RECEIVED
SEP 13 1991
U91JOH03

RESULTS OF STREAM SURVEYS FOR HARLEQUIN DUCKS IN THE GALLATIN AND A SECTION OF THE CUSTER NATIONAL FORESTS, MONTANA

by

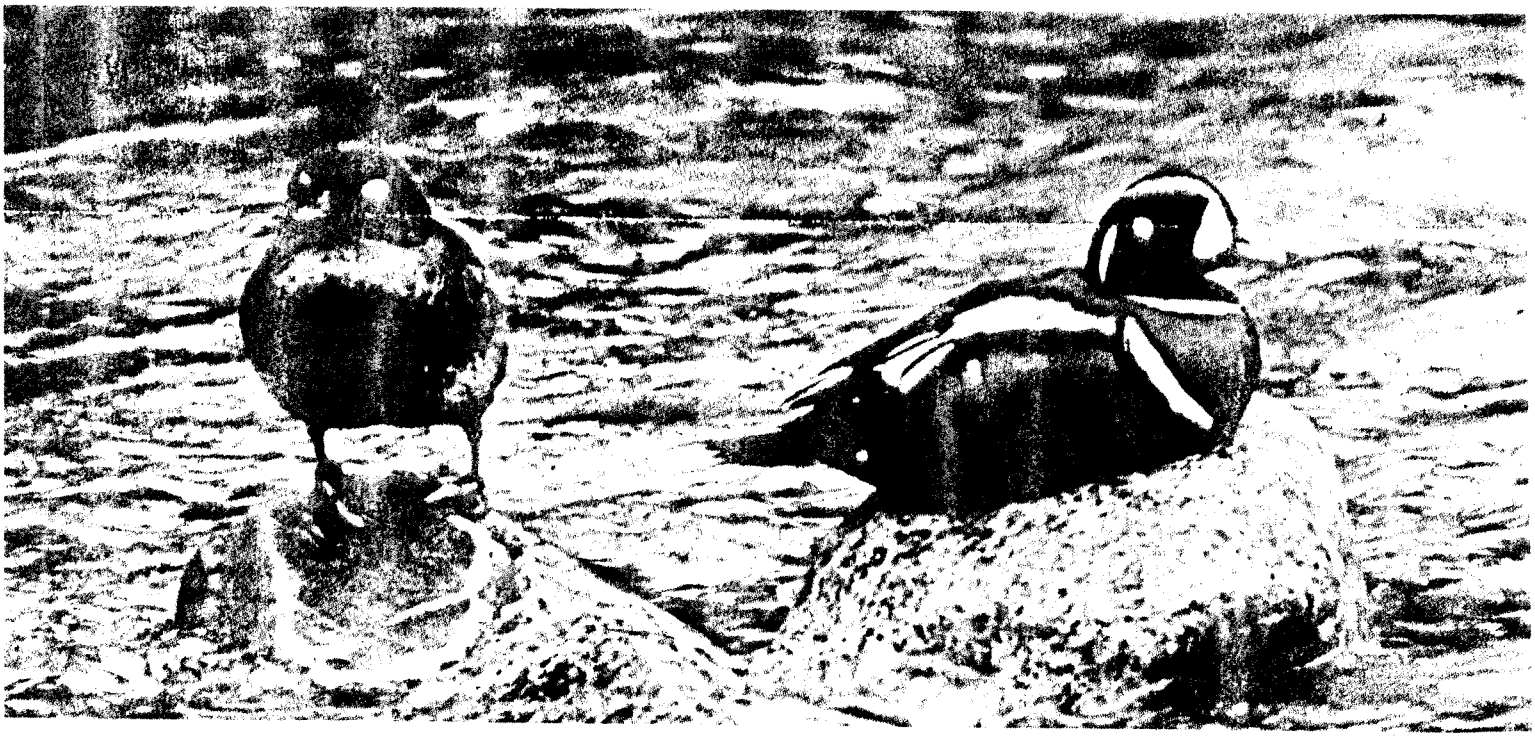
Darren D. Johnson

for

MONTANA NATURAL HERITAGE PROGRAM

1515 EAST SIXTH AVENUE

HELENA, MONTANA 59620



June 17 - September 12, 1991

TABLE OF CONTENTS

	page
Title Page	i
Table of Contents	ii
List of Tables and Figures	iii
Abstract	iv
Objectives	v
Introduction	1
Survey Area	2
Methods	4
Results & Discussion	4
Conclusion & Recommendations	11
Acknowledgements	12
Associated Species Observed	12
Literature Cited	13
Appendix A	14

