

Hungry Humpbacks: Measuring seasonal foraging intensity at South Georgia

Draft Project report: 2024 South Georgia Field Season

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PROJECT OVERVIEW AND OBJECTIVES

A recent study estimates that over 30,000 whales, predominantly humpback whales (*Megaptera novaeangliae*), visit South Georgia waters in the summer months (Baines et al., 2021), making this United Kingdom Overseas Territory the highest-density UK hotspot for recovering whales. Since humpbacks are known to be major krill consumers in the southern ocean, the yearly presence of this many whales has management implications for the South Georgia government-managed krill fishery. For example, in the summers of 2018 and 2019, whales were estimated to consume 3.38-5.08 million tonnes of krill in South Georgia territorial waters (Baines et al., 2021). While the winter krill fishery occurs when many humpbacks are on the breeding grounds, there is evidence that some whales may be resident in SG waters well into winter months (Calderan et al., 2023; Kennedy et al., 2023).

To maintain sustainable Antarctic fisheries, CCAMLR conducts regional krill risk assessments (KRA), integrating spatial data relating to krill stocks, predator foraging and krill fisheries into summer and winter data-layers. In the western Antarctic Peninsula (WAP), ~73% of krill consumed by higher predators in summer was estimated to go to whales, showing their impact (Warwick-Evans et al., 2022). The KRA requires summer and winter data on whale abundance, distribution and krill consumption rates. Krill consumption estimates vary widely (Baines et al., 2021; Savoca et al., 2021) and are mostly derived from summer feeding or whaling data. However humpback whale tagging studies in the WAP found that foraging rates declined 51% across the feeding season from summer to winter (Nichols et al., 2022). Additionally, humpback feeding rates are known to be demographically-specific. Therefore, applying standardized summer consumption rates to wintering whales can substantially overestimate total krill consumed, if whale age, sex, and/or behaviour is not considered.

The overall objective of the Hungry Humpbacks project is to quantify humpback whale demography and foraging rates at South Georgia using established proxies: body-shape (condition) and size (using UAV photogrammetry measurements), diving rates (using satellite tags) and epigenetically-measured age, providing seasonal, demographically-specific krill consumption estimates for the KRA, and generating tracking-based winter habitat use models to enhance the fishery management capacity of the Government of South Georgia and the South Sandwich Islands (GSGSSI).

SEASON SUMMARY

The 2024 summer field season was conducted from the King Edward Point (KEP) base on South Georgia Island. The scientific team left the Falkland Islands on January 12th aboard the M/V *Pharos* and arrived in South Georgia on the night of January 15th. The team conducted one and two-person cetacean watches on the south-bound transit on an opportunistic basis when weather and vessel operations were suitable.

Between January 16th and 21st, the team prepared the survey gear, familiarized themselves with KEP base protocol, and participated in small-boat training conducted by the BAS boating team. Small-boat training included man-overboard and other emergency drills, assessment of individual boat driving capacity, and familiarisation with KEP boating standard operating procedures. Whale surveys from KEP began on January 22nd and ended on March 18th (See Appendix I for a daily events summary). The team boarded the RSS *Sir David Attenborough* (SDA) on March 25 for transport to the Falkland Islands, via Signy. See other report for full details of operations conducted aboard the SDA during the transit.

There were five scientific team members and one dedicated vessel operator working on the project. Additional assistance was provided by the two BAS boat team members stationed at KEP, plus a rotating crew of BAS personnel from the KEP station. All data collection was carried out under permit RAP/2023/040 Issued by the GSGSSI following review and approval of all data collection approaches by the BAS Animal Welfare and Ethics Review Board (review #1090).

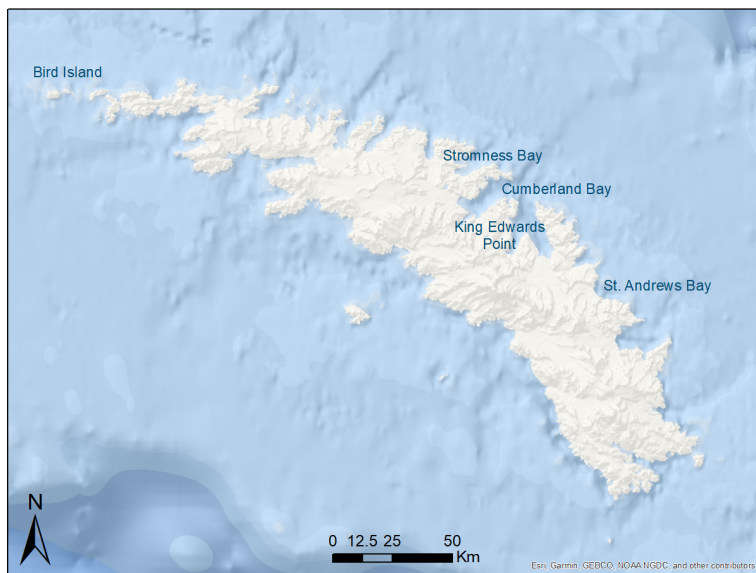


Figure 1: *Top*: A map showing the location of South Georgia Island within the South Atlantic Ocean. *Bottom*: A close view of the island, including the location of major landmarks.

