KOOTENAI FALLS WILDLIFE INVENTORY

DECEMBER 1978

MONTANA DEPARTMENT OF FISH AND GAME
ECOLOGICAL SERVICES DIVISION

PREPARED BY:

GAYLE JOSLIN

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Terrestrial wildlife of the Kootenai Falls area was inventoried during 1978 by the Montana Department of Fish and Game Ecological Services Division while under contract to the Montana Department of Natural Resources and Conservation (DNRC). Northern Lights, Inc. of Sandpoint, Idaho, plans to construct a hydroelectric facility immediately above the falls (see cover and Figure 1) and therefore must comply with the Major Facility Siting Act and the Montana Environmental Policy Act by preparing an environmental impact statement (EIS) on the area. The Major Facility Siting Act is administered by the DNRC.

The Kootenai River originates in southeast British Columbia, flows south into Montana, then west into Idaho and turns north to enter Canada once again. Kootenai Falls is located between the northwest Montana communities of Libby and Troy (Figure 2), 30 miles (48 km) down river from Libby Dam. Libby Dam impounds 50 miles or approximately half of the Kootenai River in the state and backs water into Canada for another 50 miles. Currently Libby Dam is a baseload facility but upon installation of four additional generators, it would be converted to a peak load facility. Conversion to a power-peaking dam would require construction of a reregulating dam to avoid flooding of downstream settlements. The rereg dam would impound another 20 percent of the free flowing Kootenai River in Montana. The Kootenai Falls Dam would be located approximately 20 miles (32 km) below the rereg dam.

Figure 1. Kootenai Falls proposed dam site.

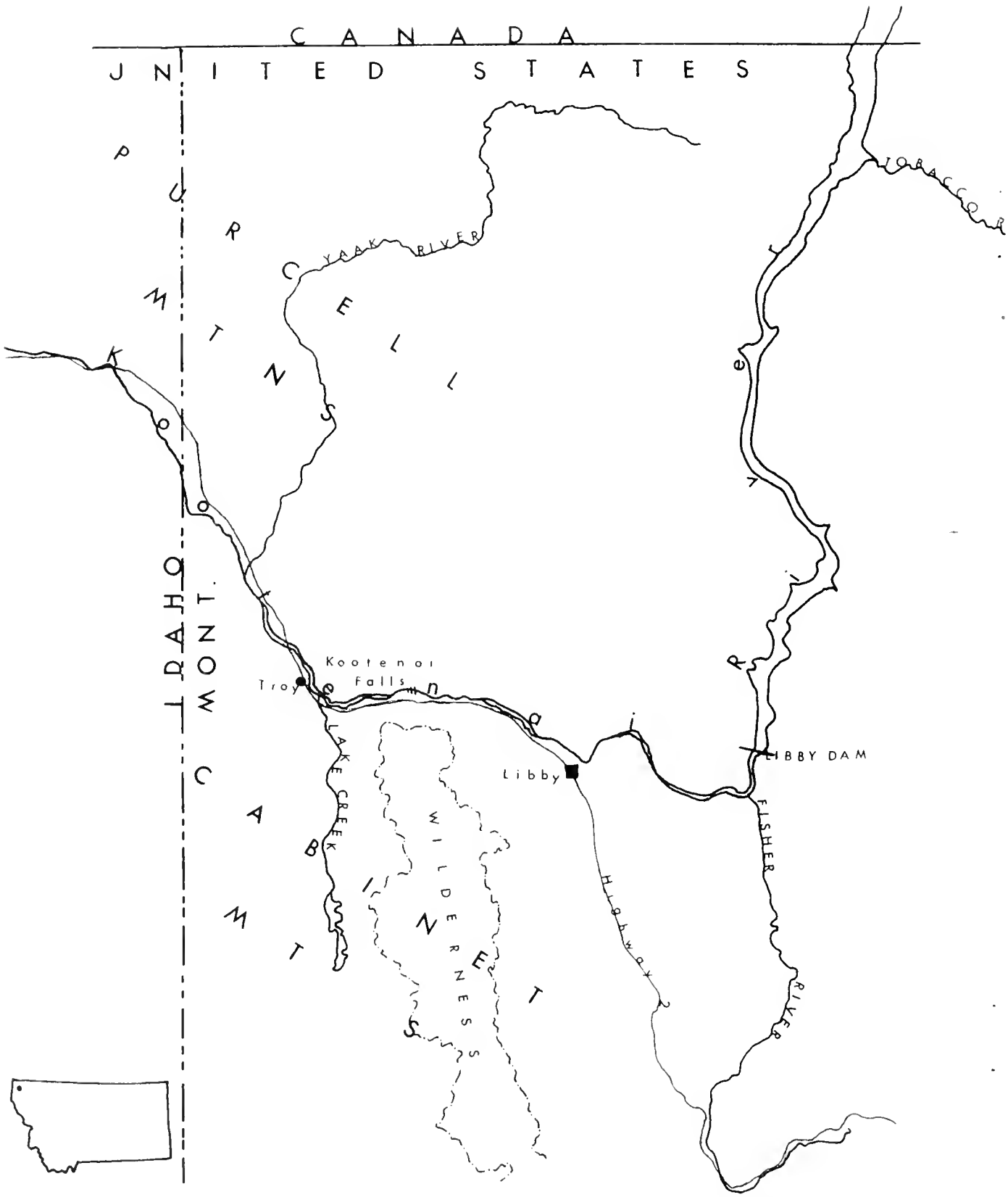


Figure 2. General location map of Kootenai River Basin.

Kootenai Falls is the last major falls on a Montana river not yet dammed or impounded. The falls is composed of a complex series of cascades falling over shelf rock which occur between and on either side of three islands located in mid river (Figure 3). The falls marks the entry to the rugged 3 mile (4.8 km) long Kootenai Canyon (Figure 4). Water depths in the canyon are as much as 99 feet (30 m) providing habitat for the only white sturgeon fishery within the state (Graham 1978). The rare and unique harlequin duck also finds suitable habitat in this rugged canyon. Even though the falls cannot be seen from Highway 2 the area receives up to 55,000 visitor days of use per year (Sewall and Associates 1978), likely making it the most popular natural scenic attraction in Lincoln County.

Figure 5 illustrates the design of the proposed Kootenai Falls Dam. The dam structure would be approximately 30 feet (9.1 m) high, impounding the river and associated riparian habitat (Figure 6) for approximately 3 miles (4.8 km). It would be utilized for peak power periods commensurate with flows released from dams upriver. Water would be diverted from above the dam into an underground powerhouse which would have the capacity to utilize 24,000 cfs or the entire flow of the river. The water would return to the river through two 39-foot tunnels approximately 1 mile below the falls. The bypassed portion of the canyon would be nearly dewatered (Figure 4).

The all-time low flow recorded on the Kootenai was 1000 cfs. Historic flows range from 4,000 to 46,000 depending upon the season, then with installation of Libby Dam, seasonal flow regimes were reversed and flows now range from 2,000 to 20,000 cfs. Northern Lights, Inc. plans to divert all but 750 to 1,000 cfs for power generation. A maximum of 1,000 cfs would be allowed to flow over the dam in an attempt to simulate the natural appearance of the falls.

OBJECTIVE

The objective of this study was to record species diversity and occurrence within the Kootenai Falls study area and to provide direction toward a comprehensive impact analysis. Because of the brief nature of this inventory, specific wildlife impact analyses could not be addressed.

METHODS

General

Intermittent field work was conducted from January into July 1978, totaling approximately 2 months of reconnaissance. Investigations were concentrated around Kootenai Falls, although different study area boundaries were defined depending upon the species being investigated. Observations were aided by the use of a 7 x 35 power binocular and a 15 to 60 variable power spotting scope. Field data were recorded on standard data sheets which are on file with the Energy Division of the Montana Department of Natural Resources and Conservation. For purposes of this study, winter was defined as the period January 1 to March 15, spring as March 15 through May 30, and summer as June 1 to July 31. All information collected herein was obtained by the author unless otherwise indicated.

Figure 3. Islands at the head of Kootenai Falls.

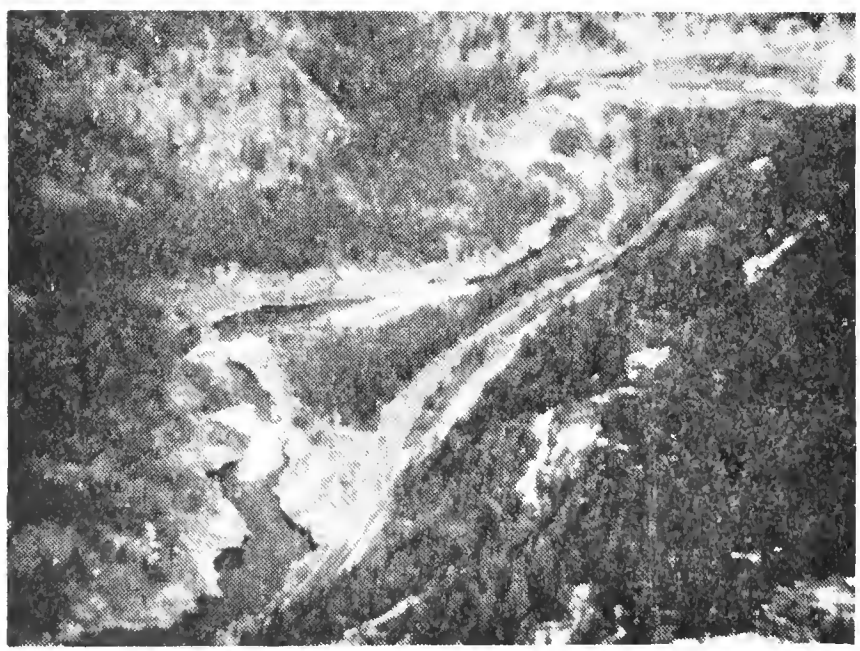


Figure 4. Kootenai River canyon below Kootenai Falls. Section of river proposed to be dewatered with installation of dam.

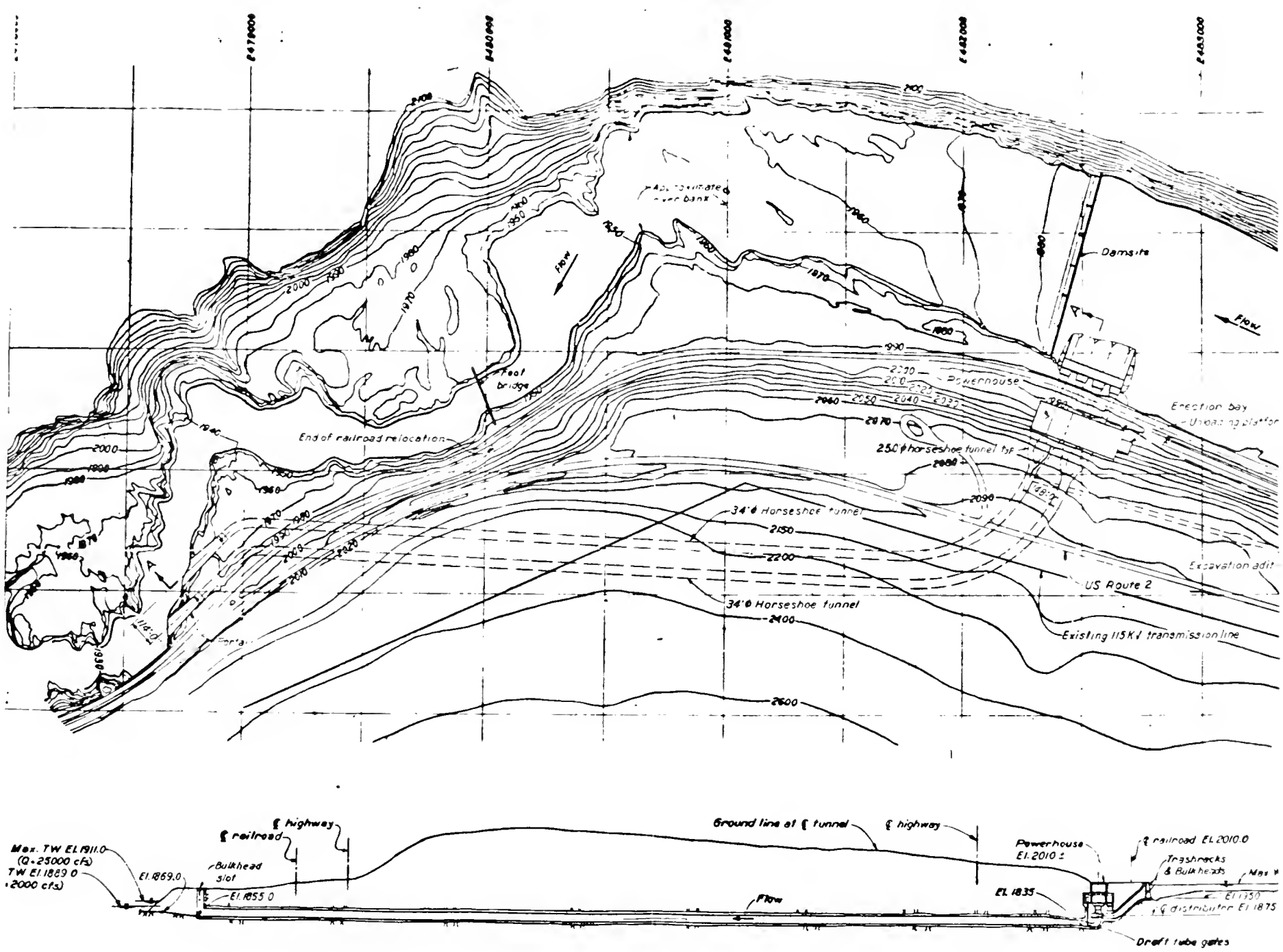


Figure 5. Location of proposed dam, powerhouse and diversion tunnels. (Prepared by Harza Engineering Co.)

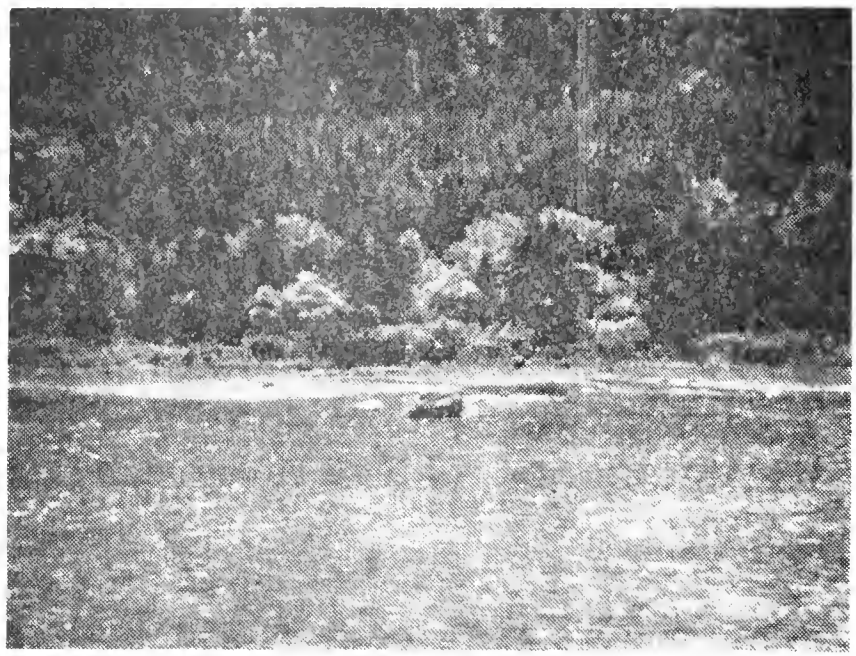


Figure 6. Riparian habitat above Kootenai Falls.

Habitat Description

A map (scale = 1:24,000) of forest habitat types (Pfister et al. 1977) for the area was provided by the Kootenai National Forest (Olson-Elliott & Associates 1976), and served as the basis for more detailed field mapping of cover and terrain types within the study area (Figure 7). Four natural cover types were recognized: timber, shrub, grass and rock (or bare). Eight terrain types were mapped on 7.5 minute topographic maps using ocular estimates and infra-red color photographs. The following four terms describe rocky terrain types: bluffs, benches with rocky drop-offs, often in step-like series; cliffs, rock faces several feet in height; talus, masses of shale or boulders, generally not capable of supporting vegetation to climax stage due to instability or poor edaphic features; broken, those areas which are not bluffs, cliffs or talus but which were obviously difficult to traverse because of rocky substrate. If an area could not be defined by one of the rocky terrains, then it was classified as one of the four remaining terrain types including: ridge, the line of land separating two drainages; floodplain, the low-lying, flat or gently sloping land adjacent to a water course; park, a nontimbered flat or sloping area; sidehill, a catchall term used to categorize any nonrocky area which would not fit any of the other terrain types. The cliff, talus and park types by definition are not timbered but the five remaining terrain types could support any cover type. Cutting unit information is incomplete. Forest vegetation*within the primary study area was quantitatively described in five randomly located 0.04 ha. (0.1 acre) circular plots, using the methods of James and Shugart (1970). Voucher specimens of most major trees, shrubs, and forbs were collected and stored.

