

IDAHO CONSERVATION DATA CENTER

DISTRIBUTION AND STATUS OF HARLEQUIN DUCKS (Histrionicus histrionicus) ON THE TARGHEE NATIONAL FOREST

by

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Cooperative Challenge Cost Share Project
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ABSTRACT

From May to September 1990, 20 streams on the Targhee National Forest were examined for habitat suitable for Harlequin Duck breeding activity. Twelve streams were surveyed for Harlequin Ducks with ten of these meeting the breeding requirements of the species. Surveys were conducted by walking or driving along streams or walking within the streambeds while searching for ducks. Posters requesting reports of Harlequin Ducks were placed at trailheads, campgrounds, and tourist facilities. Pairs of adult Harlequin Ducks were observed on Big Elk Creek⁽⁰⁰²⁾ on the Palisades Ranger District (RD) and Darby Creek on the Teton Basin RD. Adult Harlequin Ducks were also reported on Teton Creek by USFS personnel. One duckling was observed on two consecutive days on Darby Creek. Monitoring of Big Elk, Darby, and Teton Creeks for breeding activity should continue and further surveys should be conducted on Bitch and Robinson Creeks during May or early June when Harlequin Ducks are most visible.

INTRODUCTION

Harlequin Ducks (Histrionicus histrionicus) are small sea ducks inhabiting both the Atlantic and Pacific coasts of North America. The Pacific Harlequin Duck (H. histrionicus pacificus) winters on the Pacific coast while its breeding range extends through the mountainous regions of northwestern Wyoming to northern Canada and Alaska, and through the Cascade and Coast ranges of the Pacific Northwest south (historically) to the Sierra Nevada of California (Bellrose 1980) (Figure 1).

Harlequin Ducks arrive on their breeding grounds in Grand Teton National Park in April or May and begin nesting activity from mid-May to mid-June (Wallen 1987). Drakes usually depart the breeding areas once the hens settle into incubation. Broods are present from mid-July to early September before departing for their coastal wintering areas. On their breeding grounds, Harlequin Ducks favor low gradient, mountain streams removed from high levels of human disturbance.

The eastern subspecies of Harlequin Duck has experienced a significant population decline over the past 100 years. Concern is mounting over the small number of birds estimated to make up that population and its survival may be precarious at best (Goudie 1989). The Pacific population is substantially larger, yet breeding populations in the Rocky Mountains are very small. For example, Cassirer and Groves (1990a) estimate the northern



Figure 1. Breeding distribution of harlequin ducks in North America (from Bellrose 1980).

Idaho population at 30 pairs which were responsible for producing 11 broods in 1990. Due to low population densities and the need for relatively undisturbed mountain streams with high water quality for breeding, this seldom observed waterfowl was classified by Region 1 of the United States Forest Service (USFS) as a Sensitive Species in 1987. In 1989 the Idaho Department of Fish and Game (IDFG) classified it as a Species of Special Concern. Region 4 of the USFS finalized its designation of the Harlequin Duck as a Sensitive Species in 1990.

The ecology of Harlequin Ducks in northern Idaho has been under investigation since 1987. Initial efforts concentrated on determining distribution, general habitat requirements, and breeding chronology. Subsequent work has focused on habitat use, population dynamics, and breeding biology (Wallen and Groves 1988, 1989; Cassirer 1989; Cassirer and Groves 1989, 1990a).

OBJECTIVES

The objectives of this study were to document the distribution of breeding Harlequin Ducks on the Targhee National Forest and to identify streams supporting successfully reproducing pairs.

METHODS

During May, June, August, and early September 1990, we placed posters requesting information on Harlequin Ducks at trailheads, campgrounds, and various other tourist facilities on the Targhee National Forest (Appendix A).

With the aid of Craig Groves, Nongame and Endangered Wildlife Program, IDFG, we chose streams on the Targhee National Forest to reconnoitre and/or survey for Harlequin Ducks. We conducted surveys of streams during May and June by hiking or driving along the streambanks and searching for ducks with binoculars. In the upper reaches of several streams, we were able to walk in the stream channel itself at this time. During August and September, low water levels on all streams allowed us to hike completely within the streambed. Harlequin Ducks, especially young, may hide under riparian vegetation. These birds may be missed if the stream is only surveyed from the bank. Therefore, walking in the stream increases the chances that these individuals will be observed.