METHODS

Visual Observations and Photographic Identification:

The BAS jet boats *M/V Pipit* or *M/V Prion* (used on an alternating schedule to distribute engine hours evenly between the two boats) were the primary observation and support vessels for the field operations. The rigid-hulled inflatable boat (RIB) *Sooty* was equipped with a specially designed tagging/biopsy platform and was always used on survey days as the primary biopsy, photo-identification, and tagging vessel.

Visual observations were carried out from the jet boat by one observer standing at an elevated piloting station on the port side of the outer deck of each jet boat, plus at least one additional observer stationed on the starboard side at deck level. Start/end of day, weather, sightings data, and observer effort were recorded from the jet-boat only. Observations were conducted opportunistically from *Sooty* whenever possible, yet their low clearance and exposure to weather did not allow for standardized observations.

When cetaceans were sighted, data were recorded on species identity, group size (minimum, maximum and likely “best” number of individuals). Sightings where species identification was not possible were classified to the lowest taxonomic level possible. Identification photographs were collected for all species whenever possible, depending on weather and distance from shore.

Satellite Tagging:

Remote attachment of satellite tags was undertaken using implantable MK10 dive-depth recording transmitters made by Wildlife Computers (Redmond, WA USA). These tags consist of a custom-designed stainless steel cylindrical-shaped instrument that penetrates the animal upon deployment. All tags were sterilized with ethylene oxide in a commercial gas sterilizer prior to arrival in Stanley. The sealed bags were not opened until moments before deployment. Sterilized tags were manipulated by the tagger (Kennedy), and were always handled with sterile latex gloves. The tags were briefly activated at KEP to ensure that they were collecting accurate locations before deployment. All non-deployed tags were powered down for long-term storage and transported to the Marine Mammal Laboratory by Kennedy.

Tags were deployed using a custom-modified pneumatic line throwing device (e.g. Air Rocket Transmission System, or ARTS) that is charged with a standard SCUBA tank with a DIN valve. The tags were implanted at distances from the whale ranging from 3-7 m to ensure optimal placement. Tagging is typically attempted during the final surfacing prior to a dive in order to ensure maximum exposure of the preferred dorsal/flank area, yet this is not always the best timing in every situation. Standard ARTS deployment pressures range from 10-15 bar (145 to 200 psi) and the pressure selected for each shot is dependent on whale species and body condition. Biopsy samples, video, and photo-identification data were collected during all tagging operations.

Biopsy sample collection:

Skin and blubber biopsy samples, for genetic, isotopic, hormone and transcriptome analyses, were collected using small (5cm), stainless steel biopsy darts deployed from a crossbow (Lambertsen, 1987). Biopsy collection took place using the crossbow from a custom-built platform on the front of the rigid inflatable boat designed specifically for this project. After a biopsy attempt, darts and/or samples were retrieved from the water either by hand or with a dip net. Depending on the length of the biopsy, skin and blubber samples were divided into 4 subsamples for genetics, stable isotope, hormone and transcriptome analysis, and stored in 95% ethanol (skin for genetic analyses) or frozen at -80°C (all other samples) at the King Edward Point research station for subsequent shipment to the British Antarctic Survey.

Aerial imagery:

An unmanned aerial vehicle (UAV; DJI Inspire 2) was used to collect aerial images of the dorsal side of surfacing humpback whales for body condition analysis. The UAV was launched from the back of the jet-boats and a laser range finder (attached to the UAV) was used to measure the exact altitude of the drone over the surfacing whale(s). The UAV was flown over the focal whale(s) at altitudes ranging from 20-50m. Video recordings of the whale(s) were made, and a still frame of each animal was extracted to create morphometric measurements. From each image, the body length (distance from the tip of the rostrum to the notch of the tail fluke) and widths (at 5% increments along the body axis of the whale) were extracted, in pixels, and converted to absolute size (meters) using the measured altitude of the UAV together with the known focal length, sensor size and image resolution (Christiansen et al., 2018). The body length and width data were used to estimate the body volume of the whales, using the approach of Christiansen et al. (2019). The body condition of each measured whale was then calculated as the residual of the log-linear relationship between body volume and body length (Christiansen et al., 2018).

Other sample collection:

A faecal sampling dipnet of mesh size 0.15mm was used to opportunistically collect faecal samples from large whales in SG waters, in order to understand the target prey species of cetaceans in this region. Samples were collected using the net, transferred to 50ml falcon tubes, and frozen at -20°C. Water sample controls for eDNA analyses were taken in 50ml falcon tubes from the same location and stored frozen at -20°C at the KEP research station for subsequent shipment to the BAS laboratory.

RESULTS AND DISCUSSION

Visual Survey:

In total, 2,282.8 km of visual transect data were conducted and 34 cetacean sightings were recorded during the field season (Fig. 2). Humpback whales were sighted on 6 days for a total of 22 sightings of 62 (range: 51-97) whales, including within-day resights. Three individual southern right whales, including one mom/calf pair, were recorded. There were three sightings of four individual Antarctic blue whales, including a mother/calf pair, and three sightings of four

fin whales. We also had one sighting of 20-25 Type-B killer whales, including a number of very small calves. Please see Supplemental Materials I for a full account of sightings data.

