Assessing the Availability of Glacial Ice as Habitat for Harbor Seals in a Tidewater Glacial Fjord

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Tidewater glaciers are a prominent landscape feature along the southern coasts of Alaska and play an important role in landscape and ecosystem processes. Tidewater glaciers calve icebergs into the marine environment, which then serve as habitat for large aggregations of harbor seals. Although tidewater glaciers are naturally dynamic, advancing and retreating in response to local climatic and fjord conditions, most of the ice sheets that feed tidewater glaciers in Alaska are thinning and, as a result, many of the tidewater glaciers are retreating. The rapid thinning and retreat of tidewater glaciers may impact harbor seals, which exhibit a high degree of fidelity to glacial fjords and rely upon glacial ice as a haulout substrate. However, the potential impacts of changes in ice coverage and characteristics and the relationship with the distribution and abundance of harbor seals are unknown. Our primary objectives were (1) to develop a semi-automated method for estimating ice cover and characteristics of ice used by seals from digital imagery and (2) to assess the relationship between the availability of ice and the spatial distribution and abundance of seals. We conducted aerial photographic surveys (n = 53) of seals and glacial ice in Johns Hopkins Inlet, Glacier Bay National Park during June and August from 2007 to 2014. Surveys were flown along a grid of 12 transects at an altitude of 1,000 ft. Non-overlapping digital photos were taken directly under the plane using a vertically aimed camera. Preliminary estimates of seal abundance were consistently higher during June than August. The spatial distribution of seals was also much more extensive during June and corresponded to more extensive ice coverage in the fjord. Understanding relationships between glacial ice availability and harbor seal distribution and abundance is a first step towards understanding how changes in tidewater glaciers may influence harbor seals.