LIST OF FIGURES

page

Figure 1: Map of streams in survey area ---------- 3

Figure 2: Harlequin duck observations 1991 ---------- 5

LIST OF TABLES

Table 1: Harlequin Duck observations in the Big Timber Ranger District 1991 ---------- 6

Table 2: Streams surveyed separated by Ranger District and National Forest ---------- 15

ABSTRACT

Surveys were conducted to gain more information on the summer brooding and population distribution of harlequin ducks on high mountain streams in the Gallatin and Custer National Forests. The surveys were completed by walking the stream banks of 53 outlined streams. A majority of the streams are located in four Forest Service Ranger Districts. The four ranger districts are the Big Timber, Livingston, Gardiner, and Bozeman that split the Gallatin National Forest. A summary and habitat description of each stream surveyed is given for each of the streams in the four districts covered. Potential habitat alterations and high recreation use problems are discussed. A total of five harlequin ducks were seen throughout this survey. Three adult males and two females were observed in the Boulder River drainage of the Big Timber Ranger District.

OBJECTIVES

Conduct stream surveys to gain more information on the spring and summer distribution of harlequin ducks and the habitat they seek for nesting and brood rearing. Areas harlequin ducks do not utilize will also be found. The information gathered will further assist in management of the species.

INTRODUCTION

The Harlequin duck (Histrionicus histrionicus) is in the Tribe Mergini, the Sea Ducks, and is our only "torrent" duck in North America. Torrent refers to the harlequin's utilization of fast moving streams. Kuchel (1977) and Wallen (1987) describe the morphological and behavioral similarities between harlequin ducks and two other torrent ducks; the South American torrent duck (Merganetta armata) and the New Zealand blue duck (Hymenolaimus malacorhynchos). Those are the known duck species that use fast flowing mountain streams and have similar feeding habits. There is also the American Dipper (Cinclus mexicanus) that likewise feeds on insects in swift mountain streams of North America.

The harlequin is the only torrent duck species occupying the northern North American mountain streams at the time of its breeding and nesting season. The American Dipper is also present, but it is not known to compete with the harlequin. Thus, the harlequin evolved to utilize a unique food source with little competition, except for what might occur with fish and the American Dipper, for rapid development during their four to five month brood rearing period.

Two populations of harlequin ducks have developed from past studies. One population winters on the Northern Atlantic Coast and the other on the Northern Pacific Coast. I concentrate on the Northern Pacific coast population that may winter along the western coast from central California up to the Aleutian Islands

(Kuchel 1977). The surveys completed in this report were for Western populations of harlequins that occur along the west coast.

The harlequin duck is one of the most beautiful species of waterfowl. The males are colored a glossy slate-blue with chestnut sides and flanks. A white crescent and white spots occur on its head. Females are a dusky color with three white spots on their head (Bellrose, 1980). The harlequin, which is a shy, sensitive sea duck, makes a yearly spring migration inland to high, fast flowing mountain streams to breed and rear young. Mating and pairing of adult males and females is done both prior to and after migrating inland. They migrate to the remote sections of streams, where they are very rarely seen.

In order to discover harlequin population distributions during the spring and summer, stream surveys were conducted to locate males, females, and later hens with broods and obtain information on the stream habitat and vegetative components the harlequins seek for rearing the young. The data gathered from these surveys will help develop a better understanding for management of harlequin ducks and the stream areas they utilize.

SURVEY AREA

I surveyed streams located in the Gallatin National Forest and a portion of the Custer National Forest. Figure 1 presents a map of the streams surveyed. They are located in four ranger districts of the Gallatin and the Stillwater, West Rosebud, and tributaries in the Custer National Forest. The four ranger districts are the Big Timber, Livingston, Bozeman, and Gardiner.

