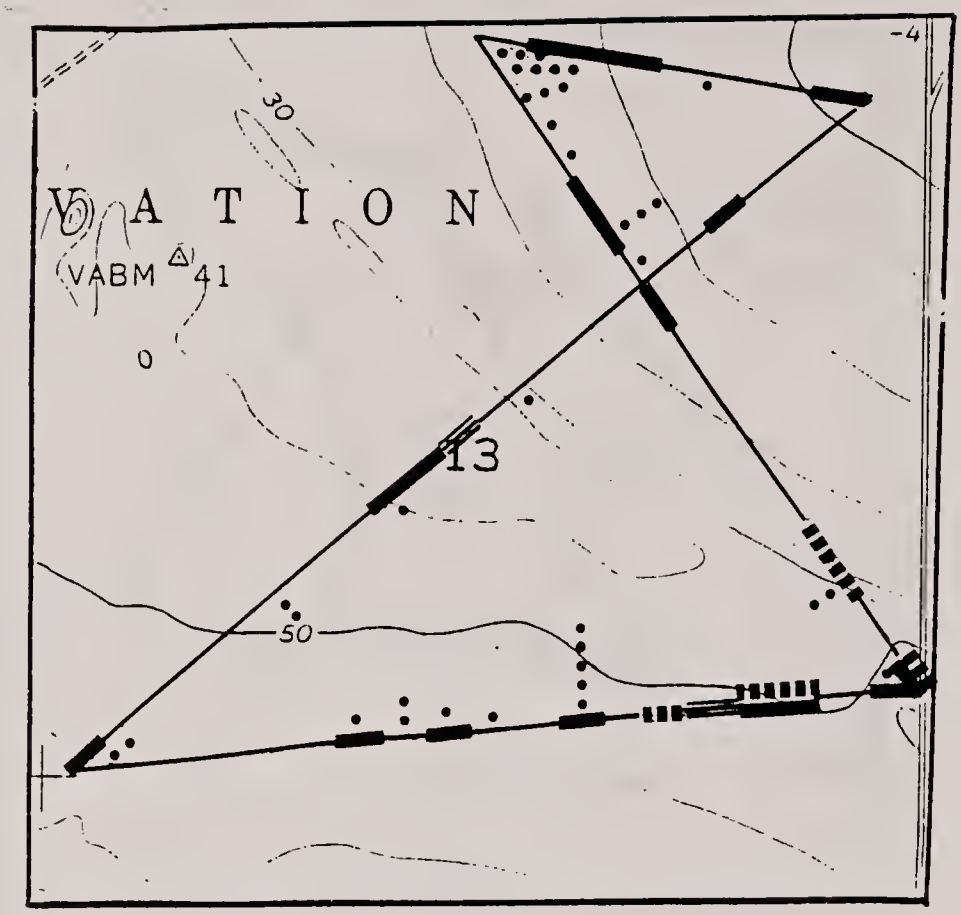


Figure 15. Transect 12 results. Key: ▮▮▮▮=AROT, ——=no use, ▬▬=non-approved ORV use, ▬▬=transmission line road, •••=lizard scat.

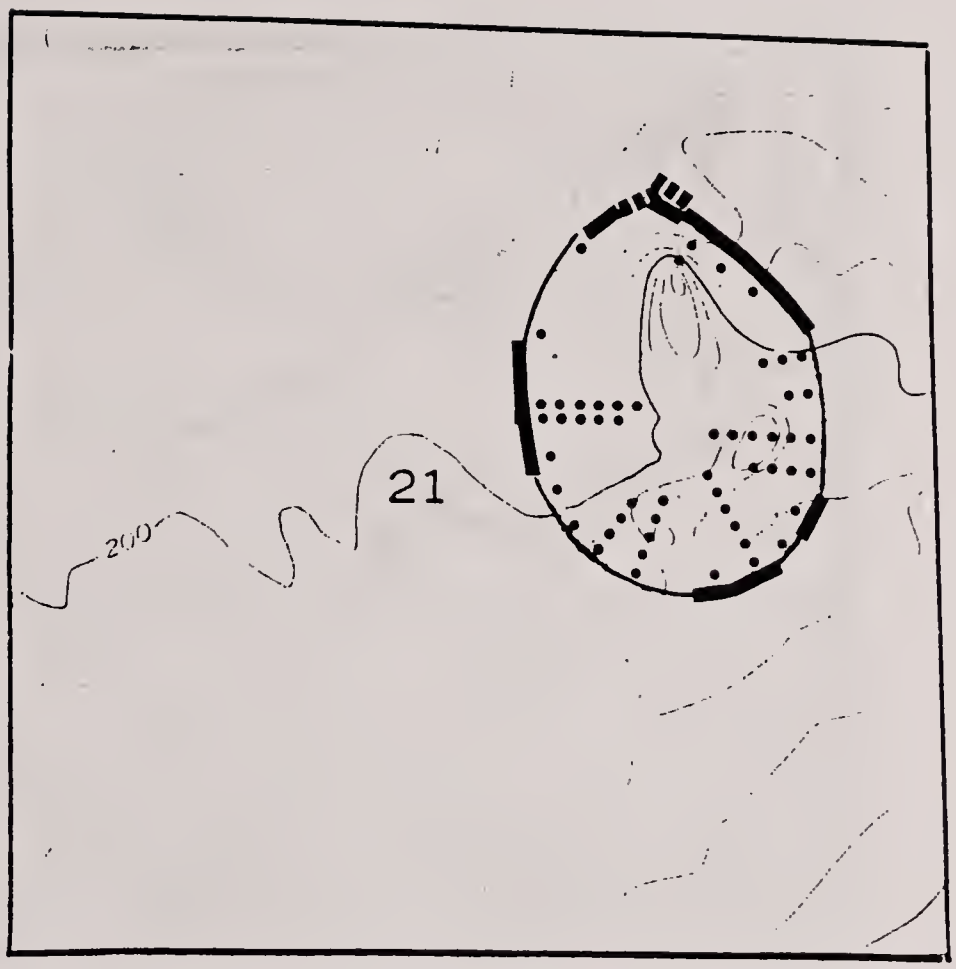


Figure 16. Transect 13 results. Key: ▮▮▮▮=AROT, ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

Figure 17. Transect 14 results. Key: ▪▪▪▪=AROT, ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

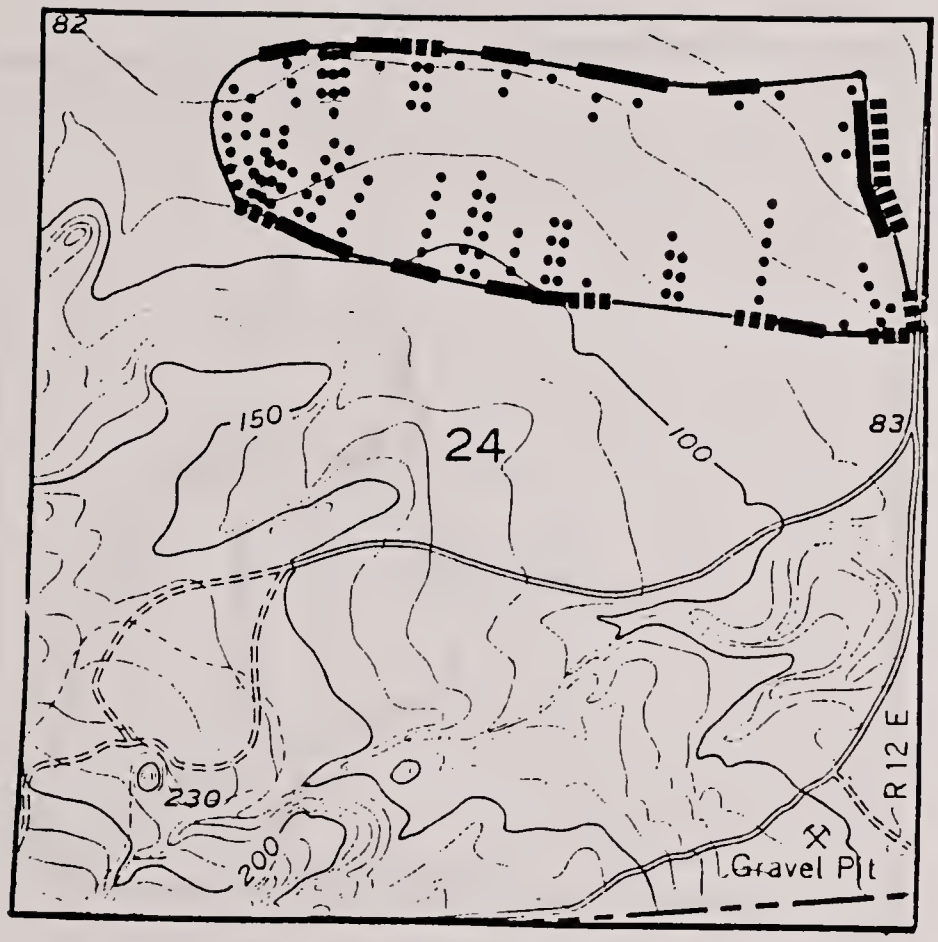


Figure 18. Transect 15 results. Key: ▪▪▪▪=AROT, ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

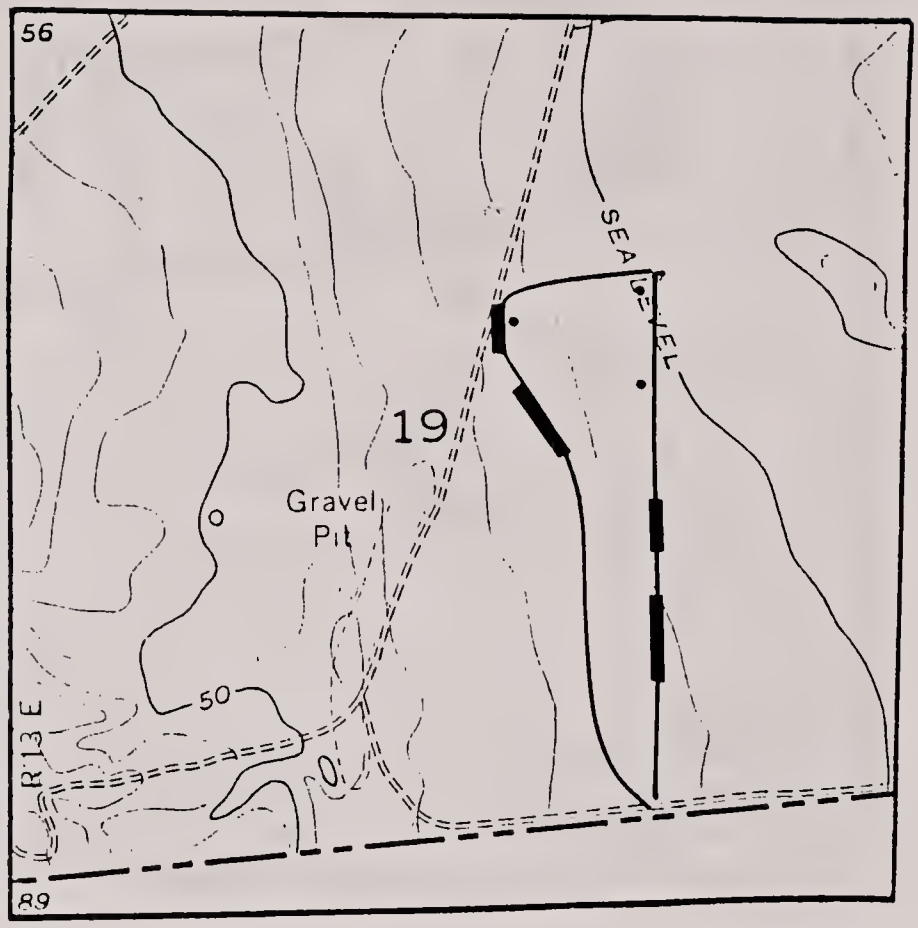


Figure 19. Transect 16 results. Key: ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

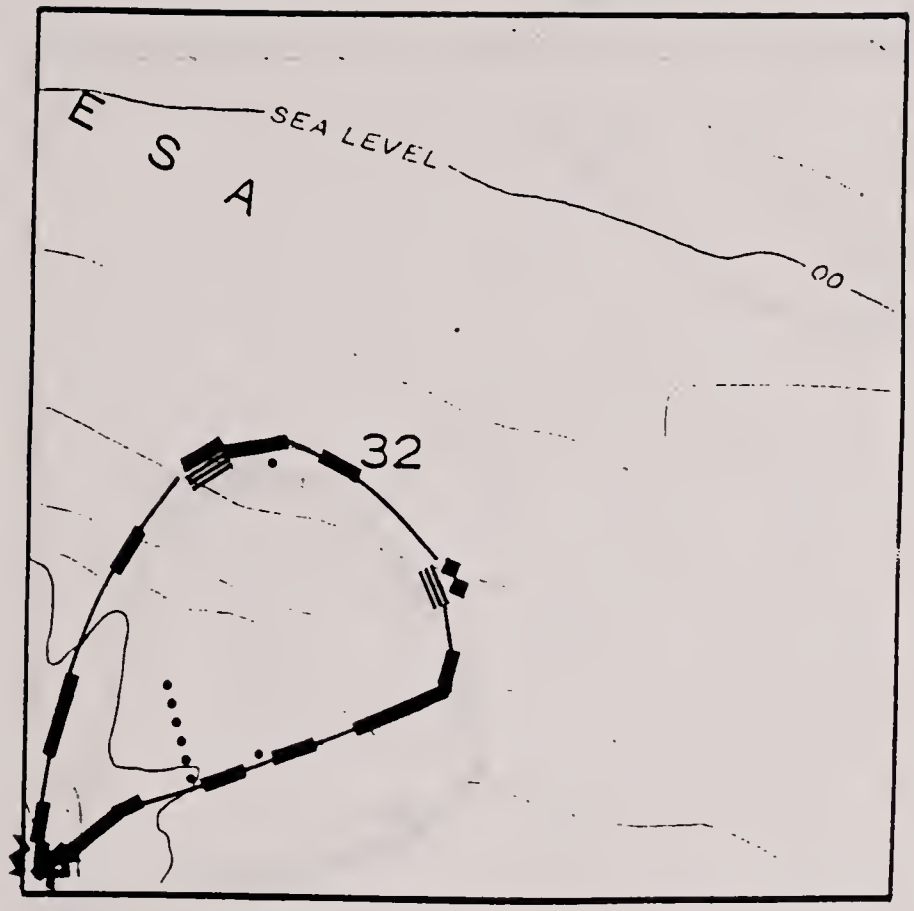


Figure 20. Transect 17 results. Key: ◆◆◆=electrical transmission facility, ——=no use, ▬▬=non-approved ORV use, ∿∿=racing, ═══=transmission line road, •••=lizard scat.

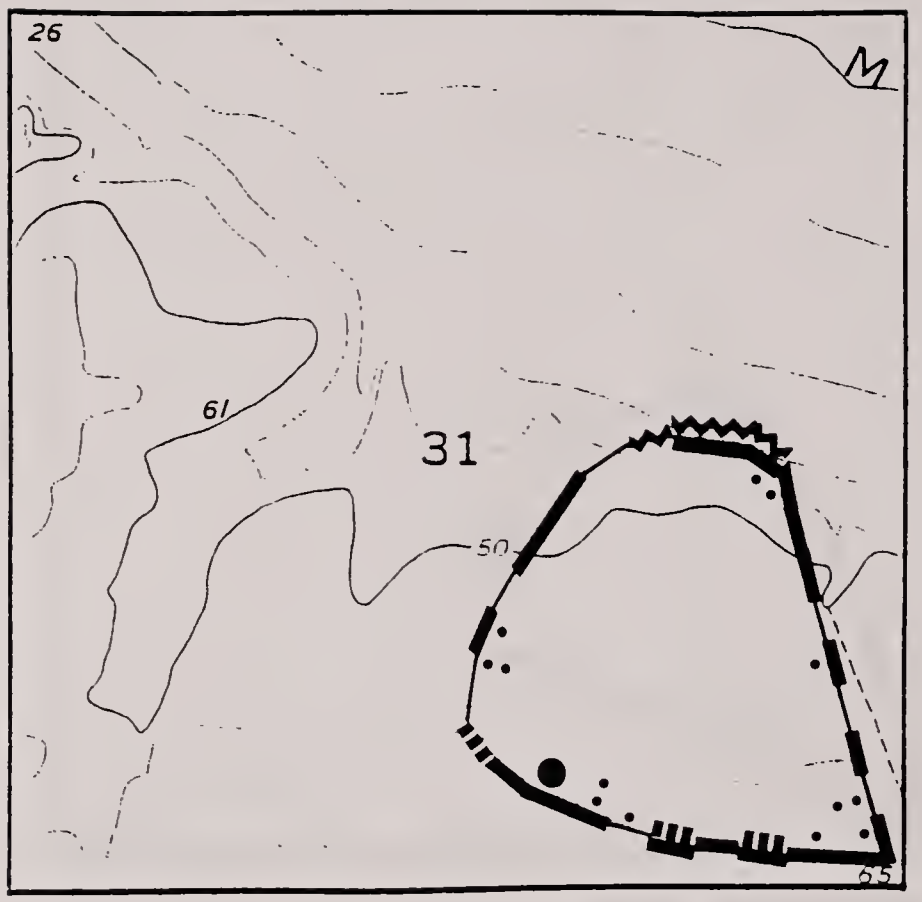


Figure 21. Transect 18 results. Key: ▮▮▮▮=AROT, ——=no use, ▬▬=non-approved ORV use, ᴡᴡ=racing, •••=lizard scat, ●=lizard.

