Harlequin Duck surveys in western Montana: 1992

A Report to:

USDA Forest Service

Kootenai National Forest
506 U.S. Highway 2 West
Libby, MT 59923

and

Flathead National Forest
1935 Third Avenue East
Kalispell, MT 59901

Submitted by:

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INTRODUCTION

The harlequin duck (Histrionicus histrionicus) is a small sea duck, found inland only during the breeding season. The male is strikingly colored with black and white spots and slashes, and chestnut sides on a deep cobalt blue background. The female is dull brown with three white spots on her face. Harlequins breed in western North America from Alaska and the Yukon south through western Montana to California; in eastern North America they breed form Baffin Island south to eastern Quebec and Labrador (Goudie 1993). In the Palaearctic they breed in Iceland, Greenland and Siberia (A.O.U. 1983). Approximately 110 pairs of harlequins currently breed in Montana (Genter 1993), with most located in the following areas: 1) tributaries of the lower Clark Fork River; 2) tributaries of the North, Middle, and South Forks of the Flathead River; 3) streams coming off the east front of the Rocky Mountains; and 4) the Boulder River (Miller 1988, 1989, Kerr 1989, Carlson 1990, Fairman and Miller 1990, Diamond and Finnegan 1992).

During the breeding season harlequins are found along fast mountain streams (Bengston 1966). In many areas harlequins use streams with dense timber or shrubs on the banks (Cassirer and Groves 1990), but they are also found in relatively open streams along the east slopes of the Rocky Mountains, Montana (Markum and Genter 1990, Diamond and Finnegan 1992) and the Arctic tundra (Bengston 1972). In Idaho, 90% of observations occurred near old growth or mature timber stands (Cassirer and Groves 1990). Mid-

stream rocks, logs, islands, or stream-side gravel bars serve as safe loafing sites are important habitat components.

Most of the ducks arrive on their inland breeding areas in mid-April to early-May; unmated males typically arrive before pairs (Kuchel 1977). The males return to the coast shortly after the females begin incubation; most are gone by early July (Kuchel 1977). The females and young remain on the streams until August or early September. This chronology is influenced by elevation and the timing of spring runoff and may vary up to several weeks between years.

The U.S. Forest Service, Region 1, lists the harlequin duck as Sensitive (Reel at al. 1989). The species is listed as a Species of Special Concern by the Montana (Genter 1992) and Idaho (Moseley and Groves 1990) Natural Heritage Programs. The eastern North American population is listed as endangered in Canada (Goudie 1993); the western population is listed under Category 2 as a candidate for listing under the Endangered Species Act by the U.S. Fish and Wildlife Service (U.S. Department of Interior 1991).

The Montana Natural Heritage Program began surveying harlequin ducks in 1988. The survey data gave rise to questions involving site fidelity, productivity and mortality. Individual marking of birds began to a limited extent in 1991. Long term goals are: 1) developing a baseline status report of current and historic harlequin populations in Montana; 2) gather information on site fidelity, reproduction and mortality to allow estimations

of what constitute viable harlequin populations; 3) develop surveying protocols for actual and potential harlequin streams; 4) develop management guidelines for maintaining and restoring harlequin populations and habitat. Goals for 1992 included: 1) surveying additional streams for presence and status of harlequins; 2) gathering productivity data on some primary harlequin streams; and 3) marking as many individuals as possible on selected streams for long-term monitoring.

METHODS AND MATERIALS

Harlequin ducks were surveyed on parts of the Kootenai, Flathead and Lolo National Forests during May-August 1992. Most surveys were conducted by walking the stream channel (when possible) or stream bank. In most cases the surveyor walked upstream, giving more time to observe the bird before it moved out of sight. Some large streams on the Flathead National Forest were surveyed by kayak or raft. Dates, locations, km surveyed, and general characteristics of the stream reaches surveyed were recorded; any harlequins sighted were noted with location, numbers, ages, and sex of birds present. For several streams in the Flathead and Clark Fork drainages, we attempted to capture and mark all birds seen, when a licensed, qualified birdbander was present on the survey. Captured birds were identified to sex and age, weighed, measured (wing and tail), marked, and released. Except in Glacier National Park, all birds were marked with numbered USFWS aluminum leg bands and colored nasal discs, individually

recognizable by shape and color combinations. The Park felt the nasal discs would be aesthetically unacceptable to Park visitors. Birds in Glacier National Park were banded with USFWS bands and a unique combination of 3 plastic, colored leg bands.

RESULTS AND DISCUSSION

Surveys

Flathead National Forest. Pair surveys were conducted along 200 km of 12 streams during May-June 1992 (Table 1). A minimum of 13 harlequins (5 males, 8 females) were seen on 3 streams (Table 1, Appendix B & C). These included the North Fork of the Flathead River (1♂, 2♀), Sullivan Creek (2♀), and Trail Creek (4 pairs); additionally we had reports of harlequins from the Middle Fork of the Flathead River (1♂ and 1 pair; H. Rivera) and Harrison Creek (1♂; J. Graham) (Table 2).

Brood surveys were conducted along 301 km of 22 streams during July - August 1992 (Table 1). A minimum of 43 different harlequin ducks were observed on 6 streams (Table 1, Appendix B & C). These included: 1) Little Salmon Creek (2♀, 2 brood w/ 3 & 5 young), 2) South Fork of the Flathead River (4♀), 3) Spotted Bear River (1♀, 2 broods of 3 & 4 young), 4) Sullivan Creek (2 birds, either adult ♀, or fledged young), 5) Trail Creek (2♀, 2 broods of 4 & 4 young), and 6) White River (3♀, 3 broods of 1, 2, & 3 young). Additionally S. Sigler reported birds on the Middle Fork of the Flathead River (3♀, 2 broods of 5 & 4).

No harlequins were observed on Bunker Creek, Mid Creek, Big

Creek and Wounded Buck Creek where they have been observed in at least one of the past five years.

Kootenai National Forest. Pair surveys were conducted along 36 km of 3 streams during May-June 1992 (Table 1). A minimum of 8 harlequins (5 males, 3 females) were seen on 2 streams (Appendix B & C). These included the Vermillion River (1♂, 1♀) and Marten Creek (2 pairs plus 2♂).

Brood surveys were conducted along 41 km of 5 streams during late July - August 1992 (Table 1). A minimum of 18 different harlequin ducks were observed on 1 stream (Table 1, Appendix B & C). Marten Creek had 5♀ present with 4 broods (4,4,4,1).

No harlequins were observed on Rock Creek, Elk Creek and Swamp Creek where they have been observed in at least one of the past five years.

Lolo National Forest. Brood surveys were conducted along 42 km of 3 streams during August 1992 (Table 1). Three different harlequin ducks were observed on 1 stream (Table 1, Appendix B & C). The North Fork of the Blackfoot River had 3 juveniles present. Additionally an angler we talked to on the bay at the mouth of Marten Creek (Kootenai NF), reported that he had seen a female with a small brood in July on Graves Creek; he also stated he had seen harlequins on Deep Creek in previous years, but not in 1992. He was able to tell harlequins from other ducks present at the time (mallards and common mergansers). However, our survey and past surveys on Graves Creek have failed to find harlequins (Miller 1989, Fairman and Miller 1990). No harlequins

were observed during a survey of Trout Creek where they have been observed in at least one of the past five years.

Glacier National Park. Brood surveys were conducted along 24 km of the McDonald Creek drainage on 10-11 August 1992 and along 16 km again on 2 September 1992 (Table 1). A minimum of 50 different harlequin ducks (12♀; 13-14 broods of 1, 1, 2, 2, 3, 3, 3, 4, 4, 4, 7, and a group of 8 young with two size classes present) were observed on McDonald Creek and an additional 3 (1♀ with 2 young) on Mineral Creek (Table 1, Appendix B & C). Many other surveys were conducted throughout the season by Glacier National Park personnel (Ashley 1992). These surveys found considerable mixing of broods, both before and after marking on 10-11 August.

Breeding Chronology and Effects on Surveying. Breeding was very early this year, probably due to very low flows during spring runoff. As a result, most females apparently began egg laying and incubation several weeks early; males had left by the second pair survey of Marten Creek on 1 June. The last male was seen on McDonald Creek on 23 June 1992 about 10 days earlier than reported in 1973-75 (Kuchel 1977, Ashley 1992). All young were fledged or nearly flying by 4 August on Marten Creek and 12 August on Trail Creek. Some females and young left Marten Creek by 7 August. If other streams surveyed were more advanced chronologically, birds might have already left for the coast by the time the streams were surveyed for broods. However, most females and young were still present on 11 August at McDonald

Creek in Glacier National Park, and over 50% still remained on 2 September (Table 1). Surveys on Red Meadow, Rock and Swamp creeks were most likely to have been affected, since many reaches had extremely low flows or were intermittently dry by early August.

Table 1. Streams surveyed and Harlequin Ducks observed in 1992.

Stream	Date	kms	Harlequins M	F	J	U	Pr	Br
Flathead National Forest								
Babcock Creek	16 Jul	3						
Bartlett Creek	19 Jul	2						
Big Creek	15 May	3						
	12 Jun	18						
	14 Aug	19						
Big Salmon Creek	22-23 Jul	10						
Bunker Creek	22 Jun	8						
Coal Creek	13 Jun	10						
	13 Aug	13						
Danaher Creek	17 Jul	6						
Doris Creek	6 Aug	3						
Glacier Creek	5 Aug	2						
Gordon Creek	18 Jul	8						
Little Salmon Creek	23-24 Jul	13		2	8			2(3,5)
Mid Creek	23 Jun	1						
Middle Fork Flathead River	30-31 Jul	32						
North Fork Flathead River	14 May	48	1	2				
Quintonkon Creek	26 Jun	6						
Red Meadow Creek	13 Aug	10						
S. Fork Flathead River	23 Jun	29						
	27-26 Jul	64		4				
S. Fork White River	20 Jul	1						
Spotted Bear River	24 Jun	22						
	13 Aug	19		1	7			2(3,4)
Sullivan Creek	25 Jun	13		2				
	8 Aug	13				2		1?(1?)
Swan River	4-5 Aug	13						
Trail Creek	14 May	19	4	4				
	9-11 Jun	19	3	3				
	12 Aug	21		2	8			2(4,4)

additional marking attempts were also made 13 Aug

Table 1. continued.

Stream	Date	kms	Harlequins M	F	J	U	Pr	Br
Flathead National Forest (cont.)								
Upper Twin Creek	23 Jun	2						
Wheeler Creek	9 Aug	3						
White River	19-21 Jul	14		3	6			3(1,2,3)
Wounded Buck Creek	5 Jun	2						
	7 Aug	6						
Youngs Creek	15-17 Jul	26						
Kootenai National Forest								
Marten Creek	12 May	5	4	2			2	
	1 Jun	5						
	4 Aug	9		5	13			4(4,4,4,1)
additional marking attempts were	also made 5-7 Aug							
Rock Creek	4 Aug	2						
	5 Aug	2						
	1 Aug	6						
Swamp Creek	13 May	13						
	6 Aug	3						
Vermillion River	1-2 Jun	13	1	1				
	5-6 Aug	16						
Wigwam River	8 Jul	3						
Lolo National Forest								
Graves Creek	6 Aug	5						
N. Fork Blackfoot River	21-22 Aug	26		1	2			1(2 or 3)
Trout Creek	7 Aug	11						

Table 1. continued.

Stream	Date	kms	Harlequins M	F	J	U	Pr	Br
Glacier National Park								
McDonald Creek	10-11 Aug	23		10	33			10
	Broods: 10(3,2,3,7,4,1,2,1,3 & group of 8)							
	2 Sep	16		5	20	2		2+
	New Broods: 2(4,4)							
Mineral Creek	11 Aug	1		1	2			1(2)
Ole Creek	12 Aug	7						

Table 2. Miscellaneous reports of Harlequin Ducks during 1992.

Stream	Date	Harlequins M	F	J	U	Pr	Br
Flathead National Forest							
Harrison Creek	27 May	1					
T24N R14W S8	J. Graham						
Middle Fork Flathead River	3 May	1					
T30N R16W S34 NW¼	H. Rivera						
	31 May	1	1			1	
T28N R15W S33 NW¼	H. Rivera						
	10 July		2	4			1(4)
T28N R16W S12	S. Sigler						
	16 July		1	5			1(5)
T29N R16W S2	S. Sigler						
Lolo National Forest							
Graves Creek	July		1	2+			1(2+)
T23N R29W S36							

631.377

Reproduction

Harlequins were present this year on at least 12 streams in the study area and adult females or broods were seen on 11 of those streams. A minimum of 42 adult females were present. Of 42 potential broods, a minimum of 31 were produced for a 74% success rate of broods per adult female. Mid-late August brood size averaged 3.27 (n=30). Most broods were seen in Class III or fledged stages of development (Bellrose 1976:27), and we made no adjustment for age of broods in our calculation of mean brood size. Success rates per adult female are biased by having incomplete early pair surveys for comparison on some streams, resulting in high recorded success rates. However, this may have been offset by some broods fledging and leaving the area prior to brood survey completion on some streams such as Trail Creek and the Vermillion River.

Capture and Marking

The first year of the juvenile Harlequin Duck site fidelity and survival study got off to a good start. A total of 62 juvenile birds from 4 drainages were captured and marked (Table 3, Appendix D & E). Five adult males and 18 adult females were marked in addition to the 4 males and 2 females marked in 1991 (Table 3, Appendix D & E).

The two females and one male marked with nasal disks on Marten Creek in 1991 were recaptured in 1992. No problems with the nasal disks were apparent. The ducks appeared healthy and each female successfully raised broods of 4 young during 1992.

However, USFWS aluminum leg bands were moderately worn on one female and severely worn on the other (the last number was nearly illegible). Additionally, one of the females had apparently been shot, probably in the fall 1991 hunting season; several healed, round, shot-sized holes were present in the foot webbing.

While banding in Glacier National Park in August we noted that some birds had tarsi too short to safely use both a plastic leg band and USFWS band on the same leg. In those cases we split the plastic band to make it only 1/2 as tall. This appeared to work well on one bird recaptured in September. However, we did note some injury to the hallux on both legs on another recaptured bird where all bands were full height. We used one split band (top) and one whole band (bottom) on all subsequent birds banded. We recommend that all birds banded in the future have the upper color band split in half to prevent this problem from reoccurring.

Table 3. Summary of harlequin ducks marked in 1992.

Location	Male	Female	(Pair)	Juv.	Total
McDonald Creek, Glacier NP		13		40	53
Trail Creek, Flathead Co.	3	3	(2)	4	10
Spotted Bear R., Flathead Co.		1		7	8
Vermillion River, Sanders Co.	1				1
Marten Creek, Sanders Co. (includes 2 pairs & 2 single males from 1991; 2 females and 1 male from 91 were also recaptured in 92)	5	3	(2)	11	19
TOTAL	9	20	(4)	62	91

MANAGEMENT RECOMMENDATIONS AND RESEARCH NEEDS

Adult harlequins show strong fidelity to breeding sites (Bengston 1972, Kuchel 1977, Dzinbal 1982, Wallen 1987). The extent of fidelity to natal areas by adults breeding for the first time is unknown, but is likely to be strong. Colonization of currently unoccupied streams is likely to be a rare event. Harlequins appear sensitive to human disturbance (Clarkson 1992, Cassirer and Groves 1991). Repeated disturbances may discourage nesting at traditional sites and reduce productivity (Rodrick and Milner 1991). However, proximity to trails and roads does not always correlate with reduced reproductive success. Sixty percent of harlequin sites were within 50 m of trails on the Rocky Mountain Front (Diamond and Finnegan 1992). In this case, most harlequin streams are located in roadless or wilderness areas and receive limited human activity prior to or during the nesting period.

