BIRD SPECIES COMPOSITION AND ABUNDANCE IN TWO RIPARIAN AREAS WITH DIFFERING GRAZING HISTORIES ON THE CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

prepared by

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INTRODUCTION

On western rangelands, domestic cattle tend to concentrate in riparian areas and repeatedly graze herbaceous and woody vegetation. This continuous grazing has the potential to alter plant species composition and abundance, and the physical characteristics of the riparian zone. The area encompassed by the Charles M. Russell National Wildlife Refuge (CMR), in north-central Montana, has been subjected to over a century of intense cattle grazing resulting in degraded riparian zones.

In general, these riparian zones are dominated by black greasewood (*Sarcobatus vermiculatus*), silver sagebrush (*Artemisia cana*) and western wheatgrass (*Agropyron smithii*). Isolated plains cottonwoods (*Populus deltoides*) and old flood deposited cottonwood logs can be found along many of the drainages on the CMR. The implications are that these riparian areas once supported more woody vegetation, and probably still could support more woody vegetation, if livestock grazing was better controlled.

The impacts of riparian zone grazing on neotropical migrant birds has been examined by several researchers and reported to have adversely impacted avian communities (Taylor 1986, Szaro and Rinne 1988, Medin and Clary 1990). Cattle grazing can also reduce abundance of some species and increase abundance of other bird species (Mosconi and Hutto 1981, Baker and Guthery 1990). Other studies have failed to demonstrate difference in bird species composition and abundance in relation to grazing in riparian areas (Sedgwick and Knopf 1987, Medin and Clary 1991). However, the widespread nature of livestock grazing has made it nearly impossible to compare a grazed riparian area with an area that has no history of grazing and has a fully developed riparian plant community.

Two adjacent drainages flowing out of the Little Rocky Mountains into the Missouri River on the northwestern portion of the CMR provide a good contrast in long-term and recent differences in grazing intensities. Siparyann Creek has a long history of intense livestock grazing, and Rock Creek has a varied history of livestock grazing which includes no grazing since 1991 on its upper portion and spring grazing on its lower portion. The drainages have identical riparian zone potential but support strikingly different riparian habitat, presumably resulting from different grazing histories. This paper reports on the results of a breeding bird survey conducted in June 1994 in both of these drainages.

DESCRIPTION OF THE STUDY AREA

The study is located on the western portion of the Charles M. Russell National Wildlife Refuge, approximately 70 mi northeast of Lewistown, Montana. The Missouri River flows through this portion of the CMR and its bottomlands are dominated by cottonwood trees and willow (*Salix* spp.). Timbered river breaks extend 5-10 miles either side of the River. Ponderosa pine (*Pinus ponderosa*)/Rocky Mountain juniper (*Juniperus scopulorum*) and Douglas fir (*Pseudotsuga menziesii*)/Rocky Mountain juniper habitats occur on steeper slopes in this area while upland ridges are dominated by the big sagebrush (*Artemisia tridentata*)/western wheatgrass (*Agropyron smithii*)/blue grama (*Bouteloua gracilis*) habitats. Mackie (1970) and Allen (1968) describe both upland and bottomland vegetation in this area.

The bird surveys were conducted along the Refuge portions of Siparyann and Rock Creeks (Figure 1). Riparian vegetation along Rock Creek is an alternating series of silver sagebrush/western wheatgrass, Great Plains cottonwood/western snowberry (*Symphoricarpus occidentalis*), Great Plains cottonwood/herbaceous habitats. Rocky Mountain juniper occurs as scattered stands within all three of these habitats. Herbaceous vegetation within the Rock Creek floodplain is composed of sedges (*Carex* spp.), rushes (*Juncus* spp.), spike sedge (*Eleocharis macrostachya*), alkali bulrush (*Scripus paludosus*), prairie cordgrass (*Spartina pectinata*), and western wheatgrass. Yellow sweetclover (*Melilotus officinalis*) is abundant in most ungrazed riparian areas. The black greasewood/western wheatgrass habitat occurs extensively on higher sites in the Rock Creek bottomlands.

The most extensive stands of Great Plains cottonwood occurr in lower Rock Creek and in some areas sandbar willow (*Salix exigua*) is abundant too. Rock Creek was formerly dammed just above its mouth and subsequent siltation of the impoundment resulted in a dense growth of cottonwoods and willow in the lower mile of the creek. In addition, this area was not grazed by cattle until 1987 when flash floods destroyed the fence. Rock Creek riparian vegetation potential is the Great Plains cottonwood/red-osier dogwood (*Cornus stolonifera*) community types.

Riparian vegetation along Siparyann Creek is presently dominated by silver sagebrush/western wheatgrass and greasewood/western wheatgrass habitats. Cottonwood trees occur only at isolated sites and most of these are solitary trees. Rocky Mountain juniper also occurs in isolated stands along Siparyann Creek. Herbaceous vegetation along the Creek is similar to that described for Rock Creek. The only portion of Siparyann Creek with a dense cottonwood/willow habitat is a small area above its mouth where a road crossing has altered stream flow and permitted silt deposits to form. Siparyann Creek

riparian vegetation potential is the Great Plains cottonwood/red-osier dogwood community type.

Both creeks originate in the Little Rocky Mountains, flow into the Missouri River, have similar drainage basins and are of similar lengths (about 25 miles). They are separated by a single ridge and are located in identical range sites. Based on range survey information, 82% of the forage within 1/2 mile of water and on 0-10° slopes is allocated to livestock use. Each stream is (or at least has the potential) to be a perennial stream and both drainages have the potential to produce the same riparian community type.

