

Assessing the Availability of Glacial Ice as Habitat for Harbor Seals  
in Tidewater Glacial Fjords in Alaska

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Tidewater glaciers are a prominent landscape feature along the southeastern and southcentral coasts of Alaska and play an important role in landscape and ecosystem processes. Many tidewater glaciers calve large icebergs into the marine environment which then serve as important substrate for harbor seals (*Phoca vitulina richardii*) for resting, pupping, nursing young, molting, and avoiding predators. Although tidewater glaciers are naturally dynamic, 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 changes in available glacial ice may influence harbor seal populations; however, the relationship between ice conditions and harbor seal spatial distribution are unknown. Our primary objectives are to assess the relationship between the availability of glacial ice and harbor seal spatial distribution and abundance. We conducted systematic aerial photographic surveys (n = 43) of seals and glacial ice in Johns Hopkins Inlet, Glacier Bay National Park, Alaska, during the pupping (June) and molting (August) periods from 2007 to 2012. 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 GPS-linked camera. Intensity surfaces of seal distribution and abundance were generated using statistical models for spatial point processes. Object based image processing techniques were used to quantify percent ice cover, iceberg size, and distance to ice edge. Estimates of seal abundance were consistently higher in June (range: 1,325 - 2,647) than in August (range: 1,041 - 1,928). The spatial distribution of seals was also much more extensive during June and corresponded to more extensive glacial ice coverage. Ultimately, understanding relationships between glacial ice availability and harbor seal distribution and abundance may provide novel perspectives on the spatial and temporal variation of harbor seals in tidewater glacial fjords.