A SURVEY OF THE HERPETOFAUNA OF BRUNEAU RESOURCE AREA, BOISE DISTRICT, WITH FOCUS ON THE SPOTTED FROG, RANA PRETIOSA

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with the
Bureau of Land Management
Boise District
Boise, ID 83706

Summary: Little is known about the distribution and abundance of reptiles and amphibians in the deserts of the Intermountain West. In particular, the status of the spotted frog, Rana pretiosa, (presently federally classified as C2) is poorly known. We conducted censuses of the amphibians at potential breeding sites in the portion of the Bruneau Resource Area at the southern end of the Owyhee Mountains and collected data on potentially important habitat variables. We found adult spotted frogs at 41 sites and their larvae at 3 sites out of 204 characterized. Adult spotted frogs tended to be found at oxbows, pools, or ponds, at sites with sandy substrate, at sites with lower sagebrush cover, and at sites with hideaways present. Sites with spotted frogs had significantly less evidence of grazing than did sites without spotted frogs. Larvae of the other common species of amphibian, the Pacific treefrog (Pseudacris regilla), were found at 37 sites, and adults at 11 sites. Two other amphibian species and ten reptile species were found as well.

INTRODUCTION.

The Boise district plans to prepare a Resource Management Plan for the Bruneau Resource Area in the mid-1990's. To allow construction of an RMP that is sensitive to the wildlife of an area, it is important to know the occurrence and status of species present in the area. At the present time, however, little is known of the occurrence in the resource area of members of two classes of vertebrates, amphibians and reptiles.

Of particular concern are the amphibians. A number of researchers have argued that amphibian populations worldwide are undergoing a decline (e.g. Freda and Dunson 1986, Weygoldt 1989, Wake and Morowitz 1990 and Wyman 1990). The hypothesized reasons for decline include: (i) global phenomena, either increased ultraviolet radiation (due to partial loss of the protective ozone layer) or climate change. (ii) pollution, in the form of pesticides or acid rain, the effects of which may be exacerbated by the relatively permeable skin of amphibians, (iii) loss of breeding habitat due to human impacts, or the fragmentation of habitat, leading to local extinctions without recolonization, and (iv) the introduction of exotic species, both fishes and amphibians, which prey upon larval forms.

Of the species of amphibian that occur in the Bruneau Resource Area, the spotted frog (Rana pretiosa) is the only species recognized by the federal government as being potentially in trouble. Presently, the species has a federal status of C2, meaning that listing is possibly appropriate, but that more information is needed before proper consideration can be given. The U.S. Forest Service Region 4 lists

the species as "sensitive". The Bureau of Land Management does not list the species. Idaho Fish and Game list it as G5S5, meaning that it is widespread and abundant, both throughout its range and within Idaho.

The spotted frog has a distribution that covers much of western North America, from southern Alaska to central Nevada, and historically from the Pacific coast to Wyoming. It has been extirpated from west of the Cascades due to predation from introduced bullfrogs. It usually occurs in mountainous areas near slow-flowing streams and rivers, lakes, springs, and marshes. It is highly aquatic, typically occurring near cool permanent quiet water. In the more arid portions of its range, it exists as isolated populations, inhabiting higher elevation ranges. One such isolated population occurs in the Owyhee Mountains of southwestern Idaho. Because the Endangered Species Act requires protection of populations as well as species, it is important to determine the status of the Owyhee Mountains population.

The objectives of this project are (1) To provide information on the abundance and distribution of populations of spotted frogs in the southern portion of the Bruneau Resource Area, both from censuses and from museum records, (2) To provide an indication of the habitat variables important to spotted frogs, (3) to provide information on the distribution and habitat requirements of other species (amphibians and reptiles) incidentally captured in the same area, and (4) to indicate the reliability of using National Wetland Inventory maps to predict the presence of spotted frogs and other amphibians.

METHODS

DATABASE

Museum records from the Idaho State University Database were not accessed for this report; information from those records will be compiled and reported in the report from 1994's field season.

SURVEY FOR REPTILES AND AMPHIBIANS

Survey for Amphibians. During the period of 18 May to 9 July 1993, we visited a number of sites in the area of the Mud Flat Guard Station. Essentially, we visited as many sites as possible during this period, basing our decisions on which site to visit on accessibility and nearness to our base at the Guard Station. Once chosen, a given body of water (mostly streams and ponds) was surveyed by walking as much of its length or circumference as possible. At these water bodies, we searched for amphibians by carefully examining all shallow and bank areas, watching for sudden movement, turning rocks and vegetation, and dipnetted for larvae and eggs in promising areas. When adult amphibians were found, their location and species were noted. When larval amphibians were found, their number was estimated and a minimum of 5 were taken as a sample for later identification (identification in the field is difficult).

Habitat Characterization: At most sites where amphibian adults or larvae were found, we conducted a site characterization. In practice, in those areas where relatively few amphibians were captured, each capture site was characterized. In areas where adults were abundant, we characterized a subsample of capture sites. We also characterized arbitrarily chosen sites roughly every 400 meters of stream length; these sites were later compared to capture sites.

For each water body (e.g. stream), we measured three variables: conductivity (MC-1 meter, MarkIV, Lab-Line Instruments), and hardness and alkalinity, determined from Hach kits on water samples. Capture sites and random sites were characterized as follows: (i) We measured water characteristics: pH with a handheld meter; water temperature with a mercury thermometer; depth and width of the body of water; characterization as run, riffle, pool, oxbow, or pond. (ii) Substrate described by estimating the percent coverage underwater of mud, sand, gravel, and rock. (iii) Streamside vegetation was described by

visual inspection) a score of 0 to 3 for each of sagebrush, grass, forb, willow, cottonwood, reed, and bare. (iv) Aquatic vegetation was described by assigning a score of 0 to 3 for each of algae, emergent vegetation, and submerged vegetation. (v) We scored whether there was a hiding place present, and whether that hideaway consisted of branches, vegetation, rocks, or an overhang. (vi) We extracted from National Wetland Inventory maps the system, the class, and the regime. (vii) We described the location to the nearest 1/64 section. (viii) We classified the weather as sunny, partly cloudy, cloudy, and rainy; and measured the air temperature with a mercury thermometer, (ix) We scored grazing as 0 (none) to 3 (heavy) based on a quick visual inspection.

Statistical Analysis: Statistical analyses were used to provide an initial exploratory analysis aimed at indicating which habitat variables appear to be more or less associated with the presence of spotted frogs. Because tree frogs, *Pseudacris regilla*, were quite abundant throughout the site, we performed similar analyses on this species. The two other amphibian species encountered, Woodhouse's toad (*Bufo woodhousei*) and the western toad (*Bufo boreas*) were only encountered a total of 3 times, not enough to warrant analysis. Analyses consisted (i) contingency table analysis (SAS PROC FREQ) for categorical habitat variables vs. presence or absence of each species, and (ii) multivariate analysis of variance (MANOVA; SAS PROC GLM) to determine if the means of non-categorical (including ranked) habitat variables (e.g. water depth) differed between sites where a species was present and sites where it was not present. Note that sites where a species was not present included (i) random sites and (ii) sites where a different species was found. Analyses of conductivity, hardness, and temperature were conducted using separate ANOVA's because a substantial number of values for these variables are missing, and these missing values would have compromised the power of the MANOVA.

Miscellaneous Sightings. While conducting amphibian surveys or while walking or driving to sites, we occasionally encountered reptiles. The locations of these sightings were recorded.

Sample Collection and Deposition: An adult of each species or amphibian and reptile was collected, fixed in formalin, and preserved in ethanol for deposition in Boise State University's Vertebrate Museum. Additional specimens were preserved if they were taken from greater than 10 miles from the sites of other specimens of the same species.

RESULTS

We characterized a total of 204 sites. Of these, 103 were random sites, 41 were at *Rana pretiosa* adult sites, 3 were at *R. pretiosa* larval sites, 12 were at *Pseudacris regilla* adult sites, 37 were at *P. regilla* larval sites, 1 was at a *Bufo woodhousei* adult site, 1 at a *Bufo boreas* adult site, and 1 at a *Bufo* (species not identified) larval site. Twelve of the random sites were dry, and are excluded from the analysis presented here. Examination of the output indicates very little effect of this exclusion on the trends presented below.

Spotted frogs were observed in the following drainages: Rock Creek, Camas Creek, Deep Creek, Camel Creek, Hurryback Creek, Stoneman Creek, Pole Creek, Slack Creek, and in two ponds and one reservoir. Another possible sighting was made at Dry Creek. Sites at which spotted frogs and the other two amphibian species were observed are marked on the accompanying QUADRANGLE MAPS. The SITE NOTES give a description of the sites. APPENDIXES I AND II give the complete data set for all variables measured at the 204 sites.

SPOTTED FROGS

National Wetland Inventory Classification. Spotted frog larvae were found at only three sites, and these sites tended to be the type at which adults were most common. All larvae were found in palustrine systems; adults were found significantly more than expected in palustrine systems, but they also occurred

in riverine systems. Larvae were either in emergent or shrubscrub class, and adults were found significantly more than expected in the shrubscrub class with fewer than expected in emergent class. Larvae were all in seasonally flooded regime, and adults were found significantly more than expected in seasonally flooded but also in permanently flooded and temporarily flooded (Table 1).

Water body characteristics. Adult spotted frogs were found substantially more than expected in calm water: oxbows and pools. They did occur, albeit at lower than expected frequencies, in all water types, including runs and ripples. Larvae were found in slow water: one site each was found in pond, pool, and oxbow. No differences between frog sites and non-frog sites were found with regards depth or width of the water body (Table 1). No differences in water chemistry characteristics were found. However, water temperatures at sites at which spotted frog larvae were found were significantly warmer than at random sites (Table 4).

Substrate and vegetation. Sites with adult spotted frogs had marginally significantly more sand and less gravel than did sites without adults, but adults were found in a wide variety of substrate types. In contrast, all three larval sites had 100% mud as a substrate. Sites with adult spotted frogs had significantly less sagebrush cover and marginally less forb cover than did sites without adults. No patterns were obvious with regards larvae. Aquatic vegetation did not differ between sites with frogs and sites without frogs. Sites with hideaways had a higher probability of having frogs than did sites without hideaways; all sites with larvae present had hideaways present (Tables 1, 2, and 3).

Grazing. Sites with adult spotted frogs had a significantly lower rating for evidence of grazing (average rating 0.769 on a scale of 3) than did sites without adults (average rating 1.262). Larvae were found in a sites with ratings of 0, 1, and 2. The average rating for sites without spotted frog larvae was 1.162 (Tables 2 and 3, Figure 1).

TREEFROGS

Treefrog adults were found at only 11 sites, giving relatively little power for answering questions regarding their location. Larvae, however, were found at 37 sites.

National Wetland Inventory Classification. Treefrog adults and larvae were found in both palustrine and riverine systems, with no real pattern. Adults were found throughout the various classes, but larvae were found significantly more than expected in emergent and unconsolidated bottom classes, and less in the shrubscrub class. Both adults and larvae were found in a wide variety of regimes in approximately expected frequencies (Table 1).

Water body characteristics. Treefrog adults were never found in oxbows, but were found significantly more than expected near pools, runs, and ponds. Larvae, on the other hand, were found significantly more in oxbows, ponds, and pools than expected. Interestingly, they were recorded to occur in runs as well, although at lower than expected frequencies (Table 1). No water chemistry variables were significant. However, sites with treefrog larvae had warmer water temperatures than did random sites (Table 4).

Substrate and vegetation. Treefrog adults exhibited no significant trends with regards substrate or vegetation. Sites where larvae were found were significantly wider, and with significantly more mud and less gravel substrate than were sites without larvae. In addition, sites with larvae had significantly more reed cover, marginally more forb cover, and significantly more emergent vegetation, submerged vegetation, and algae than did sites without treefrog larvae (Tables 1, 2, and 3).

Grazing. No significant difference existed between sites with adults or larvae and sites without adults or larvae (Tables 2 and 3).

MISCELLANEOUS SIGHTINGS

During our field work, we encountered individuals of 5 lizard species: Sideblotched lizard (Uta stansburiana), Western whiptail lizard (Cnemidophorus tigris), sagebrush lizard (Sceloporus graciosus), short-horned lizard (Phrynosoma douglassi), and western fence lizard (Sceloporus occidentalis). We also encountered 5 snake species: Western rattlesnake (Crotalus viridus), western terrestrial garter snake (Thamnophis elegans), striped whipsnake (Masticophis taeniatus), racer (Coluber constrictor), and gopher snake (Pituophis catenifer)

DISCUSSION

HABITAT REQUIREMENTS OF SPOTTED FROGS.

Although we found no set of parameters that clearly define the habitat requirements of spotted frogs, we did find that adult spotted frogs tended to be found in situations with slow water, and were especially prevalent in the oxbows of streams. These sites were typically in sandy areas, with relatively little vegetation, and with some sort of hideaway. Several adults were typically found together in ponds and oxbows; those encountered on stream banks were typically found singly.

Given the large number of sites at which adult frogs were found, it is surprising how few breeding sites were found. It is unclear whether they were breeding at sites undiscovered by us, whether they had failed to breed for some environmental reason (e.g. cool temperatures), or whether they had attempted to breed but had failed because of egg death due to some environmental factor. Two things can be said about breeding sites (besides their rarity): all three sites were found in slow water situations, and all three had a mud substrate. In addition, the water temperature was quite warm at larval sites. It is our hope that during the summer of 1994 we will be able to find and describe more breeding sites.

NATIONAL WETLAND INVENTORY MAPS AS PREDICTORS OF AMPHIBIAN PRESENCE.

We found several significant associations of the presence of frogs with one or more NWI variables. On the one hand, this gives some indication that NWI maps could be used to identify areas that are more likely to harbor amphibians: according to our analysis, higher than expected numbers of sites with palustrine regime, shrubscrub class, and seasonally flooded regime held adult spotted frogs. On the other hand, however, such generalizations ignore the possibility that other areas might be important for larvae. In addition, it should be noted that these trends cannot be used to predict the presence of frogs. For example, frogs were found with more than expected frequency at sites with C (seasonally flooded) regime. However, only 33 of 134 C-regime sites sampled had adult spotted frogs.

DIFFERENCES BETWEEN SPOTTED FROGS AND TREEFROGS

The most striking difference between these species is the relative proportions of sites with larvae to sites with adults. Three of 44 sites with spotted frogs held larvae. Thirty-seven of 49 sites with treefrogs held larvae. We can speculate as to 3 possible reasons for this: (i) Treefrogs appear to be much more opportunistic in their choice of breeding sites. They were found in a wide variety of habitat types, although sites with larvae did tend to have more aquatic vegetation and mud substrate than did sites without larvae. (ii) Adult treefrogs are undoubtedly more difficult to find, since they are quite terrestrial and may be hiding in nearby rocks or vegetation. Spotted frogs, in contrast, were often seen in water, where they could easily be detected and captured. (iii) Spotted frog eggs may be more susceptible to environmental damage than are treefrog eggs as evidenced by a recent study by Blaustein et al. (1994) that found that eggs of another Rana species are more susceptible to UV radiation than are treefrog eggs.

EFFECTS OF GRAZING

This study found that sites with adult spotted frogs had ratings for grazing pressure that were significantly lower than sites without adult spotted frogs. This trend was noted by workers in the field. This result does provide preliminary evidence that grazing may degrade the habitat in a way that makes it less favorable for spotted frogs. Before such a conclusion is made, however, further confirmatory data should be gathered and other possible explanations, such as that cattle may not have had access to areas where spotted frogs are most common, should be ruled out.

STATUS OF THE SPOTTED FROG

Our general impression is that although the spotted frog can be common in some areas, these areas are fairly limited, apparently to certain permanent water bodies. The other species of amphibian common to the area was much more wide spread, occupying temporary as well as permanent water bodies. As mentioned above, the rarity of breeding sites for spotted frogs is troubling. More study is needed to determine whether these sites are indeed rare, and if so, to determine the causes of this rarity.

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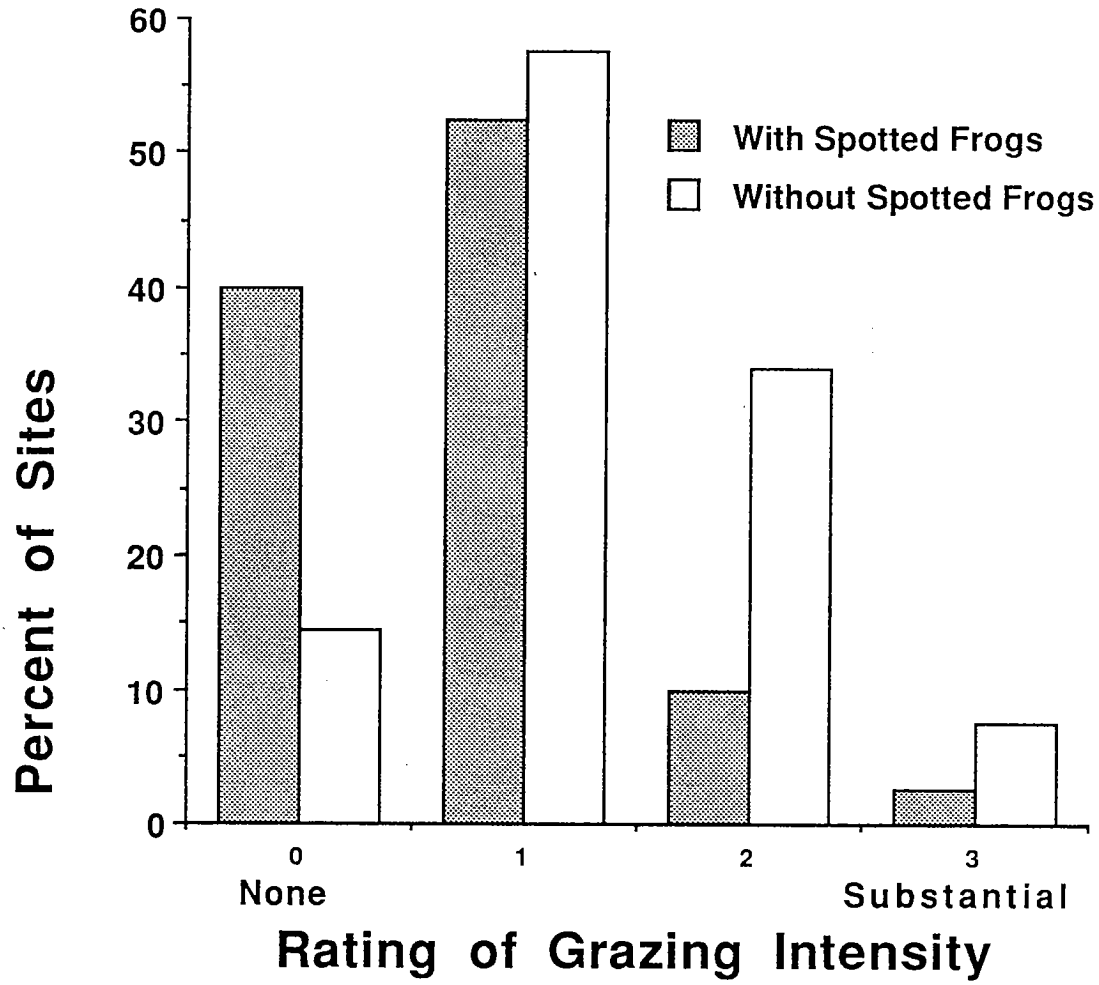


Figure 1. Relative grazing intensity at 40 sites at which spotted frog larvae and/or adults were found and at 132 sites at which neither spotted frog adults nor spotted frog larvae were found.

Table 1. Contingency table analysis of the association of presence of frogs with categorical environmental variables. Analysis is performed separately for each age class (larva or adult) for each species (spotted frog or treefrog). The N and Y on the left side of each contingency table refer to the presence (Y) or absence (N) of that species/life stage. The numbers in each box refer are the observed number of sites in that cell (above) and the expected number of sites in that cell (below), based on independence of presence and the environmental parameter. Statistical analysis is the G-test (Likelihood Ratio X^2) of SAS Proc FREQ. Statistical analyses were not performed on Spotted frog larvae due to low sample sizes.

SPOTTED FROGS

Spotted Frog Larvae by NWI System

	P	R3	R4		Total
N(absent)	148	12	25	<Observed	185
	148.59	11.809	24.601	<Expected	
Y(present)	3	0	0		3
	2.4096	0.1915	0.3989		
Total	151	12	25		188

Spotted Frog Larvae by NWI Class

	EM	FO	SB	SS	UB	US	Total
N	45	3	22	97	16	2	185
	46.25	2.9521	21.649	96.436	15.745	1.9681	
Y	2	0	0	1	0	0	3
	0.75	0.0479	0.3511	1.5638	0.2553	0.0319	
Total	47	3	22	98	16	2	188

Spotted Frog Larvae by NWI Regime

	A	B	C	F	H	Total
N	21	3	131	17	13	185
	20.665	2.9521	131.86	16.729	12.793	
Y	0	0	3	0	0	3
	0.3351	0.0479	2.1383	0.2713	0.2074	
Total	21	3	134	17	13	188

Spotted Frog Larvae by Weather

	CLOUDY	PCLOUD	RAINY	SUNNY	Total
N	53	9	8	119	189
	53.156	8.8594	7.875	119.11	
Y	1	0	0	2	3
	0.8438	0.1406	0.125	1.8906	
Total	54	9	8	121	192

Spotted Frog Larvae by Water Body Type

	Oxbow	Pond	Pool	Riffle	Run	Total
N	34 34.453	12 12.797	29 29.531	36 35.438	78 76.781	189
Y	1 0.5469	1 0.2031	1 0.4688	0 0.5625	0 1.2188	3
Total	35	13	30	36	78	192

Spotted Frog Larvae by Presence of Hiding Place

	N	Y	Total
N	53 52.025	107 107.98	160
Y	0 0.9755	3 2.0245	3
Total	53	110	163

Spotted Frog Adults by NWI System

	P	R3	R4	Total
N	116 118.07	7 9.383	24 19.548	147
Y	35 32.931	5 2.617	1 5.4521	41
Total	151	12	25	188

G-test df = 2 G = 8.993 P = 0.011

Spotted Frog Adults by NWI Class

	EM	FO	SB	SS	UB	US	Total
N	39 36.75	3 2.3457	22 17.202	72 76.628	10 12.511	1 1.5638	147
Y	8 10.25	0 0.6543	0 4.7979	26 21.372	6 3.4894	1 0.4362	41
Total	47	3	22	98	16	2	188

G-test df = 5 G = 16.982 P = 0.005

Spotted Frog Adults by NWI Regime

	A	B	C	F	H	Total
N	19 16.42	3 2.3457	101 104.78	17 13.293	7 10.165	147
Y	2 4.5798	0 0.6543	33 29.223	0 3.7074	6 2.8351	41
Total	21	3	134	17	13	188

G-test df = 4 G = 16.451 P = 0.002

Spotted Frog Adults by Weather

	CLOUDY	PCLOUD	RAINY	SUNNY	Total
N	43 42.469	8 7.0781	8 6.2917	92 95.161	151
Y	11 11.531	1 1.9219	0 1.7083	29 25.839	41
Total	54	9	8	121	192

G-test df = 3 G = 5.005 P = 0.171

Spotted Frog Adults by Water Body Type

	Oxbow	Pond	Pool	Riffle	Run	Total
N	14 27.526	11 10.224	18 23.594	35 28.312	73 61.344	151
Y	21 7.474	2 2.776	12 6.4063	1 7.6875	5 16.656	41
Total	35	13	30	36	78	192

G-test df = 4 G = 54.209 P = 0.000

Spotted Frog Adults by Presence of Hiding Place

	N	Y	Total
N	50 43.571	84 90.429	134
Y	3 9.4294	26 19.571	29
Total	53	110	163

G-test df = 1 G = 9.274 P = 0.002

TREEFROGS

Treefrog Larvae by NWI System

	P	R3	R4	Total
N	123 120.48	8 9.5745	19 19.947	150
Y	28 30.521	4 2.4255	6 5.0532	38
Total	151	12	25	188

G-test df = 2 G = 1.607 P = 0.448

Treefrog Larvae by NWI Class

	EM	FO	SB	SS	UB	US	Total
N	31 37.5	3 2.3936	17 17.553	88 78.191	10 12.766	1 1.5957	150
Y	16 9.5	0 0.6064	5 4.4468	10 19.809	6 3.234	1 0.4043	38
Total	47	3	22	98	16	2	188

G-test df = 5 G =16.856 P = 0.005

Treefrog Larvae by NWI Regime

	A	B	C	F	H	Total
N	16 16.755	3 2.3936	108 106.91	13 13.564	10 10.372	150
Y	5 4.2447	0 0.6064	26 27.085	4 3.4362	3 2.6277	38
Total	21	3	134	17	13	188

G-test df = 4 G = 1.747 P = 0.782

Treefrog Larvae by Weather

	CLOUDY	PCLOUD	RAINY	SUNNY	Total
N	38 42.75	8 7.125	6 6.3333	100 95.792	152
Y	16 11.25	1 1.875	2 1.6667	21 25.208	40
Total	54	9	8	121	192

G-test df = 3 G = 3.924 P = 0.270

Treefrog Larvae by Water Body Type

	OXBO	POND	POOL	RIFF	RUN	Total
N	22 27.708	4 10.292	18 23.75	36 28.5	72 61.75	152
Y	13 7.2917	9 2.7083	12 6.25	0 7.5	6 16.25	40
Total	35	13	30	36	78	192

G-test df = 4 G =51.594 P = 0.000

Treefrog Larvae by Presence of Hiding Place

	N	Y	Total
N	45 40.319	79 83.681	124
Y	8 12.681	31 26.319	39
Total	53	110	163

G-test df = 1 G = 3.569 P = 0.059

Treefrog Adults by NWI System

	P	R3	R4	Total
N	143 142.97	12 11.362	23 23.67	178
Y	8 8.0319	0 0.6383	2 1.3298	10
Total	151	12	25	188

G-test df = 2 G = 1.623 P = 0.444

Treefrog Adults by NWI Class

	EM	FO	SB	SS	UB	US	Total
N	45 44.5	3 2.8404	21 20.83	92 92.787	15 15.149	2 1.8936	178
Y	2 2.5	0 0.1596	1 1.1702	6 5.2128	1 0.8511	0 0.1064	10
Total	47	3	22	98	16	2	188

G-test df = 5 G = 0.833 P = 0.975

Treefrog Adults by NWI Regime

	A	B	C	F	H	Total
N	19 19.883	3 2.8404	126 126.87	17 16.096	13 12.309	178
Y	2 1.117	0 0.1596	8 7.1277	0 0.9043	0 0.6915	10
Total	21	3	134	17	13	188

G-test df = 4 G = 4.320 P = 0.364

Treefrog Adults by Weather

	CLOUDY	PCLOUD	RAINY	SUNNY	Total
N	50 50.906	9 8.4844	7 7.5417	115 114.07	181
Y	4 3.0938	0 0.5156	1 0.4583	6 6.9323	11
Total	54	9	8	121	192

G-test df = 3 G = 1.977 P = 0.577

Treefrog Adults by Water Body Type

	OXBO	POND	POOL	RIFF	RUN	Total
N	35 32.995	9 12.255	27 28.281	36 33.938	74 73.531	181
Y	0 2.0052	4 0.7448	3 1.7187	0 2.0625	4 4.4688	11
Total	35	13	30	36	78	192

G-test df = 4 G =17.161 P = 0.002

Treefrog Adults by Presence of Hiding Place

	N	Y	Total
N	50 49.423	102 102.58	152
Y	3 3.5767	8 7.4233	11
Total	53	110	163

G-test df = 1 G = 0.152 P = 0.697

Table 2. Results of Multivariate Analysis of Variance examining the whether transects with larval frogs differ from those without larval frogs. The statistical model used was SPOTLA TREELA = DEPTH, WIDTH, GRAZE, etc..., where SPOTLA and TREELA refer to the presence or absence of spotted frog larvae or treefrog larvae, respectively. To control for Type I error, probability values should be evaluated for significance against a Bonferroni corrected $\alpha = 0.003$. Because the overall MANOVA for Spotted frog larvae is not significant, univariate tests for that species should not be evaluated. *statistically significant; #marginally significant.