Mid-stream loafing sites are important in breeding areas (Cassirer and Groves 1990). Brood rearing areas in Idaho and Montana west of the Continental Divide have a dense shrub or timber/shrub mosaic on the banks (Cassirer and Groves 1989, Gangemi 1991). East of the Divide in Montana stream banks are more open, and most observation sites had banks composed of gravel, grass-forb, or bedrock habitat (Diamond and Finnegan 1992, Markum and Genter 1990). Low benthic macroinvertebrate biomass may limit the number and productivity of harlequins (Bengston and Ulfstrand 1971, Kuchel 1977). Given these factors, we recommend the following management strategies on harlequin streams:

1) minimize unnecessary human activity along harlequin streams during May through August (mid-May through June is the critical nesting period when birds are most sensitive);
2) a stream buffer of > 50 m should be maintained on both sides of streams for most activities; roads and trails should be > 100 m from streams and not visible from the streams;
3) major activities (road building, timber harvest, restoration projects, etc.) that are to be undertaken within 300 m of a stream should be done during the period 15 August - 1 April;
4) minor activities within stream buffers (e.g. trail maintenance or reconstruction) should not be preformed during 1 June - 15 July;
5) avoid activities which will change stream runoff patterns or decrease water quality;
6) limit access to harlequin streams during the breeding period May - August; in particular do not promote activities which will bring people into contact with harlequins; and
7) in any area where major management activities are to take place in potential harlequin habitat, survey for the preceding two years both for pairs (May) and broods (mid-July to mid-August). If harlequins are present, develop a monitoring plan for harlequins during and after the activity is to take place.

Long term research and management needs involve:

1) develop a baseline status report of current and historic

harlequin populations in Montana (currently in preparation);

2) investigate site fidelity, inter-stream movement, reproduction and mortality to allow estimations and modeling of what constitutes a viable harlequin population (began in 1992);
3) determining the primary limiting factors for harlequin duck populations in occupied and historic habitat situations in the Northern Rockies;
4) developing standardized surveying protocols for occupied and potential harlequin streams;
5) developing management guidelines for maintaining harlequin populations and habitat; and
6) assess the impacts of past and current habitat modification and develop techniques to restore harlequin populations and habitat.

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APPENDICES

Appendix A. Data forms

Harlequin Duck Survey Form. ___ of ___

Date_____ Time_____ Surveyor(s)_____
(Start/Finish)

Stream_____
Include map with exact area(s) surveyed on back of this page

Weather_____
(Temp., wind dir & speed, cloud cover, precip last 24 hrs)

Accessibility?_____
==========

Group #_____ # Individuals_____
(Put on map)

Sexes & Ages_____

Marked?_____

Accessibility?_____

Group #_____ # Individuals_____
(Put on map)

Sexes & Ages_____

Marked?_____

Accessibility?_____

Group #_____ # Individuals_____
(Put on map)

Sexes & Ages_____

Marked?_____

Accessibility?_____

NOTES:

Harlequin Duck Banding Form.

Date____________ Location____

Sex____ Age____ T_____N, R_____W, Section________________
Nasal Saddles Color Bands
Band #____________ Lft___________ Rt____________ Lt_______ Rt________

Weight_________ Wing chord________ Tail___________ Tarsus________

Molt____

Notes____
(with other ducks? marked, sex, age? etc.)

++

Date____________ Location____

Sex____ Age____ T_____N, R_____W, Section________________
Nasal Saddles Color Bands
Band #___________ Lft___________ Rt____________ Lt_______ Rt________

Weight__________ Wing chord________ Tail__________ Tarsus________

Molt____

Notes____
(with other ducks? marked, sex, age? etc.)

++

Date____________ Location____

Sex____ Age____ T_____N, R_____W, Section________________
Nasal Saddles Color Bands
Band #___________ Lft___________ Rt____________ Lt_______ Rt________

Weight_________ Wing chord________ Tail___________ Tarsus________

Molt____

Notes____
(with other ducks? marked, sex, age? etc.)

++
NOTES:

Appendix B. Element Occurrence Records from 1992 surveys

HISTRIONICUS HISTRIONICUS * 002
HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2 Federal Status: C2

Survey site name: UPPER MCDONALD CREEK
EO rank: A
EO rank comments: 11-14 PAIRS PRESENT

County: FLATHEAD

USGS quadrangle: MOUNT CANNON
AHERN PASS
MOUNT GEDUHN

Township:	Range:	Section:	TRS comments:
034N	017W	27	NW4

Survey date:
First observation: 1973
Last observation: 1992-09-02

Elevation: 3153 -4200
Slope/aspect:
Size (acres): 60

Location:
UPPER MCDONALD CREEK IN GLACIER NP; STREAM SECTION FROM CONTINENTAL CREEK SW TO THE NORTH END OF LAKE MCDONALD, AND INCLUDING MINERAL CREEK AND AVALANCHE CREEK AND LAKE.

Element occurrence data:
A POPULATION OF HARLEQUIN DUCKS WAS STUDIED OVER 4 YEARS. 31 BIRDS, INCLUDING 7 JUVENILES, WERE BANDED. 11-14 PAIRS PRESENT. 6/5/90: 4 PR, 11 MALE, 3 FEMALE PRESENT. 1992: A MINIMUM OF 14 BROODS PRODUCED A TOTAL OF 45 YOUNG; COLOR BANDED 40 YG AND 13 ADULT FEMALES.

General site description:
CA. 20 MILES OF MOUNTAIN STREAM.

Land owner/manager:
GLACIER NATIONAL PARK

Comments:
EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN. SPRING PAIRS AND LATE SEASON YOUNG REPORTED ON LOWER MCDONALD CREEK MAY OR MAY NOT BE BIRDS FROM UPPER MCDONALD CREEK POPULATION.

Information source:
KUCHEL, C.R. 1977. MS THESIS, U OF M, MISSOULA, MT, 59812.

Specimens:

HISTRIONICUS HISTRIONICUS * 006
HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2 Federal Status: C2

Survey site name: MARTEN CREEK
EO rank:
EO rank comments:

County: SANDERS

USGS quadrangle: NOXON
BLOOM PEAK

Township:	Range:	Section:	TRS comments:
025N	032W	32	ADDITIONAL SECTIONS

Survey date:
First observation: 1986
Last observation: 1992-08-04

Elevation: 2330 -2850
Slope/aspect:
Size (acres): 0

Location:
THE SOUTH AND NORTH FORKS OF MARTEN CREEK ARE ON THE WEST SIDE OF NOXON RESERVOIR, CA. 8 MILES NW OF TROUT CREEK.

Element occurrence data:
(SEE ALSO: ECOMONITORING DATA) GENERALLY 2 TO 4 PAIRS BREED.

General site description:
MOUTH OF MARTEN CREEK IS MAPPED. THIS EO INCLUDES THE NORTH BRANCH (CA. 5 MILES) AND SOUTH BRANCH (CA. 1.5 MILES) AS CONTIGUOUS HABITAT.

Land owner/manager:
KOOTENAI NATIONAL FOREST, CABINET RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:

Information source:
WILDLIFE BIOLOGIST, CABINET DISTRICT, KOOTENAI NATIONAL FOREST, HCR2, BOX 210, TROUT CREEK, MT 59874.

Specimens:

EcoMonitoring Record
EM.USMTHP2*1

Monitoring Subject--
Scientific Name: HISTRIONICUS HISTRIONICUS G Rank: G5
Common Name: HARLEQUIN DUCK S Rank: S2

Sitename: Marten Creek

Element Occurrences of Concern--

Element Occurrence Code:	Scientific Name:	G Rank:	S Rank:	Sitename:
ABNJB15010*006*MT	HISTRIONICUS HISTRIONICUS	G5	S2	

Goals & Objectives--

Management Plan: Monitoring Plan: YES Monitoring Level: QUANTITATIVE ESTIMATE OF ABUNDANCE
Management Goals:

Monitoring Goals:
TRACK CHANGES IN THE POPULATION AND REPRODUCTIVE SUCCESS; DETERMINE SITE FIDELITY.

Monitoring Procedure--

Parameters:	Threshold:
MALES	1
FEMALES	1
PAIRS	1
JUVENILES	1
BROODS	1

Sampling Methodology:

Sampling Frequency:
MINIMUM TWICE PER YEAR, CA. MAY & JULY/AUGUST.

Visit Date(s): 1987-06-18
1987-06-22
1988-06-18
1989
1992 05 12
1992 06 01
1992 08 04

Coordinator: REICHEL, JIM

Trends & Recommendations--

Short-term Trend: STABLE Long-term Trend:

Trend Comments: POPULATION APPEARS STABLE OVER LAST 5 YEARS.

Current Condition: GOOD

Condition Comments: CURRENT POPULATION SEEMS TO BE MAXIMUM THAT HABITAT CAN SUPPORT.

Trend Information Updated: 1993-03-24

Management Recommendations:

Monitoring Recommendations:

References--
Sourcecode: Citation:

Ecomonitoring Visit Summary
Visit Code: EM.USMTHP2*1*02

Visit Date: 1987-06-18

Observer: ASH, E. & CROWE, E.

Person hours:

Effort Comments: NORTH FORK SURVEY.

Ecomonitoring Parameters:	Quantitative Summary:	Qualifying Note:
MALES	0	
FEMALES	6	
PAIRS	0	
JUVENILES	?	
BROODS	3	

Other Observations:

Ecomonitoring Visit Summary
Visit Code: EM.USMTHP2*1*03

Visit Date: 1987-06-22

Observer: ASH, E. & CROWE, E.

Person hours:

Effort Comments: SOUTH FORK SURVEY.

Ecomonitoring Parameters:	Quantitative Summary:	Qualifying Note:
MALES	0	
FEMALES	3	
PAIRS	0	
JUVENILES	?	
BROODS	2	

Other Observations: MAY BE DUPLICATION OF BROODS OBSERVED ON NORTH FORK ON 6/18.

Ecomonitoring Visit Summary
Visit Code: EM.USMTHP2*1*04

Visit Date: 1988-06-18

Observer:

Person hours:

Effort Comments:

Ecomonitoring Parameters:	Quantitative Summary:	Qualifying Note:
MALES	?	
FEMALES	1 + ?	
PAIRS	?	
JUVENILES	6	
BROODS	1	NEAR DEVILS GAP (NORTH FO

Other Observations: OTHER ADULTS OBSERVED, BUT DETAILS MISSING.

Ecomonitoring Visit Summary
Visit Code: EM.USMTHP2*1*05

Visit Date: 1989

Observer:

Person hours:

Effort Comments:

Ecomonitoring Parameters:	Quantitative Summary:	Qualifying Note:
MALES	0	
FEMALES	2	
PAIRS	0	
JUVENILES	?	
BROODS	2	ON NORTH FORK

Other Observations:

Ecomonitoring Visit Summary
Visit Code: EM.USMTHP2*1*11

Visit Date: 1992 05 12

Observer: GENTER, DAVID

Person hours: 2.50

Effort Comments: SURVEYED SOUTH FORK UP TO SORREL GULCH.

Ecomonitoring Parameters:	Quantitative Summary:	Qualifying Note:
MALES	2	
FEMALES	0	
PAIRS	2	
JUVENILES		
BROODS		

Other Observations: RECAPTURED MALE #27560 (BANDED IN 1991). BANDED MALE #27561.

Ecomonitoring Visit Summary
Visit Code: EM.USMTHP2*1*12

Visit Date: 1992 06 01

Observer: REICHEL, JIM, et al.

Person hours: 2.00

Effort Comments: SPOT SURVEYED CA. LOWER MILE OF NORTH FORK; WALKED UPSTREAM LOWER MILE OF SOUTH FORK.

Ecomonitoring Parameters:	Quantitative Summary:	Qualifying Note:
MALES		
FEMALES		
PAIRS		
JUVENILES		
BROODS		

Other Observations: NO DUCKS OBSERVED.

Ecomonitoring Visit Summary
Visit Code: EM.USMTHP2*1*13

Visit Date: 1992 08 04

Observer: REICHEL, JIM; BECKSTROM, STAN

Person hours: 20.00

Effort Comments: SURVEYED NORTH FORK UP TO CLINTON GULCH; LOWER MILE OF SOUTH FORK (STREAMS INTERMITTENT ABOVE THOSE POINTS). MOST TIME SPENT BANDING - 12 BIRDS FIRST DAY AND 3 BIRDS SECOND DAY.

Ecomonitoring Parameters:	Quantitative Summary:	Qualifying Note:
MALES	0	
FEMALES	5	SINGLE FEMALE IN BAY
PAIRS	0	
JUVENILES	13	
BROODS	4	BROODS OF 4,4,4,1

Other Observations: BROODS LOCATED AT: MOUTH OF MARTEN CREEK (2); CA. 200m UP FROM MOUTH; Sec.25 SW4SE4.

EM.USMTHP2*1*4 → 15
*5 → 16

HISTRIONICUS HISTRIONICUS * 008
HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2 Federal Status: C2

Survey site name: VERMILLION RIVER
EO rank:
EO rank comments:

County: SANDERS

USGS quadrangle: TROUT CREEK
SEVEN POINT MOUNTAIN
VERMILLION PEAK
MILLER LAKE

Township:	Range:	Section:	TRS comments:
024N	031W	12	SW4

Survey date:
First observation: 1988
Last observation: 1992-06-01

Elevation: 2340 -3400
Slope/aspect:
Size (acres): 0

Location:
FROM TROUT CREEK GO NORTH 1.5 MILES ON SR 200, RIGHT 5 MILES ON THE BLUE SLIDE ROAD, THEN LEFT 2 MILES UP THE VERMILLION RIVER ROAD.

Element occurrence data:
1988: HEN WITH 3 YOUNG OBSERVED. 1989: 2 FEMALES WITH BROODS OBSERVED, ONE IN MAPPED LOCATION, ONE IN T24N,R30W,8 (SEVERAL MILES UPSTREAM). 1992: OBSERVED SINGLE MALE [T24N,R30W,2] AND SINGLE FEMALE [T24N,R30W,7]; MALE WAS MARKED.

General site description:
A CA. 10 MILE STREAM SEGMENT, FROM VERMILLION BAY TO VERMILLION FALLS.

Land owner/manager:
KOOTENAI NATIONAL FOREST, CABINET RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
PLUM CREEK TIMBER COMPANY

Comments:
PLACER MINING IN AREA. EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN.

Information source:
MILLER, V. E.(GENE). 850 HWY 200 WEST, PLAINS, MT 59859.

Specimens:

HISTRIONICUS HISTRIONICUS * 017
HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2 Federal Status: C2

Survey site name: SULLIVAN CREEK
EO rank:
EO rank comments:

County: FLATHEAD

USGS quadrangle: CONNOR CREEK

Township:	Range:	Section:	TRS comments:
026N	016W	31	NE4NW4

Survey date:
First observation: 1990
Last observation: 1992-08-08

Elevation: 4100 -
Slope/aspect:
Size (acres):

Location:
CA. 6 MILES UP FS ROAD #547 ALONG SULLIVAN CREEK, ON THE WEST SIDE OF HUNGRY HORSE RESERVOIR.

Element occurrence data:
1990: FEMALE AND 4 YOUNG OBSERVED. 1992: 2 UNAGED BIRDS SEEN 8 AUG.

General site description:

Land owner/manager:
FLATHEAD NATIONAL FOREST, SPOTTED BEAR RANGER DISTRICT

Comments:

Information source:
CARLSON, J. C. 1990. RESULTS OF HARLEQUIN DUCK SURVEYS IN 1990 ON THE FLATHEAD NATIONAL FOREST, MONTANA. UNPUBLISHED REPORT, 31PP.