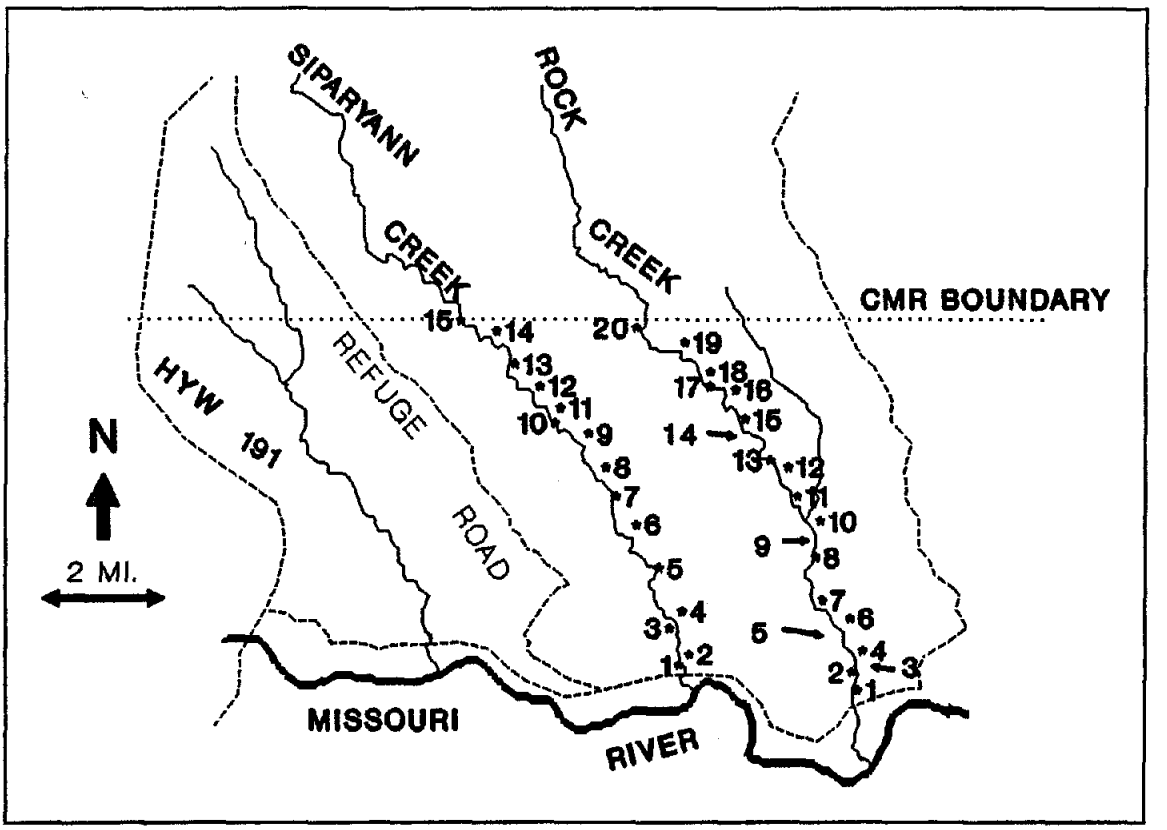

Figure 1. Map of the study area showing the general locations of the bird survey transects.

The plains cottonwood trees occurring in Rock Creek represent a variety of age classes from old, decadent specimens to newly established trees. Although there is a well established shrub layer in Rock Creek, with shrubs such as yellow willow, snowberry, rose (*Rosa woodsii*) and Rocky Mountain juniper; other shrubs and trees such as red-osier dogwood, common chokecherry (*Prunus virginiana*), and green ash (*Fraxinus pennsylvanica*) are absent. Individual decadent cottonwood trees occur along

Siparyann Creek but only sporadically. Except for a few Rocky Mountain juniper, other woody plants are absent. Aerial photographs from 1938 show a decline in the number of cottonwood trees to the present.

Season-long grazing along Rock Creek was changed in 1992 to allow primary and secondary succession to occur in the absence of livestock induced disturbance in one area and with greatly reduced intensity in another area. The upper five miles of Rock Creek on the CMR were entirely removed from livestock grazing to serve as a control to evaluate spring only grazing on the lower five miles of Rock Creek.

Preliminary field information indicates that cottonwood reproduction and survival has occurred with these changes in grazing on Rock Creek. The overall health and trend of the Rock Creek riparian community is upward. However, under intensive season-long grazing along Siparyann Creek, cottonwood survival is not occurring and plant communities remain a disturbance induced herbaceous or shrub community type. Young age classes of cottonwoods are absent in Siparyann Creek.

Our breeding bird survey was designed to qualitatively assess bird species composition and relative abundance in the riparian zones of these two adjacent drainages. Based on the striking contrast between drainages in the riparian plant communities, it was believed that there were significant differences in bird species composition and abundance between sites. Many neotropical migrant species of concern, i.e. *Empidonax* complex flycatchers and warblers, utilize woody riparian plant communities. The overall goal of this study is to establish baseline data on passerine bird species occurrence and relative abundance in riparian plant communities found under the different intensities of livestock grazing. Future monitoring of these sites will make these data valuable for establishing grazing guidelines specific to the CMR which will enhance riparian habitat for neotropical migrants.

METHODS

The objectives of this study were to:

1) Establish Area Search Census Plots in riparian vegetation on Rock Creek and Siparyann Creek,
2) Determine species occurrence and relative abundance of avifauna along riparian habitat in the two study areas,
3) Contrast species occurrence and relative abundance of avifauna along riparian habitat in the two study areas, and
4) Establish baseline data to allow for future monitoring of species occurrence and relative abundance of avifauna along riparian habitat in the two study areas.

This study was designed to be consistent with the three tiered approach to non-game bird monitoring described by Jones (1993). Bird censuses within the two study areas followed the Area Search Census outlined by Ralph et al. (1993). This census technique was selected over the more quantitative Point Count technique because two drainages lacked vehicle access and the open nature of the present riparian areas would have required a point count census area separation in excess of 400 yds. This latter factor would result in only 40 points per drainage which is less than adequate sampling for this technique.

The Area Search Census offered several advantages. Its major advantage is that it samples larger areas and will reduce between year variability due to observer abilities. It also permits detection of inconspicuous birds.

The breeding bird surveys were conducted from 7-10 June 1994. All census plots were sampled from sunrise until 10 AM. However, on 7 June, heavy rain delayed the start of the survey effort until 11 AM. A total of 15 census plots were placed in Siparyann Creek and a total of 20 were placed in Rock Creek. At least one census plot was established per linear mile in each drainage. Census plots ranged in size from 3 to 10 ha and the census period for each plot was 20 minutes. All birds seen or heard within the riparian zone during the twenty minute time period were recorded to species. Appendix A shows the exact location of the transects and lists bird species observed by transect.

Vegetation monitoring is being conducted along each drainage independent of this study. Riparian scorecard evaluation forms and photo points will be completed for various sections of the drainages at a minimum of three year intervals. Vegetation classification and scorecard procedures will follow Hansen et al. (1991) and Cook et al. (1993), respectively. An effort will be made to correlate vegetation monitoring sites with the Area Search Census plots.

RESULTS

A total of 42 bird species was observed in Siparyann and Rock Creeks during all phases of the bird survey work (Table 1). An additional 23 species were observed along the Missouri River and in other areas of the CMR during the survey period. A complete list of these bird species with common and scientific names are presented in Appendix B.

Thirty bird species were observed in Siparyann Creek at the 15 census plots and 32 species were observed in Rock Creek at the 20 census plots. A total of 183 different birds was recorded along the 15 transects in Siparyann Creek - averaging 12.2 birds

Table 1. List of bird species observed, number of observations of each species and percent of transects with each species for 15 transects in Siparyann Creek and 20 transects in Rock Creek, 7-10 June 1994. An asterisk indicates that the species was observed in the area but not during a designated sampling period or area.