In August and September, we characterized each stream surveyed by recording habitat information at 1-km intervals on Harlequin Duck Data Forms (Appendix B). Habitat data consisted of the following variables: stream habitat, substrate, bank composition, overstory age and species, channel type, number of midstream loafing sites present, the presence of undercut banks, and whether vegetative overhang was present. We measured the

wetted stream-width and classified the location by ease of human access (Wallen 1987). We also recorded this habitat information at sites where ducks were observed throughout the study period.

RESULTS & DISCUSSION

Twenty streams were assessed as to whether they contained potential Harlequin Duck breeding habitat (Table 1). Suitable nesting habitat is characterized by low-gradient stream reaches of approximately ten meters or larger in width, high macro-invertebrate productivity (Grand Teton National Park), high canopy coverage (north Idaho), numerous mid-stream loafing sights, and shrubby streambank vegetation (Wallen 1987, Cassirer and Groves 1989, Wallen and Groves 1989). We judged 13 of these streams to be suitable or marginally suitable nesting streams and 12 streams were actively surveyed for breeding pairs and/or hens with broods (Appendix C). We compiled 10 sightings of Harlequin Ducks during the surveys including sightings of one young-of-the-year bird and four sightings that were reported to the Idaho Natural Heritage Program as a result of the poster (Table 2). Sightings occurred on the following three streams on the Targhee National Forest: Big Elk ⁰⁰²⁷ Creek, Darby ⁰¹¹⁶ Creek, and Teton Creek. Previously, Harlequin Ducks had been observed on Big Elk Creek and McCoy Creek in 1989 (Cassirer and Groves 1990b).

Table 1. Streams assessed for habitat suitable for Harlequin Duck breeding on the Targhee National Forest.

Stream	Suitable (Y/N/M)*	Reason Unsuitable	Dates Visited
<u>Ashton R. D.</u>			
Badger Creek	M	Size	8/21
Bitch Creek	Y	-----	9/2
Falls River	M	**	8/5
Robinson Creek	Y	-----	8/5, 8/18
Warm River	M	Canopy	8/5
<u>Island Park R. D.</u>			
Buffalo River	N	Swampy	6/19
Icehouse Creek	N	Size/Canopy/Use	6/22
Moose Cr.	N	Swampy	6/19
Sheridan Creek	N	Size/Canopy/Use	6/22
Targhee Creek	M	Size	6/20, 8/5
<u>Palisades R. D.</u>			
Bear Creek	N	Size/Canopy/Use	5/27
Big Elk Creek	Y	-----	5/17, 23, 25, 8/8
Indian Cr. (N. Fk.)	N	Size	5/24
Indian Cr. (S. Fk.)	N	Size	5/24
McCoy Creek	M	Canopy/Use	5/26
Palisades Creek	M	Size/Use	5/24
<u>Teton Basin R. D.</u>			
Darby Creek	Y	-----	5/28, 6/18, 8/6, 20
Fox Creek	M	Size	5/28
Moose Cr.	M	Canopy/Swampy	5/28
Teton Cr. (mainstem)	Y	-----	8/7
Teton Cr. (S. Fk.)	Y	-----	6/18, 8/7

Size= stream deemed too small for breeding

Canopy= canopy not closed; stream often bordered by shrubsteppe habitat (see Discussion section)

Use= stream suffering from high livestock or recreational use

* Y=suitable, N=not suitable, M=marginally suitable for Harlequin Duck breeding

**= Best breeding habitat on Falls River probably occurs within Yellowstone National Park

Table 2. Sightings of Harlequin Ducks on the Targhee National Forest in 1990.

