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FIELD SURVEY SUMMARY REPORT
OF THE HARLEQUIN DUCK
(Histrionicus histrionicus)
ON THE KOOTENAI NATIONAL FOREST
MONTANA

by

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for

MONTANA NATURAL HERITAGE PROGRAM
1515 East Sixth Avenue
Helena, Montana 59620

September 1989

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MONTANA NATURAL HERITAGE PROGRAM

ABSTRACT

A spring occurrence survey of 27 streams and stream confluences, 5 falls, and 1 lake covering 55 miles was conducted during May and June of 1989. Harlequin ducks were observed at Kootenai Falls on May 14 (4 males, 2 females : one bonded pair), May 28 (3 males), and June 11 (1 male). Harlequin ducks were observed on Graves Creek on May 19 (1 male, 1 female : bonded pair), and on June 1 (2 males, 2 females : two bonded pairs). No other harlequin duck sitings were made during the spring occurrence survey period. An estimated potential nest start for the hen of the bonded Kootenai Falls pair was between June 4 and June 11. Estimate potential nest start for both hens of bonded pairs on Graves Creek as between June 1 and June 15.

A summer brood survey of 15 streams covering approximately 74 miles was conducted during July and August. Only one harlequin duck siting was made during this period. One adult female duck was observed on Graves Creek July 19. She was observed foraging for about an hour. No sign of any offspring was observed.

Data collected during the summer brood survey included: stream measurements (width, estimated volume of stream flow, average gradient of low-gradient reaches, and stream temperatures), occurrence of associated species (dippers, spotted sandpipers, belted kingfishers, herons, and common mergansers) which can indicate level of aquatic insect - fish populations, and stream habitat characteristics. (rated relative value of slow water side/overflow channels, vegetated gravel bars, overhanging vegetation, log/debris jams, and beaver activity for low-gradient reaches of each stream surveyed).

Some existing and potential limiting factors for the harlequin duck on the Kootenai National Forest include: recreational fishing pressure, road building and timber harvest, private landowner activities, mining development, low volume of stream flow, low productivity of aquatic invertebrates, lack of adequate loafing and nesting sites, large fluctuations in the level of the Kootenai River (Libby Dam) during the spring and summer, and the possible direct and indirect effects the common merganser may have on potential harlequin duck brood rearing habitat.

Possible methods to increase verified harlequin duck sitings include a public relations program centered around an identification poster on the harlequin duck and targeted to those private landowners who live along key stream reaches. Another method which might produce spring occurrence verification is the use of monitoring cameras at key stream confluences.

INTRODUCTION

The harlequin duck (Histrionicus histrionicus) is a Forest Service Sensitive Species on the Kootenai National Forest. The occurrence of this species of sea duck is rare to uncommon on the forest. Documented harlequin reproduction has occurred on the Cabinet Ranger District, and nesting is suspected to occur on the Three Rivers Ranger District, Libby Ranger District, and Fortine Ranger District. Verified sightings of harlequin ducks on the KNF (excluding the Cabinet R.D.) during the 1980's include:

FORTINE RANGER DISTRICT

Graves Creek (1980's : Steve Fox / Tim Manley)

LIBBY RANGER DISTRICT

Quartz Creek (1987 or 1988 : Barry Hansen ...
3 harlequin chicks caught in
upstream fishtrap)

(1981 or 1982 : Al Bratkovich ...
1 male and 1 female 1/2-1 mile
upstream from mouth)

REXFORD RANGER DISTRICT

Big Creek (1988 - spring : Marge Swanson ...
1 adult at mouth)

THREE RIVERS RANGER DISTRICT

Kootenai Falls (1980's : observed by biologists every
spring; Carl Wolf verified nest site
within log/debris jam above Falls in
early 80's)

Callahan Creek (1986 : Barry Hansen ...
1 pair during spring)

Yaak River (1983 - spring : Randy Matchet ...
observed ?# at MP 13)

N.Fk. Yaak (1980's : Bill Pomeroy)

E.Fk. Yaak (1980's : Clint / Gloria Mills ...
may be seeing wood ducks)

17-Mile Creek (1988 : Bill Pomeroy ...
at bridge 1/4 mile upstream
from mouth)

Spar Lake (1988 - spring : Bob Byars ...
1 pair at Whoopee Cr. confluence)

The objectives of this field survey were to document additional harlequin duck occurrences, and hopefully gain some insight on the breeding chronology, nesting, productivity, and habitat on the KNF.

METHODS

Information on potential and past harlequin duck occurrences was obtained through District biologists. Streams that had previous duck sightings and potential habitat based on past studies (Wallen and Groves 1989, Kuchel 1977) were given priority for field surveys.