Bird Species	Siparyann Creek # obs.	Siparyann Creek % trans.	Rock Creek # obs.	Rock Creek %trans.
sora	1	7		
northern harrier			1	5
red-tailed hawk	1	7	1	5
American kestrel	*	*	8	40
morning dove	3	20	20	60
northern flicker	4	27	14	45
Say's phoebe	5	13	2	10
eastern kingbird	6	20	31	85
least flycatcher			13	40
western wood-pewee			12	40
cliff swallow	3	13		
violet-green swallow	3	20	1	5
black-billed magpie	*	*	6	15
pinion jay	*	*		
black-capped chickadee			5	20
red-breasted nuthatch	*	*		
house wren	3	20	27	60
American robin	5	20	13	45
mountain bluebird	29	67	7	15
cedar waxwing			1	5
European starling			9	25
yellow warbler	1	7	45	80
common yellow throat	5	27	18	45
yellow-breasted chat			13	45
black-headed grosbeak	1	7	3	10
lazuli bunting	4	13	26	60
rufus-sided towhee	9	33	26	65
green-tailed towhee	9	33	3	10
vesper sparrow	9	27		
lark sparrow	3	20	6	15
chipping sparrow	17	67	11	35
song sparrow	1	7		
field sparrow	3	13	3	15
Brewer's sparrow	6	27	*	*
clay-colored sparrow	2	13	1	5
lark bunting	1	7		
Savannah sparrow	*	*		
western meadowlark	23	60	38	75
Brewer's blackbird	18	27	1	5
brown-headed cowbird	2	13		
Northern oriole	1	7	5	20
American goldfinch	5	27	34	55

per transect. For Rock Creek, a total of 404 different birds was recorded along the 20 transects - averaging 20.2 birds per transect.

Table 2 compares the relative abundance by rank of all bird species observed during the surveys. The most common bird species observed in Siparyann Creek in total number of birds and number of transects was the mountain bluebird. Numerically, the most common bird species observed in Rock Creek was the yellow warbler and the bird species observed in the most census plots was the eastern king bird.

Eight bird species typically associated with grassland and shrub/grassland habitats were clearly more abundant in Siparyann Creek than Rock Creek. These were the green-tailed towhee, vesper sparrow, chipping sparrow, field sparrow, Brewer's sparrow, clay-colored sparrow, Brewer's blackbird, and brown-headed cowbird. In addition, the Savannah sparrow, and lark bunting were found in Siparyann Creek in low numbers but were not found in Rock Creek. Figure 2 contrasts birds by group between Siparyann and Rock Creeks.

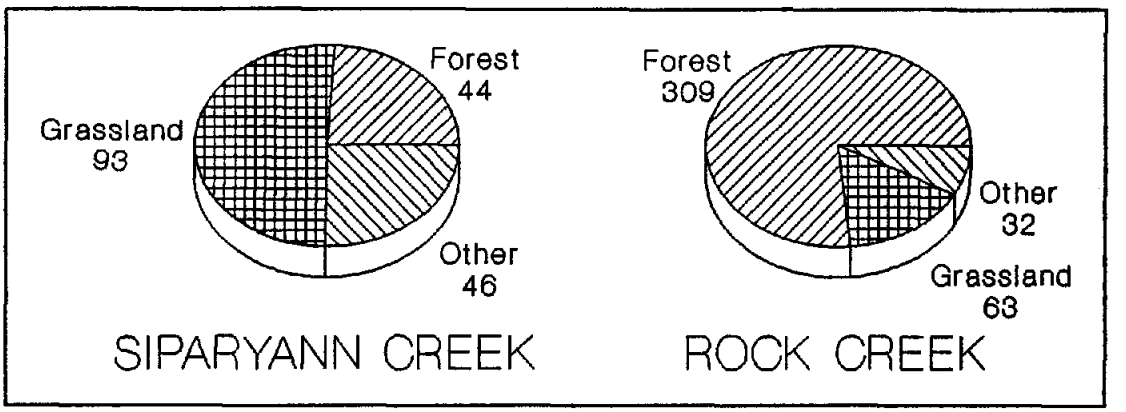

Figure 2. A comparison between Siparyann and Rock Creeks of bird species associated with riparian forests, grasslands, and other habitats. The comparison is based on number of observations by group.

Thirteen bird species typically associated with forested riparian habitats were clearly more abundant in Rock Creek than Siparyann Creek. These were the American kestrel, northern flicker, eastern kingbird, least flycatcher, western wood-pewee, black-billed magpie, black-capped chickadee, house wren, American robin, European starling, yellow warbler, yellow breasted chat, and lazuli bunting. The kestrel, flicker, black-capped chickadee, house wren, and starling are all cavity nesting species. While walking in Rock Creek, we also briefly saw a

small woodpecker (downy or hairy woodpecker) but were unable to identify it to species.

Table 2. Relative index of abundance of birds species by drainage based on rank. The relative index value of 100 indicates the bird species most frequently observed, and an index value of 0 indicates that the bird species was not observed.

Bird Species	Siparyann Creek		Rock Creek	
	obs.	trans.	obs.	trans.
sora	8	14	0	0
northern harrier	0	0	5	7
red-tailed hawk	8	14	5	7
American kestrel	0	0	35	50
morning dove	23	42	70	71
northern flicker	31	57	50	57
Say's phoebe	38	29	10	14
eastern kingbird	46	42	85	100
least flycatcher	0	0	55	50
western wood-pewee	0	0	50	50
cliff swallow	23	29	0	0
violet-green swallow	23	42	5	7
black-billed magpie	0	0	25	21
black-capped chickadee	0	0	20	28
house wren	23	42	80	71
American robin	38	42	55	57
mountain bluebird	100	100	30	21
cedar waxwing	0	0	5	7
European starling	0	0	40	36
yellow warbler	8	14	100	93
common yellow throat	46	57	65	57
yellow-breasted chat	0	0	55	57
black-headed grosbeak	8	14	15	14
lazuli bunting	31	28	75	71
rufus-sided towhee	69	71	75	79
green-tailed towhee	69	71	15	14
vesper sparrow	69	57	0	0
lark sparrow	23	42	25	21
chipping sparrow	77	100	45	43
song sparrow	8	14	0	0
field sparrow	23	28	15	21
Brewer's sparrow	46	57	0	0
clay-colored sparrow	15	28	5	7
lark bunting	8	14	0	0
western meadowlark	92	86	95	86
Brewer's blackbird	31	57	5	7
brown-headed cowbird	15	28	0	0
Northern oriole	8	14	20	29
American goldfinch	38	57	90	64

Other bird species such as the mourning dove and American goldfinch also appeared more abundant in Rock Creek but are not necessarily associated with forested habitats. The rufus-sided towhee and western meadowlark occurred with similar abundance in each drainage.

DISCUSSION

The vegetative differences between Siparyann and Rock Creeks are a result of both past and recent grazing practices. Cottonwood trees in Rock Creek ranged from a few very old trees to numerous young trees that have become established since 1992 when grazing was either eliminated or limited to a short period in spring. Intermediate age cottonwood trees were also common. Willows along Rock Creek show a similar age class distribution. Willows were very abundant on the lower mile of Rock Creek and became less common with increasing distance from the River. Cottonwood trees in Siparyann Creek were primarily old, decadent individuals, and willows existed only on the lower mile where the flow of the creek was altered by a road crossing.

