

POTENTIAL EFFECTS ON ATLANTIC WALRUS OF WARMING IN THE ARCTIC

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Introduction

It has been suggested that the predicted warming of the Arctic may have a negative effect on walrus (Kelly 2004; Stabeno & Overland 2004; Hassel 2004; Derocler et al. 2004). In this working paper we offer the alternate hypothesis that walruses eventually could benefit from Arctic warming and associated decrease in ice cover. We contend that walruses are morphologically and behaviorally adapted to persist in boreal conditions with little or no ice. Although walruses in general are considered, we concentrate on the situation of the Atlantic subspecies (*Odobenus rosmarus rosmarus*).

The walrus: a cold water species?

Although the paleontological evidence for the "creation of walruses" is fragmentary, some points concerning their evolution and zoogeography can be used to speculate on their ability to cope with the recent and expected future warming of the Arctic (for predictions of warming in the Arctic e.g. Hassel 2004). Modern walruses appear to have retained many traits from their ancestors, including some that enabled them to become benthic feeders in boreal and Arctic areas.

Early in their evolution, the walruses evolved morphological traits that were advantageous later when living in icy Arctic seas: (1) Tusks that can be used to help them haul out on ice, or to chop ice, and to resist attacks by polar bears (*Ursus maritimus*) or killer whales (*Orcinus orca*); (2) a quadruped gait for movement on ice (and land); (3) a large, rounded body to conserve energy that also facilitates smoothing through ice; and (4) thick (2-6 cm), tough skin