Key: Gallatin and Section of Custer Nat. Forests

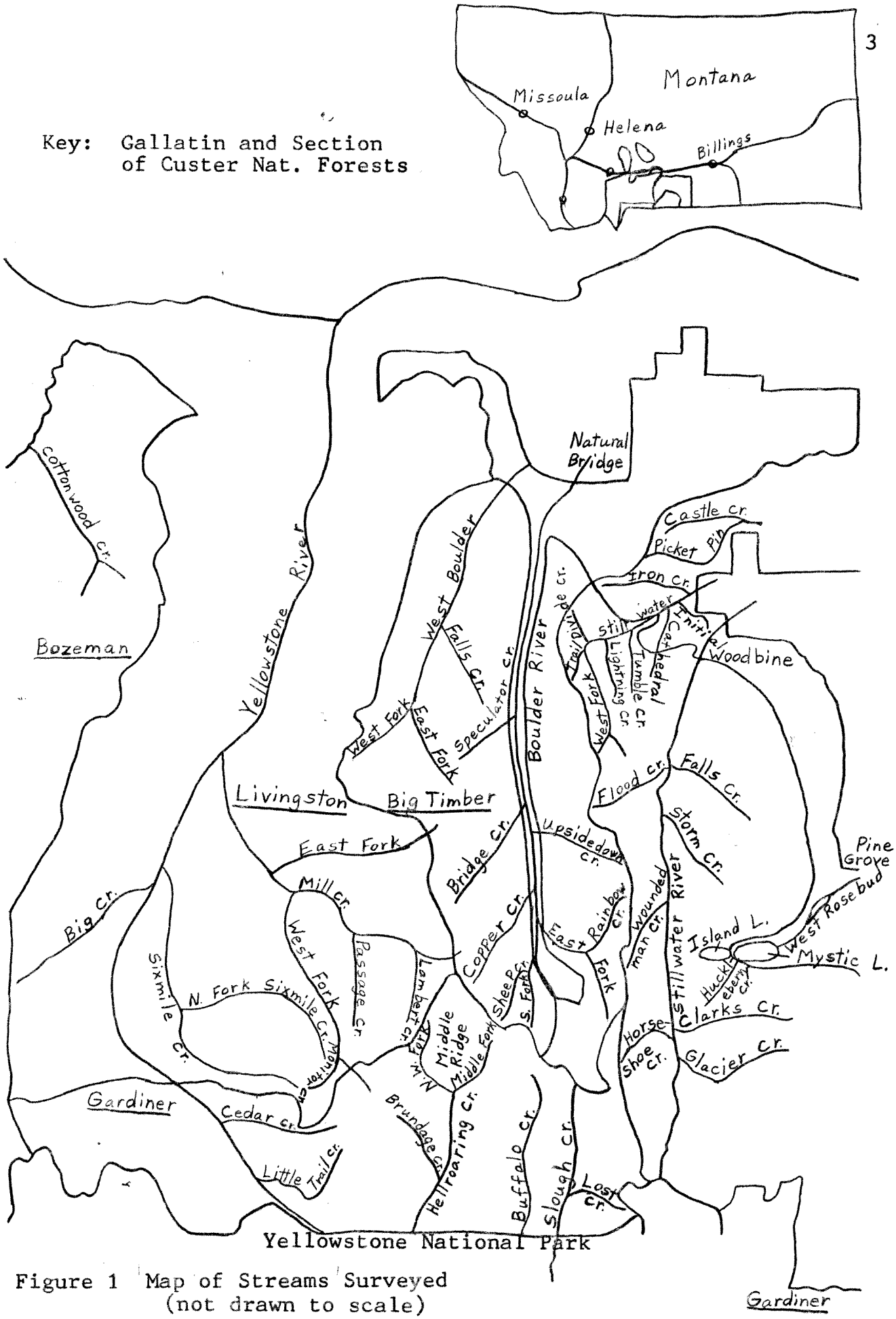


Figure 1 Map of Streams Surveyed (not drawn to scale)

METHODS

I conducted stream surveys by walking the stream bank to locate pairs of harlequins and later hens with broods. I surveyed from June 19th through September 6, 1991. All the streams surveyed were walked once through this time period. I photographed and filled out Montana Natural Heritage Program survey forms when I observed a harlequin duck. Otherwise, I recorded a brief description of the stream and its potential for harlequin duck habitat and problems incurred that suggest possible reasons why harlequins are absent. Streams were visually analyzed and a few water temperatures were taken.