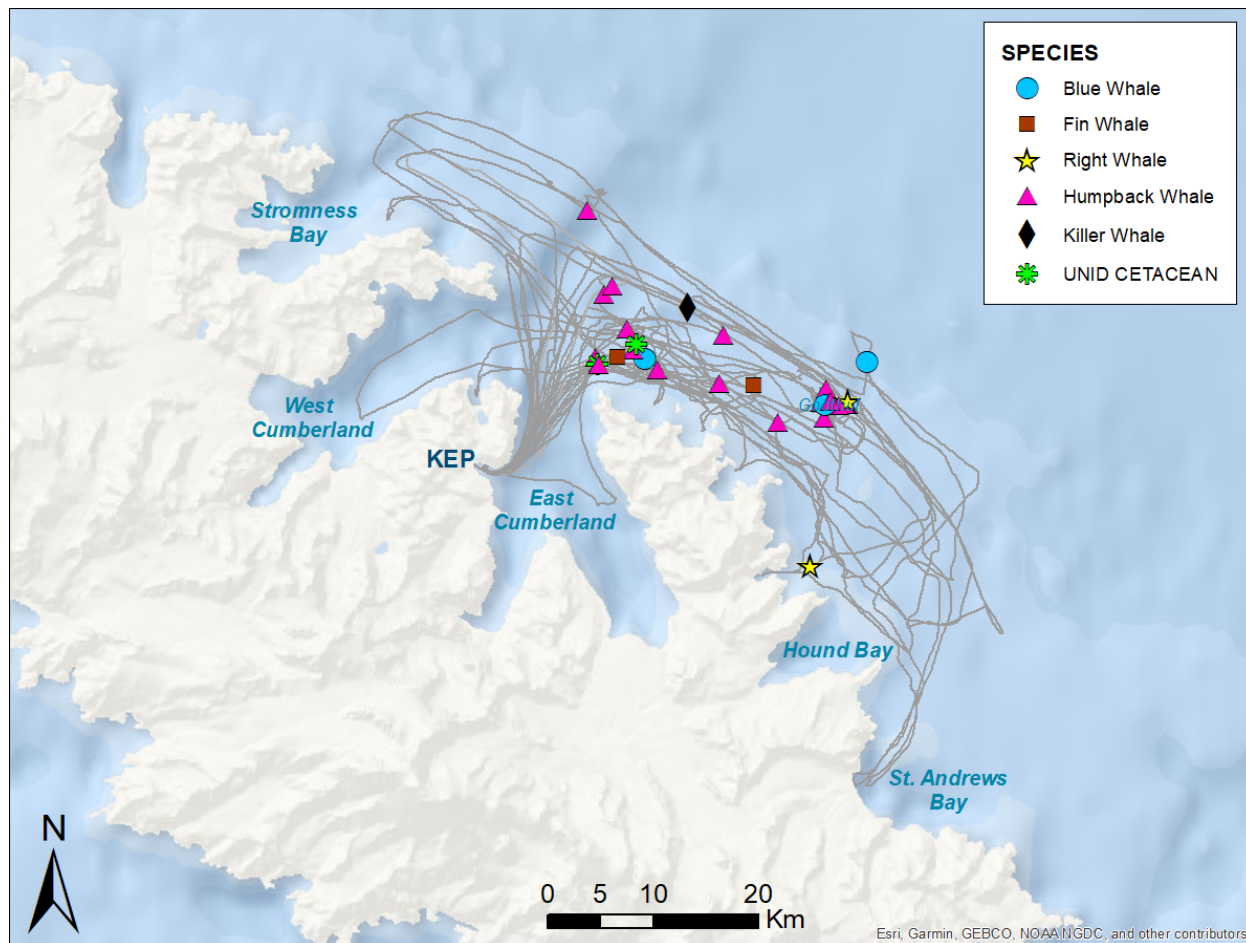


Figure 2. Cetacean sightings during the Hungry Humpbacks 2024 South Georgia summer field season.

Photo-identification (Photo-ID):

In all, 1,597 cetacean images were collected during this field season. Of those images, we obtained high-enough quality photos (vessel and aerial) to identify 3 individual southern right whales, 3 Antarctic blue whales, at least 8 killer whales, and 13 humpback whales. Callosity, fluke, flank, or dorsal fin images of all but one of the biopsied whales were obtained.

The blue whale and killer whale photographs have been distributed and will be inter-matched with the existing Antarctic catalogues. Right whale images will be compared within the existing SGRW catalogue and also with the catalogues from right whale calving grounds in Argentina, Brazil and South Africa. Humpback whale fluke images will be submitted to HappyWhale.com for comparison with their global catalogue.

Satellite tagging:

The team attempted to tag an adult southern right whale (a mom with calf) on February 12th but were unable to approach the mother at the correct distance/angle for instrument deployment. The small boat attempted to approach the animal for approximately 1 hour, but the whale was extremely evasive and the team eventually ran out of time and adequate light for tagging operations to continue.