Almost twice as many individual birds were observed per transect in Rock Creek as compared to Siparyann Creek. This is related to the fact that a larger volume of vegetation is available for bird use in the riparian zone of Rock Creek. Generally, in Rock Creek, three layers of vegetation (low herbaceous/shrub, tall shrub/low tree, tall tree) were available to birds while in Siparyann Creek only a single layer was available (low herbaceous/shrub). Bird community diversity and abundance is usually correlated to complexity of habitat structure (MacArthur and MacArthur 1961, Balda 1975). An even greater difference between Siparyann and Rock Creeks is expected to develop in the future as the riparian zone benefits from reduced and/or eliminated grazing.

The sharp contrast in bird species composition between Siparyann and Rock Creeks is further evidence of the difference in riparian vegetation. Siparyann Creek had a diversity of sparrow or sparrow-like birds which do well in grassland and shrub/grassland habitats. These birds probably benefit from a certain level of cattle grazing. In Rock Creek, these bird species were not common in the riparian zone but were found at higher and dryer sites adjacent to the riparian zone.

Several of the bird species (e.g. yellow warbler, black-headed grosbeak, northern oriole, lazuli bunting) associated with forested riparian habitats found in Siparyann Creek were primarily found in transects within the lower mile of the Creek close to the Missouri River bottomlands and within the area of altered stream flow from the road crossing. Observations of lazuli buntings and house wrens in the upper portion of Siparyann

Creek were associated with isolated cottonwood trees. Even dead standing cottonwood trees appeared attractive to wrens. In Rock Creek, the bird species associated with forested riparian habitats were much more widely distributed. The yellow warbler and lazuli bunting were just as likely to be found near the Refuge boundary as they were in the lower mile of Rock Creek.

Some species, such as the mourning dove and meadowlark which are not necessarily forest adapted bird species, were observed to perch in cottonwood trees (especially dead branches) in Rock Creek for resting and calling. The attraction of trees for perching probably made these species more visible. The sora in Siparyann Creek was in a small cattail marsh formed at the base of a landslide adjacent to the creek. This bird was on a nest with eggs.

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APPENDIX A

LOCATION OF TRANSECTS AND BIRD SPECIES OBSERVED BY TRANSECTS

Table A-1. List of bird species observed in Siparyann Creek and the transect number where the species were encountered.

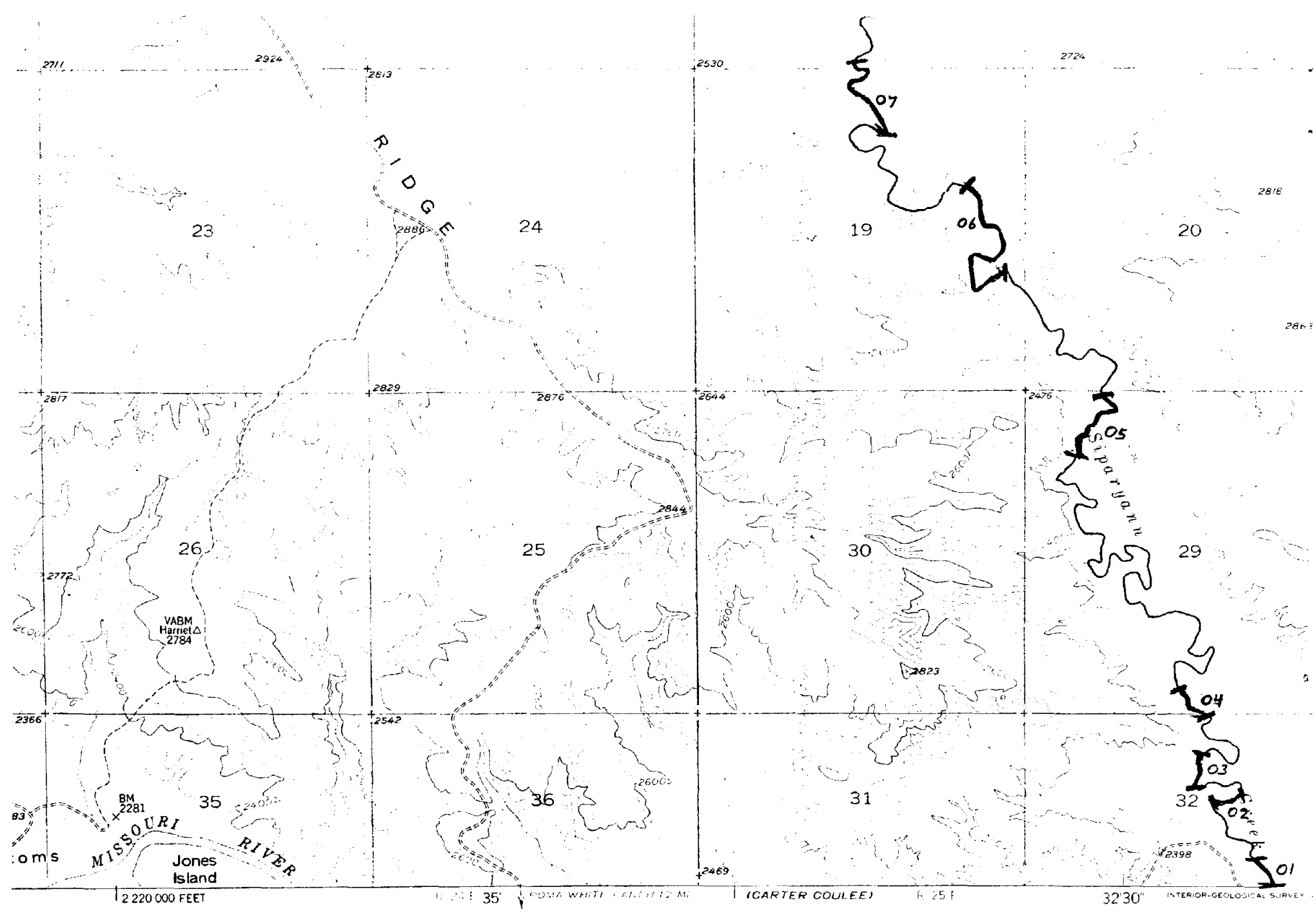
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
sora					X										
red-tailed hawk															X
morning dove	X											X		X	
northern flicker		X	X			X		X							
Say's phoebe		X											X		
eastern kingbird	X	X			X										
cliff swallow			X											X	
violet-green swallow	X		X				X								
house wren		X		X						X					
American robin	X				X					X					X
mountain bluebird	X	X	X			X	X	X	X		X	X		X	
yellow warbler	X														
common yellow throat			X			X			X	X					
black-headed grosbeak	X														
lazuli bunting	X					X									
rufus-sided towhee												X	X	X	X
green-tailed towhee			X	X						X			X		X
vesper sparrow			X	X			X	X							
lark sparrow	X	X	X	X											
chipping sparrow		X	X				X	X	X	X	X	X	X	X	
song sparrow		X													
field sparrow			X		X										
Brewer's sparrow							X	X						X	
clay-colored sparrow								X		X					
lark bunting			X												
western meadowlark			X		X			X	X		X	X	X	X	X
Brewer's blackbird							X		X			X	X		
brown-headed cowbird													X		X
Northern oriole		X													
American goldfinch		X	X		X	X									

Table A-2. List of birds species observed at transects 1-10 in Rock Creek and the transect number where the species were encountered.