RESULTS AND DISCUSSION

Through the time period of this survey from June 19th to the 6th of September, 1991, I observed five harlequin ducks. The five harlequins, three males and two females, were sighted on the Boulder River in the Big Timber Ranger District (Figure 2). I recorded the date, time, specific location, and described the stream habitat around the observed harlequin (Table 1). Seven are given in the table, but two sightings I figured were duplicate. They occurred just upstream and right after the previous sighting. I obtained five stream temperatures (deg. F): 1) 44 deg. on Sixmile Cr.; 2) 50 deg. on the North Fork of Sixmile Cr.; 3) 48 deg. on Cedar Cr.; 4) 50 deg. on Iron Cr.; and 5) 52 deg. on Wounded Man Cr. The five temperatures were all taken at noon (12:00 a.m.) out in the main current of the stream. The five observations that I made are consistent with the 1990 survey. All observations were made on the Boulder River (Markum,

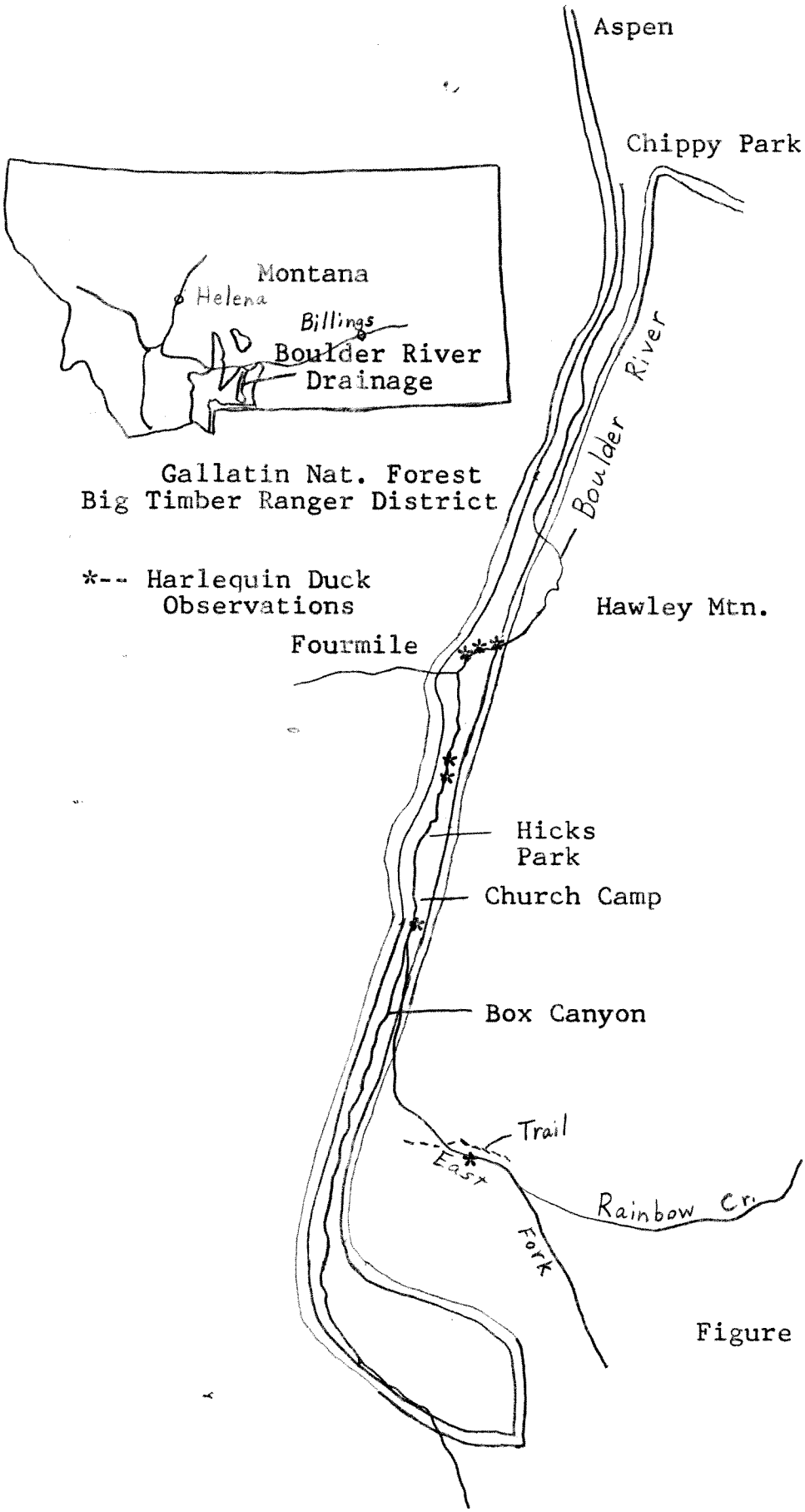


Figure 2 Harlequin Duck observations in the Big Timber Ranger District 1991.

DATE	TIME	STREAM	HABITAT & OBSERVATIONS
6/23/91	2:52pm	Boulder	1 male beside a rocky island with willows and stump; flew upstream 1 female merganser also present T5S, R12E, SEC 35, SW1/4, SW1/4
	4:06pm	Boulder	1 male, probably same one, just upstream from previous observation T6S, R12E, SEC 3, NE1/4, NW1/4
	4:48pm	Boulder	1 male, standing, stretching wings on large boulder, close to alder, pine tree, and herbaceous vegetation T6S, R12E, SEC 3, NW1/4, SW1/4
6/29/91	3:40pm	Boulder	1 male feeding upstream beside island T6S, R12E, SEC 16, SW1/4, SE1/4
	6:42pm	Boulder	1 male, upstream from last observation standing on a rock preening, then began diving and feeding again, during rain shower, probably same one T6S, R12E, SEC 21, NW1/4, NE1/4
6/30/91	12:46pm	Boulder	1 female, feeding beside small rock island, a second island to the left with spruce and aspen trees T6S, R12E, SEC 28, NW1/4, SE1/4
7/1/91	6:20pm	East Fork	1 female, feeding by largest of 5 separate small islands, ducked out of sight behind large overhanging spruce trees T7S, R12E, SEC 3, SE1/4, SE1/4

Table 1 Harlequin Duck observations in the Big Timber Ranger District 1991.