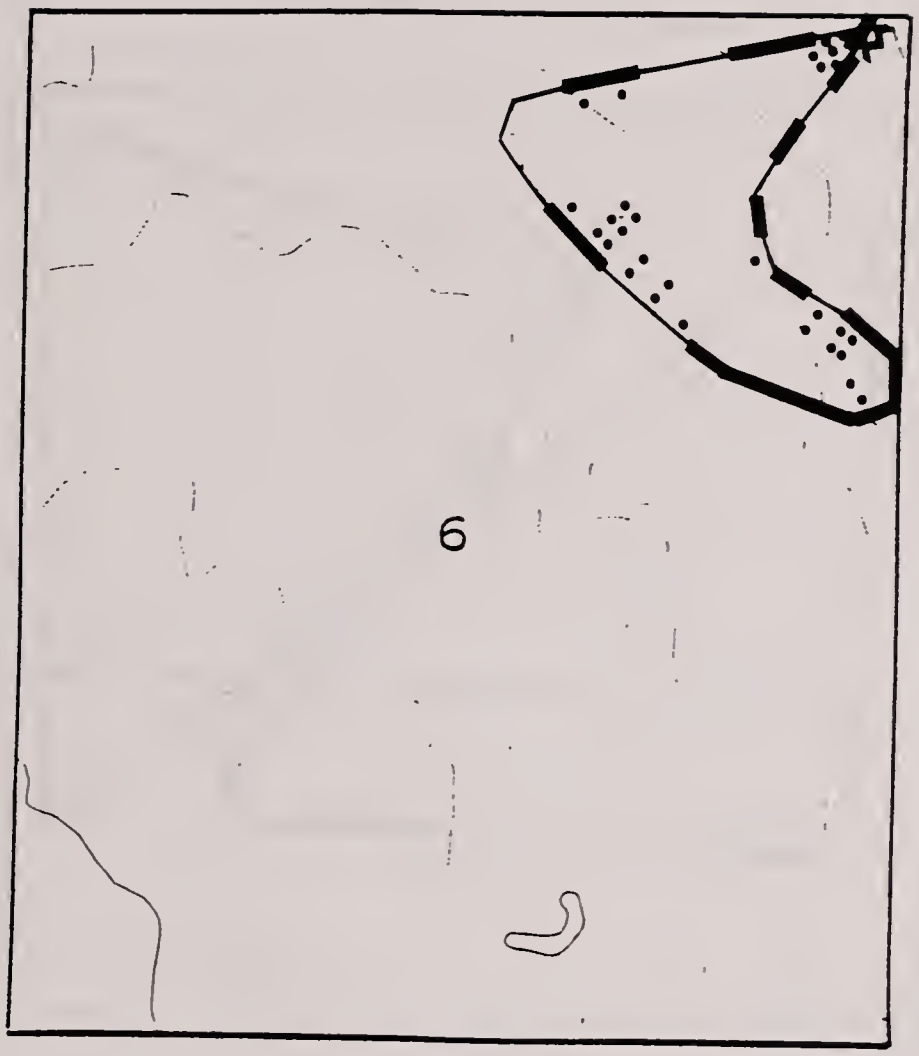


Figure 22. Transect 19 results. Key: —=no use, ▬=non-approved ORV use, ᴗᴗ=racing, •••=lizard scat.

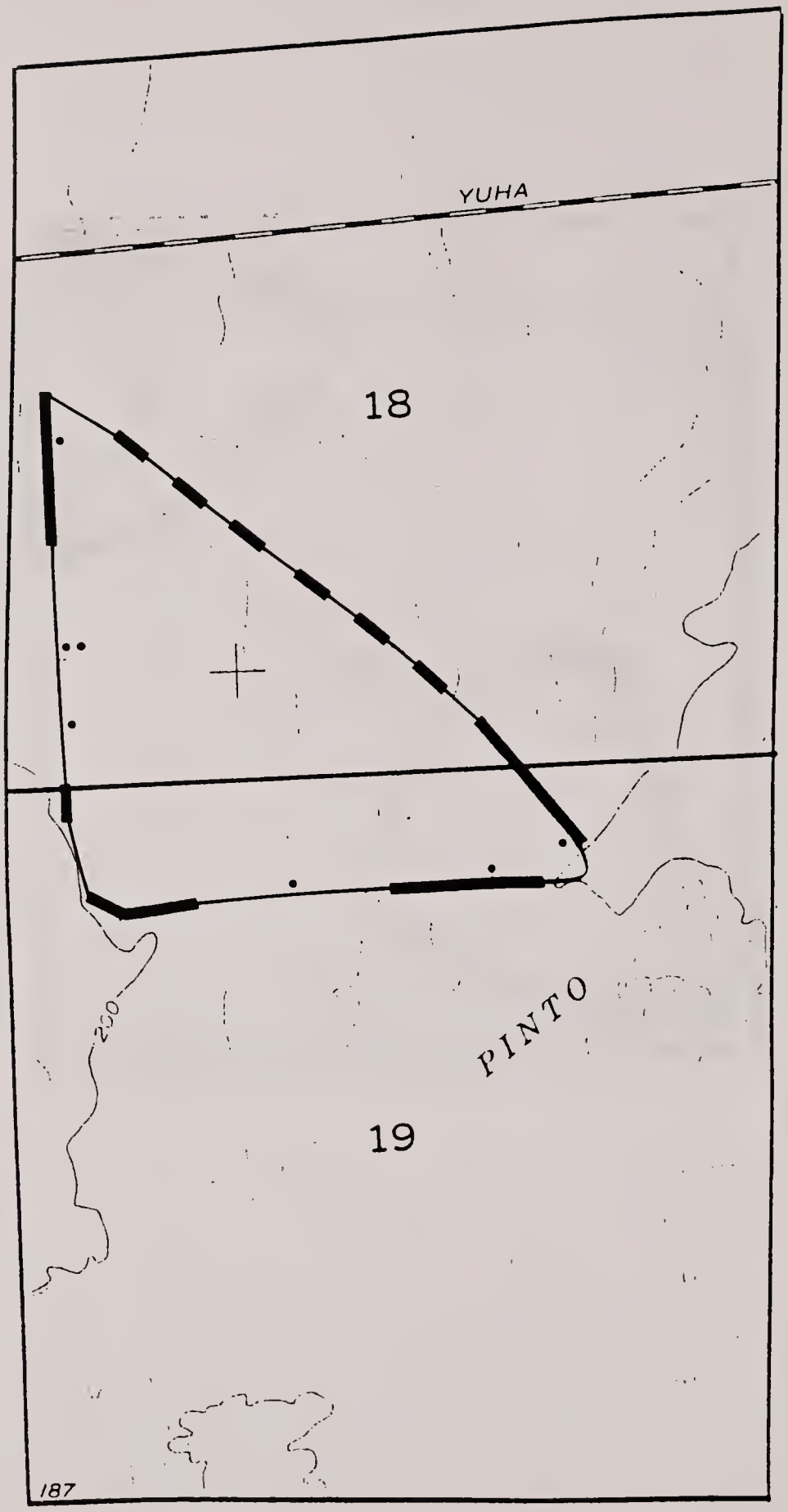
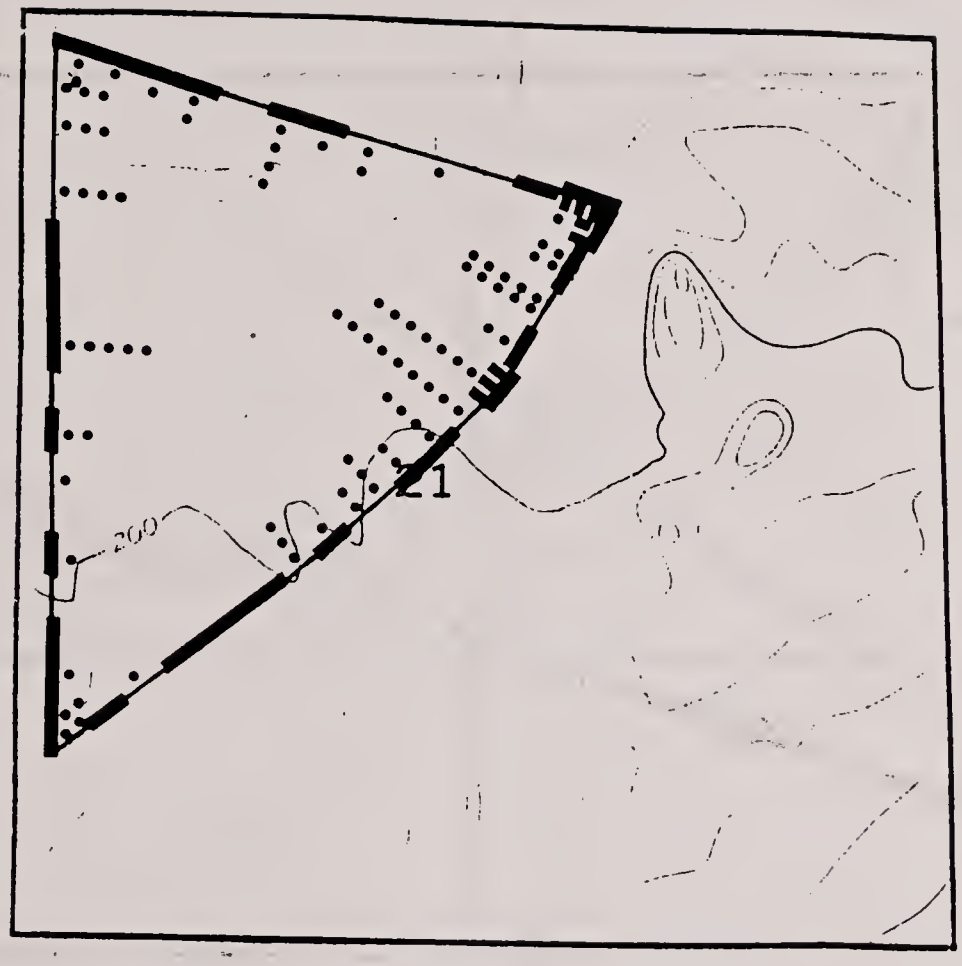


Figure 23. Transect 20 results. Key: ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.



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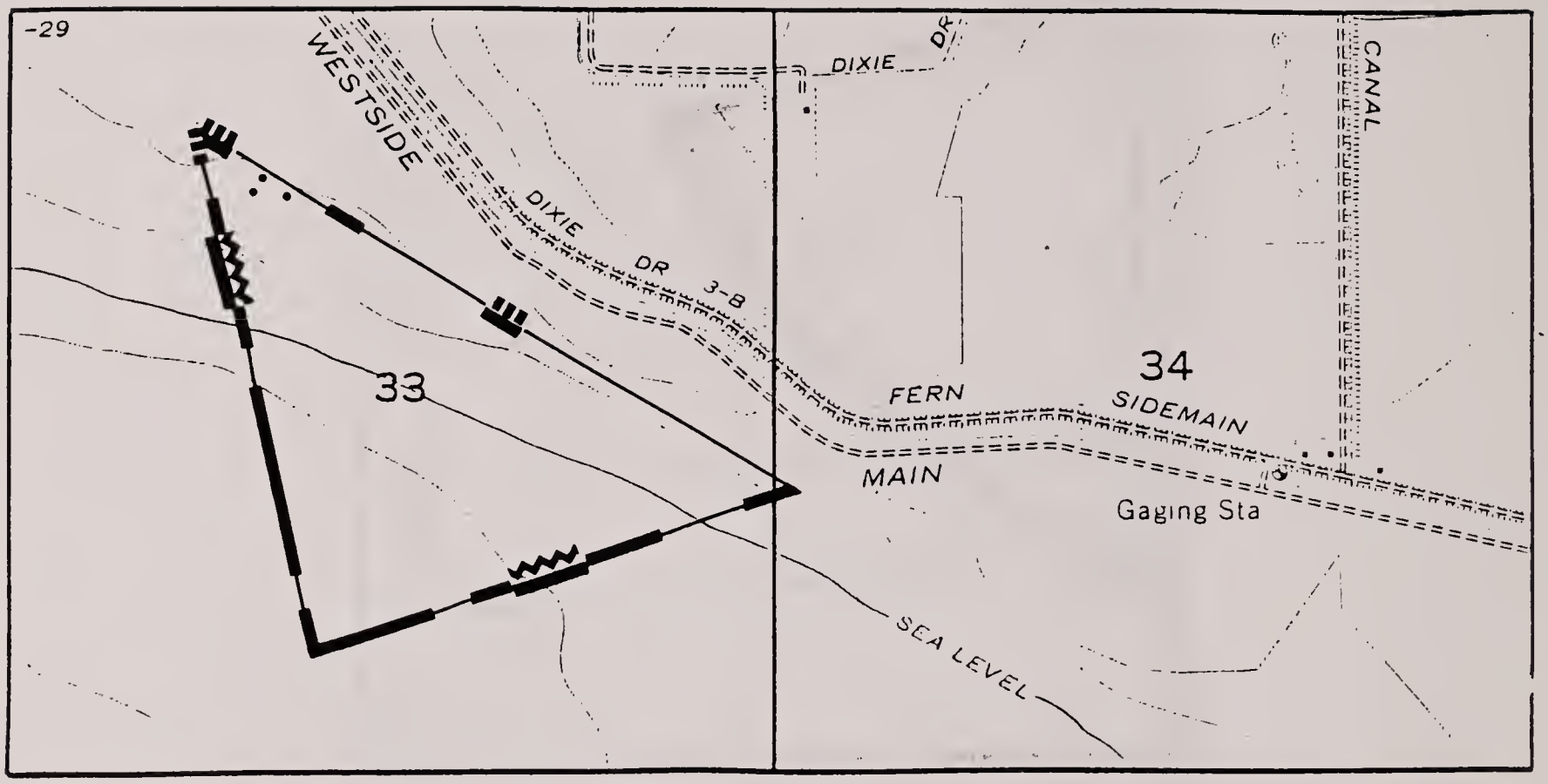


Figure 25. Transect 22 results. Key: ▮▮▮▮=AROT, ——=no use, ▬▬=non-approved ORV use, ᴡᴡ=racing, •••=lizard scat.

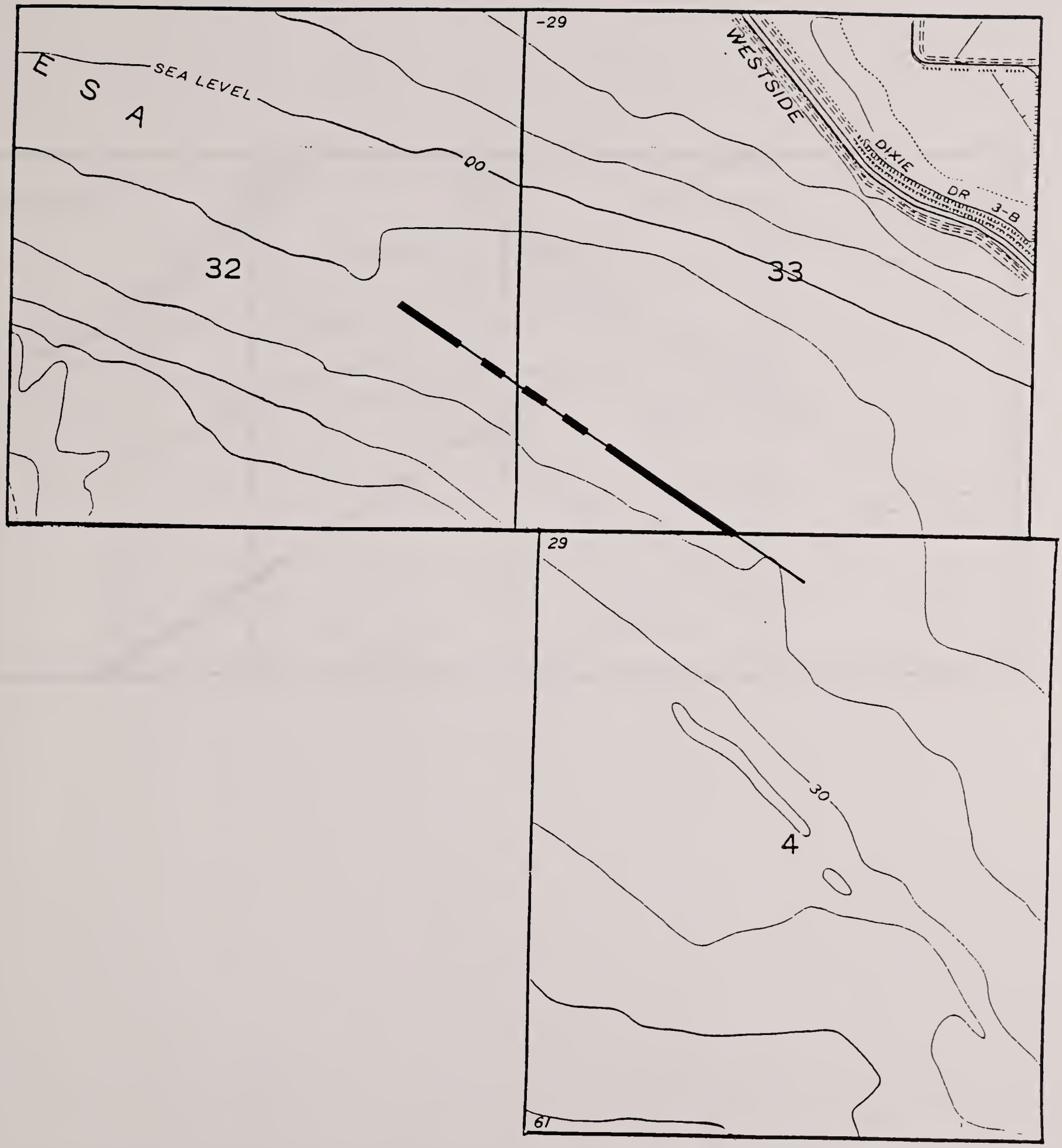


Figure 26. Transect a results. Key: ——=no use, ▬▬=non-approved ORV use.