Specimens:

HISTRIONICUS HISTRIONICUS * 018
HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2 Federal Status: C2

Survey site name: MIDDLE FORK FLATHEAD RIVER
EO rank:
EO rank comments:

County: FLATHEAD

USGS quadrangle: NIMROD

Township:	Range:	Section:	TRS comments:
028N	015W	19	

Survey date:
First observation: 1990
Last observation: 1992-07-10

Elevation: 4050 -
Slope/aspect:
Size (acres):

Location:
ALONG THE MIDDLE FORK FLATHEAD RIVER, CA. 5 MILES BY TRAIL UPSTREAM (SOUTH) OF US 2.

Element occurrence data:
1990:1 FEMALE AND 4 YOUNG OBSERVED. 1992: 1 FEMALE WITH 4 CHICKS PLUS A SECOND FEMALE OBSERVED NEAR MOUTH OF SPRUCE CREEK.

General site description:

Land owner/manager:
GREAT BEAR WILDERNESS
FLATHEAD NATIONAL FOREST, HUNGRY HORSE RANGER DISTRICT

Comments:
1992 SIGHTING BY SARAH SIGLER (USFS).

Information source:
CARLSON, J. C. 1990. RESULTS OF HARLEQUIN DUCK SURVEYS IN 1990 ON THE FLATHEAD NATIONAL FOREST, MONTANA. UNPUBLISHED REPORT, 31PP.

Specimens:

HISTRIONICUS HISTRIONICUS * 019
HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2 Federal Status: C2

Survey site name: TRAIL CREEK
EO rank:
EO rank comments:

County: FLATHEAD

USGS quadrangle: TRAILCREEK
MOUNT HEFTY

Township:	Range:	Section:	TRS comments:
037N	022W	30	SE4NE4

Survey date:
First observation: 1990
Last observation: 1992-08-12

Elevation: 3800 -4280
Slope/aspect:
Size (acres):

Location:
TAKE THE NORTH FORK FLATHEAD ROAD PAST POLEBRIDGE TO FS ROAD #114, THEN CA. 3 MILES WEST.

Element occurrence data:
1990: MULTIPLE SIGHTINGS OF UP TO 4 YOUNG; MAY BE SEVERAL BROODS. 1992: 4-5 PAIRS PRESENT; MINIMUM 2 BROODS PRODUCED 8 YG; MARKED 2 FEMALES, 3 MALES, AND 4 YOUNG.

General site description:
A CA. 7 MILE SEGMENT OF MOUNTAIN STREAM, SECTIONS OF WHICH ARE INTERMITTENT DURING LATE SUMMER.

Land owner/manager:
FLATHEAD NATIONAL FOREST, GLACIER VIEW RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
STATE LAND - UNDESIGNATED

Comments:
EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN.

Information source:
CARLSON, J. C. 1990. RESULTS OF HARLEQUIN DUCK SURVEYS IN 1990 ON THE FLATHEAD NATIONAL FOREST, MONTANA. UNPUBLISHED REPORT, 31PP.

Specimens:

HISTRIONICUS HISTRIONICUS * 022
HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2 Federal Status: C2

Survey site name: NORTH FORK BLACKFOOT RIVER
EO rank:
EO rank comments:

County: POWELL
LEWIS AND CLARK

USGS quadrangle: LAKE MOUNTAIN

Township:	Range:	Section:	TRS comments:
016N	011W	23	NW4SW4

Survey date:
First observation: 1992-08-28
Last observation: 1992-08-22

Elevation: 4700 -
Slope/aspect: -/-
Size (acres):

Location:
FROM SR 200 EAST OF OVANDO, FOLLOW SIGNS TO NORTH FORK BLACKFOOT RIVER TRAILHEAD AND GO UP TRAIL CA. 1 MILE.

Element occurrence data:
1992: 3 DUCKS SIGHTED - JUVENILES, OR HEN WITH 2 JUVENILES.
1991: HEN WITH 4 JUVENILES SIGHTED (T17N,R10W,S31).

General site description:

Land owner/manager:
LOLO NATIONAL FOREST, SEELEY LAKE RANGER DISTRICT

Comments:
ACTUAL BREEDING LOCATION UNKNOWN, SINCE BROODS MIGHT HAVE TRAVELED SOME DISTANCE BY DATE OF THESE SIGHTINGS.

Information source:
CASTREN, CHAD. 1992. [REPORT ON FIELD SURVEYS FOR HARLEQUIN DUCKS, SUMMER 1992.]

Specimens:

HISTRIONICUS HISTRIONICUS * 023
HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2 Federal Status: C2

Survey site name: LITTLE SALMON CREEK
EO rank:
EO rank comments:

County: FLATHEAD

USGS quadrangle: MARMOT MOUNTAIN
PAGODA MOUNTAIN

Township:	Range:	Section:	TRS comments:
022N	014W	27	NE4NW4

Survey date:
First observation: 1992-07-23
Last observation: 1992-07-24

Elevation: 4200 -4250
Slope/aspect: -/-
Size (acres):

Location:
IN THE BOB MARSHALL WILDERNESS CA. 1.25 MILES UP LITTLE SALMON CREEK FROM THE SOUTH FORK FLATHEAD RIVER.

Element occurrence data:
FEMALE WITH 5 YOUNG (LIGHT COLORED, DOWNY LOOKING) OBSERVED. ALSO FEMALE WITH 3 YOUNG SIGHTED CA. 1 MILE DOWNSTREAM, NEAR PACK BRIDGE.

General site description:
CA. 2 MILE SEGMENT OF MOUNTAIN STREAM.

Land owner/manager:
BOB MARSHALL WILDERNESS
FLATHEAD NATIONAL FOREST, SPOTTED BEAR RANGER DISTRICT

Comments:
EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN.

Information source:
CASTREN, CHAD. 1992. [REPORT ON FIELD SURVEYS FOR HARLEQUIN DUCKS, SUMMER 1992.]

Specimens:

HISTRIONICUS HISTRIONICUS * 024
HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2 Federal Status: C2

Survey site name: WHITE RIVER
EO rank:
EO rank comments:

County: FLATHEAD
POWELL

USGS quadrangle: HAYSTACK MOUNTAIN

Township:	Range:	Section:	TRS comments:
021N	012W	6	SE4SW4

Survey date:
First observation: 1992-07-19
Last observation: 1992-07-21

Elevation: 4700 -4850
Slope/aspect: -/-
Size (acres):

Location:
IN THE BOB MARSHALL WILDERNESS, NEAR THE CONFLUENCE OF WHITE RIVER AND ITS SOUTH FORK, CA. 15 AIR MILES ENE OF BENCHMARK.

Element occurrence data:
3 BROODS SIGHTED; 2 (FEMALE +3, FEMALE +1) AT SOUTH END OF CANYON BELOW NEEDLE FALLS AND 1 (FEMALE +2) CA. 0.5 MILE DOWNSTREAM OF CONFLUENCE.

General site description:
CA. 2 MILE SEGMENT OF MOUNTAIN STREAM.

Land owner/manager:
BOB MARSHALL WILDERNESS
FLATHEAD NATIONAL FOREST, SPOTTED BEAR RANGER DISTRICT

Comments:
EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN.

Information source:
CASTREN, CHAD. 1992. [REPORT ON FIELD SURVEYS FOR HARLEQUIN DUCKS, SUMMER 1992.]

Specimens:

HISTRIONICUS HISTRIONICUS * 029
HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2 Federal Status: C2

Survey site name: SPOTTED BEAR RIVER
EO rank:
EO rank comments:

County: FLATHEAD

USGS quadrangle: WHITCOMB PEAK

Township:	Range:	Section:	TRS comments:
025N	014W	14	13

Survey date:
First observation: 1992-08-13
Last observation: 1992-08-13

Elevation: 4050 -4200
Slope/aspect: -/-
Size (acres):

Location:
FROM HUNGRY HORSE, GO UP EAST SIDE OF RESERVOIR TO SPOTTED BEAR RIVER (CA. 50 MILES), THEN UP SPOTTED BEAR RIVER TO BEAVER CREEK CAMPGROUND.

Element occurrence data:
2 BROODS CAPTURED AND BANDED. ONE AT BEAVER CREEK (4 JUVENILES) AND ONE AT WHITCOMB CREEK (FEMALE WITH 3 JUVENILES).

General site description:
STREAM REACH OF CA. 2 MILES.

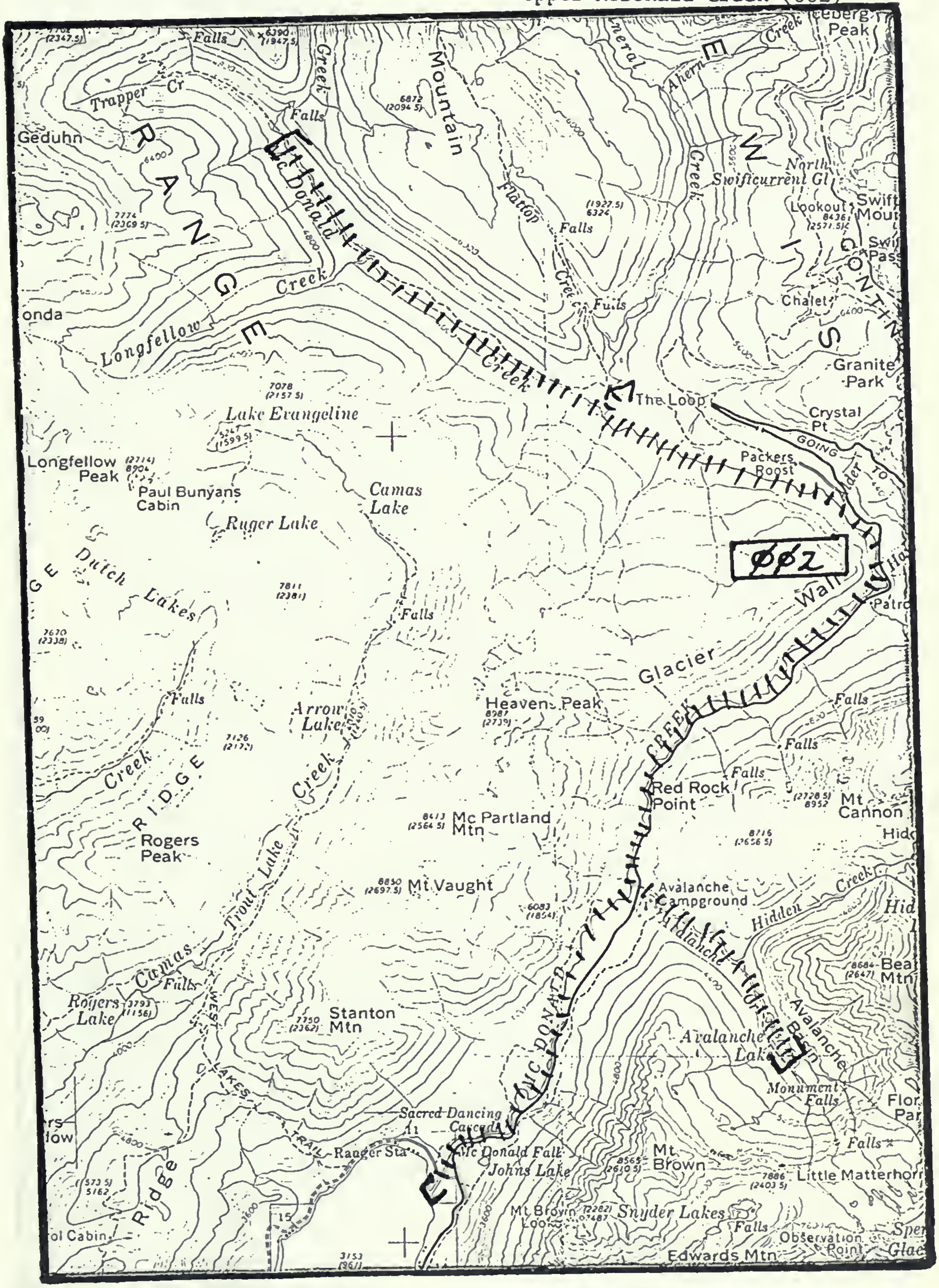
Land owner/manager:
FLATHEAD NATIONAL FOREST, SPOTTED BEAR RANGER DISTRICT

Comments:
EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN.

Information source:
GENTER, D. L. 1992. [FIELD NOTES FROM 13 AUGUST RE: BANDING HARLEQUIN DUCKS ON SPOTTED BEAR RIVER.]

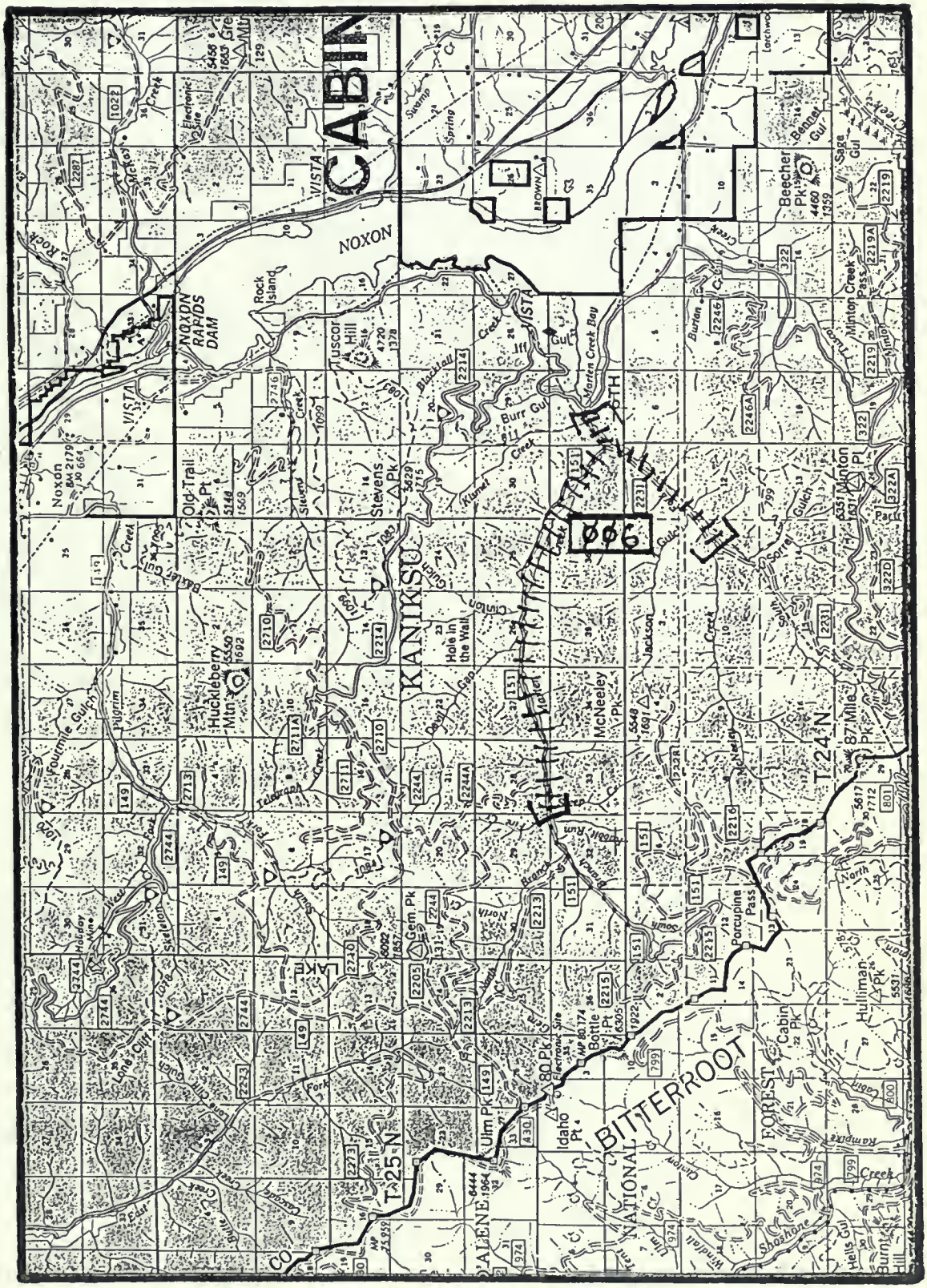
Specimens:

Appendix C. Maps of 1992 Element Occurrence Records


002
Trapper Cr
Geduhn
RANGE
McDonald Creek
Longfellow Creek
Mountain
Flattop
Falls
Swiftcurrent Gl
Lookout
Chalet
Granite Park
The Loop
Crystal Pt
Packers Roost
GOING TO
Lake Evangeline
Longfellow Peak
Paul Bunyans Cabin
Ruger Lake
Camas Lake
Dutch Lakes
Glacier Wall
Heavens Peak
Arrow Lake
Creek
RIDGE
Rogers Peak
Red Rock Point
Mt Cannon
Mc Partland Mtn
Mt Vaught
Avalanche Campground
Hidden Creek
Trout Lake
Camas
Rogers Lake
Stanton Mtn
Avalanche Lake
Monument Falls
Sacred Dancing Cascade
Ranger Sta
Mc Donald Falls
Johns Lake
Mt Brown
Little Matterhorn
Snyder Lakes
Mt Brown Lookout
Observation Point
Edwards Mtn
Ridge
Cabin
MC DONALD CREEK
TRAIL

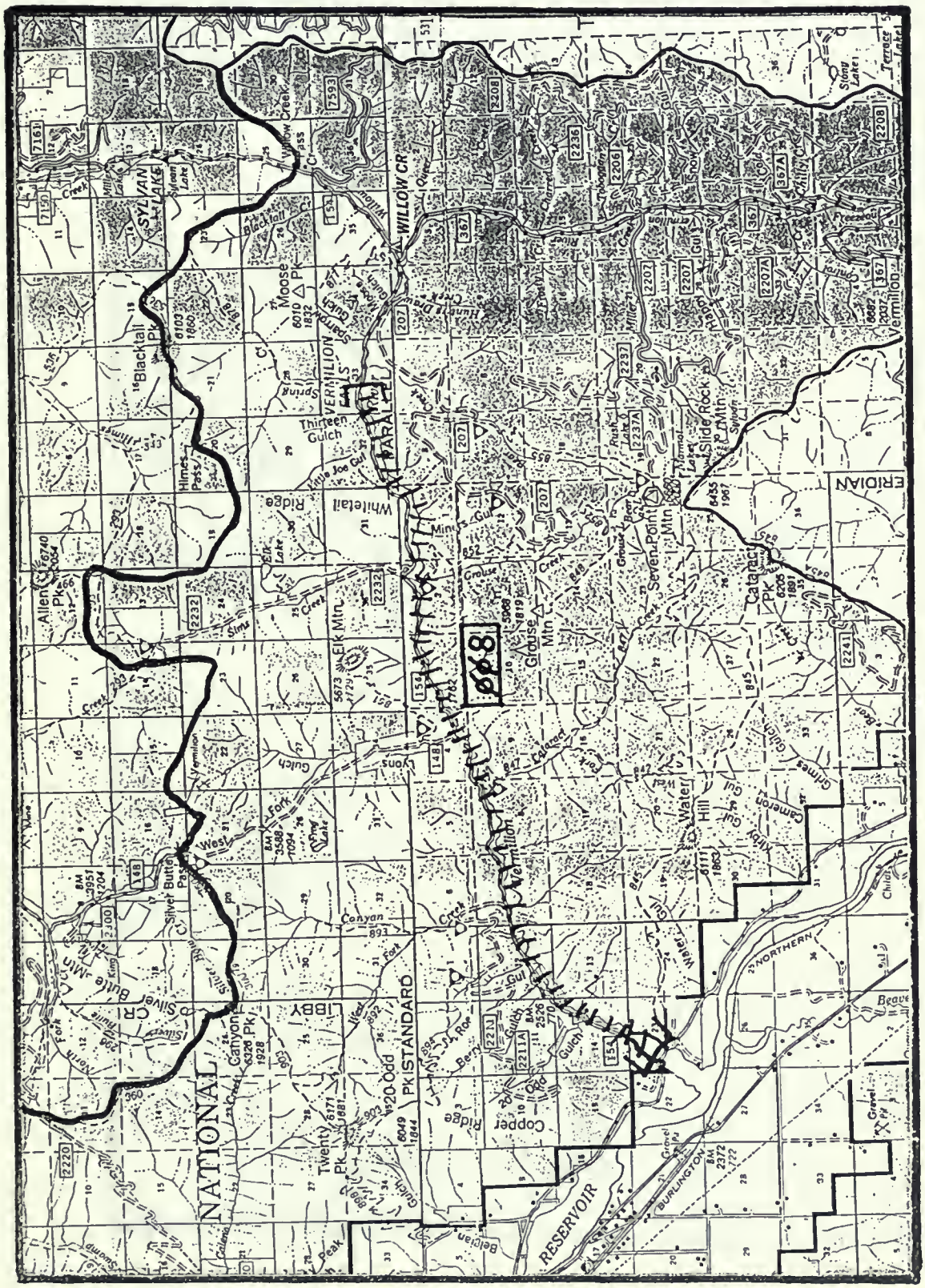
Histrionicus histrionicus

Marten Creek (006)

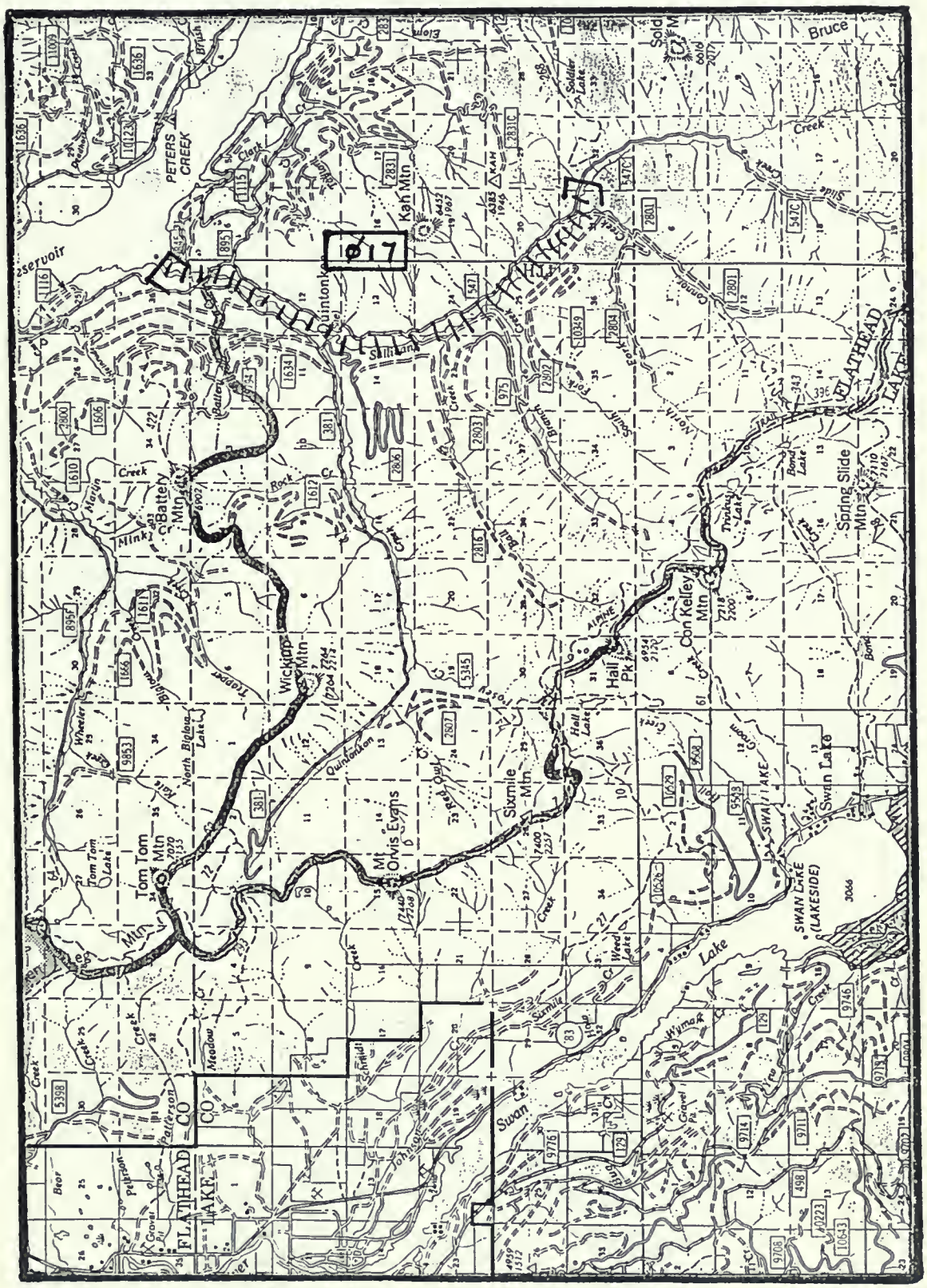


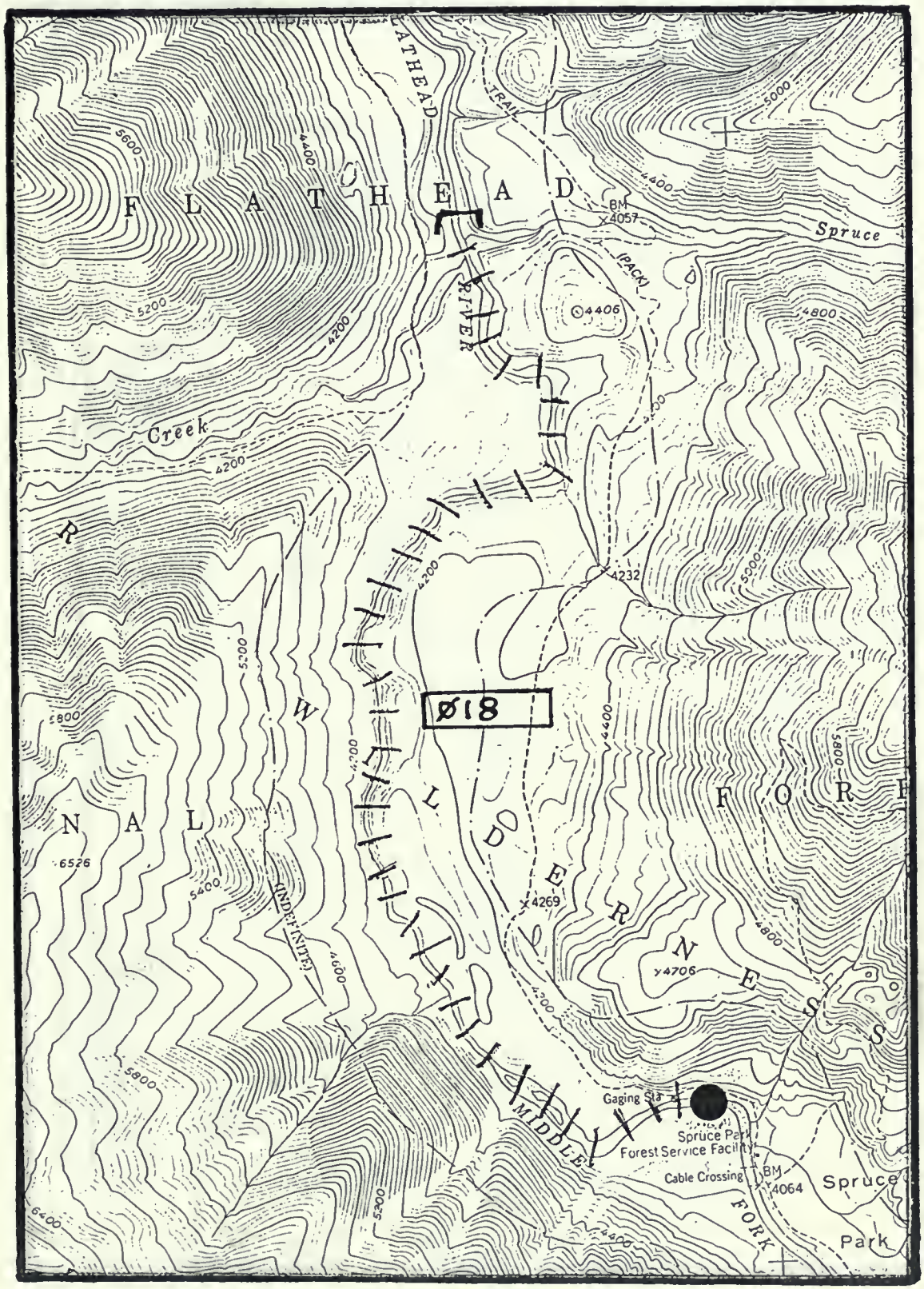
Histrionicus histrionicus

Vermilion River (008)



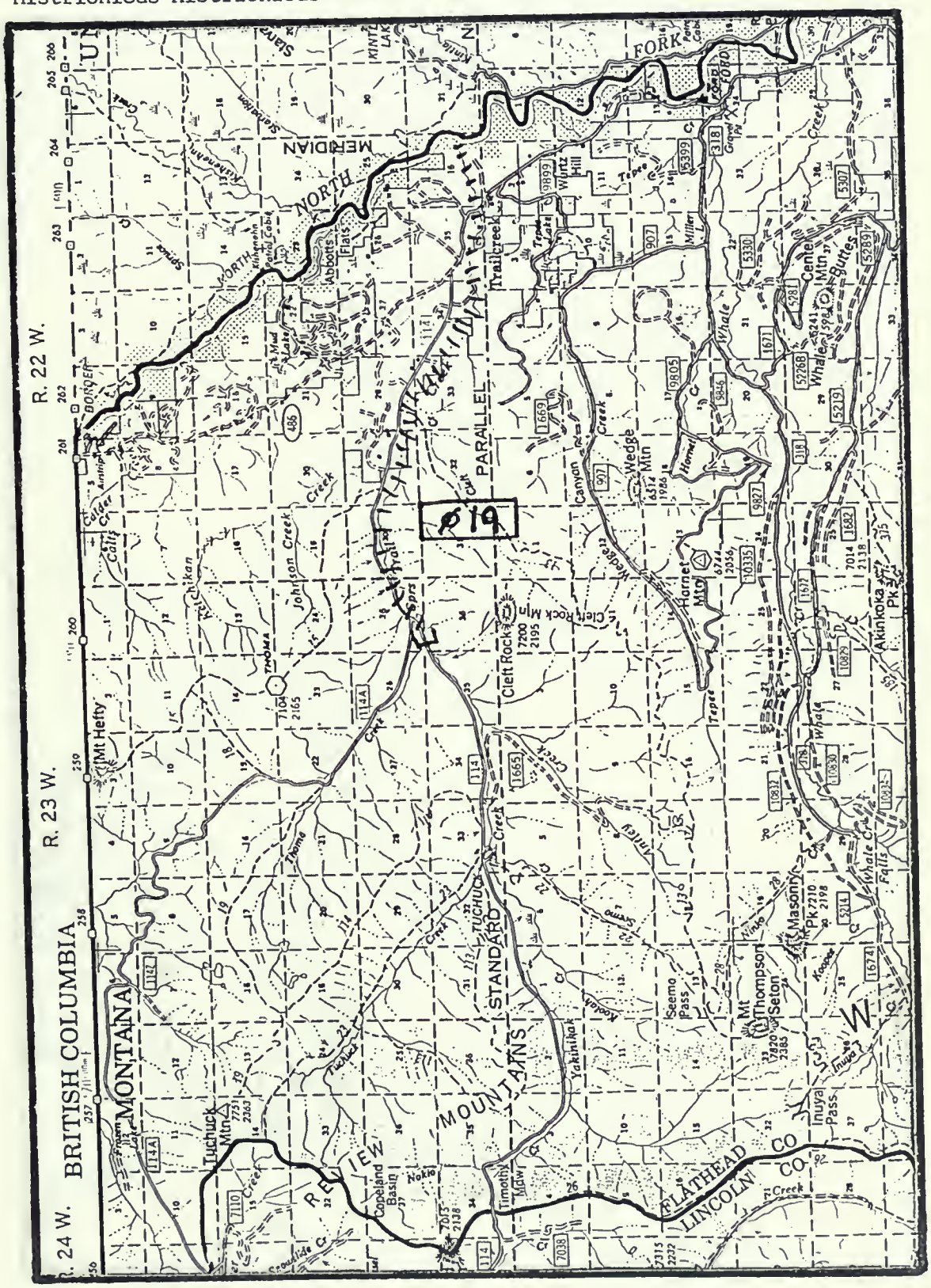
Histrionicus histrionicus Sullivan Creek (017)