1990). The low number of sightings (only five) that I encountered primarily stems to my later start in June. I believe the high water run-off this spring may have caused low nest success. I surveyed each stream only once and the particular time of day may not have been good for observing harlequins. Although, harlequins have been sighted at various times during the day.

Descriptions by Ranger District

Big Timber Ranger District

The area of the Boulder River below Hells Canyon and down towards Natural Bridge is meandering and more open. Private land and cabins, and greater concentrations of recreation occurs in the lower areas of the Boulder. Down towards Crystal Springs and through Chippy Park and Falls Cr. campgrounds the stream banks are not as remote. Below Falls Cr. campground the Boulder moves slow meandering through black cottonwood, chokecherry, and rose bush banks and around grassy meadows and grazing lands where the river bottom forms deep pools and muddy bottoms. The creeks below and above Box Canyon that include Speculator, Upsidedown, Bridge, Copper, Elk, Sheep, and South Fork were characterized by high gradient flows with large boulders, pools, and sections of steep canyon and rocky stream banks. Rainbow Cr. contained some portions of lower gradient flows with willows, but available feeding areas, and islands are lacking on Rainbow Cr. and the previous creeks mentioned.

The West Boulder River has a few suitable islands below the campground. Above the campground, there is mostly a single

channel running until the West Boulder Meadows. The current is too slow around the meadows where mud bottoms exist. Above the Beaver meadows and up the East and West Forks the gradient is higher and likewise with Falls Cr., the available nesting and feeding areas are absent.

Livingston Ranger District

The Mill Cr. area showed good potential for harlequins. There was one reported sighting of a harlequin on the West Fork. Later in July after this sighting occurred, the Thompson Cr. fire occurred. I surveyed the area after the fire, but no harlequins were present. The East Fork was a low gradient creek, but had few if any loafing sites and very few islands. The upper reaches of West Fork of Mill Cr. and where Monitor Cr. flows in, the stream banks were steep with rock ledges. On Mill Cr. from Passage cr. to Lambert Cr., the gradient is low, but islands and loafing sites are absent.