	1	2	3	4	5	6	7	8	9	10
northern harrier										X
red-tailed hawk							X			
American kestrel							X	X	X	X
morning dove					X	X				X
northern flicker		X				X		X	X	X
Say's phoebe					X		X			
eastern kingbird	X		X	X	X	X	X	X		X
least flycatcher	X	X	X	X	X		X	X		
western wood-pewee		X		X			X			
violet-green swallow									X	
black-billed magpie							X			X
black-capped chickadee								X		
house wren						X	X	X	X	X
American robin	X		X			X		X		
cedar waxwing			X							
European starling									X	X
yellow warbler	X	X	X		X	X	X	X		X
common yellow throat				X	X					X
yellow-breasted chat			X				X			
black-headed grosbeak	X									
lazuli bunting	X	X	X		X	X	X	X	X	X
rufus-sided towhee	X	X		X	X	X				
green-tailed towhee					X					
lark sparrow					X		X			
chipping sparrow							X			X
field sparrow				X						X
clay-colored sparrow		X								
western meadowlark			X		X	X	X	X	X	X
Brewer's blackbird				X						
Northern oriole	X		X				X			
American goldfinch	X	X	X	X	X	X		X		

Table A-3. List of birds species observed at transects 11-20 in Rock Creek and the transect number where the species were encountered.

	11	12	13	14	15	16	17	18	19	20
American kestrel	X					X		X		X
morning dove	X	X	X	X	X		X	X	X	X
northern flicker					X	X	X			X
eastern kingbird	X		X	X	X	X	X		X	X
least flycatcher	X									
western wood-pewee	X		X			X	X			X
black-billed magpie										X
black-capped chickadee		X							X	X
house wren		X		X		X	X	X	X	X
American robin		X		X	X		X			
mountain bluebird				X	X	X				
European starling							X	X	X	
yellow warbler	X		X	X		X	X	X	X	X
common yellow throat	X		X			X		X	X	X
yellow-breasted chat		X	X	X		X		X	X	X
black-headed grosbeak	X									
lazuli bunting	X			X				X		
rufus-sided towhee	X	X	X			X	X	X	X	X
green-tailed towhee									X	
vesper sparrow										
lark sparrow					X					
chipping sparrow	X		X	X					X	X
song sparrow										
field sparrow	X									
Brewer's sparrow								X		
western meadowlark	X		X	X	X	X	X	X	X	X
Northern oriole				X						
American goldfinch	X			X				X		



