

HABITAT UTILIZATION OF HARLEQUIN DUCKS

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Abstract

During the 1986 field season, 89 Harlequin Ducks (*Histrionicus histrionicus*) were individually identified on four backcountry streams and the Snake River. Forty-eight birds were banded (15 adults and 33 young of the year). Twelve adults and one young of the year banded in 1985 returned to the study area. Eight broods were found. Hatch dates ranged from 15 July to 1 Aug with a mean brood size of 5.4. An estimate of age span at different plumage subclasses was determined through repeated observations. Age at first flight was found to be 42 days. Moose Creek produced the most broods (4). Insect samples were taken at feeding sites along four streams on a monthly basis to give some insight into food resources. Eight measurements of habitat were taken at points where ducks were observed and at 200 m intervals along the streams which they were found. Five hens which showed up in late June 1985 as unpaired birds returned to the same streams this season with mates. None of the marked hens with broods found in 1985 were seen on the study area in 1986.

Introduction

Breeding Harlequin Ducks (*Histrionicus histrionicus*) can be found on remote mountain streams, away from concentrated human activities (Harju 1980, Kuchel 1977). This study was designed to investigate a portion of the Pacific harlequin population breeding in Grand Teton National Park. The objectives of the study are:

1. Locate and quantitatively describe nest sites.
2. Describe feeding opportunities (benthic insects).
3. Define breeding chronology and important habitat within G.T.N.P.
4. Determine Park population sizes (birds/summer).
5. Identify any human/harlequin conflicts.
6. Identify possible migration patterns to and from the study area.

Methods

Weekly searches for harlequins were initiated 5 May 1986 along four backcountry streams in the upper Snake River drainage. Less intensive surveys were conducted along streams other than the four primary study streams.

Observations of birds were made by hiking along streambanks and using binoculars to collect information on the behavior and the identity of ducks. Snake River canoe trips were taken to find marked birds arriving on the study area in May.

Eight habitat parameters (Table 1) were measured for each observation, and at 200 m. intervals along four streams. These data will undergo an analysis of utilization test (Neu et. al 1974).

Observations which were turned in at the information desk and to the park biologists were investigated. If a positive identity was determined (via markers), the observation was used to keep track of movements of individual birds. These observations were not evaluated using the parameters in Table 1 unless the observer was encountered in the field and an exact location of observation was determined.

A mist net (4" mesh) was stretched across the streams with the bottom of the net at or just above the water surface in order to capture adult birds. The ducks would be driven towards the net and flushed from the water surface at about 10 m. from the net. Broods were captured by placing large rocks on the bottom of the net to secure it to the streambed. Young broods were captured by using a second mist net (2" mesh) downstream of the first. The hen would be caught in the 4" mesh while the chicks would normally get through and tangle in the 2" mesh. When the chicks reached three weeks of age they could be caught in the 4" mesh.

Adult birds were marked using nylon nasal discs of four shapes and eight colors (Lokemoen and Sharp 1985). Two adult hens were fitted with poncho mount telemetry transmitters weighing 13 gms. All captured birds were measured using dial calipers and a pesola scale. The six measurements taken were: weight (gms), total length (mm), culmen (mm), middle toe (mm), tarsus (mm) and wing (mm).

A simple stream discharge procedure was used to monitor stream volumes. Discharge was calculated using surface width (m), mean depth (m), mean water velocity (m/sec) and a coefficient of roughness (Wetzel 1975).

Aquatic insects were collected on a monthly basis from known feeding sites along four different streams and from one stream on which ducks were not observed. Insects were preserved in the field in Kahle's solution (Merritt and Cummins 1984) for later compilation of a qualitative list of species. Notes were taken on relative abundance during collections with a kick sampler. A dredge sampler was used on one pond location in Cascade Canyon.

Table 1. Habitat parameters used in evaluating each observation and for availability of habitat along each stream (modified from Kuchel 1977).

