APPENDIX 1. Continued.

Species[a]	Nesting[b]	RCM[c]	PPDI[d]	IABA	IRBA	Source[e]
Lophodytes cucullatus	H, S	111.1	—	O	O	1, 7, 9, 46, 47
M. octosetaceus	H, S?	?	O	?	?	1, 83
M. merganser	H, S	73.9	—	O	O	1, 7, 9, 46
M. serrator	U, S	64.9	—	O	O	1, 7, 9, 12, 46, 84
M. squamatus	H, S	?	—	—	—	1, 85

[a] Based on the tribal classification of Johnsgard (1978) and Livezey (1991, 1995a, 1995b, 1995c, 1996a, 1996b, 1996c, 1997).
[b] E = emergent vegetation; U = upland; H = hole or cavity; S = solitary breeder; C = colonial breeder; S/C = solitary to colonial breeder.
[c] RCM = relative clutch mass.
[d] PPDI = paternal presence during incubation; ? = not known; — = not reported; O = occurs.
[e] (1) Johnsgard 1978, (2) Marchant and Higgins 1990, (3) Whitehead and Tschirner 1991, (4) Horn et al. 1996, (5) Clark 1976, (6) Siegfried 1973, (7) Palmer 1976, (8) Bergman 1994, (9) Bellrose 1978, (10) McCamant and Bolen 1979, (11) Frith 1967, (12) Weller 1959, (13) Cramp and Simmons 1977, (14) Perrins et al. 1994, (15) Henson and Cooper 1992, (16) Henson and Cooper 1994, (17) Fox et al. 1995, (18) Van Impe 1996, (19) Tegelstrom and Vonessen 1996, (20) Weigmann and Lamprecht 1991, (21) Williams 1994, (22) Lank et al. 1991, (23) Prevett et al. 1972, (24) Eisenhower and Kirkpatrick 1977, (25) Banko 1992, (26) Seddon and Nudds 1994, (27) Choudhury et al. 1993, (28) Forslund and Larson 1995, (29) Bregnballe and Madsen 1990, (30) Spaans et al. 1993, (31) Fullagar et al. 1990, (32) Veltman and Williams 1990, (33) Livezey and Humphrey 1992, (34) Moffett 1970, (35) Clark 1980, (36) Ali and Ripley 1968, (37) Wilson and Wilson 1980, (38) Vuillemier 1994, (39) Riggert 1977, (40) Williams 1979, (41) Hori 1969, (42) Patterson et al. 1982, (43) Fox and Salmon 1994, (44) Kear 1975, (45) Hallstrom 1956, (46) Johnsgard 1975, (47) Bouvier 1974, (48) Briggs 1991, (49) Kingsford 1990, (50) Brewer 1989, (51) Buitron and Nuechterlein 1989, (52) Duebbert et al. 1983, (53) Bengtson 1972, (54) Johnson et al. 1996, (55) Titman and Lowther 1975, (56) Moulton and Weller 1984, (57) Cunningham and Welch 1955, (58) Young 1995, (59) Heyl 1994, (60) Green et al. 1994, (61) Hohman and Ankney 1994, (62) Norman and McKinney 1987, (63) Sorenson et al. 1992, (64) Esler and Grand 1994, (65) Stahl et al. 1994, (66) Nummi and Pöysä 1995, (67) Amat 1991, (68) Sorenson 1993, (69) Bouffard 1983, (70) Sorenson 1991, (71) Wilme 1994, (72) Hines and Mitchell 1984, (73) Reese and Hillgarth 1984, (74) Livezey 1995b, (75) Joyner 1983, (76) Briggs 1988, (77) Alisaukas and Ankney 1992, (78) Robertson et al. 1992, (79) Bjorn and Erikstad 1994, (80) Butnes and Erikstad 1991, (81) Gauthier 1987, (82) Brown and Brown 1981, (83) Bartmann 1988, (84) Pelz 1971, (85) Zhengjee et al. 1995, (86) Amat 1985, (87) Dumbell 1986, (88) McKinney and Brewer 1989, (89) Davies and Baggott 1989, (90) Siegfried 1974.

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FIRST BREEDING RECORDS OF WHOOPER SWAN AND BRAMBLING IN NORTH AMERICA AT ATTU ISLAND, ALASKA[1]

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Abstract. We document the first breeding records of Whooper Swan (*Cygnus cygnus*) and Brambling (*Fringilla montifringilla*) in Alaska and North America on Attu Island in the Western Aleutians in the spring of 1996. Five cygnets were seen with adults and the nest located, and a territorial pair of Bramblings was observed and a nest with eggs found.

Key words: Alaska, Attu Island, Brambling, breeding record, Cygnus cygnus, Fringilla montifringilla, *Whooper Swan.*

A pair of adult Whooper Swans (*Cygnus cygnus*) and what was suspected to be a nest were discovered by D. J. Trochlell and R. A. Wilt on 19 May 1996 near Lake Nicholas (165 ha) in lower Siddens Valley, Attu Island, Western Aleutians, Alaska. Attu (67 km long, 28 km wide, 888 km^2) is treeless and mountainous, and lies 700 km east of the Kamchatka Peninsula, Russia. D. Sonneborn et al. observed five small cygnets swimming with two adult *C. cygnus* on a lake SE of Lake Nicholas on 5 June. On 8 June D. D. Gibson confirmed a swan nest on an islet in a small pond (different from where cygnets were seen) SE of Lake Nicholas. A white flank feather and a few white breast feathers, all in fresh condition, and eggshell fragments were collected from the nest by D. D. Gibson (all material, University of Alaska Museum: UAM 6988). R. C. Laybourne, National Museum of Natural History, confirmed the identity of the feathers. This *C. cygnus* nesting site (52°52′13″N, 173°15′45″E) was on a narrow 1-ha pond 0.5 km SE of Lake Nicholas. The nesting islet was 6 m from the nearest point on shore (D. D. Gibson, pers. comm.), and one of the few places safe from terrestrial predators—primarily the intro-

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FIGURE 1. Whooper Swan nest with five eggs under incubation, 4 June 1997 (nest empty 18 May), at same site as 1996, Attu Island, Alaska. Outside diameter of nest was 80 cm, cup diameter 35 cm, top of nest 20 cm above substrate and 41 cm above the pond, and maximum pond depth 66 cm. Photo by Paul W. Sykes Jr.

duced Arctic fox (*Alopex lagopus*). The swans nested at this same site again in 1997 (Fig. 1).

