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Walruses Attack Spectacled Eiders Wintering in Pack Ice of the Bering Sea

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ABSTRACT. We observed walruses (*Odobenus rosmarus*) pursuing spectacled eiders (*Somateria fischeri*) within pack ice of the Bering Sea, 70–90 km from the nearest land. We used both direct observations from a helicopter and a heligimbal camera system that can film animals from a helicopter at high altitudes. The eiders were in monospecific flocks of thousands of birds within large leads. The walruses apparently tried to catch the eiders from below; the eiders responded with a "flash expansion" (explosive radial movement), wing-flapping and running along the water surface to escape. Disturbance by individual walruses could restrict flocks of thousands of birds to small portions of the open water. In eight such events that we witnessed over 75 min of observations, we were unable to confirm that walruses captured any of these full-grown, flight-capable eiders. However, the high rate of attacks and the eiders' dramatic escape response suggest that walruses can at times be effective predators on them, and may affect the eiders' dispersion and energy balance.

Key words: Bering Sea, heligimbal camera system, marine mammal predation on birds, pinniped predation on birds, predator avoidance, spectacled eider, walrus

RÉSUMÉ. Nous avons observé des morses (*Odobenus rosmarus*) en train de pourchasser des eiders à lunettes (*Somateria fischeri*) sur la banquise de la mer de Béring, soit à une distance de 70 à 90 kilomètres de la terre ferme la plus près. Nous nous sommes servis à la fois d'observations directes faites à partir d'un hélicoptère et d'un appareil héligimbal capable de filmer les animaux à partir d'un hélicoptère à haute altitude. Les eiders se tenaient en bandes monospécifiques constituées de milliers d'oiseaux faisant partie de gros groupements. Il semblait que les morses essayaient d'attraper les eiders par en-dessous; les eiders réagissaient en faisant une « expansion éclair » (un mouvement radial explosif), en battant des ailes et en courant le long de la surface de l'eau afin de s'échapper. Les perturbations exercées par les morses individuels pouvaient avoir pour effet de restreindre les bandes de milliers d'oiseaux à de petites nappes d'eau libre. Dans huit cas de telle nature dont nous avons été témoins pendant plus de 75 minutes d'observation, nous n'avons pas été en mesure de confirmer si les morses avaient réussi à capturer des eiders adultes en état de voler. Cependant, le taux élevé d'attaques de même que la réaction dramatique des eiders qui tentaient de s'échapper laissent entrevoir que les morses pourraient être des prédateurs efficaces en ce qui les concerne, ce qui pourrait exercer une influence sur l'expansion des eiders et sur leur bilan énergétique.

Mots clés : mer de Béring, appareil héligimbal, prédation d'oiseaux par des mammifères marins, prédation d'oiseaux par des pinnipèdes, évitement des prédateurs, eider à lunettes, morse

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Some marine mammals regularly prey on other mammals. However, except for leopard seals (*Hydrurga leptonyx*) eating penguins (Ainley et al., 2005), predation by marine mammals on birds is thought to be mostly occasional and opportunistic (e.g., Ballard and Ainley, 2005). Marine mammal predation potentially has greater impacts on birds when focused on young birds or molting adults with poor flight capability (Long and Gilbert, 1997; Smith, 2006) or on adults that are concentrated near colonies (Mallory et al., 2004). For example, around a colony of Cape cormorants (*Phalacrocorax capensis*), Cape fur seals (*Arctocephalus pusillus*) were reported to eat at least 2461 newly fledged cormorants over two breeding seasons, about 7.3% of the cohort during the first year (Marks et al., 1997). Around a large breeding colony of thick-billed murres (*Uria lomvia*), walruses (*Odobenus rosmarus*) were estimated to eat up to 67 adult murres per day, with an attack success rate of 46% (Mallory et al., 2004).

For ducks, reported predation by marine mammals includes killer whales (*Orcinas orca*) eating common eiders (*Somateria mollissima*) and flightless steamer-ducks (*Tachyeres leucocephalus*) (Straneck et al., 1983; Smith, 2006), sea otters (*Enhydra lutris*) preying on adult surf scoters (*Melanitta perspicillata*) (Reidman and Estes, 1988), and