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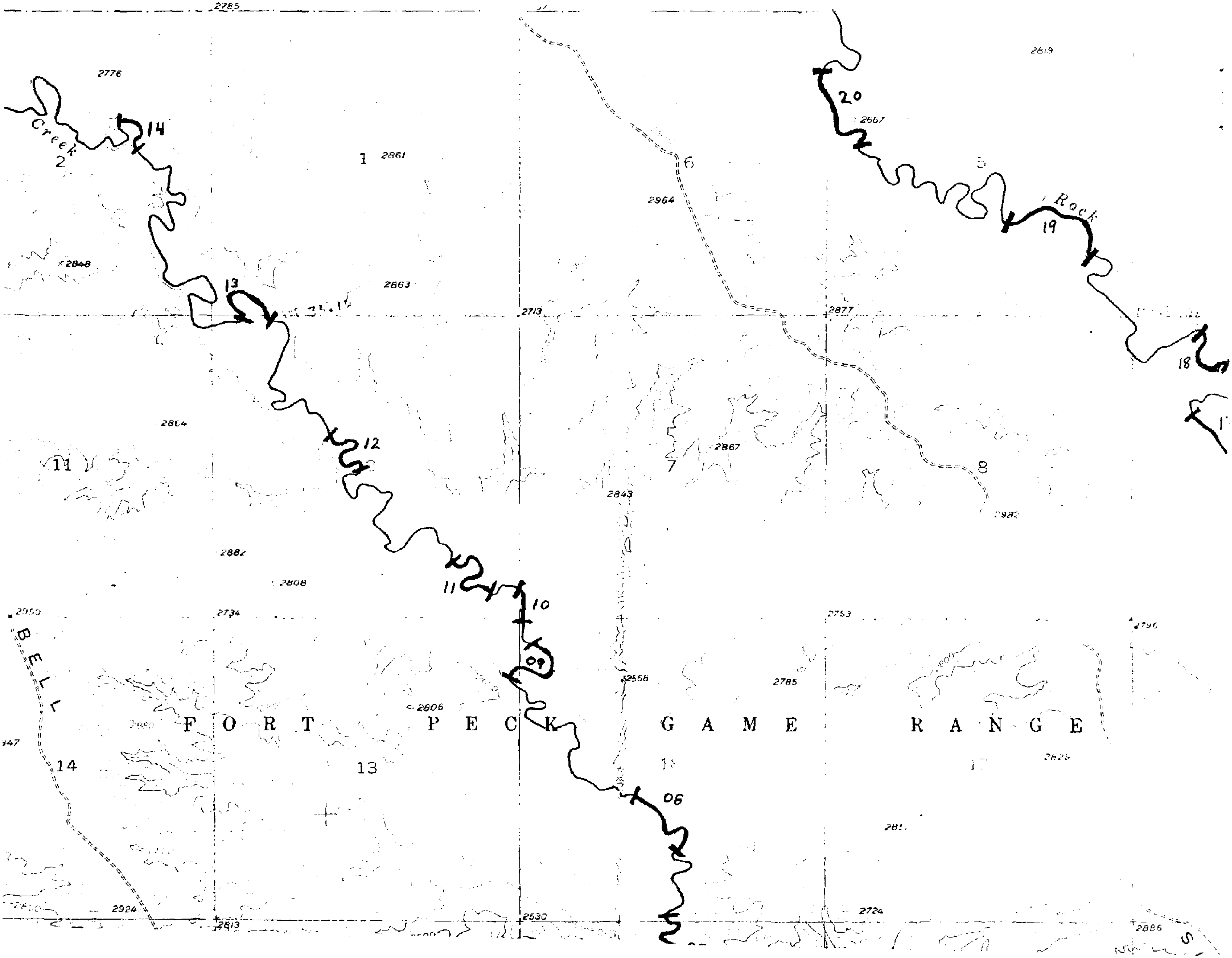
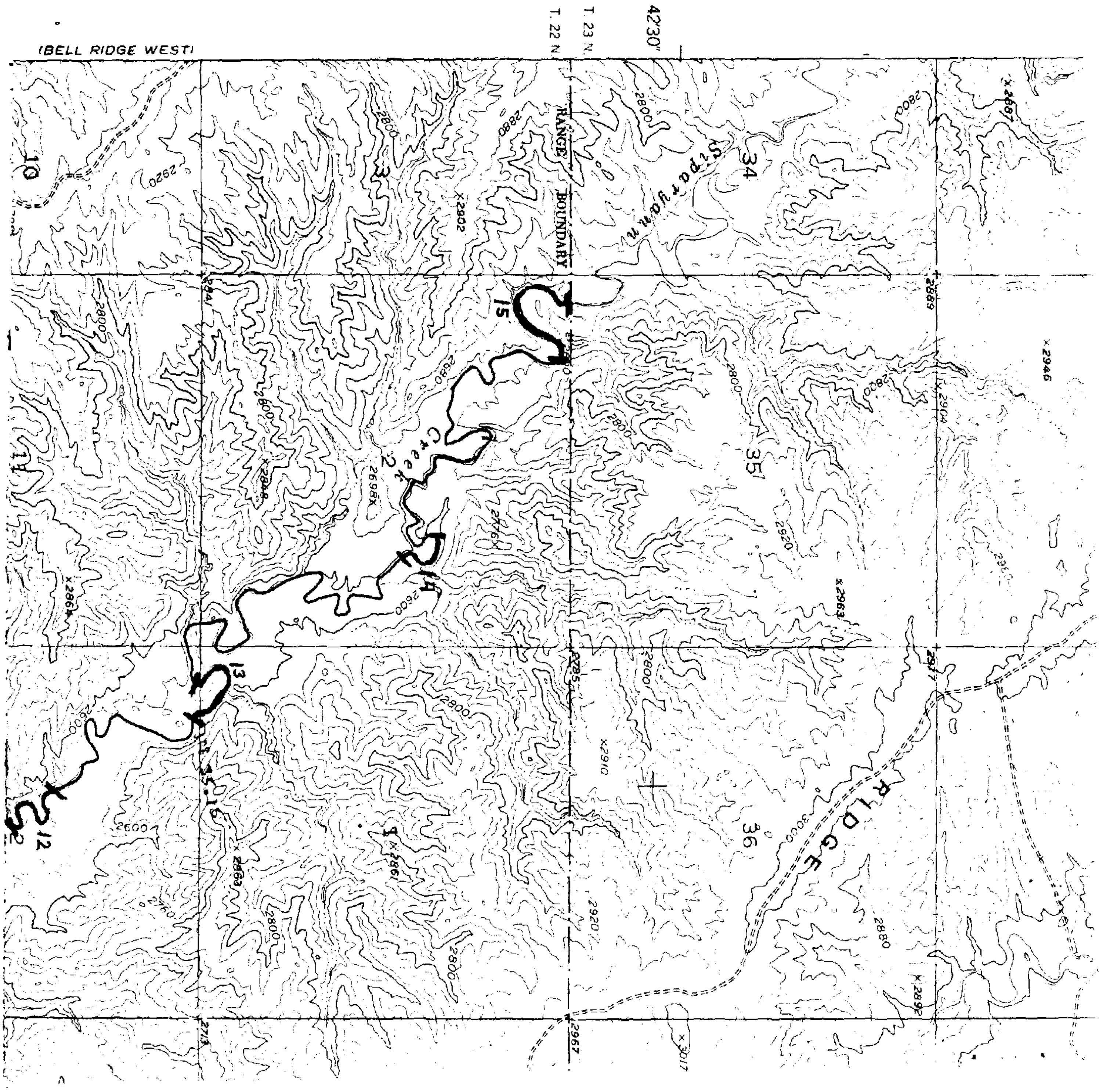
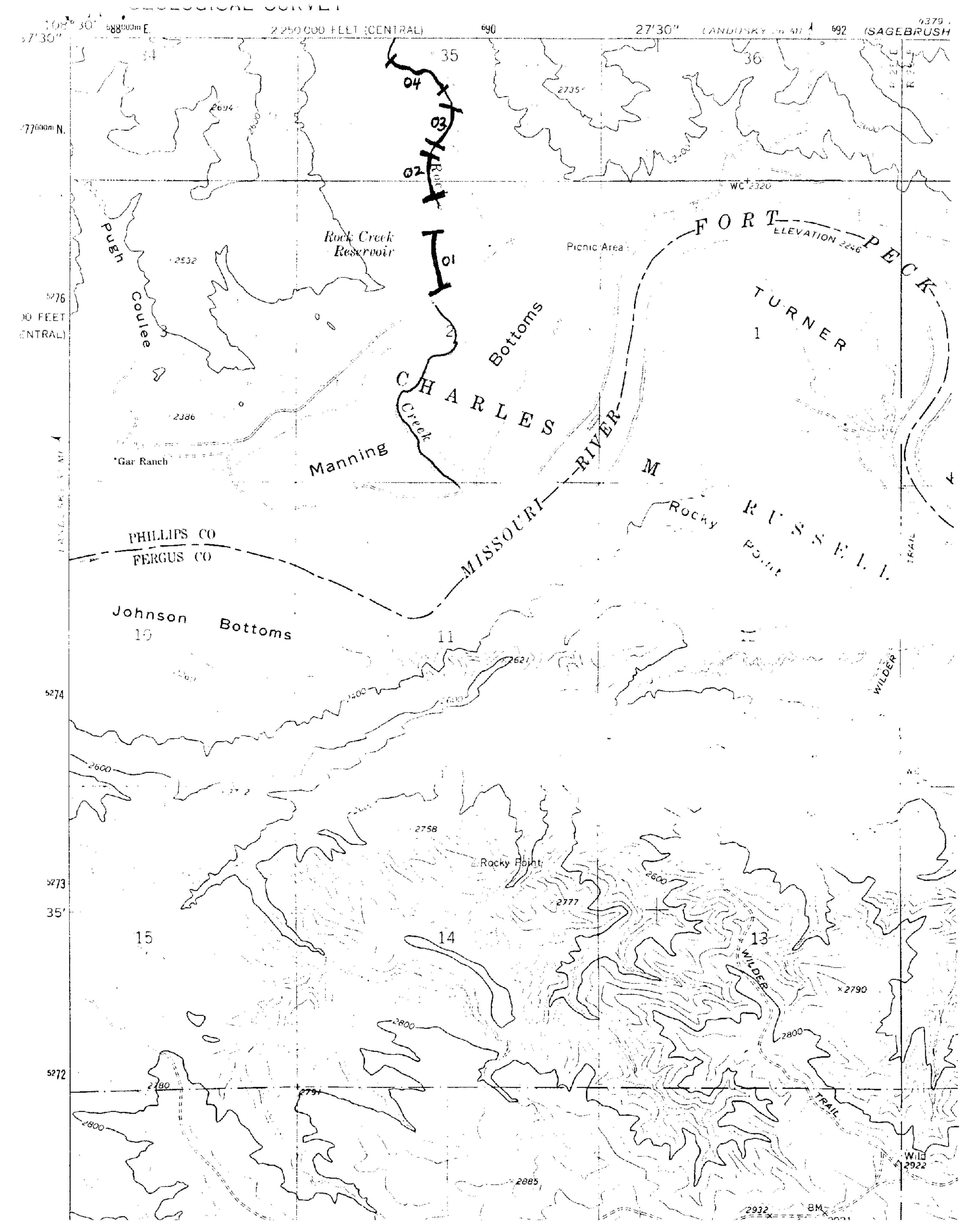
1000 FEET

