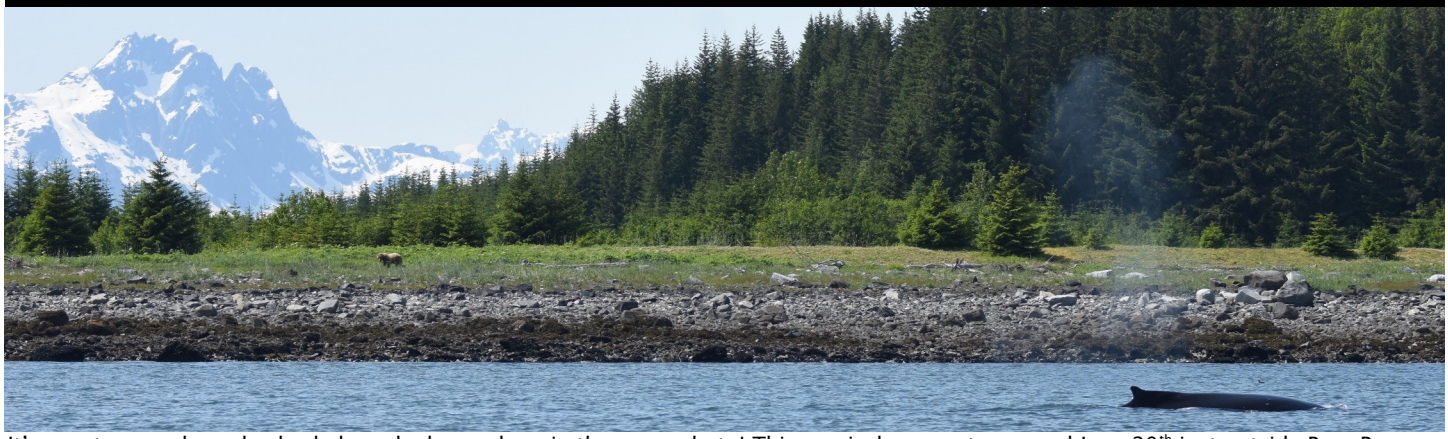
Glacier Bay & Icy Strait Humpback Whale Population Monitoring: 2025 Update

National Park Service
U.S. Department of the Interior

Glacier Bay National Park & Preserve



It's rare to see a humpback whale and a brown bear in the same photo! This magical moment occurred June 20th just outside Berg Bay.

Background

Migratory humpback whales (*Megaptera novaeangliae*) use the waters in and around Glacier Bay National Park and Preserve (GBNPP) in southeastern Alaska (SEAK) as spring, summer, and fall feeding habitat. The majority spend the winter breeding season in Hawai'i but at least 10% migrate to Mexico. Commercial whaling decimated these populations until the mid-1970s. Most whales return to the same feeding areas where their mother brought them as a calf. This strong maternally directed site fidelity drove population growth until the unprecedented 2014–2016 NE Pacific marine heatwave (PMH) caused an abrupt crash in the SEAK population (Gabriele *et al.* 2022) and throughout the North Pacific (Cheeseman *et al.* 2024) and highlighted that climate change is a growing threat to this species.

This report summarizes results from 2025, the 41st consecutive year of GBNPP's humpback whale monitoring program in Glacier Bay and Icy Strait. The initial impetus for this program stemmed from concern in the 1970s that increased vessel traffic in Glacier Bay may have caused many whales to abandon the bay (Jurasz and Palmer 1981). Understanding the condition of the whale population is essential to making informed management decisions. GBNPP's decades-long annual monitoring program is unique within Alaska and has produced one of the world's longest and most complete time-series of data on a baleen whale population.

Key Findings from 2025

- Whale abundance in Glacier Bay–Icy Strait decreased compared to 2024 and overall numbers remain ~30% lower than before the 2014–2016 NE Pacific marine heatwave (PMH). The most profound long-term effects appear to be in Icy Strait where effort-corrected abundance is 42.5% lower than before the PMH.
- After a "baby boom" in 2024 we documented only six calves, yielding a below average crude birth rate (3.8%), though calf and juvenile survival appear to be rebounding following the PMH.
- Lingering impacts from the PMH suggest there will be reduced humpback whale population growth in the coming years, even if feeding conditions are favorable.
- Whales appeared to move around the study area more than normal in search of food, with more emaciated whales and forage fish monitoring confirming that prey were more dispersed and there were fewer large concentrated schools than in 2024.
- In late June, we documented two whales with new injuries that appeared to be incisions from vessel propellers. Despite the severity of whale #2583's injuries, it was resighted up to 53 days later and appeared to behave normally.
- We confirmed the survival of #5490 (entangled in October 2023) and #2800 (struck by a vessel in Glacier Bay in August 2011) through sightings of both whales in 2025.