The Sixmile Cr. area contained open areas due to cattle grazing and then gradually the stream bank vegetation took its place. Both Sixmile and North Fork of Sixmile creeks were low gradient creeks, and water levels were too low at this time of the year.

Big Cr. had cattle grazing above the trailhead, so the area around the creek was fairly open. One section contained steep rocky banks and large boulders with waterfalls. Water levels were also low at this time of the year on Big Cr. As I surveyed towards the private land, Big Cr. went dry as water was diverted to irrigation.

Gardiner Ranger District

Cedar Cr. was fairly high gradient below the OTO Ranch and then leveled out as the valley widened. It was lacking in good feeding sites, because the majority of Cedar Cr. was pool formation and the current is too slow and water levels too low for harlequin habitat. Little Trail Cr. was also too small for any harlequin potential.

The Hellroaring Cr. drainage contained deep, rocky canyons from the Forest Service boundary upstream a coupe of miles. Two miles above the Hellroaring forest Service Station the meadows begin and the creek meanders and the water flow is practically still. Brundage Cr. was too small. Both the Middle Fork and the North West Fork of Hellroaring Cr. are low gradient, and low flowing creeks. Buffalo Cr. and Slough cr. meandered through meadow areas and did not have extensive vegetation on the stream side. The water levels are too low and the turbulence is absent. Lost Cr. was characterized by steep banks and large boulders and small pools. The three drainages Slough, Buffalo, and Hellroaring, burned during the 1988 fires. The vegetation component and stream habitat may be lacking.

Bozeman Ranger District

The only stream surveyed on this district was Cottonwood Cr. From my starting point in the private land, cattle were grazing leaving a short stretch of creek partially open for approximately one half of a mile. Then the vegetation was thick that gave the creek good cover. It is highly secluded and remote, but island and nesting habitat is lacking.

Custer National Forest

The West Rosebud is a disturbed area with a dam on Mystic Lake. When work is progressing a helicopter transports materials up the West Rosebud drainage for construction work on the dam. Below the dam and down to Lake Emerald, the W. Rosebud is white-water and also as it leaves Lake Emerald there exists a high gradient flow. Then it slows and the stream bed widens toward Pine Grove picnic ground. Huckleberry Cr. flowed down a fairly steep gradient, until approximately 100 meters before flowing into Mystic Lake.

The whole Stillwater River drainage was burned from the 1988 fires. If trees are an important component, they are lacking. The undergrowth is coming back well, but the river is open and less remote. The creeks which include Glacier, Clarks, Horseshoe, Wounded Man, Flood, Falls, and Storm, are primarily high gradient, open streams. They contain many logs forming pools and large boulders.

On the West Fork Stillwater River, feeding areas and loafing sites were lacking. The gradient was too high at the higher reaches towards Chalice Peak. There were willows and a meadow section below Divide Creek, and towards Initial the river flowed through a steep rocky section to a meandering stream through Horseman Flats. The creeks observed on the W. Fork Stillwater river, were all high gradient and had really low water flows this time of the year. The main channel of Divide Cr. was completely dry where it crossed the trail and Lightning Creek's main channel was dry. Iron, Initial, and Cathedral creeks all contained many

large and small pools, waterfalls, and a lot of moss. Pin Cr. contained an irrigation dam with headgate diverting water to a side channel. The pools formed by tree limb build-up and from large boulders had very fine grained, sandy bottoms.

Two extra observations were made by Forest Service personnel. One was in the Hebgen Lake Ranger District on the Madison River, and one observation on the Yellowstone River by Gardiner.

CONCLUSION & RECOMMENDATIONS

Some of the areas that I surveyed were burned recently by fires. The lack of shade and extensive recreation in the Stillwater drainages, and the influx of people in the Boulder area have possibly contributed to the low number of harlequin duck sightings. The majority of the creeks surveyed were good sized, but the water levels are too low in the later part of August for harlequin duck habitat. I could see harlequins utilizing some of the smaller creeks during early spring runoff, but not for brood rearing. It is also possible that harlequins have not utilized or migrated into that stream area.