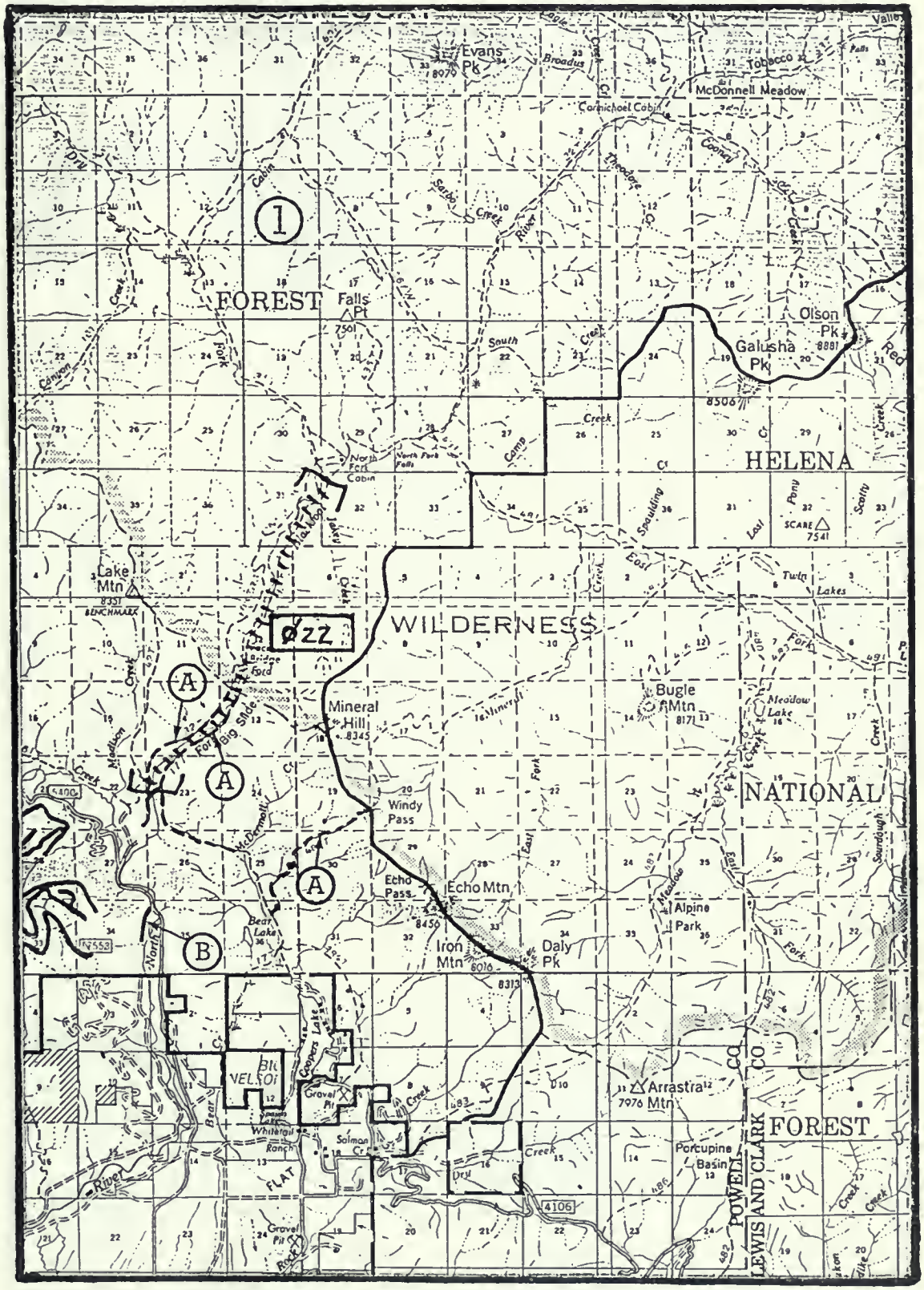

FLATHEAD
TRAIL
BM 4057
Spruce
(PACK)
RIVER
Creek
4232
018
WILDERNESS
FOREST
NATIONAL
6526
UNDEFINITE
4269
4706
Gaging Sta
Spruce Park
Forest Service Facility
Cable Crossing
BM 4064
MIDDLE FORK
Spruce
Park

Histrionicus histrionicus

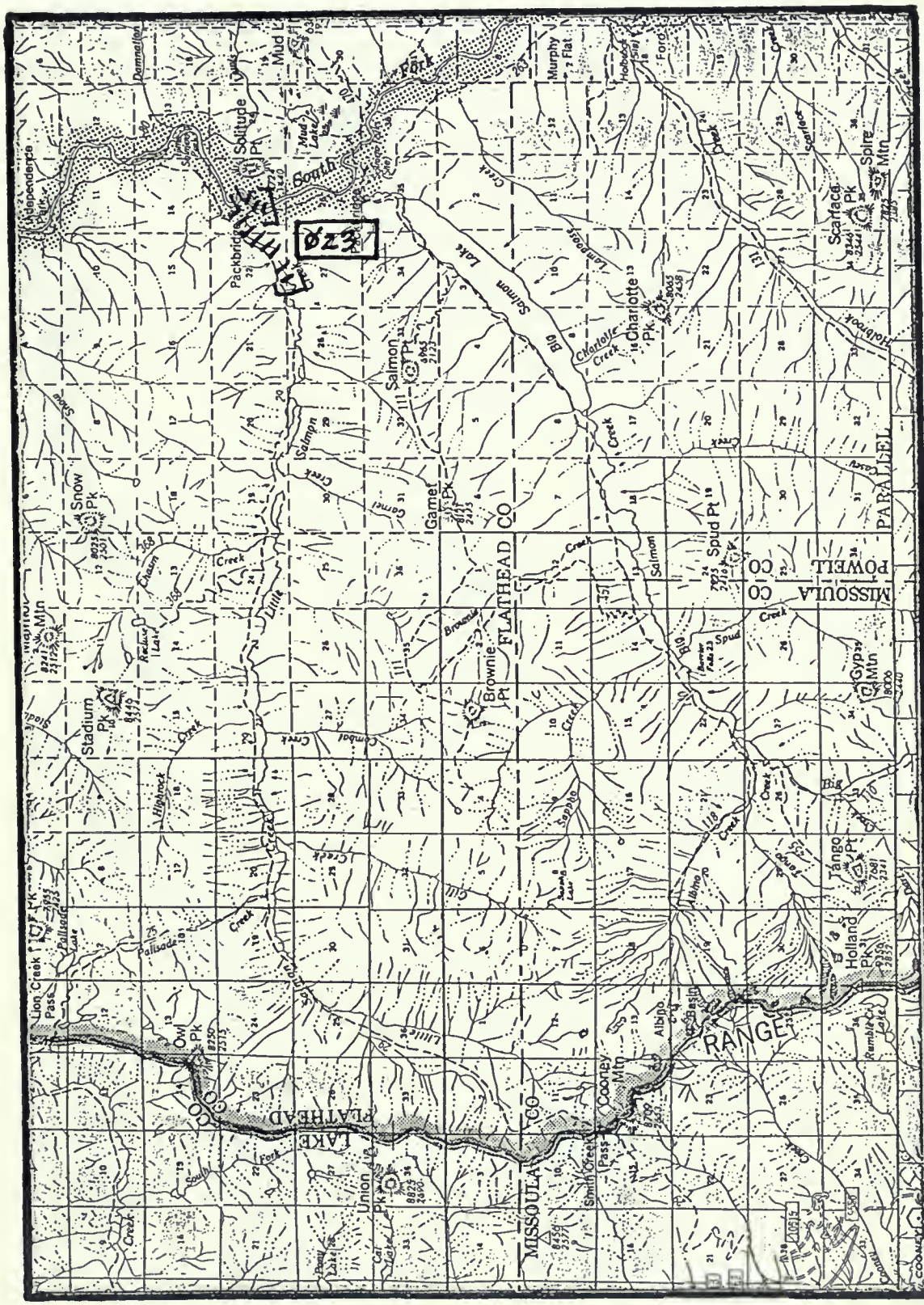
Trail Creek (019)



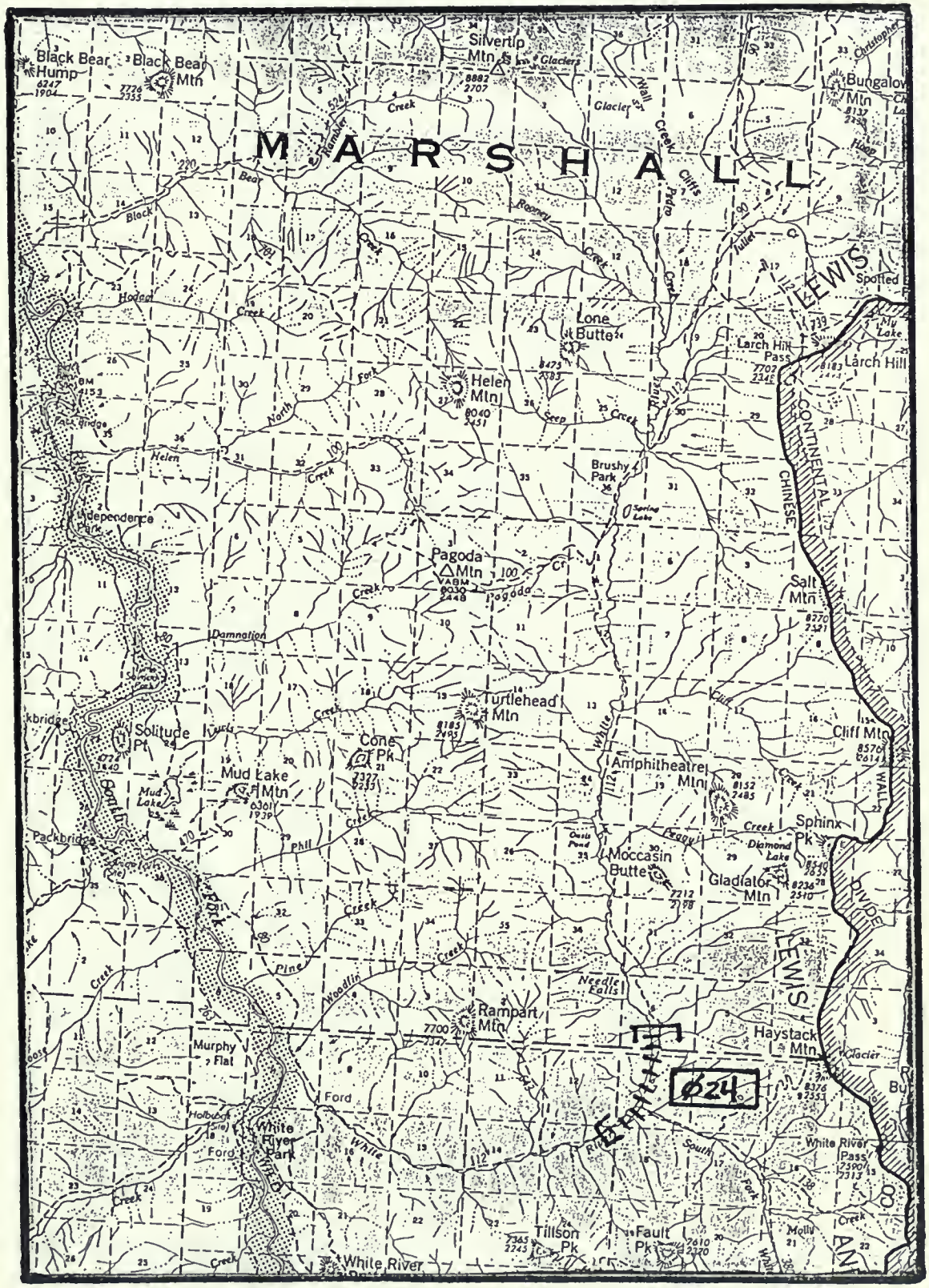
Histrionicus histrionicus N. Fork Blackfoot River (022)



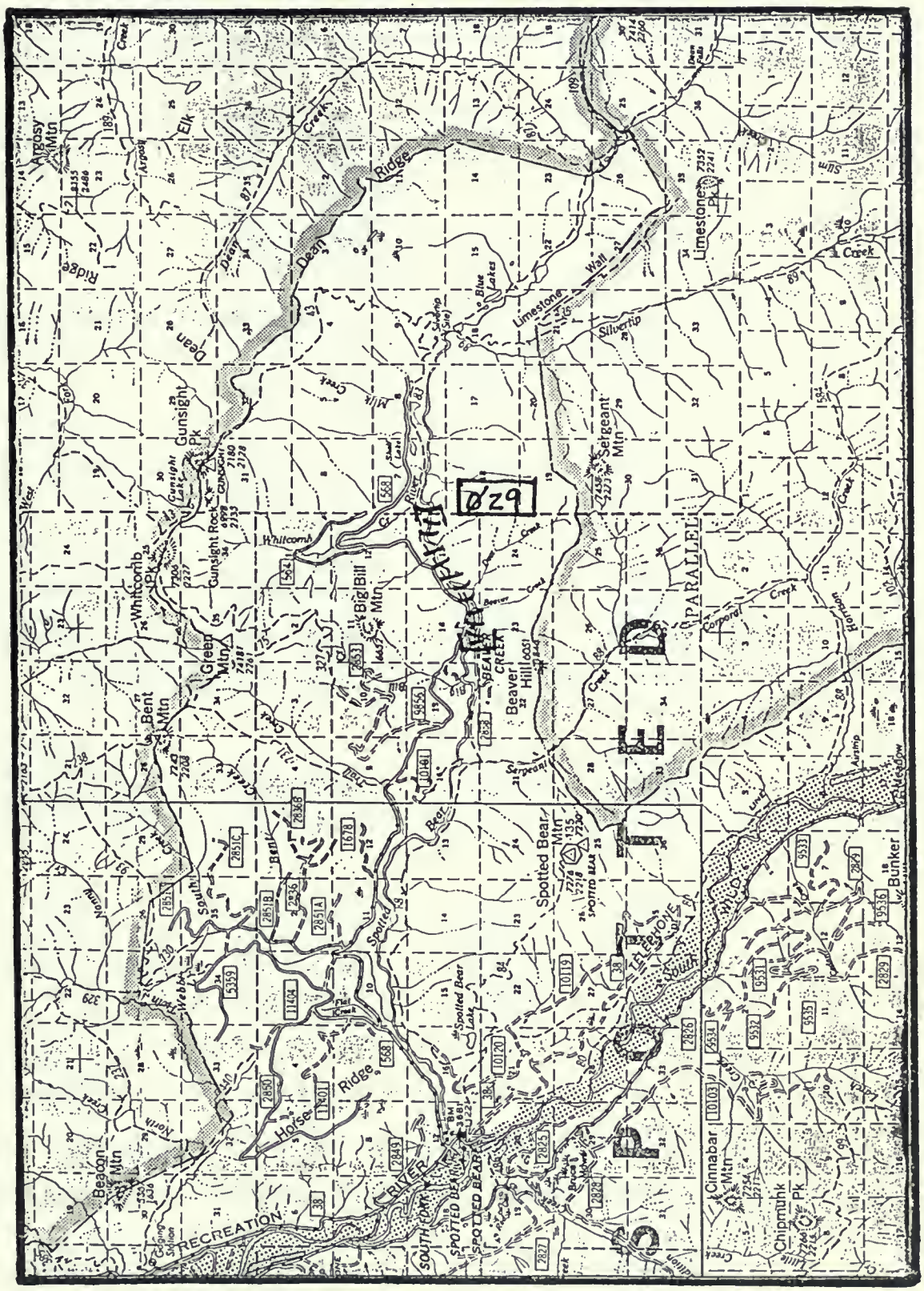
Histrionicus histrionicus Little Salmon Creek (023)