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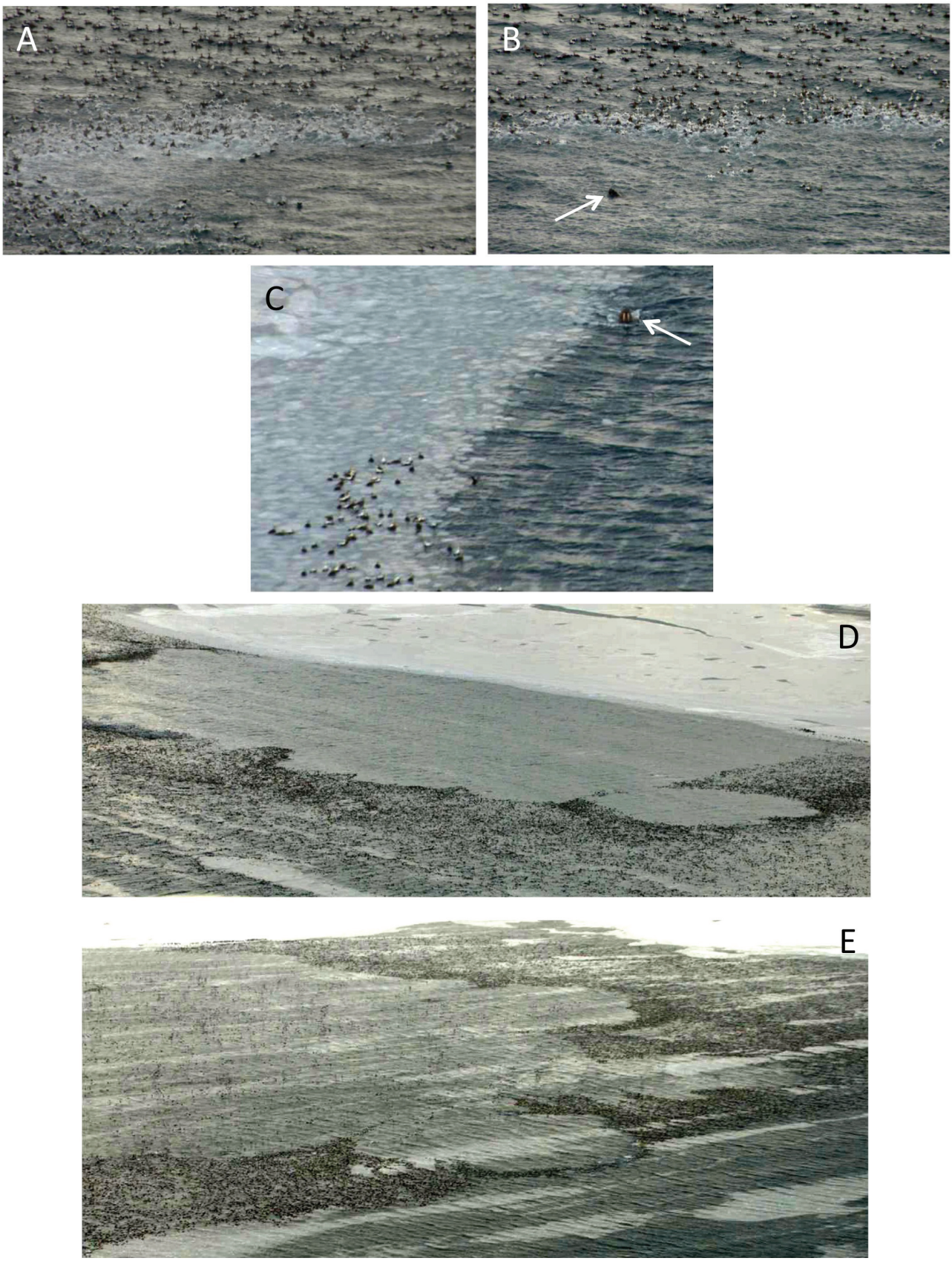

FIG. 1. (A) Flash expansion of spectacled eiders followed by (B) surfacing by a walrus. (C) Walrus approaching a group of eiders on small pancake ice. (D) Large area within a once continuously dispersed flock that has been vacated as a result of walrus presence, including a subarea (right) cleared by a recent flash expansion. (E) Area of a large flock vacated as a result of walrus presence, including three areas cleared by recent flash expansions. White arrows indicate the walrus in panels B and C.

a harbor seal (*Phoca vitulina*) attacking a harlequin duck (*Histrionicus histrionicus*) (Tallman and Sullivan, 2004). Adult ducks in open water that can escape by aerial flight must be taken by surprise. Conditions favoring such predation, such as predictably high concentrations of ducks in very restricted areas, may be rare enough in most environments that predation by mammals is opportunistic and relatively uncommon.