One right whale, named “Disco”, was tagged near the entrance to Ocean Harbor on March 9th at approximately 13:45 (PTT# 250610). The single animal was highly reactive to the vessel, exhibiting pronounced flinching and rolling behavior during boat approaches closer than 10 meters. However, while the animal was actively reacting to the vessel proximity, it showed no reaction to the tag deployment event itself. Photo-ID, vessel and aerial video documentation, and drone measurements were collected during tagging operations, Skin, blubber, and fecal samples were also obtained from this whale.

Disco continues to transmit positions and has spent the majority of the time presumably foraging off the southern and western edge of the SG shelf (Fig. 3)

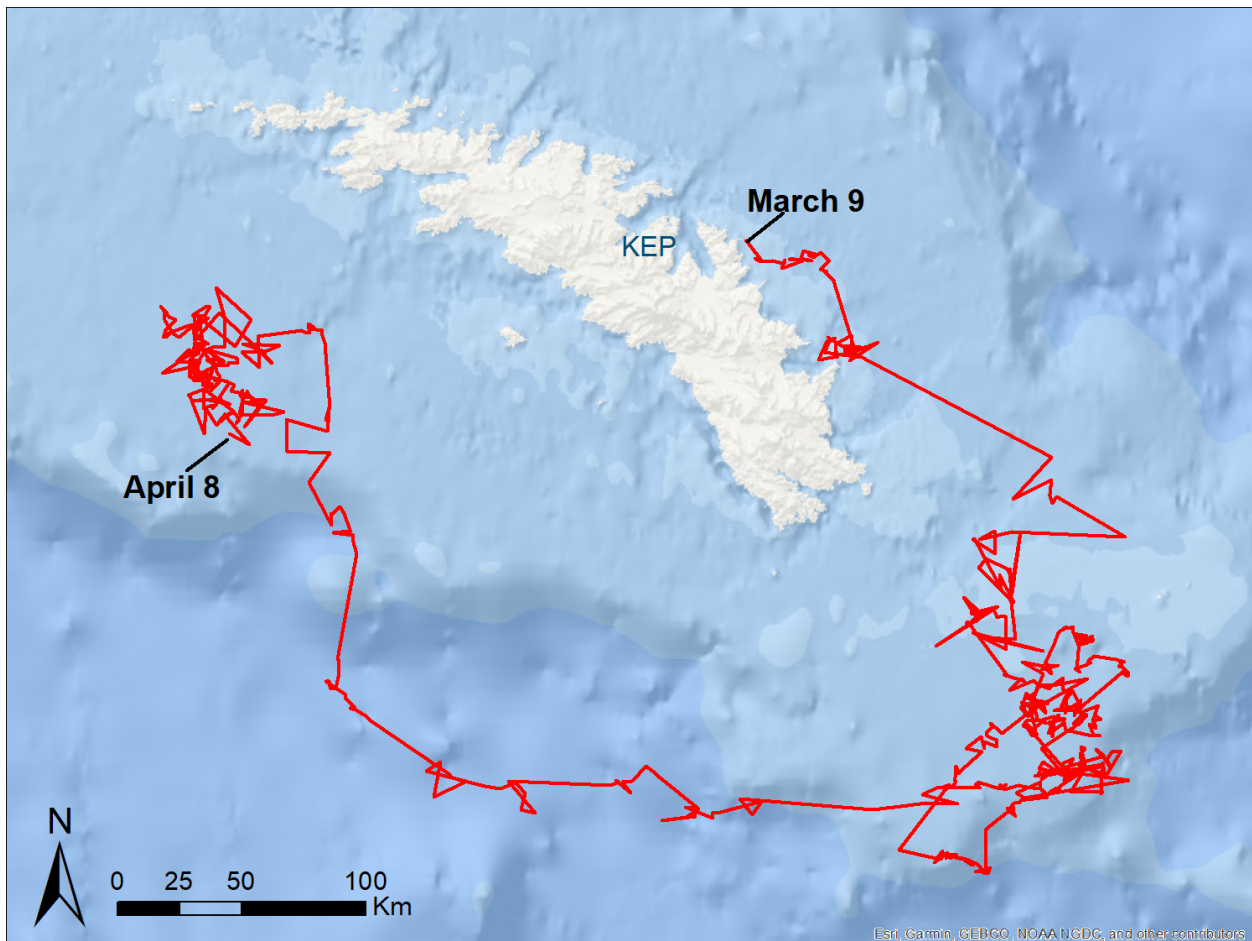


Figure 3: Satellite telemetry results from the southern right whale “Disco”, tagged near Hound Bay March 9th to time of report submission.

Biopsy sampling:

Overall, biopsy sampling was successfully attempted 16 times on two individual southern right whales, one individual blue whale and 10 individual humpback whales (Table 2). All samples were successfully retrieved (Fig. 5). One southern right whale (the tagged whale, Disco) was sampled three times, as the first two samples were superficial skin samples only. The other individual right whale sample was not large enough for blubber subsampling, and was retained for genetic, isotopic and hormone analysis only. The blue whale and all humpback biopsy samples were large enough to be subsampled for all four analyses. Genetic, isotope and transcriptomic work will be conducted at the British Antarctic Survey and University of Auckland. Hormone analyses will be carried out at the University of Aberdeen.

