# Glacier Bay Harbor Seal Capture Trip Summary
# September 12-19, 2008

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## Harbor Seal Captures

A harbor seal capture trip was conducted from September 12-19, 2008 in Johns Hopkins Inlet (JHI) in Glacier Bay National Park (GBNP) on board the R/V *Steller*. The primary objectives of the trip were to (1) deploy satellite transmitters on immature and mature female harbor seals to assess overwinter movement patterns and habitat use, and (2) collect biological samples to assess genetic make-up, and health/disease status.

## Methods

Seals were captured by deploying monofilament nets from small inflatable skiffs in Johns Hopkins Inlet. A total of 50 harbor seals were captured including 20 young-of-the year (10M, 10F), 3 yearlings (1M, 2F), 8 subadults (2M, 6F), and 19 adults (7M, 12F) (Table 1). Morphometric measurements, blood, serum, hair, vibrasse, and tissue for genetics were taken from each seal. In addition, a portable ultra-sound unit was used to non-invasively measure body condition. The ultra-sound procedure was conducted by Dr. Lori Polasek (AKSLC) and involves the application of water to the pelage, followed by momentary pressure to the skin in the xiphisternal, neck, shoulder, and hind quarters of each seal.

## Overwinter Movements and Habitat Use of Seals

To assess overwinter movements and habitat use, satellite tags (Spot 5, Wildlife Computers) were attached to 22 female (12 immature, 10 mature) harbor seals (Table 1). Specifically, our objectives are to identify important overwinter habitats, determine if movement patterns and habitat use differ between immature (non-breeding) and mature females during the winter months, and understand how habitat use relates to factors such as oceanographic conditions.

The satellite tags were glued to the head (Figure 1) and programmed to transmit location data and haulout statistics (% of each day spent hauled out) every day for 12 hours per day. Locations from each seal are received via System Argos, downloaded, and processed using the Douglas Argos-Filter Algorithm which ingests satellite tracking data and flags improbable locations based on user defined distance and velocity thresholds (Dave Douglas, USGS Alaska Science Center).

In addition, 9 flipper-mounted satellite tags were provided by the National Marine Mammal Laboratory and deployed to determine longer-term movement patterns of seals. The flipper-mounted satellite tags are expected to transmit for up to 3 years and will primarily provide haulout location information.

As of 3 October 2008, the satellite tags have been deployed for 13-22 days on seals, depending upon date of deployment. All tagged seals have departed JHI, with only a few remaining in Glacier Bay. Most seals have moved into Icy Strait, Cross Sound, Lynn Canal, and the Gulf of Alaska (GOA) (Figure 2 & 3). Tagged seals that still remain in Glacier Bay are located in Rendu Inlet (n=2), Tidal Inlet (n=1), and in the lower bay area around the Beardslee Islands (n=3). Over the last 2 weeks several tagged seals have congregated in Mud Bay (Icy Strait), the upper reaches of Dundas Bay, and in

Berners Bay (Lynn Canal) (Figure 2 & 3). The use of these areas by seals is most likely influenced by the presence of spawning coho salmon.

Three adult females have already traveled into the GOA (PV08GB21, PV08GB22, PV08GB31). In particular, seal #PV08GB21 captured on 13 September 2008, traveled out of JHI on 14 September and reached the Fairweather Grounds by 15 September. She stayed at-sea for ~5 days (15-19 Sept) in the vicinity of the Fairweather Grounds area then traveled back to mainland to the Alsek River area on 21 September. Between 21-24 September she was located along the Alsek River and the Yakutat Forelands. On 24 September, she traveled back to the continental shelf margin where she remained at-sea for ~8 days (24 Sept-1 Oct). On 2 October she traveled back to the mainland near the Dangerous River (Figure 2). Anticyclonic eddies form and occur in the GOA just off the continental shelf of south of Yakutat in the same general vicinity as the locations if PV08GB21. Eddies may influence the distribution of phytoplankton biomass, migratory patterns of fish, as well as the foraging patterns of upper-trophic level predators, such as seals. Another adult female #PV08GB31 has been in the vicinity of La Perouse Glacier on the outer coast since 19 September. Seal #PV08GB22, also an adult, has just recently traveled out to the continental shelf margin beyond Cape Spencer (Figure 2).