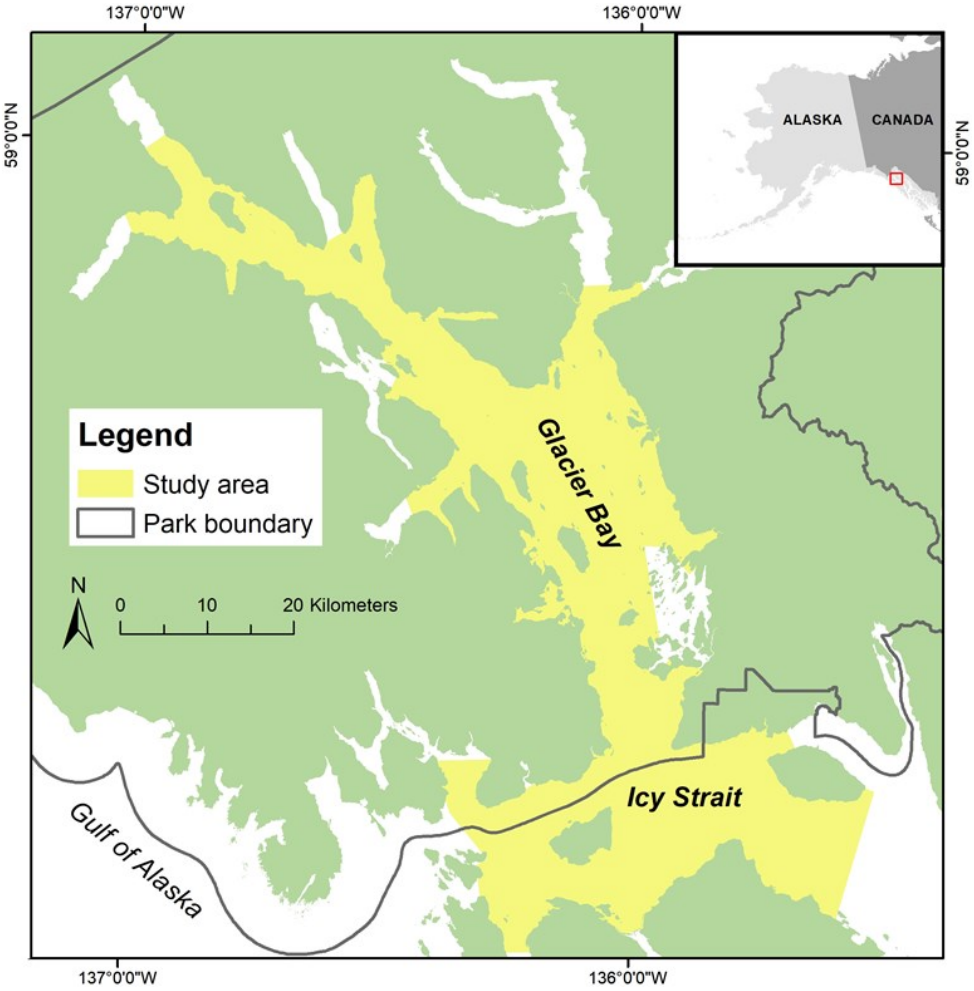


Figure 1. Study area in Glacier Bay and Icy Strait, Alaska.

Figure 2. The stable, distinct coloration and shape of a whale's flukes allow researchers to track individuals over time. Each whale receives a unique identification number. For example, the whale with black flukes is adult female #1834 (left) and the whale with white flukes is 31-year-old male #1293 (right).

Figure 3. R/V *Sand Lance* underway with research team. (Photo © UNESCO /Mark Kelley)

Where & How Do We Gather Data?

Every year since 1985, GBNPP biologists have conducted small boat-based photo-identification surveys in Glacier Bay (GB) and Icy Strait (IS) (Figs. 1, 2) 4-5 days per week from June 1 – August 31 (core period) with less frequent surveys in the spring and fall (see Gabriele *et al.* 2017 and Neilson *et al.* 2018 for detailed methods). Our primary goal is to describe the distribution and abundance of humpback whales in a way that is comparable between years. We use a mixed approach in which we target 'hotspots' where whales have been reported or are known to frequent, while also surveying areas where whales may or may not be present.

