Results of the 1991 Survey for Harlequin Duck (*Histrionicus histrionicus*) Distribution in the Non-wilderness Portion of the Flathead National Forest, Montana

submitted by:

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Summary

This survey of harlequin ducks was conducted in the non-wilderness portion of the Flathead Basin on Flathead National Forest Lands and Stillwater State Forest Lands. Stream surveys began on 15 July 1991 and ended on the 31 August 1991. Physical characteristics of each stream were evaluated qualitatively. Discharge measurements were provided by Wally Page, hydrologist for the Flathead National Forest. One breeding pair of harlequin ducks was observed during this survey. Unusually late spring run-off causing inundation of nest sites and drowning chicks may be the reason for the lack of breeding success.

One harlequin hen was found on the Stillwater State Forest. Five single female harlequins and 1 female with a brood of four young were found in the Glacier View Ranger District. Two Harlequin hens were observed in the non-wilderness portion of the Spotted Bear Ranger District. No harlequins were observed in the Hungry Horse Ranger District. I received reports of pairs along the North Fork of the Flathead River in the Glacier View Ranger District in April and May by several individuals. One hen with a brood of three young was reported on the North Fork of the Flathead River in the Glacier View Ranger District. One individual reported two separate sightings at different locations on the Middle Fork of the Flathead River. One of these sightings was a hen with a brood of three young between Moccassin Creek and West Glacier and the other was a hen with a brood of five young in the wilderness portion of the Middle Fork. A table of stream characteristics is included in the appendix. Those streams meeting harlequin habitat criteria worthy of future surveys are highlighted.

Objectives

The objectives of this study were to assess the distribution of harlequin ducks in the non-wilderness portion of the Flathead National Forest and evaluate the habitat suitability for harlequins of each stream in the survey.

Introduction

Harlequin ducks (*Histrionicus histrionicus*) are unique sea ducks that winter in coastal areas and migrate inland to nest along swiftly flowing mountain streams. Two distinct populations exist: one in the Atlantic and one in the Pacific. Little information is available concerning harlequin duck migration patterns, breeding biology or habitat requirements (Carlson 1990). Due to the lack of understanding concerning harlequin habitat requirements and increasing encroachment into pristine areas by recreational enthusiasts, the United States Forest Service has listed the harlequin duck as a Sensitive Species (Reel, Schassberger, and Ruediger 1988).

The Flathead National Forest contracted with the Montana Natural Heritage Program through the Challenge Cost-Share Program to conduct harlequin surveys in 1991. This cooperative agreement has been conducted each summer season since 1988. The objectives of the ongoing harlequin duck project are to collect information on the distribution and population numbers of harlequin ducks in Montana; to identify and describe occupied nesting, brood rearing, and migratory habitats, and to eventually develop a habitat suitability model (Fairman 1990). I began this study on July 15, 1991. My primary goal was to record the distribution and population numbers of harlequin ducks in the non-wilderness portion of the Flathead National Forest. In addition, I identified and described brood rearing sites and collected stream habitat data. This report includes the findings of the 1991 field season.

Overview

The pacific population of harlequin ducks extends from central California to northern Alaska and inland to the east front of the Rocky Mountains and south into northwest Wyoming (Bellrose 1976). Northwest Montana is on the eastern fringe of the migration route for the Pacific Coast population of harlequins. Breeding harlequins have been found on the Kootenai, lower Clark Fork, and Flathead River drainages; streams in Glacier and Yellowstone National Parks; and streams on the east front of the Rocky Mountains (Kuchel 1977; Fairman, personal communication). Breeding populations are uncommon and localized in western Montana despite numerous streams which superficially appear to provide suitable habitat (Kuchel 1977).

Harlequin ducks congregate in secluded coastal waters between July and April. Males tend to spend more time in coastal waters than do females. Pair bonding most likely occurs at this time (Wallen 1987). Harlequin ducks spend approximately 2 to 5 months in Montana with pairs arriving in late April or early May. Nonbreeding and unmated ducks also migrate inland. Males return to the coast by mid to late June generally leaving just prior to initiation of incubation (Kuchel 1977; Wallen 1987). Unpaired females remain at the nesting grounds for for 3-5 weeks before returning to the coastal waters. Hens with broods depart in late August.