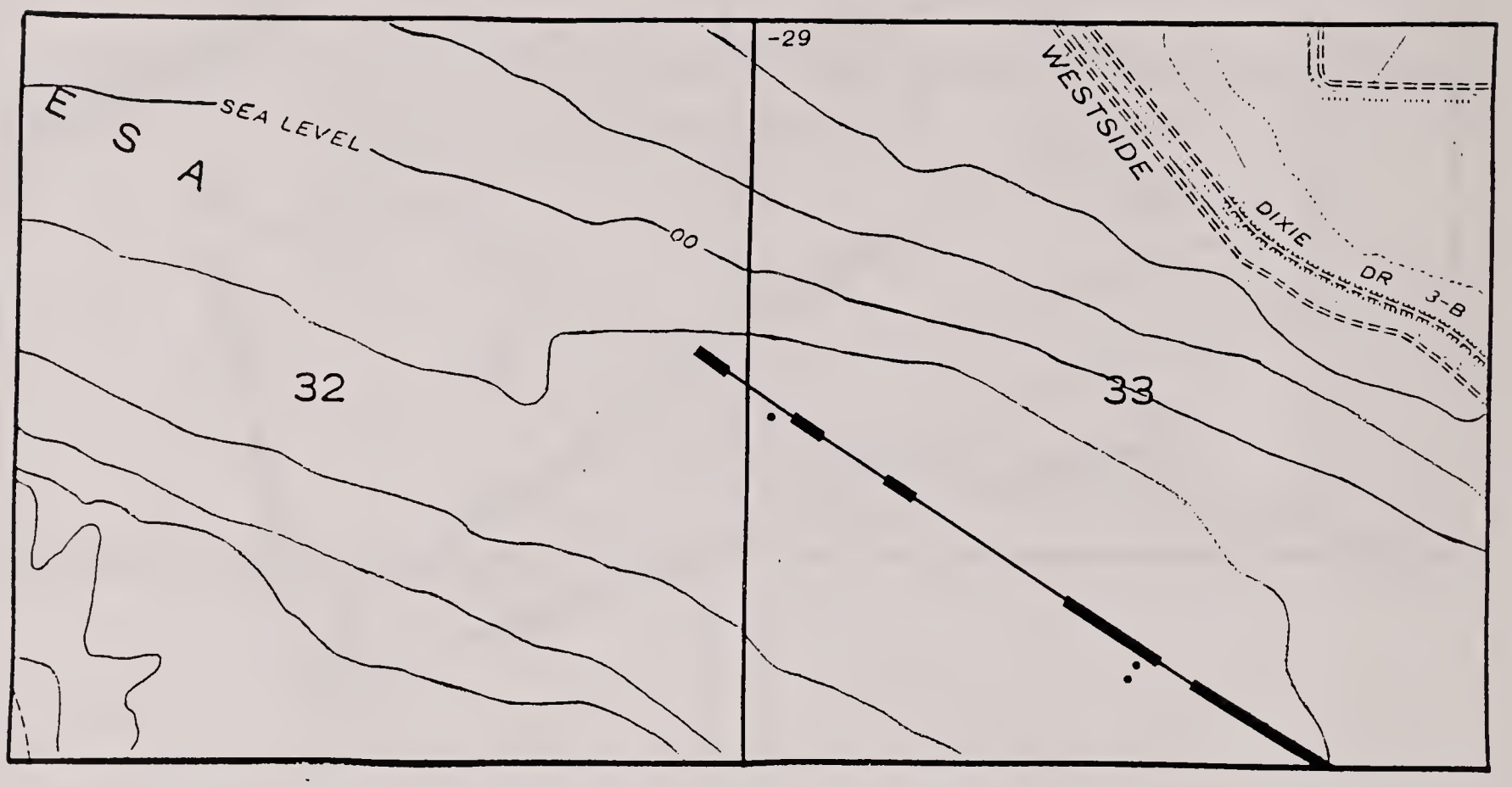


Figure 27. Transect b results. Key: ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

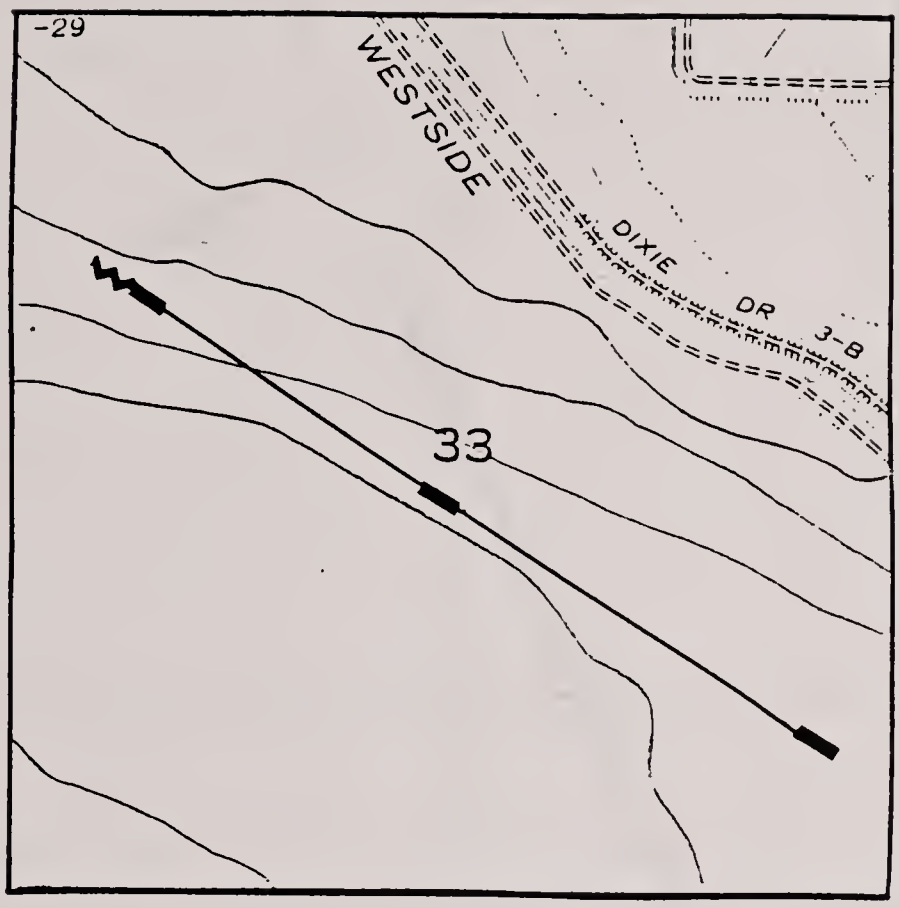


Figure 28. Transect c results. Key: ——=no use, ▬=non-approved ORV use, ∿∿=racing.

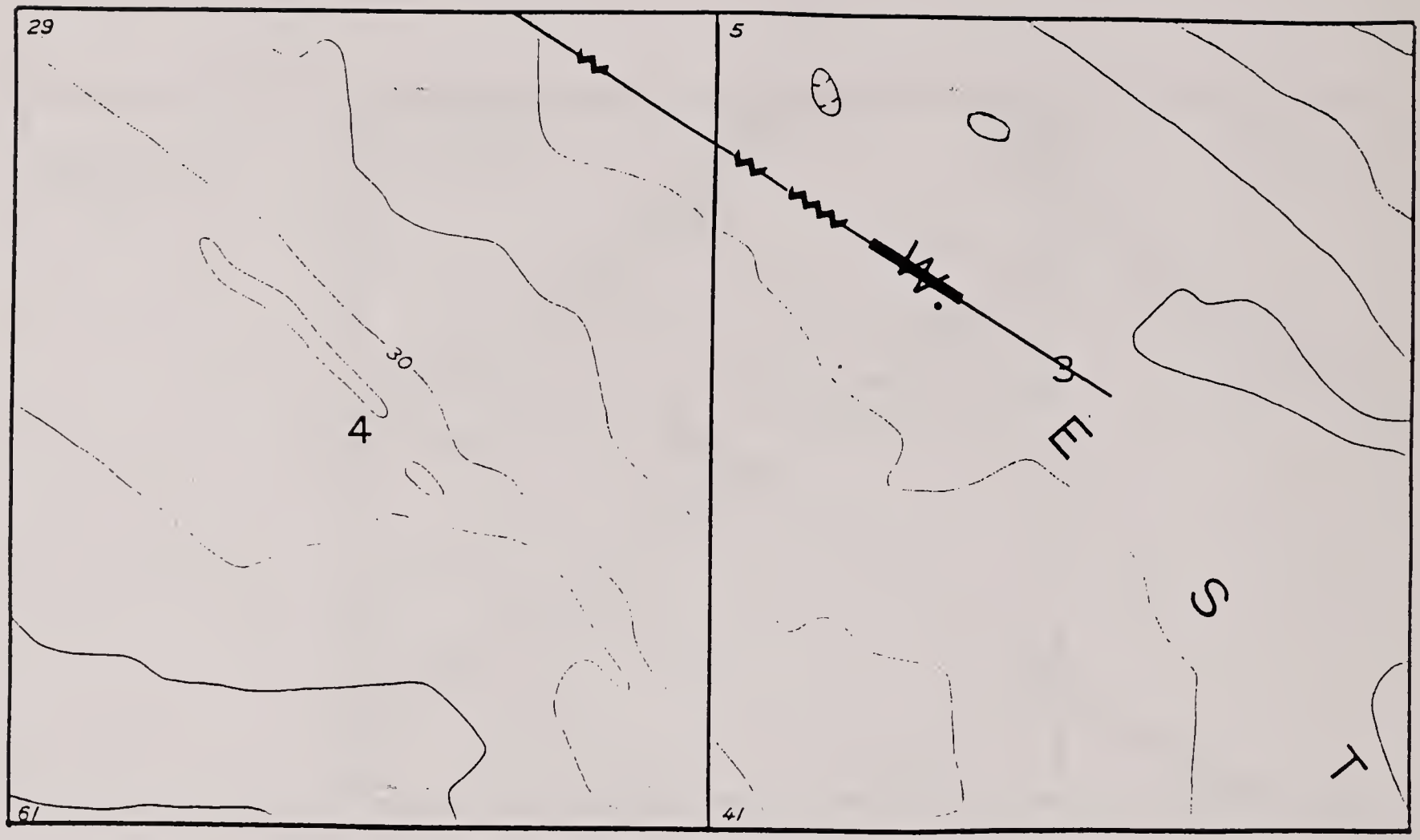


Figure 29. Transect d results. Key: ▮▮▮▮=AROT, ——=no use, ▬▬=non-approved ORV use, ᴡᴡ=racing, •••=lizard scat.

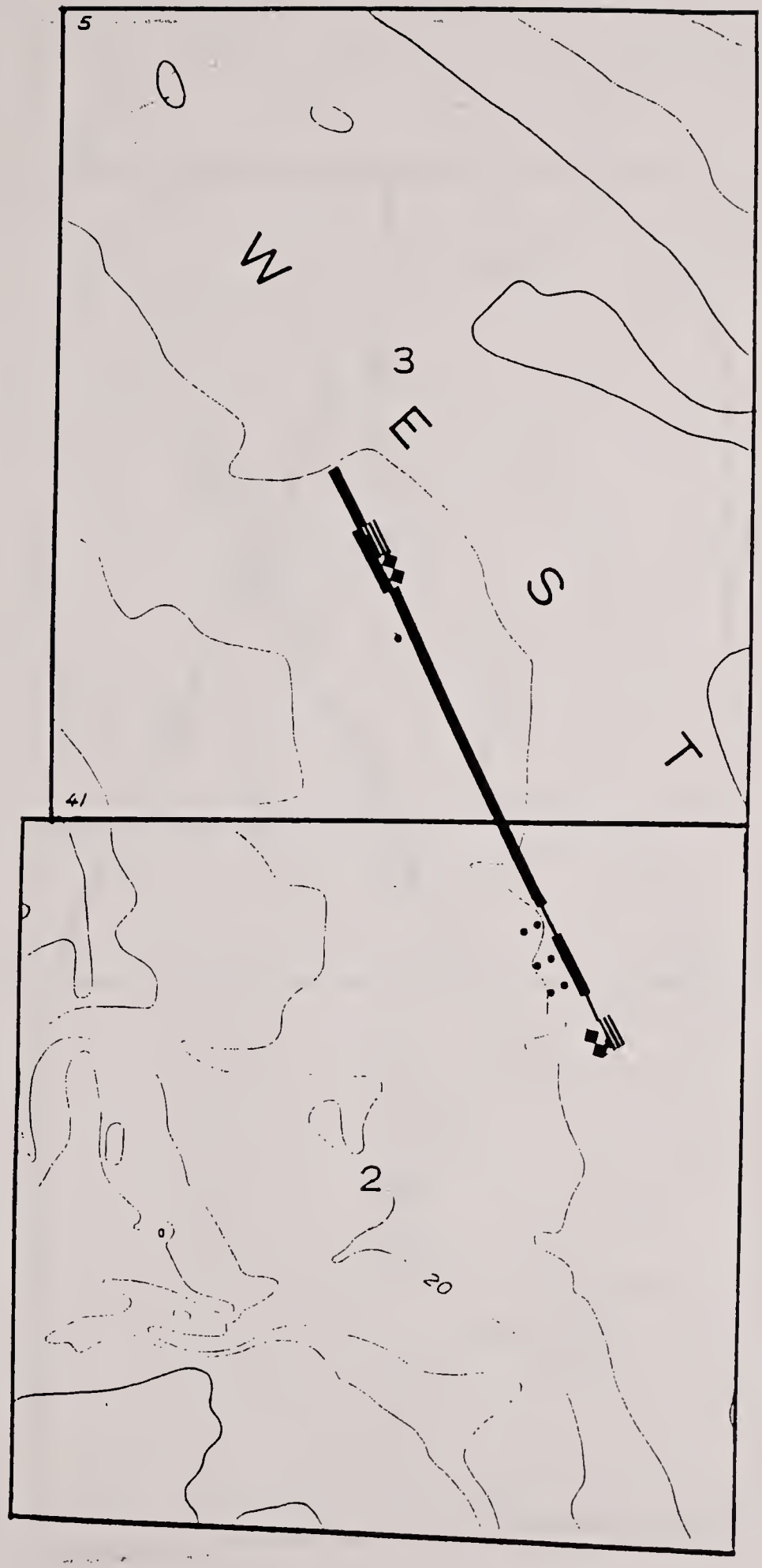


Figure 30. Transect e results. Key: ◆◆◆=electrical transmission facility, ——=no use, ▬▬=non-approved ORV use, ═══=transmission line road, •••=lizard scat.

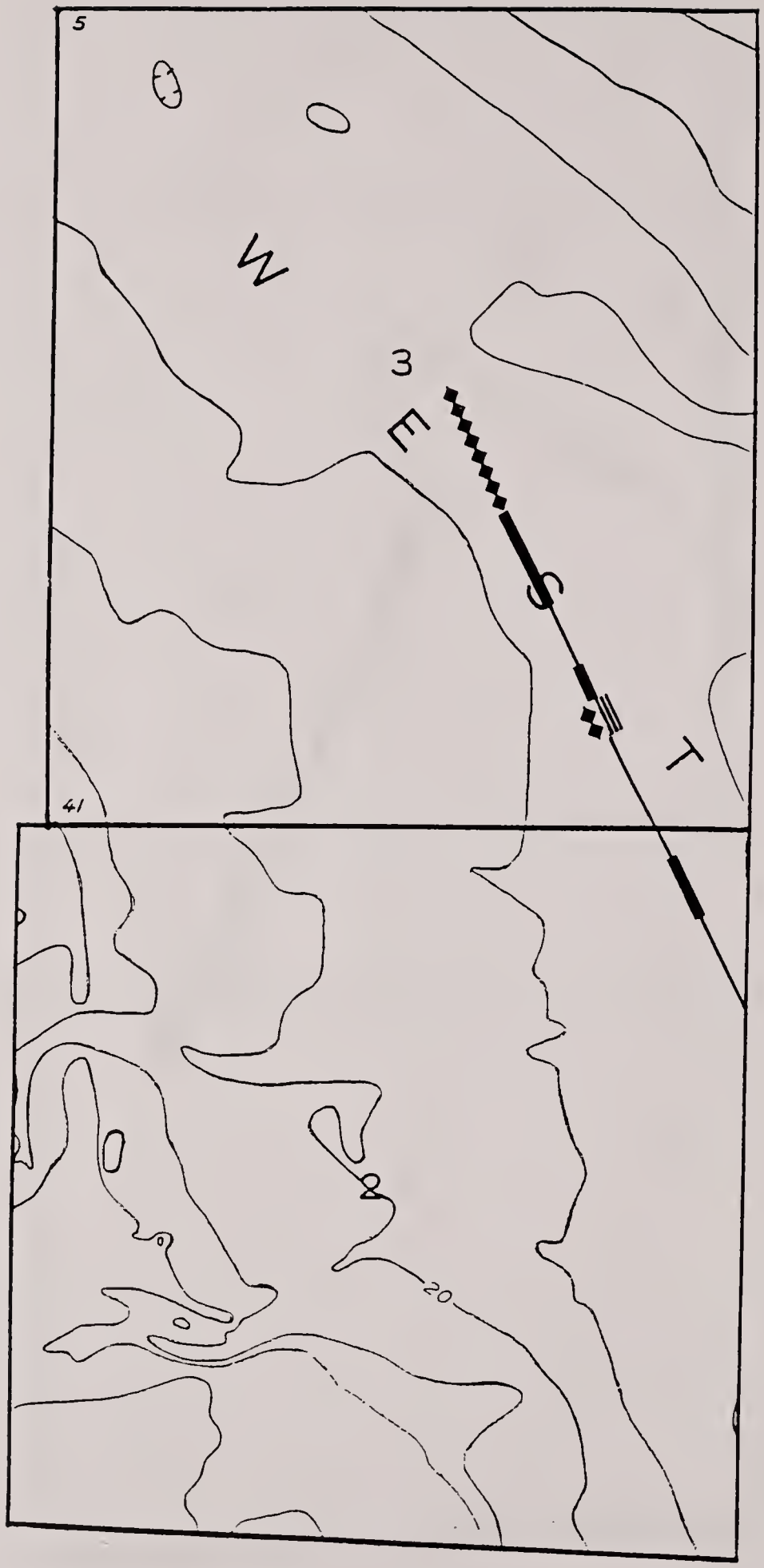


Figure 31. Transect f results. Key: ◆◆◆=electrical transmission facility, —=no use, ▬=non-approved ORV use, ═══=transmission line road.

