Brood Amalgamation in Bewick's Swan *Cygnus columbianus bewickii*: a Record from Japan

Mark Brazil*

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Introduction

Bewick's Swan *Cygnus columbianus bewickii* breeds across a wide, but narrow range that spans the Eurasian Arctic from the Kola Peninsula in the west to the Chukotka Peninsula in the east, and lying almost entirely north of the Arctic Circle. Eastern birds, those breeding from the Lena River Delta eastwards, migrate in southerly directions to winter in the region from eastern China to the Korean Peninsula and northern Japan, with particularly large numbers passing through Hokkaido on their way to wintering grounds in Japan's main island of Honshu (Cramp & Simmons 1977, Brazil 1991, Hoyo *et al.* 1994, Rees *et al.* 1997). Although some authors in the past considered these east Siberian birds to belong to a separate subspecies, *C. c. jankowskii* Alpheraky, 1904 (a position still retained by the Ornithological Society of Japan (2000), but without providing any data to support its separation), bill size is in fact clinal, there is considerable overlap in body measurements, size extremes occur in all populations, and apparent intermediates between Bewick's and Jankowskii's Swans occur. As it cannot be clearly distinguished either on its morphology, or on its range, there is no justification for recognizing the *jankowskii* subspecies (e.g. Cramp & Simmons 1977, Hoyo *et al.* 1994, Rees *et al.* 1997, Clements 2000, Brazil in press), thus birds occurring in Japan belong to the subspecies *Cygnus columbianus bewickii*.

Among the swans *Cygnus* spp., because of constraints that may include climatic conditions on the breeding grounds and the considerable length of the breeding process from nesting to fledging of the young, a single clutch is the norm. With the exception of one case, in which a pair of Mute Swans *Cygnus olor* produced a second brood in a single breeding season in a temperate low-latitude region (Absolom & Perrins 1999) none of the swan species produces second broods in the wild. The clutch of Bewick's Swan is typically of three to five eggs, more exceptionally two to six eggs (Cramp & Simmons 1977, Hoyo *et al.* 1994, Rees *et al.* 1997) and probably cannot successfully exceed that number in the wild because to do so would be to extend the period required until fledging of the larger brood. Neither replacement, nor second clutches have been recorded from Bewick's Swan

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* Department of Environmental Systems, Rakuno Gakuen University, 582-1 Midorimachi, Bunkyo-dai, Ebetsu-shi, Hokkaido, 069-8501 Japan. E-mail: markbrazil@compuserve.com

although there have been relatively few intensive studies of the species in its breeding range.

The size of the eastern population of Bewick's Swans is not known, but must exceed 35,000 as more than 31,000 have been found at their mid-winter peak in Japan (EAJ 1999). Large numbers migrate down through northeast Asia, crossing Sakhalin to enter northern Japan by way of northern, then western, Hokkaido. Numbers have increased considerably since Brazil (1991) reported as many as 5,000 appearing at sites such as Kutcharo-ko in northernmost Hokkaido. Numbers in Hokkaido now peak in late October and again in late April with nearly 16,000 birds appearing in autumn and as many as 20,000 being counted in spring (Kutcharo-ko visitor information centre unpublished). Breeding success appears to vary considerably from year to year, with small broods of one and two commonly recorded in some winters, while in other years as many as four young may be found in a single brood. Four cygnets may be regarded as a rather high number of young to have been reared by a single pair, at least amongst birds wintering in Japan. The proportion of young in flocks at Kutcharo-ko ranges from about 4% after a poor breeding season to about 20% after a good breeding season.

Bewick's Swans are monogamous and have strong family ties. Families migrate together in autumn, winter together and return northwards in spring together. Siblings will associate in subsequent winters and will even re-join their parents in several subsequent winters (Cramp & Simmons 1977, Rees *et al.* 1997). Thus while family size may reach a maximum of eight (two parents plus up to six young of the year), this number may be exceeded when young from previous years re-unite with their family. In such cases, however, there is a clear age difference between the new young and young of previous years.

Brood amalgamation, although common amongst certain waterfowl (e.g. the Harlequin Duck *Histrionicus histrionicus*) is rare amongst larger waterfowl species. Amongst the swans, brood amalgamation has been recorded most frequently from the Trumpeter Swan *Cygnus buccinator* in North America (Banko 1960, Page 1976, Mitchell & Rotella 1995, Mitchell & Rotella 1997), and among Black Swans *Cygnus atratus* in Australia and New Zealand (Williams 1981, Bowler in press), it has been reported only twice among Whooper Swans in Europe (Black & Rees 1984, Rees *et al.* 1990) and also among Mute Swans in Europe (Minton 1968, Bacon 1980, Meng & Parkin 1991); it does not appear to have been observed so far amongst any of the swans occurring in Asia, and no confirmed cases have yet been published for Bewick's Swans in any part of their range.