Between May 6-September 12, 2025, we searched for and photographed humpback whales from the 5.8-m *R/V Sand Lance* (Fig. 3). We took photos of each whale's flukes & dorsal fin with a Nikon D7200 camera equipped with an 80-400mm zoom or 300mm lens.

We compared these photos to previous GBNPP photos to determine the identity and past sighting history of each whale. We also used the Happywhale.com automatic matching system to identify some whales. We entered sighting data, including group composition and behavior state, in a database shared with the University of Alaska Southeast in Sitka. We calculated the crude birth rate (CBR) as # calves/total # whales identified during the core monitoring period.

Other information that we collected opportunistically included: a) sloughed whale skin for genetic analysis and b) opportunistic observations of whales' body condition (*e.g.,* emaciation), body size (*e.g.,* small), and probable whale prey. Whale distribution data from surveys form the basis of recommendations to the GBNPP superintendent on where and when 'whale waters' vessel speed and/or course restrictions should be implemented to protect humpback whales from vessel collisions and disturbance.

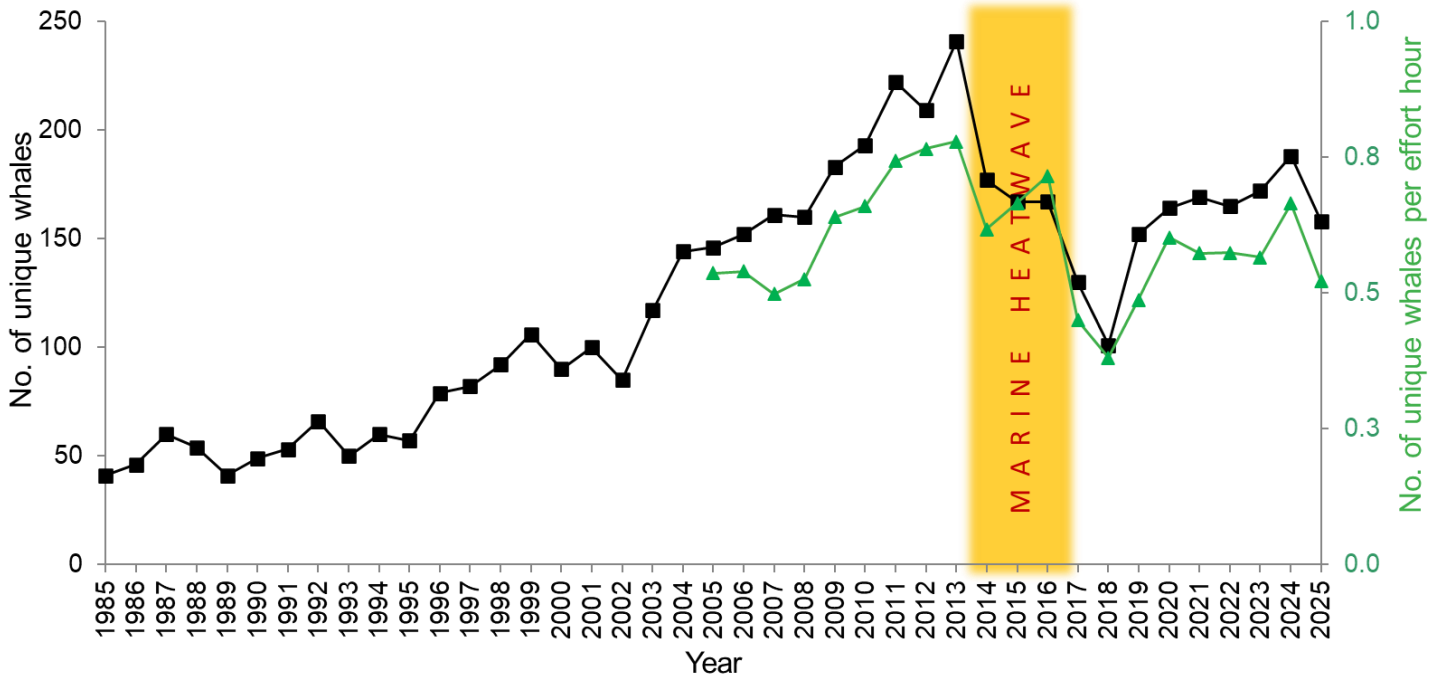


Figure 4. Relative abundance metrics for Glacier Bay & Icy Strait. Annual whale counts (black squares) and annual whale counts corrected for survey effort (green triangles) from June 1 – August 31, 1985–2025. A marine heatwave dominated the NE Pacific Ocean during the period highlighted in orange. Whales/effort hour is not available for 1985–2004.

What Did We Find in 2025?