Table 2. The total number of individuals biopsied and the number of independent biopsy samples taken across individuals for three species of mysticete whales in SG waters, with associated photo-identifications

Scientific name	Common name	Total biopsies	Total individuals
<i>Eubalaena australis</i>	Southern right whale	4	2
<i>Balaenoptera musculus</i>	Blue whale	1	1
<i>Megaptera novaeangliae</i>	Humpback whale	11	10

Aerial imagery collection:

UAV flight operations occurred on 10 of the survey days. A total of 39 UAV flights were conducted. Aerial images of 29 humpback whales, 3 southern right whales (including 1 calf), 4 blue whales (including 1 calf) and ~20 killer whales (including several calves), were obtained (Fig. 4). Most images were collected during calm seas with good water visibility (low turbidity), thus resulting in good quality images suitable for morphometric measurements (Fig. 4). Biopsy samples (see previous section) were obtained from 9 of the measured humpback whales, 2 of the right whales and 1 of the blue whales.

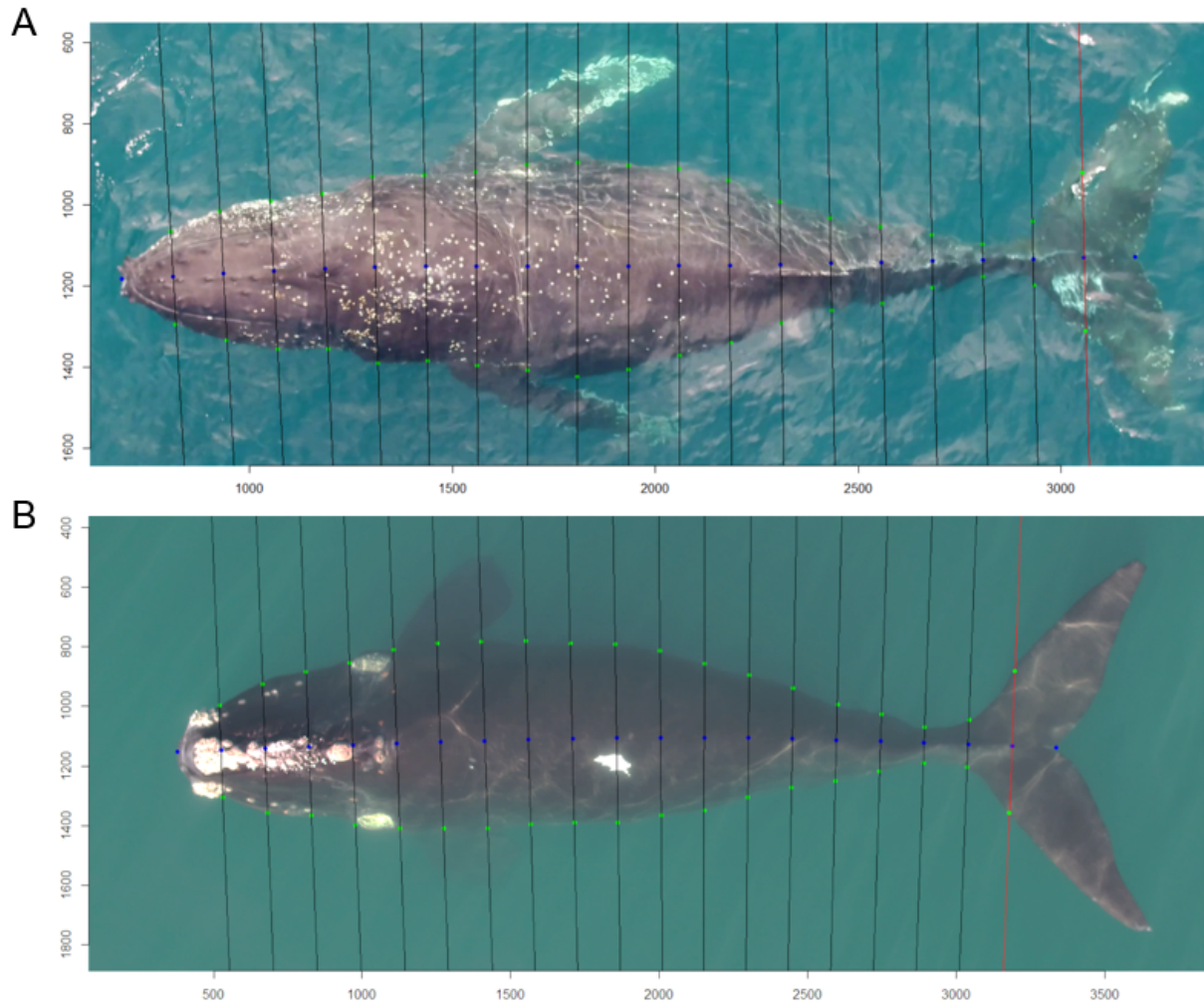


Figure 4: Example aerial images of (A) a humpback whale and (B) a southern right whale, showing the measurement locations.

Other sample collection:

Observers noted the presence of faeces at the surface during the successful tagging of the southern right whale Disco; one faecal sample was collected successfully with additional water sample controls.



