



Taking the Long View: Twenty-six Years of Monitoring Glacier Bay's Largest Harbor Seal Aggregation



Aerial image of harbor seals resting on glacier ice in Johns Hopkins Inlet. Jamie Womble/NPS Photo

Background

Tidewater glaciers calve icebergs into the marine environment which provide habitat for some of the world's largest seasonal aggregations of harbor seals. Johns Hopkins Inlet, in Glacier Bay National Park in southeastern Alaska, hosts the largest aggregation of harbor seals in the bay, and seals have been monitored there consistently since 1992. Satellite telemetry studies demonstrate that harbor seals exhibit a high degree of fidelity to Johns Hopkins Inlet during the pupping (May-June) and molting (August) periods. Special speed and distance regulations are in place in Johns Hopkins Inlet from May through August, to protect harbor seals from human-related disturbance.

Methods

Over the 26-year period from 1992-2017, harbor seals in Johns Hopkins Inlet were monitored using two different methods. From 1992-2002, seals were counted by observers from a shore-based observation site. Beginning in 2007, there was a

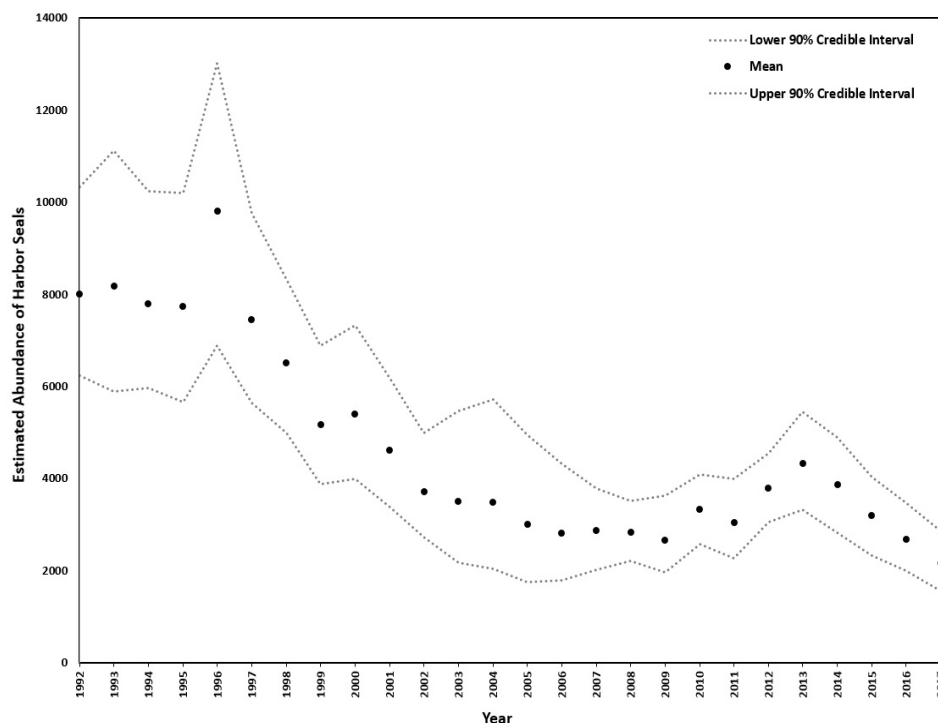


Figure 1. Estimated abundance of harbor seals in Johns Hopkins Inlet, adjusted for the proportion of seals in the water. Data from 1992-2002 were collected by Mathews & Pendleton (2006) and Womble et al. (2010) using counts by observers from a shore-based site. Data from 2007 to 2017 were collected by the National Park Service using aerial photographic surveys (Womble et al. 2020).