Survey Effort

Our survey effort during the June 1 – August 31, 2025 core period (303 h) was above average compared to 2005–2024 (mean 286 h, SD = 21 h) but within the range for survey effort in these years (233–323 h). We strive to maintain consistent survey effort each year but it inevitably fluctuates as a result of factors such as weather, staff availability, and unexpected events (*e.g.,* mechanical issues and marine mammal strandings).

Whale Counts

Between June 1 and August 31, we documented 158 unique humpback whales (Fig. 4, black squares) in GB-IS. This raw count represents a 16.0% decrease compared to 2024. Correcting the count for survey effort reveals a 21.6% decrease compared to 2024 (Fig. 4, green triangles). This decline follows a record number of calves in 2024 and a four-year period (2020–2023) in which total abundance remained relatively flat and depressed following the 2014–2016 Northeast Pacific marine heatwave (PMH).

It has been nine years since the PMH subsided and the GB-IS humpback whale population has not recovered to pre-PMH levels. The PMH caused widespread and prolonged ecological disruption (Arimitsu *et al.* 2021, Suryan *et al.* 2021) and a significant decline in the North Pacific humpback whale population (Cheeseman *et al.* 2024). Effort-corrected abundance overall (0.52 whales/effort hr) is 33.1% lower than before the PMH, when it peaked at 0.78 whales/effort hr in 2013. In Glacier Bay, effort-corrected abundance (0.55 whales/effort hr) is 37.2% lower than before the PMH, when it peaked at 0.87 whales/effort hr in 2012. In Icy Strait, the decline is even more substantial, where effort-corrected abundance (1.15 whales/effort hr) is 42.5% lower than before the PMH, when it peaked at 2.01 whales/effort hr in 2013.

Outside of the core monitoring period, we documented four additional whales (two in GB, two in IS) for a grand total of 162 unique whales in 2025. Across all dates and not including calves, four whales were new to the study (one in GB-IS, three in IS).

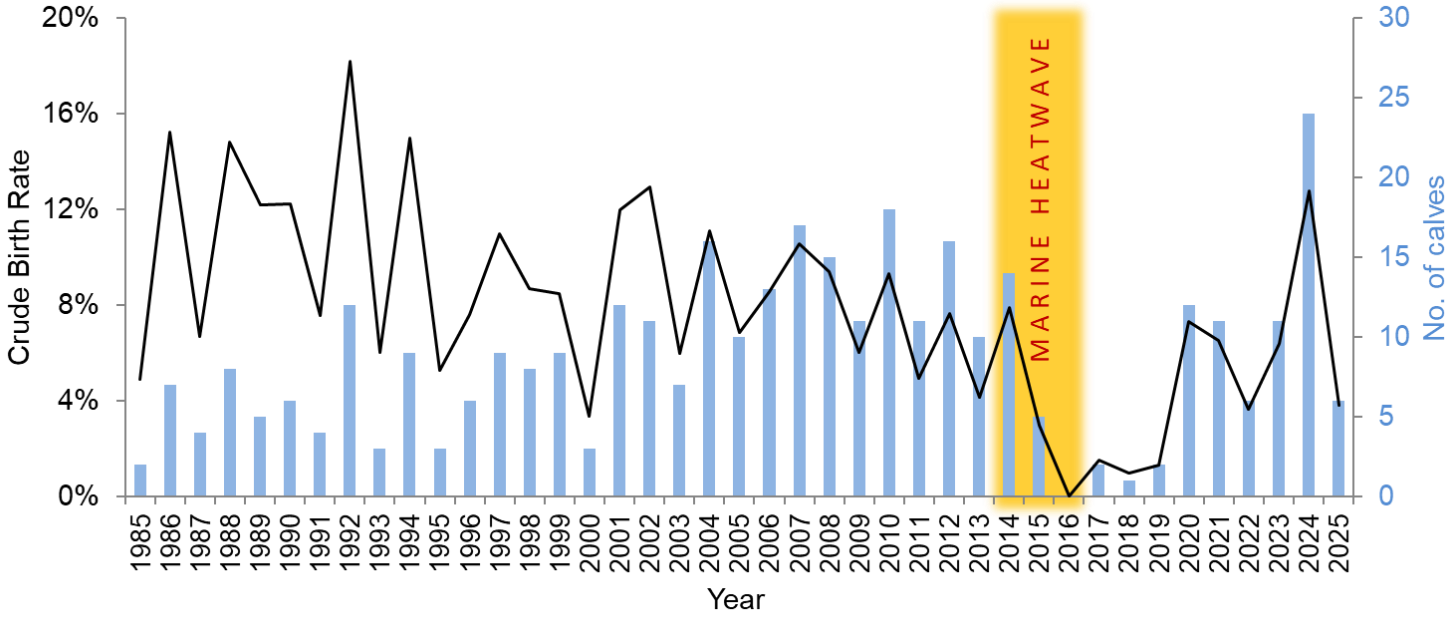


Figure 5. Crude birth rate (black line; # calves/total # whales) and annual number of calves (blue bars) in GB-IS from 1985-2025.