Figure 5: Humpback whale full skin and blubber biopsy subsequently subsampled for all 4 analyses - genetics, stable isotopes, steroid hormones and transcriptomics.

Appendix I: Daily Survey Summaries

RUNNING TOTAL OF BOATING HOURS USED: 102.5

Jan 12: Load Pharos, underway at 13:30. HH team stood hourly watch from 14:00 to 18:00. 3-4m swell, Bfrt 6, partly cloudy

Jan 13. HH team stood hourly watch from 08:30 to 17:30. 4 meter swell all day, overcast and light rain. No large cetacean sightings.

Jan. 14: HH team stood hourly watch from 08:30 to 17:30. Much better weather today, numerous large whale sightings, esp. near Shag Rocks. Images collected, see sighting log. Southern Bottlenose whale = highlight

Jan. 15: Arrived at bird island middle of night. HH team stood hourly watch from 09:45 to 17:30 for coastal transit from BI to Stromness. Some humpbacks seen throughout the day, none especially close to shore. 1 Mom/calf blue whale sighted just south of Bay of Isles. Images taken. See sighting log. Team asked to leave the ship and move into KEP @22:00 due to undisclosed emergency requiring the Pharos assistance.

Jan. 16: First full day KEP. Biosecurity checks, station tour, unpacking and gear setup.

Jan 17: More gear set-up, survey prep, meet with Bob. Numerous meetings with KEP personnel. Brief overview of the project and tagging given to the Boaties and Bob. Science meeting covering data sheets, gear, packing, roles, etc. Overview of project with Station Leader (Cameron). Brief in-office training for KEP boating procedures.

Jan. 18: On water training: RIBS (Sooty and Molly) and team conduct the following: PEP gear, pre-launch checklist, launching, basic maneuvering, man overboard, coming alongside the pier, post-survey boat cleaning, fueling. Both boats transit to Maiviken to familiarize with KEP transit lines/safe boating zones.

Jan 19: On water training: RIBS (Sooty and Molly) and Jet Boat (Pipit). More MOB training, docking, coming alongside Pipit for crew transfer. FC tested and calibrated drones and conducted drone catching training.

Jan. 20: Terrible weather, blowing 50, gusting up to 80. 120+ cruise ship passengers stranded for 6+ hours at Grytviken. All hands assisting with rescue response.

Jan 21: Sunny but Very windy all day, no boating

Jan 22: Launched Pipit and Sooty at 10:15 to try and conduct ops. Light to medium rain intermittent all day. Just past hope point, the weather kicked up to 2-3m confused swell. Tried to head north to the mouth of the bay but couldn't. Headed south towards right whale rocks, the weather was then calm enough for drone but no small boat ops. FC flew and collected images of 2 Mn, Sighting 1 and 2. 2 additional whales were seen, but no images. Wind and rain

increasing. Transited to Corral Cove (?) for a crew transfer at 13:30. SM, AK, JK, and HS transfer to Sooty to conduct small boat ops shakedown. Sorted gear and discussed possible tagging/biopsy situations. NO tagging or Biopsy ops conducted. Back at KEP dock at 14:30. Hours used: 4.25

Jan 23-25: No whale boat ops due to weather. Small boat training: Extended boating kit, First aid kit, tying knots, towing.

Jan 26: Started day at 10:08, Sooty and Pipit. Weather was pretty rough to start so we turned into Maivicken to test Tagging gun and biopsy crossbow. Weather got better, so we left Maivicken and headed south. Encountered a blue whale near the mouth of Cumberland, collected drone footage, photo-ID and biopsy. Encountered a pair of humpbacks later in the day, collected drone footage and photo-id. End day: 16:28. Hours used: 6.5

Jan 27: Started day at 08:19, Sooty and Prion. Beaufort 2-3, 1m swell all day. Encountered sparse numbers of humpbacks throughout the day. Collected 1 biopsy, a number of photo-IDs and drone footage. End day at 15:05. Hours used: 6.75

Jan 28-30: No small boat ops due to weather.

Jan 31: Started day at 10:13, Sooty and Prion. Beaufort 3 and 1-2m swell throughout the day. Single fin whale sighted at the mouth of Cumberland. Encountered a large, persistent group of humpbacks between Right Whale Rocks and Rookery Bay. 20-30 animals throughout the day. Collected 5 biopsies, numerous photo-IDs and 10 drone flights. Very rough weather for Sooty, but biopsies possible due to sheer density of animals. End day at 17:16. Hours used: 6

Feb. 01-Feb. 05: No boating ops today due to weather.

