

Philopatry of Harlequin Ducks moulting in southern British Columbia

André M. Breault¹ and Jean-Pierre L. Savard²

¹ Pacific Wildlife Research Centre, Canadian Wildlife Service, 5421 Robertson Road, Delta, BC, Canada V4K 3N2

² Canadian Wildlife Service, 1141 route de l'Église, P.O. Box 10100, 9th Floor, Ste-Foy, QC, Canada G1V 4H5

Abstract

We captured 26 male and two female moulting Harlequin Ducks *Histrionicus histrionicus* in coastal British Columbia with a modified funnel trap. The trap and wings were attached to aluminum poles supported by shelf brackets and set in a rocky intertidal area at low tide. Two small boats were used to drive birds into the trap at high tide. Sightings of marked birds between August 1986 and August 1989 indicated that males and nonbreeding females shared moulting sites, which were also used during winter, and that birds returned to the same moulting and wintering sites in subsequent years.

Résumé

Nous avons capturé 26 mâles et deux femelles Arlequins plongeurs (*Histrionicus histrionicus*) muant dans la région côtière de la Colombie-Britannique au moyen d'un piège en entonnoir modifié. Le piège et les ailes étaient attachés à des poteaux d'aluminium soutenus par des consoles pour tablettes et placés dans une zone intertidale rocheuse à marée basse. On a utilisé deux petites embarcations pour pousser les oiseaux dans le piège à marée haute. L'observation d'oiseaux marqués entre août 1986 et août 1989 a indiqué que les mâles et les femelles non reproductrices partageaient les mêmes sites de mue, également utilisés pendant l'hiver, et que les oiseaux retournaient au même site de mue et d'hivernage dans les années subséquentes.

1.0 Introduction

Harlequin Ducks *Histrionicus histrionicus* breeding in the Pacific Northwest moult and winter along rocky shorelines and exposed areas from northern California to Alaska (Bellrose 1976; Campbell et al. 1990; Breault and Savard 1991). Breeding males and nonbreeding females begin moult in June and July, whereas breeding females moult from late July to September (Palmer 1976; Robertson et al. 1997). The exact duration of the period for which the birds are flightless is unknown. There is also confusion as to whether Harlequin Ducks moult and winter in the same geographical area (Palmer 1976; Robertson et al., this volume).

We undertook an ancillary banding program to study moulting and wintering of Harlequin Ducks in coastal British

Columbia. Moulting birds were captured with a funnel trap adapted for use on rocky coastal areas. Captured birds were assigned a moulting score (see Ginn and Melville 1983) and weighed. This paper describes the use of moulting and wintering areas by 28 marked individuals.