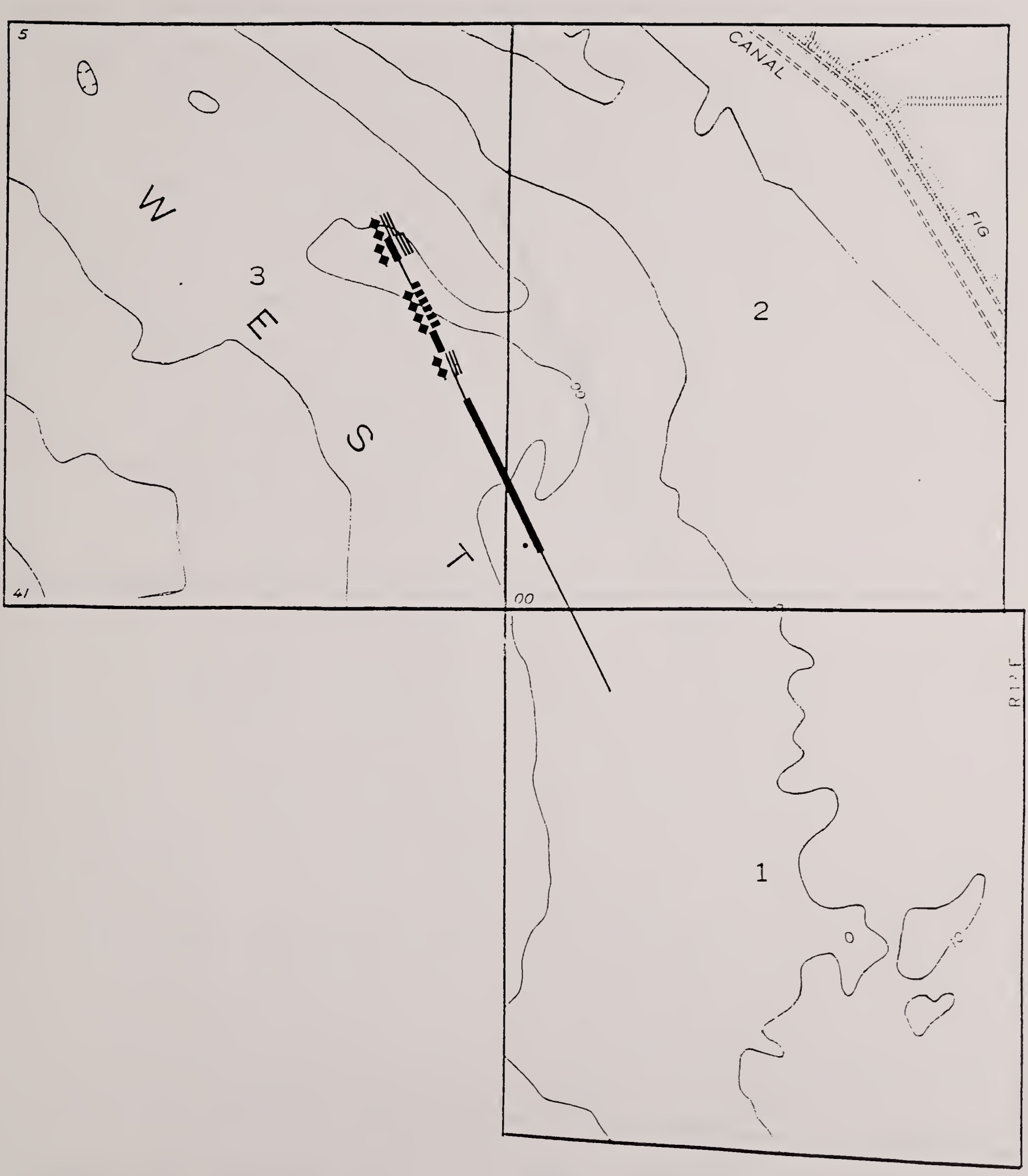
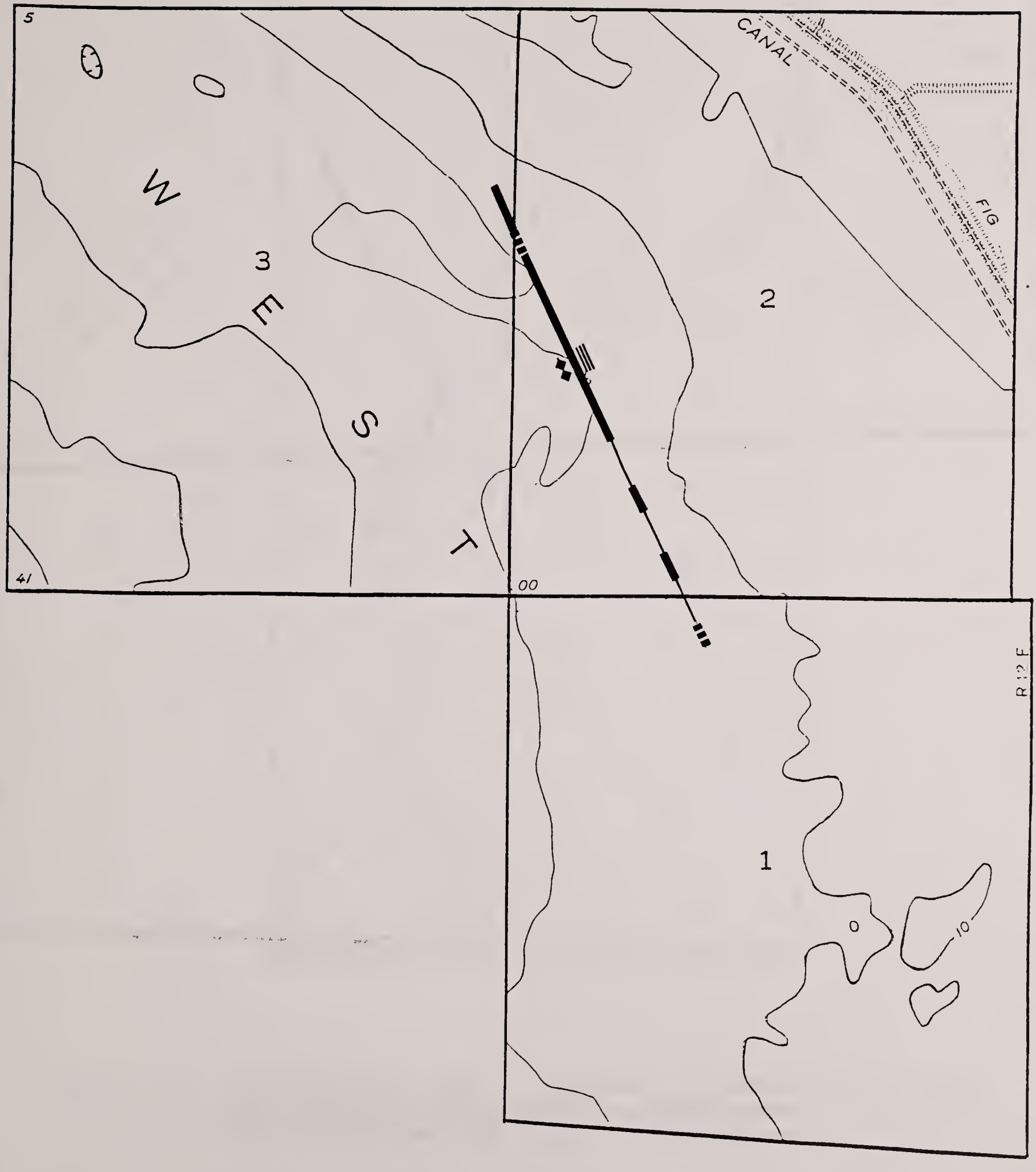


Figure 32. Transect g results. Key: ▪▪▪▪=AROT, ◆◆◆=electrical transmission facility, ——=no use, ▬▬=non-approved ORV use, ≡≡≡=transmission line road, •••=lizard scat.



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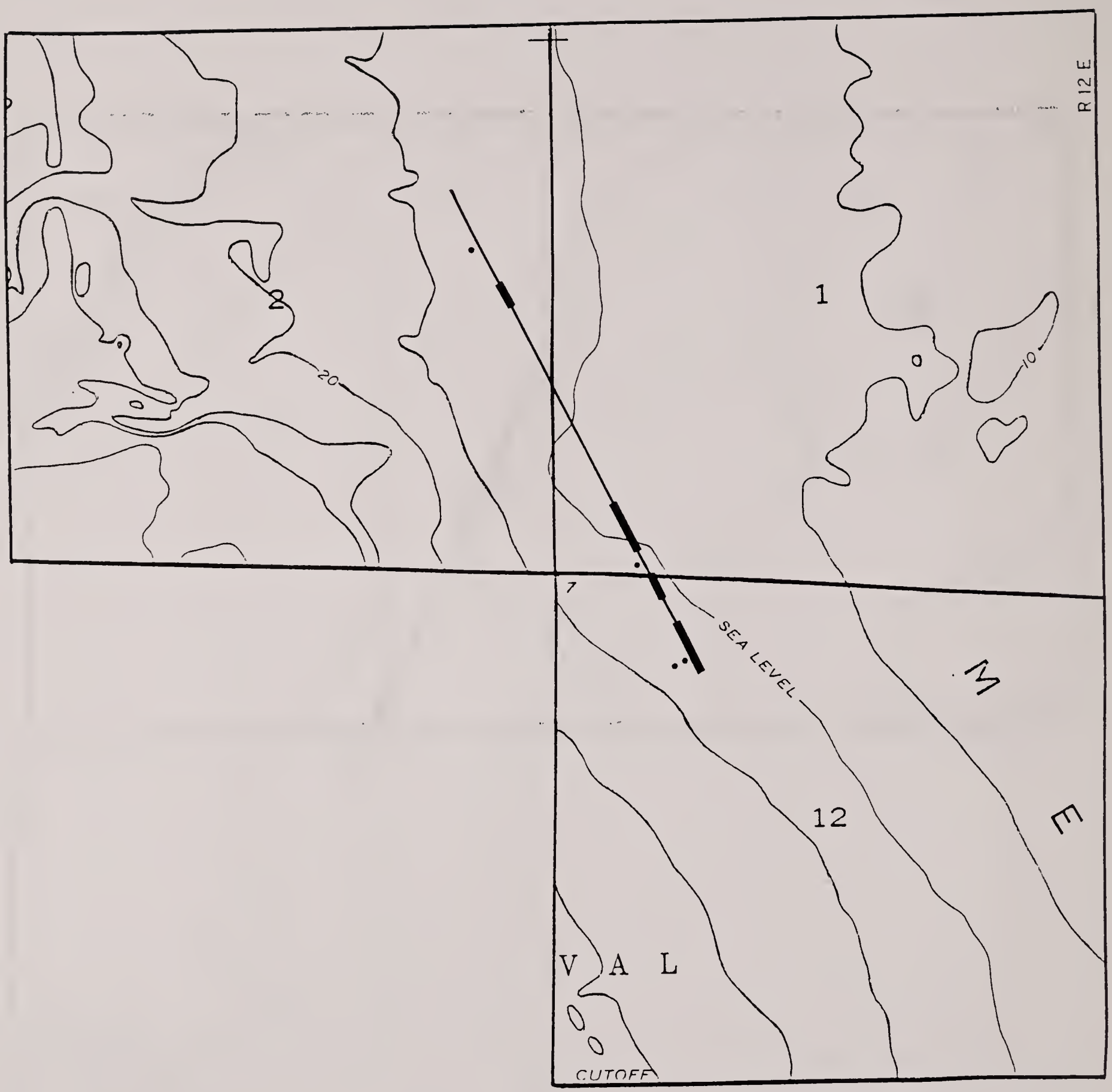
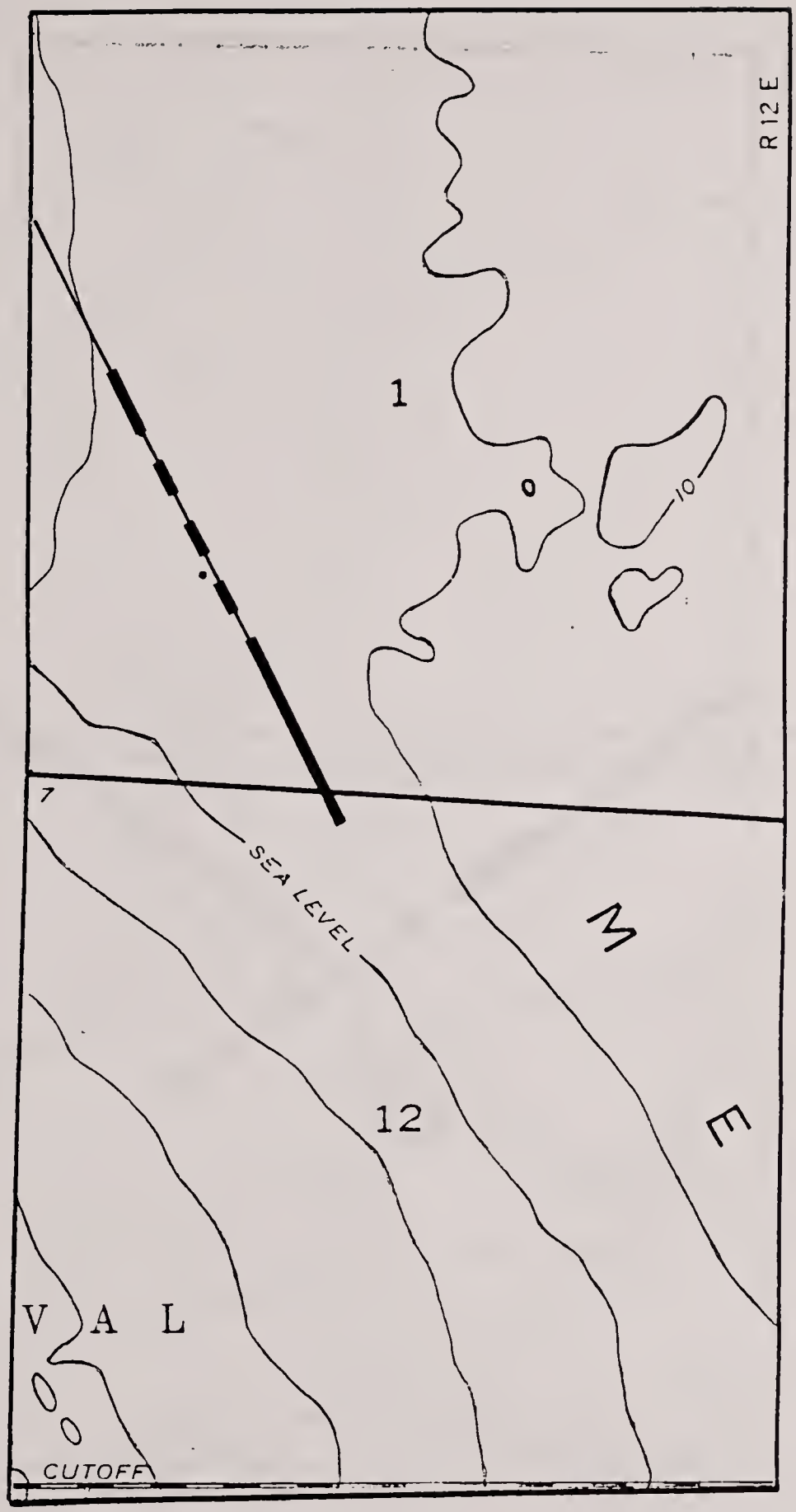


Figure 34. Transect i results. Key: ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.