Date	Stream	Observation
May 4	Teton Creek	Mary Maj (USFS) saw 1 pair swimming and loafing in fast water section. T5N, R46E, Sec20, NE1/4
May 6	Big Elk Creek	Cathy Troop saw 3 males T1S, R46E, Sec9, SE1/4
May 17	Big Elk Creek	Eric & Melonie Atkinson & Craig Groves saw 2 pairs feeding and occassionally loafing while swimming upstream. T1S, R46E, Sec17, SW1/4 T1S, R46E, Sec9, SE1/4
May 23	Big Elk Creek	Eric & Melonie Atkinson saw 1 male actively moving then loafing in meandering section of stream. T1S, R46E, Sec9, NE1/4
May 25	Big Elk Creek	Eric & Melonie Atkinson saw 2 pairs. First pair loafing on edge of run. Second pair feeding and loafing while swimming upstream in swift section of alternating pools and riffles. T1S, R46E, Sec9, NE1/4 T1S, R46E, Sec3, SE1/4
May 28	<i>016</i> Darby Creek	Eric & Melonie Atkinson saw 1 pair feeding and occassionally loafing while swimming upstream. T43N, R118W, Sec14, SW1/4 <i>Wyoming TRC</i>
June 5	<i>016</i> Darby Creek	Debra Patla (USFS) saw 1 male swimming and loafing in rapids (same location as 5/28 sighting). T43N, R118W, Sec14, SW1/4 <i>Wyoming TRC</i>

Table 2 (cont). Sightings of Harlequin Ducks on the Targhee National Forest in 1990.

Date	Stream	Observation
June 8	Teton Creek (S.Fk.)	Terry Brattain (USFS) saw male loafing on midstream rock just upstream from footbridge. T44N, R117W, Sec29, NW1/4
August 6 <i>016</i>	Darby Creek	Eric & Melonie Atkinson saw one lone young feeding and loafing in narrow portion of stream. T43N, R118W, Sec22, NE1/4 <i>Wyoming TRS</i>
August 7 <i>016</i>	Darby Creek	Eric & Melonie Atkinson, & Craig Groves saw one young loafing on cobbles (same bird as 8/6). T43N, R118W, Sec22, NE1/4 <i>Wyoming TRS</i>

016
We observed only one young harlequin during the surveys. We watched this individual forage and loaf for two consecutive days (August 6 & 7) on Darby Creek (Teton Basin RD), but no other individuals were seen. Although its back and head remained somewhat downy, its retrices and flight feathers were partially developed corresponding to waterfowl plumage class IIb (Larson and Taber 1980). This level of development occurs at 22-27 days (Wallen 1987) in Grand Teton National Park, an age at which it should have remained in the company of the hen (Cassirer and Groves 1989; Wallen 1987).

016
Backdating allowed us to estimate that hatching occurred between July 11 and July 16. This hatching date is similar to that reported by Kuchel (1977), Wallen (1987), and Cassirer and Groves (1988, 1989, 1990a). Allowing a 28-day incubation period (Bengston 1972), we estimated that incubation was initiated during the second week of June. Further backdating with an approximately 13-day egg-laying period indicated that nest initiation began around June 2. This time table compares favorably with the sighting of a pair of Harlequin Ducks on May 28 only 0.8 km above where the duckling was observed. Additionally, a male was observed by USFS personnel on June 5 at the same location as the May sighting. The June observation of a single male corresponds to the period of egg-laying which may account for the absence of the female in this sighting. With the aid of a hunting dog, we searched this area for a nest on June 18-19 but found no harlequins.

Searching upstream and downstream on the day we observed the duckling revealed the presence of no other ducks. We resurveyed this stream reach two weeks later and didn't observe the duckling or any other ducks. The duckling was originally observed in a narrow portion of the stream bordered by undercut and high bedrock cliffs. It is possible that this duckling represented what remained of a family group on Darby Creek, the other members having dispersed or died.

We collected approximately one cc of fecal material that had been voided onto rocks by the Darby Creek duckling. We identified prey items under a dissecting scope. The feces were composed largely of numerous appendage parts of mayflies and seven Brachycentrus sp. (Trichoptera) cases (Table 3). Additionally, on May 28 we observed the male of the pair feeding upon large caddis larvae (Limnephillidae, possibly Dicosmoecus sp.).