Harbor seals that inhabit the marine waters of GBNP are protected during the breeding season by several measures including the closure of important seal pupping areas to vessel traffic; however, satellite telemetry data from 2007 demonstrate that some immature female harbor seals captured in JHI spend a substantial amount of time (up to ~8 months) outside of the boundaries of GLBA during the non-breeding season. Thus a significant portion of their annual cycle is spent outside of the protected waters of GBNP where they may be exposed to numerous threats with significant demographic consequences.

This project represents the first effort to quantify spatially explicit space-use patterns of individual harbor seals from a glacial fjord system in Alaska. Ultimately, understanding the seasonal movement patterns and winter habitat use of individual harbor seals from GLBA is critical for several reasons. First, identifying important foraging habitat and migratory routes is a central management question. Second, the nonbreeding season may be the most energetically challenging period for juvenile harbor seals, thus understanding individual variability in movement tactics relative to biophysical variables is critical. Third, harbor seals are capital breeders that to a large extent depend upon stored energy to nourish offspring during the breeding season and identification of foraging areas and habitat use during the non-breeding season is essential. This project will contribute to our knowledge of over-winter migratory patterns and habitat use of harbor seals that occupy glacial fjord systems and will have implications for the conservation and management of harbor seals stocks in Alaska.

**Health and Disease Status of Seals**

To assess health and disease status of harbor seals we partnered with Dr. Todd O'Hara (UAF), graduate student Darce Holcomb, and scientists from the Alaska Sealife Center. This partnership, with funding from National Park Service (NRPP-NRM), Oceans Alaska Science and Learning Center (OASLC), and the Alaska Sealife Center, will assess health and disease status, and be examined in the context of the

recent population decline, representing the first systematic study of health and disease status in an upper-trophic level predator in Glacier Bay. Specifically, the project includes a systematic evaluation of serum for antibodies against specific disease agents (marine and canine morbilliviruses, *Brucella* spp., *Leptospira* spp., Avian Influenza, *Toxoplasma gondii*). Fecal samples will be used to detect and genotype protozoa (*Cryptosporidium* spp. and *Giardia* spp.). In addition, serum, whole blood, and hair are undergoing analyses for stable isotopes, as well as determining concentrations of Hg, Se, Cd, Zn, Pb, and Cu. Laboratory analysis is currently ongoing with archived samples collected during previous capture trips and samples that were recently collected.

**Other Observations**

Two seals captured during these efforts were‘re-captures’ from 2006 and 2007, allowing for an assessment of growth and health of these individuals and comparison of movement patterns across years. Seal # PV08GB36, a yearling female, was previously captured in Fall 2007 as PV07GB21. In both 2007 and 2008, a head-mounted satellite tag was attached to this seal. Between September 2007 to June 2008, she remained primarily within in the Glacier Bay/Icy Strait and returned to JHI during the 2008 breeding season. As of October 1, 2008, this seal was located in Port Frederick near Halibut Island. Seal #PV08GB42, an adult male, was previously captured in Fall 2006 as PV06GB45. Both ‘re-captured’ seals appeared to be in good body condition.

Finally, seal# PV08GB41, a young-of-year female, had a large granulated open wound along her mid-dorsal area. The wound was approximately 13 cm in length, 3 cm in width, and ~0.3 cm in depth. In addition, to the large granulated open wound, there was also smaller possible puncture wound adjacent to the larger wound. The source of this wound is not known; however, digital images of the wound were archived and will be sent to colleagues experienced in the identification of bite wounds on pinnipeds.

**Acknowledgements**

Harbor seal capture trip biologists and crew included Jamie Womble (NPS), Scott Gende (NPS), John Jansen (NMML), John Wells (ADFG), Lori Polasek (AKSLC), Jill Prewitt (AKSLC), Darce Holcombe (UAF), Rachel Dziuba, DVM (Bridge Veterinary Services), Jamie King (ADF&G), Suzanne Conlon, Nat Lazzaretti, Captain Dan Foley (R/V *Steller*), and Char Damron. Logistical support and gear were provided by USFWS, ADFG, AKSLC, UAF, NMML, and NPS. Funding for this project was provided by NPS-NRPP, NMML-Polar Ecosystem Program, and Alaska Sealife Center. Harbor seal captures were conducted under NOAA Fisheries Permit No. 782-1676-02 issued to Alaska Fisheries Science Center-National Marine Mammal Laboratory and GLBA Scientific Permit #GLBA-2008-SCI-0004.