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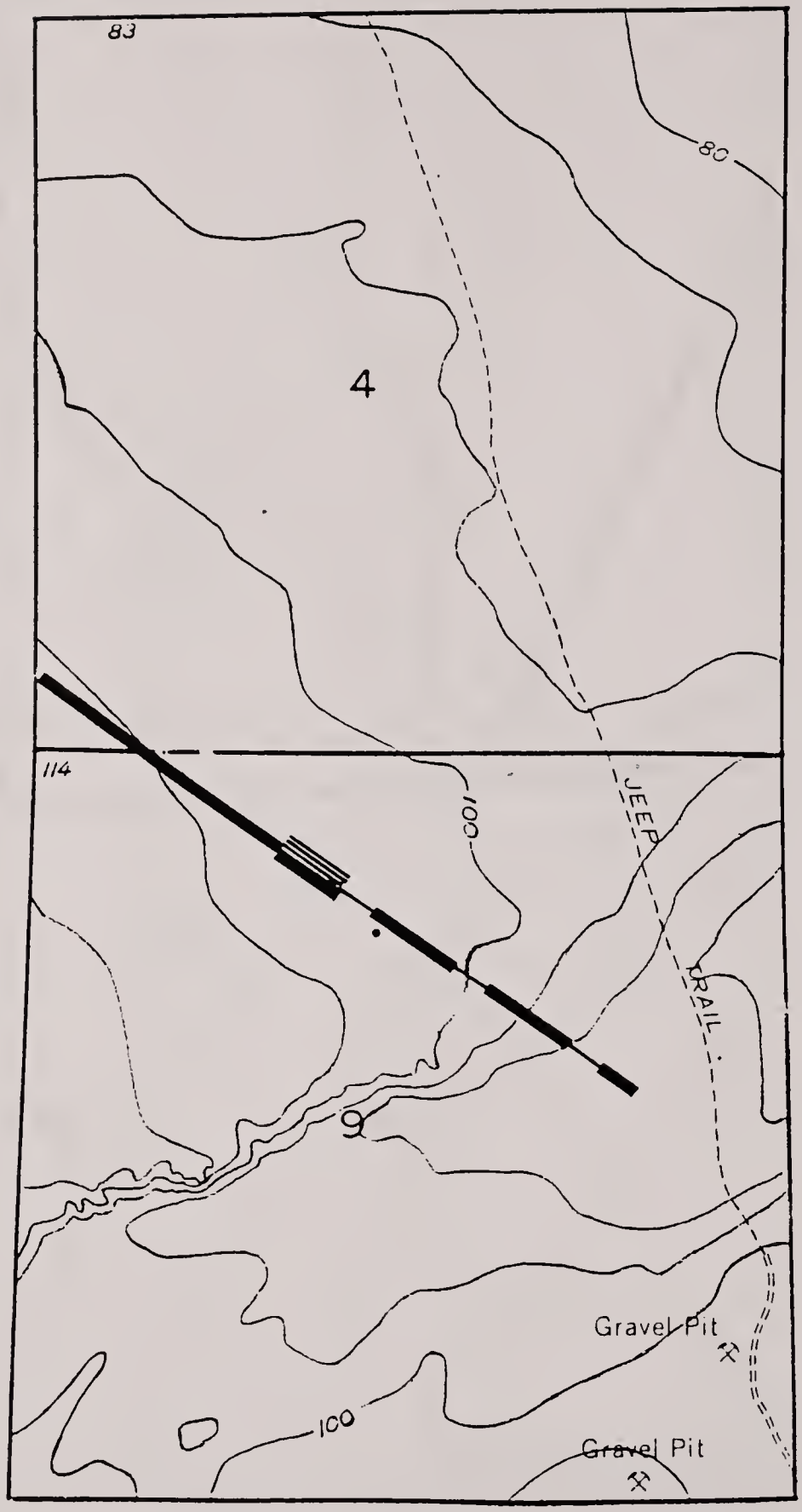

Figure 36. Transect k results. Key: ——=no use, ▬▬=non-approved ORV use, ═══=transmission line road, •••=lizard scat.

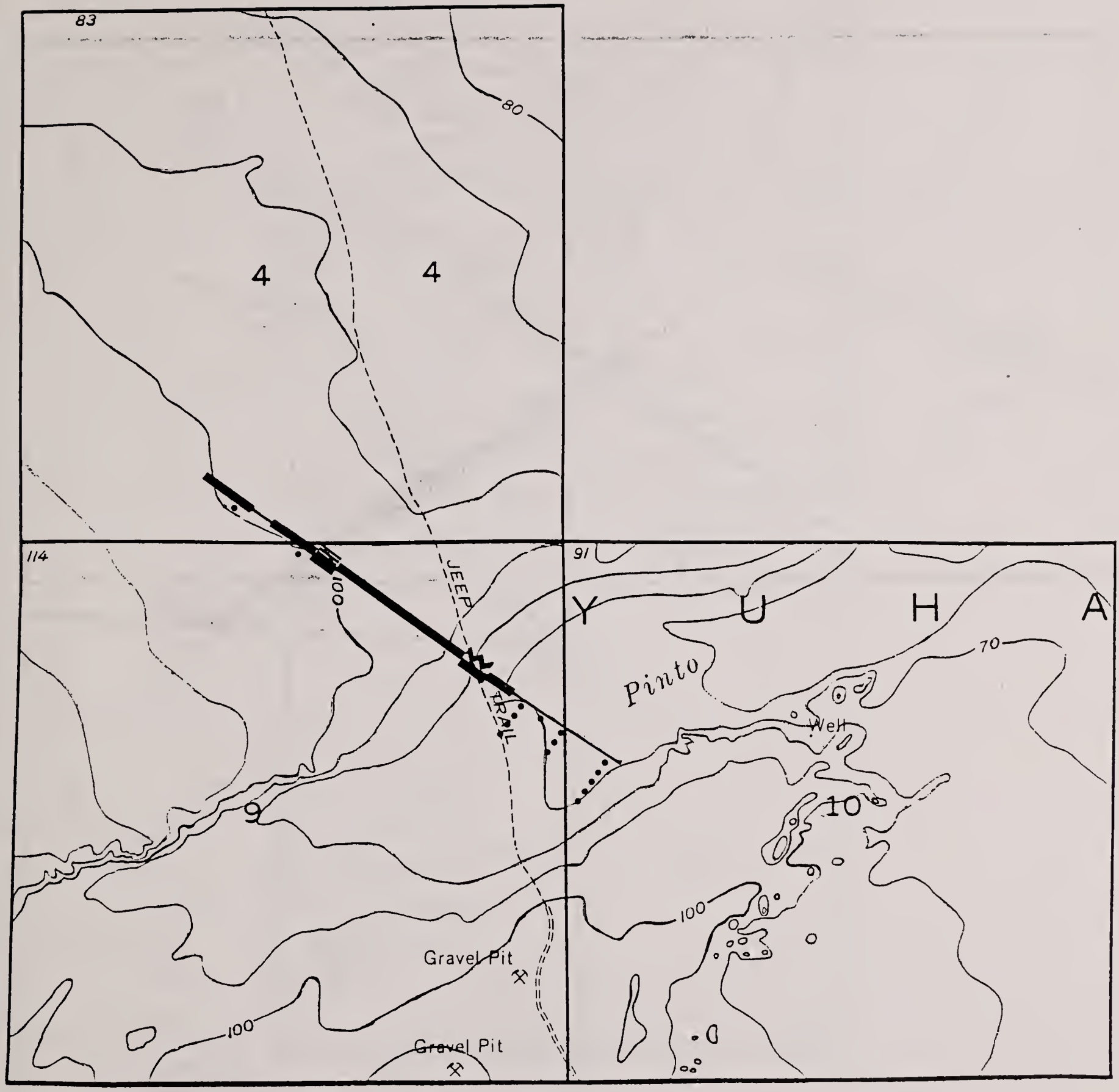

Figure 37. Transect 1 results. Key: ——=no use, ▬▬=non-approved ORV use, ∿∿=racing, ═══=transmission line road, •••=lizard scat.

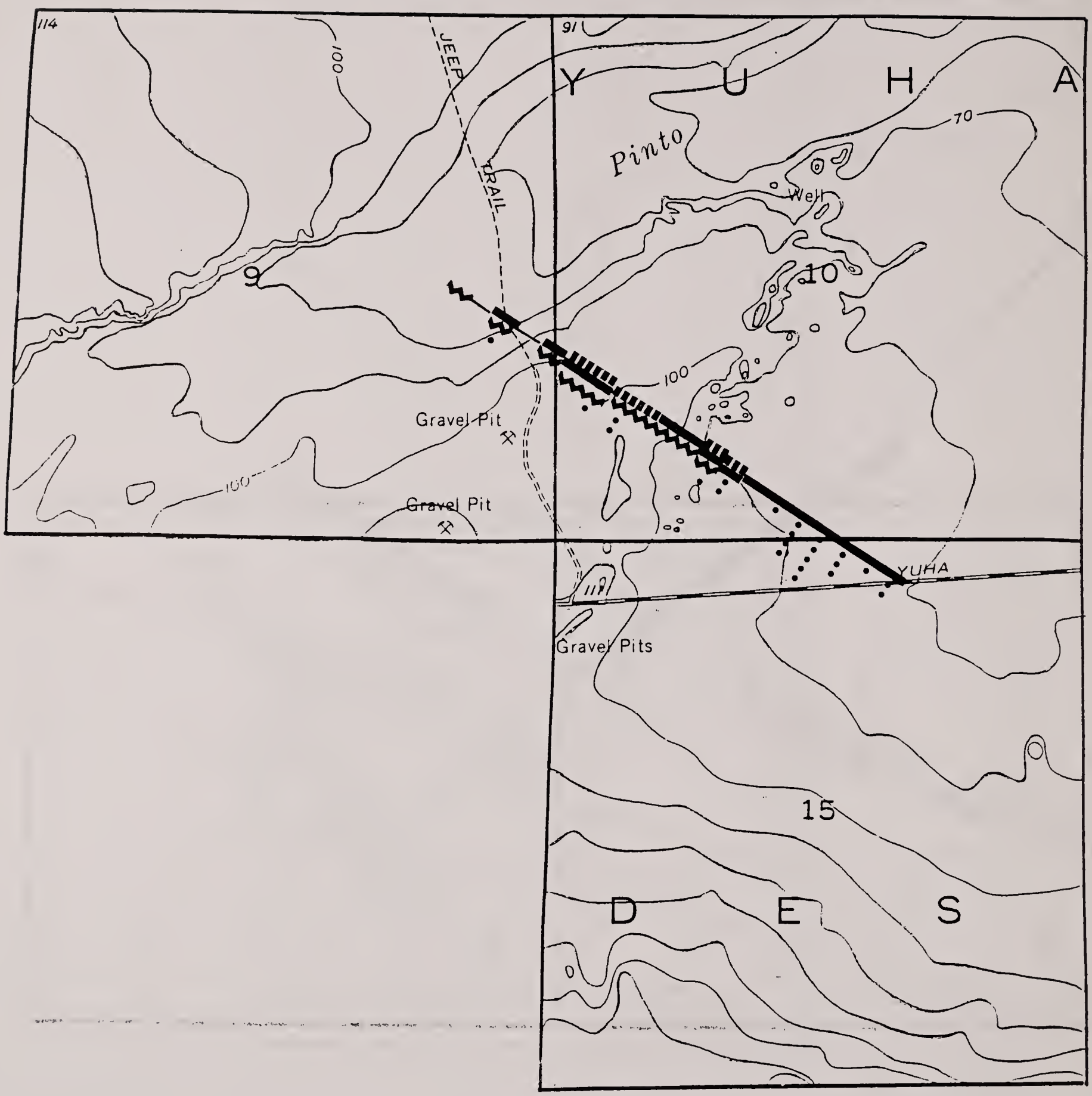

Figure 38. Transect m results. Key: ▮▮▮▮=AROT, ——=no use, ▬▬=non-approved ORV use, ∿∿=racing, •••=lizard scat.

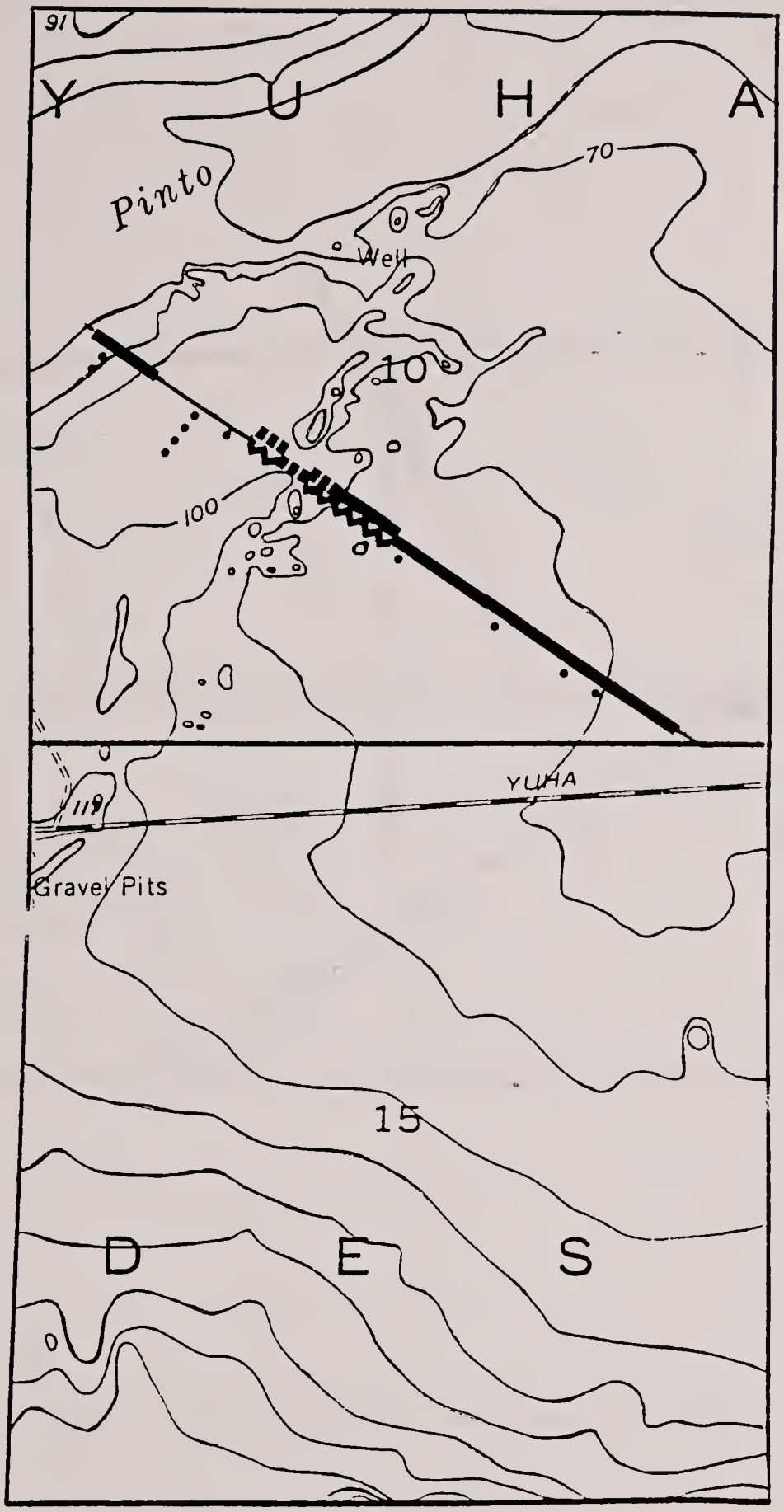

Figure 39. Transect n results. Key: ▮▮▮▮=AROT, ——=no use, ▬▬=non-approved ORV use, ᴡᴡ=racing, •••=lizard scat.

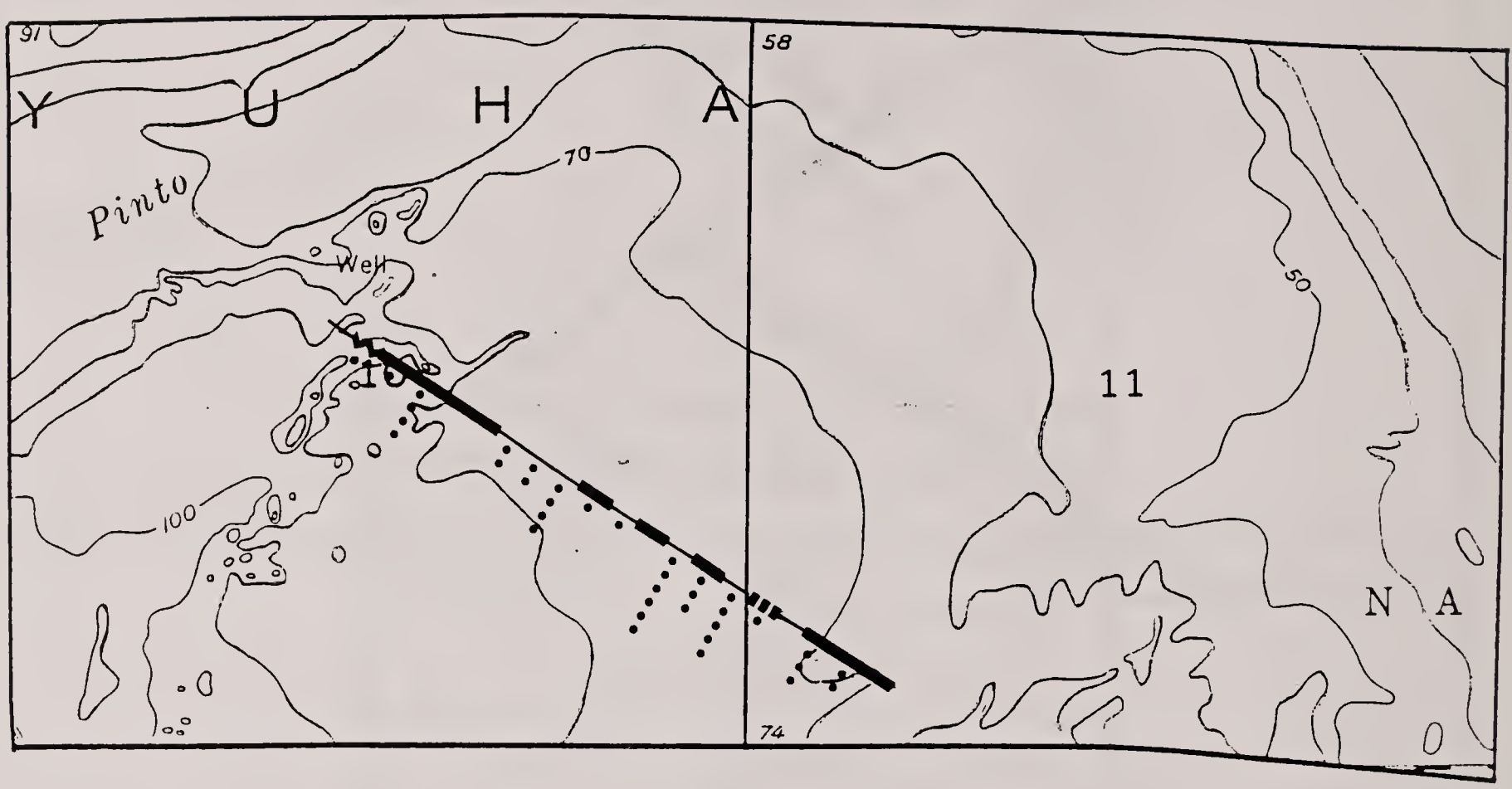

Figure 40. Transect o results. Key: ▪▪▪▪=AROT, ——=no use, ▬▬=non-approved ORV use, ∿∿=racing, •••=lizard scat.

