

Plumage development and growth of wild Surf Scoter *Melanitta perspicillata* ducklings

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The plumage development and growth of wild Surf Scoter ducklings were studied in a 640 ha boreal forest lake in Quebec by observing and photographing free-ranging individuals and by examining live-caught birds. During their first three to five days, Surf Scoter ducklings were uniformly dark with few distinctive markings. Subsequently, the appearance of a pale-coloured cheek patch added some contrast to their pattern but they remained generally undistinctive through to fledging, at which time they were quite similar in size, appearance and colouration to the female parent. Subtle differences in the shape, size and colouration of the cheek patch, and neck posture (head held close to body or erect), were useful clues to distinguish age classes in the field. Body mass increased from about 44 to 817 g during the 55-day period between hatching and fledging, whereas head length increased from 41 to 97 mm. Few differences in plumage development or growth pattern were noted from studies of other duck species.

Keywords: Surf Scoter, Plumage, Growth, Duckling Development, Ageing

A knowledge of growth and plumage development patterns in ducklings is important in both taxonomic and ecological studies (Sedinger 1992; Nelson 1993). Such patterns have been described for several species (Weller 1957; Dzubin 1959; Schneider 1965; Erskine 1971; Brown & Frederickson 1983), but little is known for the Surf Scoter *Melanitta perspicillata*, one of the commonest seaducks of North America (Bellrose 1980; Nelson 1993). During the course of investigations on the breeding ecology of Surf Scoters in the open boreal forest of Quebec in 1993-95 (Reed *et al.* 1994; Morrier *et al.* 1996), we gathered data on plumage development and growth of body mass and size in wild ducklings. We present those data here as a contribution to knowledge on growth and development of waterfowl, and as an aid to ageing Surf Scoters in the field.

Study area and methods

Data were collected at Lake Malbaie (47° 34'N, 71° 00'W), a shallow 664 ha lake in the Laurentides Provincial Wildlife Reserve 95 km north-northeast of Quebec City. By virtue of the high altitude (820 m above sea level) within the Laurentian highlands, the vegetation is typically high-boreal, dominated by Black Spruce *Picea mariana* and other conifers.

We described plumage development by direct observation of ducklings during periodic boat surveys of broods in June to August, 1993-95. Peak numbers of ducklings on the lake were 139, 80, and 225 in 1993, 1994 and 1995, respectively. In 1995, at approximately four-day intervals, broods of known identity and age (i.e. accompanied by marked adult females) were slowly herded toward an observer who was concealed along the shore and who photographed them for further detailed

examination. In 1994-95, 26 ducklings were examined, measured and weighed as nestlings (1994-95), as were 30 others captured at various stages of development using funnel traps or submerged mist nets. Body mass was determined using spring scales (100 g, resolution ± 0.5 g; 300 ± 1 g; 1000 ± 25 g). Standard measurements (culmen, head, tarsus, body length, length of ninth primary) followed Dzubin & Cooch (1992) and also included total bill length (tip of bill to posterior extremity of frontal extension; Mendall 1986). Anatomical terminology followed that of Nelson (1993). To render our results more useful in field studies, we described plumage and morphometric characteristics of ducklings in relation to the age-class groupings of Gollop & Marshall (1954). The total growth period of 55 days (hatch to fledging), as determined by us for Surf Scoters at Lake Malbaie, (Morrier *et al.* 1996), was subdivided into age classes for which minimum, median and maximum ages were calculated (Table 1) by interpolation from other species studied by Gollop & Marshall (1954). These age thresholds for different classes also reflected accurately the transition between major stages of development for known age ducklings.

Table 1. Duckling age (in days) of Surf Scoters in the various age classes of Gollop & Marshall (1954)

Age class	Minimum age	Median age	Maximum age
Ia	1	4	7
Ib	8	11	13
Ic	14	18	21
IIa	22	25	28
IIb	29	32	34
IIc	35	38	41
III	42	49	55

Results

Nestlings

Newly-hatched ducklings were uniformly sooty brown above with a grey belly. The head was blackish with an indistinct brownish-grey cheek patch. Bill and feet were dark grey. The mean mass of ducklings was 43.8 g whereas head length

and total tarsus averaged 41.3 and 26.4 mm, respectively (Table 2).