OVERALL MANOVA RESULTS

Species	Wilks' Lambda	F	Num DF	Den DF	P
Spotted Frog Larvae	0.86148323	1.5228	17	161	0.0925
Treefrog Larvae	0.74750176	3.1991	17	161	0.0001*

UNIVARIATE TESTS

Environmental Variable	Species	df	Mean Square	F	P
DEPTH					
	SPOTLA	1	148.67886	0.88	0.3483
	TREELA	1	115.12593	0.68	0.4090
	Error	177	168.09780		
WIDTH					
	SPOTLA	1	18.54682	0.63	0.4271
	TREELA	1	271.02782	9.26	0.0027*
	Error	177	29.27740		
GRAZE					
	SPOTLA	1	1.12311	1.90	0.1693
	TREELA	1	2.41007	4.09	0.0447
	Error	177	0.58963		
MUD					
	SPOTLA	1	8380.02233	6.44	0.0120
	TREELA	1	28011.51245	21.52	0.0001*
	Error	177	1301.38271		
SAND					
	SPOTLA	1	812.55792	0.74	0.3894
	TREELA	1	705.20974	0.65	0.4225
	Error	177	1091.24921		
GRAVEL					
	SPOTLA	1	1513.01798	1.28	0.2589
	TREELA	1	12347.39018	10.47	0.0014*
	Error	177	1179.35836		
ROCK					
	SPOTLA	1	478.90922	0.64	0.4258
	TREELA	1	1684.71246	2.24	0.1361
	Error	177	751.61030		
SAGE					
	SPOTLA	1	0.12253	0.24	0.6259
	TREELA	1	0.71300	1.39	0.2404
	Error	177	0.51388		
GRASS					
	SPOTLA	1	0.77883	1.34	0.2486
	TREELA	1	0.98090	1.69	0.1956
	Error	177	0.58130		

(CONTINUED)

Environmental Variable	Species	df	Mean Square	F	P
FORB					
	SPOTLA	1	1.03824	1.90	0.1703
	TREELA	1	4.00914	7.32	0.0075#
	Error	177	0.54781		
REED					
	SPOTLA	1	1.84933	1.57	0.2119
	TREELA	1	18.50595	15.71	0.0001*
	Error	177	1.17796		
BARE					
	SPOTLA	1	0.90353	1.12	0.2919
	TREELA	1	4.79730	5.93	0.0158
	Error	177	0.80850		
WILLOW					
	SPOTLA	1	0.00557	0.01	0.9401
	TREELA	1	3.71094	3.77	0.0536
	Error	177	0.98310		
COTTON					
	SPOTLA	1	0.43607	7.96	0.0053#
	TREELA	1	0.01912	0.35	0.5554
	Error	177	0.05478		
EMERGE					
	SPOTLA	1	2.06823	2.85	0.0929
	TREELA	1	11.74411	16.21	0.0001*
	Error	177	0.72459		
SUBMERGE					
	SPOTLA	1	0.12926	0.21	0.6462
	TREELA	1	9.41167	.39	0.0001*
	Error	177	0.61140		
ALGAE					
	SPOTLA	1	0.02809	0.03	0.8629
	TREELA	1	12.41571	13.22	0.0004*
	Error	177	0.93942		

Table 2 (continued) . Means and standard deviations of environmental variables analyzed by MANOVA for larval spotted frogs and larval treefrogs.

Presence of Spotted Frog Larvae	N	DEPTH Mean	DEPTH SD	WIDTH Mean	WIDTH SD	GRAZE Mean	GRAZE SD	MUD Mean	MUD SD
N	178	18.556	12.971	2.833	5.550	1.162	0.774	24.612	38.205
Y	2	10.500	9.192	0.750	0.353	0.500	0.707	100.000	0.000

	N	SAND Mean	SAND SD	GRAVEL Mean	GRAVEL SD	ROCK Mean	ROCK SD	SAGE Mean	SAGE SD
N	178	21.938	33.094	34.438	35.342	18.084	27.588	0.550	0.719
Y	2	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.354

	N	GRASS Mean	GRASS SD	FORB Mean	FORB SD	REED Mean	REED SD	BARE Mean	BARE SD
N	178	1.070	0.766	1.106	0.755	1.462	1.132	1.203	0.914
Y	2	0.500	0.000	0.500	0.000	0.750	0.354	1.750	0.354

	N	WILLOW Mean	WILLOW SD	COTTON Mean	COTTON SD	EMERGE Mean	EMERGE SD	SUBMERGE Mean	SUBMERGE SD
N	178	0.91910	1.001	0.0370	0.228	1.070	0.881	0.551	0.808
Y	2	0.75000	0.353	0.5000	0.707	0.250	0.353	1.000	1.414

	N	ALGAE Mean	ALGAE SD
N	178	0.919	0.996
Y	2	1.250	1.768

Presence of Tree Frog Larvae	N	DEPTH Mean	DEPTH SD	WIDTH Mean	WIDTH SD	GRAZE Mean	GRAZE SD	MUD Mean	MUD SD
N	146	18.11	12.25	2.22	3.69	1.10	0.79	19.13	33.75
Y	34	19.97	15.68	5.30	9.88	1.38	0.65	52.58	47.18

	N	SAND Mean	SAND SD	GRAVEL Mean	GRAVEL SD	ROCK Mean	ROCK SD	SAGE Mean	SAGE SD
N	146	22.73	33.56	38.18	34.91	19.43	27.76	0.58	0.77
Y	34	17.20	30.43	16.32	31.84	11.23	25.65	0.41	0.35

	N	GRASS Mean	GRASS SD	FORB Mean	FORB SD	REED Mean	REED SD	BARE Mean	BARE SD
N	146	1.03	0.75	1.03	0.70	1.30	1.12	1.28	0.90
Y	34	1.20	0.81	1.39	0.90	2.10	0.92	0.88	0.85

	N	WILLOW Mean	WILLOW SD	COTTON Mean	COTTON SD	EMERGE Mean	EMERGE SD	SUBMERGE Mean	SUBMERGE SD
N	146	0.98	1.01	0.04	0.25	0.94	0.81	0.45	0.73
Y	34	0.61	0.88	0.02	0.17	1.57	1.00	1.04	0.94

	N	ALGAE Mean	ALGAE SD
N	146	0.79	0.92
Y	34	1.47	1.14

Table 3. Results of Multivariate Analysis of Variance examining the whether transects with adult frogs differ from those without adult frogs. The statistical model used was SPOTAD TREEAD = DEPTH, WIDTH, GRAZE, etc..., where SPOTAD and TREEAD refer to the presence or absence of spotted frog adults or treefrog adults, respectively. To control for Type I error, probability values should be evaluated for significance against a Bonferroni corrected $\alpha = 0.003$. Because the overall MANOVA for treefrogs is not significant, univariate tests for that species should not be evaluated. *statistically significant, #marginally significant

OVERALL MANOVA RESULTS

Species	Wilks' Lambda	F	Num DF	Den DF	P
Spotted Frog Adults	0.75518093	3.0702	17	161	0.0001*
Treefrog Adults	0.93419562	0.6671	17	161	0.8316

UNIVARIATE TESTS

Environmental Variable	Species	df	Square	F	P
DEPTH					
	SPOTAD	1	48.87976	0.29	0.5902
	TREEAD	1	236.10741	1.41	0.2373
	Error	177	167.90248		
WIDTH					
	SPOTAD	1	0.00097	0.00	0.9955
	TREEAD	1	11.17224	0.36	0.5477
	Error	177	30.79398		
GRAZE					
	SPOTAD	1	7.29159	12.94	0.0004*
	TREEAD	1	0.50957	0.90	0.3428
	Error	177	0.56330		
MUD					
	SPOTAD	1	2923.37	1.94	0.1654
	TREEAD	1	9.22082	0.01	0.9377
	Error	177	1506.61978		
SAND					
	SPOTAD	1	8902.27201	8.48	0.0040#
	TREEAD	1	238.93564	0.23	0.6338
	Error	177	1049.46348		
GRAVEL					
	SPOTAD	1	9308.05741	7.72	0.0061#
	TREEAD	1	836.30678	0.69	0.4061
	Error	177	1206.05579		
ROCK					
	SPOTAD	1	3808.84857	5.13	0.0247
	TREEAD	1	131.69954	0.18	0.6741
	Error	177	131373.70798		
SAGE					
	SPOTAD	1	6.15981	12.80	0.0004*
	TREEAD	1	0.38647	0.80	0.3714
	Error	177	0.48130		
GRASS					
	SPOTAD	1	1.70400	2.97	0.0864
	TREEAD	1	1.48911	2.60	0.1087
	Error	177	0.57302		

FORB					
	SPOTAD	1	3.83211	6.95	0.0091#
	TREEAD	1	0.15711	0.28	0.5943
	Error	177	0.55171		
REED					
	SPOTAD	1	0.00187	0.00	0.9696
	TREEAD	1	0.09958	0.08	0.7813
	Error	177	1.28759		
BARE					
	SPOTAD	1	0.79874	0.96	0.3287
	TREEAD	1	0.35408	0.43	0.5152
	Error	177	0.83263		
WILLOW					
	SPOTAD	1	0.67721	0.69	0.4079
	TREEAD	1	2.99655	3.04	0.0827
	Error	177	0.98415		
COTTON					
	SPOTAD	1	0.00051	0.01	0.9245
	TREEAD	1	0.01279	0.22	0.6368
	Error	177	0.05720		
EMERGE					
	SPOTAD	1	0.20420	0.26	0.6130
	TREEAD	1	0.38568	0.48	0.4871
	Error	177	0.79523		
SUBMERGE					
	SPOTAD	1	0.06310	0.09	0.7583
	TREEAD	1	0.30158	0.45	0.5014
	Error	177	0.66463		
ALGAE					
	SPOTAD	1	2.17640	2.19	0.1405
	TREEAD	1	1.06121	1.07	0.3027
	Error	177	0.99306		

Table 3 (continued). Means and standard deviations of environmental variables analyzed by MANOVA for adult spotted frogs and adult treefrogs.

Presence of Spotted Frog Adults		---DEPTH-----		-----WIDTH------		-----GRAZE------		------MUD--------	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
N	141	18.213	13.092	2.813	5.741	1.262	0.762	23.333	37.310
Y	39	19.385	12.521	2.799	4.722	0.769	0.706	33.103	43.467
		------SAND------		-----GRAVEL-----		------ROCK------		------SAGE-------	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
N	141	18.014	29.123	37.801	35.382	20.319	28.487	0.645	0.731
Y	39	35.000	42.068	20.513	32.052	9.077	21.701	0.192	0.533
		-----GRASS-----		------FORB------		------REED------		------BARE-------	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
N	141	1.113	0.738	1.177	0.747	1.452	1.181	1.175	0.901
Y	39	0.885	0.839	0.821	0.721	1.462	0.928	1.333	0.948
		-----WILLOW----		-----COTTON-----		-----EMERGE-----		----SUBMERGE----	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
N	141	0.887	0.972	0.043	0.238	1.079	0.905	0.574	0.841
Y	39	1.026	1.088	0.038	0.241	1.000	0.835	0.526	0.707
		-----ALGAE-----							
	N	Mean	SD						
N	141	0.979	1.017						
Y	39	0.718	0.916						

Presence of Treefrog Adults		--DEPTH-----		---WIDTH-----		------GRAZE-----		------MUD------	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
N	173	18.693	3.018	2.860	5.621	1.167	0.778	25.468	38.965
Y	7	12.857	10.139	1.571	1.618	0.857	0.690	25.000	37.527
		----SAND------		---GRAVEL----		------ROCK------		------SAGE-----	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
N	173	21.878	32.912	33.670	35.358	18.086	27.853	0.557	0.725
Y	7	17.142	37.289	43.571	35.906	12.857	17.043	0.285	0.393
		-----GRASS-----		----FORB-----		------REED------		-----BARE-----	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
N	173	1.046	0.759	1.106	0.763	1.449	1.140	1.217	0.905
Y	7	1.500	0.816	0.928	0.449	1.571	0.838	1.000	1.080
		-----WILLOW---		-----COTTON----		-----EMERGE----		---SUBMERGE---	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
N	173	0.942	1.005	0.043	0.242	1.052	0.897	0.572	0.824
Y	7	0.285	0.393	0.000	0.000	1.285	0.636	0.357	0.377
		-----ALGAE---							
	N	Mean	SD						
N	173	0.907	1.001						
Y	7	1.285	0.951						

Table 4. Analysis of Variance tables for water quality variables. P-values should be evaluated for significance relative to an alpha α=0.0085 to control for Type I error. A multivariate analysis of variance is not performed because missing values would have led to exclusion of a large proportion of the samples from the analysis.

Dependent Variable: Conductivity

Source	df	MS	F	P
Spotted Frog Larvae	1	163.63949	0.03	0.8741
Treefrog Larvae	1	7345.08962	1.13	0.2894
Error	136	6492.20688		

Dependent Variable: Conductivity

Source	df	MS	F	P
Spotted Frog Adults	1	9193.99396	1.42	0.2352
Treefrog Adults	1	1396.59939	0.22	0.6429
Error	136	6465.88063		

Dependent Variable: Hardness

Source	df	MS	F	P
Spotted Frog Larvae	1	87.94377	0.24	0.6271
Treefrog Larvae	1	281.73449	0.76	0.3849
Error	171	371.17141		

Dependent Variable: Hardness

Source	df	MS	F	P
Spotted Frog Adults	1	687.21726	1.86	0.1740
Treefrog Adults	1	118.53557	0.32	0.5715
Error	171	368.70018		

Dependent Variable: Alkalinity

Source	df	MS	F	P
Spotted Frog Larvae	1	6.83646	0.02	0.8954
Treefrog Larvae	1	1303.72674	3.31	0.0707
Error	171	394.22258		

Dependent Variable: Alkalinity

Source	df	MS	F	P
Spotted Frog Adults	1	774.55128	1.95	0.1644
Treefrog Adults	1	4.38811	0.01	0.9164
Error	171	397.29927		

Dependent Variable: Air Temperature

Source	df	MS	F	P
Spotted Frog Larvae	1	30.37503	0.80	0.3735
Treefrog Larvae	1	16.16005	0.42	0.5160
Error	137	38.10321		

Dependent Variable: Air Temperature

Source	df	MS	F	P
Spotted Frog Adults	1	0.02072	0.00	0.9815
Treefrog Adults	1	3.69394	0.10	0.7569
Error	137	38.40289		

Table 4. (continued)

Dependent Variable: Water Temperature

Source	df	MS	F	P
Spotted Frog Larvae	1	182.13128	7.14	0.0083
Treefrog Larvae	1	131.17726	5.14	0.0247
Error	162	25.51997		

Dependent Variable: Water Temperature

Source	df	MS	F	P
Spotted Frog Adults	1	0.11488	0.00	0.9484
Treefrog Adults	1	36.62034	1.34	0.2485
Error	162	27.29827		

Table 4(continued). Means and standard deviations of water quality variables.

Conductivity			
Present?	N	Mean	SD
Spotted Frog Larvae			
N	136	106.602941	81.2076697
Y	3	96.333333	1.1547005
Treefrog Larvae			
N	113	109.902655	84.4203941
Y	26	91.076923	58.2758427
Spotted Frog Adults			
N	106	111.075472	87.7850945
Y	33	91.303030	47.3032008
Treefrog Adults			
N	131	107.328244	82.6157410
Y	8	90.875000	13.3997601

Hardness			
Present?	N	Mean	SD
Spotted Frog Larvae			
N	171	45.8479532	19.3652276
Y	3	40.0000000	0.0000000
Treefrog Larvae			
N	137	46.4233577	20.2824622
Y	37	43.2432432	14.5399935
Spotted Frog Adults			
N	135	46.8148148	21.0419571
Y	39	42.0512821	10.0471224
Treefrog Adults			
N	165	45.9393939	19.5341156
Y	9	42.2222222	12.0185043

Alkalinity			
Present?	N	Mean	SD
Spotted Frog Larvae			
N	171	59.2982456	20.1049876
Y	3	60.0000000	0.0000000
Treefrog Larvae			
N	137	60.7299270	21.0613612
Y	37	54.0540541	14.0355619
Spotted Frog Adults			
N	135	60.4444444	21.9179837
Y	39	55.3846154	9.6916008
Treefrog Adults			
N	165	59.2727273	20.2292844
Y	9	60.0000000	14.1421356

Table 4. (continued)

Air Temperature			
Present?	N	Mean	SD
Spotted Frog Larvae			
N	137	20.8744526	6.20382981
Y	3	24.0000000	1.00000000
Treefrog Larvae			
N	109	21.1128440	6.16803440
Y	31	20.3387097	6.16899113
Spotted Frog Adults			
N	114	20.9535088	6.10070618
Y	26	20.8884615	6.50902923
Treefrog Adults			
N	134	20.9761194	6.24342275
Y	6	20.1666667	3.92003401

Water Temperature			
Present?	N	Mean	SD
Spotted Frog Larvae			
N	162	15.8938272	5.0101846
Y	3	24.0000000	10.5830052
Treefrog Larvae			
N	128	15.5414063	5.05019727
Y	37	17.7702703	5.47036790
Spotted Frog Adults			
N	137	16.0459854	5.23400947
Y	28	16.0178571	5.21124522
Treefrog Adults			
N	156	15.9282051	5.15716595
Y	9	18.0000000	6.12372436

Table 5. Miscellaneous species encountered during wetland surveys. Legal location is given in the order of, for example, SW 1/4 of the NE 1/4 of the SE 1/4 of Section 24.

GENUS	SPECIES	DATE	LOCATION	LEGAL LOCATION
Sceloporus	occidentalis	May 19,1993	rocks 10 m from deep creek	SW SW SW S3 T10S R3W
Thamnophis	elegans	May 19,1993	bank of deep creek	SE SE SE S4 T10S R3W
Sceloporus	graciosus	May 19,1993	rocks 40 m from deep creek	SW SW NE S9 T10S R3W
Uta	stansburiana	May 19, 1993	flats above deep creek	SW SE SE S4 T10S R3W
Coluber	constrictor	May 20, 1993	on flats to SW of current creek.	SW SW SW S5 T10S R3W
Thamnophis	elegans	May 20,1993	tributary of current creek	SW S32 T9S R3W
Thamnophis	elegans	May 20, 1993	tributary of current creek	SW SW SW S31 T9S R3W
Sceloporus	occidentalis	May 20, 1993	tributary of current creek	SW SW SW S31 T9S R3W
Thamnophis	elegans	May 21, 1993	poison creek	NW SW S11 T8S R1E
Thamnophis	elegans	May 21, 1993	poison creek	NW SW S11 T8S R1E
Sceloporus	occidentalis	may 21, 1993	poison creek	NW of S11 T8S R1E
Uta	stansburiana	May 21, 1993		NW SE SW S2 T8S R1E
Uta	stansburiana	May 21, 1993		NW NE S10 T8S R1E
Pituophis	catenifer	May 21, 1993	Poison creek springs	NE NE SE S2 T8S R1E
Masticophis	taeniatus	May 21, 1993	Mud flat road.	NE of S21 T7S R2E
Coluber	constrictor	May 24,1993	Near spring - wet habitat	SW NW NE S14 T8S R2W
Sceloporus	graciosus	May 25,1993	Dried stream bed - rocky sagebrush	NW NW NE S14 T8S R2W
Phrynosoma	douglassi	May 25,1993	flat plateau	NW NW NE S11 T8S R2W
Thamnophis	elegans	May 25,1993	on shale rock 5m above rock creek	SE NE SE S26 T8S R2W
Phrynosoma	douglassi	May 25,1993	dry sagebrush	NW NW SW S12 T8S R2W
Phrynosoma	douglassi	May 25,1993	flat plateau	NW SE NW S12 T8S R2W
Thamnophis	elegans	May 26,1993	up from transect 11-2 inches from rock cr	SE SE NW S23 T8S R2W
Sceloporus	graciosus	May 26,1993	east side of Rock Creek in rocks and sagebrush	
Sceloporus	graciosus	May 26,1993	east side of Rock Creek in rocks and sagebrush	
Sceloporus	graciosus	May 26,1993	east side of Rock Creek in rocks and sagebrush	
Thamnophis	elegans	June 3,1993	near mud flat rd.	S7 T10S R3W
Thamnophis	elegans	June 3,1993	on shore in reeds 10m below trans 1	SW SW SW S4 T10S R3W
Thamnophis	elegans	July 7,1993	Camas creek (transect 12)	NW SE NE S25 T10S R2W
Thamnophis	elegans	July 7,1993	Oxbow next to camas creek (tansect13)	NW SE NW S25 T10S R2W
Thamnophis	elegans	July 7,1993	Oxbow next to camas creek (tansect13)	NW SE NW S25 T10S R2W
Crotalus	viridis	July 7,1993	Rocks along stream	SE SE NE S26 T10S R2W
Crotalus	viridis	July 7, 1993	Mud flat rd. approx. 4miles from guard station	
Sceloporus	graciosus	July 8,1993	on trail - in sagebrush	NW SW NE S9 T7S R1E
Cnemodophorus	tigris	July 12,1993	on E.F. Shoofly Creek apprx. 1mile from mudflat	
Sceloporus	occidentalis	July 12,1993	Poison creek- approx. 3 ft. fom poison cr	NW NW NE S20 T7S R2E
Thamnophis	elegans	July 13,1993	Hackberry resv. approx. 1.5 miles from Mud flat rd	SE SE SE S28 T9S R3W
Thamnophis	elegans	June 21,1993	in stream(Camas Creek)	SW NW SW S17 T10S R1W
Sceloporus	occidentalis	June 22,1993	In slate on slope(N. Fork Castle cr.)	SE NE SW S15 T7S R2W
Sceloporus	occidentalis	June 23,1993	on large boulder in sun (E.F. Shoofly Cr.	SW NE SW S18 T8S R2E

Appendix I. Locations and observed species at transects. F or R refers to Frog or random transect. ad=adults; la=larvae; Species Codes: *Rp*=Rana pretiosa, *Pr* = Pseudocris regilla, *Bw* = Bufo woodhousei or Bufo boreas. Topographic quadrangle abbreviations: SlaMt = Slack Mountain, CloMt = Clover Mountain, WBxBa = Wagon Box Basin, SnoCk = Snow Creek, RghMt = Rough Mountain, RMtNE = Rough Mountain NE, PerCa = Perjue Canyon, HUpCk = Hurry Up Creek, CrbSp = Crab Springs, TriRe = Triangle Reservoir, BSpRa = Big Springs Ranch. NWI = National Wetland Inventory categories (see text).