Elements indicating potential harlequin duck brood rearing include:

1. Low stream gradient
2. Braided or meandering stream reaches
3. Relative high and stable stream flow volume
4. High quality riparian shrub component ... vegetated gravel bars and overhanging vegetation
5. High aquatic insect populations
6. Presence of log/woody debris jams
7. Presence of beaver activity

Spring occurrence surveys for breeding pairs were conducted by hiking along stream reaches not observable from roads, and by driving roads along stream reaches, searching for harlequin ducks with binoculars.

Summer brood surveys for females with broods were conducted by wading upstream selected low gradient stream reaches. The Yaak and Kootenai Rivers were surveyed by a combination of hiking, floating, and driving roads.

Observations of harlequin ducks and information on streams surveyed were recorded on MT.NHP Animal Survey Forms. Data collected included date, time, weather, temperature, and biotic & abiotic features of the site (vegetation, elevation, sex, age, and number observed). Information collected on streams where no harlequin ducks were observed included date, weather, stream flow data, miles of stream surveyed, time spent, and associated animal species observed.

Maps of the KNF indicating stream reaches surveyed were prepared and are included with this report.

RESULTS

TABLE 1. SPRING OCCURRENCE SURVEY.

Date	Drainage	Stream Miles Surveyed	From	To
5/14/89	Kootenai River LIBBY RD	1	T31N, R32W Sec18	T31N, R33W Sec13
5/19/89	Graves Creek FORTINE RD	4	T36N, R25W Sec14	T37N, R24W Sec32
5/19/89	Big Creek REXFORD RD	3.5	T34N, R29W Sec2	T35N, R29W Sec33
5/23/89	Quartz Creek LIBBY RD	1	T31N, R32W Sec24	T31N, R32W Sec13
5/24/89	Spar Lake (Whoopee Creek Spar Creek Hiatt Creek)	1.25 0.25 0.25 0.25	T29N, R34W Sec16	T29N, R34W Sec28
5/24/89	Keeler Creek	0.25	T30N, R33W Sec17	T30N, R33W Sec19
5/24/89	Lake Creek	1.25	T31N, R33W Sec30	T30N, R33W Sec7
5/25/89	Kootenai River	1.5	T32N, R34W Sec35	T32N, R34W Sec5
5/25/89	Yaak River	8.5	T32N, R34W Sec5	T36N, R31W Sec6
5/25/89	17-Mile Creek	0.5	T34N, R33W Sec27	T34N, R33W Sec27
5/25/89	Spread Creek	0.25	T35N, R33W Sec3	T35N, R33W Sec10
5/25/89	Pete Creek	0.5	T35N, R32W Sec5	T36N, R32W Sec32
5/26/89	W.Fk. Yaak	2	T37N, R31W Sec32	T37N, R32W Sec36
5/26/89	E.Fk. Yaak THREE RIVERS RD	0.5	T37N, R31W Sec25	T37N, R31W Sec25
5/26/89	Young Creek	1	T37N, R28W Sec13	T37N, R28W Sec24
5/26/89	Pinkham Creek	1	T35N, R28W Sec5	T35N, R28W Sec4
5/26/89	Sutton Creek REXFORD RD	1	T35N, R29W Sec25	T35N, R28W Sec30
5/28/89	Kootenai Falls THREE RIVERS RD	0.25	T31N, R33W Sec13	T31N, R33W Sec13
6/1/89	Graves Creek FORTINE RD	2	T36N, R25W Sec12	T37N, R24W Sec32
6/4/89	Kootenai Falls THREE RIVERS RD	0.25	T31N, R33W Sec13	T31N, R33W Sec13

TABLE 1 (cont). SPRING OCCURRENCE SURVEY.

Date	Drainage	Stream Miles Surveyed	From	To
6/5/89	Wolf Creek FISHER RIVER RD	3	T31N, R26W Sec17	T31N, R27W Sec1
6/6/89	Marten Creek	1	T25N, R32W Sec33	T25N, R32W Sec31
6/7/89	E.Fk. Blue Creek CABINET RD	1	T27N, R34W Sec17	T27N, R34W Sec18
6/9/89	Pipe Creek LIBBY RD	3	T31N, R31W Sec21	T31N, R31W Sec20
6/11/89	Kootenai Falls	0.25	T31N, R33W Sec13	T31N, R33W Sec13
6/11/89	Callahan Creek THREE RIVERS RD	3	T31N, R34W Sec19	T31N, R34W Sec21
6/13/89	Fisher River FISHER RIVER RD	5.25	T26N, R29W Sec8	T29N, R29W Sec27
6/15/89	Graves Creek FORTINE RD	1	T36N, R25W Sec1	T37N, R24W Sec32
6/19/89	West Fisher	3	T27N, R29W Sec31	T26N, R30W Sec2
6/19/89	Silver Butte	1	T25N, R29W Sec17	T26N, R30W Sec36
6/20/89	East Fisher FISHER RIVER RD	0.5	T25N, R29W Sec2	T25N, R29W Sec3
6/21/89	Graves Creek FORTINE RD	1	T36N, R25W Sec1	T37N, R24W Sec32
6/24/89	Kootenai Falls THREE RIVERS RD	0.25	T31N, R33W Sec13	T31N, R33W Sec13

During May and June of 1989, 27 streams and stream confluences were surveyed for breeding pairs of harlequin ducks. Fifty-five stream miles were checked, as well as 5 falls (Kootenai Falls, Yaak Falls, West Fork Yaak Falls - 2, and East Fork Yaak Falls) and 1 lake (Spar Lake).