Histrionicus histrionicus White River (024)



Histrionicus histrionicus · Spotted Bear River (029)



Appendix D. List of Harlequin Ducks marked in 1992

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle
T = Triangle
S = Square

red = red
grn = green
blu = blue
yel = yellow
blk = black
wht = white
ora = orange

Marten Creek, Kootenai National Forest, Sanders Co., MT

Site	USFWS Band #	Nasal Discs left	Nasal Discs right
1) 4 Aug 92			
Adult Female	755-76007	T-blk	T-grn
Juvenile	755-76008	T-grn	S-red
Juvenile	755-76014	S-grn	S-red
Juvenile	755-76015	C-wht	S-red
Juvenile	755-76016	C-blu	S-red
Juvenile	755-76017	C-grn	S-red
Adult Female	755-76018	T-grn	T-grn
(Replaced worn band on adult female [double green triangle, old number 765-27559]			
5 Aug 92			
Juvenile	755-76019	S-red	T-grn
Juvenile	755-76020	S-red	T-blk
(with female 765-27556 [double black triangle] and 2 unmarked juveniles)			
2) 4 Aug 92			
Juvenile	755-76009	T-blk	S-red
Juvenile	755-76010	T-yel	S-red
Adult Female	755-76011	T-yel	T-grn
Juvenile	755-76012	S-ora	S-red
Juvenile	755-76013	S-blu	S-red
3) 29 May 92			
Adult Male	765-27561	T-Grn	T-Grn

(2 pairs and 2 single males were banded in 1991)

Vermillion River, Kootenai National Forest, Sanders Co., MT

1) 2 June 92			
Adult Male	765-27562	T-yel	T-yel

Trail Creek, Flathead National Forest, Flathead Co., MT

Site	USFWS Band #	Nasal Disks left	right
1) 12 Aug 92			
Juvenile	755-76042	S-red	T-yel
Juvenile	755-76043	S-red	S-ora
Juvenile	755-76044	S-red	S-blu
Adult Female	755-76045	S-ora	T-grn
Juvenile	755-76046	S-red	S-grn
2) 10 June 92			
Adult Male	765-27563	C-blu	C-blu
Adult Female	765-27564	S-ora	S-ora
3) 10 June 92			
Adult Male	765-27565	C-red	C-red
Adult Female	765-27566	C-blu	C-blu
4) 11 June 92			
Adult Male	765-27567	C-grn	C-grn
(with unmarked female and male 765-27563)			

Spotted Bear River, Flathead National Forest, Flathead Co., MT

1) 13 Aug 92			
Juvenile male	765-27589	C-red	C-grn
Juvenile ?male	765-27590	C-red	C-blu
Juv. female	765-27591	C-red	C-wht
Juv. female?	765-27592	C-red	S-grn
2) 13 Aug 92			
Juvenile ?male	765-27593	C-red	S-blu
Juvenile ?male	765-27594	C-red	S-red
Adult female	765-27595	C-red	C-red
Juv. male?	765-27596	C-red	T-yel

Colored Leg Bands used in Glacier National Park

p = pink (pink/USFWS for 1992 juveniles)
r = red
g = green
b = blue
y = yellow
w = white
o = orange
s = silver (FWS band)

Glacier National Park

Site	USFWS Band #	Plastic leg bands left	right
1) 10 Aug 92			
Juvenile	755-76021	o/g	p/s
Juvenile	755-76022	o/b	p/s
Juvenile	755-76023	o/y	p/s
Juvenile	755-76024	o/w	p/s
Adult Female	755-76025	o/g	o/s
Juvenile	755-76026	o/o	p/s
Juvenile	755-76027	g/o	p/s
Juvenile	755-76028	b/o	p/s
(1-2 additional juveniles were present but not captured)			
2) 10 Aug 92			
Juvenile	755-76029	p/s	o/g
Juvenile	755-76030	p/s	o/b
Adult Female	755-76031	o/b	o/s
Juvenile	755-76032	p/s	o/y
3) 11 Aug 92			
Adult Female	755-76033	o/y	o/s
Juvenile	755-76034	p/s	o/w
(one additional juvenile was present but not captured)			
3A) 2 Sept 92			
Juvenile	755-76047	p/s	b/o
Juvenile	755-76048	p/s	y/o
Juvenile	755-76049	p/s	w/o
Juvenile	755-76050	y/b	p/s
Adult Female	755-76051	o/s	o/b
4) 10 Aug 92			
Juvenile	765-27568	b/w	p/s
Juvenile	765-27569	g/w	p/s
Juvenile	765-27570	w/w	p/s
Adult Female	765-27571	w/b	w/s

Glacier National Park (cont.)

Site	USFWS Band #	Plastic leg bands left	right
4A) 2 Sept 92			
Juvenile	755-76053	y/g	p/s
5) 11 Aug 92			
Juvenile	765-27572	w/b	p/s
Adult Female	765-27573	g/w	w/s
Juvenile	765-27574	p/s	b/w
Juvenile	765-27575	p/s	g/w
Juvenile	765-27576	p/s	w/w
Juvenile	765-27577	p/s	w/b
Juvenile	765-27578	p/s	w/g
(one additional juvenile was present but not captured)			
6) 11 Aug 92 (2 groups)			
Adult Female	765-27579	b/w	w/s
Juvenile	765-27580	w/g	p/s
Juvenile	765-27581	p/s	o/r
Juvenile	765-27582	p/s	w/r
Juvenile	765-27583	p/s	y/r
Juvenile	765-27584	s	p
Adult Female	765-27585	w/s	g/w
7) 11 Aug 92			
Adult Female	765-27586	w/s	w/w
Juvenile	765-27587	p/s	g/r
Juvenile	765-27588	o/r	p/s
7A) 2 Sept 92			
Adult Female	755-76054	o/s	o/y
Juvenile	755-76055	y/y	p/s
Juvenile	755-76056	y/w	p/s
Juvenile	755-76057	p/s	y/g
Juvenile	755-76058	p/s	y/b
8) 11 Aug 92			
Juvenile	755-76035	p/s	o/o
Adult Female	755-76036	o/w	o/s
9) 11 Aug 92			
Juvenile	755-76037	y/o	p/s
Adult Female	755-76038	o/o	o/s
(two additional unmarked downy young were present)			
10) 11 Aug 92			
Adult Female	755-76039	o/s	o/g
Juvenile	755-76040	w/o	p/s
Juvenile	755-76041	p/s	g/o

Appendix E. Maps of locations of Harlequin Ducks marked in 1992

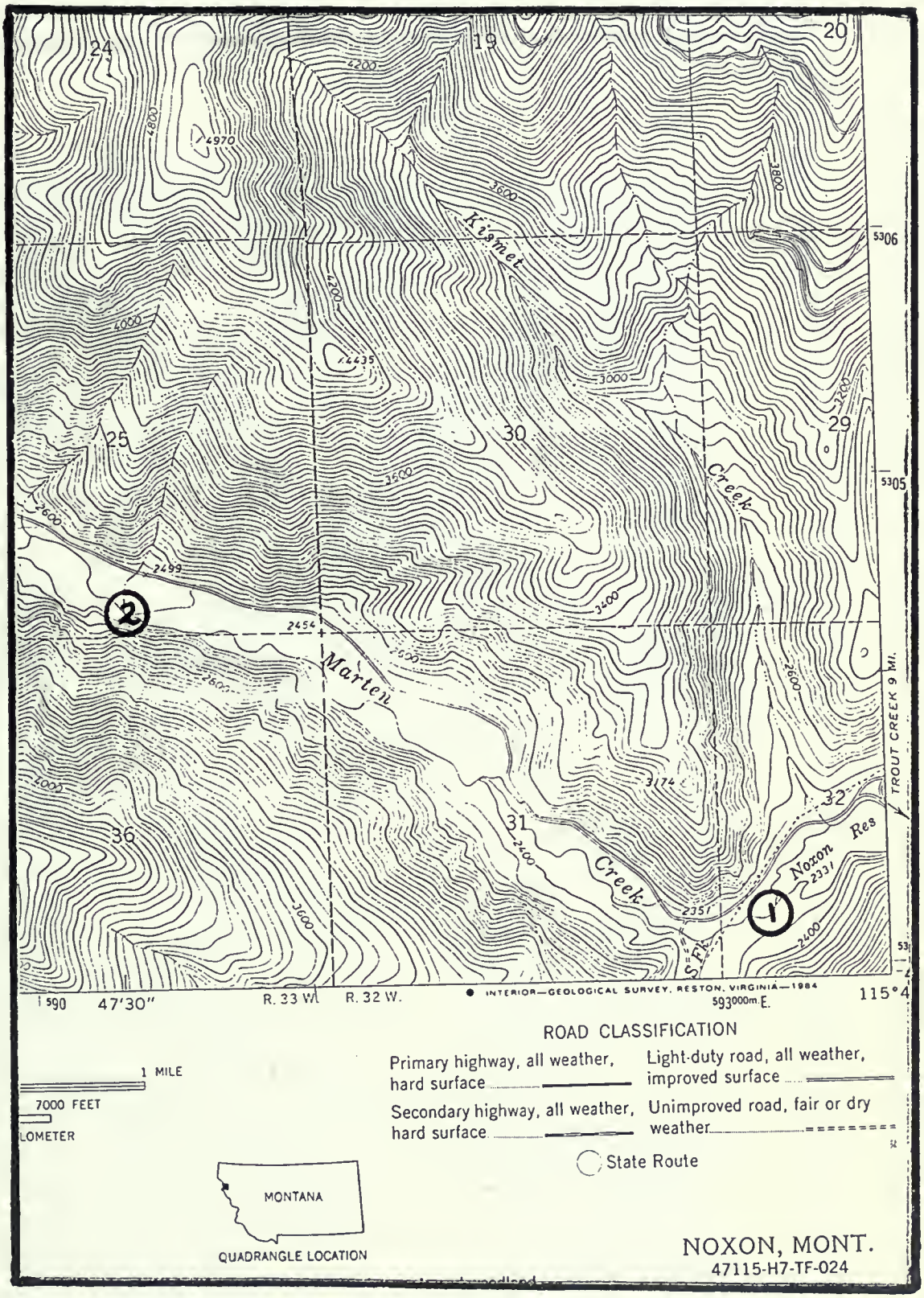


Figure . Marten Creek Harlequin Duck marking sites, 1992.

QUAD: Noxon

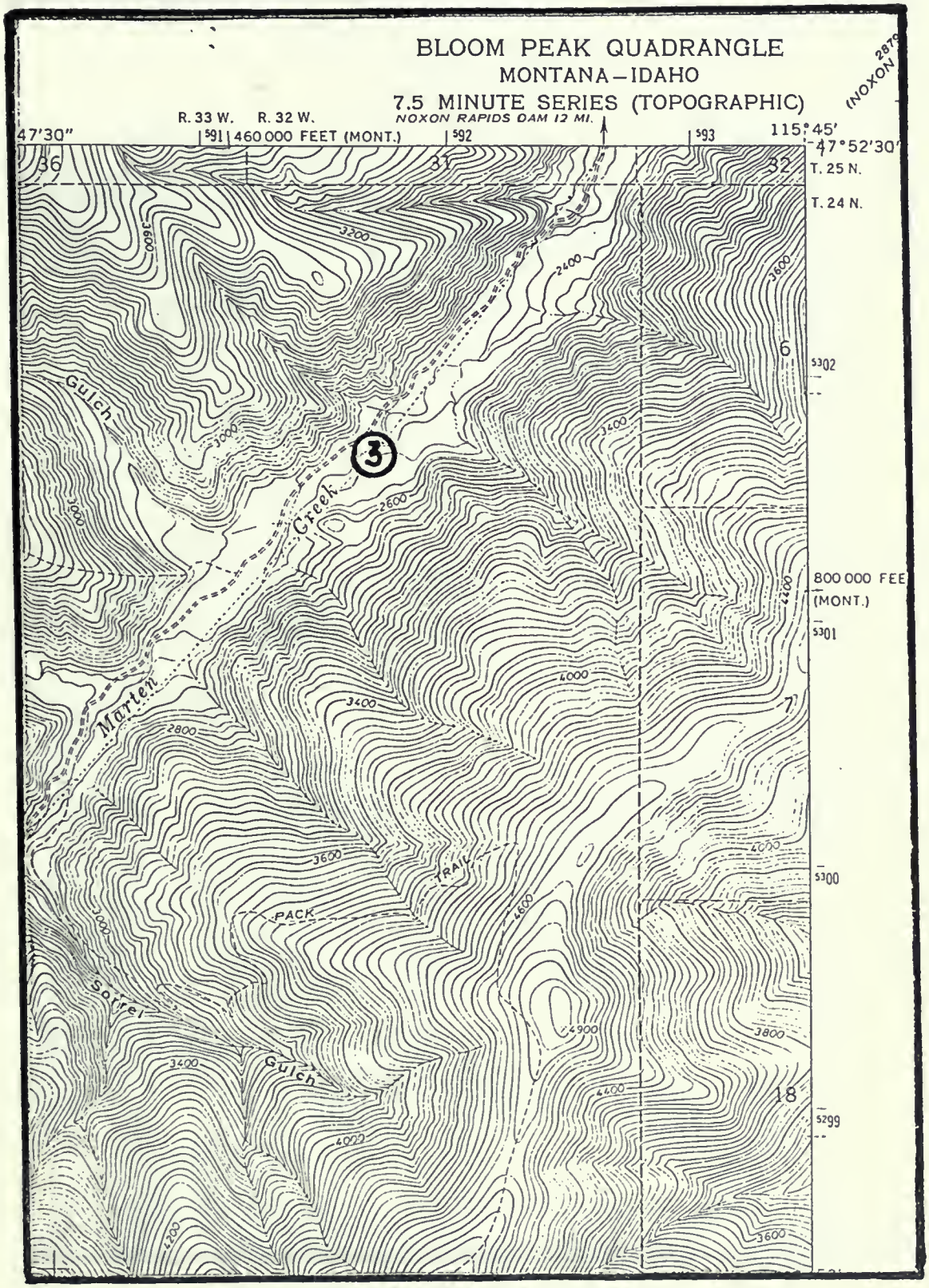


Figure . Marten Creek Harlequin Duck marking site, 1992.