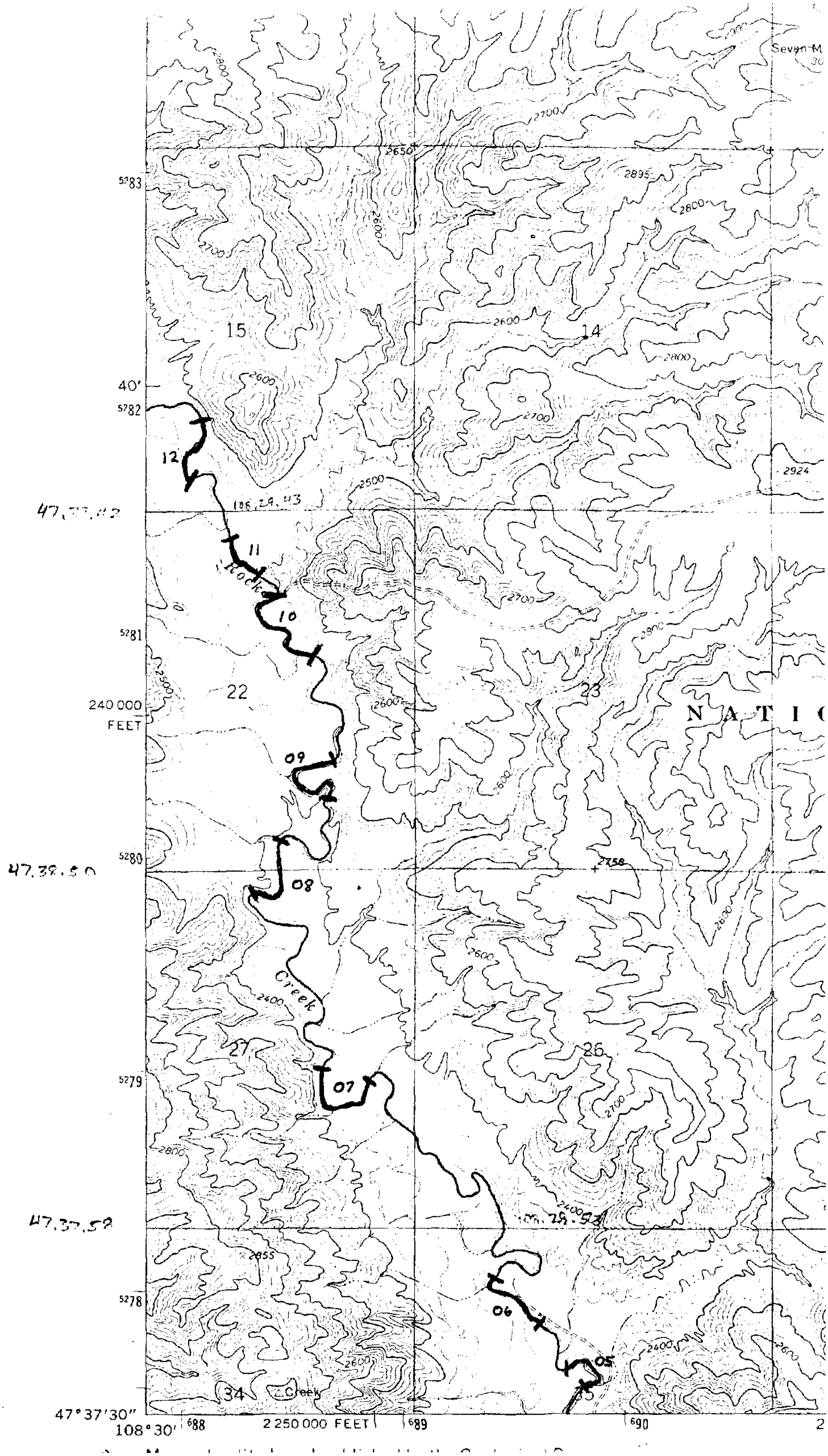
KILOMETER



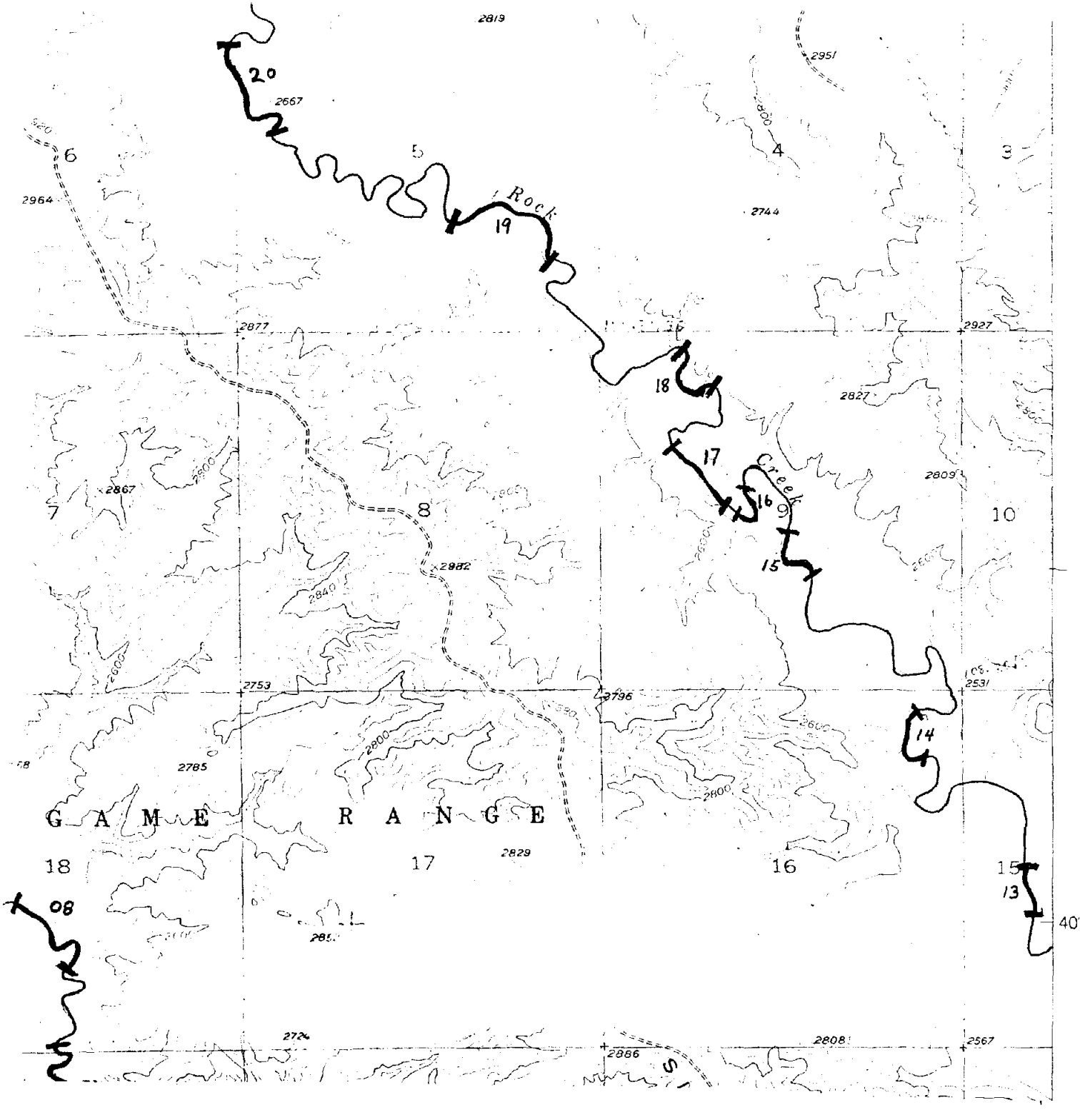
Creek
Rock
FORT PECK GAME RANGE
BELL
2785
2776
2819
2667
2861
2964
2848
2863
2713
2877
2864
2867
2843
2882
2808
2734
2753
2796
2568
2785
2806
2530
2724
2924
2813
2886
20
19
18
14
13
12
11
10
09
08
1
2
5
6
7
8
11
13
14