2.0 Methods

2.1 Capture technique

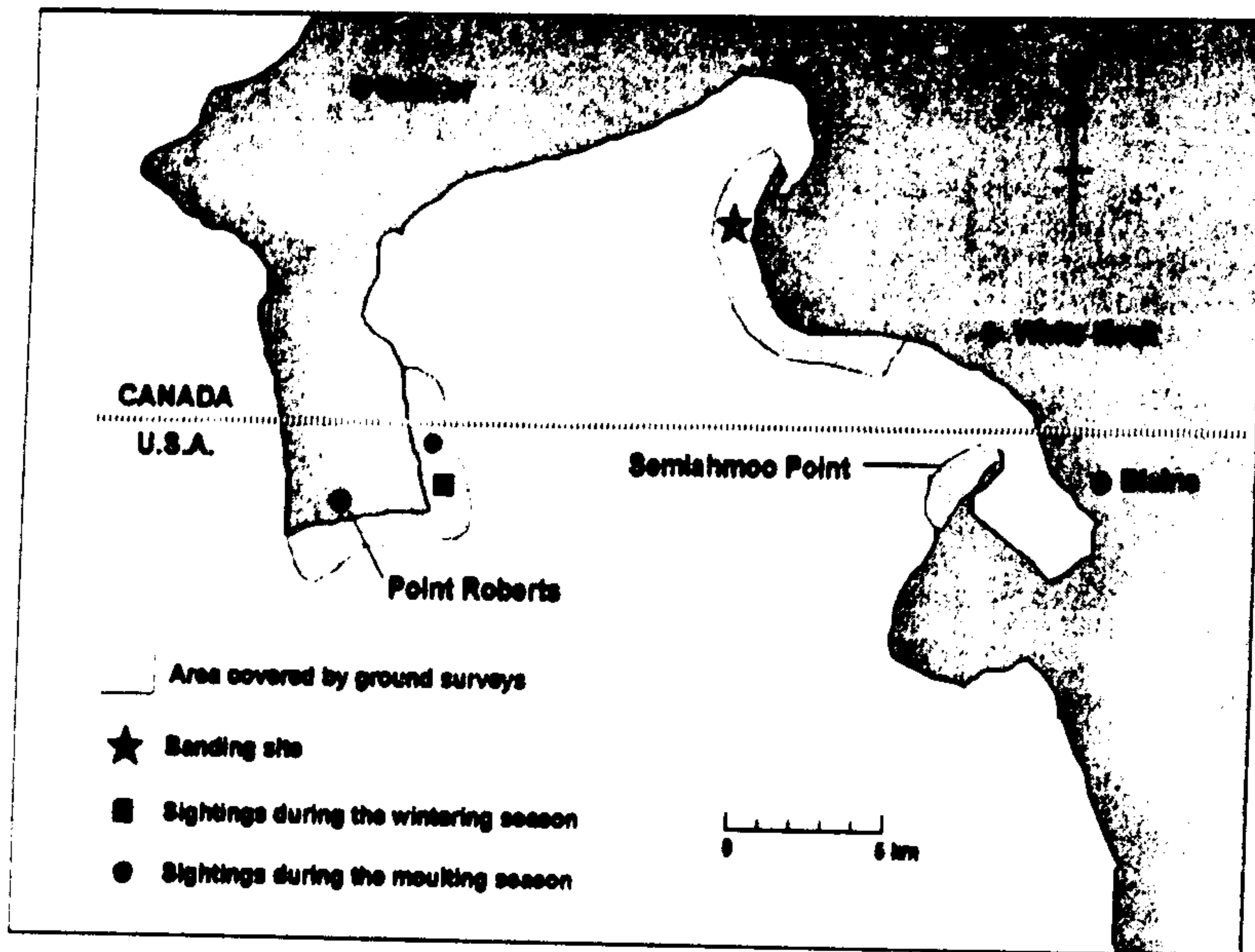
We used a modified funnel trap (McTaggart-Cowan and Hatter 1952) to capture Harlequin Ducks. The holding unit was made of four separate wooden frames (1.2 × 2.4 m) hooked together. Black nylon netting (4 × 4 cm mesh) was used for the front door and the two side panels, whereas the back panel was made of 1-cm-thick transparent Plexiglas. We used 50-m-long black netting for each of the two lead nets. We attached four 20 × 20 cm shelf brackets with metal clamps to the base of each aluminum pole. The shelf brackets stabilized the poles and provided support to trap and lead nets on rocky shorelines. Additional anchor was obtained by placing rocks on these brackets.

Trap and lead nets were placed in the intertidal area at low tide. Harlequin Ducks were driven into the trap from an inflatable boat and a canoe at low tide on 5 and 6 August 1986 in White Rock, British Columbia (see Fig. 1). Harlequin Ducks were individually marked with plastic nasal discs (Lokemoen and Sharp 1979). Individuals were weighed to the nearest 10 g upon capture with a portable 1000-g Pesola scale. Moulting scores (from Ginn and Melville 1983) were assigned to each set of primary and secondary feathers.

2.2 Use of moulting and wintering areas

One of the authors conducted 32 ground surveys between 12 August 1986 and 4 August 1989 in the study area (White Rock, British Columbia, and Point Roberts and Semiahmoo Point, Washington) (Fig. 1) in order to locate marked individuals. Individuals observed at least once between July and September (inclusive) were assumed to be moulting, whereas individuals observed once between October and April (inclusive) were assumed to winter at that particular site. Sightings made during the remaining months (May and June) were assumed to represent birds during the breeding season.