Reproduction & Juvenile Survival

We documented six mother/calf pairs, yielding a crude birth rate (CBR) of 3.8% (Fig. 5). This represents a sharp decline in productivity following the 2024 "baby boom" when we documented 24 calves and a CBR of 12.8% (Neilson *et al.* 2025). The 2025 CBR is far below the long-term average CBR before the PMH (9.2%, 1985-2013) and also lower than the post-PMH mean CBR (6.7%, 2020-2025).

The simplest explanation for the low CBR in 2025 is that the record high number of females that calved in 2024 left fewer females available to have a calf in 2025, given the 2-3 year mean calving interval for this population (Gabriele *et al.* 2017). This effect is exacerbated by the number of adult females (and males) that are presumed to have died during and after the PMH, estimated at 58 whales in Glacier Bay and Icy Strait alone (Neilson *et al.* 2024, Neilson *et al. in prep*).

Two of this year's mothers had their first known calf: #2324 (age 15 with a complete sighting history since age 2) and #2582 (minimum age 13 with a complete sighting history since 2013 and noted as small-medium in size 2013-2018). These females are older than 11-12 years, which was documented as the average age of first calving in this population based on Alaska sightings from 1985-2014 (Gabriele *et al.* 2007, 2017). Female #2324 was reported to be accompanied by a calf at age 12 during a March 2022 citizen science sighting in Hawai'i[1], however this could not be confirmed, and when we observed her in the study area in summer 2022, she did not have a calf.

Unlike last year when several mothers had unusually long calving intervals (9-11 years), four mothers in 2025 who had prior calves had apparent calving intervals of 2-4 years, which is within the normal range for this population (Baker *et al.* 1987, Gabriele *et al.* 2017). These more typical intervals indicate that reproductive rates may be normalizing after the severely disruptive PMH, however this year's low CBR indicates that feeding conditions in the prior two years (2023-2024) may not have been sufficient to support the body condition needed for more females to calve successfully (Frankel *et al.* 2021, Moran *et al.* 2025).

After a pulse of apparent mid-summer calf mortalities during and after the PMH, we have detected none since 2021. All of the 2025 calves appeared to be in relatively good body condition with a healthy amount of nuchal fat and none had questionable skin conditions like those we noted in 2024 (Gabriele *et al.* 2024, Neilson *et al.* 2025). However, four of the six mothers appeared to be in poor body condition throughout the summer, based on protruding scapulas or low amounts of nuchal fat.

Several GB-IS calves born between 2019-2024 have been resighted in subsequent years in the study area (Fig. 6) or elsewhere, indicating increased juvenile survival since the PMH. In contrast, only one of 22 GB-IS calves born in 2014-2018 is known to have survived past its calf year (#2772, an individual from the Mexico Distinct Population Segment (DPS) which was less affected by the PMH than the Hawai'i DPS; Cheeseman *et al.* 2024). In August, we resighted the 2024 calf of #1846, whose absence during a late September 2024 observation led to speculation about mid-season calf mortality (Neilson *et al.* 2025). The documented survival of this whale reinforces the concept that an absent calf in the fall may indicate temporary separation or weaning rather than calf mortality.

Figure 6. Two-year-old #2716 (first documented as a calf in GB in 2023) returned to GB for the third year in a row as seen in this July 29th photo.

The profound ecological effects of the PMH and its aftermath induced a 6-year period of low humpback whale calf survival, low productivity, and negligible recruitment that began in 2014 (11 years ago) (Gabriele *et al.* 2022) which is also the mean age at first calving for this humpback whale population (Gabriele *et al.* 2007, 2017). We suspect that a reduced number of females in the cohort that would be expected to produce their first calf in 2025-2030 will be reflected in low CBRs for years to come.

Moreover, if the PMH trophic disruption continues to increase the age at first calving, as suggested by our past few years' observations, that may also affect long-term population growth. Food limitation has been associated with delayed onset of reproduction in ungulates (Gaillard *et al.* 2000) and would not be unexpected for post-PMH whale populations. Previous work demonstrated that recruitment from within, as opposed to immigration, has been the foundation of humpback whale population growth in the GB-IS area (Pierszalowski *et al.* 2016). All of these factors suggest reduced humpback whale population growth in the coming years, even if feeding conditions are favorable.