During July and August of 1989, 15 streams were walked for female harlequin ducks with broods. Approximately seventy-four miles were surveyed. Information collected during the summer brood surveys included stream characteristics, associated species, and stream habitat characteristics.

TABLE 2a. SUMMER BROOD SURVEY : LOCATION

Date	Drainage	Stream Miles Surveyed	From	To
7/19-20/89	Graves Creek FORTINE RD	2.5	T36N,R25W Sec12	T37N,R24W Sec32
7/21/89	Pipe Creek	3.25	T31N,R31W Sec20	T31N,R31W Sec10
7/22/89	Quartz Creek	3	T31N,R32W Sec24	T32N,R32W Sec23
8/10-12/89	West Fisher	7	T27N,R29W Sec31	T27N,R30W Sec32
7/25/89	Kootenai River	4	T31N,R32W Sec14	T31N,R33W Sec13
8/20/89	Kootenai River LIBBY RD	6	T31N,R32W Sec24	T31N,R33W Sec13
7/29/89	W.Fk. Yaak	3	T37N,R32W Sec36	T37N,R32W Sec22
7/31/89	E.Fk. Yaak	2.25	T37N,R31W Sec25	T37N,R30W Sec29
8/17/89	E.Fk. Yaak	2.5	T37N,R30W Sec27	T37N,R30W Sec35
			T37N,R31W Sec23	T37N,R31W Sec26
8/17/89	N.Fk. Yaak	3	T37N,R31W Sec22	T37N,R31W Sec4
8/19/89	S.Fk. Yaak	2	T35N,R32W Sec12	T34N,R31W Sec5
8/18/89	Spread Creek	3.5	T35N,R33W Sec10	T36N,R33W Sec19
8/19/89	17-Mile Creek	3.5	T34N,R33W Sec25	T33N,R32W Sec5
7/31/89	Yaak River	4.75	T36N,R31W Sec30	T35N,R32W Sec2
8/18/89	Yaak River	4.5	T34N,R33W Sec9	T35N,R32W Sec5
7/23/89	Callahan Creek THREE RIVERS RD	2.75	T31N,R34W Sec19	T31N,R34W Sec21
8/23-25/89	Big Creek REXFORD RD	11	T34N,R29W Sec3	T34N,R30W Sec29
8/12/89	Silver Butte FISHER RIVER RD	5	T26N,R29W Sec17	T26N,R30W Sec34

TABLE 2b. SUMMER BROOD SURVEY : STREAM CHARACTERISTICS

Drainage	Width	Est. Vol.	Avg. Gradient	Air Temp.	Water Temp.	Time	Date
Graves Creek	15.0'	90.0 cfs	3.0%	50° F	42° F	21:00	6/21/89
FORTINE RD		64.8 cfs		70° F	48° F	19:45	7/20/89
Pipe Creek	22.0'	64.7 cfs	1.6%	72° F	61° F	12:00	7/21/89
Quartz Creek (upper)	11.3'	30.4 cfs	2.6%	69° F	52° F	18:00	7/22/89
Quartz Creek (lower)	14.2'	56.3 cfs	3.1%	58° F	53° F	20:45	7/22/89
West Fisher (upper)	14.2'	41.3 cfs	2.2%	67° F	49° F	10:00	8/11/89
West Fisher (lower)	18.4'	61.6 cfs	1.0 %	61° F	56° F	09:30	8/12/89
LIBBY RD							
W.Fk. Yaak	21.3'	71.1 cfs	1.0%	74° F	69° F	18:00	7/29/89
E.Fk. Yaak	20.5'	153.9 cfs	1.2%	64° F	53° F	13:00	7/31/89
N.Fk. Yaak	38.1'	114.4 cfs	0.5%	56° F	57° F	14:15	8/17/89
S.Fk. Yaak	30.0'	47.3 cfs	0.7%	65° F	62° F	19:00	8/19/89
Spread Creek	35.0'	82.9 cfs	3.2%	58° F	52° F	11:15	8/18/89
17-Mile Creek	32.6'	63.2 cfs	1.2%	64° F	58° F	11:00	8/19/89
Callahan Creek	24.1'	106.0 cfs	2.0%	90° F	65° F	17:00	7/23/89
THREE RIVERS RD							
Big Creek	41.0'	84.6 cfs	1.6%	59° F	58° F	20:30	8/23/89
REXFORD RD							
Silver Butte	19.8'	62.3 cfs	1.6%	77° F	63° F	16:15	8/12/89
FISHER RIVER RD							

DISCUSSION

Certain streams stand out in terms of potential harlequin duck use after reviewing and comparing the data in Tables 2b., 2c., and 2d.