C. cygnus breeds across northern Eurasia, east to the Sea of Okhotsk, lower Amur Valley, northern Ussuriland, and Sakhalin Island (Vaurie 1965, Cramp 1977, del Hoyo et al. 1992) and sporadically on the Kamchatka Peninsula (Vaurie 1965). It is not known to breed on the Commander Islands (Johansen 1961). There has been a slight increase in overall numbers worldwide since the early 1970s, and it apparently is abundant in parts of Siberia (del Hoyo et al. 1992). This species is an uncommon and local winter visitor in Alaska in the western and central Aleutian Islands (Adak) from late October to early May, occurring in family groups or small flocks (Kessel and Gibson 1978, D. D. Gibson, pers. comm.). *C. cygnus* is the only swan regularly occurring on the Aleutian Islands west of Unimak Island (Kessel and Gibson 1978).

On 8 June 1996, about 2.5 km upstream from the mouth of Peaceful River and 100 m north of the river, Sykes observed a male Brambling (*Fringilla montifringilla*) singing from territorial perches over several hectares and frequently interacting with a female. The female was observed carrying nesting material. A search of the area on 9 June flushed the female from her nest (52°50′20″N, 173°09′10″E, elev. 30 m), which contained two smooth, glossy, pale-blue eggs uniformly marked with fine spots and small blotches of red-brown; each measured 19 × 14 mm. The clutch contained a third egg the next day. Our departure from Attu on 11 June precluded further observations.

The Brambling nest was on the relatively flat bench of a hill with SW exposure within 2 m of a shallow 6 × 3 m pond. Habitat at the site was dwarf shrub meadow (Kessel 1979). The nest was on the ground, recessed in tundra vegetation consisting mainly of mosses and live and dead grasses, and well concealed at the base of a gnarled multi-stemmed willow (*Salix lanata*) 58 cm tall. The leaves of the willow were still in bud, and half the plant was dead. Nests usually are placed 1–15 m high, and rarely on the ground (Cramp 1994). Diameter of the nest cup on Attu was 57 mm and depth 41 mm. The outer wall was composed of dried grasses and other coarse unidentified plant materials tightly woven. The cup was lined with feathers of Rock Ptarmigan (*Lagopus mutus*) and fine unidentified plant materials. Photos of the nest were taken on 9 and 10 June 1996 (VIREO catalog no. s23/10/006) and the empty nest collected 27 May 1997 (University of Alaska Museum).

F. montifringilla breeds across northern Eurasia east to the Koryak Highlands and Kamchatka Peninsula (Vaurie 1959, Cramp 1994). It is a common migrant in the Commander Islands where it does not breed (Vaurie 1959), and it is a regular spring and fall migrant in the western Aleutians (Gibson 1981). Maxi-

mum one-day spring counts at Attu over the past 20 years include 150 in 1980 and 122 in 1988 (American Birds and National Audubon Society Field Notes reports; unpubl. data).

These are the first breeding records of *C. cygnus* and *F. montifringilla* for Alaska and North America. Previous nesting by Palearctic species on Attu include White-tailed Eagle (*Haliaeetus albicilla*) in 1982–1983 (Tobish and Balch 1987), Wood Sandpiper (*Tringa glaveola*) in 1973 (Gibson and Byrd 1973), and Black-backed Wagtail (*Motacilla lugens*) in 1983 (Wagner 1991).

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FACTORS AFFECTING DURATION OF INCUBATION IN BLACK BRANT[1]

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Abstract. We investigated factors affecting duration of incubation in Black Brant (*Branta bernicla*) during 1992 and 1993 on the Yukon-Kuskokwim Delta, Alaska. Duration of incubation varied with clutch size and decreased with later nest initiation. In contrast to other studies, we found no relationship between incubation period and ambient temperature, mean egg size, or nest attentiveness. We hypothesize that a decrease in incubation length with later first egg date is an adaptation by females to reduce disadvantages of hatching late. We suggest that potential costs of reduced embryonic development time outweigh benefits for females that are able to initiate nesting early because their eggs hatch early enough to maximize recruitment of hatched young. For females that nest late, however, advantages to reproductive success of hatching earlier may outweigh costs of reduced development time.

Key words: Black Brant, Branta bernicla, *first egg date, incubation period, nest attentiveness.*

Duration of incubation varies greatly among species; part of this variation is attributable to differences in egg mass because length of incubation is positively correlated with egg mass (Rahn and Ar 1974, Martin and Arnold 1991, Arnold 1993). Nevertheless, some species have much longer incubation periods than predicted by egg size alone. Boersma (1982) proposed that longer than expected incubation in Fork-tailed Storm-Petrels resulted from frequent parental neglect of eggs and concomitant low mean incubation temperatures. Egg temperature must be maintained above 26°C for development of avian embryos to occur, and embryos develop faster when maintained closer to their optimum developmental temperature of 32–36°C (Webb 1987). Thus, the greater proportion of time an embryo is maintained near its optimum developmental temperature, the shorter its incubation period.

Factors that affect female quality, such as body size,

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