Table 1. Table 1. Animal id#, capture date/location, sex, estimated age, and mass of harbor seals captured from September 12-19, 2008 in Johns Hopkins Inlet, Glacier Bay National Park.

| Animal ID# | Capture Date | Capture Location | Sex | Estimated Age | Mass (kg) | Satellite Tag | Tag Location | Recapture |
|---|---|---|---|---|---|---|---|---|
| PV08GB01 | 9/12/2008 | Johns Hopkins Inlet | F | SA | 34.0 | X | Head | |
| PV08GB02 | 9/12/2008 | Johns Hopkins Inlet | M | YOY | 27.7 | | | |
| PV08GB03 | 9/12/2008 | Johns Hopkins Inlet | M | SA | 55.9 | X | Left hind flipper | |
| PV08GB04 | 9/12/2008 | Johns Hopkins Inlet | M | YOY | 26.8 | | | |
| PV08GB05 | 9/12/2008 | Johns Hopkins Inlet | F | AD | 55.0 | X | Left hind flipper | |
| PV08GB06 | 9/12/2008 | Johns Hopkins Inlet | M | AD | 65.0 | X | Left hind flipper | |
| PV08GB07 | 9/12/2008 | Johns Hopkins Inlet | F | AD | 67.7 | X | Left hind flipper | |
| PV08GB08 | 9/12/2008 | Johns Hopkins Inlet | M | YOY | 24.1 | | | |
| PV08GB09 | 9/12/2008 | Johns Hopkins Inlet | M | AD | 87.3 | X | Left hind flipper | |
| PV08GB10 | 9/12/2008 | Johns Hopkins Inlet | F | SA | 38.0 | X | Head | |
| PV08GB11 | 9/12/2008 | Johns Hopkins Inlet | M | YR | 30.5 | | | |
| PV08GB12 | 9/12/2008 | Johns Hopkins Inlet | M | YOY | 26.8 | | | |
| PV08GB13 | 9/13/2008 | Johns Hopkins Inlet | F | YOY | 25.9 | | | |
| PV08GB14 | 9/13/2008 | Johns Hopkins Inlet | M | AD | 62.3 | X | Left hind flipper | |
| PV08GB15 | 9/13/2008 | Johns Hopkins Inlet | F | SA | 32.3 | X | Head | |
| PV08GB16 | 9/13/2008 | Johns Hopkins Inlet | M | YOY | 27.7 | | | |
| PV08GB17 | 9/13/2008 | Johns Hopkins Inlet | F | AD | 48.6 | X | Head | |
| PV08GB18 | 9/13/2008 | Johns Hopkins Inlet | F | SA | 32.3 | X | Head | |
| PV08GB19 | 9/13/2008 | Johns Hopkins Inlet | F | YOY | 23.1 | | | |
| PV08GB20 | 9/13/2008 | Johns Hopkins Inlet | M | YOY | 30.9 | | | |
| PV08GB21 | 9/13/2008 | Johns Hopkins Inlet | F | AD | 56.4 | X | Head | X (2007) |
| PV08GB22 | 9/13/2008 | Johns Hopkins Inlet | F | AD | 54.5 | X | Head | |
| PV08GB23 | 9/13/2008 | Johns Hopkins Inlet | F | SA | 35.5 | X | Head | |
| PV08GB24 | 9/13/2008 | Johns Hopkins Inlet | M | YOY | 22.7 | | | |
| PV08GB25 | 9/14/2008 | Johns Hopkins Inlet | F | YOY | 25.5 | | | |
| PV08GB26 | 9/14/2008 | Johns Hopkins Inlet | M | YOY | 27.7 | | | |
| PV08GB27 | 9/14/2008 | Johns Hopkins Inlet | F | SA | 38.6 | X | Head | |
| PV08GB28 | 9/14/2008 | Johns Hopkins Inlet | M | AD | 63.6 | X | Left hind flipper | |
| PV08GB29 | 9/14/2008 | Johns Hopkins Inlet | M | YOY | 29.5 | | | |
| PV08GB30 | 9/14/2008 | Johns Hopkins Inlet | M | YOY | 28.2 | | | |
| PV08GB31 | 9/14/2008 | Johns Hopkins Inlet | F | AD | 65.5 | X | Head | |
| PV08GB32 | 9/14/2008 | Johns Hopkins Inlet | F | YOY | 28.2 | | | |
| PV08GB33 | 9/14/2008 | Johns Hopkins Inlet | F | YOY | 29.1 | | | |
| PV08GB34 | 9/14/2008 | Johns Hopkins Inlet | F | YOY | 29.1 | | | |
| PV08GB35 | 9/14/2008 | Johns Hopkins Inlet | F | AD | 71.8 | X | Head | |
| PV08GB36 | 9/14/2008 | Johns Hopkins Inlet | F | YR | 33.6 | X | Head | |
| PV08GB37 | 9/14/2008 | Johns Hopkins Inlet | M | AD | 65.9 | | | |
| PV08GB38 | 9/15/2008 | Johns Hopkins Inlet | F | YR | 32.0 | X | Head | |
| PV08GB39 | 9/15/2008 | Johns Hopkins Inlet | F | AD | 80.5 | X | Head | |
| PV08GB40 | 9/15/2008 | Johns Hopkins Inlet | M | AD | 68.6 | X | Left hind flipper | |
| PV08GB41 | 9/15/2008 | Johns Hopkins Inlet | F | YOY | 32.7 | X | Head | |
| PV08GB42 | 9/16/2008 | Johns Hopkins Inlet | M | AD | 85.0 | | | X (2006) |
| PV08GB43 | 9/17/2008 | Johns Hopkins Inlet | F | AD | 70.0 | X | Head | |
| PV08GB44 | 9/17/2008 | Johns Hopkins Inlet | M | SA | 54.5 | X | Left hind flipper | |
| PV08GB45 | 9/18/2008 | Johns Hopkins Inlet | F | YOY | 28.6 | X | Head | |
| PV08GB46 | 9/18/2008 | Johns Hopkins Inlet | F | AD | 65.0 | X | Head | |
| PV08GB47 | 9/18/2008 | Johns Hopkins Inlet | F | YOY | 30.0 | X | Head | |
| PV08GB48 | 9/18/2008 | Johns Hopkins Inlet | F | AD | 55.9 | X | Head | |
| PV08GB49 | 9/18/2008 | Johns Hopkins Inlet | F | YOY | 23.6 | X | Head | |
| PV08GB50 | 9/18/2008 | Johns Hopkins Inlet | F | AD | 69.0 | X | Head | |