Site Fidelity

Between June 1 and August 31, 74% (n = 117) of whales were considered 'resident' (resighted over a span of ≥20 days) (range 20-86 days) (*e.g.,* Fig. 7) and 14% (n = 22) were considered 'transient' (sighted one day only). It is notable that most whales documented in GB-IS (1985-2025 mean = 88%) are either residents or transients, with few whales spending an intermediate amount of time in the area. During and after the PMH, we documented a general trend of low residency (2014-2018: mean = 51%) and high transience (2014- 2018: mean = 33%). However, since 2019 the residency and transience rates have been more similar to before the PMH (2005-2013:

Figure 7. Twenty-one year old resident male #1836 was observed in GB beyond the core monitoring season from June 5th – September 4th (92 days). Seen in GB every year since he was a calf, he frequents shallow water areas between Beardslee Entrance and South Marble Island and uses an unusual surface feeding method in which he uses his flippers to push fish into his mouth.

mean residency = 8%; mean transience = 22%). The resumption of a pattern of high residency and low transience presumably reflects the return of favorable feeding conditions in GB-IS since the PMH.

Adult male #159 (age ≥52) returned to the study area for the 39th consecutive summer, giving him the longest unbroken sighting record of any whale in this study. Furthermore, #159's earliest known sighting was in GB in 1974 (Jurasz family/Sea Search Ltd., unpublished data) and his 52-year sighting history (1974-2025) is the longest known span for any living whale in GB-IS.

Tissue Samples

We collected eight sloughed skin samples from eight unique individuals, including four of the six calves (Fig. 8). Since 1996, we have collected 419 sloughed skin samples which are analyzed by the Cetacean Conservation and Genomics Lab at Oregon State University for sex determination, mitochondrial DNA haplotype, and nuclear DNA genotyping. These samples contribute to a broader understanding of humpback whale population genetics in the North Pacific (*e.g.,* Baker *et al.* 2013, Pierszalowski *et al.* 2016, 2023).

Figure 8. Calf #2798 breaches on June 2nd. Once the whale has moved away, GBNPP is permitted to collected sloughed skin floating on the ocean surface to send to a lab for genetic analysis.

Physical Condition

Twenty-two (14%) of the 158 whales we observed during the core monitoring period appeared to be "skinny" based on physical indicators such as visible scapulas, an overall "angular" appearance, and/or the presence of a post-cranial depression. Although our observations are opportunistic, a slightly higher proportion of the population was judged to be emaciated compared to 2024 (11%), but the rate remained lower than in 2017-2023 (Fig. 9), when we first started to notice whales in poor body condition in the summer following the PMH. The increased emaciation rate in 2025 indicates that feeding conditions may have declined in 2024 and 2025 but our methods are too subjective to be conclusive.

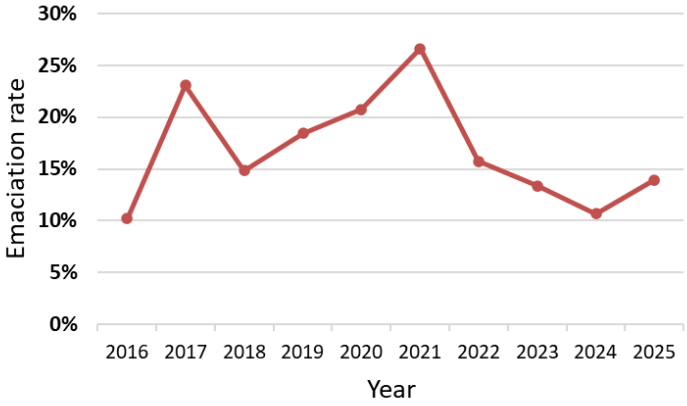


Figure 9. Rate of emaciation (number of "skinny" whales observed June 1 – August 31 divided by the total number of whales during this period) in GB-IS whales in 2016-2025.

Adult female #250 (age ≥46) was emaciated as a mother in 2022, not documented in GB-IS in 2023, and then extremely emaciated in 2024 and 2025 (through our last observation on August 18th). It is notable that she has survived for years in such an emaciated state. Van Aswegen *et al.* (2025) found that females may require more than one feeding season to recover their body condition, however it is unclear why #250 remains so emaciated.