The East Fork of the Yaak is one of these streams. It appears that the E. Fork has the best overall potential to support harlequin duck production, rating the highest in terms of habitat characteristics and stream flow volume. Average gradient of low gradient reaches surveyed was 1.2 %. This is slightly higher than what Wallen and Groves (1989) found in nesting areas of Northern Idaho (<1°).

TABLE 2c. SUMMER BROOD SURVEY : ASSOCIATED SPECIES

Drainage	Miles Surveyed	Dippers	Sand-pipers	King-fishers	Hérons	Common Mergansers
Graves Creek FORTINE RD	2.5	2		2		
Pipe Creek	3.25	3		1	2	
Quartz Creek	3	4				
West Fisher LIBBY RD	7		9	3	1	12
W.Fk. Yaak	3	3		1		
E.Fk. Yaak	4.75	5		2	3	
N.Fk. Yaak	3	1		3	2	
S.Fk. Yaak	2	1			1	
Spread Creek	3.5	2				
17-Mile Creek	3.5	1	1	2	1	6
Callahan Creek THREE RIVERS RD	2.75	3	7	1		
Big Creek REXFORD RD	11	11	9	1		
Silver Butte FISHER RIVER RD	5	3	4	1		6

The West Fisher also has good potential to support harlequin duck production. The West Fisher ranks high in terms of providing habitat components, and has a combined gradient average of 1.0 %. Possible limiting factors for supporting harlequin duck production on the West Fisher may be stream flow volume, the presence of brood rearing common mergansers, and timber harvest related disturbances.

The following streams all have the potential to support harlequin duck production in one capacity or another. They are listed in a 'loose' order according to this survey and the comparison of data collected:

Big Creek	(REXFORD R.D.)
N.Fk. Yaak	(THREE RIVERS R.D.)
17-Mile Creek	(THREE RIVERS R.D.)
Silver Butte	(FISHER RIVER R.D.)
Graves Creek	(FORTINE R.D.)
Pipe Creek	(LIBBY R.D.)
S.Fk. Yaak	(THREE RIVERS R.D.)

TABLE 2d. SUMMER BROOD SURVEY : HABITAT CHARACTERISTICS

Drainage	Side/Overflow Channels	Vegetated Gravel Bars	Overhanging Vegetation	Log Jams	Beaver Activity
<u>Graves Creek</u> FORTINE RD	3	3	4	3	3
<u>Pipe Creek</u>	4	3	4	3	4
<u>Quartz Creek</u>	3	3	4	3	2
<u>West Fisher</u> LIBBY RD	4	4	4	4	3
<u>W.Fk. Yaak</u>	3	3	3	3	2
<u>E.Fk. Yaak</u>	3	3	5	5	5
<u>N.Fk. Yaak</u>	2	2	4	2	3
<u>S.Fk. Yaak</u>	2	2	4	4	3
<u>Spread Creek</u>	3	1	2	3	1
<u>17-Mile Creek</u>	4	4	4	3	5
<u>Callahan Creek</u> THREE RIVERS RD	3	3	3	3	1
<u>Big Creek</u> REXFORD RD	3	3	3	4	3
<u>Silver Butte</u> FISHER RIVER RD	4	3	4	3	5

*1= Low Value ; 5= High Value

W.Fk. Yaak	(THREE RIVERS R.D.)
Callahan Creek	(THREE RIVERS R.D.)
Quartz Creek	(LIBBY R.D.)
Spread Creek	(THREE RIVERS R.D.)

The Yaak River also provides potential brood rearing habitat for the harlequin duck. The Yaak River has several reaches of slow, deep water which flows amongst heavy willow, dogwood, and alder bank cover. Overhanging vegetation cover is abundant. However, this high quality habitat is already being well utilized by brood rearing common mergansers. Twenty-four mergansers were observed on the Yaak River during surveys in 1989.

The Kootenai River provides marginal habitat for brood rearing. This and the fact that the river level is fluctuated (Libby Dam) so

TABLE 3. HARLEQUIN DUCKS OBSERVED DURING SURVEY.

Date	Drainage	Elevation	Observation	Location
5/14/89	Kootenai Falls	1960'	4 'Lords' 2 'Ladies'	T31N R33W S13,NW (1 pair)
5/19/89	Graves Creek	4400'	1 'Lord' 1 'Lady'	T37N R24W S32,SW (1 pair)
5/28/89	Kootenai Falls	1960'	3 'Lords'	T31N R33W S13,NW
6/01/89	Graves Creek	4400'	2 'Lords' 2 'Ladies'	T37N R24W S32,SW (2 pair)
6/11/89	Kootenai Falls	1960'	1 'Lord'	T31N R33W S13,NW
7/19/89	Graves Creek	4360'	1 'Lady'	T36N R25W S1,NE

greatly during the spring and summer months, reduces the chances of female harlequin ducks nesting on the river.