Figure 1
Areas surveyed in the moulting and wintering Harlequin Duck study in British Columbia and Washington, 1986-1989



3.0 Results

3.1 Capture of moulting individuals

In total, 26 males and two females were captured on 5 and 6 August 1986. All individuals were flightless and undergoing wing moult. One female and one male captured on 5 August were recaptured on 6 August. Moulting males were significantly heavier (mean \pm SE: 650 ± 8 g, $n = 26$) than moulting females (535 ± 5 g, $n = 2$) (t-test, $P < 0.01$). Most birds had similar moult scores, indicating that wing moult is synchronized in at least some individuals (see Table 1).

3.2 Philopatry to moulting sites

Most male Harlequin Ducks returned to the same moulting site in consecutive years, although a small number ($n = 2$) returned to an adjacent area to moult in 1987 (Table 2). Neither marked female was sighted during moult after 1986. The two males sighted in 1989 had moulted at the same site for four consecutive years, while five of the seven birds sighted in 1988 had moulted at the same site for three consecutive years. This, coupled with the low survey effort, indicates a strong philopatry to moulting site for some males.

3.3 Moulting and wintering site overlap and philopatry to wintering sites

Twenty-five out of the 28 marked individuals were observed in the study area on or after the first winter following banding (Table 3). The two marked females and 19 out of 23 marked males wintered at the moulting site,

indicating that moulting and wintering sites can be the same (Table 3). A small number of individuals did move to nearby areas ($n = 3$ in 1986-1987, $n = 1$ in 1987-1988, and $n = 1$ in 1988-1989) or outside the study area ($n = 2$ in 1986-1987), indicating that, following moult, some Harlequin Ducks will distribute over a wider area. Five males were resighted at the same wintering site the second winter after banding, indicating a strong philopatry to wintering sites.

3.4 Coastal sightings during the breeding season

In the first summer following banding, 14 marked individuals (13 males and one female) were observed at the banding site during May and June (Table 4). Because the birds were not aged at the time of capture, it is not clear whether those individuals were immature or adult birds, although it is very likely that the female was a nonbreeder. Males spend little time on breeding areas, and the number and timing of the May and June surveys are insufficient to determine the reproductive status of the males observed during this period. However, repeated sightings of some males from May to July suggest that these birds may not have bred in the summer of 1987 (Fig. 2). Departures to breeding areas did not appear to be synchronized, and no overall pattern could be determined from observations of marked individuals. Of nine males for which there are sufficient data, two were last seen on 8 April, one on 25 April, five on 1 May, and one on 27 May.

Table 1
Moult scores of Harlequin Ducks banded on 5-6 August 1986 at White Rock, B.C.

Moult score ^a	Males		Females	
	Primaries	Secondaries	Primaries	Secondaries
0				
1	8	5		
2	15	11	1	1
3	2	9	1	
4	1	1		1
5				

^a Moult scores were assigned as follows: old wing feathers (0), no feathers (1), stages of wing feather regrowth (2-4), and completely regrown (5) (Ginn and Melville 1983).

Table 2
Use of moulting areas by 26 male Harlequin Ducks banded in 1986

Year	Number of surveys	Male seen at same moulting site	Male seen at adjacent moulting site	Total
1987	4	9	2	11
1988	2	7	0	7
1989	1	2	0	2

4.0 Discussion

4.1 Capture technique and banding success

The modified funnel trap was an effective technique to capture moulting Harlequin Ducks in shallow rocky coastal areas. The trap itself was relatively compact and could fit in a single boat, and it could be easily installed on a gently sloping rocky beach. The method could easily be applied to other coastal locations, provided that wave action and tide and currents are low and the site is shallow enough to allow placement of the wings.

The capture technique is also likely to be effective with other species undergoing wing moult, provided they respond positively to being herded by boats. The use of nasal discs allowed easy tracking of marked individuals, and subsequent sightings of those individuals suggest minimum impacts from the discs.

4.2 Moult and philopatry to moulting sites

All captured individuals were in a similar state of moult, indicating some degree of moult synchrony. The lack of differences in moult scores between males and females suggests that captured females could be deferred breeders, subadults, or juveniles, as breeding females moult later than males (Palmer 1976; Robertson et al. 1997). We cannot at this time interpret the moult scores we recorded, as those were assessed only once, during banding.