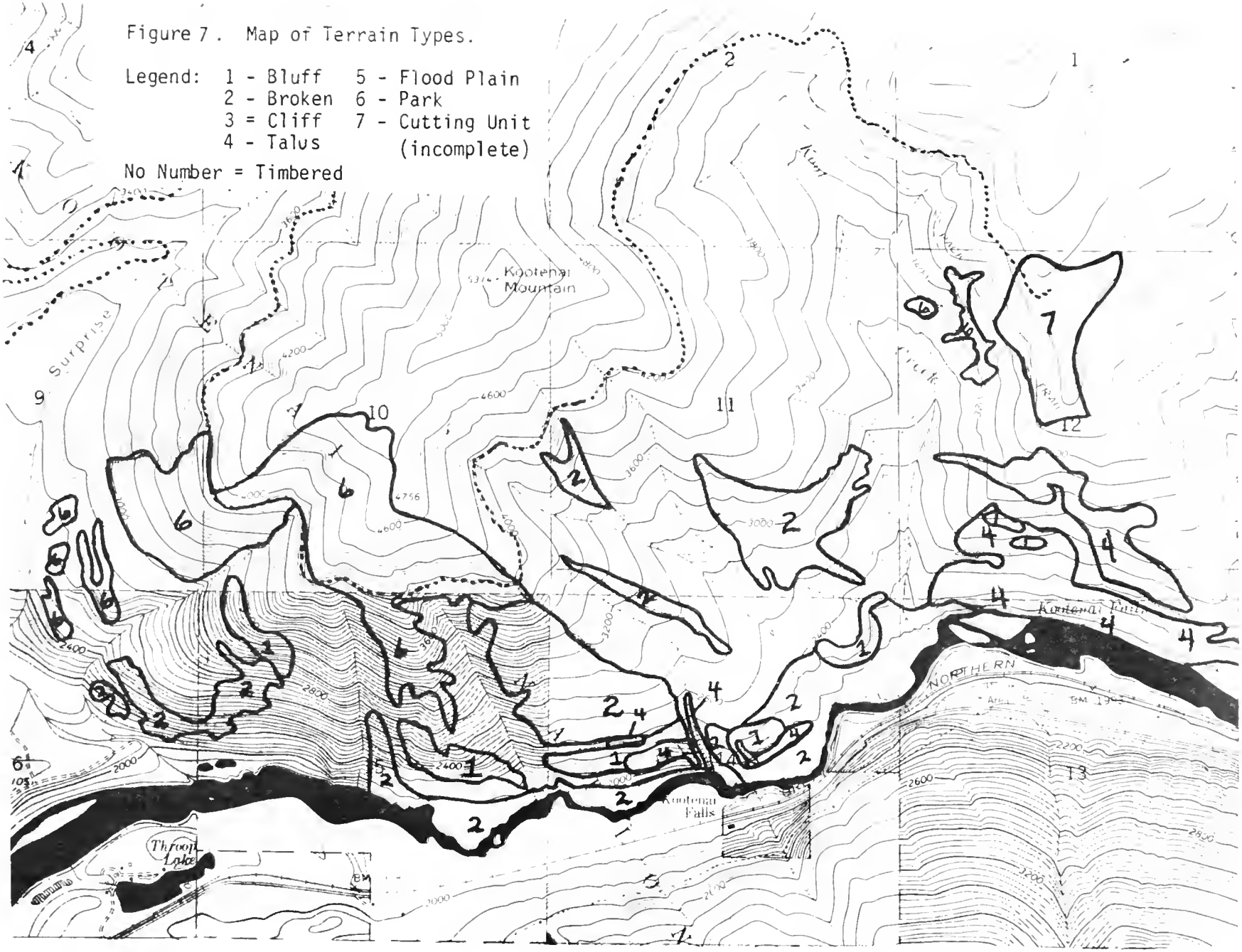
---

* Forest vegetation information collected by DNRC biologist, Larry Thompson.

Figure 7. Map of Terrain Types.

Legend: 1 - Bluff
2 - Broken
3 = Cliff
4 - Talus
5 - Flood Plain
6 - Park
7 - Cutting Unit (incomplete)

No Number = Timbered



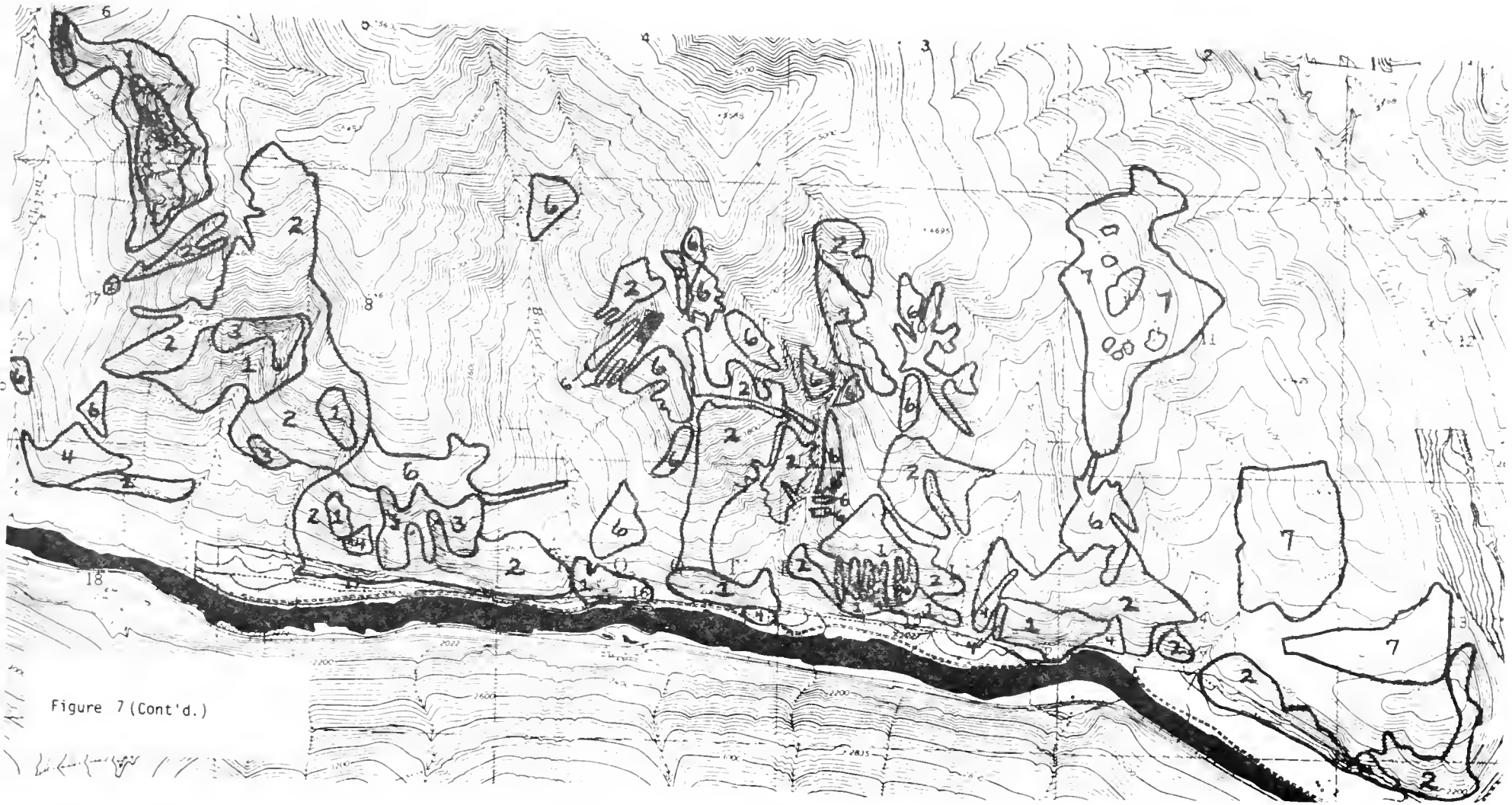


Figure 7 (Cont'd.)

Birds

A variety of techniques were employed in order to quantitatively describe bird populations of the area. The primary study area (Figure 8) was censused in winter (January 20 - March 2, 1978) and during the breeding season (May 7 - June 30, 1978) using standard methods (Hall 1964; Van Velzen 1972; Kolb 1965). The schedule of the breeding bird census is given in Appendix A. Monthly occurrence, location and habitat type were noted for each bird species. In order to document the importance of riparian habitats, a bird survey transect was established along the railroad right-of-way which parallels the river from the retaining wall along Highway 2 to the mouth of China Creek. The route was walked eight times from January 20 to March 2, 1978, and seven times from April 29 to May 9, 1978, following the technique described by Emlen (1977). The route was extended to cover the area from the falls to 2 km (1.6 miles) upstream and was conducted nine times from May 11 to July 8. Information obtained during these 16 walks was used to compare the relative use by birds in the upland coniferous forest habitat and the riparian deciduous vegetation habitat. Limited mist-net sampling was conducted early in the breeding season but was discontinued, as it was time-consuming and yielded little additional useful data. Species not previously recorded on the study area or the occurrence of a species not previously observed in a particular habitat were noted during general reconnaissance and incidental to other activities.

Waterfowl were regularly censused from 2 km (1.2 miles) above the falls to the falls during these transects, and the area from the falls to 1 km (½ mile) downstream was regularly monitored. Because much of the river from Libby to near the junction of U.S. Highway 2 and State Highway 202 is not navigable, observations along the river, other than in those areas already mentioned, were made incidental to other activities, usually while enroute between Libby and Troy on Highway 2. Locations of waterfowl observed on the river were recorded on standard data sheets using letter codes from the mouth of O'Brien Creek (A) to Pipe Creek (W), Figure 9.

Large Mammals

Data were recorded on standard data sheets for each ungulate observation, and included the following information: date, time of day, observer, mode of transportation, cloud cover, precipitation, percent snow cover, temperature, wind speed, number of animals, group composition, activity, slope, aspect, elevation, forest habitat type, general cover type and terrain type. Eight aerial surveys were made over the study area including three helicopter and five fixed-wing flights. Locations of each animal or group observed were plotted on field maps and were also recorded on data sheets using the location codes shown in Figure 9. As shown in this figure, the land area was coded using numerals from Surprise Gulch (1) to east of Pipe Creek (15) on the north side of the river, and from west of Cedar Creek (16) to the junction of Highway 2 and Highway 202 (26) south of the river.

Monthly bighorn sheep surveys were conducted from Lynx Flats to Quartz Creek from January through July, 1978, and incidental observations collected during June, November and December, 1977. The surveys were conducted from Highway 2 during early morning or late afternoon and evening.

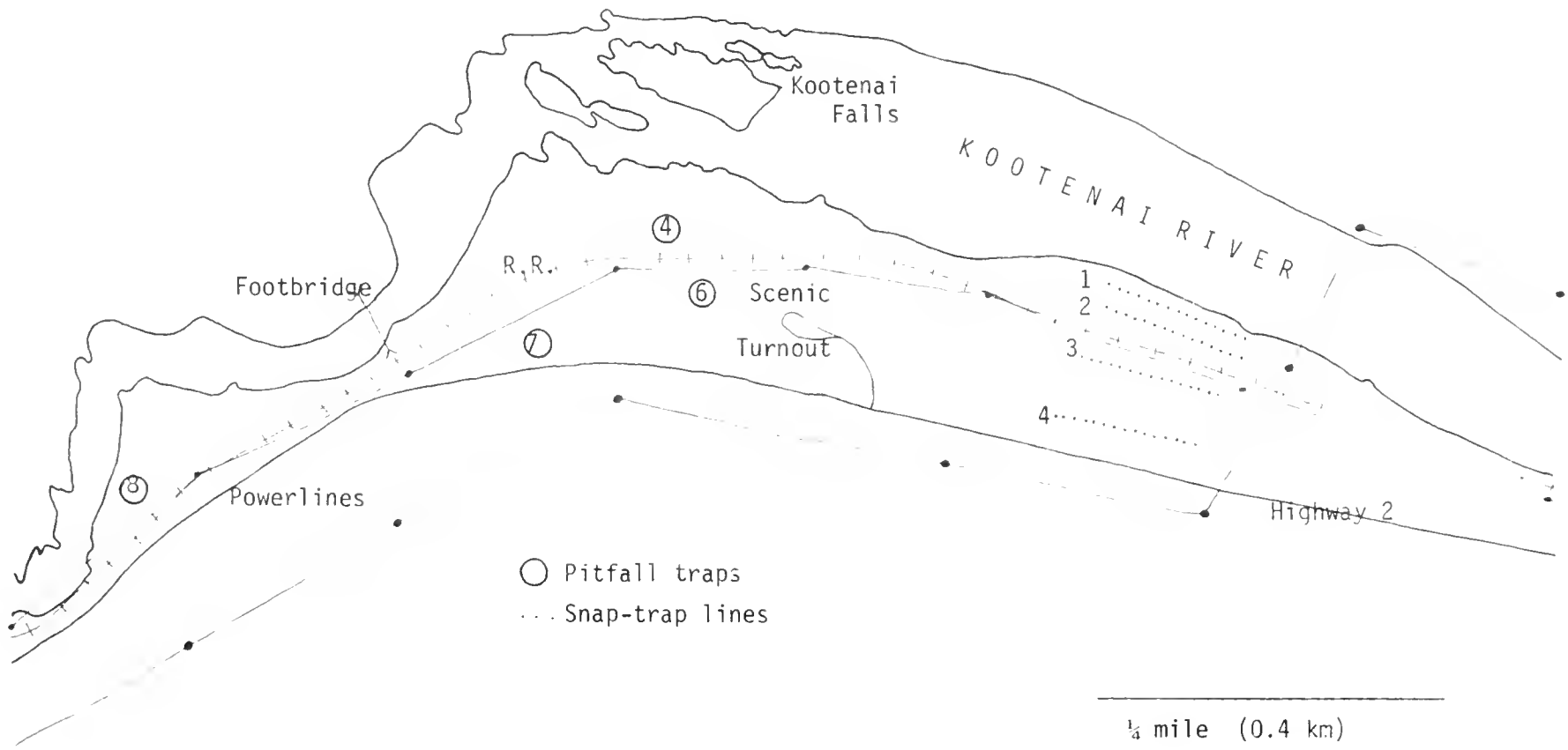


Figure 8. Primary study area and location of small mammal trapping sites.

Figure 9. Codes used for recording wildlife observations. Land areas numbered, river sections lettered.