For common eiders, king eiders (*Somateria spectabilis*), and spectacled eiders (*S. fischeri*), which often occupy leads within pack ice, conditions may sometimes favor predation by marine mammals. During winter and spring migration, these birds often occur in large flocks concentrated in relatively small areas of open water (Mosbech and Johnson, 1999; Gilchrist and Robertson, 2000; Lovvorn et al., 2009). However, for eiders that occur in shifting pack ice far from land, the logistical challenges of observing large numbers of birds over the long periods needed to document predation have prevented such studies.

On 20 March 2008, a British Broadcasting Corporation (BBC) crew filmed spectacled eiders from a helicopter in the north-central Bering Sea (~ 62° 28.9′ N, 172° 26.6′ W), about 49 nautical miles (90 km) SSW from the nearest land at St. Lawrence Island, Alaska, USA. A second flight was undertaken on 23 March 2008, ~38 nautical miles (70 km) SSW from the nearest land (~ 62° 38.8′ N, 172° 13.8′ W). On both days, filming was done from about 19:00 until 21:00 Alaska Daylight Saving Time, when darkness prevented further filming.

With typical camera systems that are strongly affected by vibration and other motion, helicopters cannot fly low enough for close filming of eiders without greatly disturbing the birds. However, we used a Cineflex Heligimbal (Model V14HD, Axsys Technologies, Grass Valley, California), a gyro-stabilized helicopter mount for movie cameras that dampens vibration so that a zoom telephoto lens can be used to film animals with minimal disturbance from altitudes of 1000 m or more. The Heligimbal mount with camera (Sony CineAlta HDC-1500) weighed less than 45 kg and was attached underneath the nose of a Bell 206 Long Ranger III helicopter launched from the deck of the U.S. Coast Guard icebreaker *Healy*. The camera assembly was operated from the back seat of the helicopter by means of a viewing screen and joystick.

During 75 min of flight observations, we observed eight instances of attempted predation by walruses on the eiders. In each case, a flash expansion (explosive radial movement of prey away from a predator; Pitcher and Wyche, 1983) of eiders (Fig. 1A) left an area of unoccupied open water from which a walrus promptly emerged (Fig. 1B). The walrus had apparently tried to attack the birds from below. After surfacing, the walrus (all were adult males) variously dove, re-surfaced, and swam along the edges of the flock, which retreated before it (Fig. 1C, D). The eiders generally fled the walrus by wing-flapping and running along the water surface, and sometimes by taking flight. We do not know how many individual walruses were involved. However, the two attacks observed on the first flight occurred 20 km away and three days earlier than the six attacks observed on the second flight, and in one instance at least two walruses made attacks on the same large flock (Fig. 1E). The eiders' reaction to even a single walrus could restrict a large flock of thousands of birds to a small fraction of the open water (Fig. 1D).

In none of these cases did we confirm that the walruses captured any eiders. Full-grown eiders capable of aerial flight can easily elude a walrus after it surfaces, but successful captures may occur if these birds are surprised from below. The seemingly high rate of attempts (8 instances in 75 min of observations) and the strong escape response suggest that the eiders perceive walruses as a genuine threat (cf. Randall and Randall, 1990). Gjertz (1990) reported similar behavior of walruses hunting birds in leads, including one instance of successful predation on ducklings of a common eider. Attack and success rates of predation do not have to be high to elicit strong escape responses (Stinson, 1980; Lima, 1998), and intermittent attempts may still have appreciable impact on the birds' time and energy budgets. Sea ice reduces wave action and wind speed, and allows the eiders to reduce heat loss by getting out of the water (Lovvorn et al., 2009). However, sea ice also concentrates the birds into dense flocks in the remaining open water, and provides hauling-out substrate needed by walruses (Fay, 1982). Thus, although the presence of ice can reduce some of the eiders' energy costs, it may also increase the presence of walruses and the eiders' vulnerability to both predation and costs of disturbance.

Diet studies of walruses have generally not reported birds as prey items (Fay, 1982; Fay et al., 1984; Dehn et al., 2007; see review by Sheffield et al., 2001). However, a walrus collected in the northern Bering Sea near St. Lawrence Island contained remains of a black guillemot (*Cepphus grylle*; Fay et al., 1990), and one account states that a walrus stomach was "full" of murres (age of birds not given, Nelson, 1969:354). Attack and success rates of walruses preying on adult murres around the birds' breeding colonies can be substantial (Mallory et al., 2004). Although walrus predation on birds may be mostly opportunistic, attacks might increase when more typical walrus foods are scarce (Fay and Kelly, 1980) or when birds are especially concentrated around colonies or by ice cover. How much the threat of walrus predation affects the habitat use and behavior of eiders in remote areas of pack ice is unknown. However, these hard-to-get films and observations suggest that such interactions are not uncommon.

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