Feb. 06: Started day at 10:00, Prion and Sooty. Very rough weather and confused seas. Tried to work south in hopes of improved swell but could only work as far as Godthul and turned back. Saw 2 fin whales but could not work them due to high seas. Ran a search transect of W. Cumberland Bay, no sightings. End day at 14:13. Hours used: 4.25

Feb 07 to Feb 11: No boating due to inclement weather

Feb. 12: Started day at 09:30, Sooty and Pipit. Beaufort 2-3, fog, 0.5-1m swell all day. Quite nice conditions for most of the day. 4 humpbacks sighted numerous times throughout the day. Mom calf blue whale sighted, photographed and droned. Mom and calf right whale sighted, photographed, biopsied (mom) and droned. Tried to tag mom Ea but couldn't. No other tagging ops due to choppy seas and or whale behavior. Overall, 5 biopsies taken (4 humpbacks, one duplicate. 1 right whale), 12 drone flights, photo-ID of 3 humpbacks, blue whales, and Ea. End day at 17:45. Hours used: 8.25

Feb 13 to Feb 16: No boating due to inclement weather

Feb. 17: Started day at 09:20, Pipit and Sooty. Beaufort 2-3, 1-2m swell with sun all day. Tried to work south, got as far as Godthul but could not work farther due to very dense iceberg coverage. Entire field of view limited to roughly 10-25% of the horizon within the iceberg field. Could not work outside the field due to extended boating limits. Cut in close to shore and started heading north to get out of the icebergs. The swell north of the entrance to Cumberland bay was too large. Cut into Stromness to switch crew and worked back to KEP via right whale rocks. Four humpbacks seen and photographed, plus drone measurements. No biopsy. End day at 16:10. Hours used: 7

Feb 18 to Feb 21: No boating due to inclement weather.

Feb 22: Started the day at 09:00, Pipit and Sooty. Beaufort 2-3, .5 to 1m swell with fog and overcast skies all day. Very dense tabular icebergs from rookery bay south. Stayed outside of them to maintain horizon as far south as Hound Bay but had to turn in toward the coast from Hound Bay to St. Andrews. Stopped at St. Andrews for a reconnaissance drone flight to check elephant seal/penguin status. After St. Andrews, headed north near coast among heavy ice. Approximately 10-20% visible horizon from St. Andrews to Rookery, then approximately 30-40% horizon. Found one humpback early in the day, collected drone measurements and a biopsy. End day at 16:34. Hours used: 7.5

Feb 23-Feb 26: No boating due to inclement weather.

Feb. 27: Very high demand on the boating program today. Both jet boats needed to 1) pick up holiday team at Sorling 2) transfer personnel to Leith 3) pick up 3 weedies plus Sally and Ken at Husvik 4) pick up personnel at Leith, then 4) back to KEP. In order to try and maximize the good weather, Amy and Fred went on the jet boat with a small drone for all the Stromness operations. Very nice weather but no whales seen between KEP and Husvik. The whale team attempted to mobilize for the remainder of the day (2 daylight hours) but the jet boat had a maintenance issue and had to return to KEP.

Feb 28: Started day at 09:00, Prion and Sooty. Sunny and clear, beaufort 2, 1-1.5 meter swell all day. Headed offshore to try and search outside of the iceberg field, roughly 3-4nm offshore between Rookery Bay and St. Andrews. 1 blue whale spotted outside our extended boating limits, but we were able to fly over it with the drone and collect measurements. We stayed offshore until St. Andrews then cut into the iceberg field for the northward leg. Stopped periodically to fly drone and check for whales amongst the icebergs. End day at 16:25. Hours used: 7.5

Feb 29: No boating due to inclement weather.

March 01: Start day at 07:52, Prion and Sooty. Rain and dense fog, Beaufort 1-2, .5m swell all day. Initially travelled north to offshore of Busen Point, then circled back south. By 10:00 the fog had come in and reduced visibility to 2km. No whales sighted. Hours used: 3.5

March 02 to 05: No boating due to inclement weather.

March 06: Start day at 08:51, Prion and Sooty. Beaufort 2, swell 1 to 1.5m and overcast all day. Sighted a large group of killer whales (approx. 20-25) near a large slab iceberg just offshore of the mouth of Cumberland Bay. Obtained photo-ID for some animals, but they were very evasive and staying close to the ice, so 100% ID coverage of the group was not possible. Drone images obtained. Travelled south to Hound Bay then back north—heavy ice from Rookery to St. Andrews. No baleen whales sighted. End day at 15:20. Hours used: 6.5

March 07: Start day at 08:53, Prion and Sooty. Beaufort 1-2, swell .5-1.5, distant fog and overcast skies all day. Travelled north to the entrance of Stromness, moved slightly offshore and travelled south to St. Andrews. Moved inshore amid crowded icebergs and picked our way north. No cetaceans sighted. End day at 16:33. Hours used: 7.5

March 08: No boating today due to inclement weather.

March 09: Start day at 09:55, Pipit and Sooty. Beaufort 1 to 3, swell 0.5 to 1.5, sunny all day. Headed north to just offshore Busen Point. Fairly bumpy so turned offshore and headed south. Stayed offshore until abeam of Ocean Harbor, then headed in toward Ocean Harbor. Spotted a right whale at the mouth of the harbor and began tagging ops. Tagged whale at approx. 13:45, -54.332 -36.221. PTT# 250610. Collected 2 skin biopsies plus 1 blubber biopsy. Collected a poo sample as well. Headed north through ice after tagging ops complete. No other whales sighted. End day at 15:54. Hours used: 6

March 10-12: No boating due to inclement weather.