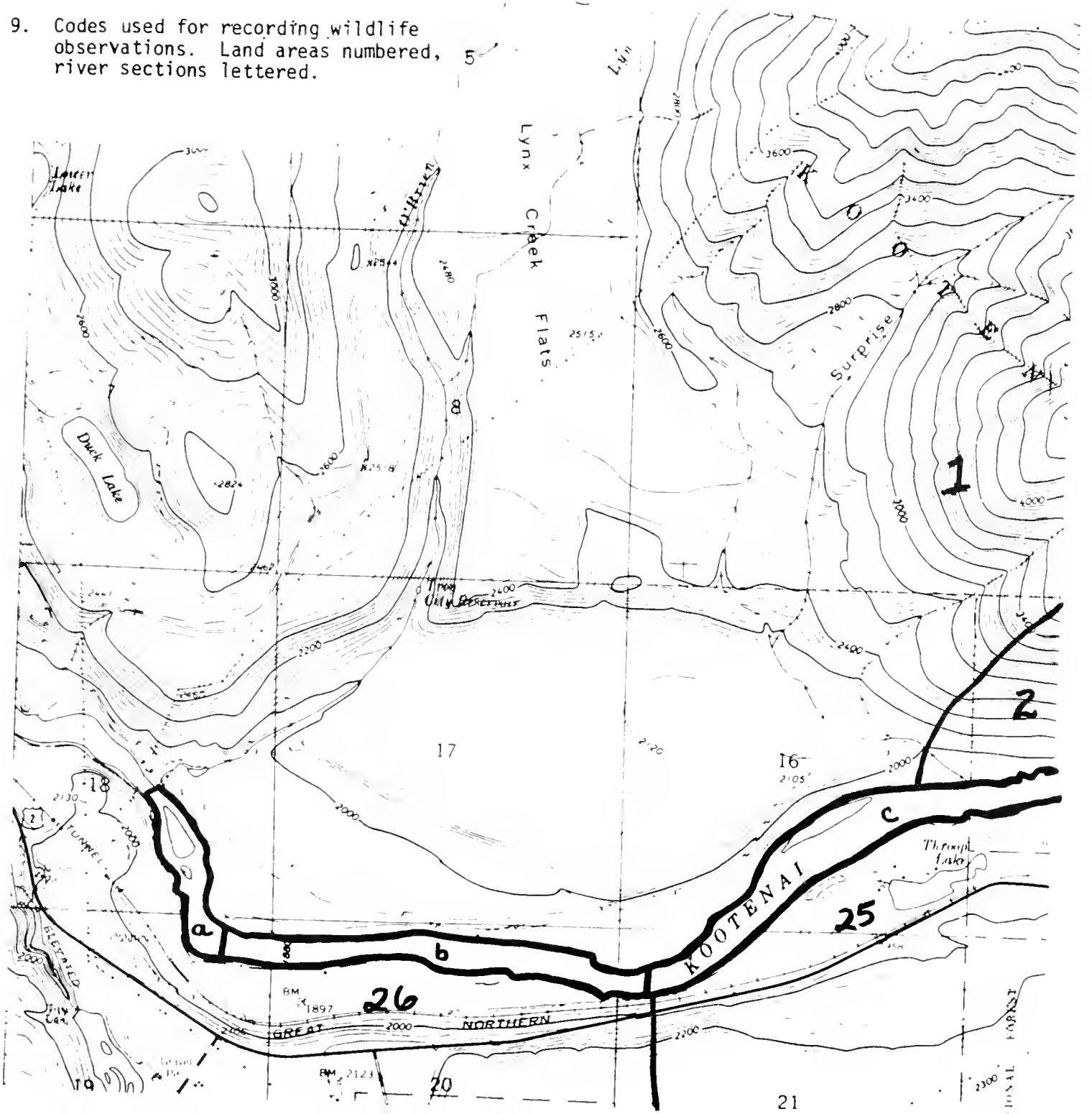
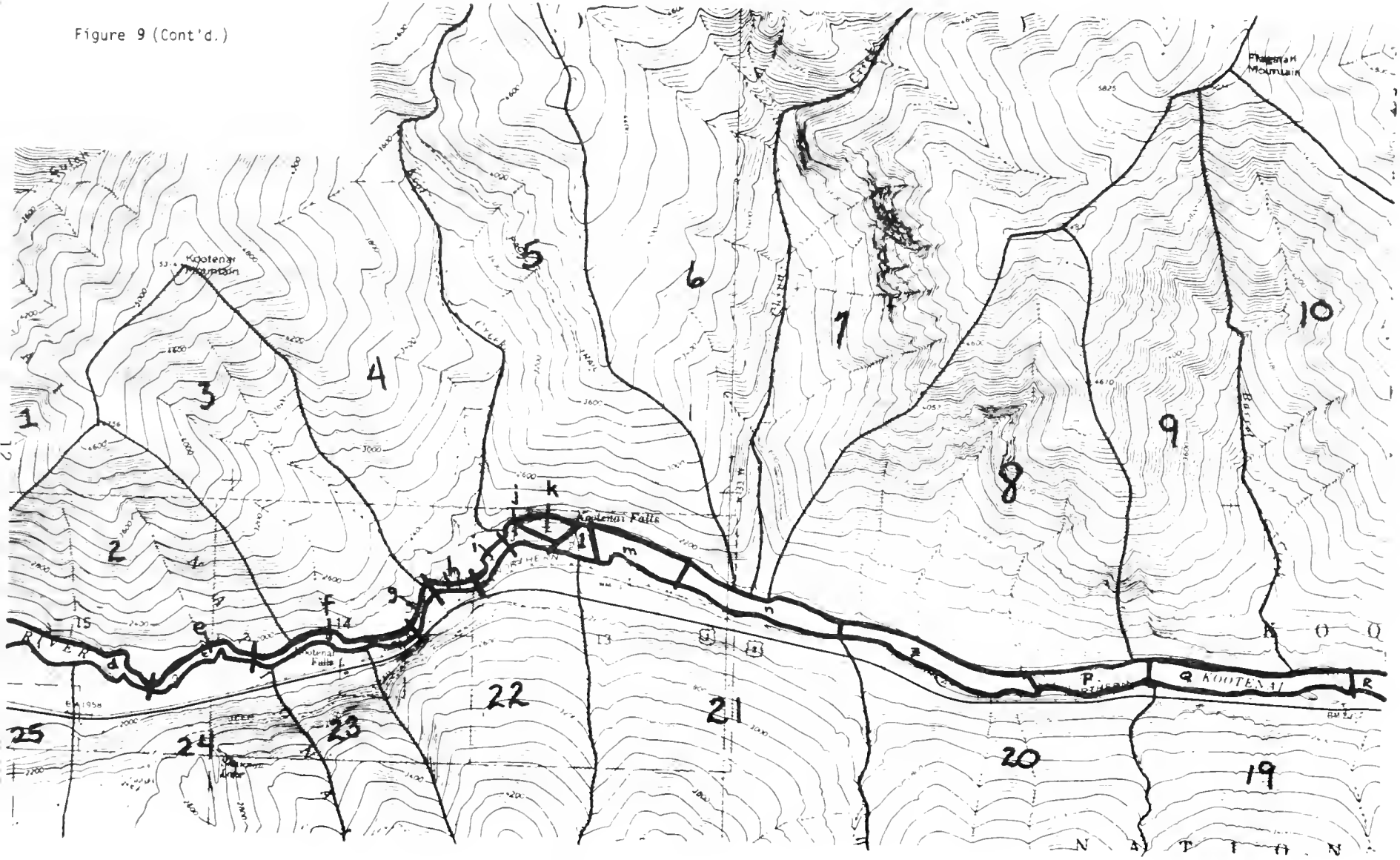


Figure 9 (Cont'd.)



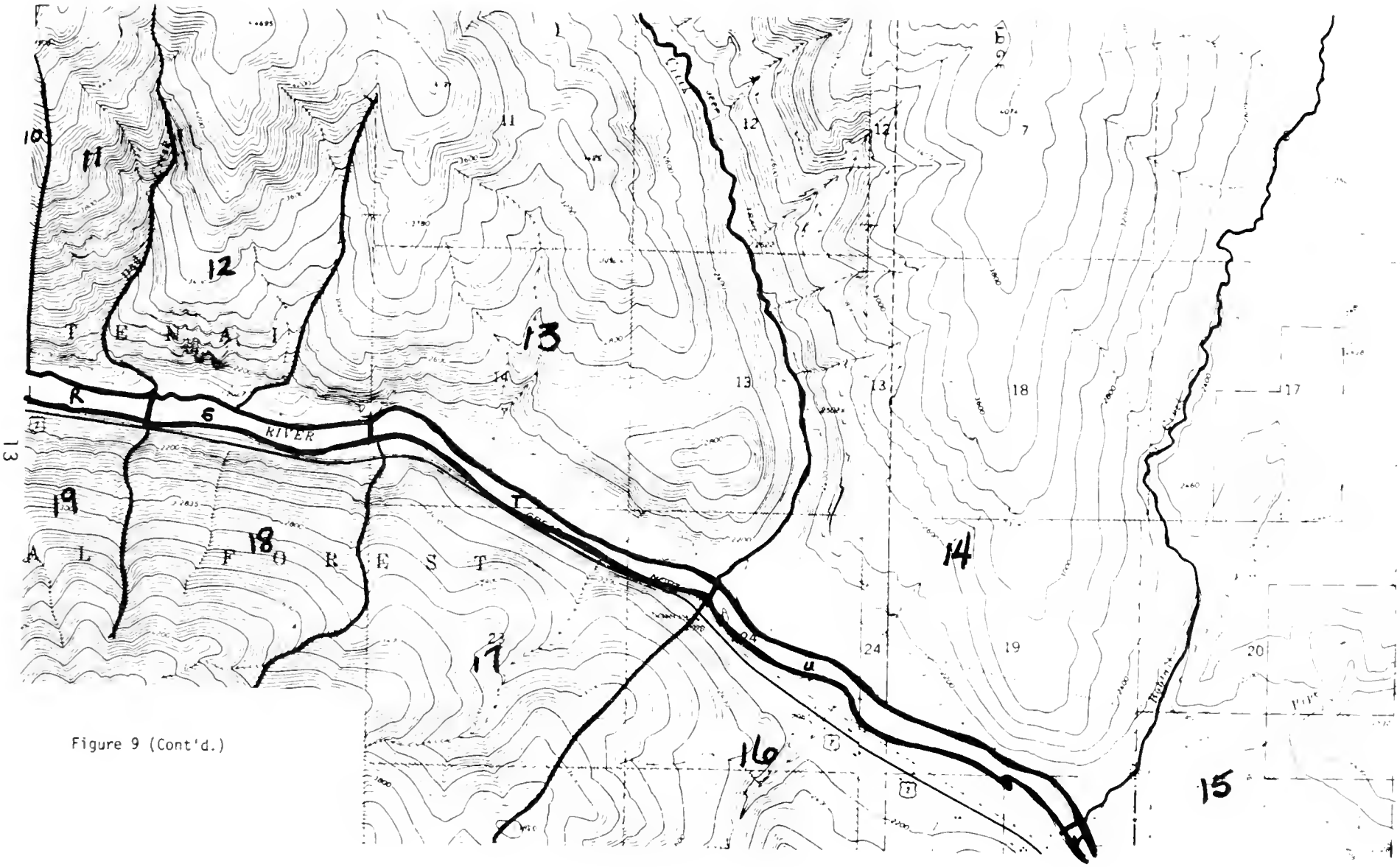


Figure 9 (Cont'd.)

Small Mammals and Other Vertebrates

Small mammal* populations were sampled in September of 1978 using a combination of snap and pitfall traps. September was chosen as the trapping period in an effort to sample populations near the peak of their annual cycle. The locations of all trapping sites and their code numbers are shown in Figure 8. Four snap trap lines, each consisting of 25 stations (2 traps/station, for a total of 50 traps per line) located at 15 m (45 ft.) intervals, were operated for three consecutive nights (September 3-5, 1978). Two of these trap lines (Nos. 1 and 2) were set in typical riparian grassland habitats in an area likely to be inundated should the project be implemented. The two remaining lines (Nos. 3 and 4) were set in typical nonriparian larch-cedar coniferous forest habitats adjacent to the grassland. Total trapping effort for these lines was 600 trap-nights (200 traps x 3 nights). In addition to snap trap lines, four additional lines, each consisting of 4 sunken-can ("pitfall") traps at 15 m (45 ft.) intervals, were run during the same period. These lines sampled typical forest-edge shrub (no.5), streamside within larch-cedar forest (no.6), shrubby Douglas fir-dominated forest (no.7), and rockslide habitats (no.8). All traps were removed at the end of the trapping period. Animals captured were weighed, measured, sexed, and identified to species. Standard study skins and skulls were prepared of all species except the deer mouse.

Observations of large mammals other than ungulates, all canivores, rodents, amphibians, and reptiles were collected incidental to other activities. Data recorded for the three latter groups included: date, location, habitat type, elevation, and aspect.

RESULTS

Habitat

The area south of the river in the vicinity of Kootenai Falls is heavily timbered and falls within the relatively moist western red cedar/queencup beadlily and western hemlock/queencup beadlily types, while the area to the north falls primarily within the much drier Douglas fir/ninebark, Douglas fir/bluebunch wheatgrass and Douglas fir/snowberry habitat types. Rocky outcrops, grassy meadows, and scree slopes are much more prevalent north of the river. A map of terrain types is shown in Figure 7. A detailed description of the vegetation of the primary study area, including the results of the quantitative survey, are presented in Appendix A.

Summary of Fauna Observed

Inventory data for 66 species of birds and 24 of mammals encountered during this study are summarized in Tables 1 and 2, respectively. The only reptiles observed were a group of nine western garter snakes (*Thamnophis elegans vagrans*) found beneath discarded sheet metal in riparian grassland near the head of Kootenai Falls. Stebbins (1966) however indicates that at least 14 other species of reptiles and amphibians occur in this region of the state.

---

* Small mammal trapping conducted by DNRC personnel.

Table 1. Summary of data collected on bird species observed on the Kootenai Falls study area, January through July 1978.

Species	Habitat	Local Distribution[1]	Status and Abundance[2] This Study	Skaar(1975)[6]	Jan	Feb	Mar	Apr	May	Jun	July[7]
Canada Goose *Branta canadensis*	Water; gravel bars; grassy shores with boulders	C,D,E,N	B-C	B W	-	-	M	A	M	J	-
Mallard *Anas platyrhynchos*	Water; calm & moderately fast; shoreline, backwater	D,F,L,M,N,T	W-A, b-A	B W	J	F	M	A	M	J	-
American Wigeon *Anas americana*	Water; calm, shoreline, backwater	M	sm-R	B W	-	-	-	A	M	-	-
Common Goldeneye *Bucephala clangula*	Water; calm, shoreline	E,F,M,N	W-A, b-A	B W	J	F	M	A	M	J	-
Barrow's Goldeneye *Bucephala islandica*	Water; calm, backwater	M	b-U	B W	-	-	-	A	M	-	-
Harlequin Duck *Histrionicus nistrionicus*	Water; fast, calm, rocks	F,G,H,J,L,M,N	b-U	b	-	-	-	A	M	J	-
Common Merganser *Mergus merganser*	Water; fast, calm, snoreline	D,F,G,H,N,S	w-U, B-A	B W	-	-	M	A	M	J	J
Red-tailed Hawk *Buteo jamaicensis*	Open; hillsides	2,8	s-U	B	-	-	-	-	M	-	-
Bald Eagle *Haliaeetus leucocephalus*	Timber along river	B,D,E,F,H,M,V	W-U, s-U	b W	J	F	M	-	-	J	J
Osprey *Pandion haliaetus*	Timber; along river	D,E,M,N,P,Q,Z, 7,21,22,24	b-C	B	-	-	M	A	M	J	J
American kestrel *Falco sparvarius*	Open-timber, deciduous vegetation-snags	21	B-U	B w	-	-	-	-	M	J	J
Ruffed Grouse *Bonasa umbellus*	Timber; conifers with shrub understory	F,8	b-U	B W	-	-	-	A	M	J	-
Killdeer *Charadrius vociferus*	Shoreline; grassy & mud	D,25	B-U	B W	-	-	-	-	M	-	-
Spotted Sandpiper *Actitus macularia*	Water; partly submerged rocks, shoreline	F,L,M,N,Z	b-C	B	-	-	-	-	M	J	J
California Gull *Larus californicus*	Water; river course	M	s-U	w	-	-	-	-	-	-	J
Ring-billed Gull *Larus delawarensis*	Water; river course	I,L	t-U, fm-R	t w	-	-	-	-	-	-	J
Band-tailed Pigeon *Columba fasciata*	Open; bare ground timber edge of opening	21	t-R		-	-	-	-	-	-	J
Mourning Dove *Zenaida macroura*	Timber - open edge	21	w-R, b-U	b W	-	F	-	-	M	J	-