transect #	Location Name and #	Location by Section ¼of	¼of	¼of	sec	TS	RA	Date	Time	WEATHER	NWI	F or R	Larvae and Adults Observed at Transect *Rp* ad	*Rp* la	*Pr* ad	*Pr* larv	*Bu* ad	*Bu* la	Topo
1	MAGPIE PO 1	SE	SW	SW	26	8S	1W	18-May-93	1350	PCLOUDY	R4SBC	F	0	0	0	200	0	0	CloMt
2	NCASTL CK MINE PD 1	SE	SE	SE	8	8S	1W	18-May-93		CLOUDY	PEMCH	F	0	0	3	100	0	0	CloMt
3	DEEP 1	NW	SE		3	10S	3W	19-May-93	0815	CLEAR	PSSC	F	1	0	1	0	0	0	SlaMt
4	DEEP 2	NW	SE		3	10S	3W	19-May-93	0815	CLEAR	PSSC	F	1	0	0	0	0	0	SlaMt
5	DEEP 3	NW	SE		3	10S	3W	19-May-93	0850	CLEAR	R3UBH	F	1	0	0	0	0	0	SlaMt
6	DEEP 4	NW	SW	NE	3	10S	3W	19-May-93	0910	CLEAR	PSSC	F	1	0	0	0	0	0	SlaMt
7	DEEP 5	NW	SW	SE	3	10S	3W	19-May-93	0915	CLEAR	PSSC	F	2	0	0	0	0	0	SlaMt
8	DEEPSP 1	NE	SE	SW	3	10S	3W	19-May-93	0930	CLEAR	PSSC	R	0	0	0	0	0	0	SlaMt
9	DEEP 6	NE	SE	SW	3	10S	3W	19-May-93	1015	CLEAR	PSSC	F	2	0	0	0	0	0	SlaMt
10	DEEP 7	NE	SE	SW	3	10S	3W	19-May-93	1023	CLEAR	PSSC	F	1	0	0	0	0	0	SlaMt
11	DEEP 8	NE	SE	SW	3	10S	3W	19-May-93	1030	CLEAR	PSSC	F	1	0	0	0	0	0	SlaMt
12	DEEP 9	NE	SE	SW	3	10S	3W	19-May-93	1035	CLEAR	PSSC	F	10	0	0	0	0	0	SlaMt
13	DEEP 10	NE	SE	SW	3	10S	3W	19-May-93	1040	CLEAR	PSSC	F	1	0	0	0	0	0	SlaMt
14	DEEP 11	NE	SE	SW	3	10S	3W	19-May-93	1100	CLEAR	PSSC	F	1	0	0	0	0	0	SlaMt
15	DEEP 12	NE	SE	SE	4	10S	3W	19-May-93		CLEAR	PSSC	R	0	0	0	0	0	0	SlaMt
16	DEEP TRIB1 1	NE	SE	SE	4	10S	3W	19-May-93	1545	CLEAR	PSSC	F	1	0	0	0	0	0	SlaMt
17	CONFPON 1	SE	NW	NE	8	10S	3W	20-May-93	0830	CLEAR	PSSA	F	8	0	0	1	0	0	SlaMt
18	CURCK 1	SE	NE	SE	8	10S	3W	20-May-93	1000	CLEAR	PSSA	R	0	0	0	0	0	0	SlaMt
19	CURCK 2	SE	NE	SE	8	10S	3W	20-May-93	1035	CLEAR	PSSA	R	0	0	0	0	0	0	SlaMt
20	CURCK 3	SE	NE	SE	8	10S	3W	20-May-93	1315	CLEAR	PSSA	R	0	0	0	0	0	0	SlaMt
21	CURTRIB 1	SW	NE	SE	8	10S	3W	20-May-93	1435	CLEAR	PSSA	R	0	0	0	0	0	0	SlaMt
22	CURTRIB2 1	NW	SW	SW	6	10S	3W	20-May-93	1700	PCLOUD	PSSC	R	0	0	0	0	0	0	SlaMt
23	MUDPON 1	NE	SE	SW	26	9S	2W	20-May-93	0800	CLEAR	PEMC	R	0	0	0	0	0	0	WaBxB
24	POISNCR 1	NW	SW	SW	11	8S	1E	21-May-93	0923	CLEAR	PSSC	R	0	0	0	0	0	0	SnoCk
25	POISNCR 2	NW	SW	SW	11	8S	1E	21-May-93	0923	CLEAR	R4SBF	R	0	0	0	0	0	0	SnoCk
26	POISNCR 3	NE	SW	NW	11	8S	1E	21-May-93	1000	CLEAR	R4SBF	R	0	0	0	0	0	0	SnoCk
27	POISNCR 4	NW	NE	NW	11	8S	1E	21-May-93	1050	PCLOUD	R4SBF	R	0	0	0	0	0	0	SnoCk
28	POISNCR 5	SW	SE	SW	2	8S	1E	21-May-93	1130	PCLOUD	R4SBF	R	0	0	0	0	0	0	RghMt
29	POISNCR 6	NW	SE	SW	2	8S	1E	21-May-93	1200	PCLOUD	R4SBF	R	0	0	0	0	0	0	RghMt
30	LONEJUNCR 1	NW	NW	NE	10	8S	1E	21-May-93	1040	MCLOUD	R4SBF	R	0	0	0	0	0	0	SnoCk
31	SPRJUN 1	SW	NE	NE	10	8S	IE	21-May-93	1050	MCLOUD	R4SBF	R	0	0	0	0	0	0	SnoCk
32	LONEJUNCR 2	SW	NE	NW	11	8S	1E	21-May-93	1100	MCLOUD	R4SBF	R	0	0	0	0	0	0	SnoCk

transect #	Location Name and #	Location by Section ¼of	¼of	¼of	sec	TS	RA	Date	Time	WEATHER	NWI	F or R	Larvae and Adults Observed at Transect *Rp* ad	*Rp* la	*Pr* ad	*Pr* lar	*Bw* ad	*Bw* la	Topo
33	ROCK CR S.F. 1	NW	NW	SW	13	8S	2W	24-May-93	1430	CLEAR	PEMC	R	0	0	0	0	0	0	HUpCk
34	ROCKCR N.F. 1	SW	NW	NE	14	8S	2W	24-May-93	1500	CLEAR	R4SBC	F	0	0	0	2	0	0	HUpCk
35	ROCKCR TRIB 1	SW	NW	SW	14	8S	2W	24-May-93	1540	CLEAR	PSSC	R	0	0	0	0	0	0	HUpCk
36	ROCKCR 1	SW	NW	SW	14	8S	2W	24-May-93	1603	HAZY	R3UBH	R	0	0	0	0	0	0	HUpCk
37	ROCKCR N.F.T 1	SE	SE	NW	14	8S	2W	24-May-93	1647	CLOUDY	PSSC	F	0	0	1	0	0	0	HUpCk
38	STATION SPR. 1	SE	NW	NW	30	8S	2W	24-May-93	1847	CLOUD	R4SBC	F	0	0	0	30	0	0	HUpCk
39	SF/NF ROCKCR 1	NE	NE	NE	14	8S	2W	25-May-93	0935	CLEAR	R4SBA	R	0	0	0	0	0	0	HUpCk
40	NFNFNF ROCKC 1	NW	NW	NE	14	8S	2W	25-May-93	1000	CLEAR	R4SBA	R	0	0	0	0	0	0	HUpCk
41	POND L 1	NE	SW	SE	11	8S	2W	25-May-93	1035	CLEAR		F	0	0	1	20	0	0	HUpCk
42	EVANS LICKSP 1	NE	NE	NE	12	8S	2W	25-May-93	1440	CLOUDY	R4SBA	F	0	0	1	20	0	0	HUpCk
43	EVANS LICK S 2	NE	NE	NE	12	8S	2W	25-May-93	1450	CLOUDY	PUBFH	F	0	0	0	400	0	0	HUpCk
44	ROCKCR TRIB 2	SE	NE	NE	23	8S	2W	25-May-93	1700	CLOUD	R4SBA	R	0	0	0	0	0	0	HUpCk
45	ROCK CREEK 1	NW	NE	NE	35	8S	2W	26-May-93	0900	CLEAR	PSSC	R	0	0	0	0	0	0	HUpCk
46	ROCK CREEK 2	NE	SE	SE	26	8S	2W	26-May-93	0935	CLEAR	PSSC	R	0	0	0	0	0	0	HUpCk
47	ROCK CREEK 3	NE	SE	SE	26	8S	2W	26-May-93	1057	CLEAR	PSSC	F	1	0	0	0	0	0	HUpCk
48	ROCK CREEK 4	NE	NE	SE	26	8S	2W	26-May-93	1025	CLEAR	PSSC	R	0	0	0	0	0	0	HUpCk
49	ROCK CREEK 5	NW	NE	NE	26	8S	2W	26-May-93	1200	CLEAR	PSSC	R	0	0	0	0	0	0	HUpCk
50	ROCK CREEK 6	NE	NW	NE	26	8S	2W	26-May-93	1305	SUNNY	PSSC	F	1	0	0	0	0	0	HUpCk
51	ROCK CREEK 7	NW	SW	SE	23	8S	2W	26-May-93	1314	CLEAR	PEMC	F	1	0	0	0	0	0	HUpCk
52	ROCK CREEK 8	NW	SW	SE	23	8S	2W	26-May-93	1400	CLEAR	PEMC	F	1	0	0	0	0	0	HUpCk
53	ROCK CREEK 9	NW	NW	SE	23	8S	2W	26-May-93	1434	CLEAR	PEMC	F	1	10	1	0	0	0	HUpCk
54	ROCK CREEK 10	NW	NW	SE	23	8S	2W	26-May-93	1452	CLEAR	PEMC	F	0	20	0	30	0	0	HUpCk
55	ROCK CREEK 11	SE	SE	NW	23	8S	2W	26-May-93	1525	SUNNY	PEMC	F	1	0	0	0	0	0	HUpCk
56	ROCK CREEK 12	NW	NE	NW	23	8S	2W	26-May-93	1601	PCLOUD	PSSC	R	0	0	0	0	0	0	HUpCk
57	NFROCKTRIB3 1	NE	SW	SW	24	8S	2W	27-May-93	0910	CLEAR	PFOB	R	0	0	0	0	0	0	HUpCk
58	NFROCKTRIB3 2	NW	SW	SW	24	8S	2W	27-May-93	0942	CLEAR	PFOB	R	0	0	0	0	0	0	HUpCk
59	ROCKCRTRIB3 3	SE	SE	SE	23	8S	2W	27-May-93	0958	CLEAR	R4SBC	R	0	0	0	0	0	0	HUpCk
60	ROCKTRIB3 4	SE	SW	SE	23	8S	2W	27-May-93	1025	CLEAR	PEMC	R	0	0	0	0	0	0	HUpCk
61	SFROCKTRIB3 1	SW	SW	SW	24	8S	2W	27-May-93	1046	CLEAR	PSSC	R	0	0	0	0	0	0	HUpCk
62	NFSFROCKTR3 2	NE	NW	NE	25	8S	2W	27-May-93	1131	CLEAR	PSSB	R	0	0	0	0	0	0	HUpCk
63	NFSFROCKTR3 3	SE	SW	SW	24	8S	2W	27-May-93	1150	CLEAR	PSSC	F	0	0	1	0	0	0	HUpCk
64	NFSFROCKTR3 4	NE	NE	NE	25	8S	2W	27-May-93	1222	CLEAR	PSSC	F	0	0	0	20	0	0	HUpCk
65	NFSFROCKTR3 5	NE	NE	NE	25	8S	2W	27-May-93	1238	CLEAR	PSSC	R	0	0	0	0	0	0	HUpCk
66	PRIVATEPOND 1	NE	NW	SE	03	10S	3W	02-Jun-93	1400	CLOUDY	PSSC	F	1	100	3	0	0	0	SlaMt
67	PRIVATECR 1	NE	NW	SE	03	10S	03W	02-Jun-93	1431	CLOUDY	R3UBH	F	2	0	0	0	0	0	SlaMt

transect #	Location Name and #		Location by Section ¼of	¼of	¼of	sec	TS	RA	Date	Time	WEATHER	NWI	F or R	Larvae and Adults Observed at Transect *Rp* ad	*Rp* la	*Pr* ad	*Pr* lar	*Bw* ad	*Bw* la	Topo
68	HURRYBACKCR	1	NW	SE	NE	03	10S	03W	02-Jun-93	1500	CLOUD	PSSC	F	1	0	0	0	0	0	SlaMt
69	STONEMANCR	1	SW	SW	NW	07	10S	03W	02-Jun-93	1000	CLOUDY	PSSC	R	0	0	0	0	0	0	SlaMt
70	STONEMANCR	2	SW	SW	NW	07	10S	03W	02-Jun-93	1035	CLOUDY	PSSC	F	1	0	0	0	0	0	SlaMt
71	STONEMANCR	3	SE	SW	NW	07	10S	03W	02-Jun-93	1051	CLOUDY	PSSC	F	3	0	0	0	0	0	SlaMt
72	STONEMANCR	4	NE	SW	NW	07	10S	3W	03-Jun-93	1123	CLOUDY	PSSC	F	1	0	0	0	0	0	SlaMt
73	STONEMTRIB1	1	SE	SW	NW	07	10S	03W	03-Jun-93	1150	RAIN	PEMA	R	0	0	0	0	0	0	SlaMt
74	STONEMANCR	5	NE	SW	NW	07	10S	03W	03-Jun-93	1210	CLOUDY	PSSC	F	1	0	0	10	0	0	SlaMt
75	STONEMANCR	5	NE	SX	NW	07	10S	03W	02-Jun-93	1226	CLOUDY	PSSC	F	1	0	0	0	0	0	SlaMt
76	STONEMANCR	6	NE	SE	NW	07	10S	03W	04-Jun-93	1117	CLOUDY	PSSC	R	0	0	0	0	0	0	SlaMt
77	STONEMANCR	7	NE	SE	NW	07	10S	03W	04-Jun-93	1144	CLOUDY	PSSC	F	1	0	0	0	0	0	SlaMt
78	STONEMANCR	8	NW	SE	NE	07	10S	03W	04-Jun-93	1239	RAINY	PSSC	R	0	0	0	0	0	0	SlaMt
79	STONEMANCR	9	SE	SW	NW	08	10S	03W	04-Jun-93	1332	CLOUDY	PSSC	R	0	0	0	0	0	0	SlaMt
80	WFDEEPCRTR1	1	SW	SW	SW	04	10S	03W	06-Jun-93	1554	CLOUDY	PEMC	R	0	0	0	0	0	0	SlaMt
81	EFDEEPCRTR1	1	SW	SE	NW	04	10S	03W	04-Jun-93	1634	CLOUDY	PEMC	R	0	0	0	0	0	0	SlaMt
82	EFDEEPCRTR1	2	NW	SE	NW	04	10S	03W	04-Jun-93	1701	CLOUDY	PEMC	F	0	0	0	20	0	0	SlaMt
83	DEEPCREEKTR1	2	NW	SE	NW	04	10S	03W	04-Jun-93	1701	CLOUDY	PEMC	F	0	0	0	30	0	0	SlaMt
84	DEEPCREEKTR1	3	SE	SW	SW	04	10S	03W	04-Jun-93	0955	RAINY	PEMC	R	0	0	0	0	0	0	SlaMt
85	DEEPCRTR1	4	NE	NW	NW	09	10S	03W	04-Jun-93	1022	RAINY	PEMC	F	0	0	0	20	0	0	SlaMt
86	DEEPCRTR1	3	SE	NE	NW	09	10S	03W	04-Jun-93	1057	CLOUDY	PEMC	R	0	0	0	0	0	0	SlaMt
87	DEEPCRTR1	4	SW	NW	NE	09	10S	03W	04-Jun-93	1121	RAIN	PSSC	F	0	0	1	0	0	0	SlaMt
88	WFDEEPCRTR1	1	NE	SE	SE	05	10S	3W	07-Jun-93	1727	CLOUDY	PEMC	F	0	0	0	30	0	0	SlaMt
89	WFDEEPCRTR1	2	NE	SE	SE	05	10S	3W	07-Jun-93	1747	CLOUDY	PEMC	R	0	0	0	0	0	0	SlaMt
90	WFWFDEEPCR	1	SE	SW	NE	5	10S	03W	07-Jun-93	1812	CLOUDY	PEMA	R	0	0	0	0	0	0	SlaMt
91	WFWFDEEPCR	2	SW	SW	NE	5	10S	03W	08-Jun-93	0950	CLOUDY	PEMC	R	0	0	0	0	0	0	SlaMt
92	WFWFDEEPCR	3	NE	SE	NW	05	10S	03W	08-Jun-93	1007	CLOUDY	PEMC	F	0	0	0	30	0	0	SlaMt
93	EFWFDEEPCRTR	1	SE	SW	NE	5	10S	03W	08-Jun-93	1030	CLOUDY	PEMC	F	0	0	0	200	0	0	SlaMt
94	EFWFDEEPCRTR	2	NE	SW	NE	5	10S	03W	08-Jun-93	1110	CLOUDY	PEMC	R	0	0	0	0	0	0	SlaMt
95	WFEFWFDEEPCR	1	SE	SW	NE	5	10S	03W	08-Jun-93		CLOUDY	PEMA	R	0	0	0	0	0	0	SlaMt
96	WFEFWFDEEPCR	2	SW	NW	SE	5	10S	3W	08-Jun-93	1141	CLOUDY	PEMA	F	0	0	0	30	0	0	SlaMt
97	WFEFWFDEEPCR	3	NE	SW	SE	32	9S	3W	08-Jun-93	1227	SUNNY	PEMA	R	0	0	0	0	0	0	SlaMt
98	EFEFWFDEEPCR	1	NE	SE	NE	5	10S	3W	08-Jun-93	1453	CLOUDY	PEMC	F	0	0	0	100	0	0	SlaMt
99	EFEFWFDEEPCR	2	NW	SE	NE	5	10S	3W	08-Jun-93	1500	CLOUDY	PEMC	F	0	0	0	200	0	0	SlaMt
100	EFEFWFDEEPCR	3	SE	SE	SE	32	9S	3W	08-Jun-93	1547	CLOUDY	PEMA	R	0	0	0	0	0	0	SlaMt
101	POLECREEK	1	SW	NE	SE	3	10S	2W	09-Jun-93	0950	SUNNY	R3UBH	F	10	0	0	100	0	0	WBxBa
102	POLE CREEK	2	SE	NW	SE	3	10S	2W	09-Jun-93	1100	SUNNY	PSSC	F	2	0	0	0	0	0	WBxBa

transect #	Location Name and #		Location by Section ¼of	¼of	¼of	sec	TS	RA	Date	Time	WEATHER	NWI	F or R	Larvae and Adults Observed at Transect: *Rp* ad	*Rp* la	*Pr* ad	*Pr* lar	*Bw* ad	*Bw* la	
103	POLE CREEK	3	NW	SE	SW	9	10S	2W	09-Jun-93	1140	SUNNY	PSSC	R	0	0	0	0	0	0	WBxBa
104	POLE CREEK	4	SW	NE	SE	9	10S	2W	09-Jun-93	1341	CLOUDY	PSSC	R	0	0	0	0	0	0	WBxBa
105	POLE CREEK	5	SE	SW	NE	9	10S	2W	09-Jun-93	1440	SUNNY	PFOC	R	0	0	0	0	0	0	WBxBa
106	POLE CREEK	6	SW	SW	SE	9	10S	2W	09-Jun-93	1507	CLOUDY	PSSC	F	0	0	0	100	0	0	WBxBa
107	POLE CREEK	7	SW	SE	NE	9	10S	2W	09-Jun-93	1539	CLOUDY	PSSC	R	0	0	0	0	0	0	WBxBa
108	DEEPCREEK	1	SW	NW	SW	21	10S	3W	14-Jun-93	1505	SUNNY	PSSC	R	0	0	0	0	0	0	SlaMt
109	DEEP CREEK	2	NW	NW	SW	21	10S	3W	14-Jun-93	1540	SUNNY	R3USA	F	0	0	0	200	0	0	SlaMt
110	DEEP CREEK	3	NW	SW	NW	21	10S	3W	14-Jun-93	1613	SUNNY	PSSC	F	0	0	0	0	1	0	SlaMt
111	DEEP CREEK	3.5	SW	NE	NW	21	10S	3W	14-Jun-93	1642	SUNNY	PSSC	F	0	0	0	0	1	0	SlaMt
112	DEEP CREEK	4	SW	NE	NW	21	10S	3W	14-Jun-93	1642	SUNNY	R3USA	F	1	0	0	0	0	0	SlaMt
113	DEEP CREEK	5	SE	SW	SW	16	10S	3W	14-Jun-93	1705	SUNNY	PSSC	R	0	0	0	0	0	0	SlaMt
114	DRY CREEK	1	NE	SE	SW	1	10S	1W	15-Jun-93	1101	CLOUDY	PEMC	R	0	0	0	0	0	0	BSpRa
115	DRY CREEK	2	NE	NW	SE	12	10S	1W	14-Jun-93	1132	SUNNY	PEMC	F	?1?	0	0	0	0	0	BSpRa
116	DRY CR POND	3	SW	NW	SE	12	10S	1W	15-Jun-93	1155	SUNNY	R3UBH	F	0	0	0	1000	0	0	BSpRa
117	DRY CREEK	4	NW	NE	SE	12	10S	1W	15-Jun-93	1245	SUNNY	PEMC	R	0	0	0	0	0	0	BSpRa
118	DRYCRTRIB1	1	NE	NE	SE	12	10S	1W	15-Jun-93	1336	CLOUDY		R	0	0	0	0	0	0	BSpRa
119	DRY CREEK	5	NE	SE	SE	12	10S	1W	15-Jun-93	1416	CLOUDY	PEMC	R	0	0	0	0	0	0	BSpRa
120	DRY CREEK	6	NE	NW	NW	18	10S	1W	15-Jun-93	1525	CLOUDY	PEMC	R	0	0	0	0	0	0	BSpRa
121	DRY CR OXBOW	1	NW	NW	SW	20	10S	1E	15-Jun-93	1652	RAINY	PEMCH	F	0	0	0	1000	0	0	CrbSp
122	SF CASTLE CR	1	SW	NE	SE	08	08S	01W	16-Jun-93	0908	CLOUDY	PSSC	R	0	0	0	0	0	0	CloMt
123	SF CASTLE CR	2	NW	NE	SE	08	08S	01W	16-Jun-93	1001	RAIN	PSSC	R	0	0	0	0	0	0	CloMt
124	CAMAS CR	1	SW	SE	SE	07	10S	02W	21-Jun-93	0230	SUNNY	R3UBH	R	0	0	0	0	0	0	BSpRa
125	CAMAS CR	2	SW	NE	NE	18	10S	01W	21-Jun-93	1451	SUNNY	R3UBH	R	0	0	0	0	0	0	BSpRa
126	CAMAS CR	3	NE	NW	SW	18	10S	01W	21-Jun-93	1512	CLOUDY	R4SBC	R	0	0	0	0	0	0	BSpRa
127	CAMAS CR	4	NW	NE	NE	19	10S	01W	21-Jun-93	1612	CLOUDY	PEMC	R	0	0	0	0	0	0	BSpRa
128	CAMAS CR	5	SE	NE	SE	19	10S	01W	21-Jun-93	1649	CLOUDY	PEMC	R	0	0	0	0	0	0	BSpRa
129	CAMAS CR	6	SE	SW	SE	19	10S	01W	21-Jun-93	1715	RAINY	PSSC	R	0	0	0	0	0	0	BSpRa
130	NFCASTLECR	1	SE	NW	NW	15	07S	02W	22-Jun-93	1134	SUNNY	PSSC	R	0	0	0	0	0	0	TriRe
131	NFCASTLE CR	2	NW	NE	SW	15	7S	02W	22-Jun-93	1230	SUNNY	PSSA	R	0	0	0	0	0	0	TriRe
132	NFCASTLECR	3	SE	NW	SE	15	07S	02W	22-Jun-93	1358	SUNNY	PSSC	R	0	0	0	0	0	0	TriRe
133	NFCASTLECR	4	SW	NE	SE	15	07S	02W	22-Jun-93	1448	SUNNY	PSSC	R	0	0	0	0	0	0	TriRe
134	NFCASTLEDR	5	NW	SW	SW	14	07S	02W	22-Jun-93	1530	SUNNY	PSSC	F	0	0	1	0	0	0	TriRe
135	UNNAMED POND	1	SE	NW	SW	20	07S	02W	22-Jun-93	1812	SUNNY	PUBFH	F	0	0	0	9000	0	0	TriRe
136	EFSHOOFLYCR	1	SE	NE	NE	24	08S	01E	23-Jun-93	1035	SUNNY	PSSC	R	0	0	0	0	0	0	SnoCk
137	EFSHOOFLYCR	2	NW	NW	NW	19	08S	02E	23-Jun-93	1140	SUNNY	PSSC	R	0	0	0	0	0	0	SnoCk

transect #	Location Name and #	Location by Section ¼of	¼of	¼of	sec	TS	RA	Date	Time	WEATHER	NWI	F or R	Larvae and Adults Observed at Transect *Rp ad*	*Rp la*	*Pr ad*	*Pr lar*	*Bw ad*	*Bw la*	
138	EFSHOOFLYCR 3	NW	SE	SW	18	07S	02E	22-Jun-93	1333	SUNNY	PSSC	R	0	0	0	0	0	0	SnoCk
139	EFSHOOFLYDR 4	NE	SW	NE	18	07S	02E	23-Jun-93	1444	SUNNY	PSSC	R	0	0	0	0	0	0	SnoCk
140	EFSHOOFLYCR 5	NE	NE	NE	18	07S	02E	23-Jun-93	1535	SUNNY	PSSC	R	0	0	0	0	0	0	SnoCk
141	UNNAMED CREEK 1	SE	SW	NE	27	09S	02W	24-Jun-93	0840	SUNNY	PEMC	R	0	0	0	0	0	0	WBxBa
142	UNNAMED CREEK 2	NW	SE	SE	27	09S	02W	24-Jun-93	0921	DUNNY	PEMC	F	0	0	0	100	0	0	WBxBa
143	UNNAMED CREEK 3	NE	NE	NE	34	09S	02W	24-Jun-93	1000	SUNNY	PEMC	F	0	0	0	100	0	0	WBxBa
144	UNNAMED CREEK 4	NW	SW	NW	35	09S	02W	24-Jun-93	1027	SUNNY	PEMC	F	1	0	0	0	0	0	WBxBa
145	UNNAMED CREEK 5	SW	SW	NW	35	09S	02W	24-Jun-93	1047	SUNNY	PEMC	F	1	0	0	0	0	0	WBxBa
146	UNNAMED CREEK 6	SW	SW	NW	35	09S	02W	28-Jun-93	1325	CLOUDY	PEMC	F	0	0	0	100	0	0	WBxBa
147	UNNAMED CREEK 7	SW	SW	NW	35	09S	02W	28-Jun-93	1342	CLOUDY	PEMC	F	1	0	0	0	0	0	WBxBa
148	UNNAMED CREEK 8	SW	SW	NW	35	09S	02W	28-Jun-93	1424	CLOUDY	PEMC	F	0	0	0	8	0	0	WBxBa
149	SLACK CREEK 1	NW	NE	SE	25	10S	03W	29-Jun-93	1121	CLOUDY	R4SBC	R	0	0	0	0	0	0	SlaMt
150	SLACK DREEK 2	NE	NE	SW	25	10S	03W	29-Jun-93	1140	SUNNY	PSSC	F	0	0	0	100	0	0	SlaMt
151	SLACK CREEK 3	SE	NE	SE	25	10S	03W	29-Jun-93	1204	SUNNY	PSSC	F	1	0	0	100	0	0	SlaMt
152	CAMEL CREEK 1	SW	NW	SW	30	10S	02W	29-Jun-93	1343	SUNNY	R3UBH	F	3	0	0	100	0	0	SlaMt
153	POLE CREEK 1	SE	NW	NW	31	10S	2W	29-Jun-93	1432	SUNNY	PSSC	R	0	0	0	0	0	0	SlaMt
154	POLE CREEK 2	NW	NW	NE	31	10S	02W	29-Jun-93	1527	SUNNY	R3UBH	R	0	0	0	0	0	0	WBxBa
155	POLE CREEK 3	NE	NW	NE	31	10S	02W	29-Jun-93	1541	SUNNY	R3UBH	F	1	0	0	0	0	0	WBxBa
156	POLECRTRIB 1	NW	NE	NW	28	10S	02W	30-Jun-93	0959	SUNNY	R4SSA	F	0	0	1	10	0	0	WBxBa
157	POLE CREEK 4	NW	SW	NE	28	10S	02W	30-Jun-93	1043	SUNNY	PSSC	R	0	0	0	0	0	0	WBxBa
158	CAMAS CREEK 7	SW	SE	NE	28	10S	02W	30-Jun-93	1202	SUNNY	PSSC	R	0	0	0	0	0	0	WBxBa
159	CAMASCREEK 8	SW	NE	NE	28	10S	02W	30-Jun-91	1238	CLOUDY	PSSC	F	1	0	0	0	0	0	WBxBa
160	CAMAS CREEK 9	SE	SW	SW	22	10S	02W	30-Jun-93	1336	SUNNY	PSSC	R	0	0	0	0	0	0	WBxBa
161	CAMAS CREEK 10	SW	SW	NE	22	10S	02W	30-Jun-93	1535	SUNNY	PSSC	F	0	0	0	20	0	0	WBxBa
162	CCC SPRING 1	NE	NE	SE	35	10S	02W	01-Jul-93	0941	SUNNY		R	0	0	0	0	0	0	WBxBa
163	CCC SPRING 2	NW	SE	SE	26	10S	02W	01-Jul-93	1032	SUNNY		F	0	0	0	100	0	0	WBxBa
164	POISNCRTR1 1	NE	SE	SE	16	08S	01E	06-Jul-93	1420	SUNNY	PSSC	R	0	0	0	0	0	0	SnoCk
165	POISNCRTR1 2	SE	SW	NE	17	08S	01E	06-Jul-93	1459	SUNNY	PSSC	R	0	0	0	0	0	0	SnoCk
166	POISNCRTR2 1	NE	SE	NE	17	08S	01E	06-Jul-93	1604	SUNNY	PSSC	R	0	0	0	0	0	0	SnoCk
167	POISNCRTR2 2	SW	SW	NW	16	08S	01E	06-Jul-93	0129	SUNNY	PSSA	R	0	0	0	0	0	0	SnoCk
168	POISNCRTR2 3	SW	NE	SE	16	08S	01E	06-Jul-93	1728	SUNNY	PEMC	R	0	0	0	0	0	0	SnoCk
169	CAMAS CREEK 11	SE	SW	SW	19	10S	01W	07-Jul-93	1003	SUNNY	R3UBH	R	0	0	0	0	0	0	WBxBa
170	CAMAS CREEK 12	NW	SE	NE	25	10S	02W	07-Jul-93	1110	SUNNY	PSSC	F	0	0	0	20	0	0	WBxBa
171	CAMAS CREEK 13	SW	NW	NE	25	10S	02W	07-Jul-93	1238	SUNNY	PSSC	R	0	0	0	0	0	0	WBxBa
172	CAMAS CREEK 14	NW	SE	NW	25	10S	02W	07-Jul-93	1320	SUNNY	R4SBF	F	0	0	0	100	0	0	WBxBa