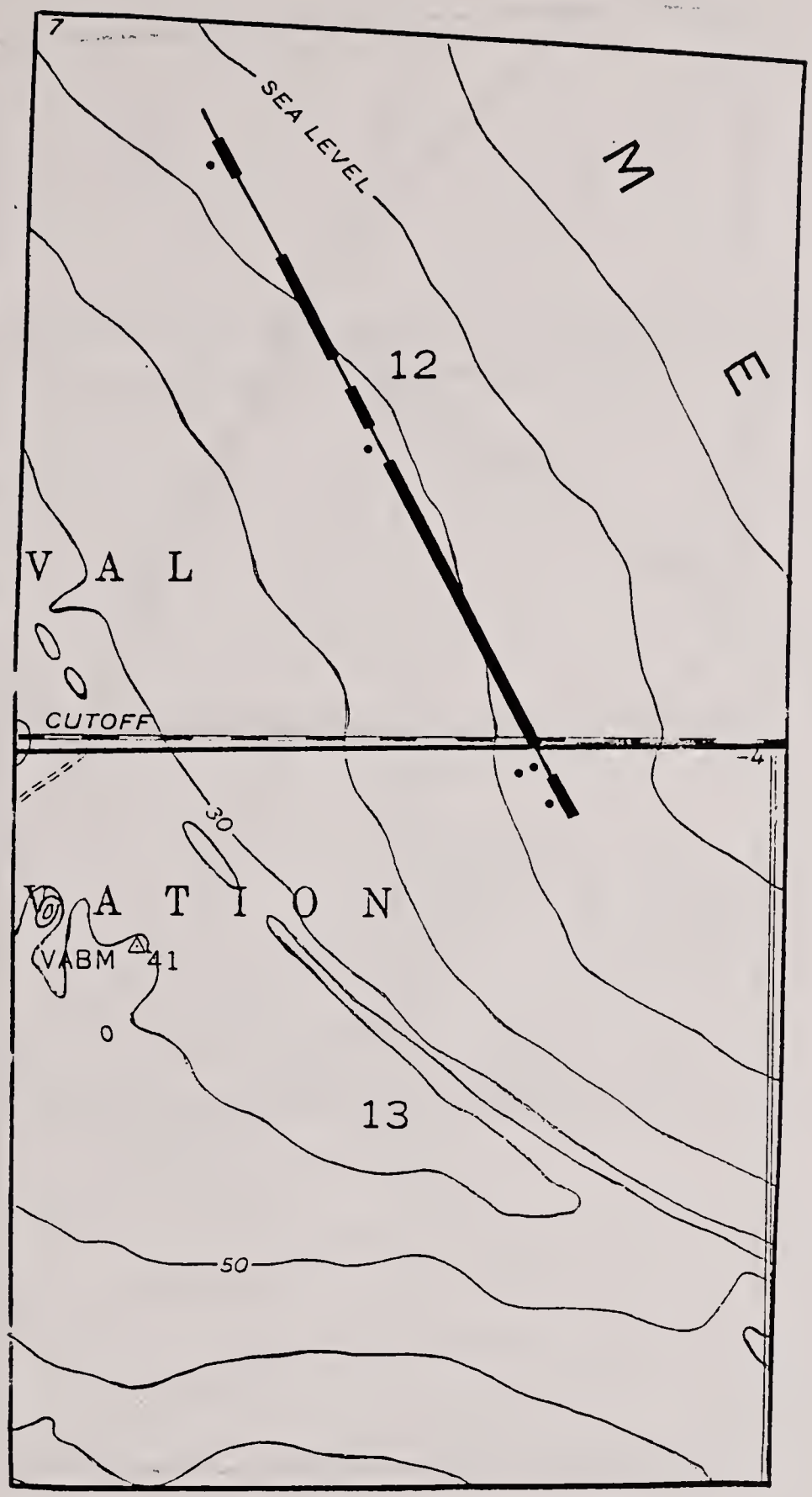

Figure 41. Transect p results. Key: ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

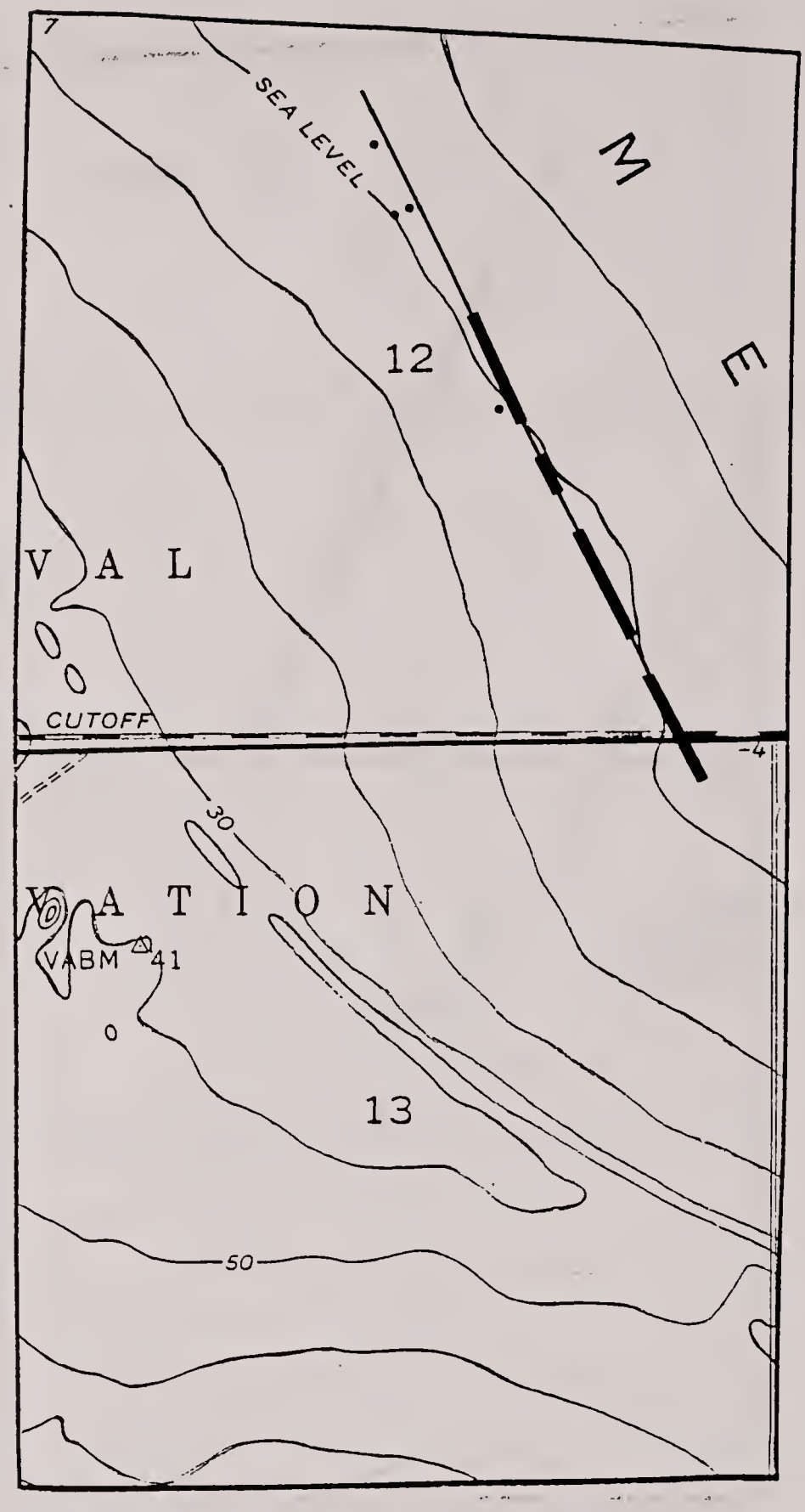

Figure 42. Transect q results. Key: ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

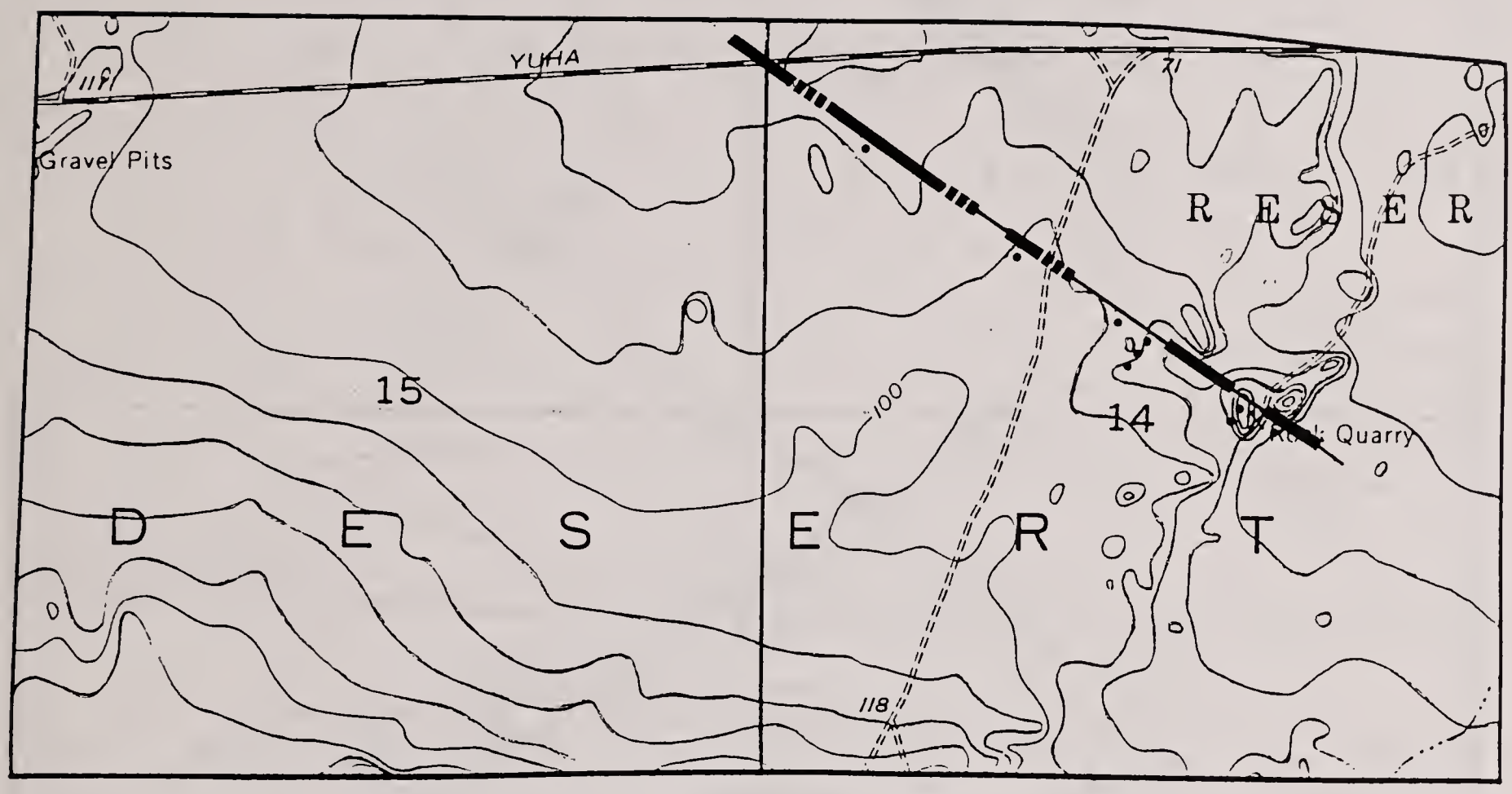

Figure 43. Transect r results. Key: ▪▪▪▪=AROT, ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

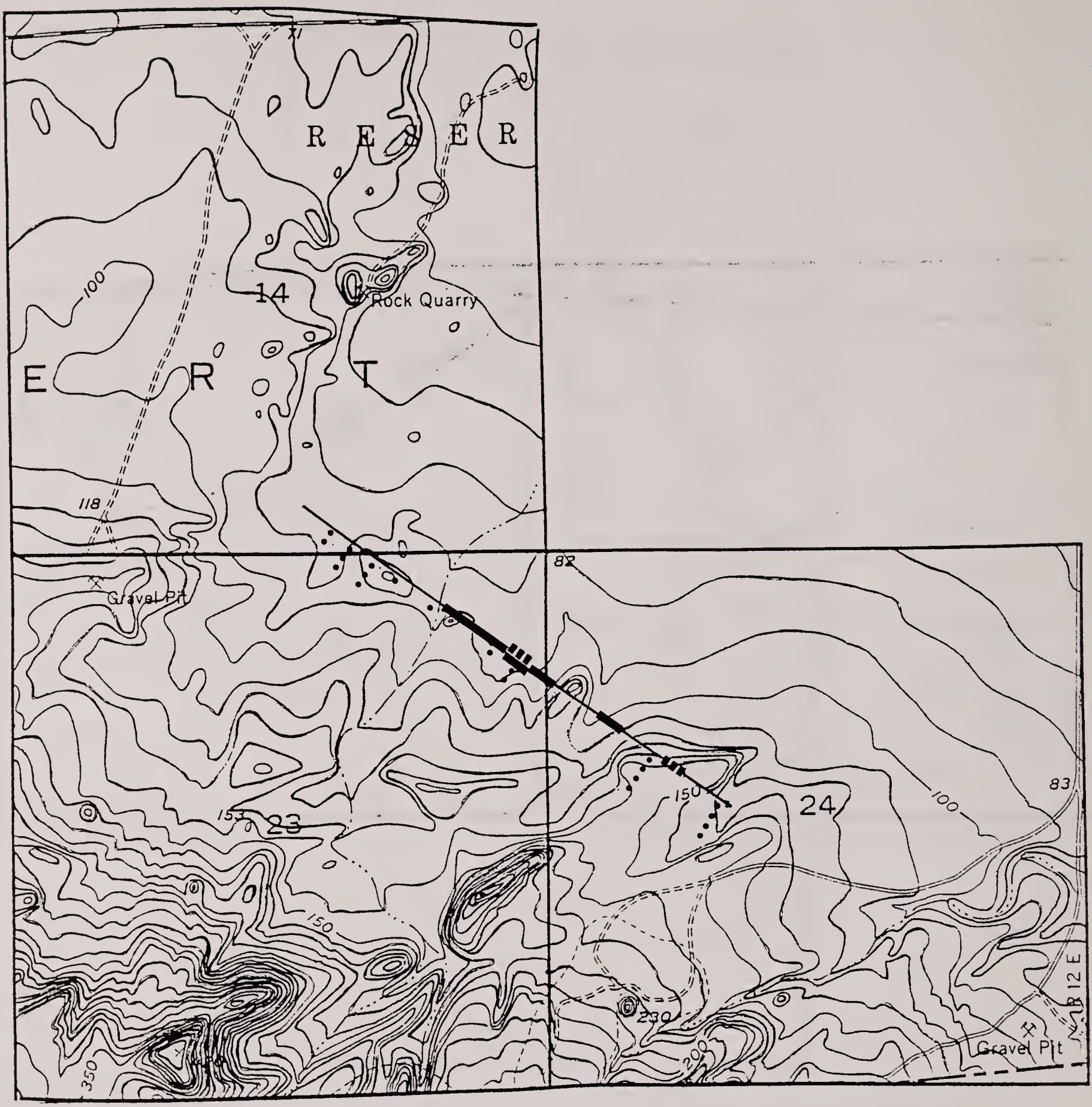

Figure 44. Transect s results. Key: ▪▪▪▪=AROT, ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

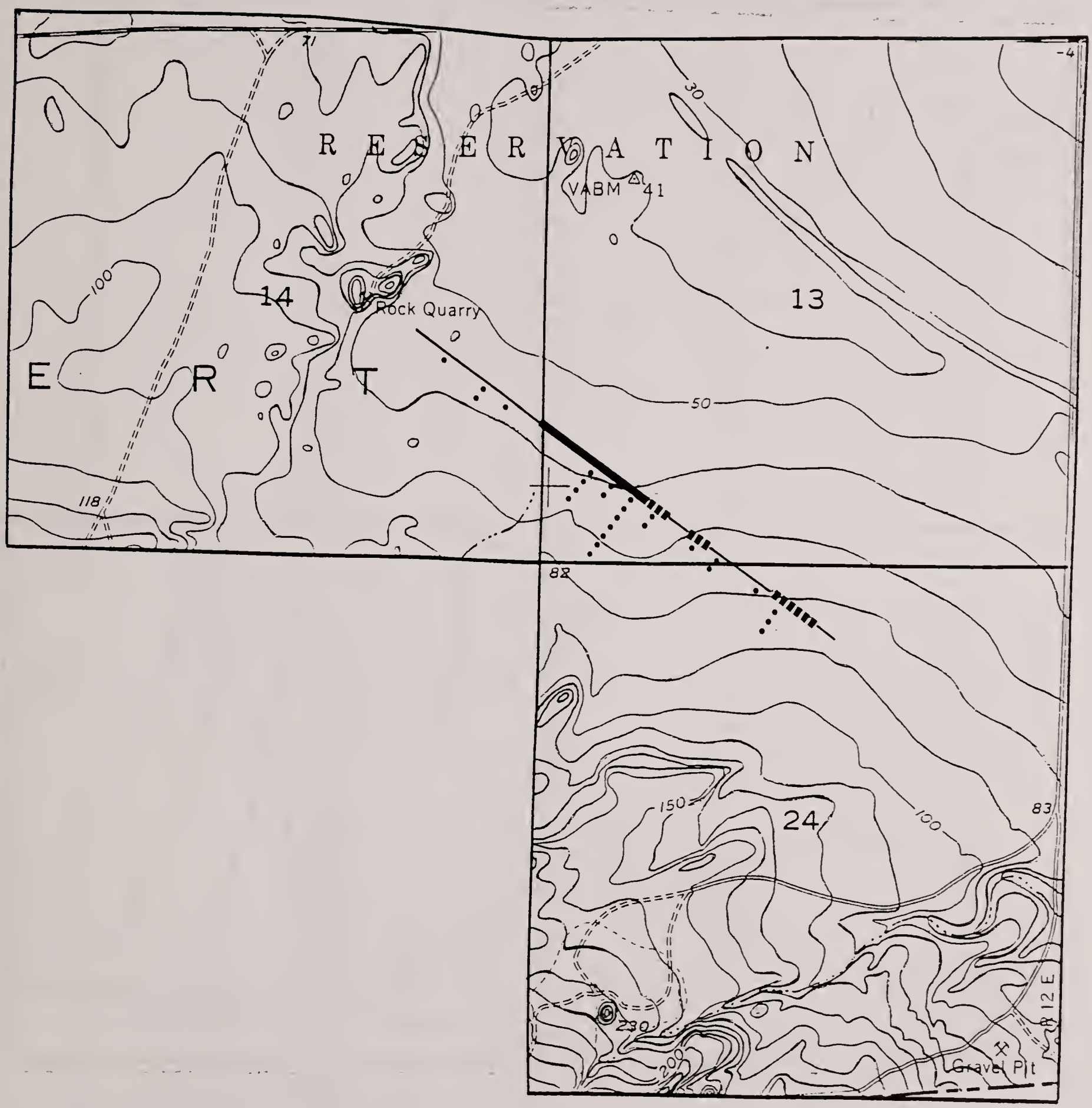

Figure 45. Transect t results. Key: ▮▮▮▮=AROT, ——=no use, ▬▬=non-approved ORV use, •••=lizard scat.