Species	Habitat	Local Distribution[1]	Status and Abundance[2] This Study	Skaar (1975)[6]	Jan	Feb	Mar	Apr	May	Jun	July[7]
Brown Creeper *Certhia familiaris*	Timber; conifers, deep woods	22	w-R	B W	-	F	-	-	-	-	-
Dipper *Cinculus mexicanus*	Water; fast, partly submerged rocks, shore	F,H,I,J,L,P	W-C, s-C	B W	J	F	M	A	M	J	J
Winter Wren[4] *Troglodytes troglodytes*	Timber; conifers	22	s-R	B W	-	-	-	-	M	J	-
Gray Catbird *Dumetella carolinensis*	Shrubs, thick deciduous vegetation	21	s-U	B	-	-	-	-	-	J	-
American Robin *Turdus migratorius*	Timber, edge conifers, deciduous trees	21,20,5,8	b-C	B W	-	-	-	A	M	J	J
Varied Thrush *Ixoreus naevius*	Timber; thick conifer forest	22,21,20,8	b-C	B W	-	-	-	A	M	-	-
Swainson's Thrush *Catharus ustulatus*	Timber; thick conifer forest with shrubs	22,21,20,4,3	B-C	B	-	-	-	-	-	J	J
Townsend's Solitaire *Myadestes townsendi*	Timber; conifers	4,21	w-U	B W	-	-	M	-	-	J	-
Golden-crowned Kinglet *Regulus satrapa*	Timber; tree tops of conifers & undershrubs	25,24,23,22,21,20, 3,4	W-A, b-A	B W	J	F	M	A	M	J	J
Ruby-crowned Kinglet *Regulus calendula*	Timber; conifer tree-tops	21	b-U	B	-	-	-	-	M	-	-
Cedar Waxwing[4] *Bombycilla cedrorum*	Open timber; pines	22	s-R	B	-	-	-	-	-	-	J
Red-eyed Vireo *Vireo olivaceus*	Timber, deciduous trees, thick shrubs	21	b-U	B	-	-	-	-	-	J	J
Warbling Vireo[4] *Vireo gilvus*	Shrubs; mixed groves, conifers and deciduous	22	b-U	B	-	-	-	-	-	J	J
Orange-crowned Warbler *Vermivora celata*	Shrubs; dense	22	b-R	b	-	-	-	-	-	-	J
Nashville Warbler *Vermivora ruficapilla*	Timber; edge of conifers in deciduous vegetation	21,20,22	b-C	B	-	-	-	-	M	J	-
Yellow Warbler *Dendroica petechia*	Shrubs; deciduous trees & shrubs	23,21,22	b-U	B	-	-	-	-	M	J	-
Yellow-rumped Warbler *Dendroica coronata*	Timber; edge of conifers in deciduous vegetation	22,21,20,5,4,3	b-A	B	-	-	-	A	M	J	J
Townsend's Warbler *Dendroica townsendi*	Timber; edge conifers shrub understory	21	b-U	B	-	-	-	-	-	J	J
MacGillivray's Warbler *Oporornus tolmiei*	Timber; edge conifers shrub understory	22,21,20	b-C	B	-	-	-	A	M	J	J

Species	Habitat	Local Distribution[1]	Status and Abundance[2] This Study	Skaar(1975)[6]	Jan	Feb	Mar	Apr	May	Jun	July[7]
Vaux's Swift *Chaetura vauxi*	Open; river course	L,M	sm-U	b	-	-	-	-	M	-	-
Calliope Hummingbird[4] *Stellula calliope*	Shrubs; deciduous vegetation	22	s-R	B	-	-	-	-	-	-	J
Rufous Hummingbird *Selasphorus rufus*	Shrubs; deciduous vegetation	21	s-U	B	-	-	-	-	-	J	J
Belted Kingfisher *Megaceryle alcyon*	Water; shoreline	D,N	w-R, s-U	B W	-	F	-	-	-	-	J
Common Flicker *Colaptes auritus*	Timber; snags in riparian zone	21(M)	B-U	B W	-	-	-	-	M	J	J
Pileated Woodpecker *Dryocopus pileatus*	Timber; deep cedar woods, edge conifers-cedar	18, 22	W-U, s-U	b W	J	-	-	-	-	J	-
Hairy Woodpecker *Dendrocopos villosus*	Timber; edge conifers	21	W-R	B W	J	-	-	-	-	-	-
Willow Flycatcher *Empidonax traillii*	Shrubs; thick deciduous vegetation	21	b-U	b	-	-	-	-	M	J	-
Flycatcher (sp. undeterm) *Empidonax* sp.	Timber; cedar and doug-fir forest	22	b-U		-	-	-	-	M	J	-
Violet-green Swallow *Tachycineta thalassina*	Open; river course, cliffs	F,G.H,I,J,K,L,M	b-A	B	-	-	-	A	M	J	J
Tree Swallow *Iridoprocne bicolor*	Open; river course snags along shore	L,M, 21	B-U	B	-	-	-	-	M	J	J
Rough-winged Swallow *Stelgidopteryx ruficollis*	Open; river course holes in retaining wall	F,G	B-U	B	-	-	-	-	M	J	J
Steller's Jay[4] *Cyanocitta stellaria*	Timber; conifers	22	fm-R	b W	-	-	-	-	-	-	-
Common Raven *Corvus corax*	Timber; Open; shore-line	M,26,25,22,21,20, 8	W-C, B-C	B W	J	-	-	-	M	J	J
Common Crow *Corvus brachyrhynchos*	Timber; Open; shore-line	24,23,22,21,20,8	W-A, b-A	b W	J	F	M	A	M	J	J
Black-capped Chickadee *Parus atricapillus*	Timber; edge conifers, deciduous shrubs	24,23,22,21,20	W-A, B-A	B W	J	F	M	A	M	J	J
Mountain Chickadee[4] *Parus gambeli*	Timber; conifers	22	fm-R	B W	-	-	-	-	-	-	-
Chestnut-backed Chickadee *Parus rufescens*	Timber; edge, shrub understory	21	w-U	b W	J	-	-	-	-	-	-
Red-breasted Nuthatch *Sitta canadensis*	Timber, conifers	22	w-R	B W	-	-	M	-	-	-	-

Species	Habitat	Local Distribution[1]	Status and Abundance[2] This Study	Skaar(1975)[6]	Jan	Feb	Mar	Apr	May	Jun	Jul,[7]
American Redstart *Setophaga ruticilla*	Timber; moist clump of birch in conifers	22	b-U	B	-	-	-	-	-	J	J
Brown-headed Cowbird *Molothrus ater*	Timber; edge of conifers and deciduous vegetation	21,20	b-C	B	-	-	-	-	M	J	J
Western Tanager *Piranga ludoviciana*	Open & deciduous timber and thick shrubs	21,20	b-U	B	-	-	-	-	-	J	J
Lazuli Bunting *Passerina amoena*	Timber; deciduous trees & thick shrub understory	21	s-R	b	-	-	-	-	-	J	-
Pine Siskin *Spinus pinus*	Timber; conifer treetops Douglas-fir and ponderosa pine	21,20	b-C	b W	-	-	-	-	M	J	-
Dark-eyed Junco *Junco hyemalis*	Timber; conifers	3,4,23,22,21,20	B-C	B W	-	-	-	-	M	J	J
Chipping Sparrow *Spizella passerina*	Timber; conifers, edge	4,22,21,20	B-C	B	-	-	-	-	M	J	J
Lincoln's Sparrow *Melospiza lincolnii*	Timber; conifers	22,21	s-R	b	-	-	-	-	M	-	J
Song Sparrow *Melospiza melodia*	Shrubs; thick deciduous vegetation	22,21,20	W-R, B-A	B W	J	F	M	A	M	J	J
Snow Bunting *Plectrophenax nivalis*	Open; bare ground, perch on power lines	21	w-U	W	J	-	-	-	-	-	-

1/ See Figure 9 for location codes of river stretches (letters) and upland areas (numbers)

2/ Status:

W - overwinters on area (at least one record each during January and February)
w- transient in winter
sm - spring migrant
fm - fall migrant
B - breeds on area (nest or dependent young located)
b - probably breeds on area (territorial males or pairs located)
s - summers on area in small numbers but no evidence of breeding
t - occurs but no evidence of breeding

Abundance:

A - abundant, found in large numbers in appropriate habitats
C - common, found in moderate numbers in appropriate habitats, 15 to 50 registrations
U - uncommon, small numbers in appropriate habitats, 2 to 15 registrations
R - rare, few sightings, 1 or 2 registrations

3/ Observed by Montana Department of Fish and Game fisheries biologist Pat Graham

4/ Observed by Montana Department of Natural Resources and Conservation wildlife biologist Larry Thompson. Observations not noted in the month columns were made during October, 1977.

5/ Observed by fisheries biologist assistant Bill Martin.

6/ Indicates status of species in this region of the state as reported by Skaar (1975).

7/ Months when seen are indicated by letter abbreviations in sequence, January through July.

Table 2. Summary of data collected on general habitat use and local distribution of mammals observed on the Kootenai Falls study area, 1978.

Common Name	Scientific Name	General Habitat Description	Local Distribution[1]
Masked shrew	(Sorex cinereus)	Trapped in western red cedar forest	21
Vagrant shrew	(Sorex vagrans)	Riparian grassland; Douglas fir and western red cedar forest	21
Golden-mantled squirrel	(Spermophilus lateralis)	Open, Douglas-fir/ponderosa pine forest on north side of river	4
Columbian ground squirrel	(Spermophilus columbianus)	Banks in open areas along railroad tracks; north of river in open Douglas-fir-ninebark forest	3,4,20,21,22
Red-tailed chipmunk	(Eutamias ruficaudis)	Dense shrubs along railroad tracks; cedar and fir forests	4,21,22
Red squirrel	(Tamiasciurus hudsonicus)	Conifers; several middens in Section 21	3,4,5,6,20,21,22,23,24
Northern flying squirrel	(Glaucomys sabrinus)	Conifers; remains discovered	22
Beaver	(Castor canadensis)	Under cut banks along south shore of river above the falls and observed in calm water below the falls	M,N,D,E
Deer mouse	(Peromyscus maniculatus)	Coniferous forest	21
Red-backed vole	(Clethrionomys gapperi)	Western red cedar forest	21
Meadow vole	(Microtus pennsylvanicus)	Riparian grassland	21
Long-tailed vole	(Microtus longicaudus)	Riparian grassland and shrubbery	21
Muskrat[2]	(Ondatra zibethica)	Below the falls in calm water	E
Meadow jumping mouse	(Zapus princeps)	Riparian grassland	21
Bushy-tailed woodrat	(Neotoma cinerea)	Steep sidehill, large rocks in timber	22
Mink[3]	(Mustela vison)	Watercourses; dead on highway	21
River otter[4]	(Lutra canadensis)	Dense, deciduous bank vegetation and river	M-N
Coyote	(Canis latrans)	Conifer forests, deciduous vegetation, meadows, shore	21
Black bear[2]	(Ursus americanus)	Trail through dense vegetation leading to river; apparently regularly used	18
White-tailed deer	(Odocoileus virginianus)	Often associated with water and dense brush but also observed in dry rocky habitats.	- [5]
Mule deer	(Odocoileus hemionus)	Often observed on steep timbered hillsides but also occurring on the flood plain	- [5]
Elk	(Cervus canadensis)	One set of tracks in cedar forest	21

Moose	(Alces alces)	River floodplain and cedar forest	17,19
Bighorn sheep	(Ovis canadensis)	Primarily in Douglas-fir habitat types and associated bluffs, broken terrain , cliffs and parks north of the river	- 6/

1/ See Figure 9 for location codes of river (letters) and upland (numbers) portions of the study area.

2/ Observed by Pat Graham, fisheries biologist.

3/ Collected by Bill Martin, fisheries biologist assistant.

4/ Observed by reliable fisherman via Pat Graham, fisheries biologist.

5/ See Figure 11, distribution map of deer observations.

6/ See Figure 10, distribution map of bighorn sheep observations.

Birds

Over 211 bird species occur in the Kootenai Basin (Skaar 1975), 84 percent of which breed there. Over 50 of these species are directly dependent upon water and an undetermined majority are dependent upon riparian habitat. Seven waterfowl, 4 raptors and 55 other bird species were observed on the study area (Table 1) out of a possible 29 waterfowl, 15 raptors and 167 other bird species which are known to occur in this region of the state. Those species observed are an incomplete sample of the total avifauna of those that actually occur there.

Observations of waterfowl were collected on the Kootenai Falls study area from January 20 through July 8, 1978 (Table 3). Wintering waterfowl included the mallard and common goldeneye. The highest number of mallards observed was 42 on February 24 and a high of 47 common goldeneye was observed February 15. Twenty-nine species of waterfowl have been recorded as transients or wintering birds in northwest Montana (Skaar 1975).

During the March through May spring migration period, seven species of waterfowl were observed in the Kootenai Falls study area. Common goldeneye was the most prevalent species followed by mallard, common merganser, Canada goose, harlequin duck, Barrow's goldeneye, and American widgeon.

Of the seven species observed during spring migration three species were known to breed on the study area including common merganser, mallard and Canada goose. Territorial pairs of harlequin ducks and common goldeneye were observed on the study area which indicate that breeding probably occurred (Dzubin 1969). This survey terminated at or before the peak of hatching for all waterfowl species observed.

Harlequin ducks were first observed April 29. They were seen feeding in the rushing waters at the head of the falls (area code L, Figure 9), in the gorge between two waterfalls (J), and in the gorge below the footbridge (H and I). All feeding sites were in swift water. Harlequins were observed loafing on exposed rocks in the river near the edge of the falls (M). A minimum of seven harlequin ducks, consisting of one pair, a lone female and four bachelor males, used the falls area and provided 88 observations. Harlequins nest in cavities (Peterson 1961) or on the ground near turbulent water (Bellrose 1976). The majority of broods hatch during the first week of July and do not feed in fast waters for 2 weeks (Kuchel 1977); therefore, broods are usually not observed till the later part of July and early August. Since this survey was terminated in early July it was not possible to document breeding, although a possible but unconfirmed brood of seven harlequin ducks was seen on June 12 by B. Shepard (pers. com.)

Common goldeneye were first observed January 20 with the initiation of this survey. They were seen along the river from near the city limits of Libby to near the only island in the river below the falls (E), but they were most often seen in the section of river (M and N) from Williams Creek to the head of the falls. Common goldeneye usually nest in cavities in deciduous trees (Bellrose 1976). Along the Kootenai River this type of habitat occurs in the riparian zone. The unverified report of a harlequin brood was possibly that of a common goldeneye brood because brood size and date of observation were indicative of goldeneye.

Table 3. Number of waterfowl observations recorded each month on the Kootenai Falls study area, January - July, 1978

	January	February	March	April	May	June	July
Common goldeneye	24(72)[1/]	196(71)	222(66)	27(29)	51(19)	36(17)	-
Mallard	9(28)	82(29)	29(9)	37(39)	96(36)	29(14)	-
Common merganser	-	-	21(6)	7(8)	32(12)	90(44)	9(100)
Canada goose	-	-	1(tr)	18(19)	33(13)	2(1)	-
Harlequin duck	-	-	-	1(1)	38(14)	49(24)	-
Barrow's goldeneye	-	-	-	2(2)	13(5)	-	-
American wigeon	-	-	-	2(2)	2(1)	-	-
Unidentified duck	-	-	64(19)	-	1(tr)	-	-

1/ Number of waterfowl observed (percent of total waterfowl observed during the month).

Mallards were first observed January 10. They were seen along the river from Bobtail Creek (U) to below the falls south of Kootenai Mountain (F). Mallards were seen in the same sections of river as common goldeneye (M and N); however, on several occasions they were noted standing and feeding in the white water just above the crest of the falls (L). A favorite loafing site of mallards was the point of land east of the boundary between sections M and N. A class I-a (Gollop and Marshall 1954) mallard brood of six was observed on May 18 directly across from China Creek (N).

Canada geese were first observed March 7. They were seen on or flying over the river from Williams Creek (N) to near Throops Lake (C). Geese were most often observed while in flight although loafing geese were observed on several occasions just up from Kootenai Falls at the boundary of sections M and N. Broods of three and eight were reported on April 26 and May 15, respectively, upstream from Throops Lake (D).

Common mergansers were first observed March 2. They were seen on the river from near the city limits of Libby to up river from Throops Lake (D). Second only to harlequin ducks, common mergansers utilized the fast water of the falls for feeding and security (I, J, L). Common mergansers were observed more universally along the river than any other species. At least two broods (probably creches), having an average brood size of 11.5, were observed between Williams Creek and China Creek (N and Z--Z was substituted for 0 for coding purposes). Common mergansers nest in cavities of deciduous trees usually near water. Peak of hatch (Bellrose 1976) was occurring just at termination of this survey.

Barrow's goldeneye were first observed April 30 and were last observed May 18. No more than two birds were observed on any one occasion although at least two males and one female were present and used the bay area immediately above the falls (M). These birds were apparently transients. Nesting habits of the Barrow's goldeneye are similar to those of the common goldeneye.

American wigeon were observed on April 30 and once more on May 25 in the bay area immediately above the falls (M). They were apparently using the area as a stopover.