At least two pairs of Harlequin Ducks occupied Big Elk Creek (Palisades RD) in 1990. A third pair, or more likely, a bachelor male also settled on this stream. Although Big Elk Creek accounted for five of the seven sightings on the Targhee National Forest, we were unable to locate any broods on this stream. Water levels remained adequate, aquatic insects were abundant (E. Atkinson, pers. observ.), but riparian vegetation was very disturbed. At one harlequin observation site the vegetation had been completely denuded by packstock by mid-August. This damage may disrupt not only the breeding attempts of Harlequin Ducks but

Table 3. Prey items identified in approximately one cc of Harlequin Duck duckling fecal material.

Taxon	Remains	Corresponding Individuals
Ephemeroptera	Numerous appendages & appendage parts	15+
Ephermerellidae	5 gill plates	1
Plecoptera		
Perlidae	3 legs	1
Trichoptera		
<u>Brachycentrus</u> sp.	7 cases	7
Coleoptera	1 head capsule	1
Trichoptera/Coleoptera	3 mandibles	2

can have major impacts upon the stream ecosystem as a whole.

Harlequin Ducks were sighted by USFS personnel on Teton Creek (Teton Basin RD), the drainage just to the north of Darby Creek. Based upon the second sighting reported, we believe that if breeding did occur on this stream, the nest site would have been on the South Fork within the Jedediah Smith Wilderness Area. Several kilometers of relatively undisturbed stream are available for nesting between the main trailhead to Devil's Staircase/Alaska Basin and the point at which the trail intersects the stream. The stream channel is probably too narrow for harlequin use above this point. We surveyed this stream during August but were unable to locate any harlequin broods. Cassirer and Groves (1990a) have noted that reproduction is highly variable on streams in northern Idaho. It is not unusual for a stream to produce young in one year only to have no successful reproduction the next.

Two other streams on the Targhee National Forest are worth noting. Bitch and Robinson Creeks are both approximately 10 meters in width and do not suffer an inordinate amount of disturbance. Due to logistical difficulties we were not able to survey these streams until August and thus may have failed to ascertain whether adult Harlequin Ducks use these streams. Bitch Creek is characterized by areas of rapids and runs separated by pools. For much of the length surveyed, the riparian vegetation is in good health and canopy closure is often high. This latter point may not be as important to the Harlequin Duck population in

the Greater Yellowstone Ecosystem as it may be to the north Idaho population (Craig Groves, pers. comm.).

Robinson Creek was unique in the streams that we surveyed. This stream, appeared to be very productive and had a high diversity of aquatic life (M. and E. Atkinson, pers. observ.). Additionally, the water felt warm to the touch. We found the stones in the streambed completely covered with caddis cases of the families Brachycentridae and Limnephillidae. In a short search of the instream substrate we noted one large fresh water mussel (Anodonta-type), many mayfly larvae, and approximately 15 stonefly larvae of the following types (in order of abundance): Pteronarcyidae, Pteronarcys californica, Pteronarcella badia; Perlidae, and Perlodidae. The canopy was open and, in many portions, the vegetation on canyon slopes consisted of big sagebrush (Artemisia tridentata). However, the riparian vegetation was quite extensive and appeared suitable for Harlequin Duck nesting.

We characterized seven sites at which Harlequin Ducks were observed. Systematic measurements of streams are on file at the Natural Heritage Program Office (Boise ID). Major variables and the frequency of observations occurring in each category are listed in Table 4. Five sites were straight runs often over cobble bottoms. The streambanks usually were covered with vegetation and, in six of seven cases, this vegetation overhung the water. The average stream width at the observation sites was 7.9 m (range= 4.5-10) and most of the sites contained several

Table 4. Habitat characteristics of sites where Harlequin Ducks were observed.

Variable	# sites (of 7) with characteristic
Stream Habitat	
Run	5
Rapid	1
Pool	1
Substrate	
Cobble	5
Boulder	1
Bedrock	1
Bank Composition*	
Shrub	5
Grass/Forb	3
Tree/Shrub Mosaic	2
Bedrock	2
Gravel	2
Channel Type	
Meander	2
Straight	4
Curved	1
Vegetative Overhang	6
Bank Undercut	3
Overstory Species	
Douglas fir	5
Douglas fir/ <u>populus</u> sp.	2
Overstory	
Pole	3
Immature	2
Mature	2
Human Access**	
Adjacent	3
Near	2
Accessible	2
Type of Human Activity*	
Road	2
Fishing	4
Hiking	6

*Each site may have had more than one characteristic.