Harlequins exhibit a strong nest site tenacity, often returning to the same site yearly (Kuchel 1977; Wallen 1987; Wallen and Groves 1989). Nesting, incubation, and hatching dates vary with local populations. This may be attributed to differences in spring run-off

from one locale to another, differences in elevation, or for other reasons unknown at this time (Kuchel 1977; Wallen 1987). Egg incubation in Idaho begins in mid-May with hatching occurring 30 days after (Wallen and Groves 1989).

Wallen and Groves (1989) found harlequins in Idaho to occupy fast running mountain streams with a dense canopy of shrubs. Aquatic insects are the primary diet of harlequins in the Rocky Mountains (Kuchel 1977; Wallen 1987). A number of studies documenting harlequin habitat in the Rocky Mountains have taken place over the past 15 years (Kuchel 1977; Wallen 1987; Wallen and Groves 1989; and Fairman and Miller 1990). Based on these studies it is possible to develop a list of summer habitat requirements for harlequins:

1. a stream with good water quality and a high density of aquatic insects.
2. a low gradient perennial stream with areas of swift water.
3. stream side cover, usually comprised of moderate to dense shrubs.
4. presence of cover and loafing areas such as logjams, debris piles, mid-stream rocks, and gravel bars.
5. presence of brood rearing areas such as beaver ponds, stream braids, meanders, side channels.

These habitat requirements may assist public land managers with policies accommodating the needs of harlequin ducks.

Survey Area

This study took place in the non-wilderness portion of the Flathead National Forest and Stillwater State Forest. The streams surveyed in this study were located in the Tally Lake Ranger District, Glacier View Ranger District, Hungry Horse Ranger District, and Spotted Bear Ranger District (figure 1). All of these streams are tributaries of the three main stems of the Flathead River and the Stillwater River.