Observation

On 4 November 2000, while observing Bewick's Swans in the Kutcharo-ko (Hamatonbetsu) and Onuma (Wakkanai) areas of northernmost Hokkaido, I was struck by the relatively large number of young present in flocks, with many broods of three and four cygnets. Although peak numbers of swans had already passed through on their way south about ten days earlier, approximately 1,500 Bewick's Swans remained at Kutcharo-ko, with a further 1,300 or so at Onuma.

At Onuma (45°20'N; 142°E), the majority of the swans were in shallow water along the northern edge of the lake where food is provided for them. This is an entirely new migratory stop-over site for both Bewick's and Whooper swans, having been developed as recently as the late 1980s and its history is currently under investigation. Approximately 200 Bewick's Swans were feeding in a flock on fields to the northeast of the lake and I concentrated my attentions on these. Approximately 500 m north of the main flock, and beside a small muddy pool, I found a small group of swans consisting of two adult Bewick's Swans accompanied by no fewer than 12 cygnets.

The "family" made a number of short movements from the pool to the adjacent river, from the river to a nearby field, and finally to another section of the same river to roost. During the course of my observations, the pair and nine cygnets flew together from the pool to the river (at 14:15) leaving three cygnets beside the pool. On the river, the cygnets divided into two groups, three that remained very close to the pair (perhaps their own parents), and six that remained together, but a little way apart (<20 m) from the pair. At 14:25, the pair and the three cygnets flew again, this time to the adjacent field where they re-commenced to feed. The six cygnets immediately took off and followed them, but only one landed and joined "the family", the remaining five landed at the river where they rested briefly before flying to re-join the family at 14:35. At that point the family consisted of two adults and nine cygnets together at the north end of the field (approximately one kilometre from the main flock), while three cygnets remained alone beside the muddy pool (about 500 m from the main flock).

When the main Bewick's Swan flock took off from the fields at 14:42 and flew noisily to the provisioning site on the shore of Lake Onuma, the "family" did not react. At 15:00, the three cygnets beside the pool took off and flew over the family, appearing as if they would re-join them, but diverting to land nearby on the river. At 15:15, however, they flew again, and this time re-joined the family so that once again it consisted of two adults and 12 cygnets. From 15:57 to 16:20 two of the 12 cygnets left the feeding family behind and visited the nearby river again, before returning to the family. At 16:39 (by which time the winter light level was so low as to make observations increasingly difficult), the pair and four cygnets flew to the river leaving eight cygnets still foraging on the fields. Three minutes later (16:42), all eight cygnets began walking towards the river where "the family" was bathing and calling; at 16:46 the eight cygnets flew the remaining distance to the river and by 16:48 all 12 cygnets were back together again with the pair on the river—where they remained to roost for the night as a family.

The 12 cygnets were clearly associating closely with the two adults throughout the entire afternoon from about 13:00 to about 17:00, and as a family they both fed and roosted at different sites from the main Bewick's Swan flock at Onuma.

Coincidentally, the pair and their "super-family" were also joined at 14:54, while they were grazing, by four Bean *Anser fabalis* and two White-fronted *A. albifrons* Geese, both scarce in the Onuma area, that fed at some distance from the large "family" of Bewick's Swans. Then at 15:25 a single adult Whistling Swan *C. c. columbianus* (also an irregular and rare winter visitor to Japan (Brazil 1991, OSJ 2000)) flew in and joined them on the fields and later also at their roost.

Discussion

The fact that swans are, almost without exception, single-brooded, combined with the short breeding season available for the high Arctic breeding Bewick's Swan, appears to preclude the possibility of large clutches in this species. In Russia, observations of broods of nine and eleven Whooper Swan cygnets in 1995, and an earlier observation of 14 cygnets in semi-natural conditions at the Askania-Nova Zoo, suggest that Whooper Swans may either combine broods, or that perhaps such large broods may originate from joint clutches (Poyarkov & Johnson 1996). In the case of Bewick's Swans, however, clutch amalgamation seems highly unlikely in the wild for various reasons including the fact that they occupy exclusive territories, because they occur at low nesting densities and because polygyny does not occur in the wild. Despite the conspecific Bewick's and Whistling Swans being among the best studied of the swans, there have been no previous documented cases of brood amalgamation for them suggesting that some aspect of their biology prevents or at least limits this behaviour. An observation of a pair of wild Bewick's Swans accompanied by 12 cygnets can safely be assumed, therefore, to relate to a case of brood amalgamation that may have occurred as early as while still on the breeding grounds, or as late as during the autumn migration south to Japan.