transect #	Location Name and #	Location by Section ¼of	¼of	¼of	sec	TS	RA	Date	Time	WEATHER	NWI	F or R	Larvae and Adults Observed at Transect: *Rp ad*	*Rp la*	*Pr ad*	*Pr lar*	*Bw ad*	*Bw la*	
173	CAMAS CREEK 15	NE	SW	NW	25	10S	02W	07-Jul-93	1348	SUNNY	PSSC	R	0	0	0	0	0	0	WBxBa
174	CAMAS CREEK 16	SE	SE	NE	26	10S	02E	07-Jul-93	1419	SUNNY	PSSC	R	0	0	0	0	0	0	WBxBa
175	BIRCH CREEK 1	NE	SW	NE	9	06S	01E	08-Jul-93	1158	SUNNY	R4SBF	R	0	0	0	0	0	0	RMtNe
176	BIRCH DREEK 2	NW	NW	SE	9	06S	01E	08-Jul-93	1238	SUNNY	PSSC	R	0	0	0	0	0	0	RMtNe
177	BIRCH DREEK 3	NE	SW	NW	16	06S	01E	08-Jul-93	1351	SUNNY	R4SBF	R	0	0	0	0	0	0	RMtNe
178	BIRCH CREEK 4	SE	NW	SE	16	06S	01E	08-Jul-93	1450	SUNNY	R4SBF	R	0	0	0	0	0	0	RMtNe
179	EFSHOOFLY CR 1	NE	NW	SE	23	07S	02E	12-Jul-93	1124	SUNNY	PSSC	R	0	0	0	0	0	0	PerCa
180	EFSHOOFLYCR 2	SE	SW	NE	23	07S	02E	12-Jul-93	1216	SUNNY	PSSC	R	0	0	0	0	0	0	PerCa
181	UNNAMED STREAM 1	SW	SE	NW	23	07S	02E	12-Jul-93	1249	SUNNY	R4SBF	R	0	0	0	0	0	0	PerCa
182	UNNAMED 1	SE	SW	NW	23	07S	02W	12-Jul-93	1259	SUNNY	R4SBF	R	0	0	0	0	0	0	PerCa
183	BIRCH CREEK 5	SW	SE	NE	35	05S	01E	12-Jul-93	1334	SUNNY	R4SBA	R	0	0	0	0	0	0	RMtNE
184	BIRCH CREEK 6	NE	SE	SW	1	06S	1E	12-Jul-93	1350	SUNNY	R4SBA	R	0	0	0	0	0	0	RMtNE
185	ERIC STREAM 1	NE	NE	NW	12	06S	01E	12-Jul-93	1415	SUNNY		R	0	0	0	0	0	0	RMtNE
186	ERICSTRTR1 1	SE	SE	NW	12	06S	01E	12-Jul-93	1424	SUNNY	R4SBJ	R	0	0	0	0	0	0	RMtNE
187	UNNAMED CREEK 1	SE	NE	SW	13	06S	01E	12-Jul-93	1436	SUNNY	R4SBA	R	0	0	0	0	0	0	RMtNE
188	UNNAMED CREEK 1	SE	SE	SW	13	05S	01E	12-Jul-93	1444	SUNNY		R	0	0	0	0	0	0	RMtNE
189	UNNAMED STREAM 1	NW	SW	NE	24	06S	01E	12-Jul-93	1451	SUNNY	R4SBA	R	0	0	0	0	0	0	RMtNE
190	UNNAMED CREEK 1	NW	SW	SW	35	06S	01E	12-Jul-93	1542	SUNNY	R4SBA	R	0	0	0	0	0	0	RghMt
191	UNNAMED CREEK 1	SW	NE	NW	31	06S	02E	12-Jul-93	1606	SUNNY	R4SBJ	R	0	0	0	0	0	0	RghMt
192	POISON CREEK 1	NW	NW	NE	20	07S	02E	12-Jul-93	1626	SUNNY	PSSA	R	0	0	0	0	0	0	PerCa
193	HACKBERRYRES 1	SE	SE	SE	28	09S	03W	13-Jul-93	1036	SUNNY	PUBHh	F	2	0	0	0	0	0	SlaMt
194	HACKBERRYRES 2	SW	NW	NW	34	09S	03W	13-Jul-93	1106	SUNNY	PUBHh	R	0	0	0	0	0	0	SlaMt
195	NIPAND TUCK 1	SE	SW	NW	27	09S	03W	13-Jul-93	1204	SUNNY	R4SBF	R	0	0	0	0	0	0	SlaMt
196	NIP AND TUCK 2	NE	SE	SE	21	09S	3W	13-Jul-93	1358	SUNNY	PSSC	R	0	0	0	0	0	0	SlaMt
197	NIP AND TUCK TRIB 1	SW	NW	SW	22	9S	3W	13-Jul-93	1417	PCLOUD		R	0	0	0	0	0	0	SlaMt
198	STONEMAN2ND 1	SW	SW	NW	07	10S	03W	14-Jul-93	1104	SUNNY	PSSC	R	0	0	0	0	0	0	SlaMt
199	STONEMAN2ND 2	NW	SE	NW	07	10S	03W	14-Jul-93	1152	SUNNY	PSSFB	F	0	0	0	10	0	0	SlaMt
200	STONEMAN2ND 3	NE	SE	NW	07	10S	03W	14-Jul-93	1215	SUNNY	PSSFB	F	0	0	0	0	0	100	SlaMt
201	STONEMAN2ND 4	NW	SW	NE	07	10S	03W	14-Jul-93	1243	SUNNY	PSSC	R	0	0	0	0	0	0	SlaMt
202	DEEP CK 2ND 1	NE	NW	SE	3	10S	3W	14-Jul-93	1443	PCLOUD	PSSC	F	0	0	0	30	0	0	SlaMt
203	DEEP CK 2ND 2	SW	SW	SW	3	10S	3W	14-Jul-93	1546	PCLOUD	PSSC	R	0	0	0	0	0	0	SlaMt
204	DEEP CK 2ND 3	NE	SW	SW	3	10S	3W	14-Jul-93	1557	PCLOUD	PSSC	F	2	0	0	0	0	0	SlaMt

Appendix II.Habitat parameters at transects. In order: transect # (see table 1); Conductivity; alkalinity; hardness; air temperature; water temperature; pH; depth in cm.; width in m; water flow class; grazing; substrate (0-100): mud, sand, gravel, rock; streamside vegetation (0-3): sage, grass, forbs, reeds, bare, willow, cottonwood; aquatic vegetation (0-3): emergent, submerged, algae; hiding place present, hiding place type.

										Substrate				Streamside veg.							Aquatic veg			Hideaway	
#	cond	hard	alka	T.	T.		dep.	wid.	body	gra-zing	mud	sand	grav	rock	sgbr	gras	forb	reed	bare	will	cott	emer	subm	alga	Y or N	type
1								7	POND	2	100	0	0	0	1	2	0	0	2	0	0	0	3	0		
2								30	POND	1	100	0	0	0	1	1	1	1	1	0	0	0.5	0.5	0		
3	93	20	40				10	5	POOL	0	0	100	0	0	0	1	1	1	3	1	0	0.5	0.5	0		
4	93	20	40				7	1.0	OXBOW	0	0	100	0	0	0.0	0.0	0.0	2.0	1.5	0.0	0.0	1.0	0.0	0.0		
5	93	40	60				7	0.2	OXBOW	0	0	100	0	0	0.0	1.5	0.5	0.5	3.0	0.0	0.0	0.0	0.0	0.5		
6	93	40	60				9	0.7	OXBOW	0	0	100	0	0	0.0	3.0	1.0	0.5	2.0	0.0	0.0	2.5	0.5	0.0		
7	93	40	60				22	0.3	OXBOW	0	0	0	100	0	0.0	1.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	1.0		
8		40	60				3	0.2	POOL	0	0	0	50	50	0.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0		
9	93	40	60				27	1.0	OXBOW	0	0	100	0	0	0.0	0.5	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.5		
10	93	40	60				8	0.3	OXBOW	0	0	100	0	0	0.0	0.0	0.0	1.5	2.0	0.0	0.0	0.0	0.5	0.0		
11	93	40	60				37	1.3	OXBOW	0	0	100	0	0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	1.0	1.0	0.0		
12	93	40	60				24	1.5	OXBOW	0	50	50	0	0	0.0	2.0	0.0	0.0	1.0	0.0	0.0	0.0	0.5	0.0		
13	93	40	60				12	1.5	OXBOW	0	0	100	0	0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	0.5	0.5	0.0		
14		40	60				9	0.8	OXBOW	0	0	100	0	0	0.0	0.0	0.0	1.0	2.0	0.0	0.0	0.5	0.5	0.0		
15	93	40	60				25	4.0	OXBOW	0	0	25	25	50	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0	1.0		
16		20	40				24	2.0	POOL	0	0	25	25	50	1.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0		
17	340						32	3.0	POOL	2	0	0	0	0	0.0	1.0	1.5	2.5	0.5	0.5	0.0	2.0	0.0	0.0		
18	420				12.8		13	1.0	OXBOW	2	0	10	90	0	0.5	1.5	1.0	1.0	2.0	0.0	0.0	1.0	0.0	1.0		
19	420	20	40				19	1.5	OXBOW	0	0	0	100	0	1.0	0.5	0.0	0.5	2.0	0.0	0.0	0.0	0.0	2.5		
20	420	20	40				7	5.0	RUN	0	0	0	100	0	0.5	1.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0		
21	420	20	40				1	0.5	POOL	0	0	0	50	50	1.5	1.0	2.0	1.5	0.5	0.0	0.0	0.5	1.5	1.0		
22		40	60					1.0	RIFFL	1	0	0	0	0	0.0	0.5	2.0	2.5	0.5	0.0	0.0	2.0	2.0	2.0		
23					12.5		42	13.0	POOL	2	90	0	10	0	2.5	1.0	0.5	1.5	0.5	0.0	0.0	2.0	2.5	2.0		
24	250	120	140		9.5		13	1.0	RIFFL	1	10	90	0	0	2.0	2.5	1.0	0.5	0.0	0.0	0.0	0.5	0.0	0.5		
25	250	120	140		9.0		20	1.0	RIFFL	2	50	0	0	50	2.0	1.0	1.0	0.5	1.0	1.0	0.0	0.5	0.5	0.0		
26	250	120	140				12	1.0	RIFFL	1	50	0	50	0	2.0	0.5	1.0	0.0	1.0	1.0	0.0	0.5	0.0	0.0		
27	250	120	140		9.5		17	1.0	RIFFL	2	0	0	50	50	2.0	1.5	1.0	0.0	2.0	2.0	0.0	0.5	0.5	0.0		
28	250	120	140				19	1.0	RIFFL	2	0	0	50	50	0.5	0.5	1.0	0.0	1.0	0.5	0.0	0.0	0.0	0.0		
29	250	120	140				17	1.0	RIFFL	2	0	0	50	50	3.0	0.0	1.0	0.0	2.0	1.0	0.0	0.5	0.0	0.0		
30							15	0.5	RIFFL	2	10	90	0	0	2.0	2.0	2.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0		
31		40	60				7	0.2	RIFFL	1	0	70	20	0	2.5	1.5	1.0	0.0	1.0	3.0	0.0	0.0	0.0	0.0		
32							15	1.0	RIFFL	1	10	30	10	10	3.0	0.5	1.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0		

#	cond	hard	alka	T.	T.		dep.	wid.	body	gra-zing	Substrate mud	sand	grav	rock	Streamside veg. sgbr	gras	forb	reed	bare	will	cott	Aquatic veg emer	subm	alga	Hideaway Y or N	type
33		40	60		21.0		2	0.5	RUN	1	0	10	80	10	0.5	1.0	0.5	1.0	1.0	0.0	0.0	1.0	0.0	1.5	Y	VEG
34		20	60		22.0		4	2.0	POOL	2	100	0	0	0	0.0	1.0	2.0	2.0	1.0	0.0	0.0	2.0	1.0	0.5	Y	VE.
35		40	60		23.0		2	1.0	RUN	2	10	0	80	10	1.0	2.0	0.5	0.0	1.0	0.0	0.0	0.5	0.0	0.0	N	VEG
36		40	60		18.0		10	1.5	RUN	2	0	0	80	10	0.0	0.5	0.5	1.0	1.0	1.0	0.0	2.5	0.0	2.0	Y	ALGAE
37		40	60		19.0		5	1.0	RUN	1	15	0	85	0	0.5	1.0	1.5	2.0	0.5	0.0	0.0	2.0	0.5	1.5	Y	ALGAE
38		40	60		18.0		5	3.0	POOL	2	100	0	0	0	1.0	2.5	1.0	0.5	0.5	0.0	0.0	2.5	2.5	2.5	Y	VEG
39	102	40	60		10.0		4	1.0	RUN	1	0	0	50	50	2.0	1.5	0.5	1.0	2.0	1.1	1.1	1.0	0.0	2.0	Y	VEG
40	98	40	60		10.0		7	1.0	RUN	1	0	0	100	0	1.0	1.0	1.0	1.5	1.0	0.0	0.0	2.0	1.0	1.5	Y	VEG
41	105	40	40		17.0			40.0	POND	2	90	0	0	10	2.0	1.0	0.5	2.0	0.0	0.0	0.0	0.0	0.5	2.0	Y	VEG
42	77	40	40		14.0			20.0	POND	2	70	0	30	0	0.5	0.5	0.5	0.5	2.0	0.0	0.0	0.5	0.0	2.0	Y	ALGAE
43	100	40	60		26.0		2	17.0	POND	2	100	0	0	0	1.0	0.5	0.5	2.5	1.0	0.0	0.0	1.5	1.5	3.0	Y	VEG
44	109	40	60		12.5		2	0.4	RUN	1	0	0	40	60	1.0	0.5	1.0	0.5	1.0	0.0	0.0	0.0	0.0	2.0	Y	VEG
45	80	40	60		10.0		30	3.0	RUN	1	5	90	5	0	0.5	0.5	0.5	1.0	2.0	0.5	0.0	1.0	0.5	0.5	N	
46	0	40	60		10.0		15	3.0	RUN	0	0	10	90	0	0.5	0.0	0.5	0.0	0.5	2.0	2.0	1.5	0.0	0.5	N	
47	97	40	60		12.0		3	0.5	OXBOW	1	100	0	0	0	0.5	0.0	0.5	1.5	2.0	1.0	0.0	1.0	0.0	0.0	Y	STICKS
48	97	40	60		11.0		30	1.0	RUN	1	5	0	80	15	0.0	1.0	1.0	2.0	0.5	2.0	0.0	1.0	0.0	0.0	Y	VEG
49	97	40	60		14.0		30	3.0	RUN	1	0	10	65	25	0.0	0.0	0.5	1.0	2.0	2.5	0.0	2.0	0.0	0.0	Y	VEG
50	97	40	60		16.0		45	2.0	RUN	1	0	50	50	0	0.0	0.0	0.5	2.5	0.5	2.0	0.0	1.5	0.0	1.0	Y	VEG
51	97	40	60	26.5	15.0			4.0	POOL	1	25	0	75	0	0.0	0.5	0.5	1.5	2.0	2.0	0.0	0.5	0.5	0.0	Y	VEG
52	97	40	60	29.0	18.0		2	5.0	POOL	1	100	0	0	0	0.5	0.5	0.0	1.0	2.5	0.0	0.0	0.0	0.0	0.0	Y	VEG
53	97	40	60	23.0	32.0		4	0.5	POOL	0	100	0	0	0	0.0	0.5	0.5	0.5	2.0	0.5	0.0	0.5	0.0	2.5	Y	VEG
54	97	40	60	25.0	28.0		17	2.0	OXBOW	1	100	0	0	0	0.5	0.5	0.5	1.0	1.5	1.0	1.0	0.0	2.0	0.0	Y	VEG
55	97	40	60	28.0	17.0		2	2.0	POOL	1	50	50	0	0	0.0	0.5	0.5	1.0	2.0	2.0	0.0	0.0	0.5	0.0	Y	VEG
56	97	40	60	26.0	18.0		16	3.0	RIFFL	1	10	0	45	45	0.5	0.5	0.5	0.5	1.0	2.5	0.0	1.0	0.5	0.0	Y	VEG
57	69	20	60	12.0	10.0		4	0.8	RIFFL	0	0	0	25	75	0.0	2.0	1.0	2.0	0.5	0.0	0.0	0.5	0.0	1.5	N	
58	69	20	60	16.0	10.0		6	0.8	RIFFL	1	0	0	50	50	0.5	1.0	0.5	0.5	2.0	1.0	0.0	0.5	0.0	0.0	N	
59	69	20	60	15.5	12.0		10	1.0	RIFFL	0	0	0	50	50	0.5	2.5	1.0	0.5	1.0	0.0	1.0	0.0	0.5	0.5	Y	NO
60		20	60	15.5	11.0		4	0.5	RIFFL	1	0	0	100	0	0.5	1.0	0.5	0.0	0.5	2.5	0.0	0.5	0.0	0.0	Y	VEG
61	73			18.5	12.0		8	1.0	RIFFL	1	0	0	50	50	0.5	0.5	1.5	0.5	1.0	1.0	0.0	1.0	0.0	2.5	Y	ALGAE
62				25.0	15.5		9	0.5	RUN	1	0	0	50	50	0.5	1.0	0.5	3.0	0.0	0.0	0.0	3.0	0.0	0.0	Y	VEG
63		20	60	21.0	21.0		11	0.5	RUN	1	0	0	70	30	0.5	2.0	1.5	1.5	0.5	0.0	0.0	2.0	0.5	1.5	Y	ALGAE
64		20	60	21.0	22.0		13	2.0	RUN	2	100	0	0	0	0.5	0.5	0.5	2.5	2.0	0.0	0.0	1.0	2.5	2.0	Y	VEG
65		20	60	21.0	20.0		8	2.0	RUN	2	100	0	0	0	0.5	1.5	0.5	2.5	1.0	0.0	0.0	2.5	1.5	1.5	Y	VEG
66	95	40	60	24.0	12.0			10.0	POND	2	100	0	0	0	0.5	0.5	0.5	2.0	1.5	2.0	0.0	2.0	2.5	2.5	Y	VEG
67		40	60	26.1	22.0		30	2.5	OXBOW	1	5	0	95	0	0.0	2.0	0.5	1.0	1.5	1.0	0.0	2.0	0.5	0.5	Y	VEG

#	cond	hard	alka	T.	T.		dep.	wid.	body	gra-zing	Substrate mud	sand	grav	rock	Streamside veg. sgbr	gras	forb	reed	bare	will	cott	Aquatic veg emer	subm	alga	Hideaway Y or N	type
68	58	40	60	25.0	16.0		25	3.0	RUN	2	0	20	80	0	0.0	1.5	0.5	0.5	2.0	2.0	0.0	0.0	1.0	1.5	Y	VEG
69	72	40	60	12.0	10.0		4	2.0	RIFFL	1	0	0	30	70	0.0	2.0	0.5	2.5	0.2	1.0	0.0	0.5	0.5	0.0	Y	VEG
70	72	40	60	10.0	10.0		15	1.3	RIFFL	1	0	0	10	90	0.0	3.0	2.0	2.0	0.0	1.0	0.0	2.0	1.0	0.0	Y	VEG
71	72	40	60	11.0	10.0		24	2.0	OXBOW	1	98	0	0	2	0.0	2.0	2.0	2.5	0.0	2.5	0.0	1.5	0.0	0.5	Y	VEG
72	72	40	60	11.0	10.0		9	1.0	OXBOW	1	100	0	0	0	0.0	2.0	2.0	2.0	2.0	0.5	0.0	0.5	1.0	0.0	Y	VEG
73	72	40	60	11.0	11.0		10	1.0	RIFFL	1	0	0	10	90	0.5	2.0	1.5	2.5	0.0	1.0	0.0	0.5	0.5	0.0	Y	VEG
74	72	40	60	11.0	11.0		35	7.5	OXBOW	2	98	0	0	2	0.0	2.0	1.0	2.0	0.5	2.0	0.0	0.5	0.0	3.0	Y	VEG
75	72	40	60	11.0	11.0		4	0.8	OXBOW	3	100	0	0	0	0.0	1.0	0.5	2.5	0.0	2.5	0.0	2.5	1.5	2.5	Y	VEG
76	72	40	60	9.0	9.0		31	2.0	RUN	1	0	20	80	0	1.0	0.5	1.0	3.0	0.5	2.5	0.0	1.5	0.5	2.0	Y	VEG
77	72	40	60	14.0	12.0		20	1.5	OXBOW	1	50	0	0	50	0.0	0.5	1.0	2.5	0.0	2.5	0.0	2.0	0.0	0.0	Y	VEG
78	72	40	60	15.0	10.0		24	3.0	RUN	1	0	20	80	0	0.0	1.0	1.0	1.0	2.0	1.5	0.0	1.0	0.0	0.0	N	
79	72	40	60	15.0	10.0		35	3.0	RUN	2	10	70	20	0	0.0	0.5	1.0	2.0	2.0	1.0	0.0	1.0	1.0	2.0	Y	VEG
80	71	20	40	15.0	12.0		37	3.5	RUN	1	100	0	0	0	0.5	2.0	2.0	3.0	0.5	0.0	0.0	2.0	0.5	2.0	Y	VEG
81	53	40	60	14.0	16.0		28	2.0	POOL	2	50	0	40	5	1.0	1.0	1.5	8.2	0.0	0.0	0.0	1.0	0.5	3.0	Y	ALGAE
82	53	40	60	14.0	18.0		20	1.0	POOL	2	0	50	0	50	0.5	2.0	2.0	2.0	0.0	0.0	0.0	1.0	0.5	0.5	Y	BANK
83		40	60	14.0	18.0		20	1.0	POOL	2	0	50	0	50	0.5	2.0	2.0	2.0	0.0	0.0	0.0	1.0	0.5	0.5	Y	BANK
84	74	40	60	12.0	12.0		3	3.0	RUN	2	0	0	50	50	0.5	2.0	1.5	2.5	0.5	1.0	0.0	2.0	0.0	2.0	Y	VEG
85	74	40	60	11.5	12.0		6	0.5	RUN	2	70	0	0	30	1.0	1.0	1.5	2.0	1.0	0.0	0.0	1.0	0.0	1.0	N	
86	74	40	60	13.0	12.0		24	1.5	RUN	1	0	10	70	20	0.0	2.0	2.0	2.0	1.0	2.0	1.0	1.0	2.0	0.0	Y	VEG
87	74	40	60	13.0	12.0		30	2.0	RUN	1	50	20	20	0	0.0	1.0	1.0	3.0	0.0	1.0	0.0	1.5	1.0	2.0	Y	VEG
88	0	40	60	13.0	15.0		11	2.0	RUN	1	100	0	0	0	0.5	1.0	2.0	3.0	0.0	0.0	0.0	3.0	2.0	3.0	Y	ALGAE
89	0	40	60	13.0	11.0		17	0.8	RUN	1	10	10	75	5	1.0	1.0	2.5	2.0	1.0	0.5	0.0	2.0	1.0	2.0	Y	ALGAE
90	118	40	80	12.0	14.0		15	1.5	POOL	2	20	80	0	0	1.0	1.0	1.0	2.0	0.5	0.0	0.0	2.0	1.0	0.5	Y	ALGAE
91	118	40	80	10.0	7.0		11	1.0	RUN	2	100	0	0	0	0.0	1.0	2.0	2.5	0.5	0.0	0.0	1.0	5.0	0.0	N	
92	118	40	80	14.0	8.0		7	3.0	POND	1	100	0	0	0	0.0	2.5	5.0	5.0	0.0	0.0	0.0	5.0	1.0	0.5	Y	VEG
93	64	40	60	11.0	8.0		4	3.0	RUN	1	80	20	0	0	0.5	1.0	1.0	2.5	1.0	0.0	0.0	1.0	0.5	2.0	Y	REEDS
94	64	40	60	15.5	8.0		6	0.5	RUN	1	20	0	80	0	0.0	0.5	1.0	3.0	0.0	0.0	0.0	3.0	1.0	2.0	Y	VEG
95	56	20	40	24.0	15.0			1.0	RUN	1	0	0	100	5	1.0	1.0	2.0	0.0	0.0	0.0	0.0	1.0	1.0	0.5	N	
96	56	20	40	20.5	11.0		5	2.0	POOL	1	0	0	100	0	0.5	2.0	2.0	3.0	0.0	0.0	0.0	2.0	1.0	3.0	Y	ALGAE
97	56	20	40	24.0	16.0		14	0.5	POOL	2	0	0	100	0	1.0	2.0	2.0	2.0	0.5	0.0	0.0	0.0	0.0	2.0	N	
98	51	20	40	26.0	20.0		50	1.5	POOL	1	0	100	0	0	1.0	2.0	2.0	2.0	0.5	0.0	0.0	1.0	0.0	2.0	Y	ALGAE
99	51	20	40	26.0	20.0		18	1.0	POOL	2	0	0	100	0	0.5	2.0	1.0	2.0	1.0	0.0	0.0	2.0	1.0	3.0	Y	ALGAE
100	51	20	40	25.0	18.0		15	1.5	RUN	2	5	5	90	0	0.0	1.0	3.0	2.0	0.0	0.0	0.0	1.0	0.5	2.5	Y	ALGAE
101	90	60	60	21.0	12.0		25	5.0	OXBOW	1	80	10	20	0	0.5	1.0	1.0	2.0	2.0	1.0	0.0	2.0	1.0	2.0	Y	VEG
102	72	60	60	17.0	13.0		22	3.0	RUN	1	0	0	90	10	0.5	1.0	2.0	2.0	1.0	2.0	0.0	1.0	2.0	0.0	Y	VEG