QUAD: Bloom Peak

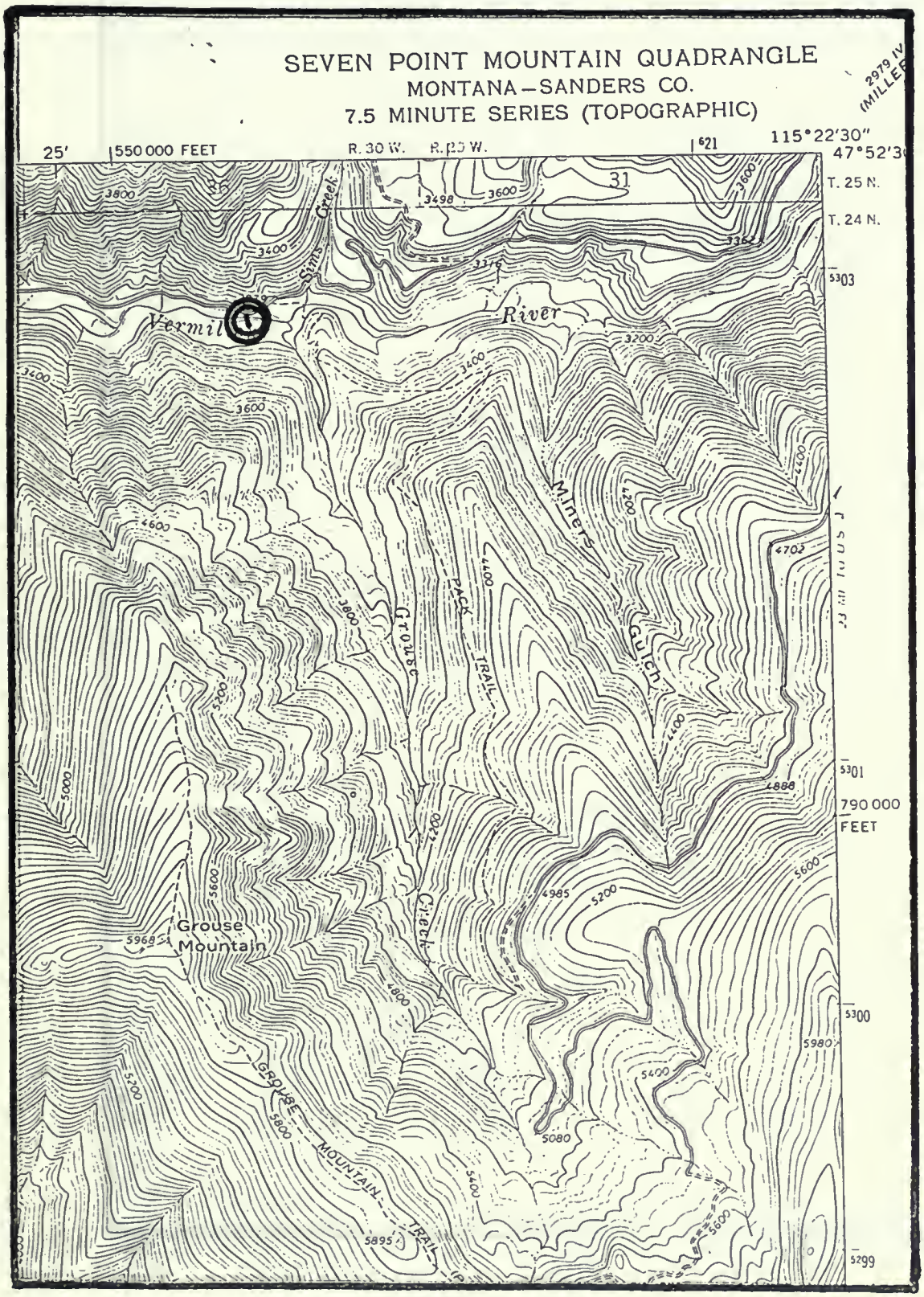


Figure . Vermilion River Harlequin Duck marking site, 1992.
QUAD: Seven Point Mountain

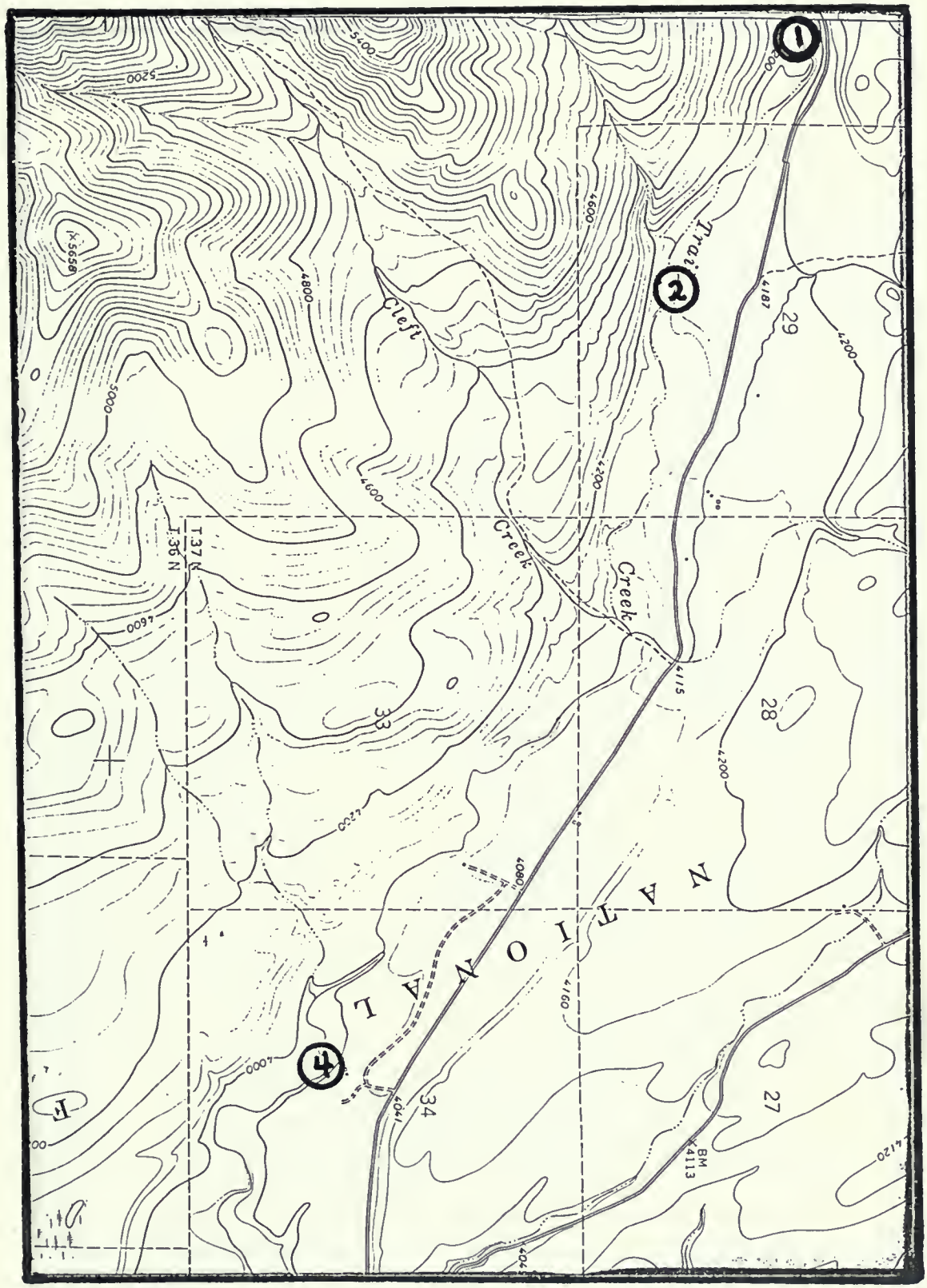


Figure . Trail Creek Harlequin Duck marking sites, 1992.

QUAD: Trail Creek

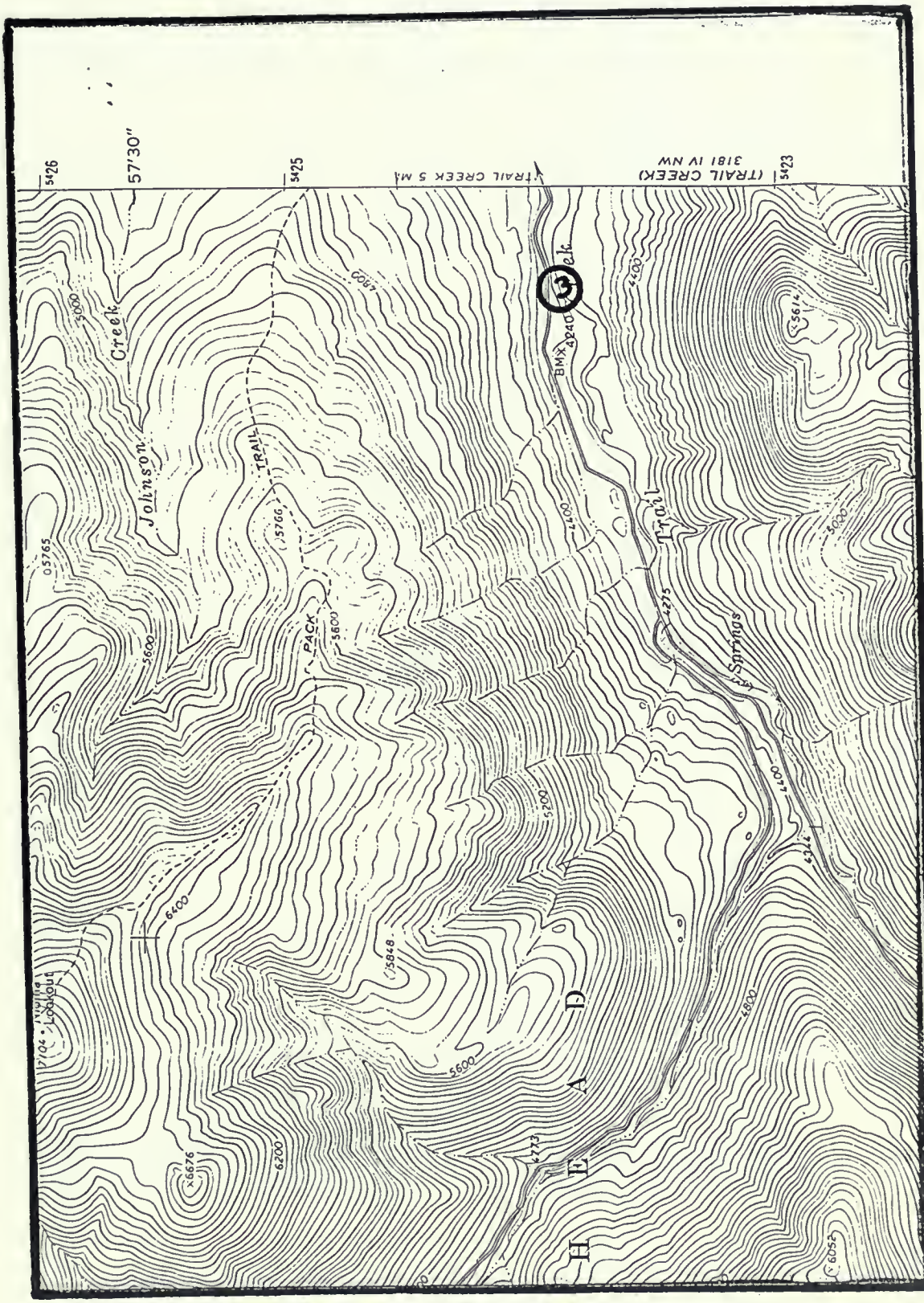


Figure . Trail Creek Harlequin Duck marking sites, 1992.

QUAD: Mount Hefty

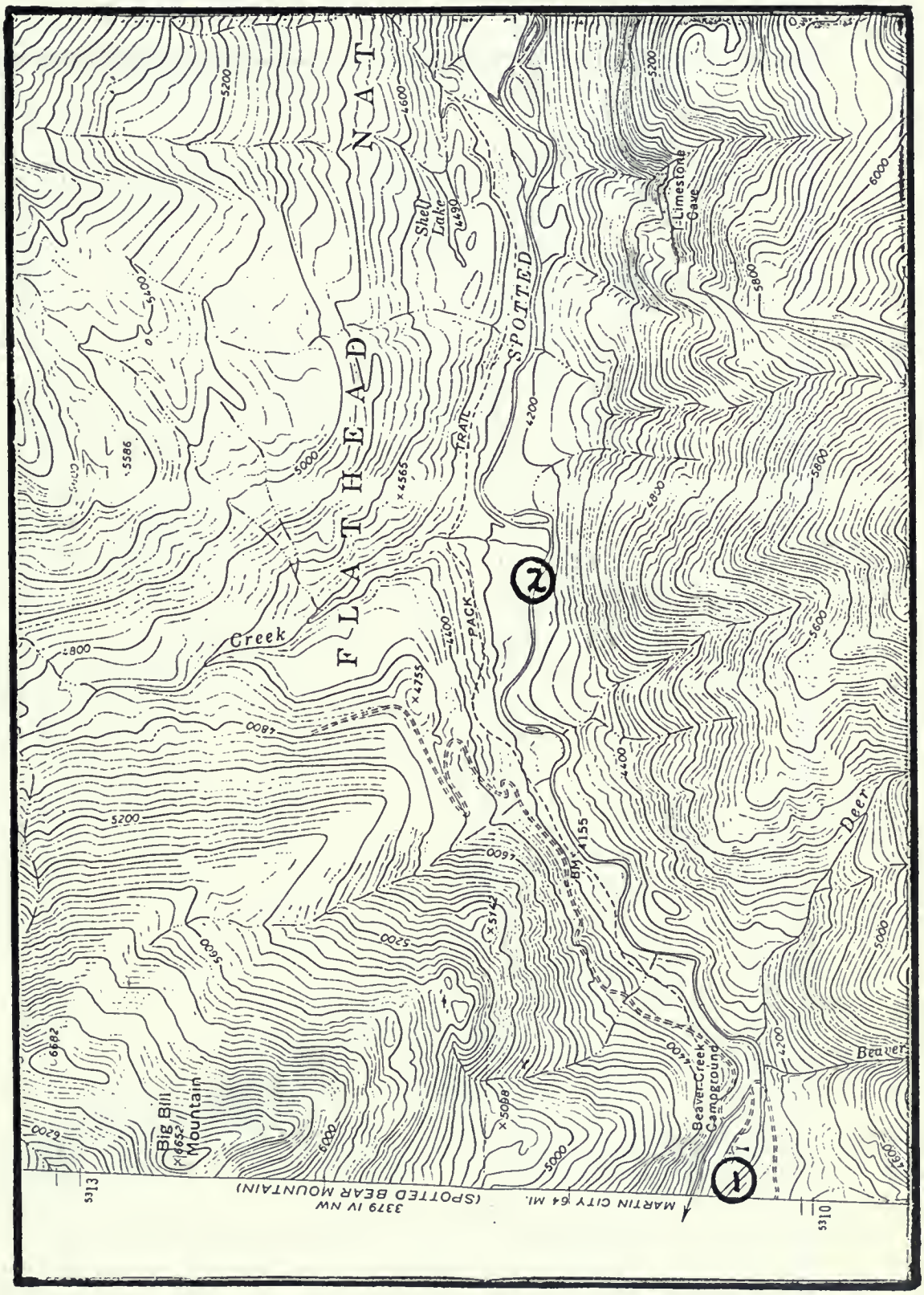


Figure . Spotted Bear River Harlequin Duck marking sites, 1992.