Several streams draining into Lake Kooconusa where not surveyed for summer broods due to being without additional time, and also because over the last 10 years I have spent considerable time walking most of the larger drainages doing stream/fish habitat surveys and conducting redd counts for the Forest Service.

Pete Creek and Burnt Creek on the Three Rivers R.D. were not surveyed for summer broods due to low (i.e. 20-30 cfs) stream flow volumes.

Additional streams which were not walked, but have good potential to support harlequin production include;

Lake Creek	(THREE RIVERS R.D.)
Keeler Creek	(THREE RIVERS R.D.)

HARLEQUIN OCCURRENCES

Ten different harlequin ducks (6 males and 4 females) were documented during this field study. All sightings were at Kootenai Falls or on Graves Creek on the Fortine R.D. The three documented pairs were estimated to have potentially started to nest between June 1 & June 15,

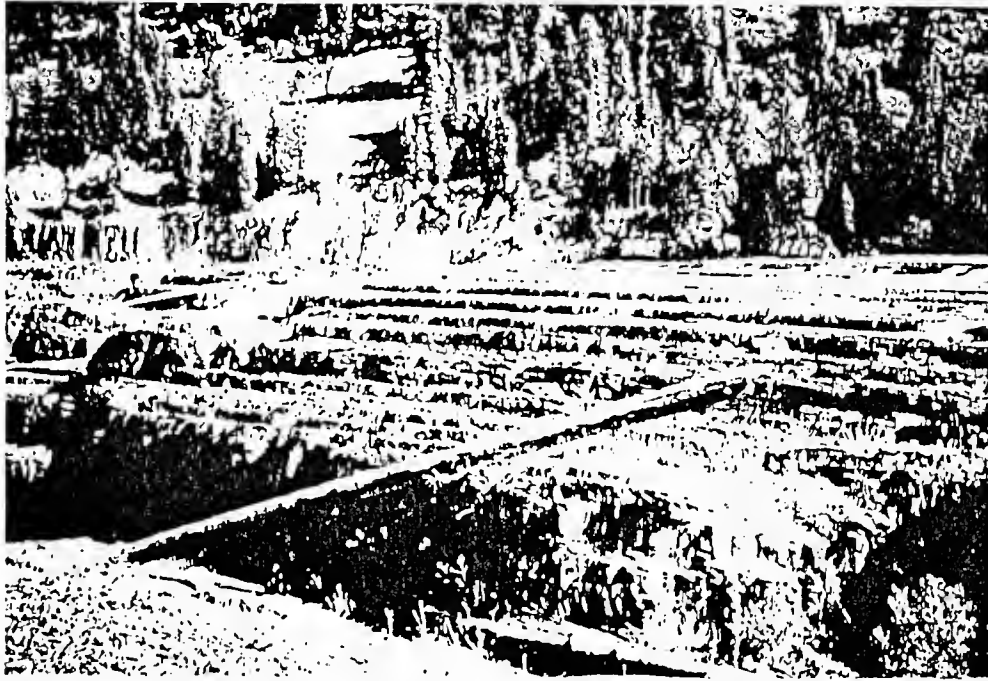
TABLE 4. ESTIMATED VOLUMES OF STREAM FLOW.

Drainage	Estimated Vol.	Estimate Location	Date	Weather
Graves Cr.	90.0 cfs	T36N R24W S1,NE	6/21/89	cool/cldy
	64.8 cfs		7/20/89	warm/pclld
Big Creek	84.6 cfs	T35N R29W S31,NE	8/23/89	cool/rain
W. Fisher (upper)	41.3 cfs	T26N R30W S5,NE	8/11/89	warm/shws
W. Fisher (lower)	61.6 cfs	T27N R29W S31,NW	8/12/89	warm/clr
Silver Butte	62.3 cfs	T26N R30W S36,NW	8/12/89	warm/shws
Pipe Creek	64.7 cfs	T31N R31W S16,SW	7/21/89	hot/clr
Quartz Cr. (upper)	30.4 cfs	T32N R32W S26,SW	7/22/89	hot/clr
Quartz Cr. (lower)	56.3 cfs	T31N R32W S13,SE	7/22/89	hot/clr
Callahan Cr.	106.0 cfs	T31N R34W S20,NE	7/23/89	hot/clr
17-Mile Cr.	63.2 cfs	T34N R33W S36,NW	8/19/89	warm/shws
Spread Cr.	82.9 cfs	T35N R33W S3,SE	8/18/89	warm/clr
Pete Creek	27.4 cfs	T35N R32W S5,NW	8/18/89	warm/pclld
S.Fk. Yaak	47.3 cfs	T35N R32W S13,NW	8/19/89	warm/pclld
W.Fk. Yaak	71.1 cfs	T37N R32W S26,SW	7/29/89	hot/hazy
N.Fk. Yaak	114.4 cfs	T37N R31W S15,NE	8/17/89	cool/rain
E.Fk. Yaak	153.9 cfs	T37N R30W S19,SE	7/31/89	hot/clr