Four species of raptors were observed on the study area including the red-tailed hawk, bald eagle, osprey and American kestrel. The red-tailed hawk was observed twice soaring high over the area; specific use of the canyon for breeding, nesting or wintering was not determined. The bald eagle was classified as an endangered species in February 1978. Bald eagles were observed on eight occasions from January, when this survey began, to July, when it ended. Bald eagles were observed at the following locations: directly over the falls (J), immediately below Kootenai Falls flying over the footbridge (H), downriver from this location approximately 0.8 km (½ mile) (F), on two occasions at the lower entrance of the river gorge (D), near the junction of Highways 2 and 202 (two perched in conifers along the river, and one perched in a conifer near the town of Libby).

Osprey were observed on 49 occasions along the river. Although no nests were located it is believed that one pair nested up Williams Creek (area code 21 - 22), another pair may have nested below the falls near the mouth of the canyon near the location of an old osprey nest (25), and a third pair may have nested on or near Lynx Flats (1). A pair was reportedly observed going through the motions of building a nest above the highway retaining wall midway down the gorge (22), but since the activity occurred in mid-June and was not completed, it is likely this pair was either young birds or was engaging in an unsuccessful renesting attempt.

The nest of an American kestrel was located in an abandoned woodpecker hole in a cottonwood snag immediately upriver from the falls (21). The nesting kestrel and a common flicker were observed harassing each other on several occasions. The flicker was nesting nearby. Success of the kestrel nest was not determined.

Forty-eight species of birds other than waterfowl (including raptors) were observed by the primary investigator and another 11 species were observed by other researchers in the area (Table 1). Species observed included: raptors - 4, grouse - 1, shorebirds - 4, pigeons - 2, swifts and hummingbirds - 3, kingfisher - 1, woodpeckers - 3, and perching birds - 41.

If a species was observed during January and February it was considered a wintering bird. Eleven species were documented winter residents of the study area, but the survey was not officially initiated until February; therefore, this figure is likely an underestimate of the wintering birds present. Skaar (1975) indicates that of the 59 species observed during this study, 30 (51 percent) winter in this region of the state (Table 1).

Winter transients were defined as those species which were observed on one occasion sometime during the period from January to March 15. Although seven species were classified as winter transients, Skaar (1975) indicates that all but the snow bunting actually spend the winter in northwest Montana.

Worthy of special note is the dipper population which winters at the falls. On one occasion 11 dippers were observed feeding in the rushing water. The average number of dippers observed during 11 trips to the falls was 6.25. Dippers move to lower elevations to find fast water during winter; they do not migrate. Because of this, the few available stretches of free-flowing white water become critical wintering areas. Kootenai Falls constitutes such an area.

Only the Vaux's swift was classed as a spring migrant. It was observed once during the spring period.

Following techniques described by Skaar (1975), 10 species were classed as confirmed breeders while 20 were classed as circumstantial breeders and 13 were classed as summer residents since evidence of breeding was not obtained. Of the 59 species observed during this survey, Skaar (1975) indicates that 36 (61 percent) are confirmed breeders and another 10 (17 percent) are circumstantial breeders in this region of the state.

Observations of the ring-billed gull, rarely seen in this region of the state, were made during June. An unverified sighting of the relatively rare band-tailed pigeon was also reported during June (B. Martin, pers. com.).

Table 4 reveals that 59 bird species were registered a total of 1277 times according to sight or song. Sixty percent of the registrations were recorded in the riparian type paralleling the river. This riparian floodplain area is the site of the proposed reservoir and construction area. The remaining registrations were noted in the coniferous forest sloping upward from the floodplain. The riparian type was used by 76 percent of the species observed while the conifer type was used by 51 percent of the species observed. Mapping of the territories of 26 bird species revealed that 85 percent of the species used the riparian type exclusively or in combination with the coniferous type. Only 15 percent of the

Table 4. Number of registrations and number of territories recorded for each bird species on the Kootenai Falls study area during sixteen transect runs and general reconnaissance, January 20 - July 8, 1978.

Species	Number of Registrations[1]					Number of Indicated Breeding Territories[2]		
	During Transect Runs		During Other Times					
	Conifers[3]	Riparian[4]	Conifers	Riparian	Total	Conifers	Riparian	Ecotone
Canada goose		28		26	54			
Mallard		239		43	282		1	
American wigeon		2		2	4			
Common goldeneye		313		243	556			
Barrow's goldeneye		13		2	15			
Harlequin duck		75		13	88		1	
Common merganser		105		45	150		2	
Red-tailed hawk			2		2			
Bald eagle				8	8			
Osprey		4		45	49			2
American kestrel		3		1	4		1	
Ruffed grouse	1		1	2	4			
Killdeer				6	6			
Spotted sandpiper		21		10	31		3	
California gull				8	8			
Ring-billed gull				1	1			
Band-tailed pigeon[5]				1	1			
Mourning dove	4	2			6			1
Vaux's swift		2		1	3			
Calliope hummingbird				1	1			
Rufous hummingbird		2		2	4			
Belted kingfisher		1		3	3			
Common flicker		3		1	4		1	
Pileated woodpecker	1		2		3			
Hairy woodpecker			1		1			
Willow flycatcher				3	3		1	
Flycatcher (*Empidonax* sp.)			2		2			
Violet-green swallow		38		21	59		3	
Tree swallow		9		3	12		1	
Rough-winged swallow		4		8	12			
Steller's jay			1		1			
Common raven	9	12	21		42			5
Common crow	77	85	35	15	212			13
Black-capped chickadee	27	23	32	16	98		2	4
Mountain chickadee			1		1			
Chestnut-backed chickadee				8	8			
Red-breasted nuthatch			1		1			
Brown creeper				1	1			
Dipper		10		59	69		4	
Winter wren			2		2			
Gray catbird		2		1	3			
American robin	17	25			42			10
Varied thrush	16	1			17	3		
Swainson's thrush	21		11		32			1
Townsend's solitare	1		2		3			
Golden-crowned kinglet	28		72		100	4		
Ruby-crowned kinglet	12				12	4		
Cedar waxwing			1		1			
Red-eyed vireo		7			7		2	
Warbling vireo				1	1			
Orange-crowned warbler				1	1			
Nashville warbler	9	6	1	1	17			5
Yellow warbler		12		1	13		1	
Yellow-rumped warbler	41	13		1	55			12
Townsend's warbler	2				2			
MacGillivray's warbler	2	16	1		19		3	3
American redstart				1	1			
Brown-headed cowbird	2	22			24		4	1
Western tanager	2	2		2	6			
Lazuli bunting		2			2			
Pine siskin	8	6			14			
Dark-eyed junco	21	2	1		24	5		
Chipping sparrow	11	4	5		20			3
Lincoln's sparrow	1			1	2			
Song sparrow		184		1	185		20	
Snow bunting				8	8			

1/ Registrations = observations or song (call).
2/ Territories determined from breeding season transect information only. A minimum of three registrations recorded on different days were used in defining a territory.
3/ Conifer = the western red cedar, douglas-fir, western larch, lodge pole pine forest. This area would not be flooded by the proposed project and little area would be disturbed.
4/ Riparian = deciduous forest and floodplain grassland, an area which is likely to be disturbed or flooded as a result of the proposed project.
5/ Unconfirmed.

species utilized the coniferous type exclusively. A total of 122 territories was identified on the transect for the 26 species. Eighty-seven percent of the territories occurred in the riparian type or ecotone; 77 percent of these occurred exclusively in the riparian type.

Mammals

The general habitat description and local distribution of mammals observed on the Kootenai Falls study area during 1978 are presented in Table 2.

Bighorn sheep were the most frequently observed ungulate in the Kootenai Falls study area. Twenty-one bighorns were transplanted along the Kootenai River between Libby and Troy in 1954, 1955 and 1963. Sporadic observations have been made by Montana Department of Fish and Game personnel (K. Knocke and B. Campbell) since 1974. Only the information collected since June 1977 was utilized in the following analysis.

From June 1977 through July 1978, 109 groups totaling 522 sheep observations were recorded (Table 5). These consisted of 91 rams, 247 ewes, 102 lambs and 82 unclassified sheep. Monthly censuses were conducted from February through June 1978, and the number observed during any one census represented a minimum number of sheep present on the visible portion of the study area. During the February census 40 sheep were observed, followed by 76 in March, 74 in April, 46 in May and 35 in June. These figures represent the maximum number of sheep observed during any one census. Observability of sheep was hampered by dense timber, rugged terrain and ground censusing from one elevation along the highway. Aerial surveys were limited due to dangerous flying conditions in the narrow canyon. A capture and mark program would be necessary to obtain population estimates or yearly trends.

Bighorn ewes do not normally breed until 2½ years of age (Smith 1954). It was difficult to separate the yearling ewe component and the 1/2 to 3/4 year old rams from adult ewes depending upon the date of observation. The unclassified portion of the herd consisted of this faction and possibly some adult ewes. Sheep classified as lambs in April were considered yearlings in May, since two newborn lambs were observed May 7. The lamb/ewe ratio (primary age ratio) based on classified animals for the February through April period was 50.5/100. This figure may be high if adult ewes were inadvertently unclassified. The ratio is 39.4/100 when the unclassified segment is incorporated. The true primary age ratio falls within this range (11 percent). Stelfox (1976) indicates that the average primary age ratio of four Canadian bighorn herds during the winter period was 45.6 lambs/100 ewes, which compares closely with these findings; however Brown (1974) found an 82 percent ratio for the February through April period in the nearby Thompson Falls herd. Age ratios cannot be used to interpret herd vigor (Caughley 1974) because the population may be exploding or crashing while the age ratio is doing the opposite, depending upon other demographic factors. The ram/ewe ratio for all months combined was 36.8/100.

The activity or behavior of all observed bighorns was recorded according to one of five activity patterns (Table 6). Seasonal changes did not seem to influence activities, although walking and running were observed more often during the summer months.

Table 5. Number of groups and number of bighorn sheep observations made each month on the Kootenai Falls study area, June 1977 - July 1978.

Date	Number of Groups Observed	Number of Sheep				
		Total	Male	Female	Lambs	Unclassified
1977						
June	1	17	1	8	7	1
November	4	13	3	6	-	4
December	1	1	1	-	-	-
1978						
January	5	11	4	3	4	-
February	10	40	12	14	9	5
March	29	121	35	48	21	17
April	16	92	15	45	24	8
May	28	113	12	70	7	29
June	8	58	1	26	17	14
July	7	51	7	27	13	4
Total	109	522	91	247	102	82

Table 6. Monthly activity of bighorn sheep on the Kootenai Falls study area, June 1977 through July 1978.

Date	Activity						
	Feeding	Bedded	Walking	Standing	Running	Tracks	Unknown
Nov. 1977 - Jan. 1978	30/32 [1]	-	10/4	50/56	-	10/8	-
February 1978	70/48	10/40	10/10	-	-	-	10/2
March 1978	69/85	25/13	-	3/1	-	-	3/1
April 1978	28/30	72/70	-	-	-	-	-
May 1978	38/47	26/31	7/3	25/17	-	-	4/2
June 1977 - 1978 [2]	11/8	22/20	22/28	44/44	-	-	-
July 1978 [3]	29/28	29/45	-	28/7	14/20	-	-
Total	41/45 [4]	27/33	5/5	18/13	1/2	1/1	3/1

[1] Percentage of groups observed during the month/percentage of sheep observations during the month.

[2] June, 1977 and 1978 data combined.

[3] July 1978 data only.

[4] Percentage of total groups/percentage of total sheep observations.

Habitat use on the Kootenai Falls bighorn sheep range is summarized in Tables 7 through 11. As previously mentioned, an observability bias was present which likely influenced the data. A radio-tracking program would alleviate this type of bias. Table 7 and Figure 10 reveal where bighorns were observed, by season. From November through March, most bighorns were observed from just below the falls (area 3, Figure 9), across Kootenai Mountain (areas 1 and 2). During spring and summer (except for June) the majority of sheep were found on other portions of the study area, upriver from the falls. During November through March the majority of sheep were observed using the broken terrain type (Table 8) but from April through July sheep were most commonly observed on the bluff terrain type. Although bighorns have occasionally been observed south of the highway, for purposes of this survey, the sheep range was considered the north side of the canyon. Because of this, sheep were predominantly observed on south aspects during all months (Table 9). During November through March the majority of sheep were observed using slopes between 10 and 35 degrees (Table 9), while during April through July sheep were observed on all slopes. Through April, the majority of sheep observed were at elevations between 670 m (3300 feet) and 835 m (2800 ft.). After April, sheep appeared to be dispersed at all observable elevations (Table 11).

A partially paralyzed bighorn lamb captured on June 8 was suffering from a large infestation of ticks and secondary afflications including wounds, pneumonia and dehydration. Efforts to improve his condition were unsuccessful so he was dispatched on June 18. The carcass was sent to the veterinary clinic in Bozeman for autopsy.

Deer, elk and moose observations were made incidental to other activities. The general habitat description and local distribution of each species are presented in Table 2. Monthly distribution of 18 mule deer, 11 white-tailed deer, 21 deer tracks, 11 droppings and 14 beds are given in Table 12 and Figure 11. Habitat type and elevation information collected for each observation is presented in Table 13. Two moose and one set of elk tracks were observed on the study area.

Black bear, coyote, river otter and mink were the only species of carnivores observed on the study area. General habitat description and local distribution of these species are given in Table 2. All species except the coyote were observed by other individuals in the area. The river otter was reportedly observed approximately 410 m (450 yards) upstream from the falls.

Rodents observed, a description of the general habitat in which they were observed and their local distribution on the study area are given in Table 9. An active beaver lodge was discovered on the river's south shore, upriver from the falls, below the powerline crossing, on the boundary of river sections M and N (Figure 9). Den openings were in an undercut bank protected by a flexible barricade of cut branches and shrubs which allowed secure access to and from the den regardless of river fluctuation.

A summary of small mammal trapping data is presented in Table 14. Eight species of mammals were captured during the trapping program; a song sparrow was also taken in a snap trap. Snap-trap data indicated that the total number of captures, total number of species, and total biomass of captures were lower in the riparian grassland than in adjacent coniferous forest. A large percentage of all captures and biomass in the coniferous forest were of deer mice, which were not taken in riparian grassland. Voles of the genus *Microtus* and meadow jumping mice were taken only in riparian grassland, while the masked shrew, red-tailed chipmunk, and red-backed vole were taken only in conifers during the snap-trapping program.

Table 7. Monthly distribution of bighorn sheep on each area of the Kootenai Falls study area, June 1977 through July 1978.

Date	Area Codes [1]												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Nov. 1977 - Jan. 1978	20/12[2]	20/20	20/12	-	10/12	-	10/20	10/20	-	-	10/4	-	-
February 1978	-	10/10	20/50	10/13	10/2	-	-	30/15	-	-	-	-	20/10
March 1978	3/11	28/13	10/5	-	10/7	-	-	3/3	7/14	-	-	21/32	18/15
April 1978	-	-	31/33	-	6/5	-	-	13/18	-	6/2	-	38/34	6/8
May 1978	-	11/3	21/22	-	-	-	-	14/8	22/28	-	4/4	21/24	7/11
June 1977 - 1978 [3]	-	-	45/50	-	-	-	-	22/27	11/4	-	-	11/16	11/3
July 1978 [4]	-	14/4	14/10	-	-	-	29/25	14/18	-	-	-	-	14/43
Total	3/3[5]	13/6	21/25	1/1	6/3	-	3/3	13/14	8/11	1/tr	2/1	17/21	12/12

[1] See Figure 9 for upland area codes.

[2] Percentage of groups observed during the month/percentage of sheep observations during the month.

[3] June 1977 and 1978 data combined.

[4] July 1978 data only.

[5] Percentage of total groups/percentage of total sheep observations.

Table 8. Montnly observations of bighorn sheep according to terrain type on the Kootenai Falls study area, June 1977 through July 1978.

Date	Terrain Type					
	Bluff	Sidehill	Cliff	Broken	Talus	Ridge
Nov. 1977 - Jan. 1978	-	20/12 [1]	10/20	70/68	-	-
February 1978	-	10/3	10/10	70/85	10/3	-
March 1978	34/32	7/2	3/7	38/40	14/13	-
April 1978	44/51	-	-	25/26	31/23	3/4
May 1978	54/70	-	11/8	32/21	4/1	-
June 1977 - 1978 [2]	78/72	-	11/3	11/25	-	-
July 1978 [3]	29/51	14/17	14/20	29/10	14/2	-
Total	38/48 [4]	5/2	7/11	38/30	11/8	1/1

[1] Percentage of groups observed during the month/percentage of sheep observations during the month.