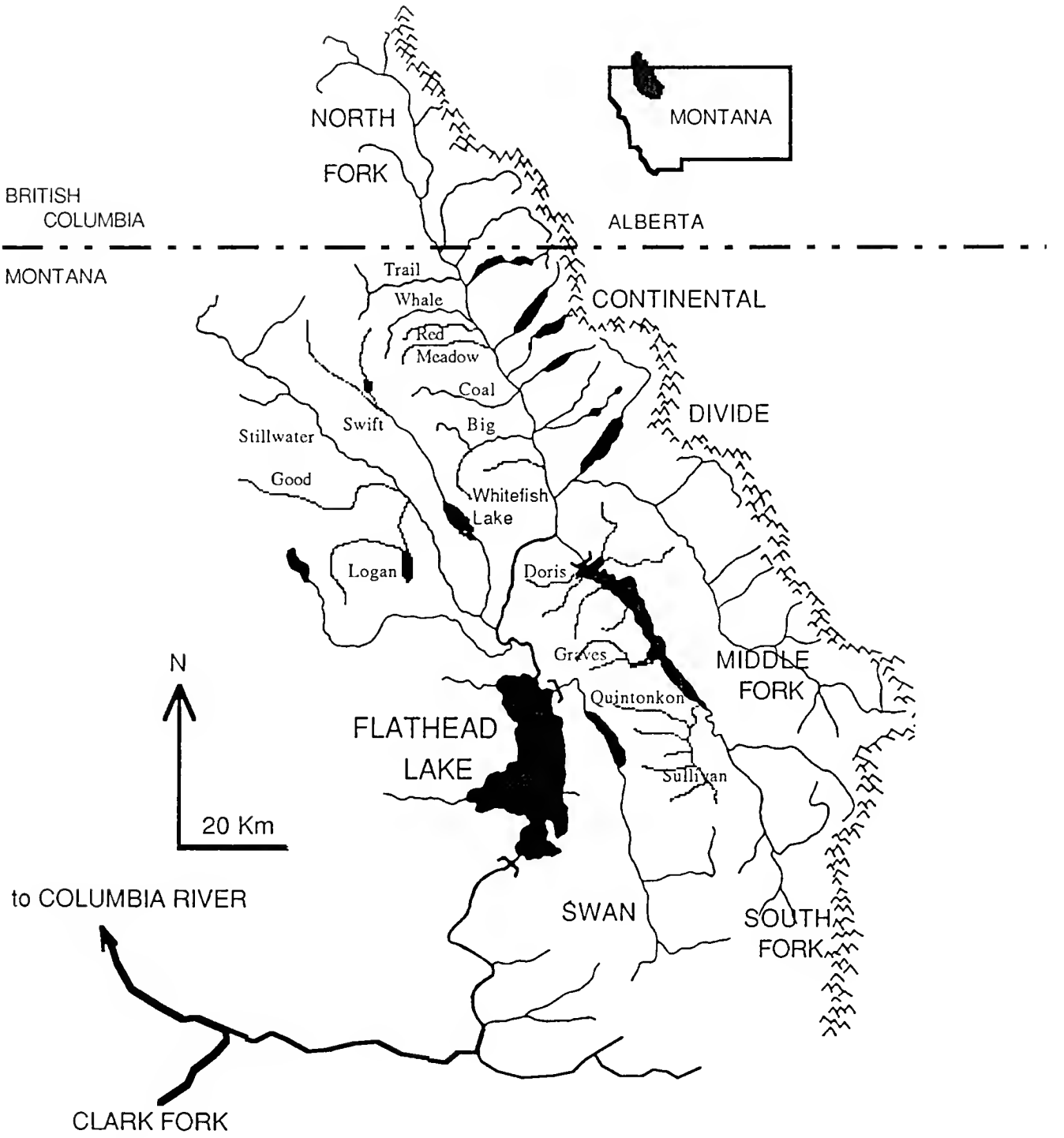

Figure 1: Major streams in the study area

Methods

Streams surveyed in this study were pre-selected by David Genter of the Montana Natural Heritage Program. Surveys were conducted by hiking up the stream bed and frequently glassing ahead with binoculars. Four streams were surveyed by floating in a kayak. Analysis of the physical characters of each stream were done qualitatively using scaling methods described by Carlson (1990). Stream flow data was obtained from the Forest Hydrologist for the Flathead National Forest. Benthic macroinvertebrate densities were estimated qualitatively based on the authors past experience working with benthos. All the streams surveyed were rated as having normal densities of aquatic insects with some registering higher than others. Streams in Northwest Montana typically have low densities of aquatic insects due to the low nutrient concentrations in the soils. The following measurement scales are taken in part from Carlson (1990). Stream characteristics based on the criteria below are evaluated in the table included in the appendix.

1. Ground cover measurements were based on the following scale.

   low = 0% - 30% ground cover

   medium = 31% - 70% ground cover

   high = 71% -100% ground cover

2. Stream bank vegetation was divided into three groups; herbaceous, shrub, tree. Dominant vegetation was determined by that shading the highest percentage of area for a distance of 15 feet from the stream bank.

3. Channel type.

braided	Stream channel is located in a flat bottomed valley with shallow channels and islands. The channel may shift slightly during each peak flow period.
canyon	Stream channel is structurally controlled by a "v" shaped valley. Rapids and runs characterize the stream flow. Virtually no movement of the channel occurs during peak flow periods.

4. Channel width was measured in feet.

5. Availability of mid-channel loafing sites.

low - 0 sites / 10 meters of stream

medium - 1-3 sites / 10 meters of stream

high - > 3 sites / 10 meters of stream

6. Frequency of debris jams.

low - < 5 / stream mile

high - > 5 / stream mile

7. Dominant substrate composition. Abbreviations are used in the table.

sand - < 1/4 "

pebbles (peb) - 1/4" - 1"

gravel (grav) - 1" - 2.5"

cobble (cob) - 2.5" - 10"

boulder (boul) - >10"

bedrock (bed)

8. Zoobenthos density.

normal- determined as normal for Flathead Basin streams

high- above normal for Flathead Basin streams

9. Does logging occur adjacent to the stream bank with little or no stream management zone? The approximate age of the cutting unit is included.

10. Harlequins present?