I would recommend that starting earlier in the spring, towards the latter part of April, is more beneficial for obtaining total population counts. Observing the males and females earlier also gives you a better idea where females might possibly be nesting. Since I concentrated on hens with broods in this survey, the later start worked out fine, although, I did not see any broods.

ACKNOWLEDGEMENTS

I would like to thank the Montana Natural Heritage Program under the direction of David Genter for the opportunity to do this harlequin duck survey. Their friendly assistance and pleasant working atmosphere was greatly appreciated. I also thank the Forest Service Ranger District personnel for their assistance and providing information that helped complete this document.

ASSOCIATED SPECIES OBSERVED

American Dippers (*Cinclus mexicanus*) were observed on all the creeks surveyed, except for Little Trail Creek. Common mergansers (*Mergus merganser*), with broods were also observed.

LITERATURE CITED

Bellrose, F. C. 1980. Ducks, Geese & Swans of North America. Third ed. Stackpole Books, Harrisburg, PA . 540pp.

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 Montana, Missoula, MT. 156pp.

Markum, D. 1990. Distribution and Status of the Harlequin Duck on the Gallatin National Forest, Montana. Draft. 18pp.

Wallen, R. L. 1987. Habitat utilization by harlequin ducks in Grand Teton National Park. M.S. Thesis, Montana State Univ., Bozeman, MT. 67pp.

APPENDIX A

Streams Surveyed on the Gallatin and Custer National Forests, 1991

GALLATIN NATIONAL FOREST

BIG TIMBER RANGER DISTRICT

STARTING DATE	STREAM	MILES SURVEYED	AVE. STREAM WIDTH (meters)	STARTING POINT
6/19/91 *	Boulder	29	12-14m.	T3S, R12E, SEC 26, NE1/4, NW1/4
6/23/91	Speculator	4	4-6m.	T5S, R12E, SEC 23, NE1/4, NE1/4
6/25/91	W. Boulder	13	5-7m.	T3S, R12E, SEC 19, NE1/4, NW1/4
6/26/91 *	East Fork	2	2-4m.	T5S, R11E, SEC 7, SW1/4, SW1/4
6/26/91	West Fork	1	2-4m.	T5S, R11E, SEC 7, SW1/4, SW1/4
6/26/91	Falls Cr.	4	2-4m.	T4S, R11E, SEC 28, SW1/4, NW1/4
7/1/91	East Fork	9	4-6m.	T6S, R12E, SEC 28, SW1/4, NW1/4
7/2/91	Upsidedown	3	2-4m.	T6S, R12E, SEC 28, NW1/4, NE1/4
7/2/91	Bridge Cr.	4	3-5m.	T6S, R12E, SEC 21, SW1/4, SE1/4
7/3/91	Rainbow Cr.	3	3-5m.	T7S, R12E, SEC 11, SE1/4, NE1/4
7/4/91	South Fork	2	4-6m.	T7S, R12E, SEC 17, SE1/4, NW1/4
7/4/91	Sheep Cr.	1	4-6m.	T7S, R12E, SEC 20, NE1/4, SW1/4

Table 2 Streams Surveyed Separated by Ranger District and National Forest.
* Stream Harlequin duck observed on

(Table 2 continued)

7/4/91	Copper Cr.	1	4-6m.	T7S, R12E, SEC 17, NW1/4, NE1/4
7/5/91	Elk Cr.	1	4-6m.	T7S, R12E, SEC 8, NW1/4, NE1/4
LIVINGSTON RANGER DISTRICT				
8/16/91	E. Fork Mill	8	5-7m.	T6S, R9E, SEC 13, NE1/4, SW1/4
8/17/91	Passage Cr.	4	3-5m.	T6S, R10E, SEC 32, NE1/4, NW1/4
8/18/91	Lambert Cr.	2	1-3m.	T6S, R10E, SEC 36, SE1/4, SW1/4
8/18/91	Mill Cr.	11	5-7m.	T6S, R9E, SEC 13, NW1/4, SE1/4
8/20/91	Big Cr.	10	3-5m.	T6S, R7E, SEC 21, NE1/4, NE1/4
8/22/91	W. Fork Mill	7	3-5m.	T6S, R9E, SEC 24, SE1/4, NE1/4
8/22/91	Monitor Cr.	3	2-4m.	T7S, R9E, SEC 24, SW1/4, SW1/4
8/24/91	N.F. Sixmile	4	3-5m.	T7S, R8E, SEC 9, SE1/4, SE1/4
8/25/91	Sixmile Cr.	9	3-5m.	T6S, R8E, SEC 32, SW1/4, NE1/4
GARDINER RANGER DISTRICT				
8/27/91	Cedar Cr.	6	3-5m.	T8S, R8E, SEC 7, SE1/4, SE1/4
8/28/91	Little Trail	2	1-2m.	T9S, R8E, SEC 8, NE1/4, NE1/4
8/29/91	Hellroaring	8	7-9m.	T9S, R10E, SEC 23, SE1/4, SW1/4
8/30/91	Middle Fork	4	2-4m.	T8S, R11E, SEC 17, NE1/4, SW1/4