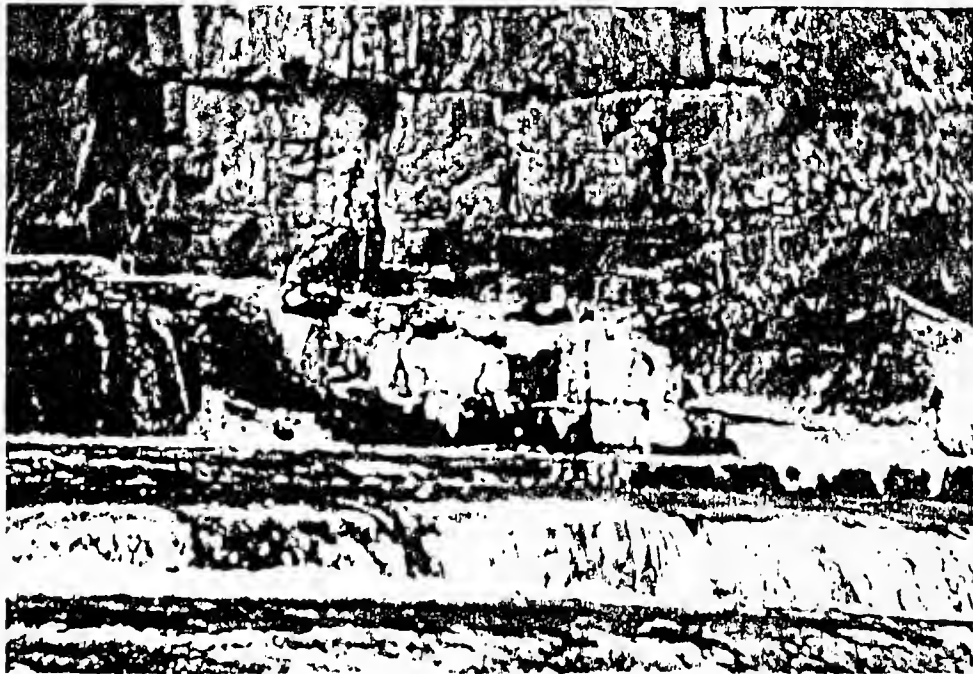
* Stream flow volumes estimated with Robins and Crawford method (1954)

LIMITING FACTORS

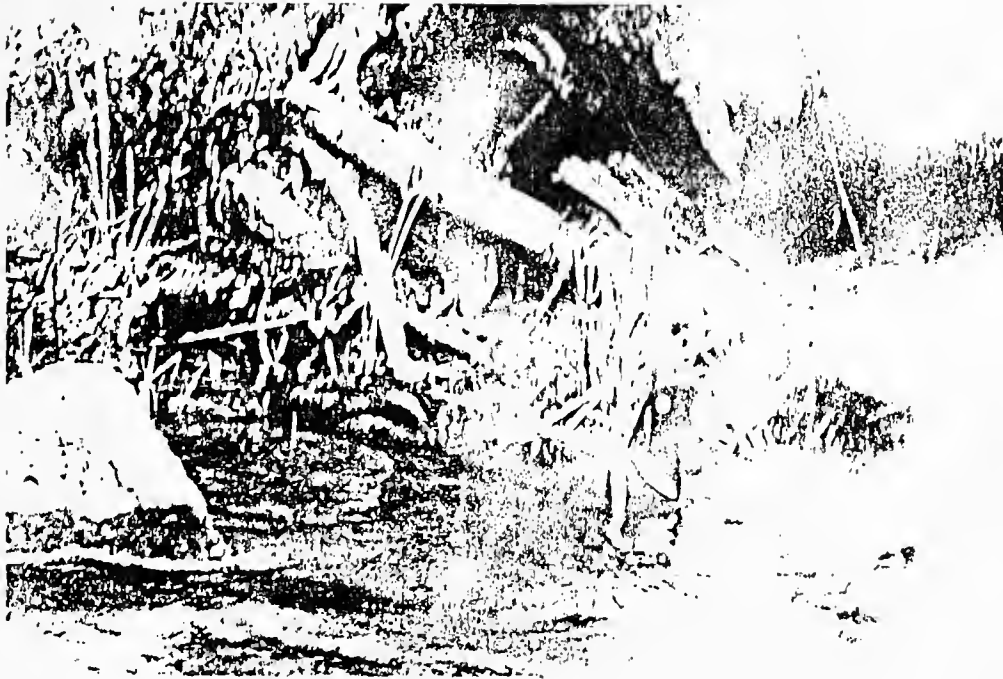
Speculation on natural limiting factors affecting potential harlequin duck reproduction on the Kootenai NF could include: stream flow volumes (1989 spring runoff was more "normal" than previous drought years); adequate stream habitat components; gradient levels; aquatic insect populations; and direct/indirect competition for brood rearing habitat with the common merganser. Other factors which may influence harlequin production would include: private landowner activities; fishing pressure (i.e. Graves Creek); timber harvest / road building affecting riparian zone and water quality; and potential hard rock mining activities.