Class Ia (1-7 days)

Ducklings of this age class had the appearance of fluffy balls of sooty-coloured down, about one-quarter the length (waterline) of the parent female (Figure 1). The head, held closely to the uniformly dark body, was roundish and somewhat darker than the body; however, the indistinct cheek patch began to lighten after three to five days, becoming light grey or ivory and contrasting with the dark brownish-grey of the crown. At the approximate mid-stage of this class (four days), body mass had more than doubled from that of the nestling stage, and head length and total tarsus had increased by 26 and 21%, respectively (Table 2).

Class Ib (8-13 days)

The head, now more oval in appearance, was held further from the body (Figure 1), making the neck more evident (even in ducklings swimming or loafing in undisturbed conditions). The large light cheek patch contrasted with the dark crown, the body remained uniformly dark, and the small wings and tail were apparent. Compared to the previous age class, body mass had again more than doubled and head length and total tarsus had increased by 25 and 30% respectively (Table 2).

Class Ic (14-21 days)

Still fully covered with down, ducklings of this age class had taken on a more elongated form, now almost three-quarters the length (waterline) of the parent female. The neck had become more evident. The cheek patch, still contrasting with the rest of the dark plumage, was more crescent shaped. Body mass had increased by 30% from that of Class Ib and head length and total tarsus had increased by 9 and 12%, respectively (Table 2).

Class IIa (22-28 days)

The head had become more triangular as the bill became more massive (Figure 1). The light cheek patch had become darker,

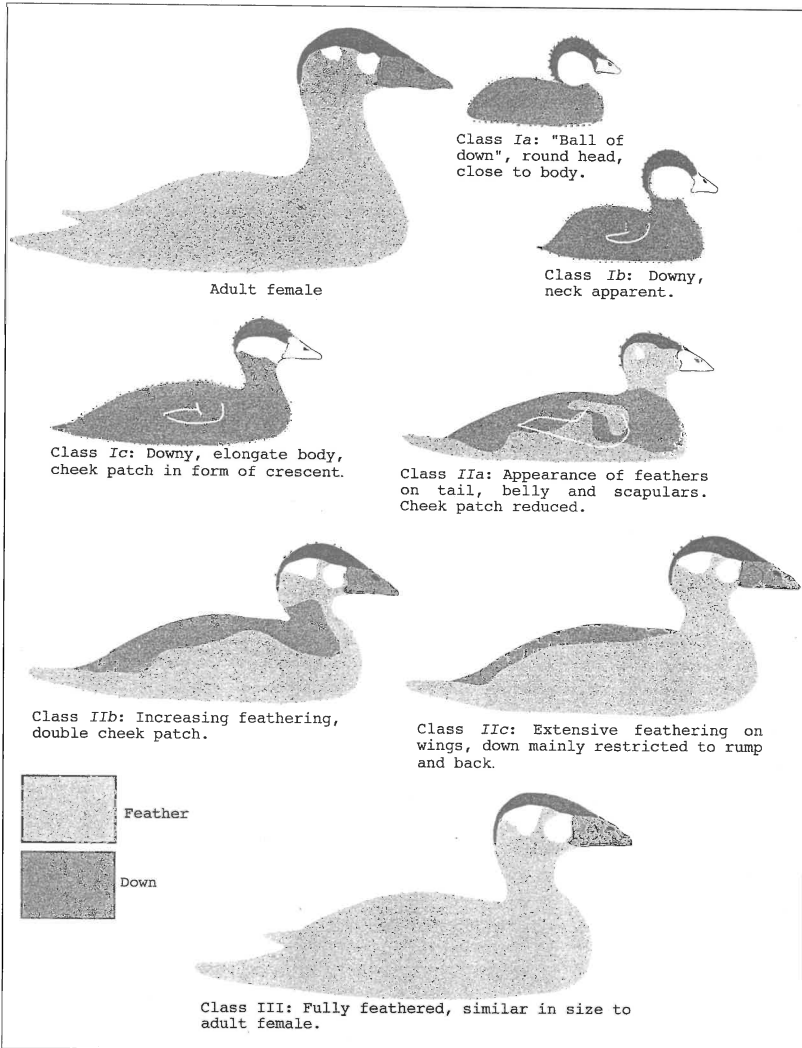


Figure 1. Relative size and plumage patterns of Surf Scoter ducklings and adult females. In the head area, the dark crown and pale cheek patches are depicted by dark and pale shadings. Elsewhere, shading (see legend) indicates areas covered by down or feathers.

generally feathered and the length of the emerging ninth primary had reached, on average, 69 mm. Head length had increased by 6% from Class IIa whereas total tarsus had not changed measurably (Table 2).