									gra-	Substrate				Streamside veg.							Aquatic veg			Hideaway	
#	cond	hard	alka	T.	T.		dep.	wid.	body	zing	mud	sand	grav	rock	sgbr	gras	forb	reed	bare	will	cott	emer	subm	alga	Y or N	type
103	72	60	60	21.0	14.0		24	2.0	RUN	0	0	0	80	20	0.0	1.0	1.0	2.0	2.5	2.0	0.0	2.0	1.0	0.0	N	
104	72	60	60	32.0	17.0		13	2.0	RUN	2	0	0	100	0	0.5	0.5	0.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0	N	
105	72	60	60	27.0	16.0		45	3.0	RUN	1	0	50	50	0	0.5	1.0	1.0	1.0	2.0	1.0	0.0	1.0	0.0	0.0	N	
106	96	60	60	26.0	23.0		40	2.0	OXBOW	0	0	0	100	0	0.5	0.0	0.0	1.0	2.0	0.5	0.0	1.0	0.0	2.0	Y	ALGAE
107	96	60	60	26.0	19.0		24	5.0	RIFFL	0	0	0	10	90	0.0	1.0	1.0	1.0	0.0	2.0	0.0	0.5	0.0	0.0	Y	ROCK
108		40	40	28.0	22.0		4	4.0	RUN	2	50	0	50	0	0.0	0.5	0.5	1.0	3.0	1.0	0.0	0.0	0.5	0.5	N	
109		40	40	34.5	30.0		1	0.2	OXBOW	1	90	0	10	0	0.0	0.0	0.5	1.0	3.0	0.5	0.0	0.0	0.0	0.5	N	
110		40	40	35.5	23.0		24	3.0	RUN	0	0	20	80	0	0.0	1.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.5	N	
111		40	40	17.0	18.0		25	6.0	RUN	0	0	10	90	0	0.5	1.0	1.0	0.5	2.5	2.0	0.0	0.0	0.0	0.0	N	
112		40	40	17.0	18.0		54	1.5	OXBOW	0	0	100	0	0	0.0	0.5	0.5	0.5	2.0	3.0	0.0	0.0	0.0	0.5	Y	VEG
113		40	40	29.0	24.0		33	3.0	RIFFL	0	0	10	90	0	0.0	1.0	0.5	2.0	2.5	2.0	0.0	1.0	0.0	0.0	N	
114		40	40	26.0	15.0		25	2.0	RUN	1	90	0	10	0	0.5	1.0	1.0	2.5	0.5	0.0	0.0	1.0	0.5	0.5	N	
115		40	40	22.0	16.0		31	1.5	RUN	1	80	0	10	10	0.0	1.0	0.5	2.5	0.5	0.0	0.0	1.0	0.0	0.5	Y	VEG
116		40	40	12.0	22.0		24	20.0	POND	1	100	0	0	0	0.5	1.0	2.0	3.0	0.0	0.0	0.0	1.5	1.5	0.0	N	
117		40	40	12.0	20.0		10	1.0	RUN	1	0	10	90	0	2.0	1.0	1.0	2.5	1.0	0.0	0.0	1.5	0.0	0.0	N	
118		40	40	24.4	24.0		12	0.5	RUN	1	100	0	0	0	0.5	2.0	0.5	2.0	0.0	1.0	0.0	2.5	1.0	1.0	Y	VEG
119		40	40	24.0	22.0		10	1.5	RIFFL	1	5	5	10	80	0.5	0.5	0.5	2.0	2.0	0.0	0.0	1.0	0.5	0.5	N	
120		40	40	17.0	24.0		12	1.5	RUN	2	50	50	0	0	2.0	0.5	0.5	1.5	2.0	0.0	0.0	1.0	0.5	0.5	N	
121		40	40	13.5	20.0			7.5	OXBOW	3	100	0	0	0	0.0	0.5	0.5	2.0	2.0	3.0	0.0	0.0	2.0	2.0	N	
122				12.0	8.0		16	2.5	RIFFL	2	0	10	20	70	0.5	1.0	0.5	0.5	2.0	2.0	0.0	1.0	0.0	0.0	N	
123				10.0	8.5		10	2.0	RUN	1	0	20	80	0	0.5	2.0	0.5	2.0	0.5	2.0	0.0	2.0	1.0	0.5	N	
124	69	40	60	20.0	21.0		44	2.0	RUN	2	30	0	70	0	2.0	0.5	0.5	1.5	2.0	0.0	0.0	1.0	0.0	2.0	N	
125	69	40	60	24.0	22.0		37	1.0	RUN	1	60	0	40	0	2.0	0.5	2.0	1.5	1.0	0.0	0.0	1.0	0.0	0.0	Y	BANK
126	69	40	60	24.5	21.5		11	2.0	RIFFL	1	0	0	80	20	0.0	1.0	2.0	2.5	1.0	0.0	0.0	1.0	0.0	1.0	Y	ALGAE
127	69	40	60	20.0	21.0		22	0.5	RUN	1	0	0	100	0	0.5	2.0	2.5	2.5	0.5	0.0	0.0	2.0	0.0	1.5	Y	BANK
128	69	40	60	18.0	22.0		36	1.0	OXBOW	0	100	0	0	0	0.5	2.0	2.0	1.0	0.5	0.0	0.0	1.0	0.5	2.0	Y	ALGAE
129	69	40	60	15.5	20.5		31	2.0	POOL	1	80	0	0	20	1.0	1.0	0.5	2.5	0.5	2.0	0.0	2.5	0.5	0.5	Y	VEG
130	109	60	80	16.0	5.5		28	2.0	RUN	1	0	50	10	40	0.0	2.0	1.5	3.0	1.0	2.0	0.0	1.0	0.0	0.0	Y	VEG
131	109	60	80	20.0	14.0		23	3.5	RUN	1	30	60	10	0	0.5	2.0	1.0	1.0	2.0	2.0	0.0	1.0	2.0	0.0	Y	VEG
132	109	60	80	24.0	16.0		38	3.0	RUN	1	40	60	0	0	0.0	1.5	0.5	0.5	2.0	2.5	0.0	0.0	0.0	0.0	Y	VEG
133	109	60	80	21.5	17.5		39	2.0	RUN	1	25	20	30	25	1.0	2.0	1.5	1.5	1.0	2.0	0.0	0.0	0.5	0.0	N	
134	109	60	80	21.0	19.0		24	1.5	RUN	1	10	0	70	20	0.0	2.5	0.5	2.0	0.5	0.5	0.0	1.5	0.0	0.0	N	
135	187	40	80	19.0	22.0		60	50.0	POND	2	100	0	0	0	0.5	1.0	0.5	2.0	1.0	0.0	0.0	2.5	2.0	2.0	N	
136	74	40	40	19.0	8.0		13	1.0	RIFFL	0	0	0	90	10	0.0	1.0	3.0	1.0	0.0	0.0	0.0	1.0	0.5	0.0	N	
137	74	40	40	18.5	9.0		18	1.0	RIFFL	1	0	0	35	65	0.0	1.0	2.5	0.0	0.5	1.5	0.0	0.5	0.0	0.5	Y	VEG

#	cond	hard	alka	T.	T.		dep.	wid.	body	gra-zing	Substrate mud	sand	grav	rock	Streamside veg. sgbr	gras	forb	reed	bare	will	cott	Aquatic veg emer	subm	alga	Hideaway Y or N	type
138	74	40	40	20.0	12.0		12	1.0	RIFFL	3	0	0	80	20	1.0	0.5	2.5	0.0	2.0	2.0	0.0	1.0	0.0	0.0	Y	VEG
139	74	40	40	19.5	13.0		8	2.5	RIFFL	3	0	0	20	80	1.5	0.0	2.0	0.0	2.5	2.5	0.0	2.0	0.5	0.0	Y	VEG
140	74	40	40	23.5	13.0		6	2.0	RUN	3	50	50	0	0	0.0	0.0	2.0	0.0	2.5	3.0	0.0	0.0	0.0	0.0	Y	VEG
141	0	40	40	14.5	8.0		24	1.0	RUN	1	100	0	0	0	0.0	1.0	1.0	2.5	0.0	2.5	0.0	2.5	3.0	3.0	Y	ALGAE
142		40	40	18.0	13.0		60	13.0	POOL	1	20	50	30	0	0.5	1.0	2.0	2.5	0.5	0.0	0.0	2.5	3.0	3.0	Y	ALGAE
143		40	40	18.0	12.0		30	2.0	POOL	1	10	80	10	0	0.0	1.5	2.0	2.5	0.0	0.0	0.0	1.5	2.5	3.0	Y	ALGAE
144		40	40	18.0	11.0		25	3.0	POOL	1	100	0	0	0	0.0	0.5	2.5	2.0	1.0	3.0	0.0	1.0	3.0	3.0	Y	BRANCH
145		40	40	21.0	16.0		15	3.0	POOL	1	100	0	0	0	0.0	0.0	2.0	3.0	0.0	0.0	0.0	2.0	0.5	2.5	Y	ALGAE
146		40	40	20.0	20.0		32	5.0	RUN	1	100	0	0	0	0.5	0.5	0.5	3.0	0.0	1.0	0.0	1.5	2.5	3.0	Y	ALGAE
147		40	40	20.0	19.5		12	1.5	POOL	1	0	0	50	50	2.5	1.0	1.0	0.5	1.0	0.0	1.5	0.5	1.5	1.5	N	
148		40	40	21.0	17.0		4	0.5	RUN	1	0	5	5	90	0.0	2.0	1.5	2.0	0.0	1.5	0.0	1.5	0.5	1.5	Y	ALGAE
149	57	40	40	19.0	11.5		15	5.0	RUN	2	0	50	50	0	0.0	0.0	0.5	2.5	0.5	0.0	0.0	2.0	0.5	2.0	Y	ALGAE
150	57	40	40	26.0	11.0		15	2.5	OXBOW	3	40	60	0	0	0.5	0.5	2.0	0.0	2.5	2.5	0.0	0.0	0.0	0.0	N	
151	57	40	40	26.0	14.0		34	2.0	OXBOW	1	0	10	70	20	0.0	0.0	1.0	3.0	0.5	2.5	0.0	1.5	0.0	0.5	Y	VEG
152	61	80	40	26.0	23.0		15	4.0	POOL	1	0	50	50	0	0.0	0.0	1.5	2.0	2.0	2.5	0.0	2.0	2.0	0.5	Y	VEG
153	90	60	60	26.5	21.0		17	10.0	POOL	2	0	0	95	5	0.0	0.0	1.5	2.0	2.5	0.0	0.0	1.0	2.5	2.5	N	
154	90	60	60	24.5	23.0		25	4.0	RUN	1	0	0	30	70	0.0	1.0	1.0	1.0	2.0	2.5	0.0	0.5	0.0	2.5	Y	ALGAE
155	90	60	60	32.0	24.0		12	2.0	POOL	1	0	50	50	0	0.0	0.0	0.5	2.0	0.5	2.0	0.0	1.5	0.0	0.5	N	
156	77	60	80	19.0	16.0		6	0.5	POOL	2	0	0	60	40	1.0	2.5	0.5	1.0	0.5	0.0	0.0	1.0	0.0	1.5	N	
157	106	60	80	15.5	13.0		100	6.0	RUN	1	0	80	0	20	0.0	0.5	0.5	2.0	2.5	0.0	0.0	0.5	0.5	2.0	Y	ALGAE
158	103	60	80	28.0	14.0		5	1.0	RIFFL	0	0	0	0	100	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.5	0.0	2.0	Y	ALGAE
159	106	60	80	24.5	17.0		15	4.0	RUN	1	0	0	30	70	2.0	0.5	0.5	2.0	0.5	2.0	0.0	1.0	0.0	1.0	Y	ALGAE
160	103	60	80	25.5	17.5		52	5.0	RUN	1	0	0	60	40	0.5	1.0	1.0	1.0	2.5	2.0	0.0	0.0	0.0	0.5	N	
161	103	60	80	32.0	24.0		15	0.8	OXBOW	0	0	0	0	100	0.0	0.0	1.5	2.0	2.0	2.0	0.0	2.0	0.0	0.5	Y	ROCK
162	104	80	80	25.5	16.0		20	0.5	RUN	1	0	0	0	100	0.0	2.5	1.0	2.5	0.5	0.0	0.0	2.0	0.0	2.5	Y	ALGAE
163	79	60	80	24.5	14.5		15	12.0	POND	1	100	0	0	0	1.0	2.0	1.0	2.5	0.0	0.0	0.0	2.5	1.0	0.5	Y	VEG
164	35			28.0	26.0		5	0.1	RIFFL	3	0	90	10	0	2.5	1.0	1.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	N	
165					22.0		5	0.1	RIFFL	3	0	90	10	0	0.5	0.5	0.5	0.0	2.5	1.5	0.0	0.0	0.0	0.0	N	
166				25.5	13.0		5	0.1	RUN	3	0	70	30	0	0.5	0.0	0.5	0.0	2.5	2.0	0.0	0.0	0.0	0.0	N	
167	33			26.8	13.0		2	0.0	RUN	3	0	80	20	0	0.5	1.0	2.0	0.0	1.5	2.5	0.0	0.5	0.0	1.0	N	
168	33			26.5	15.0		5	1.0	RUN	3	0	90	10	0	0.0	0.5	0.5	0.0	2.0	2.5	0.0	0.0	0.0	0.0	N	
169	65	60	60	25.0	16.0		24	1.0	RUN	2	0	30	70	0	2.0	0.5	0.5	2.0	2.5	0.0	0.0	0.5	0.5	0.0	N	
170	65	60	60	23.0	13.0		15	1.5	OXBOW	2	100	0	0	0	0.5	0.5	1.0	2.5	0.5	0.0	0.0	2.5	1.0	0.0	Y	VEG
171	65	60	60	25.5	15.0		16	1.0	RUN	1	0	10	10	80	0.0	2.0	0.5	2.0	0.5	0.5	0.0	2.0	0.5	2.0	Y	ALGAE
172	65	60	60	21.0	20.0			8.0	OXBOW	2	40	20	20	20	0.5	2.5	1.0	1.5	0.5	0.5	0.0	1.5	2.0	1.5	Y	VEG

#	cond	hard	alka	T.	T.		dep.	wid.	body	gra-zing	Substrate mud	sand	grav	rock	Streamside veg. sgbr	gras	forb	reed	bare	will	cott	Aquatic veg emer	subm	alga	Hideaway Y or N	type
173	65	60	60	23.0	21.0		30	4.0	RUN	1	0	10	70	20	0.0	2.0	0.5	1.5	0.5	2.5	0.0	2.5	0.5	0.5	N	
174	65	60	60	26.0	20.0		35	2.0	RIFFL	1	0	0	30	70	0.5	1.0	1.0	1.0	2.0	1.0	0.0	0.5	0.0	1.0	Y	ROCK
175	315	60	80	26.5	14.0		12	1.5	RUN	2	0	0	80	20	0.5	0.0	0.5	0.0	2.5	2.0	0.0	0.0	0.0	2.0	N	
176	315	60	80	30.0	15.0		14	1.5	RUN	2	0	20	50	30	2.0	0.0	2.0	0.0	2.0	2.0	0.0	2.5	0.5	1.0	Y	VEG
177	315	60	80	30.0	17.5		15	0.5	RIFFL	2	0	10	20	70	1.5	0.5	1.5	0.0	2.5	2.0	0.0	0.5	0.0	0.0	N	
178	315	60	80	29.0	17.5		20	1.0	RIFFL	2	0	50	50	0	0.0	0.0	1.0	0.0	3.0	2.0	0.0	0.5	0.5	0.0	N	
179	129	60	80	19.0	12.0		16	1.0	RUN	1	50	50	0	0	0.5	2.5	2.5	0.0	1.0	2.5	0.0	0.5	0.0	2.0	Y	ALGAE
180	129	60	80	24.5	14.0		10	2.5	RIFFL	1	10	30	20	40	2.5	2.0	2.0	1.0	2.0	0.0	0.0	1.5	0.5	2.5	N	
181				23.0			0	1.5	DRY	1	0	0	70	20	1.0	2.0	0.0	1.0	0.0	2.0	0.0	0.0	0.0	0.0	N	
182				23.0			0	3.0	DRY	0	0	80	20	0	2.5	0.0	0.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0		
183				23.0			0	16.0	DRY	1	0	70	20	10	2.5	0.0	0.5	0.0	3.0	0.0	0.0	0.0	0.0	0.0		
184				26.5			0	12.0	DRY	1	0	70	20	10	3.0	0.5	0.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0	N	
185				25.0			0	2.0	DRY	1	0	70	30	0	3.0	1.0	0.5	0.5	0.0	2.5	0.0	0.0	0.0	0.0	N	
186				26.5			0	3.0	DRY	1	0	80	20	0	3.0	1.0	1.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	N	
187				26.5			0	3.0	DRY	1	0	90	10	0	3.0	0.5	0.5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	N	
188				26.0			0	1.0	DRY	0	0	80	20	0	2.0	0.5	0.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0	N	
189				26.0			0	2.0	DRY	0	0	80	20	0	2.5	2.0	0.5	0.0	2.0	0.0	0.0	0.0	0.0	0.0	N	
190				26.0			0	3.0	DRY	1	0	50	50	50	2.0	0.5	0.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0	N	
191							0	1.0	DRY	0	0	60	30	10	2.5	1.0	1.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	N	
192				28.0	29.0		16	1.0	RUN	1	0	30	30	40	2.0	1.0	0.5	0.0	1.5	0.0	0.0	0.0	0.0	1.5	N	
193	44	40	40	20.0	19.0		15	30.0	POND	1	70	30	0	0	0.0	0.5	2.0	2.5	0.0	0.0	0.0	2.5	1.0	0.5	Y	VEG
194	44	40	40	23.0	20.0		60	3.0	POND	1	0	100	0	0	0.5	0.0	0.5	2.0	2.5	0.0	0.0	1.5	2.0	0.5	Y	VEG
195	37	40	40	30.0	17.0		20	2.5	RUN	2	0	0	60	40	1.0	0.5	0.5	0.5	2.5	1.0	0.0	0.5	0.0	0.0	N	
196	37	40	40	29.0	16.0		7	2.0	RUN	1	0	0	80	20	0.0	2.0	1.5	0.5	2.0	2.5	0.0	0.5	0.0	2.0	Y	BANK
197							0	1.0	DRY	1	0	0	10	90	0.5	0.5	1.0	0.0	2.0	2.0	0.0	0.0	0.0	0.0	N	
198	80	80	40	20.0	11.0		41	1.0	RIFFL	0	0	0	50	50	0.0	2.0	2.0	0.5	2.0	1.5	0.0	0.5	0.5	0.0	Y	BANK
199	80	80	40	23.0	19.0		15	1.0	OXBOW	1	100	0	0	0	0.0	2.0	2.5	0.5	1.0	2.0	0.0	0.0	2.0	2.5	Y	ALGAE
200	80	80	40	23.0	21.0		15	1.0	POND	1	100	0	0	0	0.0	0.5	1.5	0.5	2.0	1.5	0.0	0.0	0.5	1.5	Y	ALGAE
201	80	80	40	27.0	15.0		45	2.0	RUN	1	20	50	30	0	0.0	2.5	1.5	1.5	0.5	2.0	0.0	0.0	2.0	0.5	N	
202					24		24	4	OXBOW	1	0	100	0	0	0	2	1	2.5	2	1.5	0	1.5	0.5	0.5	N	
203				29	23		20	1.5	RUN	1	0	70	30	0	0	1.5	2	0	2.5	2	0	0	0	0	Y	BRANCH
204				29	22		35	3	OXBOW	1	10	20	70	0	0	1.5	0.5	1.5	2.5	2	0	1	0	0.5	Y	BANK

QUAD MAPS:

These maps are copies of areas of quadrangle maps that were surveyed by us. They are ordered from the SW portion of our site to the SE portion of our site, then from NW to NE.

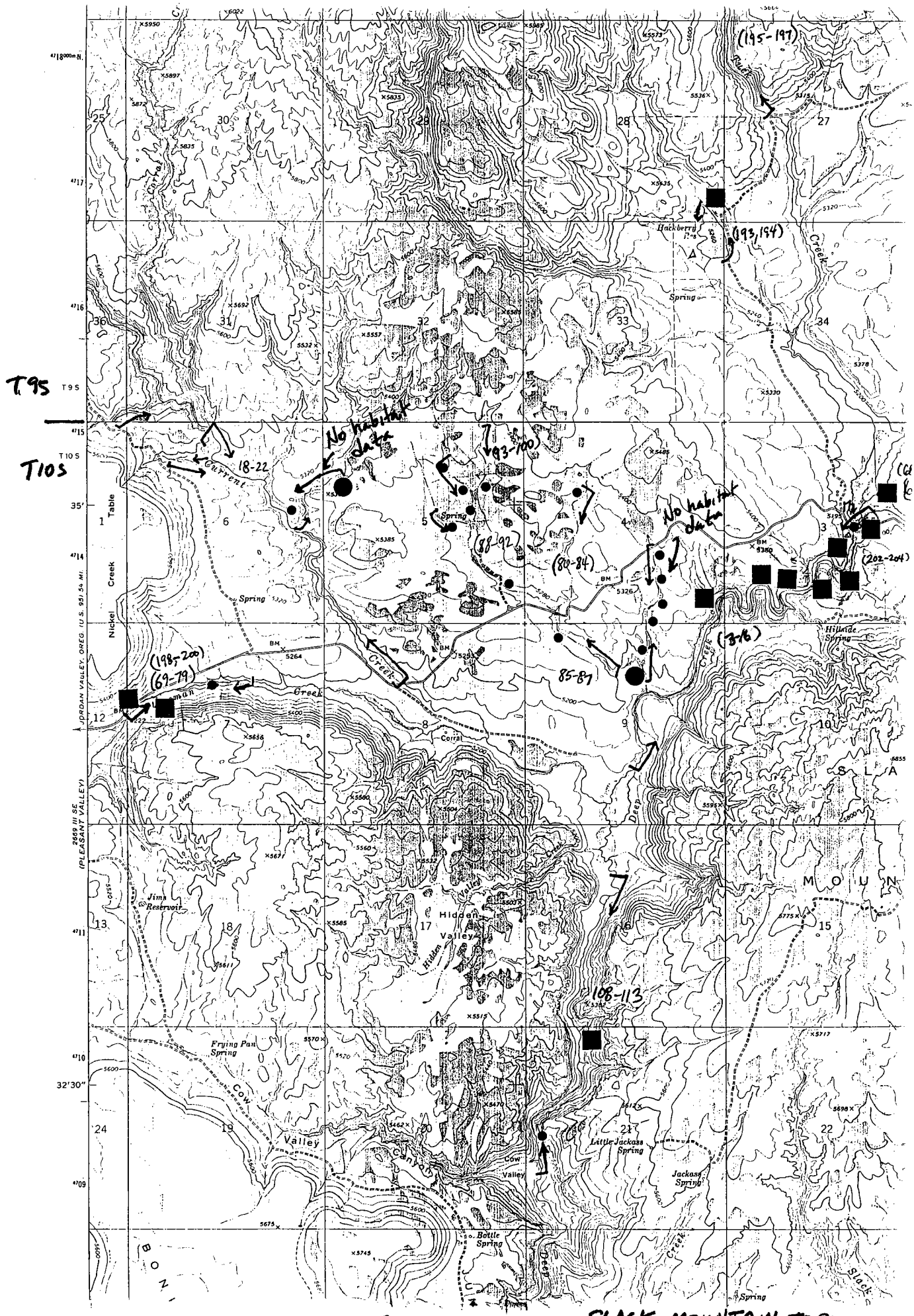
--- Numbers in parentheses refer to site numbers (see Appendixes I and II).