(BELL RIDGE WEST)
42'30"
T. 23 N.
T. 22 N.
RANGE BOUNDARY
Creek
RIDGE
34
35
36
10
11
15
13
12
14


GEOLOGICAL SURVEY
2 250 000 FEET (CENTRAL)
27'30"
(SAGEBRUSH
35
36
04
03
02
01
Rock Creek Reservoir
Picnic Area
FORT PECK
ELEVATION 2246
TURNER
Pugh Coulee
Bottoms
CHARLES
Creek
Manning
MISSOURI RIVER
M
RUSSELL
Rocky Point
Gar Ranch
PHILLIPS CO
FERGUS CO
Johnson Bottoms
10
11
Rocky Point
15
14
13
WILDER TRAIL
5274
5273
5272
35'



Seven M
2650
5283
2895
2800
2700
2600
15
14
40'
5282
12
2924
2500
11
Rock
10
5281
22
23
240 000
FEET
N A T I
09
47.38.50
5280
2758
08
Creek
2400
27
26
5279
07
2855
5278
06
05
34
Creek
47°37'30"
108°30'
688
2 250 000 FEET
689
690


20
19
18
17
16
15
14
13
08
Rock
Creek
GAME RANGE
2819
2951
2667
2964
2744
2877
2927
2827
2867
2809
2882
2840
2753
2796
2531
2785
2829
2724
2886
2808
2567
6
5
4
3
7
8
9
10
18
17
16
15

APPENDIX B

LIST OF ALL BIRD SPECIES OBSERVED 6-10 JUNE 1994

Table B-1. List of all bird species observed from 6-10 June 1994 while conducting bird survey work on the Charles M. Russell National Wildlife Refuge.

Common Name	Scientific Name
American white pelican	*Pelecanus erthrohynchos*
great blue heron	*Ardea herodias*
Canada goose	*Branta canadensis*
mallard	*Anas platyrhynchos*
blue-winged teal	*Anas discors*
sora	*Porzana carolina*
killdeer	*Charadrius vociferus*
mountain plover	*Charadrius montanus*
California gull	*Larus californicus*
northern harrier	*Circus cyaneus*
red-tailed hawk	*Buteo jamaicensis*
American kestrel	*Falco sparverius*
osprey	*Pandion haliatus*
sage grouse	*Centrocerus urophasianus*
sharp-tailed grouse	*Tympanuchus phasianellus*
mourning dove	*Zenaida macroura*
great-horned owl	*Bubo virginianus*
common nighthawk	*Chordeiles minor*
common poorwill	*Phalaenoptilus nuttallii*
northern flicker	*Colptes auratus*
Say's phoebe	*Sayornis saya*
eastern kingbird	*Tyrannus tyrannus*
least flycatcher	*Empidonax minimus*
western wood-pewee	*Contopus soridulus*
horned lark	*Eremophila alpestris*
barn swallow	*Hirundo rustica*
cliff swallow	*Hirundo pyrrhonota*
tree swallow	*Tachycineta bicolor*
violet-green swallow	*Tachycineta thalassina*
American crow	*Corvus brachyrhynchos*
black-billed magpie	*Pica pica*
pinion jay	*Gymnorhinus cyanocephalus*
black-capped chickadee	*Parus atricapillus*
red-breasted nuthatch	*Sitta canadensis*
house wren	*Troglodytes aedon*
American robin	*Turdus migratorius*
veery	*Catharus fuscescens*
mountain bluebird	*Sailia currucoides*
brown thrasher	*Toxostoma rufum*
cedar waxwing	*Bombycilla cedrorum*
European starling	*Sturnus vulgaris*
yellow warbler	*Dendroica petechia*

Table B-1 continued.

Common Name	Scientific Name
common yellowthroat	*Geothlpis trichas*
yellow-breasted chat	*Icteria virens*
ovenbird	*Seiurur aurocapillus*
black-headed grosbeak	*Pheucticus melanocephalus*
lazuli bunting	*Passerina amoena*
rufus-sided towhee	*Pipilo erthrophthalmus*
green-tailed towhee	*Pipilo chlorurus*
vesper sparrow	*Pooecetes gramineus*
lark sparrow	*Chondestes grammacus*
chipping sparrow	*Spizella passerina*
song sparrow	*Melospiza melodia*
field sparrow	*Spizella pusilla*
Brewer's sparrow	*Spizella breweri*
clay-colored sparrow	*Spizella pallida*
Savannah sparrow	*Passerculus sandwichensis*
dark-eyed junco	*Junco hyemalis*
lark bunting	*Calamospiza melanocorys*
western meadowlark	*Sturnella neglecta*
red-headed blackbird	*Agelaius phoeniceus*
Brewer's blackbird	*Euphagus cyanocephalus*
brown-headed cowbird	*Molothrus ater*
Northern oriole	*Icterus galbula*
American goldfinch	*Carduelis tristis*