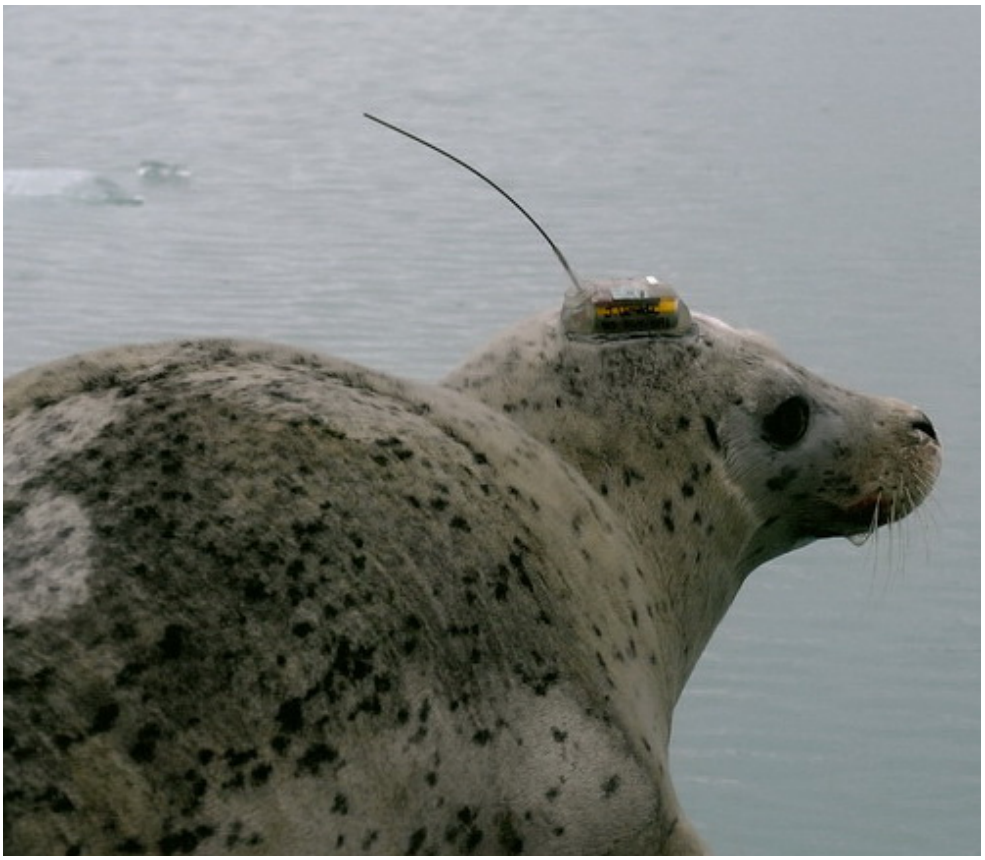

Figure 1. Harbor seal with head-mounted satellite tag.

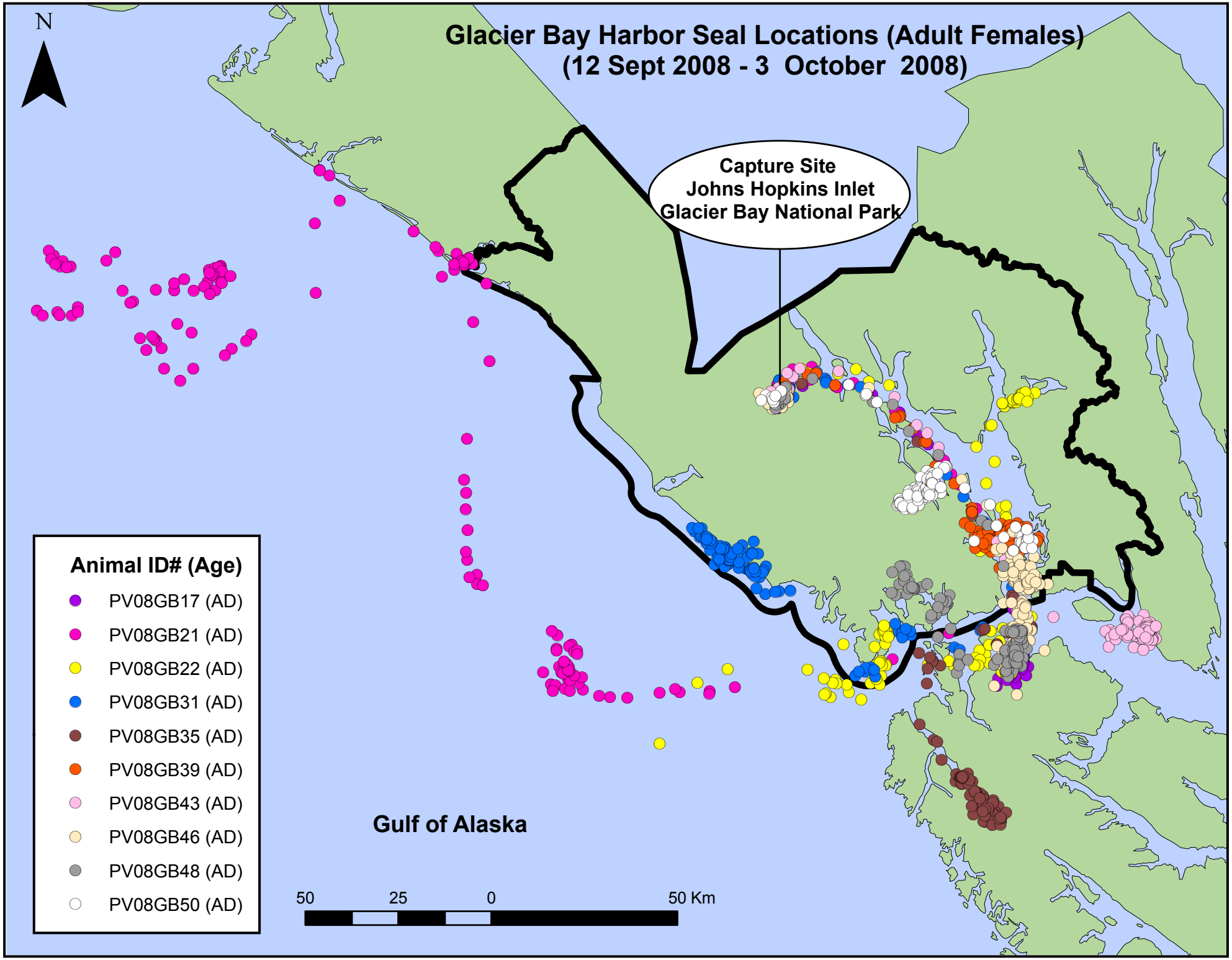


Figure 2. Plotted positions are filtered satellite telemtery locations for adult female harbor seals (n = 10) from 12 September - 3 October 2008.