Assuming the largest recorded clutch size of six eggs, this observation represents at least the amalgamation of two exceptionally large broods. The chances of two exceptional broods of six having been produced in the same region in the same year and having met does, however, seem vanishingly small, indicating that this was perhaps an amalgamation of three or even more broods. All 12 cygnets were clearly young of the year (2000), and though close in age showed some minor differences in the extent of grey in the plumage confirming that they were certainly not from the same brood. Unfortunately, as the observation only relates to a single day, it is not known whether the observed brood amalgamation involved a prolonged relationship.

Almost all previous records of brood amalgamation among swans have involved Trumpeter Swans that were breeding in high-density areas particularly at the Red Rocks Lakes National Wildlife Refuge in Montana, where as many as 11.5% of broods were involved in amalgamation, and among which it is common when cygnets are 1–14 weeks old (Banko 1960, Mitchell 1994, Mitchell & Rotella 1997). There appear to be only two previous records of brood amalgamation among Whooper Swans, at Caerlaverock in Scotland (Black & Rees 1984) and once at Welney in England (Rees *et al.* 1990), while studies of genetic fingerprinting at Caerlaverock, Scotland, in the late 1980s found no cases of adoption among Whooper Swans (Meng 1990). This observation involving Bewick's Swans at a migratory stop-over point in Japan appears to be the first published account of brood amalgamation for the species (Rees *in litt.* 2001), indicating that under very exceptional circumstances Bewick's Swans will adopt, or at least accept, other cygnets as part of their family.

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日本におけるコハクチョウ *Cygnus columbianus bewickii* の集団育雛事例

ハクチョウ (*Cygnus*) 類においては、繁殖地の気候的条件、営巣から育雛までの繁殖期間が長期に渡ることなどの制約により、一腹の卵しか産まないのが普通である。コハクチョウのクラッチサイズは通常 3~5 卵、まれに 2~6 卵である。コハクチョウの繁殖のやり直しおよび 2 回目の繁殖はいずれも記録されていない。コハクチョウの子供は 2 冬目あるいはそれ以降の冬も数年間は親鳥とともに行動し、数回目の冬を迎えても親鳥と合流することがあるが、このような場合、その年生まれの若鳥とそれ以前に生まれた若鳥との間には、はっきりとした年齢の違いが見られる。大型の水鳥における集団育雛 (brood amalgamation) はまれであり、アジアに生息するハクチョウ類では知られておらず、コハクチョウの場合、どの生息地でも確認されたことがない。

2000 年 11 月 4 日北海道稚内市大沼 (45°20'N, 142°E) で、12 羽の雛を伴っているコハクチョウ成鳥のつがいが発見された。その日の午後は 13:00~17:00 頃までずっと、12 羽の雛は明らかにこの 2 羽の成鳥とともに行動していた。また、このグループはひとつの家族として、大沼に生息するコハクチョウの中心的な群れとは異なる場所で採餌と休息を行っていた。

コハクチョウは、ハクチョウ類の中でもっともよく研究されているにもかかわらず、これまでに集団育雛が記録されたことはない。これは、何らかの点で、彼らの生態がこのような行動を抑止、あるいは少なくとも制限しているものと考えられる。したがって、野生コハクチョウのつがいが 12 羽の雛を伴っているのが観察されたことは例外的である。

これまでに記録のある最大クラッチサイズが 6 卵であるとするならば、今回の観察は少なくとも、例外的に大きなクラッチ二腹の集団育雛ということになる。しかしながら、同じ場所、同じ年に 6 羽の雛からなる例外的に大きなクラッチが生まれる可能性はほとんどないので、おそらくこれは三腹あるいはそれ以上の集団育雛であると考えられる。12 羽の雛はいずれもその年 (2000 年) 生まれの若い個体で、月齢も近かったが、羽毛の灰色の程度に若干の違いが認められた。これは明らかに彼らが同腹でないことを示すものである。残念なことにこの観察は 1 日だけのものであるので、今回観察された集団育雛の関係が長期に渡るものであったかどうかは不明である。

(摘要和訳 黒沢優子)

マーク・ブラジル: 酪農学園大学 環境システム学科, 〒069-8501 北海道江別市文京台緑町
582 番地.