[2] June 1977 and 1978 data combined.

[3] July 1978 data only.

[4] Percentage of total groups/percentage of total sheep observations.

Table 9. Monthly distribution of bighorn sheep according to aspect on the Kootenai Falls study area, June 1977 through July 1978.

Date	Aspect					
	East	Southeast	South	Southwest	West	Unknown
Nov. 1977 - Jan. 1978	10/20 [1]	30/32	40/36	20/12	-	-
February 1978	-	10/12	70/75	20/13	-	-
March 1978	-	3/2	90/83	7/15	-	-
April 1978	-	13/10	81/84	6/6	-	-
May 1978	-	36/49	43/39	14/8	-	7/4
June 1977 - 1978 [2]	-	22/20	67/79	11/1	-	-
July 1978 [3]	-	14/41	43/16	14/18	29/25	-
Total	1/1 [4]	18/23	65/63	12/10	2/2	2/1

[1] Percentage of groups observed during the month/percentage of sheep observations during the month.

[2] June 1977 and 1978 data combined.

[3] July 1978 data only.

[4] Percentage of total groups/percentage of total sheep observations.

Table 10. Monthly distribution of bighorn sheep according to slope on the Kootenai Falls study area, June 1977 through July 1978.

Date	Slope in Degrees								
	0-5	5-10	10-15	15-25	25-35	35-45	45-60	60+	Unknown
Nov. 1977 - Jan. 1978	10/8 [1]	10/4	50/48	-	30/40	-	-	-	-
February 1978	10/3	20/10	10/10	40/73	-	-	-	-	20/5
March 1978	-	7/2	14/14	24/25	10/20	10/9	31/29	3/1	-
April 1978	-	6/1	6/5	25/40	6/8	13/5	44/41	-	-
May 1978	-	21/36	7/2	21/12	25/17	7/7	4/2	4/5	11/19
June 1977 - 1978 [2]	-	22/31	-	22/20	-	-	11/3	45/46	-
July 1978 [3]	-	14/10	-	-	43/49	14/17	-	29/24	-
Total	1/tr [4]	14/15	12/8	22/25	15/16	7/6	16/15	8/10	5/5

1/ Percentage of groups observed during the month/percentage of sheep observations during the month.

2/ June 1977 and 1978 data combined.

3/ July 1978 data only.

4/ Percentage of total groups/percentage of total sheep observations.

Table 11. Monthly distribution of bighorn sheep according to elevation on the Kootenai Falls study area, June 1977 through July 1978.

Date	Elevation [1] ≤ 2000	2001-2200	2201-2800	2801-3400	3401-4000	>4000
Nov. 1977 - Jan. 1978	10/8 [2]	20/20	30/20	-	20/40	20/12
February 1978	-	20/10	80/90	-	-	-
March 1978	-	21/23	45/54	24/16	10/7	-
April 1978	6/1	19/31	44/40	19/16	12/12	-
May 1978	7/6	25/28	36/27	26/37	7/2	-
June 1977 - 1978 [3]	22/35	22/16	11/4	34/44	11/1	-
July 1978 [4]	-	29/51	14/2	-	28/10	29/37
Total	5/7 [5]	22/26	40/35	18/21	11/7	4/4

[1] In feet. (2000 ft = 610 m; 4000 ft = 1219 m).

[2] Percentage of groups observed during the month/percentage of sheep observations during the month.

[3] June 1977 and 1978 data combined.

[4] July 1978 data only.

[5] Percentage of total groups/percentage of total sheep observations.

Table 12. Mule deer and white-tailed deer observations and sign recorded on the Kootenai Falls study area, January through July,[1] 1978.

Observations	Sample Size	Percent of Total	Number					
			January	February	March	May	June	July
Mule deer	18	24.0	5	8	2	-	3	-
White-tailed deer	11	14.7	1	7	3	-	-	2
Sign								
Tracks	21	28.0	8	5	-	-	-	-
Droppings	11	14.7	9	-	-	3	5	-
Beds	14	18.6	12	-	-	2	2	-
Total	75	100.0	35	20	5	5	10	2

[1] No records during April.

Table 13. Deer observations and sign recorded on the Kootenai Falls study area according to habitat type and elevation, January through July,[1] 1978.

Category	Sample Size	Percent of Total	Percent of Observations					
			January	February	March	May	June	July
Habitat Type								
THPL/CLUN	21	27	4.8	23.8	4.8	19.0	47.6	-
PSME/AGSP	8	10	-	75.0	-	-	-	25.0
PSME/PHMA	43	56	69.8	20.9	6.9	2.3	-	-
PSME/SYAL	5	7	80.0	-	20.0	-	-	-
Elevation(feet)								
≤ 2000	49	63	61.2	6.1	2.1	10.2	20.4	-
2001-2200	6	8	-	100.0	-	-	-	-
2201-2800	10	13	-	50.0	30.0	-	-	20.0
> 2800	12	16	41.7	50.0	8.3	-	-	-

[1] No records during April.

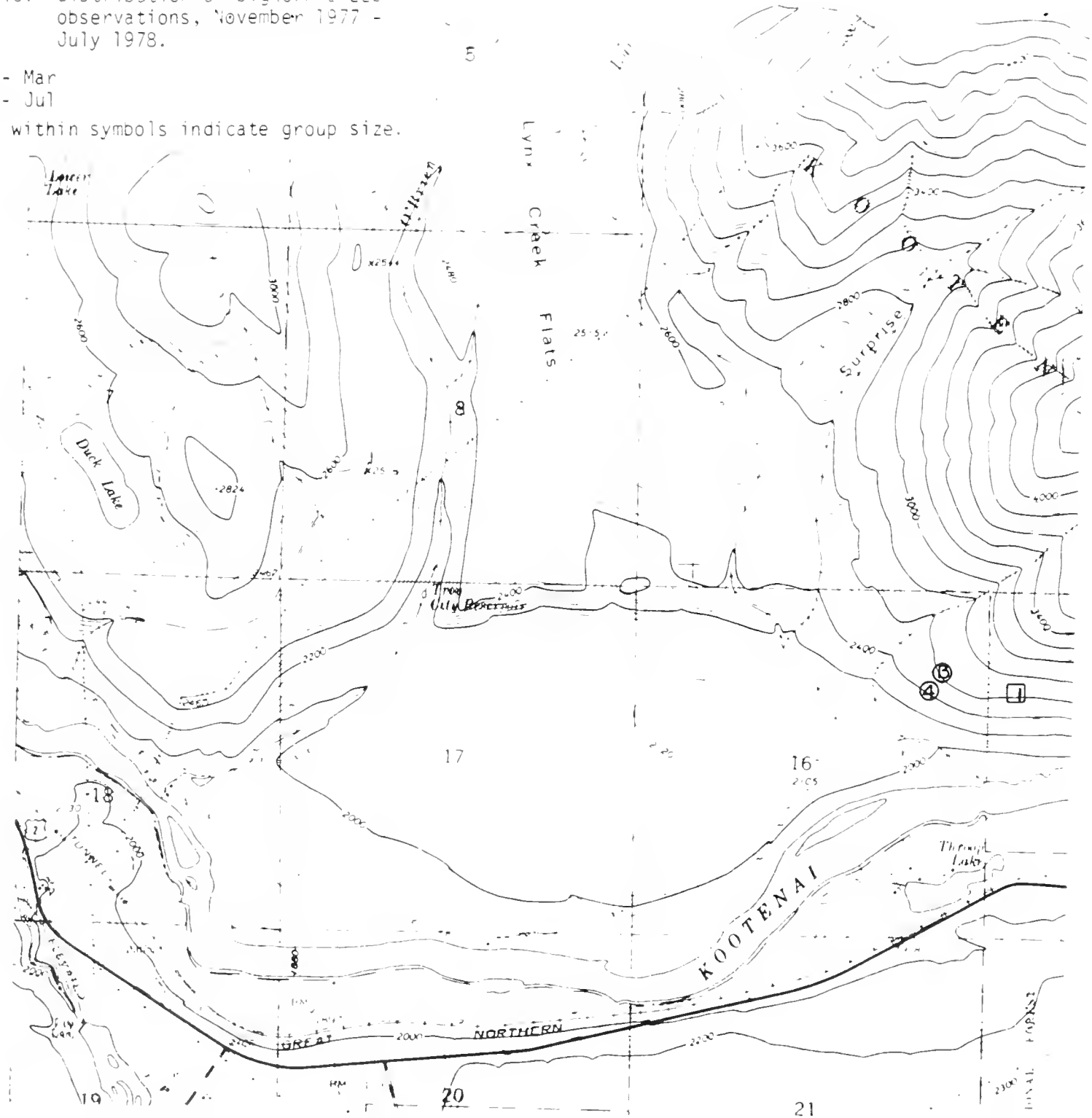
TABLE 14. SUMMARY OF KOOTENAI FALLS SMALL MAMMAL TRAPPING PROGRAM
SEPTEMBER 3-5, 1978

	Snap Traps							Pitfall Traps					Grand Total
	Floodplain Grassland			Coniferous Forest			Total	5	6	7	8	Total	
	1	2	1&2	3	4	3&4		(Shrub)	(Streamside)	(Douglas fir)	(Rocks)		
Total Number of Captures	6	11	17	16	16	33	50	2	6	4	1	13	63
Total Number of Species	2	3	4	2	4	5	8	2	2	2	1	3	8
Total Biomass (grams)	110	253	363	284	335	619	982	30	101	57	14	202	1184
Masked Shrew (Sorex cinereus)	-	-	-	-	1	1	1	-	-	-	-	-	1
Vagrant Shrew (Sorex vagrans)	4	1	5	1	-	1	6	1	-	1	-	2	8
Red-tailed Chipmunk (Eutamias ruficaudus)	-	-	-	-	2	2	2	-	-	-	-	-	2
Deer Mouse (Peromyscus maniculatus)	-	-	-	15	9	24	24	-	4	3	1	8	32
Red-backed Vole (Clethrionomys gapperi)	-	-	-	-	4	4	4	-	-	-	-	-	4
Meadow Vole (Microtus pennsylvanicus)	2	-	2	-	-	-	2	-		-	-	-	2
Long-tailed Vole (Microtus longicaudus)	-	8	8	-	-	-	8	1	2	-	-	3	11
Meadow Jumping Mouse (Zapus princeps)	-	2	2	-	-	-	2	-	-	-	-	-	2

Figure 10. Distribution of bighorn sheep observations, November 1977 - July 1978.

O Nov - Mar
□ Apr - Jul

Numbers within symbols indicate group size.