Unlike 2023 and 2024, we received no reports of killer whales (*Orcinus spp.)* "attacking", "harassing", and/or interacting with humpback whales in the study area. The lack of reports in 2025 was surprising given the sudden increase in these types of reports in GB-IS in 2023 and 2024 (Neilson *et al.* 2024, 2025).

Figure 10. Female #1896 flick feeds close to shore in Sitakaday Narrows on July 8th. Her head is underwater to the left and the dorsal side of her flukes is visible as she throws her tail rapidly forward, slapping the water surface with the topside of her flukes. A few seconds later, she lunged at the surface to engulf the prey that she had presumably stunned with this impressive feeding technique. A nearby marbled murrelet caught a capelin (inset photo), indicating this may have been what #1896 was feeding on, too.

Whale Prey and Feeding Behavior

Whales in GB-IS predominantly feed on forage fish, although krill may be targeted in parts of Glacier Bay. Opportunistic observations of near-surface forage fish in 2025 documented the presence of capelin (*Mallotus catervarius*), Pacific sand lance (*Ammodytes personatus*), and Pacific herring (*Clupea pallasii*) near feeding humpback whales in the study area. Unlike the summer of 2024 (*Neilson et al.* 2025), we did not observe unusually large schools of sand lance in GB.

Our overall impression was that whales were moving around the study area more than normal in 2025 in search of food, though this is difficult to quantify. Preliminary results from the GBNPP Forage Fish Monitoring Program, now in its second year, corroborate this observation by revealing that prey availability may have declined between 2024 and 2025. Based on standardized annual surveys in July, forage fish schools in GB were more dispersed and there were fewer large concentrated schools in 2025 *vs.* 2024 (A. Gulick, pers. comm.)

On August 19th we dip-netted an opportunistic sample of herring near whales that were feeding in Beardslee Entrance. This sample, along with additional samples collected starting in 2024 by the GBNPP Forage Fish Monitoring Program, are analyzed by our collaborators at the U.S. Geological Survey and the National Oceanic and Atmospheric Administration (NOAA) for body condition and algal toxins. Algal toxins, when consumed, can bioaccumulate in apex predators like humpback whales and seabirds.

We had fewer opportunistic detections of herring in Icy Strait in 2025 compared to 2023-2024, which is consistent with the lower effort-corrected whale count there in 2025 (1.15 whales/effort hr) compared to 2023-2024 (1.26-1.33 whales/effort hr). In addition, we did not observe any whales group bubblenet feeding in IS in 2025, a behavior typically associated with whales that are feeding on herring. Observations of group bubblenet feeding in IS were rare over the first three decades of this study, but occasional late summer occurrences became more common in recent years (2017, 2018, 2020, 2021, 2023, 2024; GBNPP unpublished data).

On four occasions between early July and mid-August 2025, we observed single whales engaged in "flick feeding" (Jurasz & Jurasz 1979) close to shore between Point Gustavus and Strawberry Island (Fig. 10). This is a relatively rare feeding behavior in the study area and in most cases we do not know what prey species the whales are targeting. However, during a July 8th observation, it seems likely the whale was feeding on capelin based on a sighting of a marbled murrelet nearby with a capelin in its mouth (Fig. 10 inset).

Whale/Human Interactions

Vessel Collisions

In late June, we documented two adult humpback whales with new injuries in Glacier Bay/Icy Strait that appeared to be incisions from vessel propellers: 37-year-old female #1019 (Fig. 11) and #2583 (sex and age unknown, minimum age 13) (Fig. 12). By comparing photos taken of both whales in the same area earlier in June, we confirmed that the injuries were new, however no vessel collisions had been reported in the area. The injuries were remarkably similar, however #2583's injuries were significantly more severe.

The deep incision on #2583's back appeared to be very fresh, perhaps just hours old on June 27th. The gash was estimated to be ~30 cm deep, exposing the blubber beneath the skin, although it was not bleeding. From the size of the cut, it is believed that the whale was struck by a medium to large vessel's propeller. Despite the severity of the injury, the whale was diving and appeared to be behaving normally.

Figure 11. Whale #1019 on June 24th. Red arrows point to new injuries acquired since June 4th.

Figure 12. Whale #2583 on June 27th. Red arrows point to new injuries acquired since June 16th.

We resighted both whales over the course of the summer, confirming their survival, which was not surprising for #1019 given her shallow wounds, but was unexpected for #2583 based on the severity of its wounds. We observed #2583 in GB on July 2nd, July 11th, August 14th, and August 19th, which offered a unique opportunity to observe the progression of wound healing following sharp trauma from a vessel collision. On the last encounter, the blubber appeared pink in color but there were no obvious signs of infection or cyamid (whale lice) infestation (Fig. 13). The whale was traveling and behaving normally with strong blows.

