



# A COMPREHENSIVE APPROACH FOR ESTIMATING HARBOR SEAL ABUNDANCE IN ALASKA

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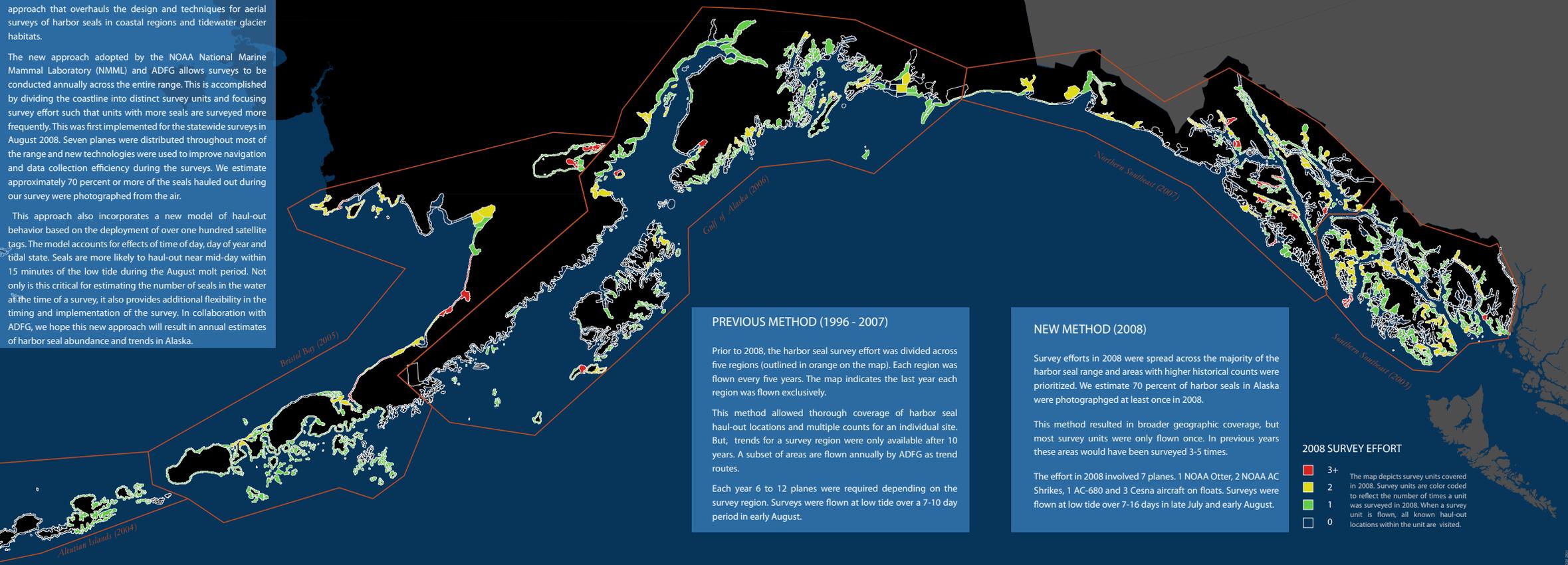
Estimating the statewide abundance of harbor seals (*Phoca vitulina*) in Alaska has always been challenging. Harbor seals range from southeastern Alaska through the Aleutian Island chain into Bristol Bay. Past efforts have involved dividing the state into five regions and conducting aerial surveys from small aircraft in one of those regions annually. An estimate is only possible once every five years, and trends were determined from surveys conducted by the Alaska Department of Fish and Game (ADFG) at a small subset of sites. We present a comprehensive, new approach that overhauls the design and techniques for aerial surveys of harbor seals in coastal regions and tidewater glacier habitats.

The new approach adopted by the NOAA National Marine Mammal Laboratory (NMML) and ADFG allows surveys to be conducted annually across the entire range. This is accomplished by dividing the coastline into distinct survey units and focusing survey effort such that units with more seals are surveyed more frequently. This was first implemented for the statewide surveys in August 2008. Seven planes were distributed throughout most of the range and new technologies were used to improve navigation and data collection efficiency during the surveys. We estimate approximately 70 percent or more of the seals hauled out during our survey were photographed from the air.

This approach also incorporates a new model of haul-out behavior based on the deployment of over one hundred satellite tags. The model accounts for effects of time of day, day of year and tidal state. Seals are more likely to haul-out near mid-day within 15 minutes of the low tide during the August molt period. Not only is this critical for estimating the number of seals in the water at the time of a survey, it also provides additional flexibility in the timing and implementation of the survey. In collaboration with ADFG, we hope this new approach will result in annual estimates of harbor seal abundance and trends in Alaska.

## ALASKA

## CANADA



### PREVIOUS METHOD (1996 - 2007)

Prior to 2008, the harbor seal survey effort was divided across five regions (outlined in orange on the map). Each region was flown every five years. The map indicates the last year each region was flown exclusively.

This method allowed thorough coverage of harbor seal haul-out locations and multiple counts for an individual site. But, trends for a survey region were only available after 10 years. A subset of areas are flown annually by ADFG as trend routes.

Each year 6 to 12 planes were required depending on the survey region. Surveys were flown at low tide over a 7-10 day period in early August.

### NEW METHOD (2008)

Survey efforts in 2008 were spread across the majority of the harbor seal range and areas with higher historical counts were prioritized. We estimate 70 percent of harbor seals in Alaska were photographed at least once in 2008.

This method resulted in broader geographic coverage, but most survey units were only flown once. In previous years these areas would have been surveyed 3-5 times.

The effort in 2008 involved 7 planes. 1 NOAA Otter, 2 NOAA AC Shrikes, 1 AC-680 and 3 Cessna aircraft on floats. Surveys were flown at low tide over 7-16 days in late July and early August.

### 2008 SURVEY EFFORT

- 3+ The map depicts survey units covered in 2008. Survey units are color coded to reflect the number of times a unit was surveyed in 2008. When a survey unit is flown, all known haul-out locations within the unit are visited.
- 2
- 1
- 0

### WESTERN ALEUTIAN ISLANDS

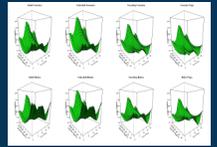
Conducting aerial surveys in the Western Aleutian Islands can be challenging with respect to weather and logistics. We were unable to include this region in our survey effort for 2008 but will make the Aleutians an area of focus in 2009.

This new, comprehensive, approach to harbor seal surveys allows more flexibility to adjust with the ebb and flow of funding and to address areas of special conservation or management concern.

Less emphasis on replicate surveys within a year also lowers the impact of weather on the overall survey objectives.

### CORRECT FOR SEALS IN THE WATER

We have deployed over 100 satellite telemetry devices across several geographic areas. The haul-out behavior data from these tags informs new statistical models designed to estimate the proportion of seals ashore when counted. These models account for time of day, tidal state and day of year.



### LOW ALTITUDE GLACIAL SURVEYS

Glacial fjords contain the largest aggregations of harbor seals during pupping and molting. Seals are dispersed over enormous areas of floating ice and this makes estimating abundance using conventional, oblique photography challenging.

We are implementing a new aerial sampling method which captures higher quality imagery of seals at low altitudes (1000 ft), along line transects, using a down-looking, high-resolution digital SLR camera.

This new, cost-effective method can also provide estimates of size/age distributions and pup production for population models.

### NEW TECHNOLOGIES

Advances in digital photography, automatic geocoding of images and handheld navigation systems have dramatically improved the efficiency of data collection.