--- Large squares: Spotted frog adult (s)

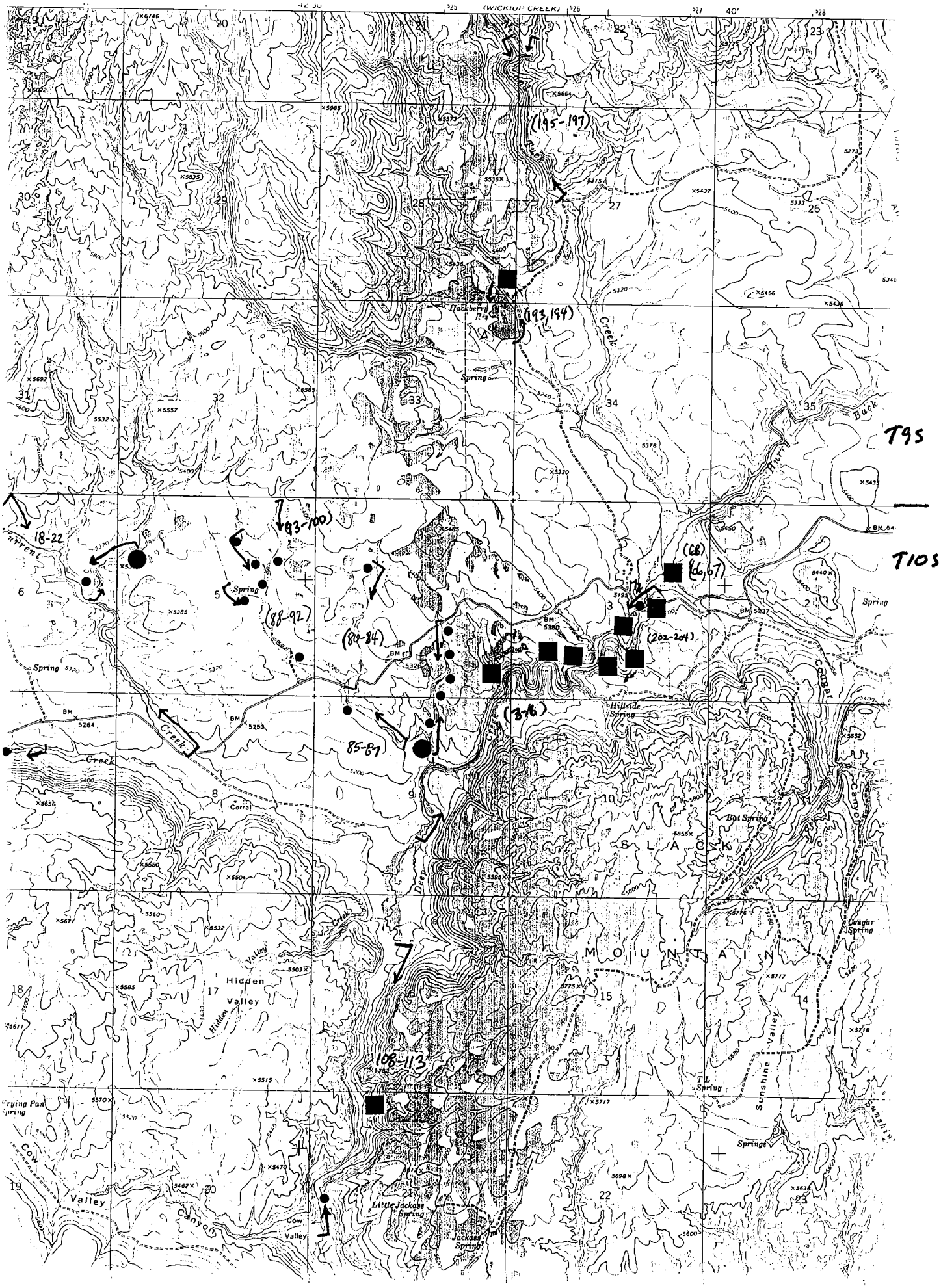
--- Small squares: Spotted frog larva(e)

--- Large circles: Treefrog adult(s)

--- Small circles: Treefrog larva(e)

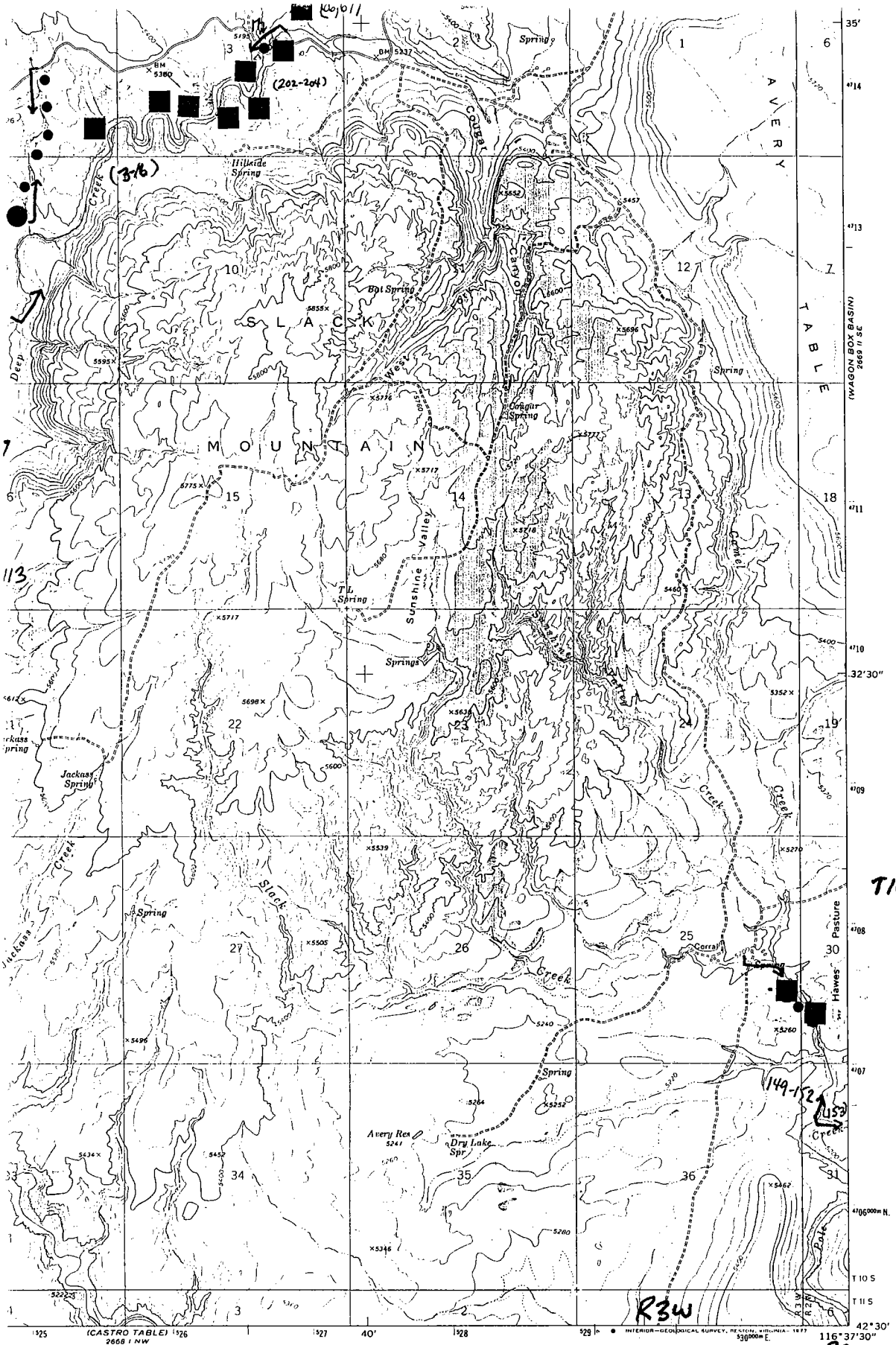


SLACK MOUNTAIN TOPO



R3W

SLACK MOUNTAIN QUAD



SCALE 1:24 000

1 MILE

7000 FEET

1 KILOMETRE

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, hard surface

Light-duty road, hard or improved surface

Secondary highway, hard surface

Unimproved road

Interstate Route

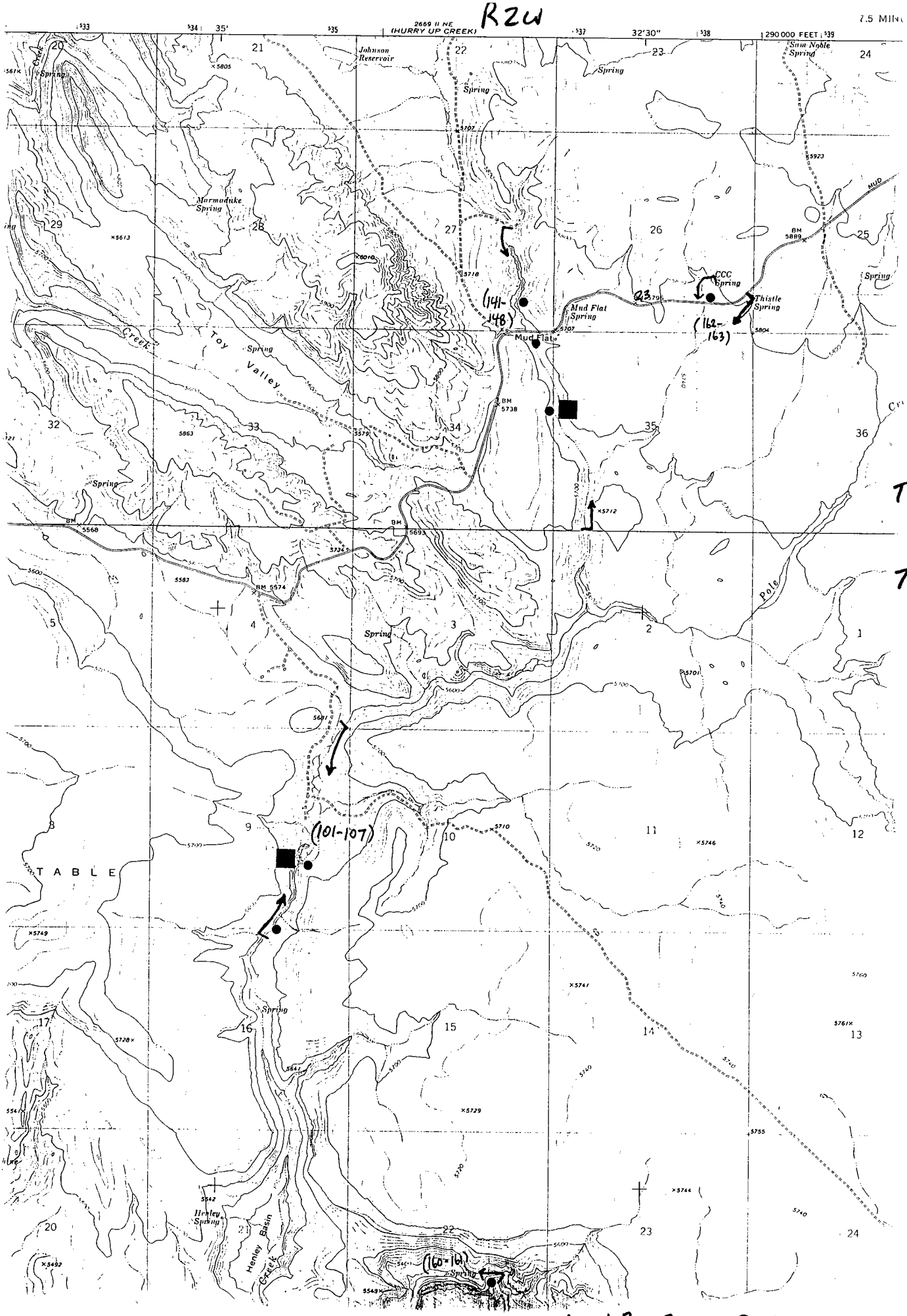
U. S. Route

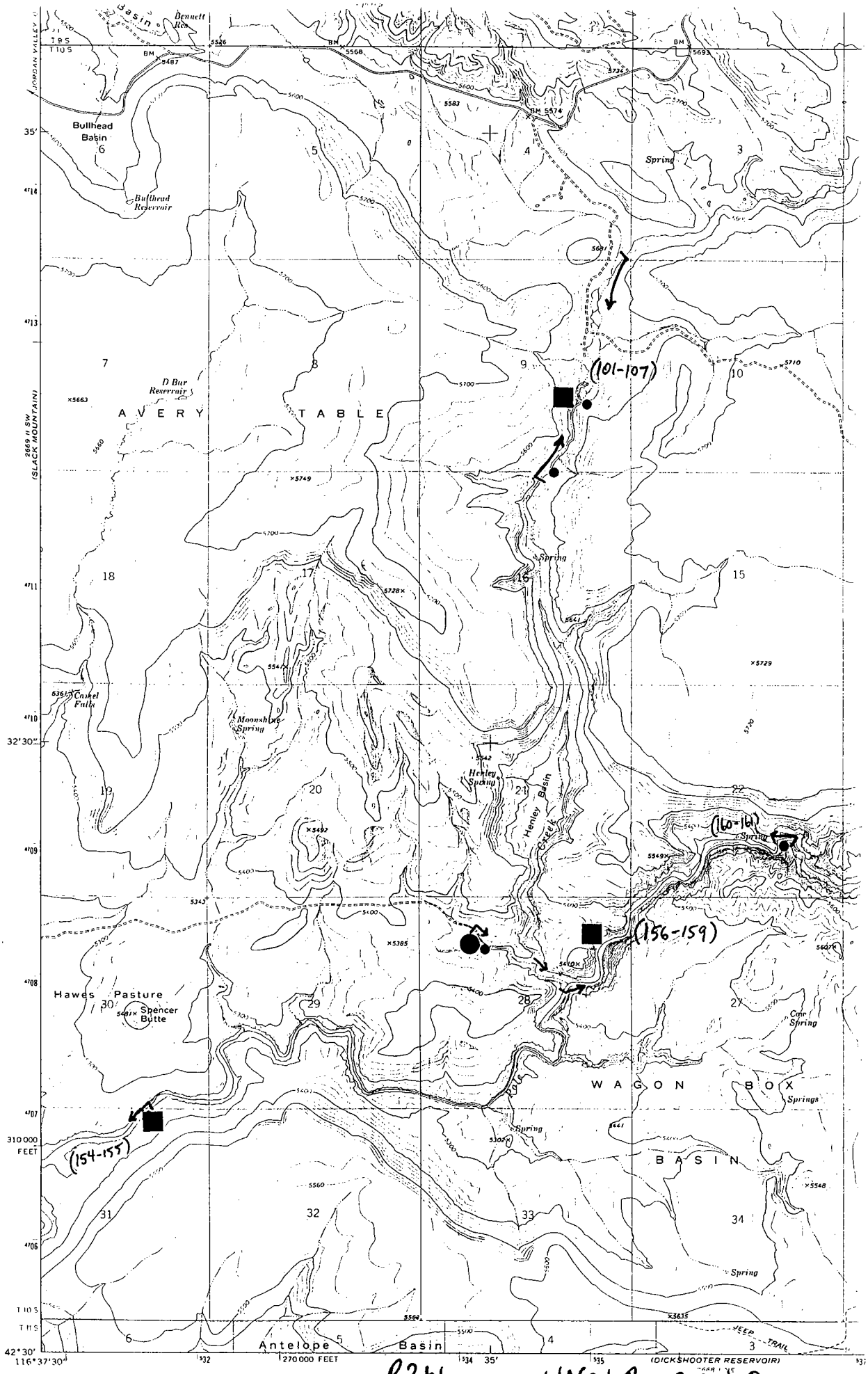
State Route

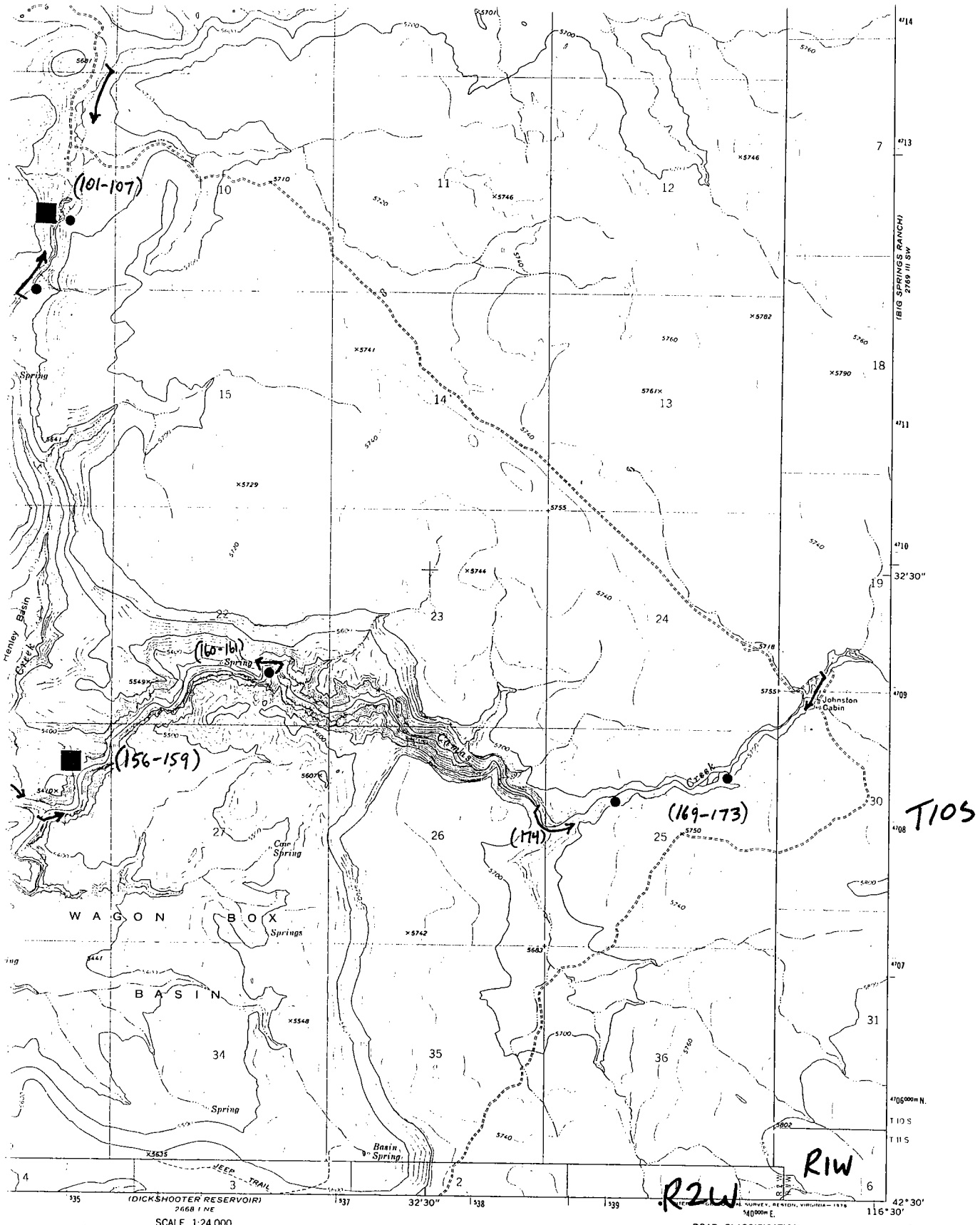
IDAHO

SLACK MOUNTAIN, IDAHO

SLACK MOUNTAIN QUAD


R2W
7.5 MIN
2669 II NE
(HURRY UP CREEK)
290 000 FEET
Johnson Reservoir
Sam Noble Spring
Mormaduke Spring
Toy Valley
Mud Flat
Mud Flat Spring
CCC Spring
Thistle Spring
Pole
TABLE
Henley Spring
Henley Basin
Creek
(141-148)
(162-163)
(101-107)
(160-161)
T9S
T10S
WAGON BOX BASIN QUAD


Bullhead Basin
Bullhead Reservoir
D Bar Reservoir
AVERY TABLE
Spring
(101-107)
Cashel Falls
Moonshine Spring
Henley Spring
Henley Basin
Creek
(160-161)
(156-159)
Hawes Pasture
Spencer Butte
Cow Spring
WAGON BOX
Springs
BASIN
(154-155)
Antelope Basin
(DICKSHOOTER RESERVOIR)
JEEP TRAIL
T 10 S
T 11 S
R 2 W
WAGON BOX BASIN QUAD



SCALE 1:24 000

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETRE

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, hard surface

Light-duty road, hard or improved surface

Secondary highway, hard surface

Unimproved road

Interstate Route

U. S. Route

State Route

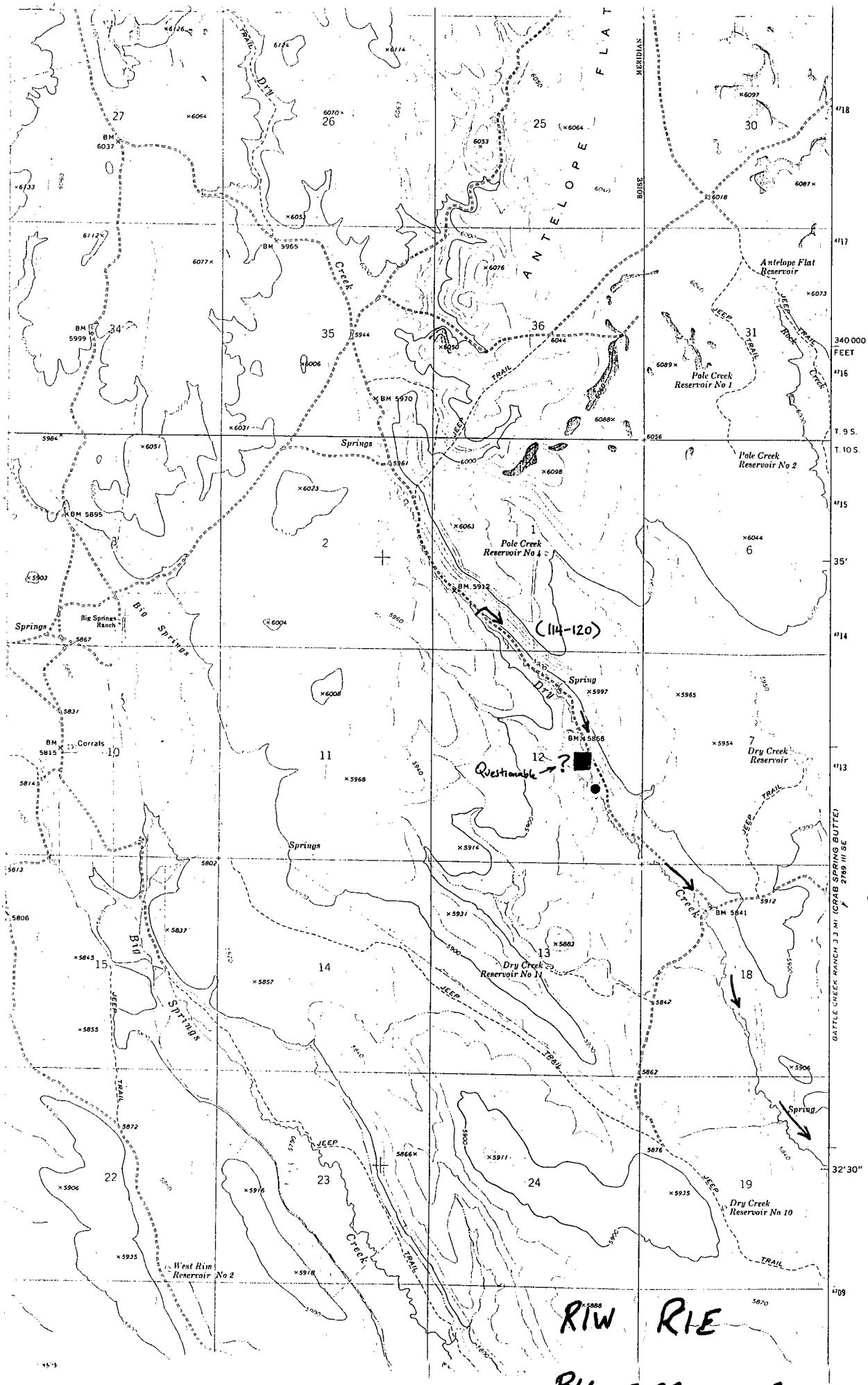
IDAHO

QUADRANGLE LOCATION

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
ALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

WAGON BOX BASIN, IDAHO
N4230—W11630/7.5

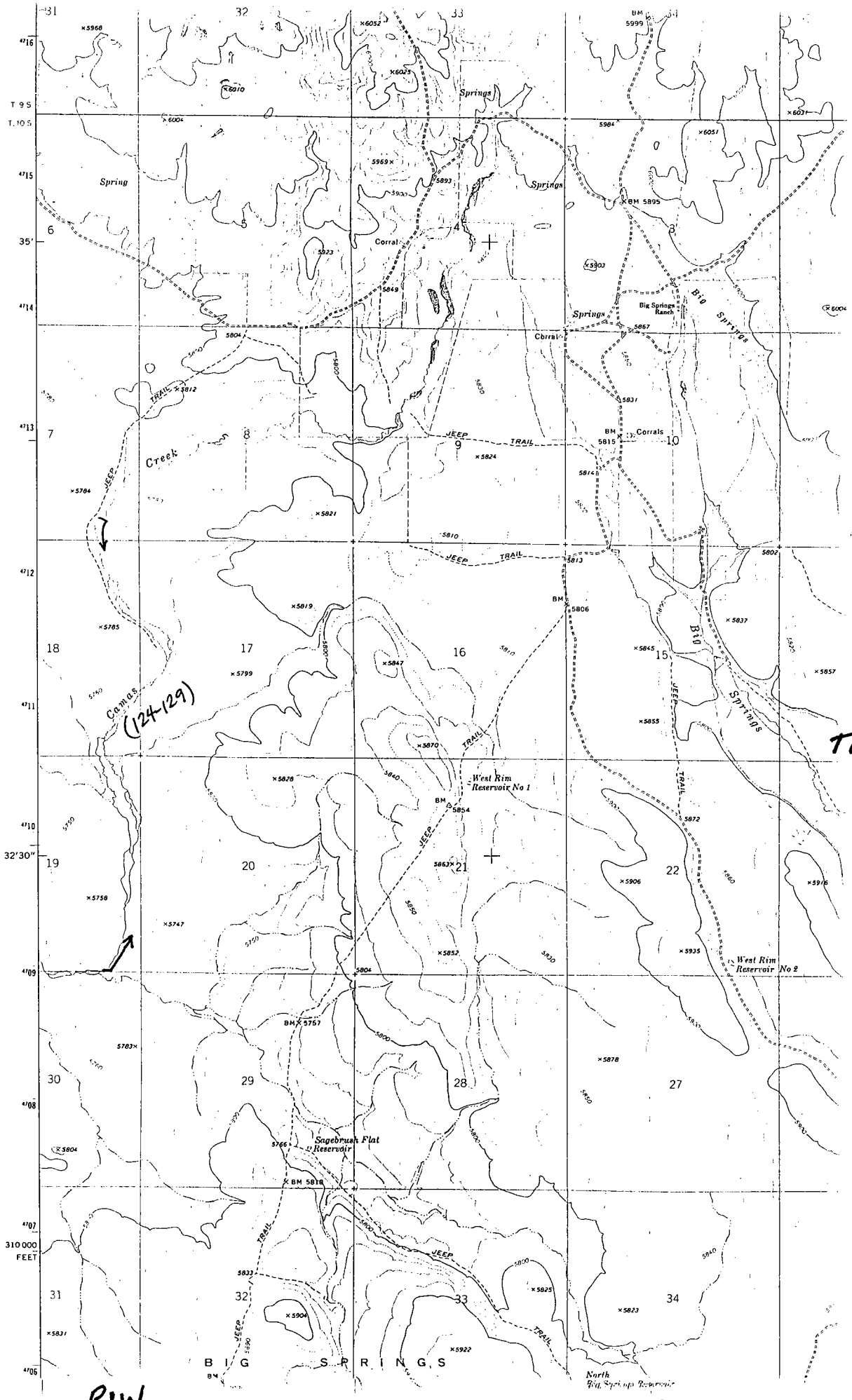
1973

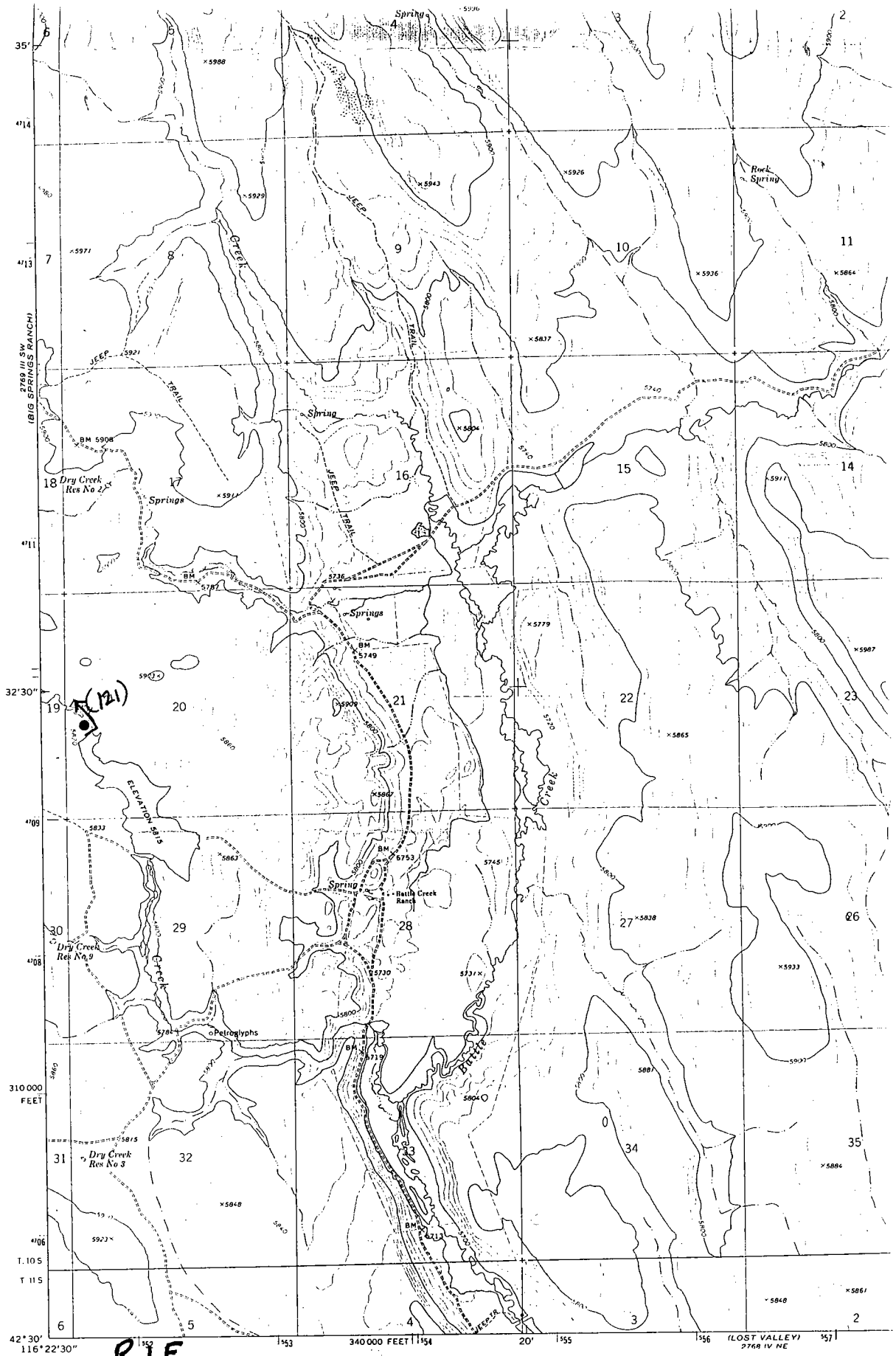


T10S

R1W R1E

BIG SPRINGS RANCH QUAD


T 9 S
T. 10 S
35'
32'30"
310 000 FEET
Spring
Springs
Corral
Big Springs Ranch
Big Springs
Corrals
JEEP TRAIL
Creek
Canas
(124-129)
West Rim Reservoir No 1
West Rim Reservoir No 2
Sagebrush Flat Reservoir
BIG SPRINGS
North Big Springs Reservoir
T10S
RIW
BIG SPRINGS RANCH QUAD



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1971. Field checked 1972

Projection and 10,000-foot grid ticks: Idaho coordinate system, west zone (transverse Mercator)

1000-metre Universal Transverse Mercator grid ticks.