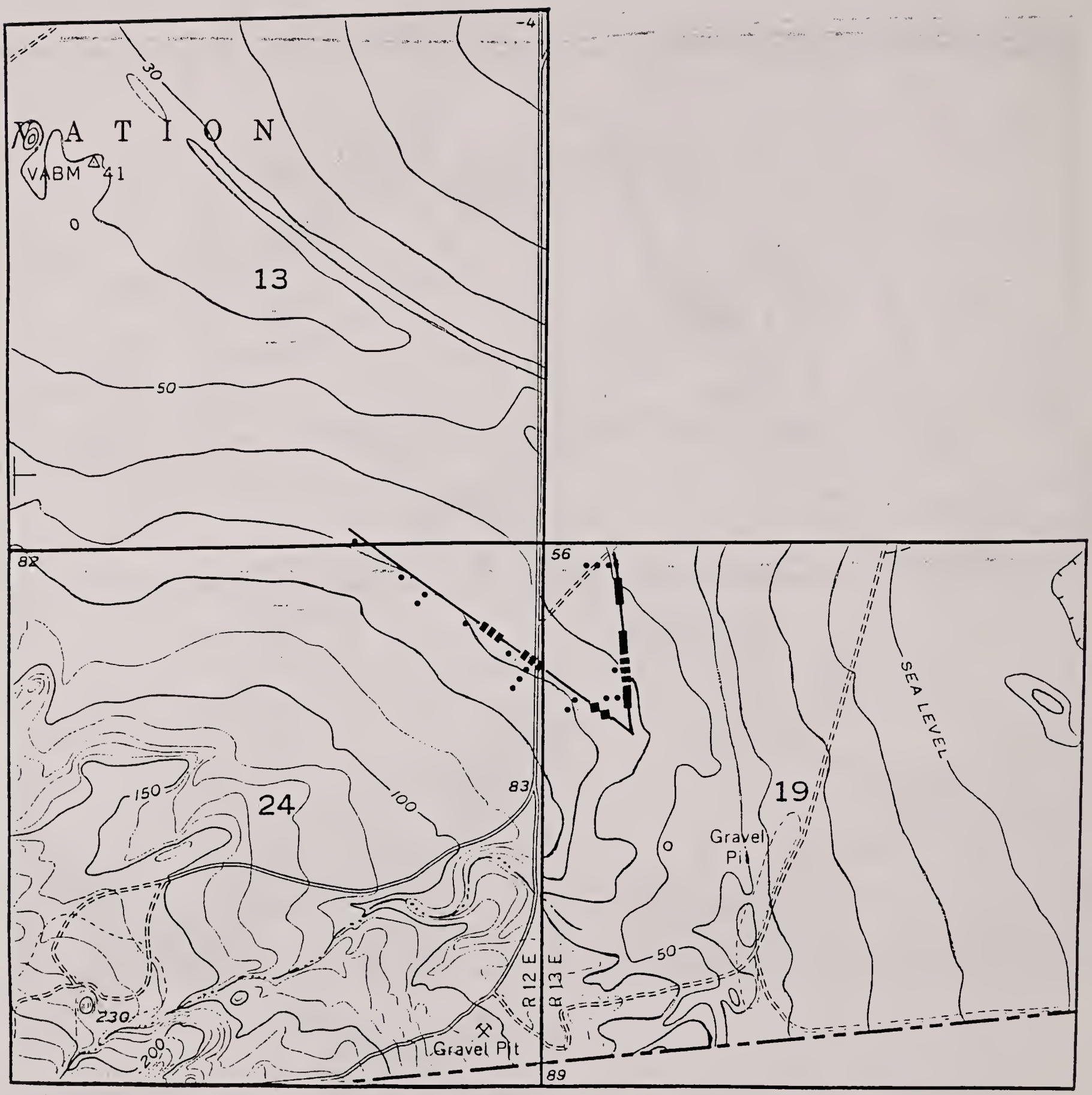

Figure 46. Transect u results. Key; ▪▪▪▪=AROT, ◆◆◆=electrical transmission facility, ORV use, •••=lizard scat.

Table 1. Transect results.

Transect	Scats observed/work hour 1979/1981[1/]	Scats observed/work hour 1984	Lizards observed/work hour 1979/1981	Lizards observed/work hour 1984
1	13.00	8.00	0.00	0.00
2	12.00	8.00	0.00	0.00
3	54.00	19.00	0.00	0.00
4	18.00	11.00	0.00	1.00
5	41.00	30.00	0.00	0.00
6	31.25	8.50	0.50	0.00
7	3.25	5.25	0.00	0.25
8	7.50	9.50	0.00	0.00
9	17.00	9.00	0.00	0.00
10	3.75	26.00	0.25	0.00
11	3.75	7.25	0.00	0.50
12	4.50	9.00	0.00	0.00
13	7.00	17.67	0.00	0.00
14	9.00	69.00	0.00	0.00
15	27.25	29.75	0.00	0.00
16	9.00	1.50	0.00	0.00
17	7.00	8.00	0.00	0.00
18	42.00	13.00	0.00	1.00
19	10.00	29.00	0.00	0.00
20	20.00	1.75	0.25	0.00
21	21.00	89.00	0.00	0.00
22	8.00	3.00	0.00	0.00
a	34.00	0.00	0.00	0.00
b	34.00	3.00	0.00	0.00
c	22.00	0.00	0.00	0.00
d	14.00	1.00	0.00	0.00
e	11.00	7.00	0.00	0.00
f	14.00	0.00	1.00	0.00
g	2.00	1.00	0.00	0.00
h	9.00	0.00	0.00	0.00
i	5.00	4.00	0.00	0.00
j	6.00	1.00	0.00	0.00
k	8.00	1.00	0.00	0.00
l	3.00	15.00	0.00	0.00
m	23.00	23.00	0.00	0.00
n	16.00	11.00	0.00	0.00
o	11.00	36.00	1.00	0.00
p	8.00	5.00	0.00	0.00
q	0.00	4.00	0.00	0.00
r	4.00	9.00	0.00	0.00
s	6.00	21.00	0.00	0.00
t	17.00	26.00	0.00	0.00
u	3.00	17.00	0.00	0.00

1/ Transects denoted by numbers were originated and performed in 1979. Transects denoted by letter were originated and performed in 1981.

Figure 47 shows the percent change in scats observed/hour/transect between 1979 and 1984, south and north of Highway 98. Figure 48 depicts these changes for 1981 vs. 1984 data. These reiterate the trend of somewhat increased scat counts south, and statistically significant decreased scat counts north, of Highway 98.

Table 2 summarizes the amount and percentage of competing uses observed in 1984 along each of the 43 transects. These are totals for each 0.05 mile segment, and are therefore likely to overestimate the length of each transect impacted by competing uses.

Although transects were chosen to permit an analysis of the possible impact of competing uses on horned lizard relative abundance, uses observed in the field were quite different from uses anticipated solely on the basis of BLM office records. Table 3 shows the number of transects anticipated to be, and actually, subject to various competing uses. A statistical analysis was not performed on the majority of these data because too many variables (percent of transect impacted by each of several uses, substrate type vs. use and scat distribution, etc.) were involved, which could result in misleading conclusions. The only type of single use observed on a given transect was non-approved ORV use. When analysed using the Wilcoxin Signed-Ranks Test, decreases between 1979/1981 vs. 1984 data for these transects were significant ($T+ = 7$, $T- = 59$, $T_{.05} = 14$).

As a result of previous and present studies, two categories of optimal habitat became apparent in the Yuha: high density optimal habitat (corresponding to transect results of 10 or more scat observed/hour effort, or 1 lizard observed, in the most recent survey) and previous optimal habitat (corresponding to habitat meeting the former criteria in an earlier study, but not during the 1984 effort; this habitat remains suitable, but horned lizard use may be reduced due to controllable, man-caused activities). These are presented, along with potential optimal habitat (which has not yet been surveyed) in Figure 49.

SUMMARY AND DISCUSSION

Transect Results

Data presented in Figure 4-46 appear to indicate a fairly even distribution of scats observed on "pristine" vs. "impacted" habitat. This apparent distribution is really an artifact of the method of data reduction, which aggregated all scats and uses observed into 0.05 mile segments, rather than using individual locations along each transect route. (For example, according to Figures 4-46, 11% of all scats observed occurred along approved vehicle routes. In actuality, less than 1% of all scats occurred on approved vehicle routes.) These figures are more accurately used as an indicator of horned lizard relative distribution, and as an aid to the delineation of high density optimal habitat. They are also useful in depicting the type and relative location of various competing uses occurring along the transects. It should be

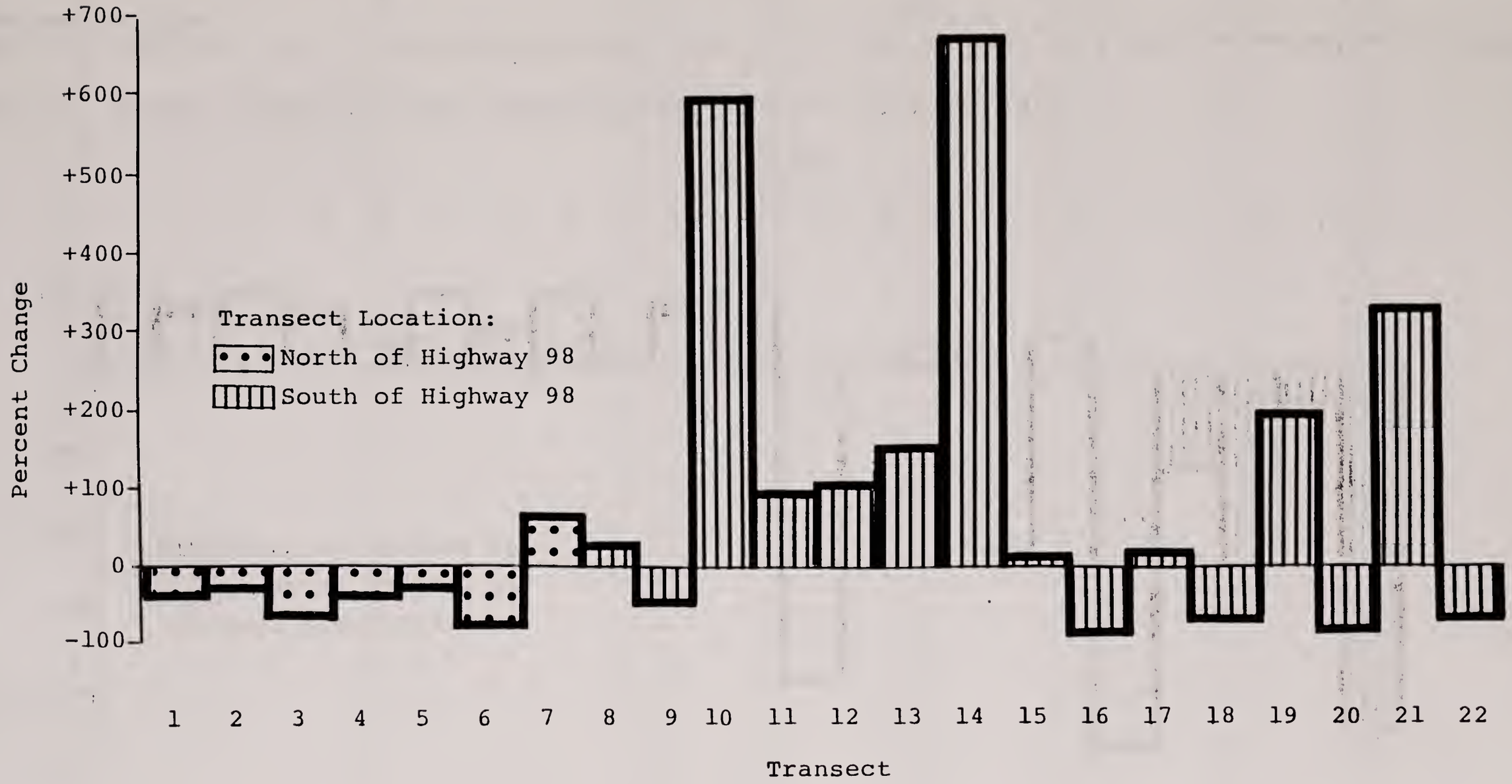

Figure 47. Percent change in scats observed/hour effort in 1984 vs. 1979.

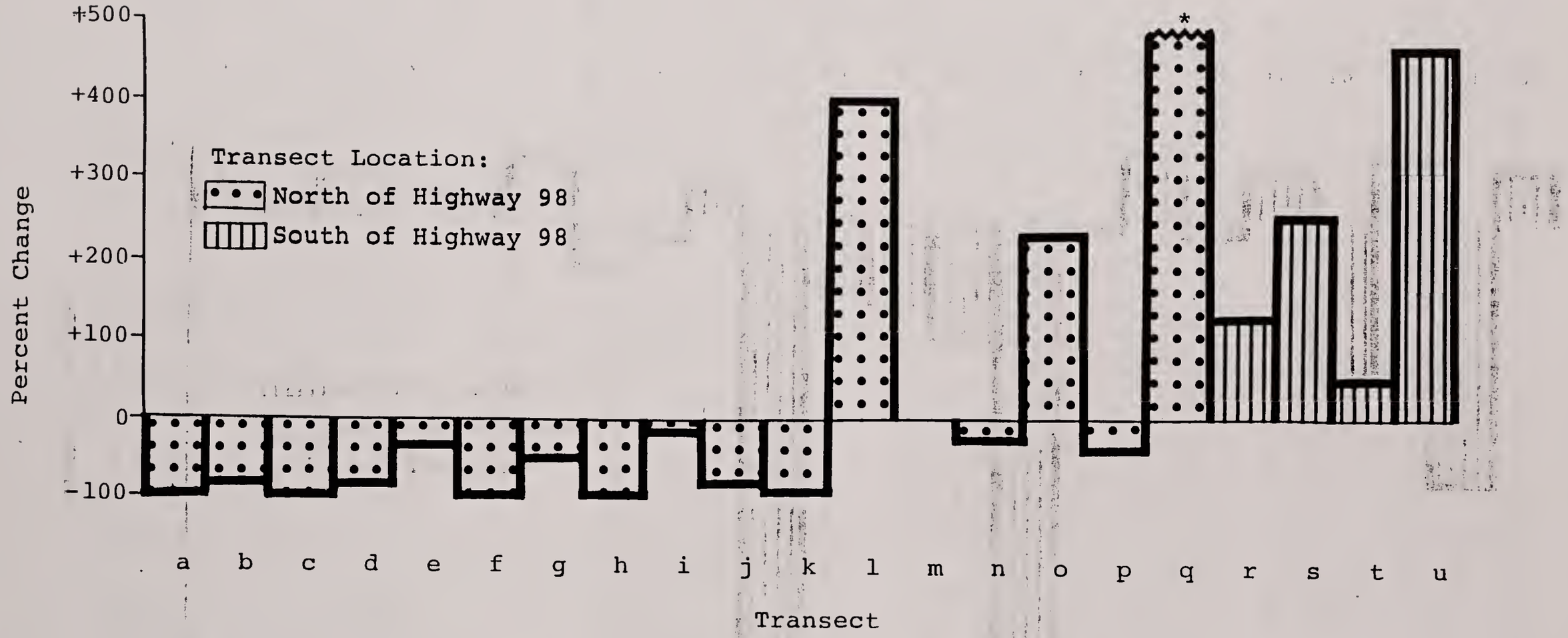

Figure 48. Percent change in scats observed/hour effort in 1984 vs. 1981.

* indicates increase from 0 scats observed/hour effort recorded in 1981 to 4 scats observed/hour effort recorded in 1984.