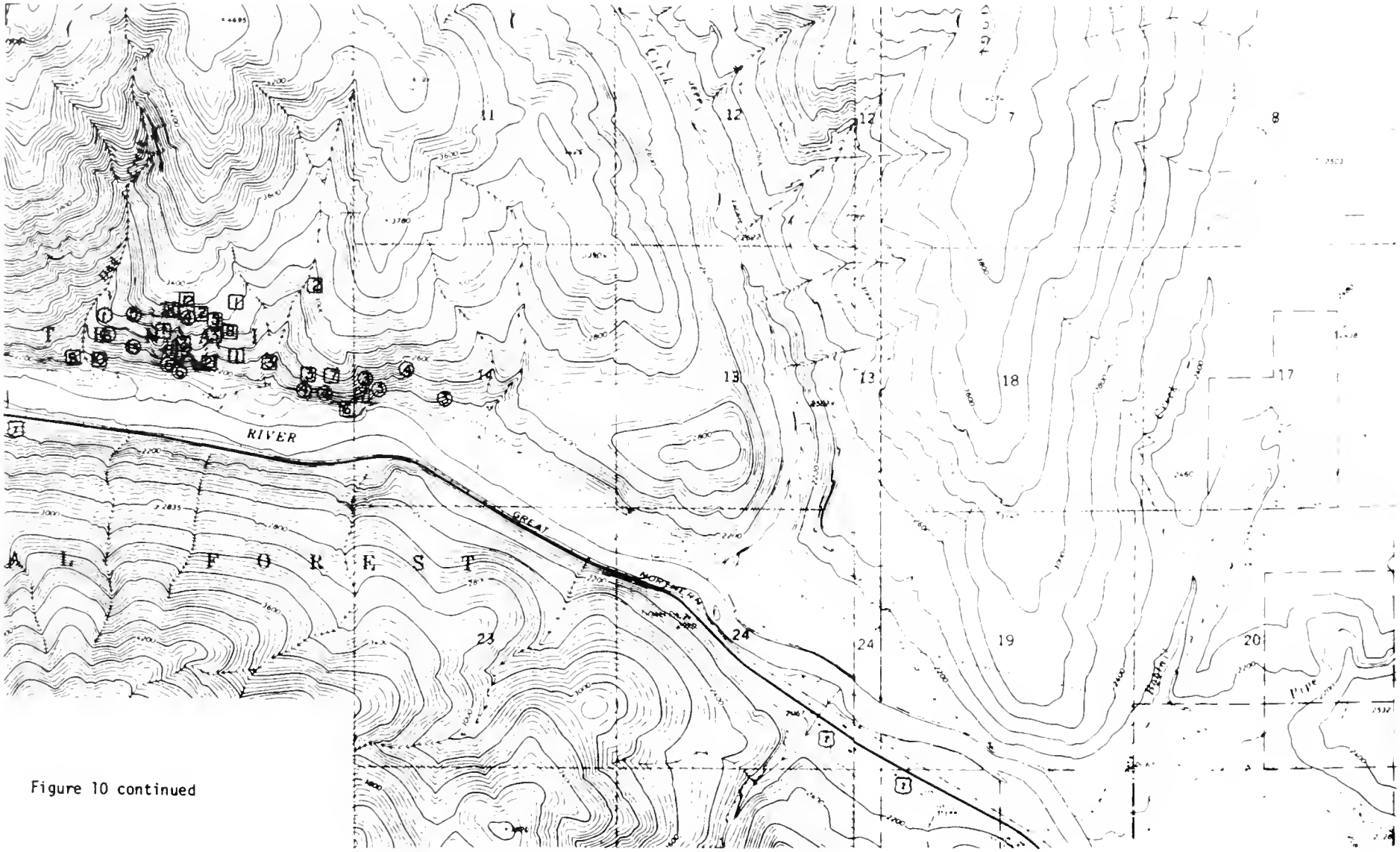


Figure 10 continued

Figure 10 continued

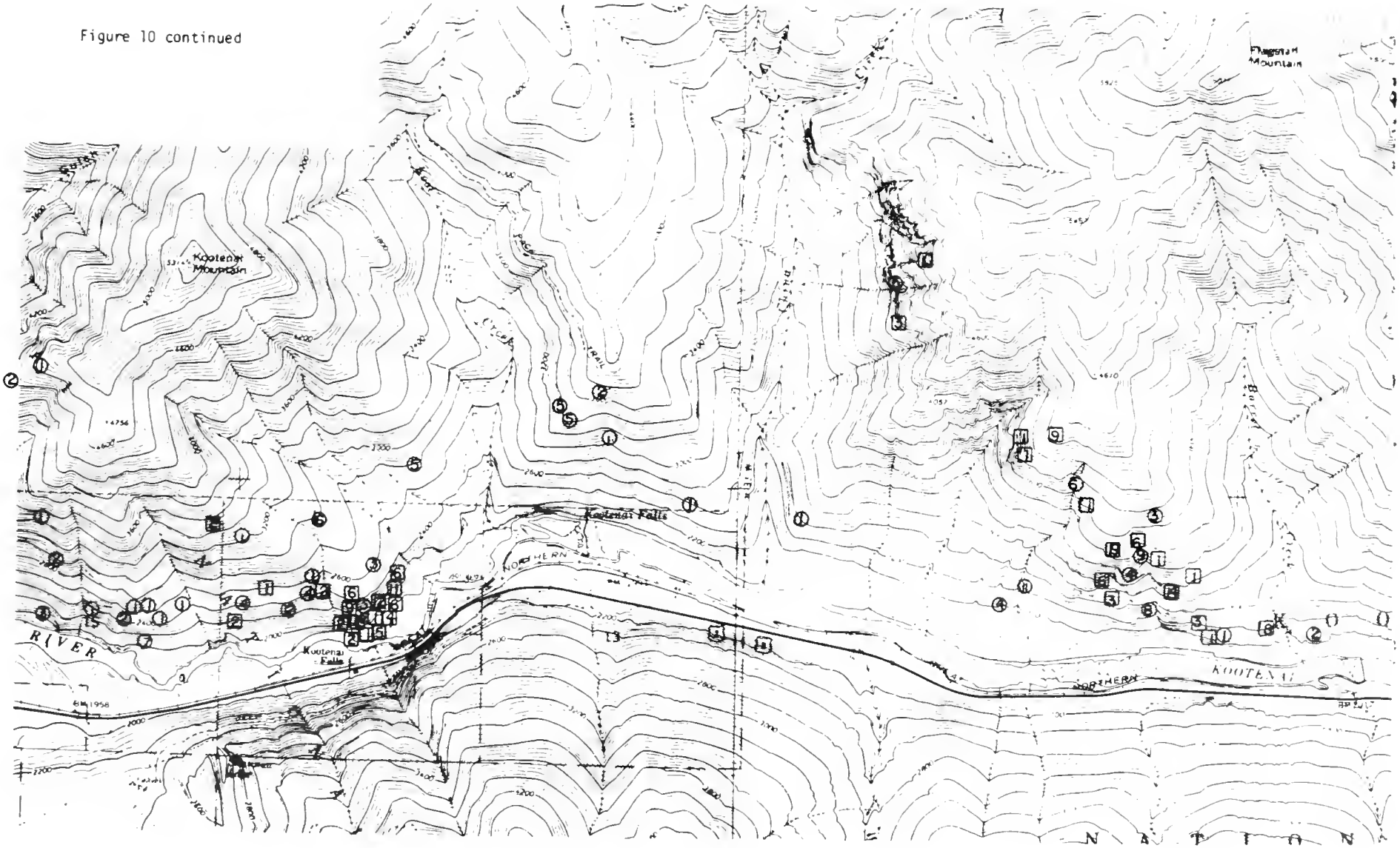
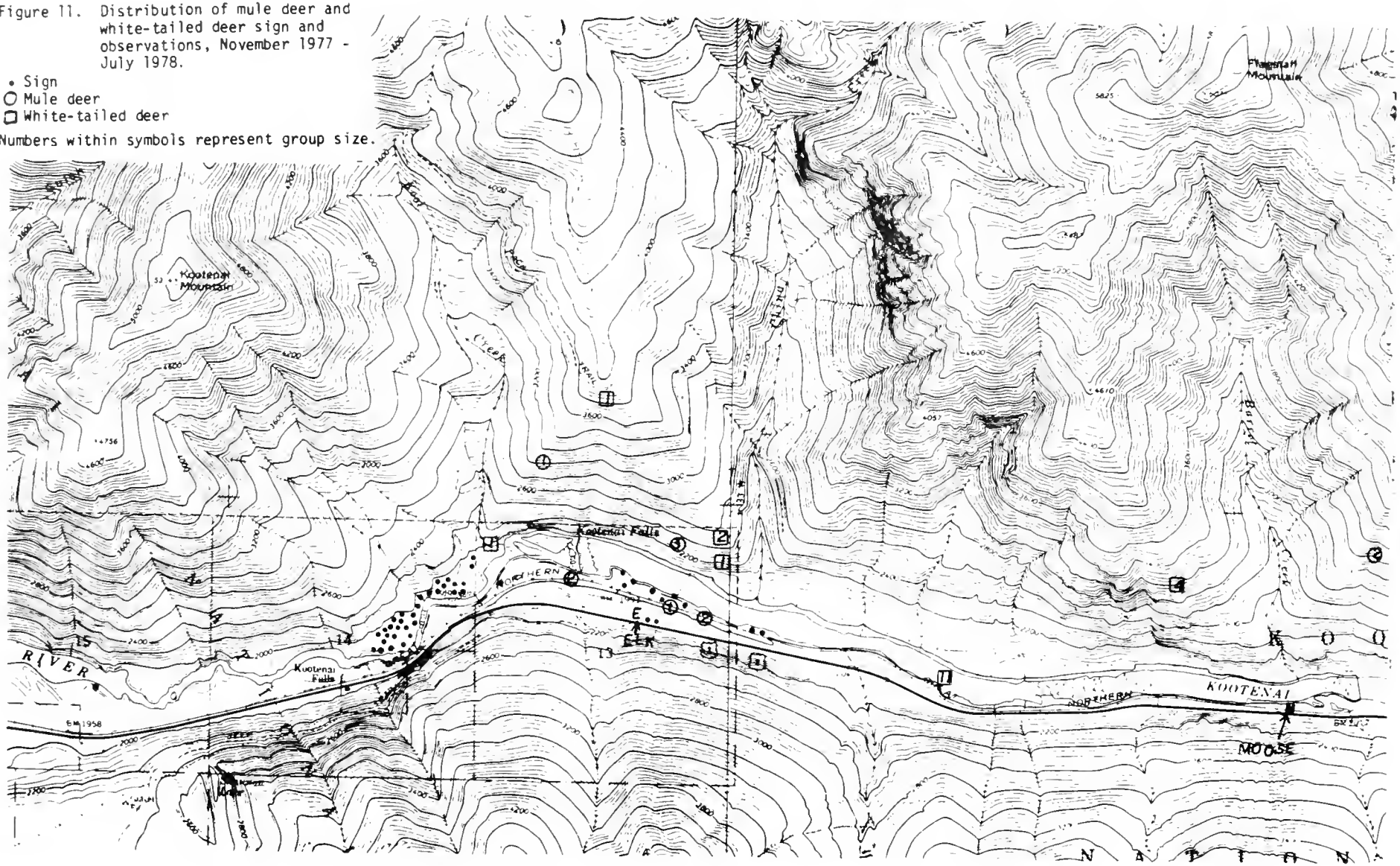


Figure 11. Distribution of mule deer and white-tailed deer sign and observations, November 1977 - July 1978.

• Sign
○ Mule deer
□ White-tailed deer

Numbers within symbols represent group size.



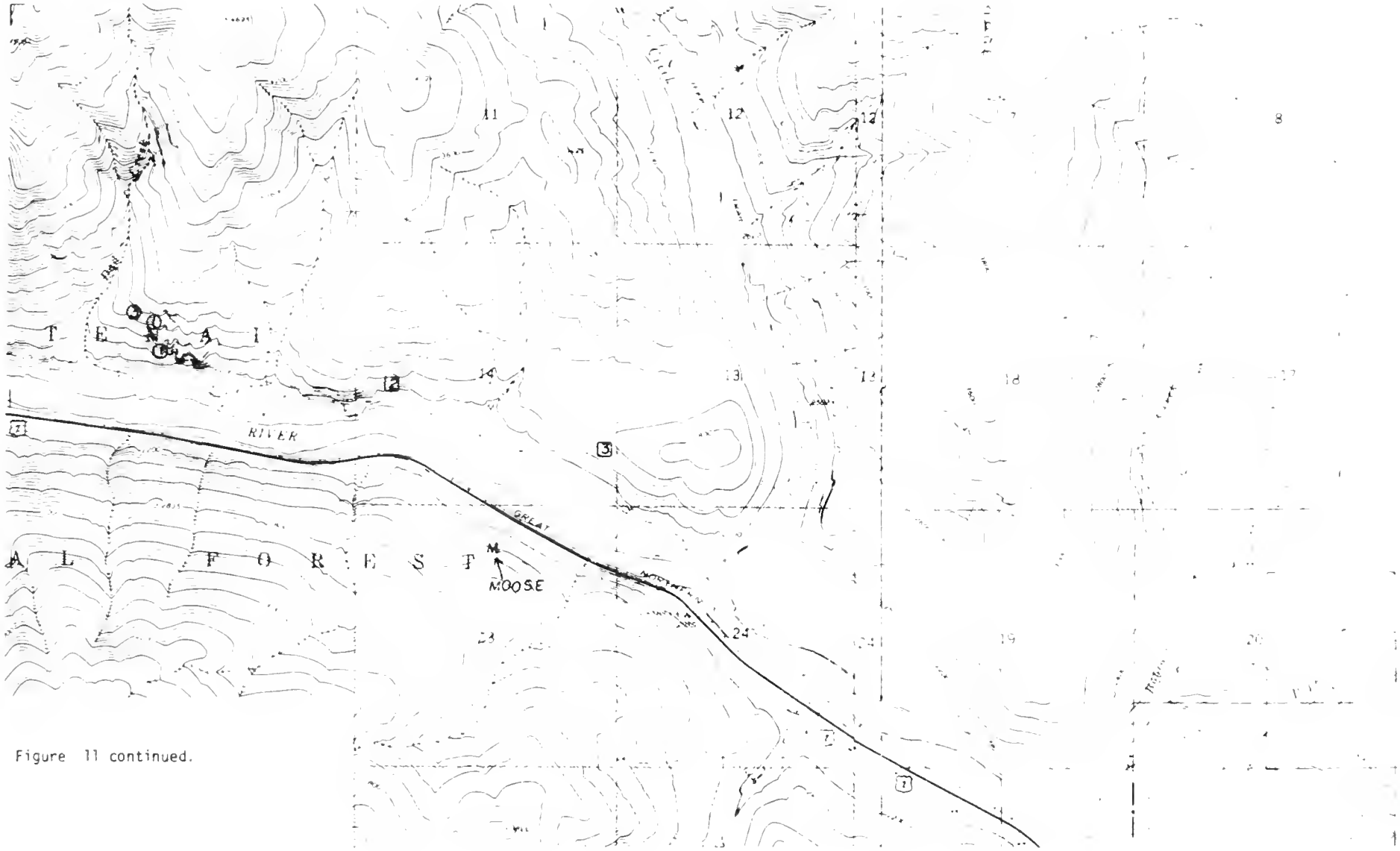


Figure 11 continued.

ASSESSMENT

At the time this progress report was prepared, Northern Lights, Inc. had not submitted an application to the department under the Major Facility Siting Act. Thus, the final layout and description of the proposed project was not available to provide a basis for detailed impact analysis. It should be emphasized that the following analysis is preliminary and potential impacts must be addressed in a more comprensive manner once the final layout is established.

A number of developments already exist in the area of the proposed Kootenai Falls dam and reservoir. These include: U.S. Highway 2, a double railroad track and two associated buildings; the Lion's Club campground, a suspended footbridge, and an access road paralleling the tracks. Proposed developments and alterations include: reconstruction of Highway 2 between Libby and Troy; building supports in the immediate area under the railroad right-of-way to allow the water impoundment to extend beneath the tracks; widening and extending the access road by approximately 0.6 miles (1 km); clearing of the riparian zone behind the falls to serve as the construction site; constructing two 39-foot diameter (11.9 m) tunnels through the canyon wall for approximately 1 mile (1.2 km) from above the falls to the retaining wall below the footbridge; substantially dewatering the gorge for approximately 1 mile (1.6 km) and impounding approximately 3 miles (4.8 km) of the Kootenai River. Mitigation of recreational impact by increasing recreational facilities would further reduce wildlife security and decrease wildlife habitat as land areas are utilized for public facilities.

Waterfowl broods survive almost exclusively on macroinvertebrates during the first 2 weeks of life, and impoundment of the river and altered flow regimes will likely affect availability of this food source. Harlequin ducks and dippers are particularly susceptible to adverse impact due to their narrow habitat requirements, but all riparian dependent birds and some cavity nesters may be locally affected. The harlequin duck is a particularly vulnerable species because it is intolerant of human activity, has a high nest site fidelity, has relatively low reproductive potential, has highly specialized habitat requirements, is dependent upon the aquatic insects of fast flowing waters as a food source, and is highly susceptible to alteration of flow regimes. Because this species is so closely adapted to its niche, it has a high potential for extinction; in fact, it became extinct in Colorado as early as the late 1800's (Kuchel 1977). Inland breeding populations are sparse and scattered, and because they are extremely secretive, observing a harlequin in Montana is an uncommon experience. Any increase in human activity or change in the character of the falls and the gorge, insect production, or flow regime would affect the use of this area by harlequin ducks.

The same factors which affect harlequins also affect the dipper which does not migrate per se, but simply moves to lower elevations. The large area of swift, shallow water at the head of the falls is a critical wintering site for dippers.

Over three-fourths of the bird species observed utilize the riparian vegetation zone to some extent. Most of this zone, if inundated, would no longer be available to birds. The common flicker is especially common in wooded foothills and along banks of rivers (Neff 1926), and many secondary cavity nesting birds utilize the flicker's excavations for nest sites. The American kestrel requires a similarly sized nest hole, and smaller hole-nesting species, especially tree swallows, take advantage of flicker holes (Jackman and Scott 1975). In the riparian area immediately behind the falls, a pair of tree swallows and a pair of American kestrels nested in abandoned woodpecker holes in the same cottonwood snag while

a common flicker nested less than 30 yards (27 m) away, also in a cottonwood snag. Fourteen additional species (including 4 waterfowl species) observed on the study area are cavity nesters, the majority of which could be adversely affected from permanent flooding of the riparian zone. Cottonwood trees and several other deciduous species are limited along the remaining free-flowing Kootenai River, and the area which constitutes the proposed forebay area of the impoundment is composed of some of the most extensive riparian habitat remaining along the river.

Bald eagles, the only known endangered species to occur on the study area, are known to winter in the immediate vicinity of Kootenai Falls. Eagles apparently summer in the area but the occurrence of breeding was not established. A comprehensive analysis of bald eagle use of the Kootenai River in the vicinity of the proposed reregulation dam is currently in progress. This project was initiated in 1978 and should provide valuable information applicable to this development. A full analysis of the possible effects of dam building at Kootenai Falls and resulting habitat alteration upon the endangered bald eagle should be made based upon this information.

Mammalian species which are dependent upon the riparian zone on a yearly, seasonal or daily basis would also suffer from loss of riparian habitat. Impounding the river will eliminate riparian vegetation, in turn eliminating essential elements of habitat for some species. Changed patterns of flooding on the fringes of the impoundment may affect the viability of riparian vegetation (Kadlec 1976) and ultimately the wildlife which use it. Altered flow patterns or volumes may directly affect aquatic wildlife such as beaver and muskrat. Five of six ungulate species which occur in this portion of the state were noted on the study area. All used the riparian zone to some extent, but the importance of this area to these species is not known. Riparian grassland is among the most productive food sources available to bighorn sheep. Of the ungulates present, the white-tailed deer and bighorn sheep will likely be the most significantly affected by flooding of the riparian zone.

Of the four species of carnivores known to occur on the area, the river otter and mink are directly dependent on riparian habitat, while the black bear and coyote are partially dependent upon the riparian zone for food and security. Because river otter are tied to the river system and are influenced by human alterations of the system, they may be considered the "key" carnivore species. Further investigation would be necessary to determine if any of the 11 other carnivore species, which occur in this region of the state, occur on the area.

Of the rodents known to occur on the study area, the beaver and muskrat are directly dependent upon the riverine system; the beaver should be identified as the "key" species to represent the small mammals species group in future research.

Herpetofauna were not intensively studied, and the presence of obligate riparian species was not determined.

According to species groups and based on the data collected to date, the following "key" species merit greatest concern and possibly additional research: harlequin duck, bald eagle, dipper, white-tailed deer, bighorn sheep, river otter, beaver.

The riparian zone as wildlife habitat is far more important than its abundance would suggest. Its demise has been cited as the cause of increasing scarcity of many species, including otter, mink, beaver, muskrat, and wood ducks.

High productivity, high species diversity, and high species densities all contribute to high intrinsic values of riparian ecosystems. The science of wildlife-riparian relationships is in its infancy. It was only in the fall of 1968 that efforts to quantify the impact of streamside vegetation removal on wildlife were first undertaken (Carothers 1977). We now realize that riparian ecosystems are important: 1) in bank stabilization, 2) as a buffer between aquatic ecosystems and potential impacts of upland activities on water quality, 3) as green belts, 4) in maintenance of instream flows by contributing riparian zone ground water, 5) for their contribution to habitat for the majority of wildlife species in North America. Water manipulation as it affects the riparian zone and the terrestrial wildlife which is dependent upon it, has only recently been recognized as a threat to the nonrenewable riparian resource. Due to various human developments, riparian vegetation has been reduced in the United States to 70-90 percent of its original extent, and remaining riparian habitat continues to be destroyed at approximately 6 percent per year (McCormick 1978). The integrity of the remaining free-flowing Kootenai River in Montana must be addressed when considering the economic, intrinsic and aesthetic values of a dam on Kootenai Falls.