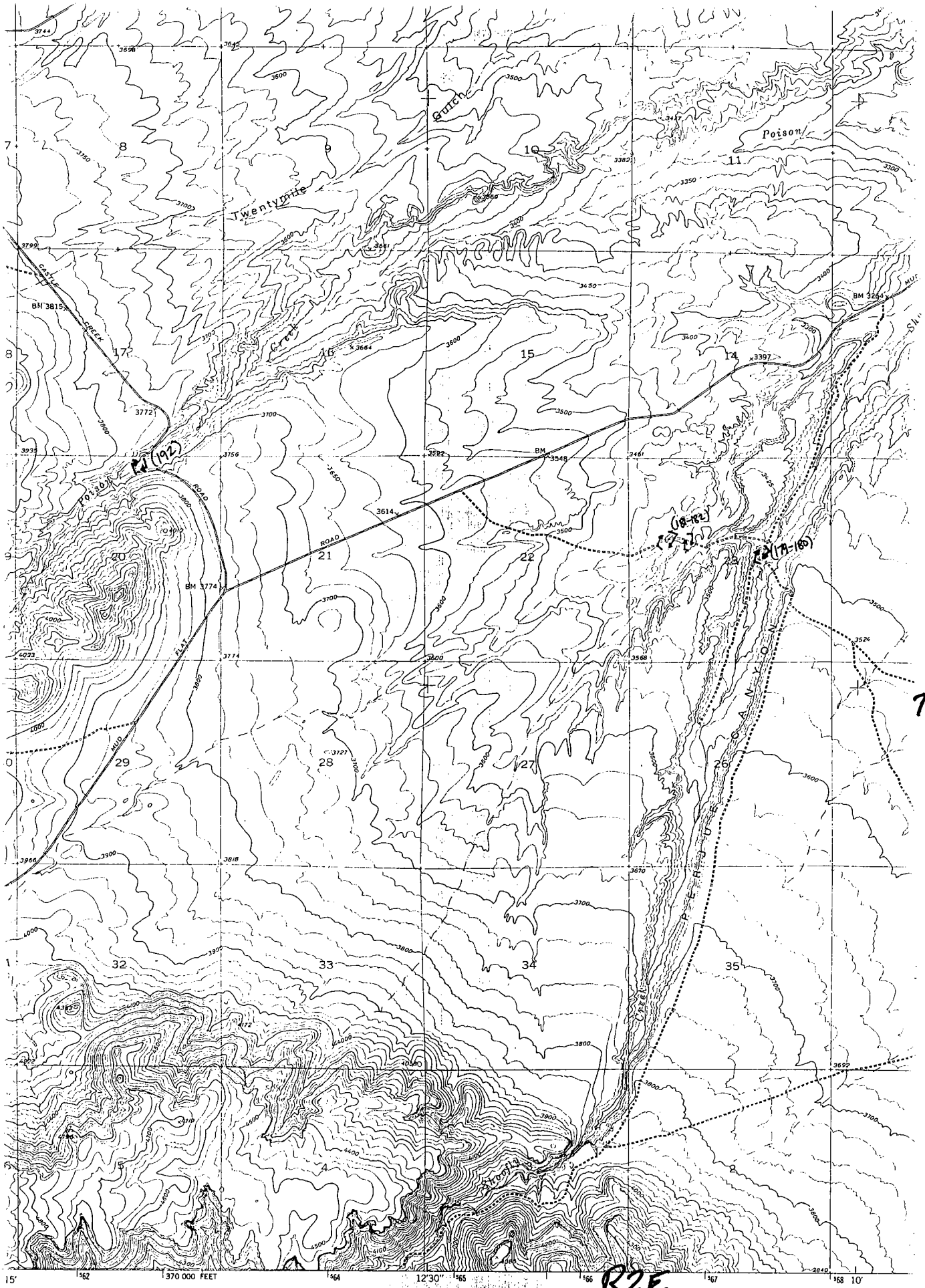
GN MN 0°28' 8 MILS 18° 320 MILS

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

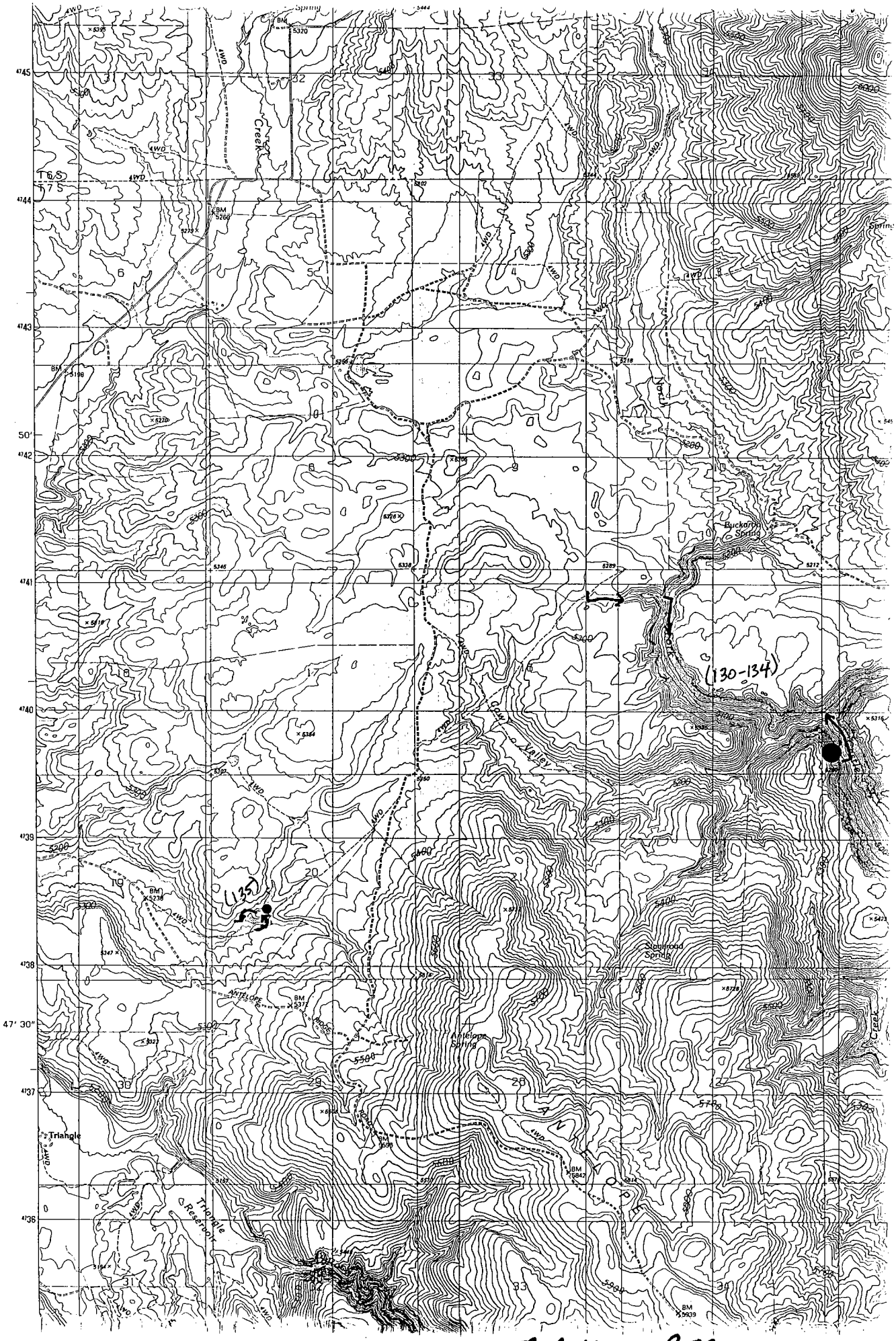
CRAB SPRING BUTTE QUAD



Mapped, edited, and published by the Geological Survey

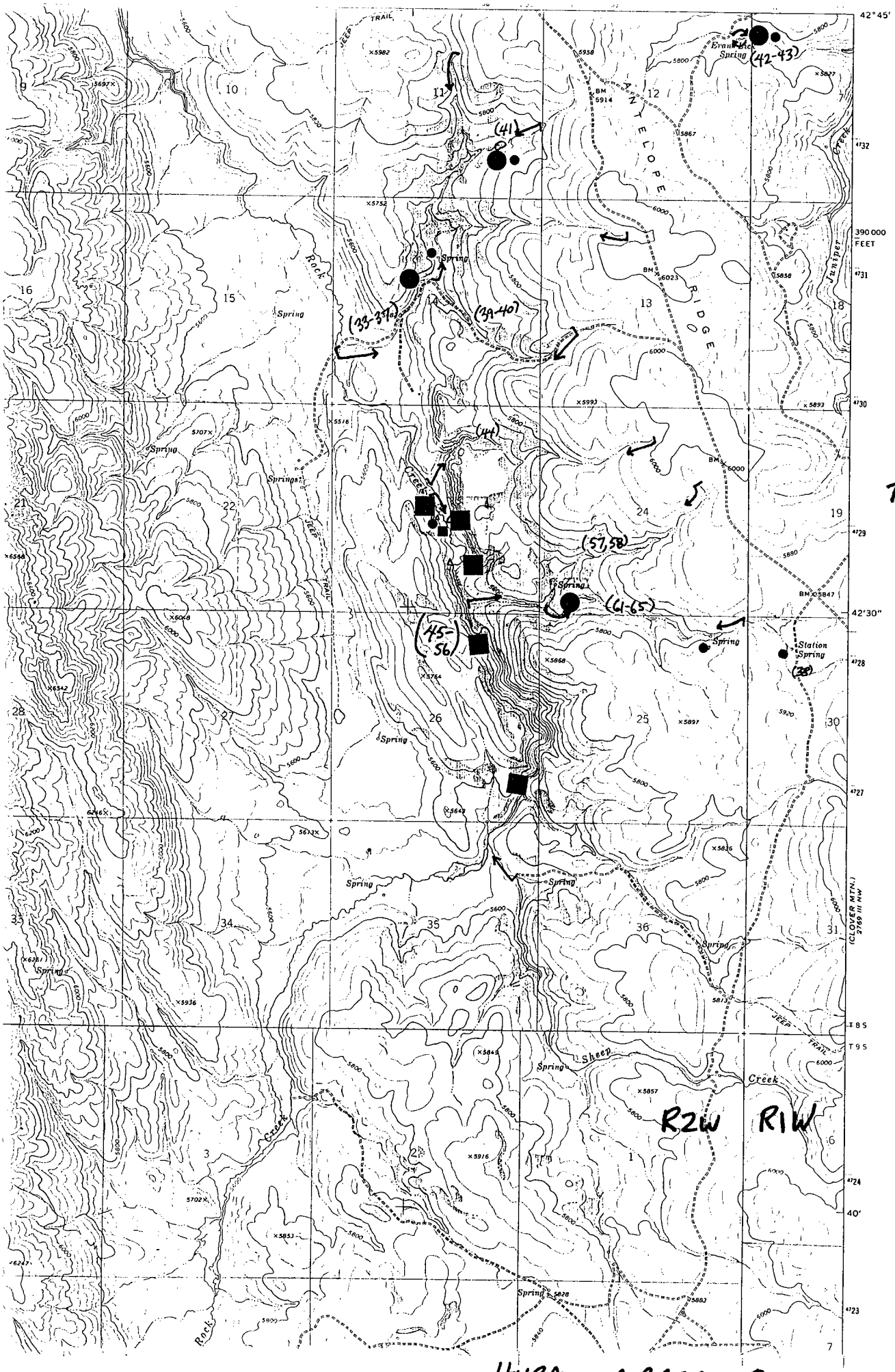
Control by USGS

PERJUE CANYON



R2W

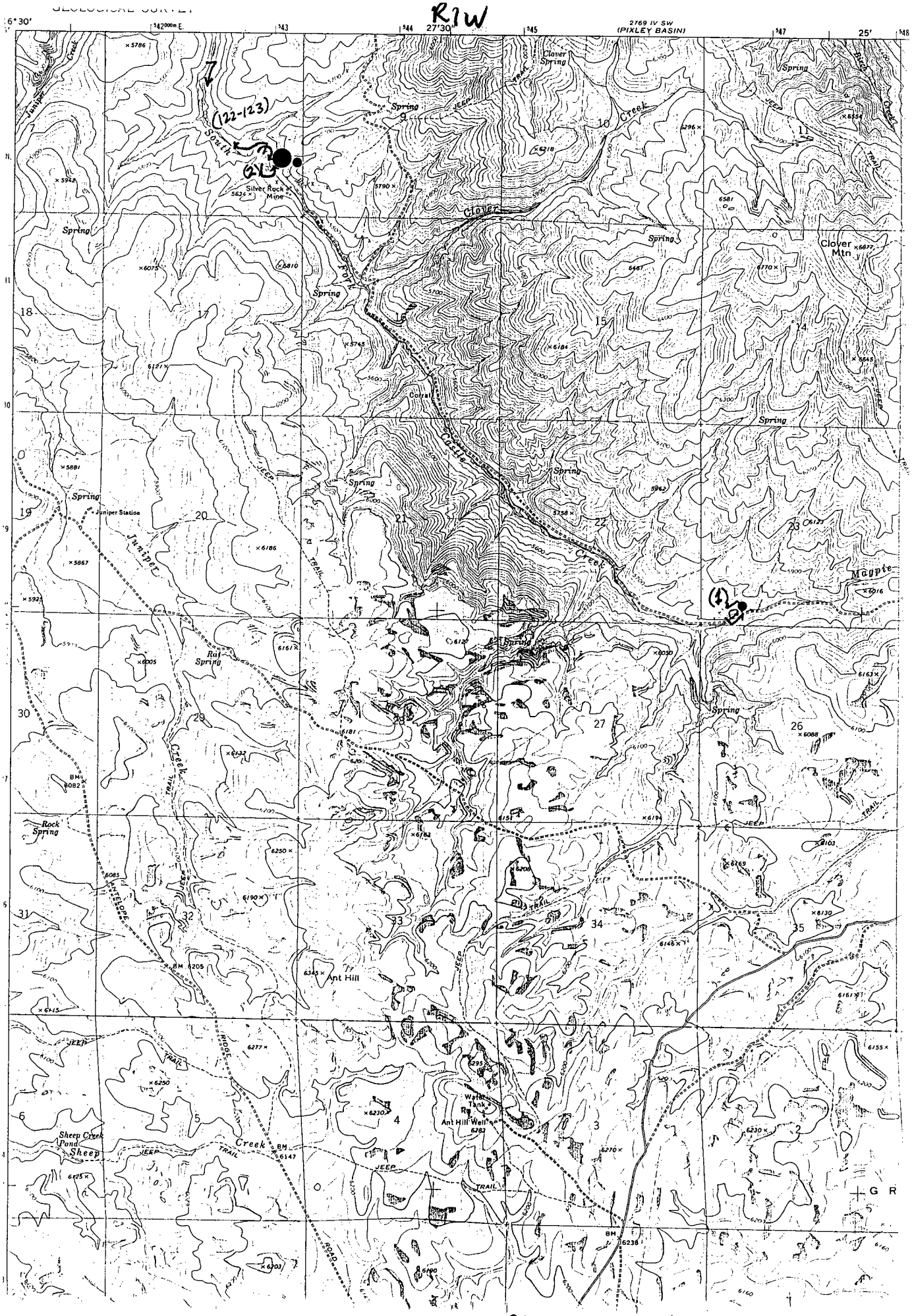
TRIANGLE RESERVOIR QUAD



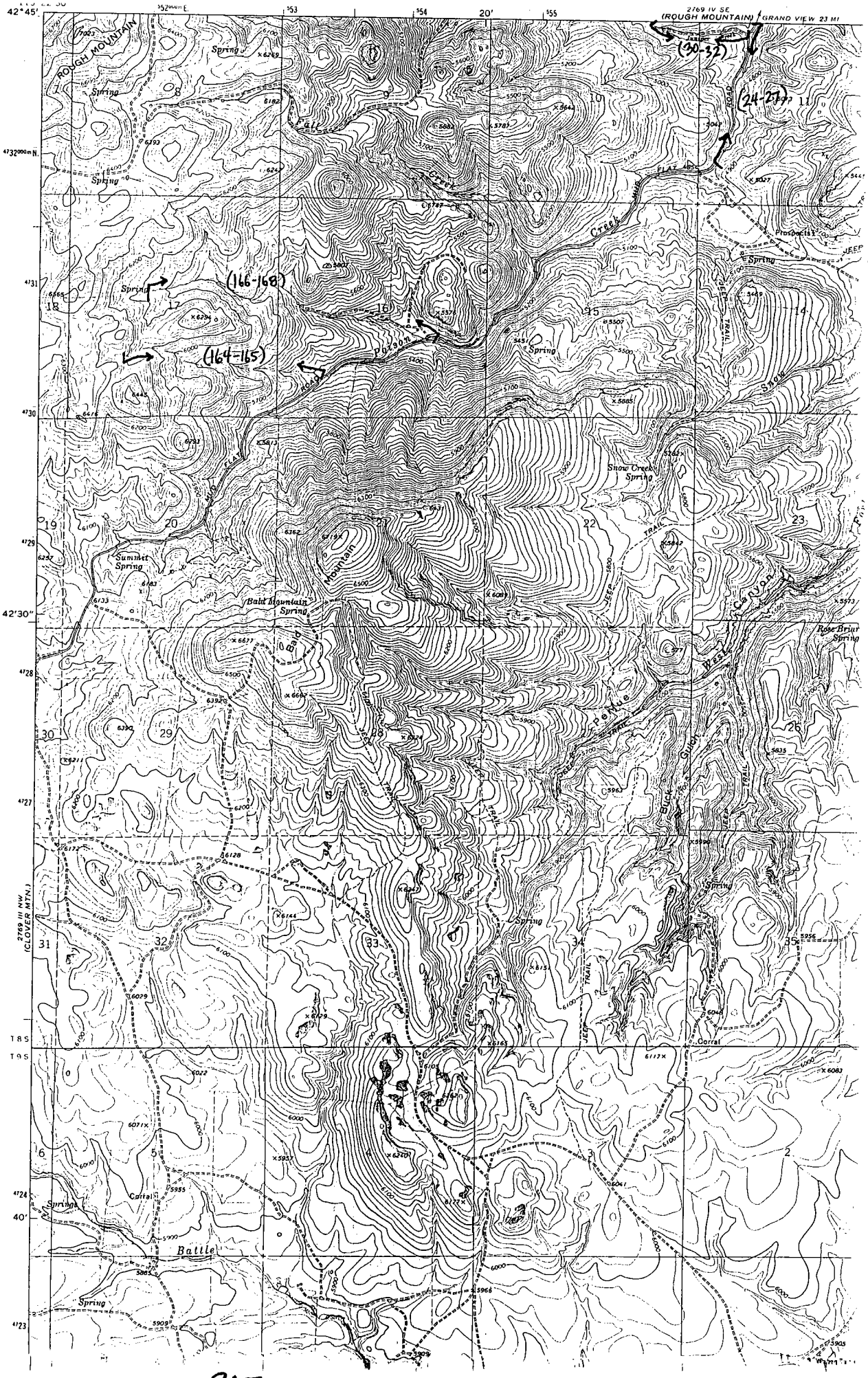
HURRY UP CREEK QUAD

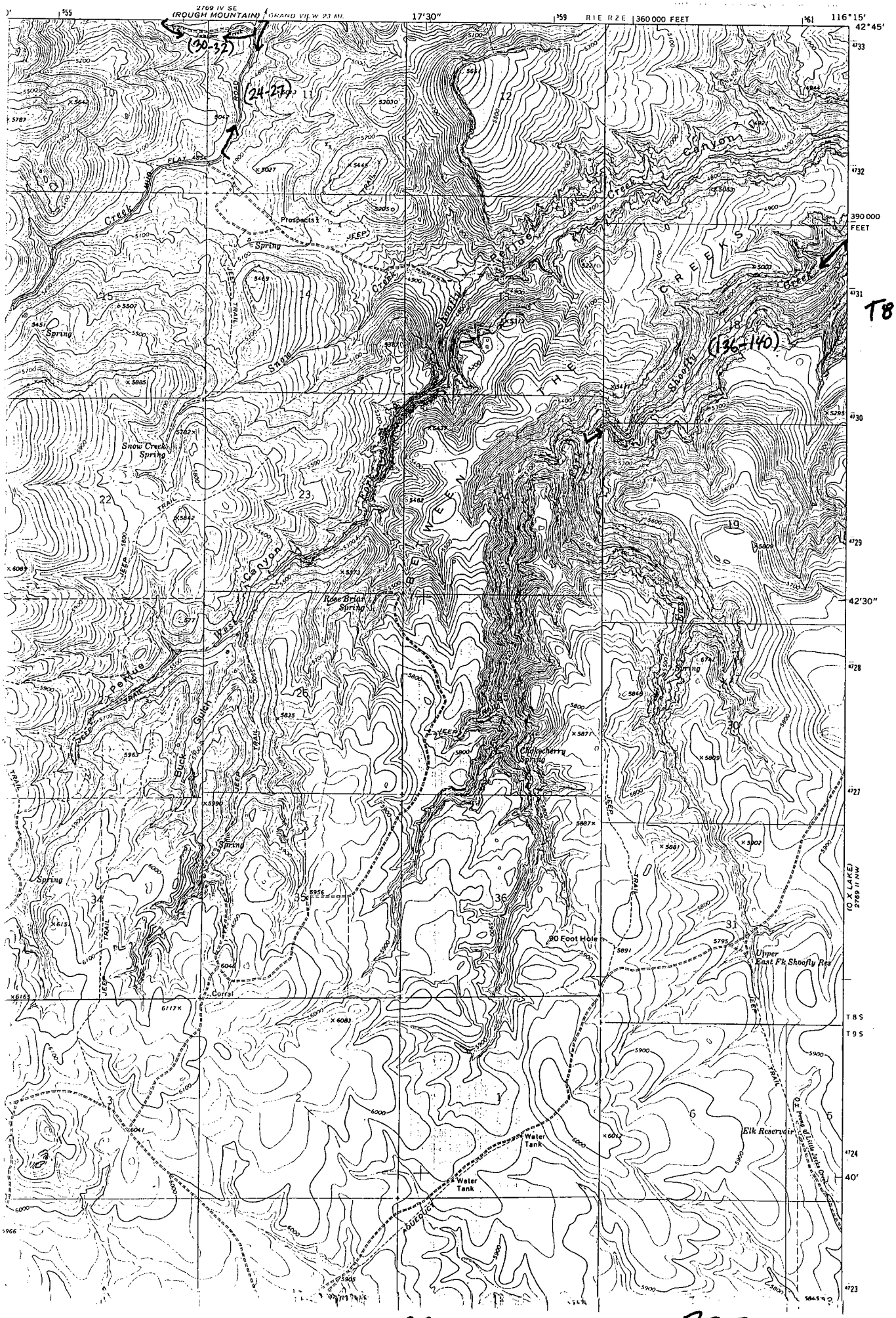
R1W

T8S

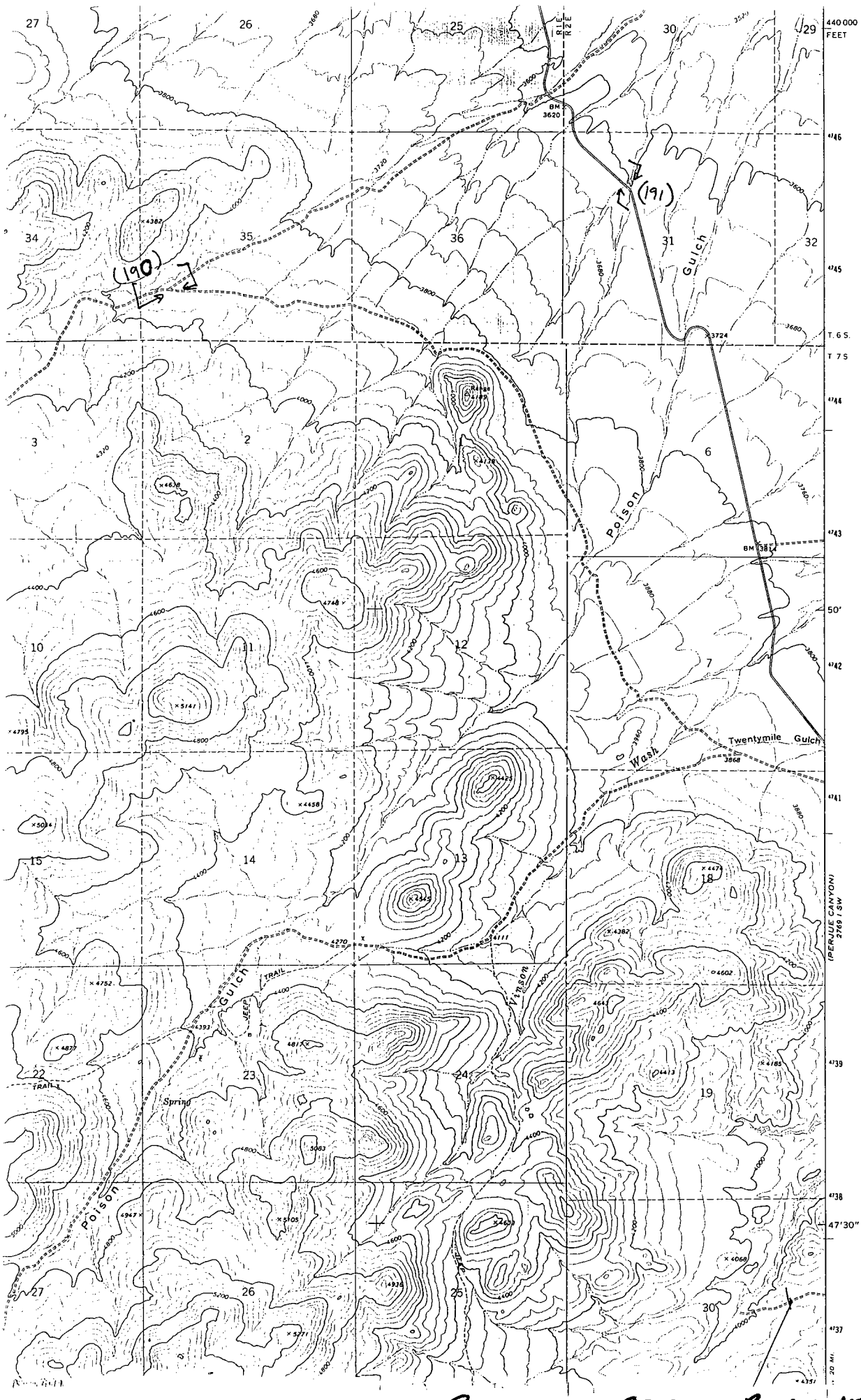


CLOVER MTN QUAD


42°45'
20'
2769 IV SE
(ROUGH MOUNTAIN)
GRAND VIEW 23 MI
(30-32)
(24-27)
ROUGH MOUNTAIN
Spring
Fall Creek
FLAT
Prospect
JEEP TRAIL
TBS
(166-168)
(164-165)
Pleasant
Snow Creek
Snow Creek Spring
Summit Spring
Bald Mountain
Bald Mountain Spring
42'30"
Rose Briar Spring
West Cajon
Le Mue
Buck Gulch
Corral
2769 III NW
(CLOVER MTN.)
T 8 S
T 9 S
40'
Battle
RIE
SNOW CREEK QUAD