Transect	Total Length (# of 0.05 mile segments)	Length (%) of use in # of 0.05 mile segments[1/]					
		No use	Trans. facility	Trans. road	Non-approved ORV use	AROT	Racing
1	45	14(31)	0(0)	2(4)	26(58)	4(9)	0(0)
2	42	32(76)	0(0)	0(0)	7(17)	0(0)	3(7)
3	46	34(74)	0(0)	0(0)	11(24)	1(2)	2(4)
4	41	32(76)	0(0)	0(0)	5(12)	1(2)	3(7)
5	46	26(57)	0(0)	0(0)	20(43)	0(0)	0(0)
6	47	28(60)	0(0)	0(0)	19(40)	0(0)	0(0)
7	45	15(33)	0(0)	0(0)	30(67)	0(0)	0(0)
8	52	11(21)	0(0)	0(0)	40(77)	1(2)	0(0)
9	46	20(43)	0(0)	0(0)	25(54)	1(2)	0(0)
10	64	22(34)	0(0)	0(0)	36(56)	8(13)	0(0)
11	42	29(69)	1(2)	2(5)	10(24)	2(5)	0(0)
12	71	48(68)	0(0)	2(3)	18(25)	6(8)	0(0)
13	26	13(50)	0(0)	0(0)	12(46)	2(8)	0(0)
14	43	20(47)	0(0)	0(0)	15(35)	10(23)	0(0)
15	41	20(49)	0(0)	0(0)	15(37)	9(22)	0(0)
16	31	25(81)	0(0)	0(0)	6(19)	0(0)	0(0)
17	35	16(46)	1(3)	2(6)	18(51)	0(0)	2(6)
18	31	8(26)	0(0)	0(0)	21(68)	3(10)	4(13)
19	33	14(42)	0(0)	0(0)	19(58)	0(0)	1(3)
20	45	23(51)	0(0)	0(0)	22(49)	0(0)	0(0)
21	47	20(43)	0(0)	0(0)	27(57)	3(6)	0(0)
22	44	21(48)	0(0)	0(0)	22(50)	3(7)	4(9)
a	20	7(35)	0(0)	0(0)	13(65)	0(0)	0(0)
b	20	10(50)	0(0)	0(0)	10(50)	0(0)	0(0)
c	20	16(80)	0(0)	0(0)	3(15)	0(0)	1(5)
d	20	13(65)	0(0)	0(0)	3(15)	0(0)	4(20)
e	20	2(10)	2(10)	2(10)	17(85)	0(0)	0(0)
f	20	9(45)	5(25)	1(5)	6(30)	0(0)	0(0)
g	20	8(40)	5(25)	3(15)	8(40)	2(10)	0(0)
h	20	6(30)	1(5)	1(5)	12(60)	2(10)	0(0)
i	20	14(70)	0(0)	0(0)	6(30)	0(0)	0(0)
j	20	9(45)	0(0)	0(0)	11(55)	0(0)	0(0)
k	20	3(15)	0(0)	2(10)	17(85)	0(0)	0(0)
l	20	6(30)	0(0)	1(5)	14(70)	0(0)	1(5)
m	20	2(10)	0(0)	0(0)	15(75)	6(30)	10(50)
n	20	4(15)	0(0)	0(0)	13(65)	3(15)	4(20)
o	20	8(40)	0(0)	0(0)	10(50)	1(5)	1(5)
p	20	6(30)	0(0)	0(0)	14(70)	0(0)	0(0)
q	20	10(50)	0(0)	0(0)	10(50)	0(0)	0(0)
r	20	6(30)	0(0)	0(0)	11(55)	3(15)	0(0)
s	20	13(65)	0(0)	0(0)	6(30)	2(10)	0(0)
t	20	11(55)	0(0)	0(0)	5(25)	4(20)	0(0)
u	20	13(65)	1(5)	0(0)	3(15)	3(15)	0(0)
Total	1383	667(48)	16(1)	18(1)	631(46)	80(6)	40(3)

1/ Note: two or more uses could occur in the same 0.05 mile segment.

TABLE 3. Anticpated and Observed Competing Uses along 43 transects.

TYPE OF USE	ANTICIPATED NUMBER OF TRANSECTS	OBSERVED NUMBER OF TRANSECTS
a. ORV use on approved routes of travel	12	0
b. Casual ORV use off of approved routes of travel	0	11
c. Racing	7	0
d. Transmission road, pad or substation	5	0
e. Control (no competing use)	7	0
a. + b.	0	10
a. + c.	6	0
a. + d.	4	0
a. + b. + c.	0	7
a. + b. + d.	0	6
a. + c. + d.	1	0
b. + c.	0	4
b. + d.	0	3
b. + c. + d.	0	2
c. + d.	1	0

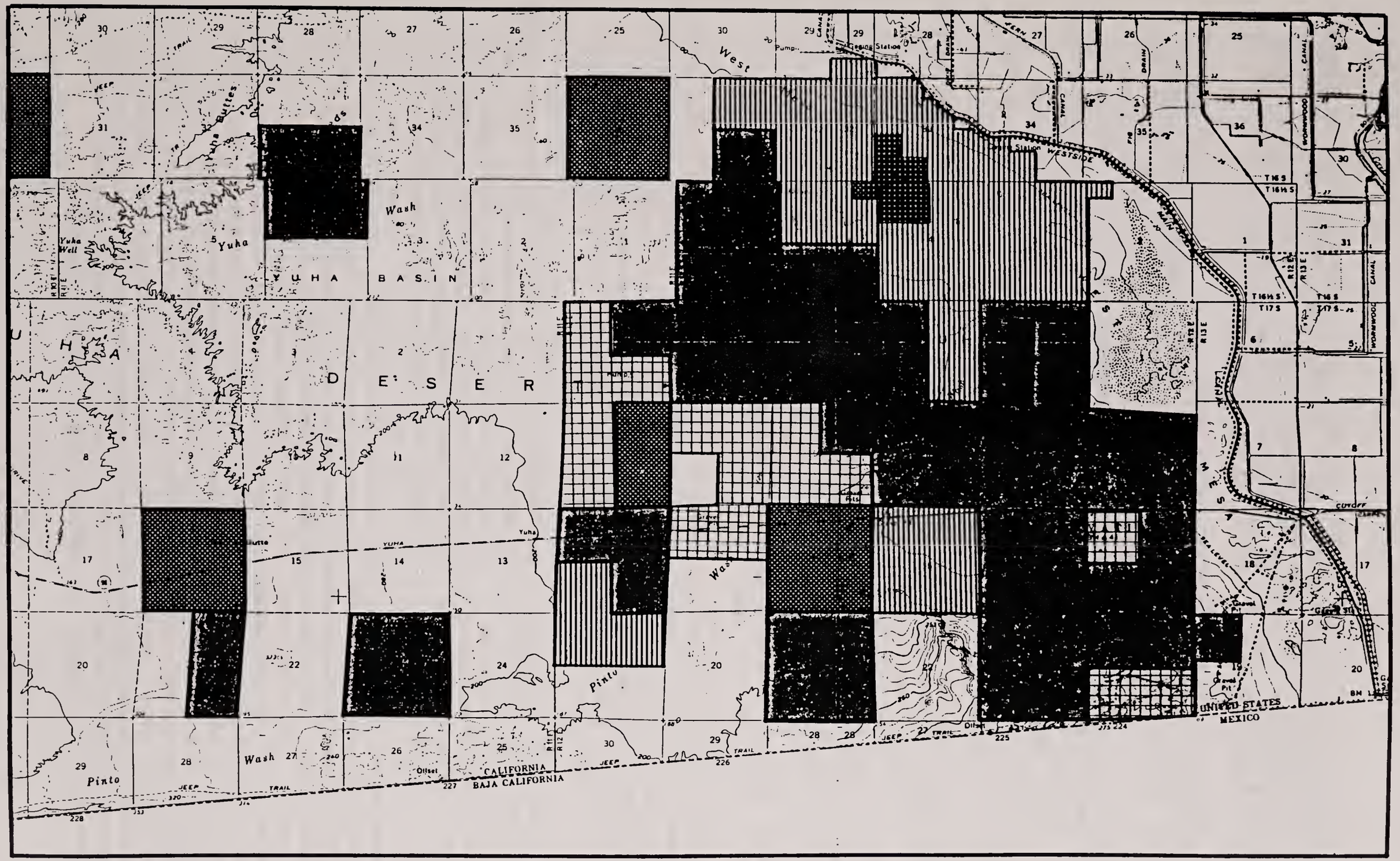

Figure 49. Flat-tailed horned lizard optimal habitat. Key: =high density optimal habitat, =previous optimal habitat, =potential optimal habitat, =private land.

noted that, although most types of uses are overestimated in these figures, the "non-approved ORV use" category is much more accurate than the others. This type of casual, single or few vehicle pass, activity occurred over large contiguous areas, in many cases covering all or most of a 0.05 mile transect segment.

Taken alone, the study area-wide transect by transect analysis for 1979 vs. 1984, and 1981 vs. 1984, data seem to indicate a stable trend in horned lizard relative abundance. However, when analysed geographically by occurrence north of Highway 98 only, or south of Highway 98 only, a different trend becomes apparent. Transect by transect analysis of the former indicate significant decreases in scats observed/hour effort, both in 1979 vs. 1984 and 1981 vs. 1984. This decrease is probably masked in the study area-wide analysis by increases south of Highway 98, although the latter are not statistically significant on a transect by transect basis.

The percent changes in scats observed/hour effort/transect reiterate the apparent increasing trend south of Highway 98, and the significantly decreasing trend north of Highway 98.

Because of the paucity of sightings, analysis of lizards observed/hour effort is not really productive in giving an indication of population trend.

Although Table 2 overestimates the percentage of each transect impacted by competing uses and underestimates the portion of "pristine" habitat present, it is useful in presenting the proportions and types of uses occurring in the Yuha. As stated previously, the "non-approved ORV use" category is the most accurate estimation. This means that of 69.15 miles of transect walked, approximately 31.81 miles were subject to casual, non-approved vehicle use. This figure is alarming with regard to habitat quality, and ACEC and WHA integrity.

It is especially alarming when compared with the occurrence of legal uses. The latter total a maximum of 7.61 miles out of 69.15 total miles, and even this is a large overestimate. This difference in non-anticipated and anticipated levels of useage is also reflected in Table 3, which shows a perfect negative correlation between anticipated uses (from BLM records) and observed uses.

The question remains, why are the observed trends of increases south of Highway 98 and decreases north of Highway 98 occurring. While the present study results cannot definitively answer the question, they can begin to answer it and also can define future study needs. Non-approved ORV use appears to be a factor in transects showing decreases in scats counted, as discussed earlier. Although not statistically testable, racing and transmission line-related activities may be a factor. All transects subject to racing, and 80% of transects subject to transmission line-related activities, occurred north of Highway 98. In addition, 10 months before the present study and before the construction of the La Rosita 230 kV line, several horned lizards and scats were observed in areas currently showing no lizards and extremely low scat counts. Attempts should be made to better assess these impacts.

Weather and localized fluctuations cannot be totally discounted. Heavy rainfall in 1983 appears to have allowed increases in relative abundance of reptiles desert-wide. This probably explains the increases observed during the present study south of Highway 98, and should also have resulted in increases north of Highway 98 unless other factors (as described) were involved. Natural population fluctuations should have resulted in random localized increases or decreases, rather than the more generalized trends observed, but cannot be ignored as possible factors.

An additional factor which may affect flat-tailed horned lizard distribution is pesticide overspray from agricultural fields near or adjacent to the study area. This type of activity, if it occurs, has probably occurred for years. Therefore, effects should have been apparent in earlier survey results, which they were not. Also, past, cursory observations showed only short-term impacts to the lizards' prey species, which would tend to discount this factor. Perhaps a change in type of chemical or frequency of spraying could account for the sudden reductions observed in 1984. The validity of this possible explanation cannot be determined. However, it would be useful to attempt to learn whether overspray is occurring presently, and also whether pesticide truely impacts the lizard or its prey species. Perhaps a series of panels of a blotter type material could be set up along the eastern portion of the study area. Panels could be checked periodically for presence of pesticide.

The time of year that the surveys were performed is another possible factor influencing the comparability of survey results. Original 1979 transects were done between 19 April and 1 June, while 1981 transects were performed between 27 May and 11 June. The 1984 survey began on 1 June and ended on 1 July. Turner and Medica (1982) indicate that season of survey influenced investigators' success in observing horned lizards and scats in 1979; middle to late May was found to be most productive. However, they did not feel that season was a signficant factor in widespread geographic variations they observed. Seasonal cycles probably do influence observer success, but climatic variations should influence the cycles' relative occurrence over time. The fact that the present study observed increases in scat counts in large blocks of habitat tends to reduce the likelihood that signficant decreases in other areas were due to the time of year. Transect performance within sampling locations (north and south of Highway 98) was interspersed with regard to time of year, wind conditions, and temperature, yet trends north of Highway 98 remained down, and south of Highway 98 remained generally up.

Finally, experimental error could be a factor. Personnel performing the 1984 surveys were different from those in earlier investigations. Transect routes walked in 1984 may have been slightly different than earlier routes. These factors would pertain study area-wide, however, and should therefore result in constant, area-wide differences, rather than for the differing trends observed south vs. north of Highway 98.

Management Situation

The present study points out several problems with the current management situation in the Yuha.

The study area was designated in the Desert Plan (USDI, BLM, 1980) as being subject to vehicle use only on approved routes of travel. Cross-country travel has been illegal since ICMP maps were published in 1977 (Vernon, pers. comm.). However, all transects surveyed in the present study were subject to casual ORV use off of approved (or even existing though non-approved) routes of travel, to a significant degree.

Competitive events are also a source of unanticipated impacts. Racing, although a permissible activity, is occurring off of the existing approved race course. Routes subject to racing are, in places, up to 400 feet in width, rather than the approved 100 foot maximum.

A significant increase in public access into the eastern and northern Yuha has been created by the construction of access roads for the 500 and 230 kV transmission lines and IV Substation. These roads are useable by 2 wheel drive vehicles and campers as well as 4 wheel drives, ATVs, and motorcylces. Although portions of these roads are officially closed to public access, closures have not been very effective. These roads are also accessible by internal approved routes, even when the roads are closed along Highway 98.

In addition, maintenance needs for the transmission lines and substation have not been carefully considered. They have klso not been addressed with regard to potential environmental conflicts.

BLM records are incomplete and inaccurate. Maps available to the public contain significant errors. This, plus the lack of signing of routes and lack of enforcement presence, exacerbates problems with cross-country travel and proliferation of non-approved routes.

A lack of use supervision (pre- and post- race compliance checks, permanent course marking, and resource monitoring) contributes significantly to the proliferation of racing activities.

Routes of travel have been approved through sensitive wildlife habitat. This tends to lead to resource degradation.

Management Recommendations

The following recommendations are suggested as means to reverse the trend of flat-tailed horned lizard resource decline apparent north of Highway 98, and to prevent a decline in resources south of Highway 98:

1) Develop an accurate route of travel map. This will provide an accurate basis for decisions regarding vehicle use in the Yuha.

2) Review and revise the existing approved route of travel network in the Yuha, and revise the existing Yuha Desert brochure. The study area is to be managed to include low intensity uses. Route of travel decision rationale criteria include the statement that routes" ...shall be located to minimize...significant disruption of wildlife habitats" (43 CFR 8342.1). Yet high intensity uses and highly disruptive activities are occurring in optimal flat-tailed horned lizard habitat. Revision of route of travel decisions could reduce unacceptable impacts which are occurring. Revising the existing brochure would encourage compliance with route designation decisions.

3) Close currently impacted optimal flat-tailed horned lizard habitat to competing uses for 5 years, and monitor the species' response. This would include closure of approximately 85% of roads associated with the Southwest Powerlink, La Rosita Transmission Line, and IV Substation, to public access. It would also include denial of competitive event applications for the portion of the Yuha Competitive Race Course or other routes which traverse optimal horned lizard habitat. Also, consideration of one enduro per year south of Highway 98 in optimal flat-tailed horned lizard habitat should be discontinued.

4) Closures should include barriers, locked gates, rocking, signs, and any other means which will increase their effectiveness. This should be implemented in new closures and to more effectively carry out existing closures.

5) Sign approved routes of travel. This will enable the public to comply with route designations.

6) Permanently monument and sign the Yuha Competitive Race Course. This will enable competitive event sponsors and participants to remain on the approved course.

7) Increase use supervision of competitive events, including pre- and post- checks, monitoring of course widening, event route changes if necessary, etc. This will decrease impacts to habitat.

8) Confine "play" or "warm-up" activities to the race pit itself; delineate the pit area boundary with signs. Again, this will decrease impacts to habitat.

9) Allow transmission line inspection and maintenance in sensitive areas by the least impacting means available. Again, this will decrease impacts to habitat.

10) Do not approve sand and gravel applications that would impact flat-tailed horned lizard optimal habitat, either directly or through fragmentation. Explore alternative material sources. This activity has the potential to severely impact habitat. Although current levels of extraction are low, future needs will increase. This could have serious repercussions with regard to the viability of flat-tailed horned lizards in the Yuha crucial habitat area.

11) Determine, if possible, whether pesticide overspraying is occuring, and to what degree; determine pesticide impacts to horned lizards and harvester ants. Although past occurrences are unknown, this information would be useful in interpreting study results.

12) Increase Bureau presence through public contact and patrol. This will encourage information transfer and public compliance with regulations.

13) Continue to monitor the status of the flat-tailed horned lizard in the Yuha. The present study indicates that the species is undergoing significant declines in a major portion of the Yuha crucial habitat area. This, combined with known losses of suitable formerly densely occupied habitat in south-eastern East Mesa, may precipitate the need to formally list the species either by the State of California or the U.S. Fish and Wildlife Service.

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