** Human Access (Cassirer and Groves 1990a)

- Adjacent = established area of motorized human activity within 10m of stream
- Near = established area of motorized human activity within 50m of stream
- Accessible = > 50 m from established area of human activity, accessible by boat or trail.
- Inaccessible = > 50 m from established area of human activity, not accessible by boat or trail.

stones/10 m stream section (\bar{x} = 2.5). Mid-stream loafing stones may be important to Harlequin Ducks for areas on which to rest while affording a certain amount of protection against predators. Woody debris was not an important component of most sites. None of the areas where Harlequin Ducks were observed were inaccessible to humans. This factor may be important to the successful reproductive effort of harlequins as Wallen (1987) noted that most reproduction in Grand Teton National Park occurred on streams undisturbed by human activity.

Broods of Harlequin Ducks move downstream as they develop (Kuchel 1977). Water diversion leaves some streams in the Teton Basin with little or no instream flow (M. and E. Atkinson, pers. observ.). These low water levels may hamper the downstream movement of harlequin broods.

CONCLUSIONS

Harlequin Ducks are present in small numbers on the Targhee National Forest and some reproduction does occur. Due to logistical difficulties, we were unable to survey all streams when both adults are present and visible (May and June). Thus, we may have missed sighting ducks on some streams (Bitch and Robinson Creeks, for example) that do contain potential breeding habitat. Regardless, the population of successfully breeding Harlequin Ducks on the Targhee National Forest is low.

RECOMMENDATIONS

1. Early season surveys of Bitch and Robinson creeks should be performed to assess whether ducks do settle on these streams. Monitoring of breeding activity should continue on Teton Creek, Darby Creek, and Big Elk Creek.
2. Efforts should be made to reduce the disturbance to the riparian area by livestock on streams including Big Elk Creek, Teton Creek, and Darby Creek, during the harlequin nesting season.
3. Activities of the organizational camp on Darby Creek should be situated away from the stream and at least in a downstream (away from the nesting area) direction.
4. Recreationists using the Big Elk Creek drainage should be encouraged to keep their activities in the riparian areas to a minimum. Packstock should not be tethered within the riparian areas due to the possibility of disrupting harlequin breeding activities.
5. Distribution and placement of the posters should continue. This is a very effective method of obtaining information while at the same time increasing public awareness and interest.

ACKNOWLEDGEMENTS

We would like to thank Craig Groves for initiating these surveys on the Targhee National Forest as well as encouragement throughout the field season. We would also like to thank the following persons of the USFS who provided invaluable support and information: Hal Gibb, Mary Maj, Nadine Branson, and Debra Patla.

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APPENDIX A

Poster requesting reports of Harlequin Duck observations.

ATTENTION WILDLIFE WATCHERS

WE NEED SIGHTINGS OF HARLEQUIN DUCKS

WE NEED YOUR HELP

The Nongame and Endangered Wildlife Program of the Department of Fish and Game is surveying Idaho's mountain streams for harlequin ducks—one of the state's rarest and shyest wildlife species.

We need your help in locating these mountain ducks. Please turn in any sightings you make as soon as possible!