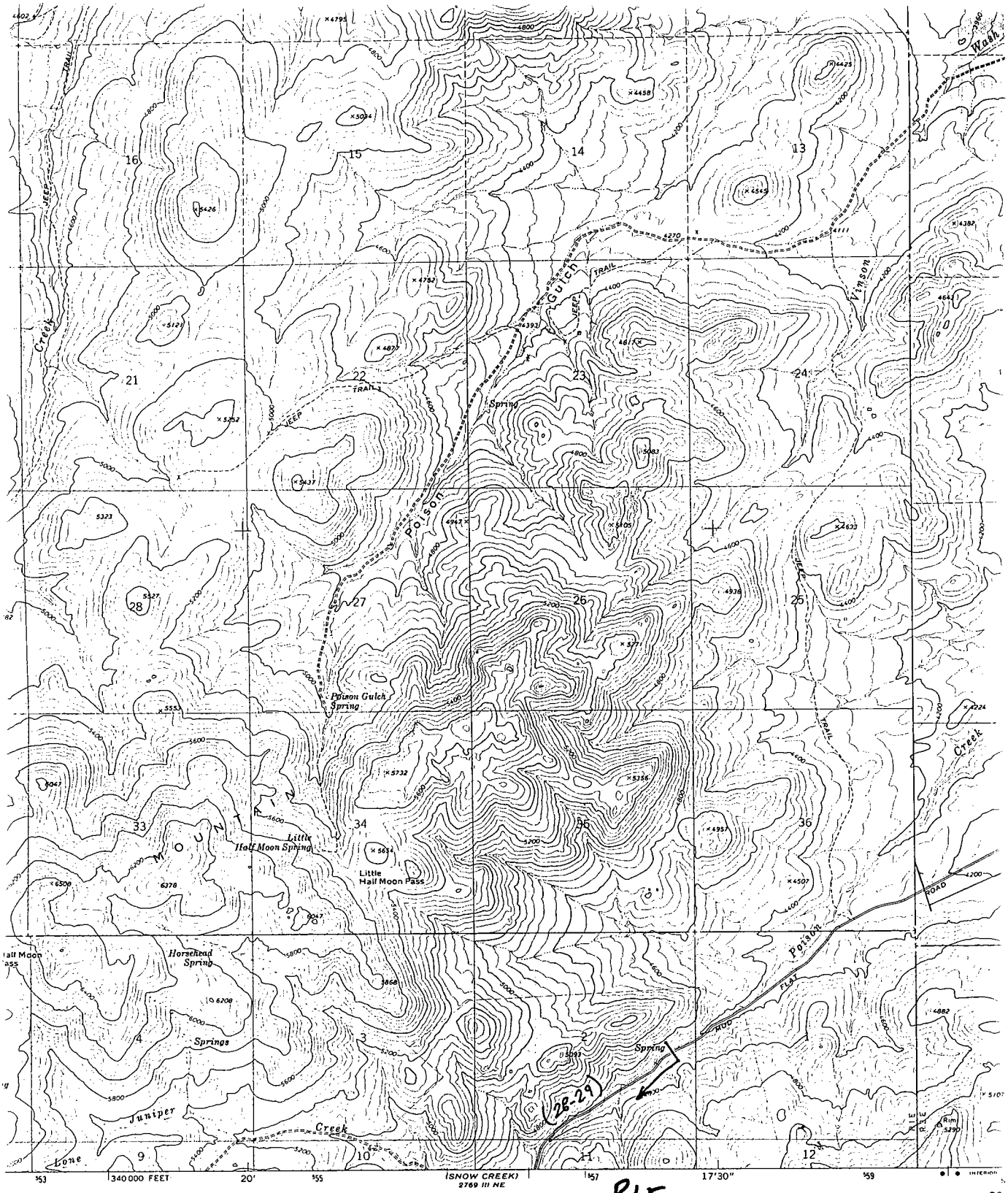


SNOW CREEK QUAD R2E



T6S

R1E R2E ROUGH MTN QUAD



SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETRE

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

GN MN 0°28' 8 MILS 18° 320 MILS

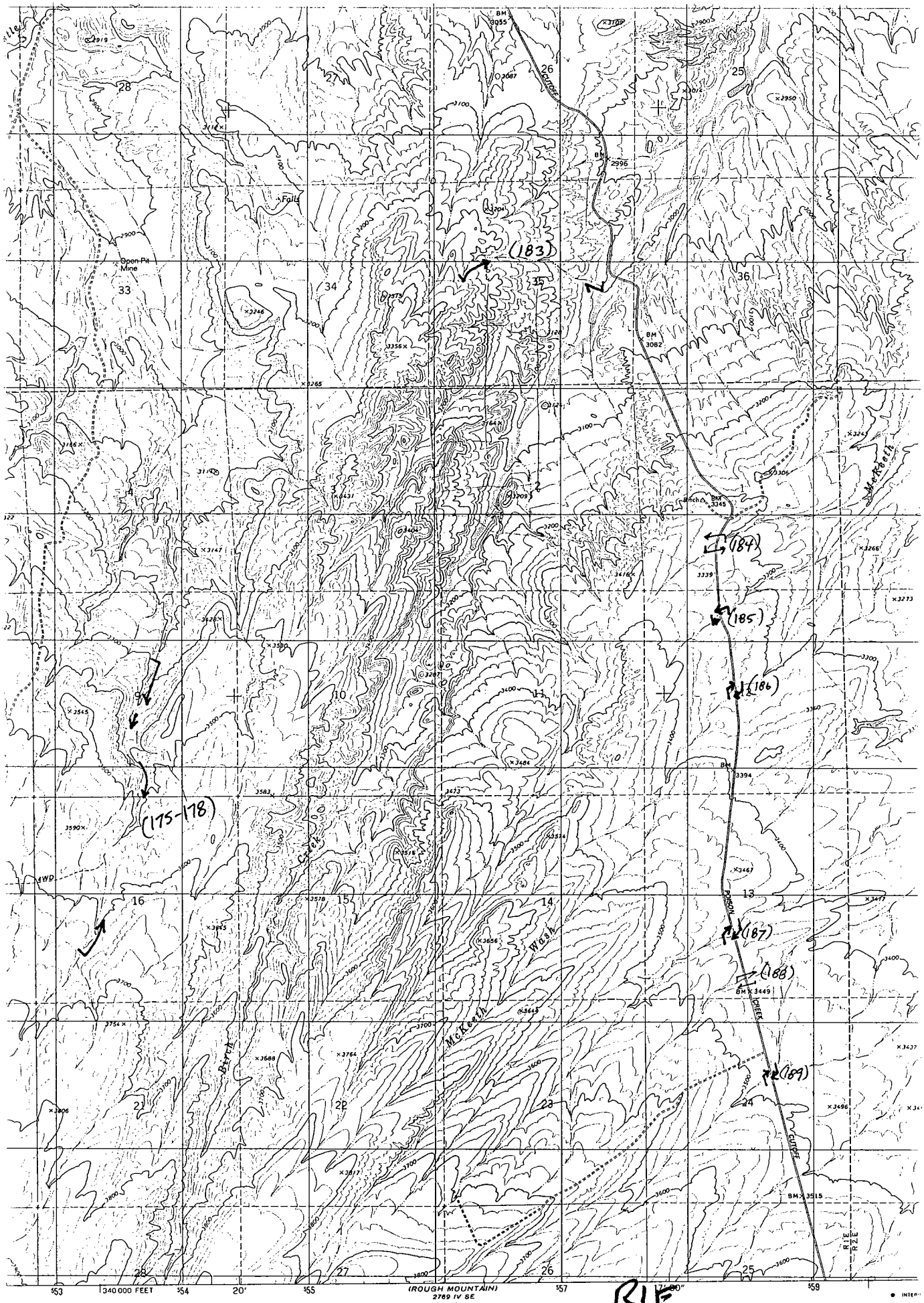
UTM GRID AND 1972 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROUGH MTN QUAD

IDAHO
QUADRANGLE LOCATION

Primary highway, hard surface
Secondary highway, hard surface
Interstate Route

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST



T6S

RIE

ROUGH MTN NE QUAD

LOCATION NOTES

These are notes informally taken at most watercourses surveyed.

Magpon-5/18/93 Site 1

Part of an old water course that has been redirected (oxbow). Rolling hills were covered with sagebrush. There were many bare spots caused by cattle. There was vegetation all along the bottom, primarily reeds. Treefrog larvae tended to remain deeper in the mud and vegetation. There were many aquatic insects.

N. Castle Mine Pond-5\19\93 Site 2

This was a stagnant pond by rolling hills created by man as a holding pond for mines. Sagebrush covered one side of the pond, while sedge and reeds surrounded the other side. There were many bare areas due to cattle. Treefrog larvae were found throughout. However, many larvae were found mainly in dense vegetation, lying on muddy bottom. Many adult Pacific Treefrog adults were found in the pond along the waters' edge and up to 35 yards away from the pond's edge.

S. Castle Mine Pond-5/l9/93

Stagnant pond next to n. Castle Mine Pond, separated by a dam. Diameter was 160 X 60 meters. Fresh water flowed into pond off hillside. The hillside was covered with sagebrush with bare areas due to cattle grazing. Many adult Pacific Treefrogs were found along the waters' edge. The water was very murky; a lot of algae and plant material found throughout.

Deep Creek #1, 5/19/93 Sites 3-16

The area surveyed was between Mud Flat Rd. and diversion dam which is at the border of private land. Deep Creek flowed through a canyon, however the first half mile was open. On this first survey, none of the adult spotted frogs were found in the stream, but rather on banks or in oxbows, which were numerous along Deep Creek. Treefrog adults were also found, but there weren't as many as Spotted frogs. There was evidence of grazing. Some areas had dense vegetation along the stream.

Noname A, 5\19\93

Runoff heading toward stream forming pools contained young Treefrog larvae. No adult of either species (Spotted/ Pacific Treefrog), were sighted. Location was located 50 meters down hill from mud flat road. The flow was very low, there was heavy algae and several pools approximately 1 X 1 meter in diameter and 3-5 centimeters deep. Noname eventually emptied into Deep Creek. Only the 100

meter section beginning 50 meters downstream had treefrog larvae.

Current creek, 5/20/93 Sites l8-22

Surveyed area from Mud Flat Road upstream to tributary that takes off to the West. The current winded through a rocky canyon. There were substandard patches of willows found along the stream. Relatively few oxbows. Only/one held Treefrog Larvae. No Spotted Frogs were sighted. Treefrog larvae were found in a very deep oxbow with few fish. Three-quarters of the way up, in section 6, it became extremely heavy with willow trees. Steep canyon walls prevented passage. Several tributaries were explored, One adult treefrog was sighted. A couple garter snakes were seen.

Mud Flat Pond (MudPon), 5\21\93 Site 23

Pond located 3 meters from Mud Flat Road. There were no adults or larvae found. The pond's diameter was 13 X 20 meters. The topography was half rolling hills and half flat. There was lots of sagebrush and sedge; also a lot of emergent vegetation and almost 100% algae on the bottom. 100+ meters west of cattleguard-near BLM camp.

Poison Creek, 5\21/93 Sites 24-29

Poison Creek was a fairly narrow stream, approximately 1 meter across. Mostly riffles, some runs and rarely pools and oxbows. Steep incline. The vegetation primarily consisted of sagebrush and some willow. No larvae or adult frogs were found. The water was very muddy and full of silt. There was evidence of heavy grazing. Poison Creek was approximately 1 to 6 meters from Mud Flat Road.

Lone Juniper Creek, 5/21/93 Sites 30-32

Lone Juniper Creek drains into Poison Creek. Narrow stream, approximately 1 meter wide. Fast moving runs and riffles, no pools. Sand and gravel bottom with large rocks. Silt along edge, making it murky. No vegetation in stream. In some spots there were willows and birch trees, the rest was covered in sage. Mud Flat Road crossed the stream three times. The bottom of the stream was gravel. Lone Juniper Creek had a sand bag dam with water flowing over. Evidence of heavy grazing.

Rock Creek Trib. #1, S.F., 5/24/93 33+

A small amount of water was moving through, dry for approximately lOO meters (intermittent). Lots of Juniper bushes. No adult or larvae was found.

Rock Creek Trib. #1 (SPring). 5\24\93

A spring was found in wide open flat area approximately 5 X 2 meters in diameter. Some algae and sedge was growing in the spring. Two adult treefrogs were found along with several treefrog larvae. Murky stagnant water.

Rock Creek #A, 5\24\93

High embankment on either side of Creek. No species of frog were found. There was an equal amount of sedge, forbs and willow.

Rock Creek Trib. #1, N.F., 5/24/93

Same as Rock Creek Trib. #I South Fork.

Station Spring 5/24\93 Site 38

This spring was found in an open meadow covered with grasses and some sagebrush, 1.5 X 5 meters. 100% mud substrate. Lots of algae. Treefrog larvae found throughout.

Private Pond, 6/2/93 *Sites 66-67*

Private Pond- diameter was 30 X 6 meters. It was directly across from where bottom of two streams emerged (Deep Creek being one of them). On private property approximately 5 meters from fence and BLM land. Pond looked like it was once part of Deep Creek. There was some rolling topography, but slight. The pond had algae throughout, muddy bottom, and a lot of sedge. Heavily grazed. Idealistic for frogs both adult and larvae. Adult Treefrog and Spotted Frogs were found, and tadpoles too.

Hurry Back Creek, 6/2/93 Site 68

On private land. Creek was carved out by heavy traffic of cattle. Not much vegetation, some willows. Water level was very low. Creek ran through very flat land.

Stoneman Creek #1, 6\3\93 Sites 69-79

Very lush area that followed Mud Flat Road. Topography was fairly flat. Deep pools and many beaver dams causing much flooding. Many adult spotted frogs were found. (eleven were found in a 30 meter area.). Treefrog adult and larvae were also found.

Pole Creek, 6 /9/ 93 Sites 101-107

Pole Creek was approximately 3 miles down from Mud flat Road (near jeep trail approximately 1 mile from Mud Flat bunkhouse). Pole Creek ran approximately 1-3 meters deep with several oxbows. At the beginning of survey, there was a wide meadow with high mud/dirt banks. Adult Spotted Frogs were found throughout. A portion of the stream had high canyon walls where creek narrowed and flowed faster. Eventually the Creek opened up into a basin with beaver dams. Near the end of the stream, before it flowed into Deep Creek, it turned very rocky with the water flowing very rapidly. No frogs were found at that point.

Deep Creek #2, 6\14\93 *Site 108-113*

Deep Creek ran fairly shallow with many oxbows located along the creek (this was the only place where Adult Spotted Frogs were found). Many of the oxbows were dried up or nearly dry. Several larvae were found in an oxbow that would be dried up by the end of the week. There was some evidence of grazing but not a lot. The topography was rolling hills. Half of the journey was in a wide open basin; the remaining was in a canyon. The vegetation consisted of willow, sedge, grasses, forbs. The bottom of the creek was mainly gravel, some rocks and some sand.

Dry Creek, 6/15/93 Sites 114-121

Dry Creek ran through a shallow U-shaped canyon. The vegetation around the stream was consistently made up of grass, sedge, and sage. The substrate varied from 100% mud to gravel and sand and also a stretch of rock. Evidence of grazing was heavy with a lot of disturbed banks. The stream also meandered and erosion of the outer corner of the turns was heavy with some cutouts reaching approximately two meters in height. Larvae were found in ponds not directly attached to the stream. One frog was seen to jump into the water from the bank. Although its identity could not be confirmed, it was likely a spotted frog.

Castle Creek, S.F., 6\16\93 Sites 122-123

No adults or larvae of either species were found this could be due to cold weather and rain. The Creek was fairly narrow, measuring 2 meters in width on the average. The banks were fairly steep and the willows were very dense making it difficult to stay near the waters' edge. There were few oxbows. The creek ran through a steep canyon.

Camas Creek, 6\21\93 Sites 124-129

Camas Creek was very similar to Dry Creek, it ran through a field that was mostly occupied by sage and rabbit brush, some junipers were present. Neither species of frogs were found. The banks had signs of erosion and there was a fair

amount of grazing. The substrate was mostly gravel, and the water had a red appearance, The creek split up many times creating large islands.

Castle Creek N. F ., 6\22\93 Sites 130-134

No Spotted Frogs were found, only one Adult Pacific Treefrog was found. The creek ran through a canyon. Vegetation consisted of willows, sedge, lots of grass, sagebrush and some junipers. There was evidence of grazing, but not heavy. There were few oxbows.

E . F . Shoofly Creek, 6/23/93 Sites 136-140

Where we entered, the canyon was very steep and the stream was 2 meters wide. The vegetation was extremely dense making it hard to pass. The substrate of the creek was mainly gravel and rock. The majority of the creek was a fast running riffle. There were no oxbows until the last quarter mile in which we saw only a couple. Half way through, the canyon opened up and there was tall sage brush and very heavy grazing. The stream had hoof marks all along the bank. A small portion of the Creek had tall Aspen.

Unnamed, 6/23 - 6/28/93 Sites 141-149

Located 400 meters West from Mud Flat Camp; the spring ran through a lot of grasses, forbs, sedge, some willows and sagebrush. The topography was flat and open (meadow). In some areas, the Creek was approximately .5 meter in width which opened up into large pools of water approximately 6 meters wide and 1 meter deep. Treefrog tadpoles were found intermittently throughout and three Adult Spotted Frogs were found on banks, two were near willows.

Slack Creek, 6/29/93 Sites 149-151

An intermittent tributary, no frogs or tadpoles found. However, there were many young fish. Heavily grazed, a lot of grass and sedge (we were only on this transect for 200 meters) .

Camel Creek, 6/29/93 152

Intermittent creek (water most the length). Vegetation--grass, sedge, forbs and willows. Treefrog tadpoles found, one Adult Spotted Frog was found. The topography was flat at first but became semi-rolling with cliffs reaching the waters' edge at times. Heavily grazed.

Pole Creek, 6/29/93 *Sites 153-157*

High cliffs on both sides, many forbs, willow and sedge. The Creek was very slow moving and had an algae reading of 3 (the highest amount). The Creek was

approximately 6 meters wide and approximately 16-35 centimeters deep. One Adult Spotted Frog was found.

Camas Creek, 6/30/93 Sites 158-161

The Creek was approximately 6 meters wide with a gravel bottom running through a steep canyon. There was a lot of vegetation and evidence of grazing. Only one Adult Spotted Frog was found. At some points, the water was moving very slowly resulting in algae.

CCC Spring, 7/1/93 *Sites 162-163*

The Creek was intermittent and dry for the most part. The topography was flat with some small rolling hills. Vegetation consisted of sedge, forbs, some grass, sage brush and willows. No frogs were found.

Poison Creek Trib #1, 7/6/93 Sites 164-165

A small, almost dried tributary between 13 centimeters and .5 centimeter wide. Gravel bottom. Heavy grazing ~3). Lot of sage and willows, some forbs. Topography: rolling hills. No frogs of either species, adult and larvae were seen.

Poison Creek, Trib #2, 7/6/93 sites 166-168

Much like Poison Creek, Trib #1. A little wider (approximately 1 meter), more vegetation i.e. willows and the topography was a little more steep. Again, no frogs of either species were found.

Camas Creek, 7/7/93 Sites 169-174

At the beginning of the hike, the topography was a large flat meadow. The creek was approximately 3-4 meters wide with gravel/sand bottom. Erosion was evident as the stream formed its own small canyon. Some grazing. The topography changed half way through. The canyon drew narrow and the vegetation became more dense. Large boulders were everywhere. No Spotted Frogs were found although we did see one Adult Treefrog and Treefrog tadpoles. There were also many garter snakes.

Birch Creek, 7/8/93 Sites 175-178

The stream started off at 1-2 meters wide; gravelly bottom and filled with stringy green algae. The stream had cut a small canyon 4-5 meters deep in the soft soil. The water was +25 centimeters deep and fairly fast moving. Further up, a man-made place was found that could be a complete dam if needed. It was right below a spring. This area was wide (5-6 meters) and swampy. Water was still shallow and there was evidence that cows used it often and recently. About

10 meters above this looked like a small, unkept beaver dam (water ran over it). It made a big pond 10 X 8 meters and the water was deep. It had about a 4 meter high bank. At the top of the pond was another dam. Above this the stream branched off at places winding through thick willow and rose bushes. It soon gave way to 1-2 meter wide shallow stream with its high bank and remained like this for the rest of the way. There were a few birch and cottonwood trees and some willow patches at the end. The majority of the vegetation was big sage bushes 5-6 feet high and dry rolling hills.

E.F. Shoofly Creek, 7/12/93 179-180

The creek flowed through a shallow valley. No amphibians were found although we did see a W. Whiptail and a Sagebrush Lizard. The vegetation was thick with 5-7 foot tall sagebrush, rabbit brush, willow, birch, roses, grasses. The creek was approximately 2 meters wide and 15 centimeters deep. Substrate consisted primarily of sand and gravel and some rock. There was also a fair amount of algae.

Battle Creek Drainage, 7/12/93 Sites 181-192

This side of the drainage almost all the creeks were dry. All had a lot of sagebrush, some grasses and forbs, and a lot of bare land. The exception was one creek which had a high salt content (alkaline) due to white on ground. All measured approximately 2 meters wide and had a gravel/sand substrate. Poison Creek, however; had a small amount of water flowing through and was extremely dense with willows, sedge, roses and grasses. Substrate was 50/50 gravel and rock. The creek was approximately 1 meter wide and flowed between two hills into a basin.

Nip and Tuck Creek, 7/13/93 *Sites 195-197*

Where we began, the creek was in an open meadow that had been heavily grazed. The vegetation at that point was severely trampled or grazed upon (willows, sagebrush, some grasses and forbs). Approximately 1 meter from where we began, the vegetation grew more dense and the canyon was narrow. The creek was approximately 2-3 meters wide with occasional oxbows (no frogs were found). We saw two W. Fence Lizards. Eventually, walking along the water became too difficult because of dense vegetation.

Hackberry Reservoir, 7/13/93 Sites 193-194

Approximately 80 X 20 meters in diameter. Topography was a meadow with a built-up dam on two sides. The vegetation consisted largely of reeds and forbs and some sagebrush. The substrate was mainly sand and mud. Two Adult Spotted Frogs were found on the bank in the reeds. We saw heavy waterfowl--geese and ducks.

Stoneman Creek (2nd survey). 7/14/93 Sites 198-201

We chose to go back to Stoneman Creek again because we found so many Adult Spotted Frogs the first time and we were curious to find if they were still there or if, perhaps, we found them due to mating time. We did see a total of four Adult Spotted Frogs along Stoneman where previously, we had seen eleven per 400 meters. The creek had dried up some since we last surveyed, and vegetation was thicker. Many oxbows were dry where we had seen several Adult Spotted Frogs before. We did see an oxbow with Toad larvae which we had not seen before.

Deep Creek (2nd survey). 7/14/93 Sites 202-204

We also chose to look at Deep Creek for a second time. We found many Adult Spotted Frogs here during the first survey just as we did today. We found a total of sixteen Adult Spotted Frogs in 1 mile. The water level was much lower, the old oxbows were dried, but new ones were created. All but one frog was found on the bank, the other was in the water. The creek moved at a slower rate.

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