Stream bank type	
vertical-	> 45 degrees from horizontal
horizontal-	< 45 degrees from horizontal
Stream botton type	
bedrock	
mud	
sand	
pebbles	16-64 mm diameter
cobbles	64-256 mm diameter
boulders	> 256 mm diameter
Streamside vegetation	
annual plants	
perennial shrubs	
trees	
Streambank composition	
vegetation	
downed snags	
rip-rap	
bedrock	
cobbles	
Channel type	
meander	
braided	
bedrock canyon	
Availability of mid-stream loafing sites	
0/ 10m	
1-3/ 10m	
> 3/ 10m	
Proximity of birds to human activities	
adjacent - maintained hiking trail within 10m of creek	
near - maintained hiking trail within 50m of creek	
away, accessible-unmaintained trail used by humans for access to the creek	
away, inaccessible-stream is inaccessible to humans via any kind of trail	
Amount of human use of the area (numbers of people viewing the stream area per unit of time)	
heavy -	> 10 people per day
moderate -	> 5 people per week
little -	2-5 people per week
none -	< 5 people per month

Results and Discussion

The number of birds located on the study area are presented in Table 2. This estimate of 89 birds was determined by direct enumeration. Several birds were known to frequent more than one location, but were included in the area in which they were most often observed. The nasal discs enabled easy identification of birds at distances up to 100 m.

The earliest sighting of the season was in Cascade Canyon on 5 May. After that birds began arriving individually or in pairs through the month of June. Two hens which were marked in 1985 were seen on the study area once only in early May. Males departed the study area by 30 June with the exception of one injured drake which was last seen on 16 July.

Immediately prior to the departure of the males a wave of unpaired females showed up on the study area. Some of these hens remained on the area until after the drakes had all left. In 1985 a similar pattern was recognized and five hens were captured and marked. All five of the marked hens were seen in 1986 along the same streams they were banded on and all five returned with mates. Only one of the five was successful in bringing off a brood.

The first brood sighting occurred on 16 July along Granite Creek. Eight broods were located on the study area along four different streams (Table 2). Although no broods were found along the Snake River near Flagg Canyon, rangers have observed broods in that location during past summers (Boyle, pers. comm.).

The trapping and banding of birds continued throughout the season. Some birds were able to break through the net or untangle themselves avoiding capture. Including recaptures, 64 harlequins were handled. Forty-eight birds, 15 adults and 33 young of the year, were leg banded. Two birds which were banded in 1985 were recaptured and nasal markers were added. Thus 17 birds received nasal markers this season. Of the 23 adult birds banded in 1985, 12 of them returned to the study area this summer. None of the four marked hens which had broods in 1985 were seen on the study area in 1986. However, one hen banded in 1985 as a young of the year returned to the same stream and raised a brood. Past literature indicates that harlequins will not breed until their third summer (Bellrose 1976, Palmer 1976).

Six young of the year were recaptured in order to monitor their growth. Table 3 shows the number of observations per brood as well as an estimate for the age span (in days) for each plumage subclass. These estimates are earlier than the estimates of a previous study done in Glacier National Park, with attainment of flight being 10 days earlier (Kuchel 1977).

Two hens were equipped with radio transmitters and were followed as long as they remained on the study area. One of these hens seemed to disappear when the drakes left the area. The other hen remained along the same stream she was captured on but moved to an area where the canyon was narrow with tall rock cliffs on either side. This made tracking her difficult because of signals bouncing around the canyon. On several occasions she was unable to be relocated because the signal was apparently coming from all directions. Every

Table 2. Number of birds individually identified on the study area in 1986

Stream	Adults		Broods	Juveniles	Total # of Birds
	M	F			
Granite Ck.	1	1	1	7	9
Cascade Ck.	5	4	1	5	14
Moose Ck.	5	7	4	21	33
Berry Ck.	10	7	2	10	27
String Lk.	2	-	-	-	2
Snake R.	2	2	-	-	4
Totals	25	21	8	43	89

Table 3. Chronology of plumage development in juvenile Harlequin Ducks and number of observations of each brood in their associated plumage class

Creek and Hatch Date of Brood		Number of Observations by Age Classes							
		Ia	Ib	Ic	IIa	IIb	IIc	III flight	
Granite	14 July	1		1					
Cascade	27 July			2				1 1	
Berry	20 July			2	3	1	1	1 1	
U. Berry	27 July						1		
Moose	25 July			2					
U. Moose	29 July				2			1	
U. Moose	25 July						1	1	
U. Moose	1 Aug							1	
Days in each category		1-5	6-9	10-14	15-21	22-28	28-35	36-42	42

relocation found her loafing in mid-stream and she was last observed on 30 July.