While #2583 is still at risk of debilitating infection, the fact that it appeared to be doing well almost two months (53 days) after the initial sighting of the injury offers a sense of cautious optimism that it may survive. Other whale researchers shared stories of other individuals with grievous injuries who have survived for many years. However, assuming the wound scars over, this whale will always carry a large gash that will presumably put it at higher risk of entanglement (because the deep injury will act as a catch-point for lines or other gear that the whale may encounter).

On August 16th, a vessel captain reported that a humpback whale surfaced under his boat, lifting the stern and rolling the vessel somewhat while he was anchored in Murphy Cove with the engine off (NMFS #2025288). This location is outside the study area but in park waters in Graves Harbor near Cape Spencer. The collision caused damage to the rudder and the captain found a piece of whale skin/blubber >10 cm in length attached to the rudder when the vessel was hauled out of the water following the incident.

Figure 13. Whale #2583 on August 19th showing wound healing.

Entanglements

On July 4th, a humpback whale became entangled in the mooring of a charter fishing vessel near the Gustavus dock in Icy Strait (NMFS #2025115). A witness reported seeing a whale thrashing and wheezing next to the boat while no one was onboard. The whale was entangled for an unknown length of time (at

least 10 mins) and dragged the vessel approximately 750 m before it freed itself and left the area. Shortly thereafter, the vessel owner recovered the vessel and all of the mooring gear, found no whale skin, and determined that no gear remained on the whale.

On July 17th, we documented injuries on adult female #2589's caudal peduncle that were consistent with a prior entanglement in line (Fig. 14). The injuries appeared to be unhealed (pink and yellow in color) and based on a comparison of photos from 2024, we determined that she had become entangled since summer 2024. It is possible that #2589 is the whale that was entangled near the Gustavus dock on July 4th, however her sighting history shows strong site fidelity to GB and it seems unlikely she would be present in Icy Strait in July.

On the evening of July 8th, an adult humpback whale was reported entangled in Icy Strait near Point Adolphus (NMFS #2025116). It was traveling west at 6-7 knots and dragging a line and buoy behind it that were positively identified as commercial crab pot gear from Canada. Photographs of the entangled whale's dorsal fin did not match any individuals in our catalog. We searched the area on July 9th but we did not re-locate the animal and there were no further sightings reported, therefore its fate remains unknown.

Happy Endings

On July 21st, a humpback whale was reported entangled in line near Flapjack Island in GB, however after reviewing photos from the reporting party, we concluded that the "line" was bull kelp (*Nereocystis lutkeana*) and no further response was needed.

In July and August, we resighted female #5490 feeding in GB, confirming her survival following a life-threatening entanglement in fishing gear (Neilson *et al.* 2024, NPS web story). The last sighting of this whale was on October 11, 2023 when we worked with colleagues at the Alaska Whale Foundation and NOAA to free her from the entanglement. Since then, her fate had been unknown with no subsequent sightings anywhere.

We also confirmed the survival of whale #2800, a small whale that was struck in August 2011 by a 22-m catamaran in GB (Neilson *et al.* 2012) when this whale was resighted in February[2] and March 2025[3] in Hawai'i.

Whale Waters

Six temporary whale waters areas with 13-knot vessel speed limits were designated in 2025 to protect shifting distributions of whales in the mid bay and lower West Arm (Fig. 15). In addition, a 10-knot vessel speed limit was in place around Jaw Point at the mouth of Johns Hopkins Inlet. Unlike 2024, when whales concentrated on the *eastern* side of lower GB, in mid- to late June 2025 whales concentrated on the *western* side, leading to a 13-knot limit in that area. By late June, whales were distributed throughout the Lower Bay and the speed limit was lowered to 13-knots throughout the area.

A.

B.

Figure 14. (A) Adult female #2589 actively feeding near Lester Point on July 17th. The red arrow points to a series of injuries on her caudal peduncle consistent with a prior entanglement in line. (B) Close-up photo of #2589's caudal peduncle showing that the injuries are pink and yellow in color (*i.e.,* unhealed). No entangling gear was visible and she was resighted in the study area through August 29th.

Figure 15. Female #2533 dives near the shoreline of South Marble Island where hundreds of Steller sea lions (*Eumetopias jubatus*) haul out each summer. Temporary whale waters with a 13-knot vessel speed limit were in place around the island for 15 days in June 2025.

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Sixteen-year-old #2164 breaches in mid-Glacier Bay as a distant cruise ship transits down the bay.