We observed a high degree of asynchrony in departures by males in spring from the wintering area. This indicated that 1) moulting and wintering males at White Rock originated from several breeding areas, 2) there are extensive differences in physiological condition prior to migration to breeding areas, and/or 3) timing of breeding is asynchronous within a given area. Data on the sex ratio of Harlequin Ducks in the same area in 1981 suggested that most breeding birds had left this wintering site by late May and that some females started to return to the wintering site in late August (Savard 1989).

4.3 Philopatry to wintering areas

In Iceland, individual birds are suspected of moving between wintering areas within the same year (Bengtson 1966). We did not observe this, but rather noticed high philopatry to wintering sites. Male Harlequin Ducks are philopatric to both moulting and wintering grounds, although their wintering range was more extensive in this study.

Table 3
Winter distribution of 26 male and two female marked Harlequin Ducks from 1986 to 1988

Sighting period	Number of surveys	Sex	Wintering location			Total
			Banding site	Nearby site ^a	Away ^b	
October 1986 - April 1987	10	M	19	3	2	23 ^c
		F	2	0	0	2
October 1987 - April 1988	3	M	6	1	0	7
October 1988 - June 1989	1	M	0	1	0	1

^a Might include individuals also observed at the moulting site in the White Rock area.

^b Individuals not observed between October and April in the White Rock area but subsequently observed.

^c Includes one male observed both at the banding site and at a nearby area on different surveys.

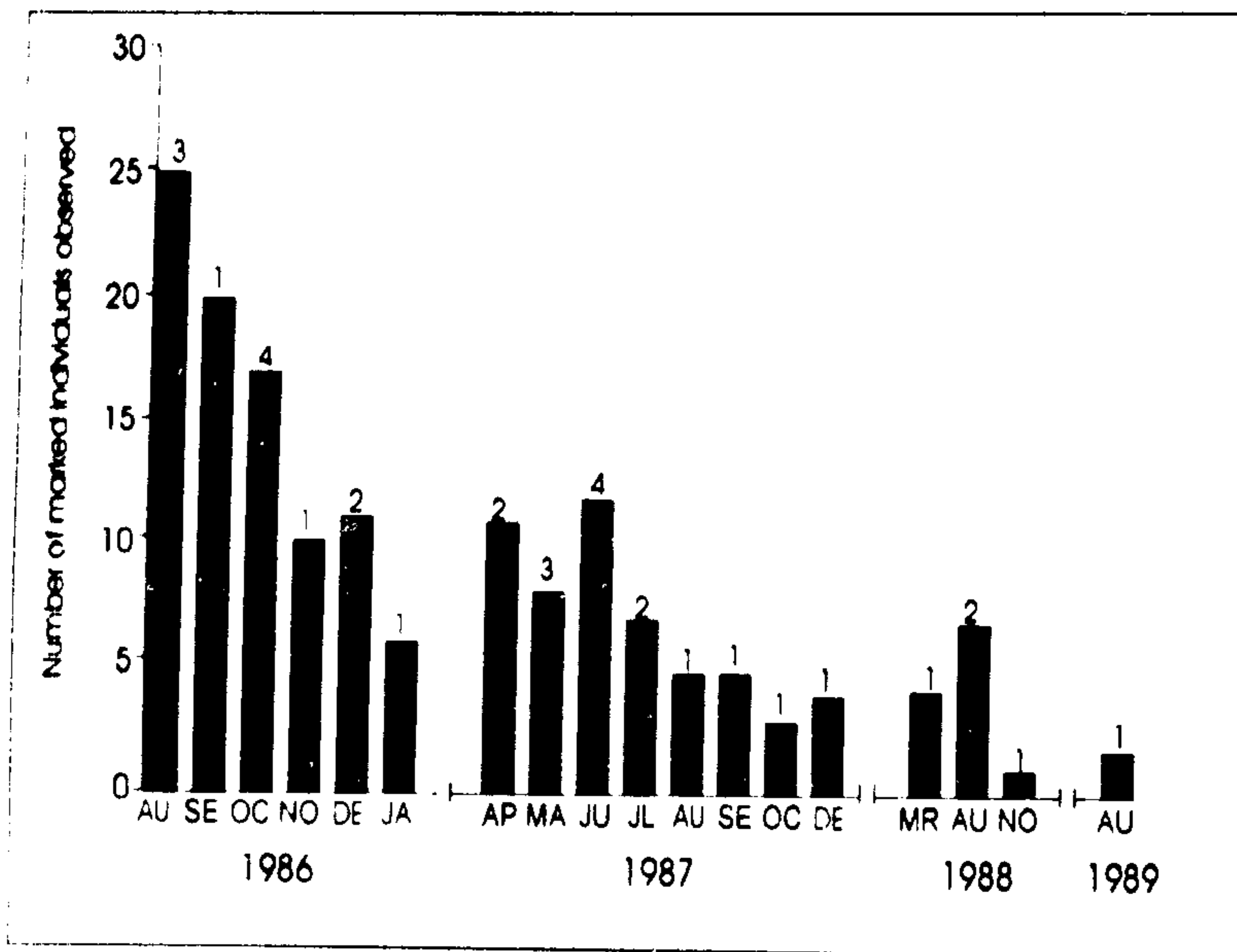
Table 4
Sightings of marked Harlequin Ducks in coastal British Columbia in May and June 1987