RECOMMENDATIONS

In assessing the wildlife resource of the Kootenai Falls area, and then the possible consequences of a dam at the falls, several questions must be resolved about the wildlife of the area and the existing habitat. Vegetation must be categorized, mapped and rated in terms of abundance and availability, and related to the diversity, distribution, seasonal occurrence and abundance of fauna. Natural maintenance of the critical vegetation components must be understood. These data must be used in conjunction with specific information about project construction, duration and goals to determine which species will be affected, and to what degree, relative to various flow regimes. Basically the following procedure could be used:

1. determine quantitative abundance of each habitat component
2. determine distribution of each habitat component
3. determine amount of each component that will be inundated with each increment of cfs up to full pool level
4. determine the desired wildlife population levels
5. determine the significance of the habitat components to: a) the number of wildlife species using each, and, b) the life cycle of each species
6. determine the critical maximum pool level, the minimum instream flow level and the altered flow regime which can be tolerated before jeopardizing the predetermined population minimums.

Comprehensive and intensive study designs are mutually exclusive due to the time/cost factor; therefore, it is possible to follow the above procedure only if key species are identified.

REFERENCES

Bellrose, F. C. 1976. Ducks, geese and swans of North America. Wildlife Manage. Institute and Ill. Natl. Historical Surveillance. Stackpole Books. 544 pp.

Brown, G. 1974. Distribution and population characteristics of bighorn sheep near Thompson Falls in northwestern Montana. M.S. Thesis. Univ. of Mont., Missoula. 134 pp.

Carothers, S. W. 1977. Importance, preservation and management of riparian habitat: an overview. In: Importance, preservation and management of riparian habitat: a symposium. Ed. R. R. Johnson and D. A. Jones, USDA Forest Service General Technical Rept. RM-43.

Caughley, G. 1974. Interpretation of age ratios. J. Wildl. Manage. 38(3):557-562.

Dzubin, A. 1969. Assessing breeding populations of ducks by ground counts. Pages 178 -230 in Saskatchewan Wetland Seminar. Can. Wildl. Ser. Printing Serial No. 6. Dept. of Indian Affairs and Northern Div., Ottawa.

Emlen, J. T. 1977. Estimating breeding season bird densities from transect counts. Auk 94:455-468.

Gollop, J. B. and W. H. Marshall. 1954. A guide for aging duck broods in the field. Mississippi Flyway County Technical Section.

Graham, P. J. 1978. Kootenai Falls fisheries study. First interim rept., Mont. Dept. of Fish & Game. 48 pp.

Hall, G. A. 1964. Breeding bird censuses - why and how. Audubon Field Notes 18:413-416.

Hitchcock, C. L. and A. Cronquist. 1973. Flora of the Pacific Northwest. Univ. of Wash. Press. 730 pp.

Jackman, S. M. and Dr. J. M. Scott. 1975. Literature review of twenty-three selected forest birds of the Pacific Northwest. USDA Forest Service Region 6. 382 pp.

James, F. C. and H. Shugart, Jr. 1970. A quantitative method of habitat description. Audubon Field Notes 24: 727-736.

Kadlec, J. A. 1976. Methodologies for assessing instream flows for wildlife. In: Methodologies for the determination of stream resource flow requirements: an assessment. Ed: Stalnaker and Arnette. USFWS Office of Biological Serv. W. Water Allocation. Pages 139-147.

Kolb, H. 1965. The Audubon winter bird-population study. Audubon Field Notes. 19: 432-434.

Kuchel, C. R. 1977. Some aspects of the behavior and ecology of harlequin ducks breeding in Glacier National Park, Montana. M.S. Thesis. Univ. of Mont, Missoula.

Martin, B. 1977. Pers. comm. Route 2, Troy, Mt.

McCormick, J. R. 1978. An initiative for preservation and management of a wetland habitat. A position paper in support of a proposal for a national program for the protection and management of riparian ecosystems. Off. of Biological Serv., USFWS 27 pp. mimeo.

Neff, J. A. 1926. A study of the economic status of the common woodpeckers in relation to Oregon horticulture. M.S. Thesis. Oregon St. College, Corvallis. 133 pp.

Olson-Elliott and Associates. 1976. Unpublished forest habitat type maps prepared for Bonneville Power Administration Libby Integration Project, Helena, Mt.

Peterson, R. T. 1961. A field guide to western birds. Houghton Mifflin Co., Boston. The Riverside Press, Cambridge. 366 pp.

Pfister, R. D., B. L. Kovalchik, S. F. Arno and R. C. Presby. 1977. Forest habitat types of Montana. Intermountain Forest and Range Experiment Sta., USDA Forest Service, Ogden, Utah. 174 pp.

Sewell, J. A. and Assoc. 1978. Newport, Washington.

Shepherd, B. 1978. Pers. comm. Libby, Mt.

Skaar, P. D. 1975. Montana bird distribution. P. D. Skaar, 1501 S. Third, Bozeman, Mt. 56 pp.

Smith, D. R. 1954. The bighorn sheep in Idaho - Its status, life history and management. Wildl. Bull. No. 1 Fed. Aid to Wildl. Restoration Act, Idaho Proj. 99-R. 154 pp.

Stebbins, R. C. 1966. A field guide to western reptiles and amphibians. Houghton Mifflin Co., Boston. 279 pp.

Stelfox, J. G. 1976. Range ecology of Rocky Mountain bighorn sheep. Canada Wildlf. Serv. Rept. Serial No. 39. 50 pp.

Van Velzen, W. T. 1972. Breeding-bird census instructions. American Birds. 26:927-931.

APPENDIX A*

CENSUS OF RIVER FALLS AND ADJACENT WESTERN RED CEDAR-DOUGLAS FIR FOREST

Location: Montana; Lincoln County; located between the Kootenai River and U. S. Highway #2, about 19 km (12 miles) WNW of Libby; 48° 27' N, 115° 47' W, Kootenai Falls Quadrangle, U.S.G.S. Continuity: New. Size: 44.5 ha = 110 acres (oblong, paced). Description of Plot: Approximately 40% of the plot is water, including a 1500 m (= 4921 ft) stretch of the Kootenai River. Kootenai Falls, the major falls of the Kootenai River, is located in this stretch, and river elevation drops 17 m (= 55 ft) between the eastern and western edges of the plot. Flows of the Kootenai River are controlled by the pattern of discharge from Libby Dam (located approximately 40 km = 25 miles upstream), and varied from 113 m^3/sec (= 4,000 ft^3/sec) to 566 m^3/sec (= 20,000 ft^3/sec) during the study. Width of the river within the plot was approximately 250 m (820 ft) at its widest point and 45 m (= 111 ft) at its narrowest, where it flows through a steep, rocky canyon. A number of islands, the largest of which is less than 2 ha (= 5 acres) in size, are found in the 400 m (= 1,312 ft) stretch of the river immediately below the falls; these islands, as well as all water areas to the north of them, were excluded from the plot. A footbridge spans the river at its narrowest point, approximately 500 m (= 1,640 ft) from the western boundary of the plot. The land area included in this plot is that between the southern bank of the Kootenai River and U.S. Highway #2 to the south. This strip of land is 300 m (= 984 ft) wide at its widest point and 70 m wide (= 230 ft) at its narrowest point. A two-track Burlington Northern railroad roughly bisects this land area lengthwise; these tracks were used by approximately one train/hour during census runs. A telephone line and a 34.5 kilovolt powerline parallel this railroad, resulting in a cleared corridor roughly 40 m (=131 ft) in width. Most of the remainder of the plot is forested. A Lion's Club picnic area with a spring, wooden tables, garbage receptacles, and outhouses is located along Highway 2 near the center of the plot, and a 150 m (= 492 ft) loop road enters into the plot from Highway 2 300 m (= 984 ft) from the eastern edge of the plot. Both areas were heavily used by picnickers, fishermen, and sightseers throughout the summer. An abandoned forest road connects U.S. #2 and the railroad right-of-way near the eastern edge of the plot. At the western edge of the plot, the highway, railroad, and telephone lines come together at the base of a steep, rocky cliff, and pass over a nearly vertical concrete embankment which extends to the riverbank. Rocky outcrops are common within the plot north of the railroad right-of-way. A number of very small streams bisect the plot. Elevations range from 588 m (= 1,930 ft) to 640 m (= 2,100 ft). A fairly steep bank rises between the railroad right-of-way and the relatively flat bench to the south in the eastern 2/3 of the plot. Forests to the north of this bank are fairly open and shrubby, with few large trees; forests to the south are much more dense, with many tall trees and little understory vegetation. The study area falls primarily within the western red cedar/queencup beadlily (*Thuja plicata/Clintonia uniflora*) habitat type (Pfister et al. 1977, Forest Habitat Types of Montana, U.S.D.A. Forest Service, Intermountain Forest and Range Experiment Station, Ogden, Utah), although a gradation to the Douglas fir/ninebark (*Pseudotsuga menziesii/Physocarpus malvaceus*) habitat type is indicated along drier, exposed ridges near the water's edge. The dominant canopy trees are Douglas fir, western larch (*Larix occidentalis*), and western red cedar, and the most prominent shrubs are Canadian buffaloberry (*Shepherdia canadensis*), chokecherry (*Prunus virginiana*),

---

* Prepared by L. Thompson, Montana Department of Natural Resources and Conservation, 32 South Ewing, Helena, Montana.

common snowberry (*Symphoricarpos albus*), creambush oceanspray (*Holodiscus discolor*), elderberry (*Sambucus* spp.), mountain alder (*Alnus incana*), ninebark, quaking aspen (*Populus tremuloides*), red-osier dogwood (*Cornus stolonifera*), redstem ceanothus (*Ceanothus sanguineus*), Rocky Mountain maple (*Acer glabrum*), syringia (*Philadelphus lewisii*), thimbleberry (*Rubus parviflorus*), western serviceberry (*Amelanchier alnifolia*), and willow (*Salix* spp.). Much of the more densely forested portion of the plot south of the railroad tracks has little or no ground cover, and the soil in these areas is covered with a mat of needles and with scattered logs and branches. A quantitative survey of the vegetation gave the following results: trees, 3 in. (= 7.6 cm) diameter and over, based on five 0.1 acre (=0.04 ha) circular samples, 242/ha (= 98/acre); total basal area 37 m^2/ha (= 160.1 ft^2/acre). Species of trees (figures after each give number of trees/ha, number of trees/acre, relative density (%), relative dominance, and frequency, in that sequence): Douglas fir 76, 33, 34, 48, 100; western larch 71, 31, 32, 27, 100; western red cedar 41, 18, 19, 13, 80; lodgepole pine (*Pinus contorta*) 86, 38, 4, 5, 40; water birch (*Betula occidentalis*) 158, 70, 7, 3, 80; Rocky Mountain maple (*Acer glabrum*) 9, 4, tr (= trace, or less than 0.5%), tr, 20; ponderosa pine (*Pinus ponderosa*) 5, 2, tr, tr, 20; Rocky Mountain juniper (*Juniperus scopulorum*) 5, 2, tr, tr, 20. A few small Engelmann spruce (*Picea engelmannii*), western hemlock (*Tsuga heterophylla*) and grand fir (*Abies grandis*) were also found in the plot. Trees by diameter size class (figures after each class given number of trees/ha, number of trees/acre, relative density (%), basal area in m^2/ha, basal area in ft^2/acre, relative dominance): A(8-15 cm = 3-6 in) 1278, 568, 58, 13.0, 56.8, 18; B(15-23 cm = 6-9 in) 540, 240, 24, 16.5, 72.0, 22; C(23-78 cm = 9-15 in) 315, 140, 14, 65.7, 112.0, 35; D(38-53 cm = 15-27 in) 41, 18, 2, 7.4, 32.4, 10; E(53-69 cm = 21-27 in) 27, 12, 1, 8.5, 37.2, 12; F(69-84 cm = 27-33 in) 5, 2, tr, 2.3, 9.8, 3. Shrub stems/ha, 5265; shrub stems/acre, 2340; ground cover 26%; canopy cover 66%; average canopy height 22 m = 72 feet (range 18-30 m = 60-100 feet). Plant names follow Hitchcock and Cronquist's (1973) Flora of the Pacific Northwest. Edge: bordered on the north by the steep north bank of the Kootenai River and the slopes of the Purcell Mountains, characterized near the plot by Douglas fir/ninebark forests and relatively dry rocky outcrops; bordered to the south by U.S. Highway 2 south of which rise the lower slopes of the Cabinet Mountains, characterized near the plot by the relatively moist western red cedar/queencup beadlily and western hemlock/queencup beadlily habitat types. A steep, rocky cliff rises above the highway just south of the western third of the plot. Weather: the spring of 1978 was relatively moist and followed a severe winter; plant phenology was thus several days behind the normal. Rain was occasionally experienced during census runs, but weather for the most part was clear to cloudy and dry. Coverage: May 7, 8, 9, 22, 25; June 5, 6, 7, 8, 9, 29, 30. All trips between 0515 and 2130 hours. Total person-hours: 34.6. Census: violet-green swallow, 12(27, 11); yellow-rumped warbler, 7 (16, 6); golden-crowned kinglet, 6(13, 5); Swainson's thrush, 5.5 (12, 5); Townsend's warbler, 5.5 (12, 5); American robin, 4.5 (10, 4); yellow warbler, 4.5 (10, 4); dark-eyed junco, 4.5 (10, 4); rough-winged swallow, 4 (9, 4); dipper, 4 (9, 4); red-eyed vireo, 4 (9, 4); black-capped chickadee, 3.5 (8, 3); song sparrow, 3.5 (8, 3); mallard, 2; warbling vireo, 2; Nashville warbler, 2; MacGillivray's warbler, 2; American redstart, 2; brown-headed cowbird, 2; pine siskin, 2; spotted sandpiper, 1.5; harlequin duck, 1; American kestrel, 1; common flicker, 1; Empidonax flycatcher (Hammond's or Dusky), 1; tree swallow, 1; common crow, 1; western tanager, 1; common goldeneye, +; common merganser, +; osprey, +; common raven, +; varied thrush, +. Total: 33 species, 91 territorial males or females (205/km^2, 83 per 100 acres). Visitors: Canada goose, American wigeon, Barrow's goldeneye, mourning dove, rufous hummingbird, calliope hummingbird, belted kingfisher, hairy woodpecker, willow flycatcher, Townsend's solitaire, cedar waxwing, orange-crowned warbler, lazuli bunting, Lincoln's sparrow. Remarks: Five nests were located: common

flicker, 1; tree swallow, 1; black-capped chickadee, 1; robin, 2. Rough-winged swallows nested in crevices in the steep concrete retaining wall at the extreme western edge of the plot, and a raven nest was located on a steep rock cliff facing Highway 2 just outside the plot. An active osprey nest was found several km downstream from the plot. Although pileated woodpeckers were not observed during the census, one was seen on the plot February 9, 1978, by G. Joslin, and feeding excavations were fairly common in old-growth western red cedar. A brood of 12 common mergansers was seen on June 2 by G. Joslin near the eastern boundary of the plot, and a possible but unverified brood of 7 harlequin ducks was seen June 12 by B. Shepard just downstream from the plot. At least seven harlequin ducks were present on the plot; these appeared to represent one pair, one lone female, and four bachelor males. All preferred the head of the falls as a feeding area and the rocky promontory just upstream from the falls as a nesting area, although the entire stretch of river within the plot was used at some time. The first harlequin (a male) was seen in the plot April 29, and the last (a female) was seen June 16. Of the 33 breeding species encountered during the census, the following were restricted to the Kootenai River and/or its shores: mallard, common goldeneye, harlequin duck, common merganser, spotted sandpiper, and dipper. The remaining species, with the exception of the swallows, were primarily restricted to terrestrial habitats, which comprised only 60% of the plot. More meaningful density estimates for these species in terrestrial habitats may thus be obtained by multiplying the density figures reported above by 1.67. The varied thrush, golden-crowned kinglet, Townsend's warbler, yellow-rumped warbler, and western tanager occupied primarily tall, dense, western red cedar and Douglas fir forests south of the railroad right-of-way; the warbling vireo, yellow warbler, MacGillivray's warbler, and song sparrow occupied open, shrub-dominated habitats along the right-of-way. Other vertebrates seen on the plot: wandering garter snake, *(Thamnophis elegans)*, beaver *(Castor canadensis)*, chipmunk (*Eutamias* spp.), tree squirrel (*Tamiasciurus hudsonicus)*, Columbian ground squirrel (*Spermophilus columbianus)*, northern flying squirrel (*Glaucomys sabrinus)*, mule deer (*Odocoileus hemionus)*. This study was part of a wildlife inventory related to a proposed hydroelectric facility, and was funded by Northern Lights, Inc.