WHO TO CONTACT

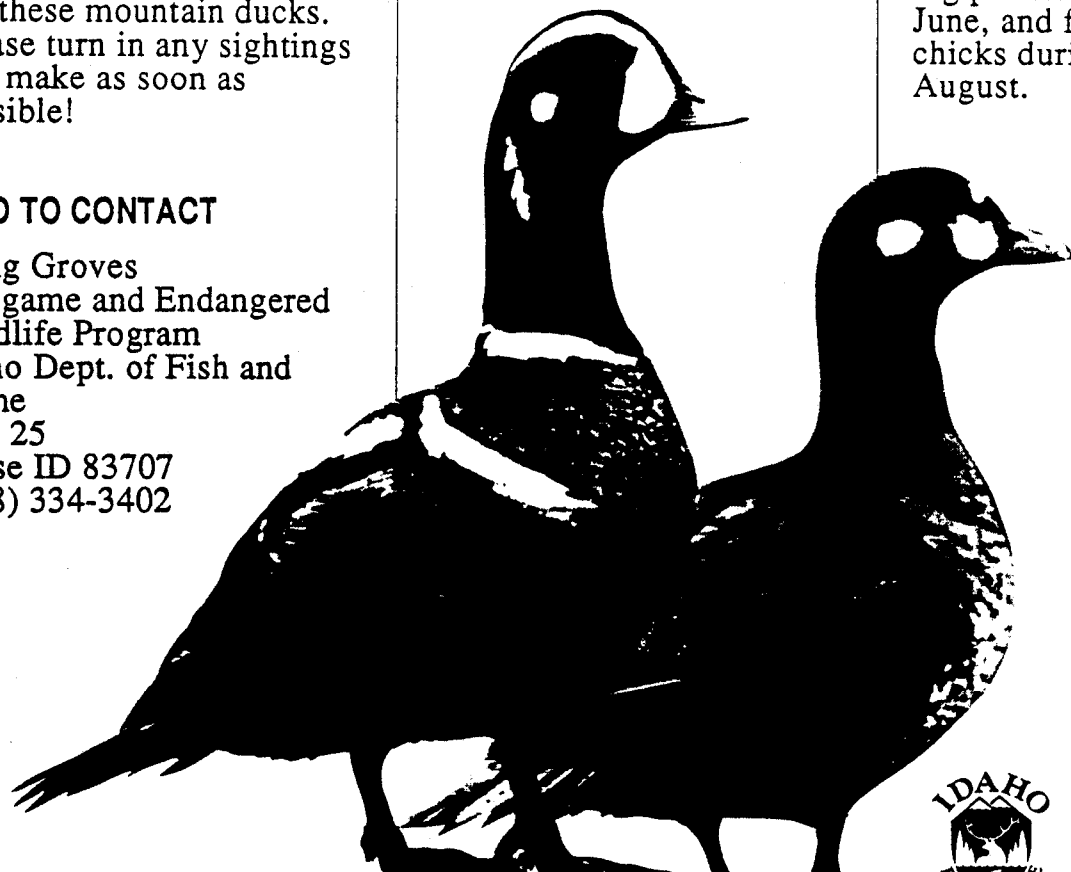
Craig Groves
Nongame and Endangered
Wildlife Program
Idaho Dept. of Fish and
Game
Box 25
Boise ID 83707
(208) 334-3402

WHERE TO LOOK

Harlequins nest on forested, mountain streams usually 10 yards or greater in width. They prefer streams with good water quality, away from human disturbance, and with dense shrubs along the stream edge.

WHAT TO LOOK FOR

Harlequins are small ducks (16" in length). Males are blueish-gray with rusty sides and various shaped white patches on the head. Females are light brown with a distinct white spot behind the eye. Look for breeding pairs during May and June, and females with chicks during July and August.



APPENDIX B

Harlequin Duck habitat data form with definitions.

Habitat categories and definitions (adapted from Cassirer and Groves 1990a)

STREAM HABITAT

Pool- deep slow water areas.

Riffle- shallow water areas where the water surface is influenced by the stream bottom (whitewater).

Rapid- deep water but water surface still influenced by stream bottom and/or streambank, (whitewater).

Run- deeper than a riffle, no whitewater but velocity greater than 0.3 m/sec., too fast to be a glide or pool.

Pocketwater- a run or riffle with boulders (> 30 cm diameter) which create numerous small pools.

Glide- run areas with velocities < 0.3 m/sec.

Backwater- slow water area out of the main stream channel.

SUBSTRATE

Silt, Sand, Gravel (0.2-7 cm); **Cobble** (8-30 cm); **Boulder** (> 30 cm); **Bedrock**.

BANK COMPOSITION- Composition of both streambanks.