Sighting period	Number of surveys	Sex	Moulting location			Total
			Banding site	Nearby site ^a	Away ^b	
May 1987 - June 1987	7	M	13	0	0	13
		F	1	0	0	1

^a Might include individuals also observed at the moulting site in the White Rock area.

^b Individuals not observed between October and April in the White Rock area but subsequently observed.

Figure 2
Number of Harlequin Duck sightings in the study area from August 1986 to August 1989. Number of surveys is indicated above bars.



4.4 Location of wintering and moulting areas

Following moult, marked males and females remained in or near the moulting area, indicating that, for at least some birds, wintering areas partially overlap with moulting areas. A better understanding of the wintering and moulting ecology of Harlequin Ducks will aid in the management of this species. For example, strong philopatry to wintering sites indicates the need to manage at a sub-population level.

Acknowledgments

This study was funded by the Canadian Wildlife Service, Pacific and Yukon Region, Delta, B.C. L. Willis, D. Docherty, and volunteers helped to design and build the trap. B. Emery, D. Smith, and S. Boyd assisted with the capture and banding of Harlequin Ducks. K. Cheng, J. Baldwin, F. Cooke, I. Goudie, and J. Smith reviewed earlier manuscripts.

Literature cited

- Bellrose, F.C. 1976. Ducks, geese and swans of North America. Stackpole Books, Harrisburg, Pennsylvania. 544 pp.
- Bengtson, S.-A. 1966. Field studies on the Harlequin Duck in Iceland. *Wildfowl* 17:79-94.
- Breault, A.M.; Savard, J.-P.L. 1991. Status report on the distribution and ecology of Harlequin Ducks in British Columbia. Can. Wildl. Serv. Tech. Rep. Ser. No. 110, Pacific and Yukon Region, Delta.

- Campbell, R.W.; Dawe, N.K.; McTaggart-Cowan, I.; Cooper, J.M.; Kaiser, G.W.; McNall, M.C.E. 1990. The birds of British Columbia. Vol. 1. Nonpasserines: Introduction, loons through waterfowl. Royal British Columbia Museum/Canadian Wildlife Service, Victoria. 514 pp.
- Glan, H.B.; Melville, D.S. 1983. Molt in birds. British Trust for Ornithology Guide No. 19. 112 pp.
- Lokemoen, J.T.; Sharp, D.E. 1979. Assessment of nasal marker materials and designs used on dabbling ducks. *Wildl. Soc. Bull.* 13:53-56.
- McTaggart-Cowan, I.; Hatter, J. 1952. A trap technique for the capture of diving waterfowl. *J. Wildl. Manage.* 16:438-441.
- Palmer, R.S. (ed.). 1976. Handbook of North American birds. Vol. 3. Yale University Press, New Haven, Connecticut. 560 pp.
- Robertson, G.J.; Cooke, F.; Goudie, R.I.; Boyd, W.S. 1997. The timing of arrival and moult chronology of Harlequin Ducks *Histrionicus histrionicus*. *Wildfowl* 48:147-155.
- Savard, J.-P.L. 1989. Birds of rocky coastlines and pelagic waters in the Strait of Georgia. Pages 133-141 in K. Vermeer and R. Butler (eds.), The ecology and status of marine and shoreline birds in the Strait of Georgia, British Columbia. Can. Wildl. Serv. Spec. Publ., Ottawa.