No nest sites were found this season, but four nasal marked hens were found to use specific sections of streams which contained a great deal of overhead cover and slow backwaters. All four of these hens were observed with their broods in these areas where nests were suspected. Searches in the thick willow and dogwood were undertaken but no nest remains were found. A bank cavity was excavated which was suspected to have been a nest site. A hen flushed from this area during one search but she must have still been in the nest site searching mode. This particular hen was never seen attending a brood.

Table 4 is a compilation of all measurement data performed on adult birds. These data, when compared to information from the Glacier study suggest that harlequins summering in Grand Teton National Park are slightly smaller.

One trapping mortality occurred during mid-September on a young of the year bird which had just begun to fly. This bird was put in the freezer and will be donated to the Montana State University museum. A stomach analysis will be done when this bird is skinned and mounted.

Stream discharge measurements are currently being calculated and graphed. The Minidoka office of the U.S. Geological Survey has supplied information on stream discharges taken daily from streams in the upper Snake River drainage. This information will be used to fill in trends in volume flow between the dates that discharge information was gathered on this study.

Feeding behavior and diving times were recorded on many occasions but this information has not been analyzed. Glossosomid and Hydropsychid caddisfly larvae seemed to be the most abundant and available food source for arriving harlequins on the backcountry streams in early May. Food sources diminished with the onset of high water and drakes seemed to depart the area when the aquatic insect abundance was at its lowest. Prior to departure drakes were found to gather in areas dominated by boulders in the streambed. These areas offer more stable insect numbers during high water. During late June and early July Chironomid (Diptera) larvae were found in the algae in large quantities and seemed to be the preferred food source at this time. Algae was found in the fecal material during trapping procedures. When the broods began appearing, the insect abundance was noticeably increasing as was the insect size. A list of all insects collected will be compiled later.

Literature Cited

- Bellrose, F. C. 1976. Ducks, geese and swans of North America. Stackpole Books, Harrisburg, Pa. 540 pp.
- Harju, H. 1980. Harlequin ducks in Wyoming. Wyoming Wildlife. Jan 80, pp. 16-17.

Table 4. Measurements of adult Harlequin ducks in Grand Teton National Park in 1986

Parameter	Male			Female		
	N	\bar{X}	Range	N	\bar{X}	Range
Weight	10	602.5	490-650	15	539.27	470-610
Total Length	10	411.3	385-429	12	391.92	375-405
Culmen	10	27.55	26.25-28.95	12	24.43	22.0-25.65
Middle Toe	10	57.9	54.55-61.82	12	54.99	52.63-59.25
Tarsus	10	41.17	35.5-45.9	12	40.36	38.4-43.75
Wing	10	198.9	185-207	12	189.58	181-195

- Kuchel, C. R. 1977. Some aspects of the behavior and ecology of harlequin ducks breeding in Glacier National Park. MS Thesis, Univ. of MT, Missoula. 163 pp.
- Lokemoen, J. T. and D. E. Sharp. 1985. Assessment of nasal marker materials and designs used on dabbling ducks. Wild. Soc. Bull. 13(1):53-56.
- Merritt, R. W. and K. W. Cummins. 1984. An introduction to the aquatic insects of North America. Kendall/Hunt Publishing Co., Dubuque, Ia. 722 pp.
- Neu, C. W., R. Byers and J. Pek. 1974. A technique for analysis of utilization-availability data. J. Wildl. Manage. 38(3):541-545.
- Palmer, R. S. 1976. Handbook of North American Birds (Vol 3). Yale Univ. Press, New Haven, Conn. pp. 323-344.
- Wetzel, R. G. 1975. Limnology. W. B. Saunders Co., Philadelphia, Pa. 743 pp.