March 13: Start day at 08:56, Prion and Sooty. Beaufort 1-3, 1m swell, overcast and foggy all day. Travelled south to Ocean Harbor nearshore. Stopped in Ocean Harbor for lunch. Continued south near shore to St. Andrews. Moved further offshore and surveyed north. No whales sighted. End day at 14:55. Hours used: 6

March 14: Start day at 08:58, Pipit and Sooty. Beaufort 1-2, 1m swell, sunny all day. Travelled north to the edge of Stromness bay, then south to Hound Bay, offshore. Moved further inshore and surveyed north. No whales sighted. End day at 14:45. Hours used: 5.75

March 15 to 16: No boating due to inclement weather.

March 17: Launched Pipit and Sooty at 8:58. The fog immediately closed in on us just after leaving the KEP dock. Waited for a while to see if it would clear, but it didn't. Came back in to the dock at 10:50 and stayed on stand-by until noon but the fog never cleared. No survey effort. Hours used: 2

March 18: Start day at 08:04, Pipit and Sooty. Beaufort 1-2, .5-1m swell, cloudy all day. Travelled south near shore to St. Andrews Bay. Went into St. Andrews Bay for lunch break. Travelled north offshore, then returned to KEP. End day at 15:18. Hours used: 7.25

Supplemental Material I: Sightings data for Hungry Humpbacks summer 2024 field season.

Date (2024)	LOCAL TIME	LAT	LONG	DAILY SGT #	SPECIES	# BEST	# HIGH	# LOW	PHOTO ?	DRONE IMGS?	Biopsy ?	KNOWN RESIGHT (Y/N)
Jan. 22	12:37	54.229	36.404	2	MN	1	1	1	N	Y	N	
Jan. 22	12:49	54.232	36.402	3	UNK MYSTICETE	1	1	1	N	N	N	
Jan. 22	12:57	54.232	36.401	4	MN	1	1	1	N	N	N	
Jan. 26	12:56	54.229	36.362	1	BM	1	1	1	Y	Y	Y	
Jan. 26	14:45	54.225	36.372	2	MN	1	1	1	Y	Y	N	
Jan. 27	10:13	54.156	36.411	1	MN	2	2	2	Y	Y	Y	
Jan. 27	11:04	54.148	36.399	2	MN	1	1	1	N	UNK	N	Y
Jan. 27	12:45	54.261	36.249	3	MN	1	1	1	N	N	N	
Jan. 31	10:51	54.228	36.385	1	BP	1	1	1	N	N	N	
Jan. 31	11:03	54.215	36.378	2	MN	1	1	1	N	Y	N	
Jan. 31	11:37	54.222	36.369	3	UNID MYSTICETE	1	1	1	N	N	N	
Jan. 31	11:44	54.221	36.349	4	MN	10	20	7	Y	Y	N	
Jan. 31	12:50	54.241	36.346	5	MN	10	20	7	Y	Y	N	Y
Jan. 31	13:44	54.226	36.346	6	MN	5	10	5	Y	Y	N	Y
Jan. 31	14:50	54.235	36.352	7	MN	15	25	10	Y	Y	Y	
Feb. 06	11:13	54.242	36.269	1	BP	2	2	2	N	N	N	
Feb. 12	11:30	54.252	36.189	1	MN	3	3	3	Y	Y	Y	
Feb. 12	11:56	54.25	36.19	2	EA	2	2	2	Y	Y	Y	
Feb. 12	12:47	54.251	36.213	3	MN	1	1	1	N	Y	Y	
Feb. 12	13:12	54.245	36.208	4	MN	1	1	1	N	N	N	
Feb. 12	13:54	54.253	36.198	5	MN	1	1	1	N	Y	N	
Feb. 12	14:43	54.267	36.208	6	EA	2	2	2	Y	Y	N	Y
Feb. 12	14:37	54.259	36.21	7	MN	1	1	1	Y	Y	Y	

Feb. 12	15:03	54.252	36.209	8	BM	2	2	2	Y	Y	N	
Feb. 12	15:15	54.245	36.215	9	MN	1	1	1	Y	Y	Y	Y
Date (2024)	LOCAL TIME	LAT	LONG	DAILY SGT #	SPECIES	# BEST	# HIGH	# LOW	PHOTO ?	DRONE IMGS?	Biopsy ?	KNOWN RESIGHT (Y/N)
Feb. 12	15:36	54.251	36.205	10	MN	1	1	1	Y	Y	N	
Feb. 12	16:12	54.274	36.186	11	EA	2	2	2	Y	Y	N	Y
Feb. 17	10:31	54.242	36.299	1	MN	2	2	2	Y	Y	N	
Feb. 17	13:05	54.197	36.396	2	MN	1	1	1	Y	Y	N	
Feb. 17	13:21	54.193	36.39	3	MN	1	1	1	Y	Y	N	
Feb. 22	10:00	54.218	36.295	1	MN	1	1	1	Y	Y	Y	
Feb. 28	10:59	54.231	36.173	1	BM	1	1	1	N	Y	N	
March 06	9:51	54.204	36.326	1	OO	21	25	21	y	y	N	N
March 09	13:17	54.332	36.221	1	EA	1	1	1	Y	Y	Y	N

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