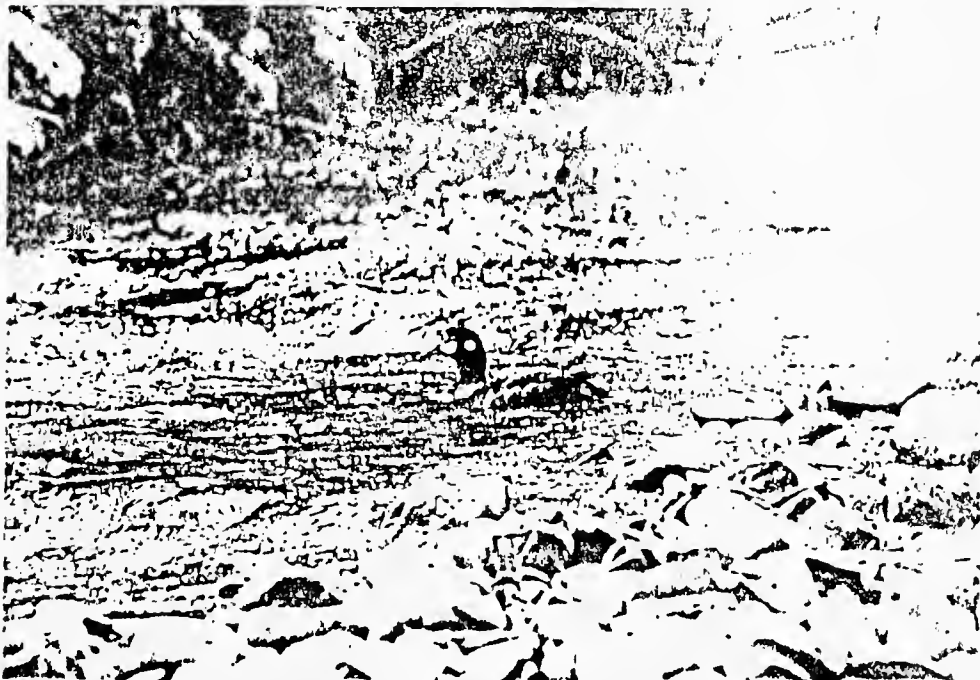
Kcotenai Falls and rock terraces.



Harlequin pair loafing on rock terrace above Falls.



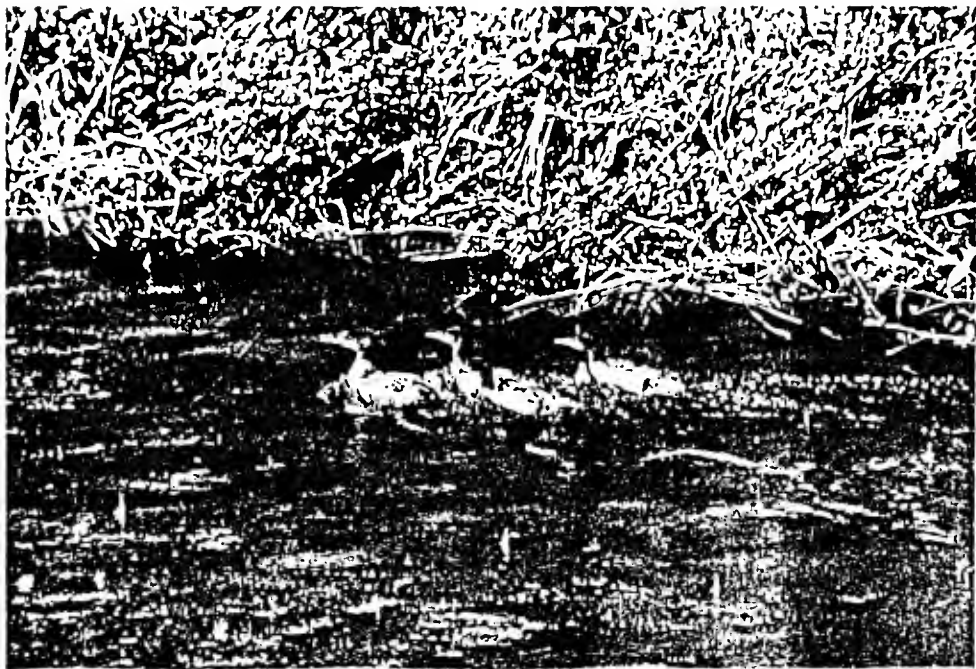
Harlequin pair foraging on Graves Creek.