Class III (42-55 days)

Ducklings of this age class were fully

feathered (Table 3) and in the field appeared as large as the female parent; often they could be distinguished only by the paler colour and larger size of the cheek patches (Figure 1). Compared to the nestling stage, body mass had increased by a factor of almost 19, head length by a factor of 2.7, and total tarsus by 2.0 (Table 2).

Discussion

On leaving the nest, Surf Scoter ducklings are the darkest, least distinctly patterned of all North American waterfowl species (Nelson 1993). Even after age four or five days, when the pale cheek patch has emerged and provided some contrast, their pattern, like that of other scoters, remains rather indistinct. This lack of distinctiveness, and the lack of marked change in colour pattern over the pre-fledge period, makes field ageing difficult. Furthermore, the similarity of pattern between older ducklings and the female parent makes it difficult to distinguish between young and adults during late season brood surveys. We have provided visual clues and descriptions, based largely on the colouration, form and location of the cheek patches and on the relative appearance of the neck, to facilitate the ageing of ducklings and to distinguish adults from young during field surveys.

The replacement of down by body feathers followed a pattern similar to that described for the Redhead *Aythya americana* (Weller 1957). Primary feathers emerged in young Surf Scoters during Class IIa, somewhat earlier than that reported for Mallard *Anas platyrhynchos* (Schneider 1965). Some down was still present in the crown of Surf Scoters through Class IIc, whereas in Canvasbacks *Aythya valisineria* it was reported to have disappeared at this stage (Schneider 1965).

White-winged Scoter *Melanitta fusca deglandi* ducklings hatched at about 54.5 g (Brown & Frederickson 1983), about 10 g more than Surf Scoter ducklings (this study), but gained mass more slowly and regularly, and at age 55 days were almost 200 g lighter than Surf Scoters (ca 600 g vs 800 g). At that age Surf Scoters fledged and presumably the rate of mass increase dropped markedly, but White-winged Scoter ducklings continued to gain mass for another one to two weeks and reached flight age (9-11 weeks) at a mass of about 800 g, a fledging mass similar to that of Surf Scoters. For culmen and tarsus length, White-winged Scoters appeared to show a somewhat faster growth rate than Surf Scoters during the first two to three weeks

of life then slowing to level off at about 90% (culmen) and 100% (tarsus) of adult size at about age 55 days, whereas Surf Scoter ducklings grew at a more regular rate through to age 55 days at which time culmen and tarsus were close to adult size. These comparisons must, however, be interpreted with caution because White-winged Scoter ducklings were studied in captivity (Brown & Frederickson 1983).

Growth of young Surf Scoters was rapid, allowing ducklings to increase their mass and body measurements several-fold during the 55 days separating hatching and fledging. No gender differences were noted in size or mass of ducklings from age classes I or II. Three Class III ducklings captured at Lake Malbaie, all males, had on average attained 88%, 98% and 82% of the mean head length, total tarsus length and body mass, respectively, of nine adult males captured at the same location in spring (Table 3). Comparing the same samples showed that the Class III ducklings had attained 82% of the adult mean body mass. A review by Sedinger (1992) suggested that fledging wild ducklings of other diving species, Canvasbacks and Lesser Scaup *Aythya affinis*, attained >95% of adult annual minimum mass, although captive White-winged Scoters attained only 60-70% (Brown & Frederickson 1983).

Table 3. Sequence of appearance of feathers on Surf Scoter ducklings of various age classes. F = feathers, D = down.

	AGE CLASS			
REGIONS	IIa	IIb	IIc	III
Crown	F,D	F,D	F,D	F
Nape	F,D	F,D	F,D	F
Cheek	F,D	F	F	F
Neck	D	F,D	F	F
Breast	F,D	F,D	F	F
Back	D	D	F,D	F
Flank	F	F	F	F
Belly	F	F	F	F
Rump	D	D	F,D	F
REMIGES				
Primaries	F*	F*	F*	F
Secondaries	F*	F*	F*	F
Scapulars	F*	F	F	F
Tail	F*	F	F	F

* Feathers small, relative to that of adults

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