QUAD: Whitcomb Peak

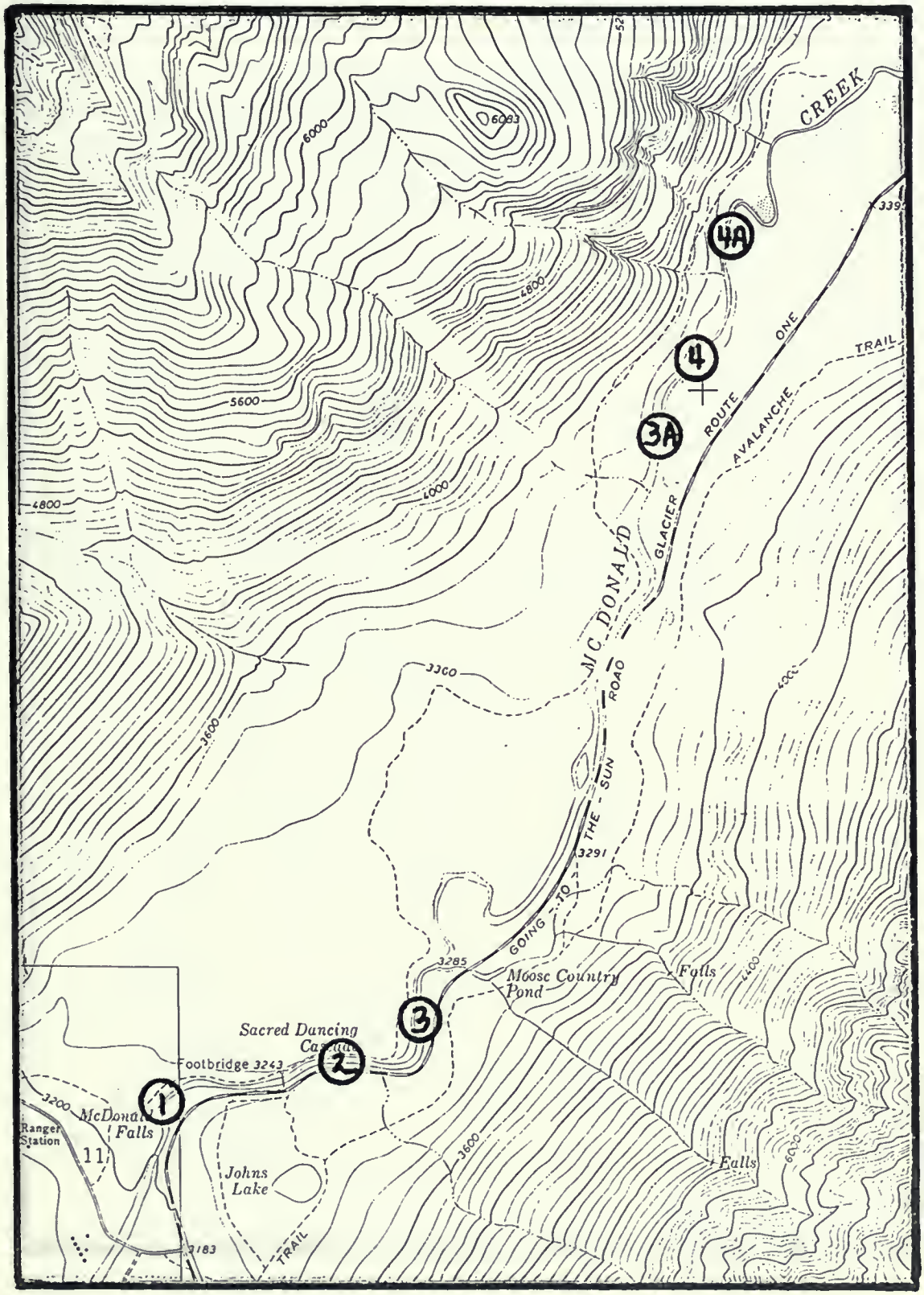


Figure . McDonald Creek Harlequin duck marking sites, 1992.
QUAD: Mount Cannon

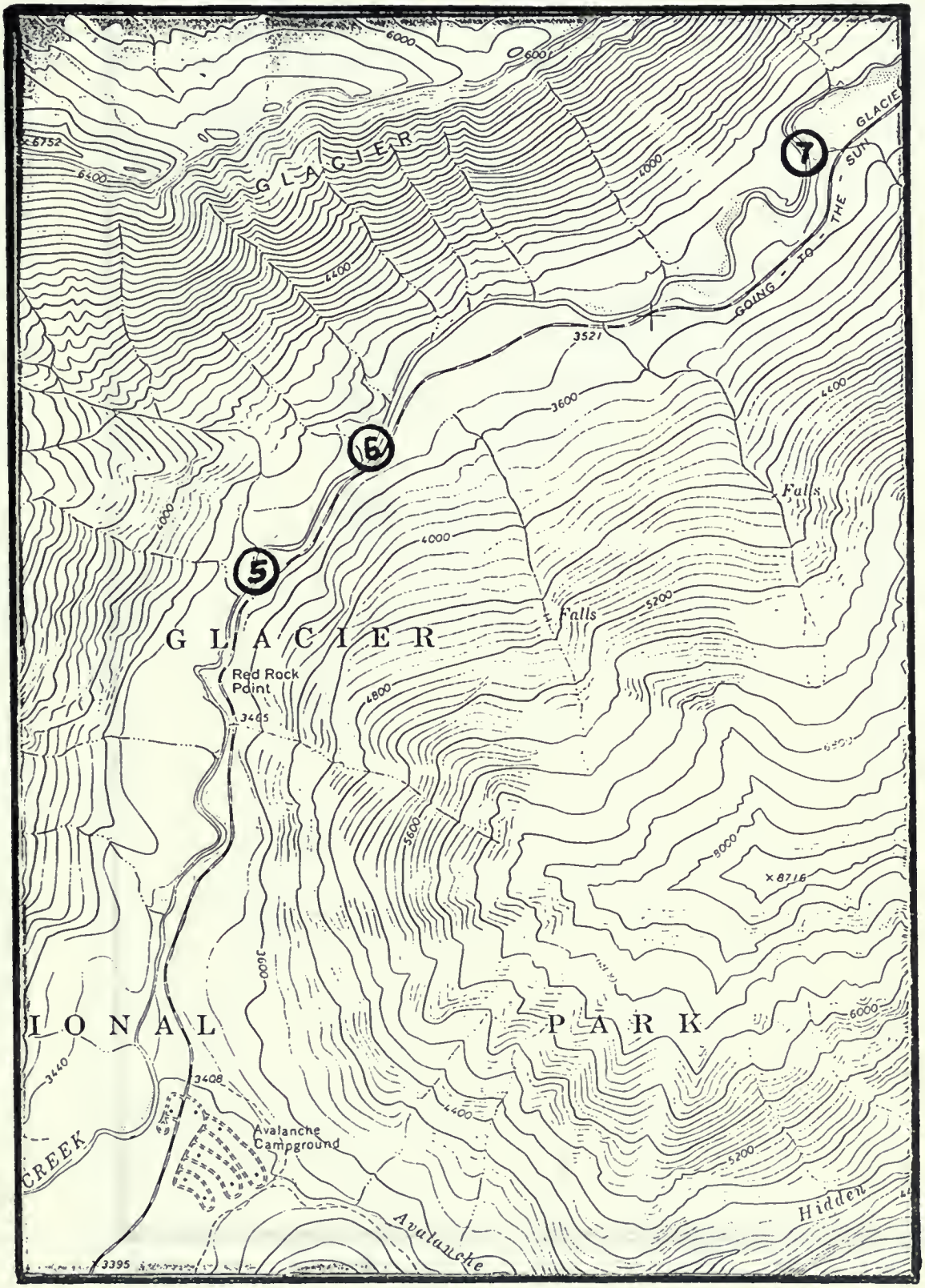


Figure . McDonald Creek Harlequin Duck marking sites, 1992.
QUAD: Mount Cannon

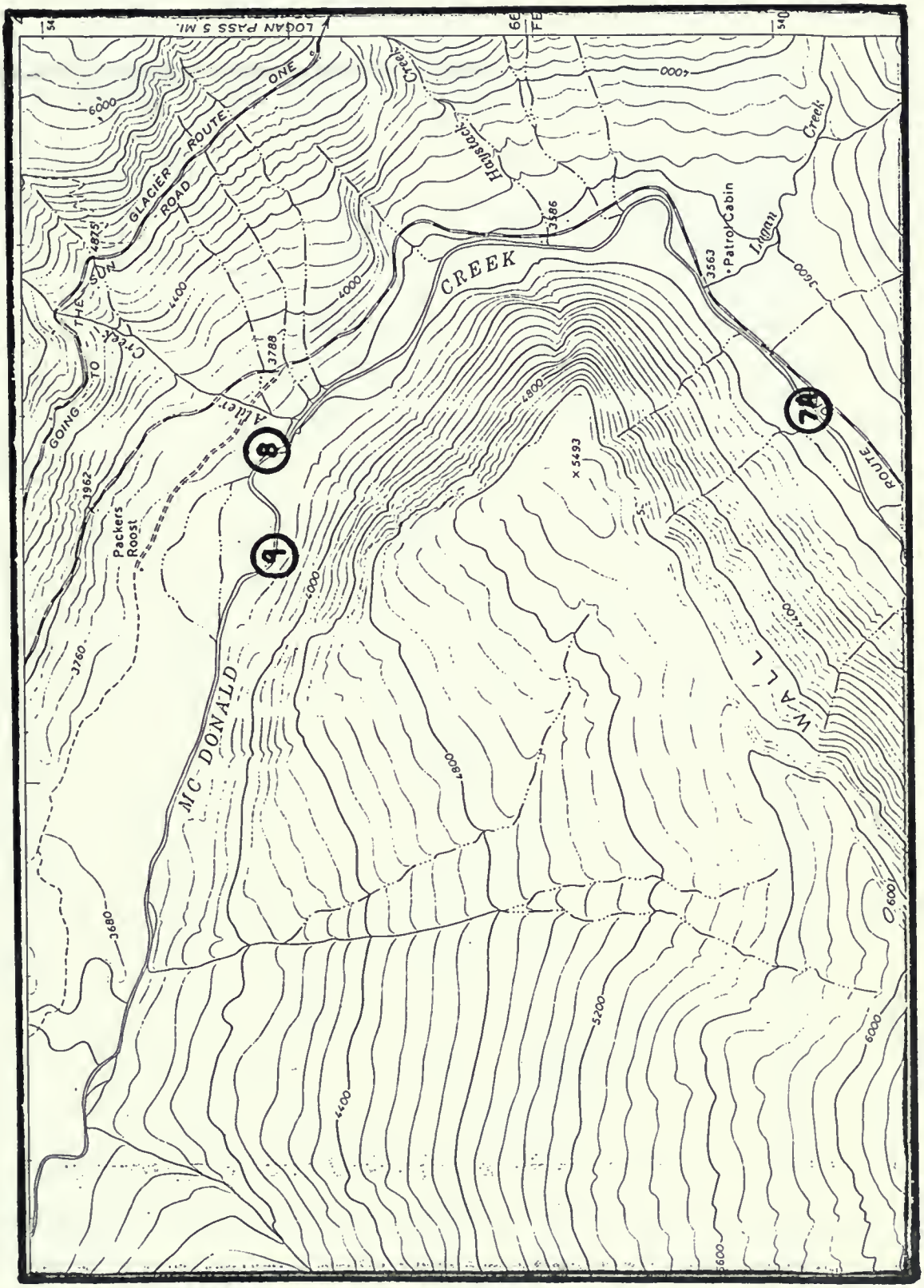


Figure . McDonald Creek Harlequin Duck marking sites, 1992.

QUAD: Mount Cannon

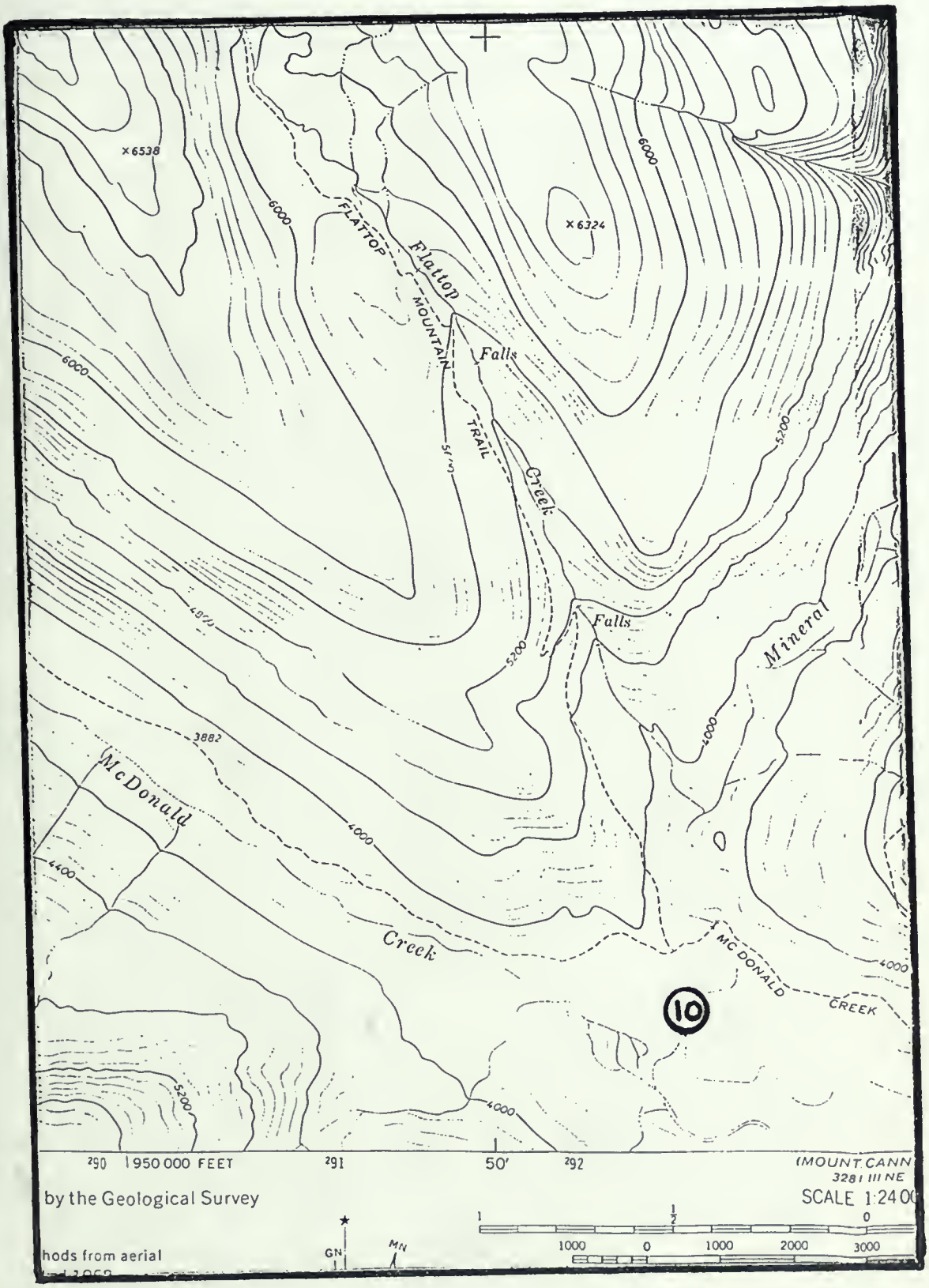


Figure . Mineral Creek Harlequin Duck marking site, 1992.
QUAD: Ahern Pass