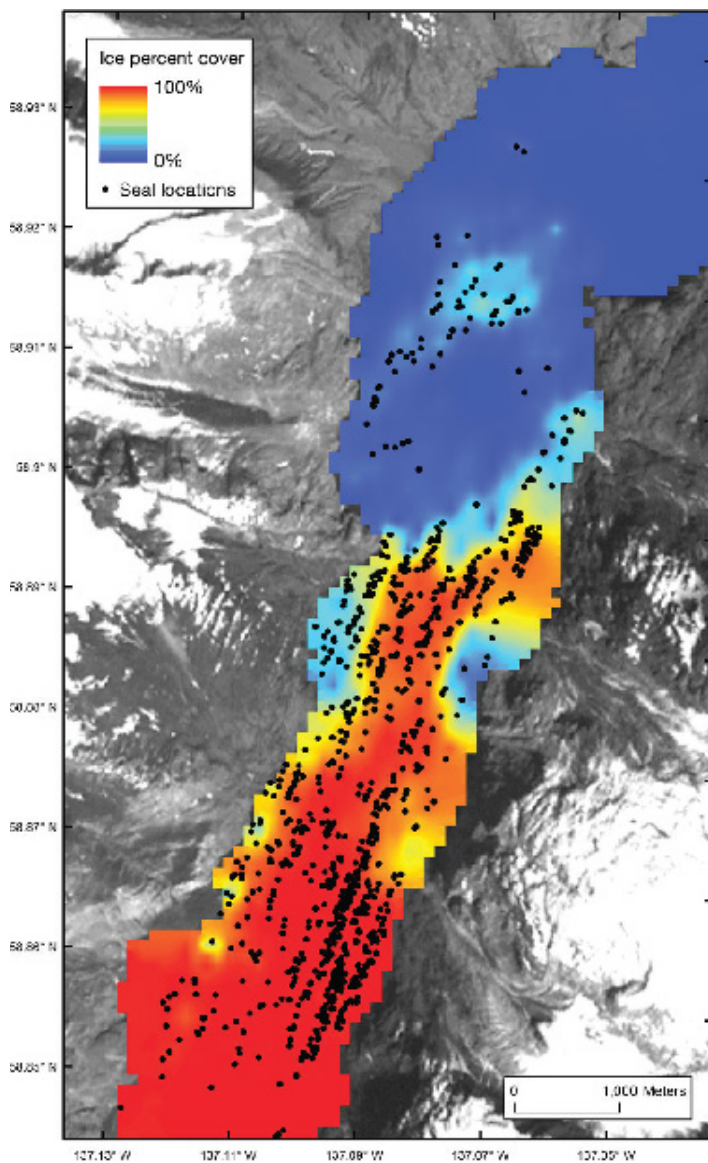


Figure 2. Locations of seals (black circles) and percent ice cover (shown as color gradient) in Johns Hopkins Inlet in Glacier Bay National Park.

transition to aerial photographic surveys for estimating the abundance of seals during June and August. Aerial surveys are flown along 12 transects and high-resolution digital photos are taken directly under the plane using a vertically aimed camera. Seals are mapped in GIS and statistical models are used to estimate the abundance of seals. An analytical calibration was developed between the two survey methods to produce long-term trend and abundance estimates from 1992-2017.

Results

Over the 26-year period from 1992 to 2017, the estimated trend for harbor seals was negative; however, trends computed for 10-year time intervals demonstrate that steep and significant declines ended around 2011, with leveling off and possibly some subsequent recovery. The most recent shorter-term (2013-2017) trends are negative again, rivaling the steepest decreases over the 26-year period. Over the most recent 10-year period (2008-2017), the estimated abundance of seals ranged from 4,341 seals (90% Credible Interval [CI]: 3,318-5,448) in 2013 to 2,163 seals (90% CI: 1,563-2,872) in 2017. The decreased abundance of harbor seals in recent years coincides with anomalously warm waters that persisted in the eastern Gulf of Alaska from 2014 to 2016.

The monitoring program in Johns Hopkins Inlet in Glacier Bay represents one of the few long-term efforts to monitor harbor seals and their ice habitat in a tidewater glacier fjord in Alaska. Long-term ecological monitoring studies provide essential baseline and trend data that are vital for understanding how species of conservation concern are responding to rapidly changing environments. Read the full study at: <https://doi.org/10.1002/ecs2.3111>

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References:

Mathews EA, Pendleton GW (2006) Declines in harbor seal numbers in Glacier Bay National Park, Alaska, 1992-2002. *Marine Mammal Science* 21: 167-189.

McNabb, R.W., Womble, J.N., Prakash, A., Gens, R., and Haselwimmer, C.E. (2016) Quantification and analysis of icebergs in a tidewater glacier fjord using an object-based approach. *PLoS ONE* 11(11):e0164444. doi:10.1371/journal.pone.0164444

Womble, J.N., Gende, S.M. (2013) Post-breeding season migrations of a top predator, the harbor seal, from a marine protected area in Alaska. *PLoS ONE* 8(2): e55386. doi:10.1371/journal.pone.0055386

Womble, J.N., Pendleton, G.W., Mathews, E.A., Blundell, G.M., Bool, N.M., Gende, S.M. (2010) Harbor seal decline continues in the rapidly changing landscape of Glacier Bay National Park, Alaska, 1992-2008. *Marine Mammal Science* 26:686-697.

Womble, J.N., Ver Hoef, J.M., Gende, S.M., Mathews, E.A. (2020). Calibrating and adjusting counts of harbor seals in a tidewater glacier fjord to estimate abundance and trends 1992-2017. *Ecosphere* 11(4):e03111. 10.1002/ecs2.3111