Trees, Shrubs, Grass/forb, Tree/shrub mosaic, Bedrock, Sand, Silt, Gravel, Boulder, Woody debris.

OVERSTORY

Seedling- 1-10 yrs old, < 1.4 m tall; **Sapling-** 10-40 yrs old, > 1.4 m tall, dbh < 13 cm; **Pole-** 40-70 yrs old, dbh 13-23 cm; **Immature-** 70-100 yrs old, dbh 24-36 cm; **Mature-** 100-160 yrs old, dbh 37-51 cm, **Old Growth-** over 160 yrs old or dbh > 51 cm

CHANNEL TYPE

Straight- stream channel linear, structurally controlled by a "V" shaped valley, no movement of channel during peak flow.

Curved- stream channel curves or zig-zags more abruptly than a meander, channel structurally controlled by a "V" shaped valley, no movement during peak flows.

Meander- channel follows sinuous curves, deep pools separated by shallow riffles, appears to shift slightly during peak flows.

Braided- channel located in flat-bottomed valley, midstream bars occur and divide the stream into several intersecting and shifting channels.

HUMAN ACCESS

Adjacent- established area of motorized human activity maintained within 10 m.

Near- established area of motorized human activity maintained within 10-50 m.

Accessible- > 50 m from established area of motorized human activity, accessible by boat or trail.

Inaccessible- > 50 m from established area of motorized human activity, inaccessible by boat or trail.

Habitat categories and definitions (cont)

WOODY DEBRIS

Bridge- log across stream.

Collapsed bridge- log across stream, submerged in the middle of the stream.

Ramp- one end of log in stream, the other end on the bank

Drift- log floating in stream.

LOAFING SITE- Rocks or logs completely surrounded by water suitable for resting sites.

Debris, Loafing sites, and Islands counted within 10 m of harlequin observation or systematic habitat transect.

STREAM WIDTH- Estimated or measured wetted width.

VEGETATIVE OVERHANG- Vegetation over the stream within 30 cm of the water surface.

APPENDIX C

Survey routes on the Targhee National Forest, 1990.

Appendix C. Stream sections and dates surveyed during 1990.

Stream	Dates	Surveyed from	Surveyed to
Badger Cr.	8/21	T45N, R118W, S12, NE	T45N, R117W, S5, SE
Bear Cr.	5/27	T2S, R43E, S17, SE	T2S, R43E, S15, NW
Big Elk Cr.	5/17	T1S, R46E, S18, SW	T1S, R46E, S9, SE
	5/23	T1S, R46E, S18, SW	T1S, R46E, S9, SE
	5/25	T1S, R46E, S9, SE	T39N, R118W, S8, SW
	8/8	T1S, R46E, S18, SW	T39N, R118W, S8, SE
Bitch Cr.	9/2	T46N, R118W, S34SE	T46N, R118W, S12, SE
Darby Cr.	5/28	T43N, R118W, S17, NW	T43N, R118W, S22, NE
	6/18	T43N, R118W, S17, NW	
	8/6	T43N, R118W, S20, SE	T43N, R118W, S14, SW
	8/20	T43N, R118W, S20, SE	T43N, R118W, S22, NE
N.Fk. Ind. Cr.	5/24	T2S, R46E, S8, SW	T38N, R118W, S19, NW
S.Fk. Ind. Cr.	5/24	T2S, R46E, S8, SW	T38N, R118W, S30, SW
McCoy Cr.	5/26	T3S, R46E, S6, SW	T3S, R44E, S19, SE
Moose Cr.			
(Tet. Bas. RD)	5/28	T42N, R118W, S29, SW	T42N, R118W, S34, NE
Robinson Cr.	8/18	T9N, R44E, S10, SW	T9N, R45E, S5, NE
Targhee Cr.	6/20	T13S, R4E, S31, SW	T13S, R3E, S14, SE
Teton Cr.	6/18	T44N, R117W, S20, SW	T43N, R117W, S4, NW
	8/7	T44N, R117W, S20, SW	T43N, R117W, S4, NW
	8/7	T44N, R117W, S20, SW	T44N, R118W, S22, SE

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