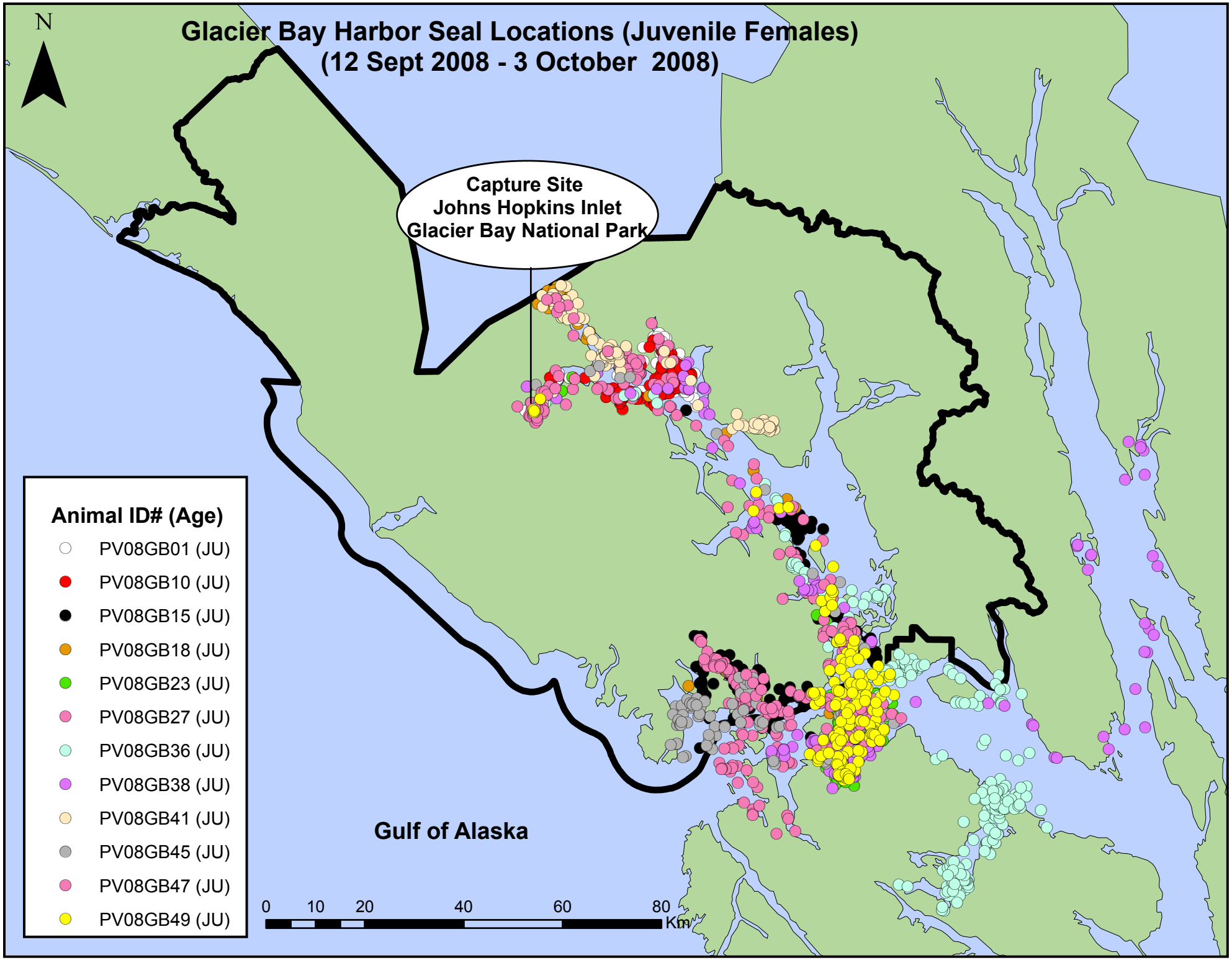


Figure 3. Plotted positions are filtered satellite telemtery locations for juvenile (JU) female harbor seals (n = 12) from 12 September - 3 October 2008.