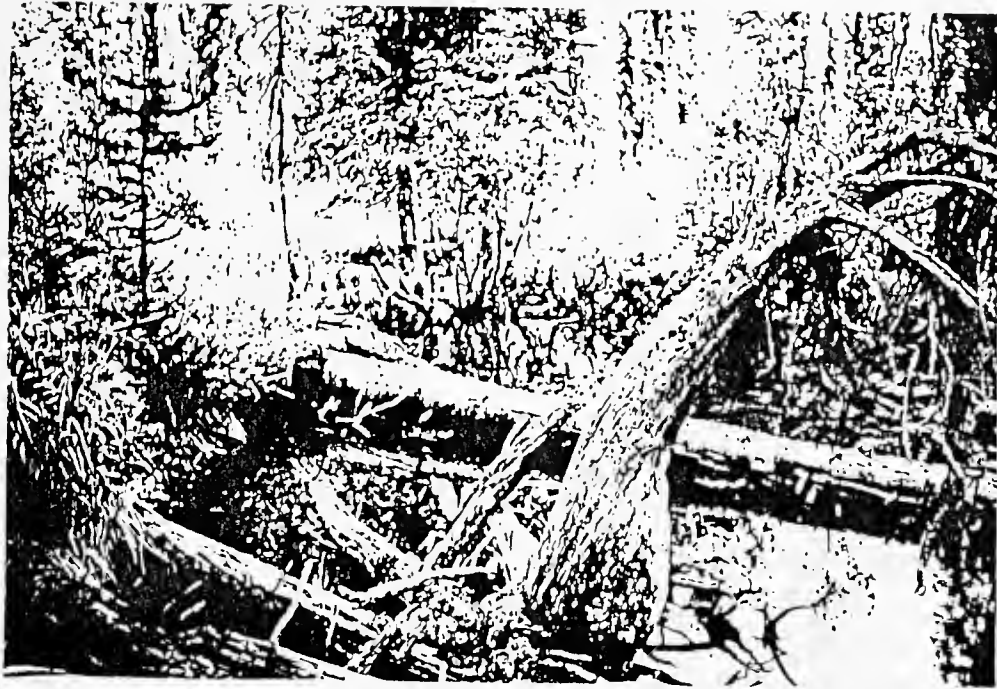
Lone female on Graves Creek in July.



Spotted sandpiper on the West Fisher.



Female merganser with grown brood.



Debris strewn side channel on Graves Creek.



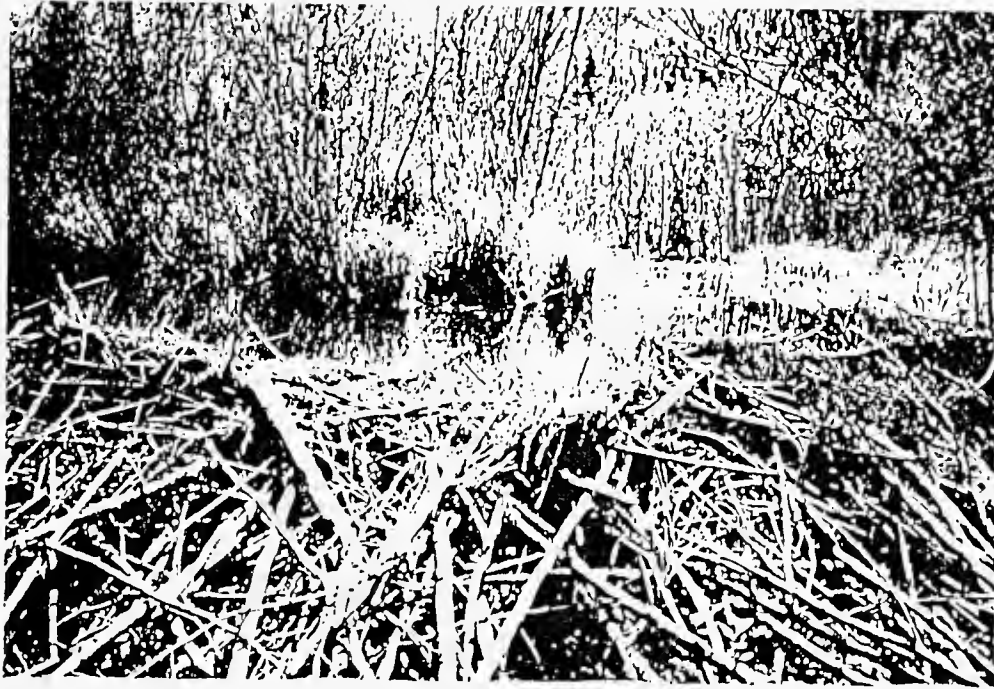
Densely vegetated gravel bar on Pipe Creek.



Overhanging vegetation on the E. Fork Yaak.



Log jam habitat on the E. Fork Yaak.



Beaver dam and created marsh on 17-Mile Creek.



Beaver pond on Silver Butte Creek.

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