(Table 2 continued)

8/30/91	N.W.F.Hellro.	3	2-4m.	T8S, R11E, SEC 17, NE1/4, SW1/4
8/31/91	Brundage Cr.	2	1-3m.	T9S, R10E, SEC 1, SE1/4, NW1/4
9/2/91	Buffalo Cr.	9	4-6m.	T9S, R11E, SEC 24, SE1/4, NW1/4
9/3/91	Slough Cr.	8	5-7m.	T9S, R12E, SEC 25, SW1/4, NE1/4
9/4/91	Lost Cr.	2	3-5m.	T9S, R13E, SEC 7, NE1/4, SE1/4
BOZEMAN RANGER DISTRICT				
9/6/91	Cottonwood	5	2-4m.	T3S, R5E, SEC 28, NE1/4, NE1/4
CUSTER NATIONAL FOREST				
7/8/91	Huckleberry	1	3-5m.	T7S, R15E, SEC 13, SE1/4, NE1/4
7/8/91	W. Rosebud	11	6-8m.	T6S, R17E, SEC 28, SE1/4, NW1/4
7/13/91	Wounded Man	3	10-12m.	T7S, R14E, SEC 9, SE1/4, SE1/4
7/13/91	Stillwater	19	8-10m.	T5S, R15E, SEC 32, NE1/4, SE1/4
7/30/91	Glacier Cr.	2	2-4m.	T8S, R14E, SEC 4, SW1/4, SE1/4
7/30/91	Clarks Cr.	2	3-5m.	T8S, R14E, SEC 4, NW1/4, NE1/4
7/30/91	Horseshoe	2	3-5m.	T8S, R14E, SEC 4, NW1/4, SE1/4
8/2/91	Flood Cr.	1	5-7m.	T6S, R14E, SEC 13, SW1/4, NE1/4
8/3/91	Falls Cr.	2	4-6m.	T6S, R14E, SEC 13, NW1/4, SE1/4

(Table 2 continued)

8/3/91	Storm Cr.	1	4-6m.	T6S, R14E, SEC 35, NW1/4, SE1/4
8/8/91	Castle Cr.	2	2-4m.	T4S, R14E, SEC 25, NW1/4, SE1/4
8/9/91	Picket Pin	3	2-4m.	T4S, R14E, SEC 36, NW1/4, NE1/4
8/10/91	W.F.Still.	16	7-9m.	T4S, R15E, SEC 33, NW1/4, SE1/4
8/13/91	Trail Cr.	1	2-3m.	T5S, R13E, SEC 34, NW1/4, SE1/4
8/13/91	Divide Cr.	1	1-3m.	T5S, R13E, SEC 27, SE1/4, SE1/4
8/13/91	Lightning	1	1-3m.	T5S, R14E, SEC 30, NW1/4, SW1/4
8/13/91	Tumble Cr.	1	1-3m.	T5S, R14E, SEC 29, NW1/4, SW1/4
8/14/91	Iron Cr.	2	1-3m.	T5S, R14E, SEC 12, SW1/4, SW1/4
8/14/91	Cathedral	1	1-3m.	T5S, R14E, SEC 14, SE1/4, NW1/4
8/14/91	Initial Cr.	1	1-3m.	T5S, R14E, SEC 14, NE1/4, NE1/4