

Harvest Data and Sample Collection Metadata from the 2021 Beluga (*Delphinapterus leucas*) Subsistence Harvest Monitoring Program in the Inuvialuit Settlement Region

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**Canada-Inuvialuit
Fisheries Joint Management Committee
Technical Report Series**

**HARVEST DATA AND SAMPLE COLLECTION METADATA FROM
THE 2021 BELUGA (*DELPHINAPTERUS LEUCAS*) SUBSISTENCE
HARVEST MONITORING PROGRAM IN THE INUVIALUIT
SETTLEMENT REGION**

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2024-02: vi + 41 p.**

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TABLE OF CONTENTS

List of Tables	4
List of Figures	5
Abstract	6
Introduction	7
Materials and Methods.....	9
Study Area	9
A) Field Sampling.....	13
I) ISR Beluga Subsistence Harvest Monitoring Program - Core Program.....	13
II) Expanded Beluga Health Research and Monitoring.....	16
B) Sample Processing	17
C) Laboratory Processing and Analyses.....	17
D) Data Compilation.....	19
Results.....	19
Summary	23
Author Contributions	24
Acknowledgements.....	24
References.....	25
Appendix A: Data and Metadata.....	29
Appendix B: Marine Mammal Sample Kit Contents.....	40

LIST OF TABLES

Table 1. Periods of recorded beluga harvest in each area of the ISR, as well as names and timing of Beluga Monitors stationed in each area.	11
Table 2. Sampling conducted on beluga whales as part of the 2021 Beluga Monitoring Program, and type of analysis conducted with these samples.	18
Table 3. Number of belugas struck, landed, lost, and sampled, by hunting area in 2021.	20
Table A1. Morphometric measurements, sex, and age of beluga whales landed during the 2021 Beluga Monitoring Program, by camp (NR= not recorded).	29
Table A2. Tissue samples taken from belugas harvested as part of the Beluga Monitoring Program in 2021 by camp.	33
Table A3. Tissue samples taken from the 20 belugas sampled by the Research Monitor at Hendrickson Island, for the Expanded Beluga Health Research and Monitoring Program in 2021.	35
Table A4. Color of harvested beluga whales recorded during the 2021 Beluga Monitoring Program, by camp.	35
Table A5. Presence/absence of beluga stomach contents for whales harvested during the 2021 Beluga Monitoring Program, by camp. Any details on contents are included as comments.	36
Table A6. Reproductive information collected on harvested female belugas in 2021. Presence of calves was communicated to Beluga Monitors by harvesters. Information was not able to be collected for all female belugas and asterisks have been used to identify where the recorded values may not be representative of the actual values due to low response numbers.	37
Table A7. Other information collected on landed belugas in 2021, based on local and TEK indicators (Ostertag <i>et al.</i> 2018), as communicated to Beluga Monitors by harvesters. Asterisks have been used to provide more information on the scarring or other signs of infection.	38
Table A8. Other information related to observations made while harvesters were conducting beluga hunts in 2021, as communicated to Beluga Monitors by harvesters. Information was not able to be collected for all beluga hunts and asterisks have been used to identify where the recorded values may not be representative of the actual values due to low response numbers.	39

LIST OF FIGURES

Figure 1. Map of the Inuvialuit Settlement Region (gray dashed line), as outlined in the Inuvialuit Final Agreement (1984), and communities of the western Canadian Arctic. The Tarium Niryutait Marine Protected Area (TNMPA) and the Anguniaqvia niqiqyuam Marine Protected Area (ANMPA) are shown in blue and purple, respectively.	8
Figure 2. Traditional whaling camps and general locations of the beluga harvest in the Mackenzie Delta area of the Inuvialuit Settlement Region.	12
Figure 3. Traditional whaling camps and general locations of the beluga harvest in the Darnley Bay area of the Inuvialuit Settlement Region.	12
Figure 4. Data collection sheet used by Beluga Monitors for the 2021 Beluga Monitoring Program, front-side.	14
Figure 5. Data collection sheet used by Beluga Monitors for the 2021 Beluga Monitoring Program, back-side.	15
Figure 6. Senior Monitor Ronald Nuyaviak with beluga (ARDL-HI-21-05) landed at Hendrickson Island, July 8, 2021. Photo Credit: DFO.	16
Figure 7. Number and timing of belugas landed in each hunting area. All belugas from the 2021 harvest were hunted between June 18 and August 5, 2021.	21
Figure 9. Number of male and female beluga harvested and recorded by beluga monitors and harvesters for each whale camp. Cases where sex was not determined are also reported.	22

ABSTRACT

Every spring the Eastern Beaufort Sea (EBS) beluga (*Delphinapterus leucas*) stock migrates along the open ice leads from the Bering Sea to their summering grounds in Canada's Western Arctic. During the summer months, beluga from this stock are harvested for subsistence by local hunters from all Inuvialuit Settlement Region (ISR) communities (Tuktoyaktuk, Inuvik, Paulatuk, Aklavik, Ulukhaktok, and Sachs Harbour). As part of the established long-term ISR Beluga Subsistence Harvest Monitoring Program initiated in 1973, Beluga Monitors (hired by local Hunters and Trappers Committees) travel to traditional whaling camps during the summer to record data and information (including observational) about the harvest, as well as to collect beluga tissue samples for scientific analyses. This report summarizes harvest and biological data collected in 2021 from the ISR Beluga Subsistence Harvest Monitoring Program. Data includes harvest metrics (e.g., hunt timing and location), observations on color and condition of individual belugas, observations on environmental conditions, and morphometric measurements. In 2021, a total of 114 belugas were reported harvested in the ISR and 72 of those were sampled by Beluga Monitors. Of the harvested belugas, 57 were male, 14 were female, and the sex of the remaining 43 belugas was unidentified. Beluga from all hunt locations varied in colour from white, grey, and yellow. The standard length of all sampled belugas ranged from 294.6 to 467.4 cm for males and 292.1 to 396.2 cm for females.

The DFO Beluga Health Research and Monitoring expansion of the program, which began in 2000 supports sampling for contaminants and other areas of concern throughout the ISR, and includes an intensive health sampling program based out of Hendrickson Island. However, in 2021 the DFO Science team was not able to conduct this health sampling at Hendrickson Island due to the global COVID-19 pandemic, and in their place a local Research Monitor was hired to collect a reduced suite of samples from 20 harvested whales. Other changes due to COVID-19 included all Monitors following appropriate safety protocols (social distancing, masking, wearing gloves), increased efforts in communication to deal with planning and logistical challenges, and a new Research Support Services community position being created to fill in gaps created by no DFO Science staff being in the region and the DFO Area office being closed.

The present report is the second of a series of annual reports, starting in 2020, that provide a summary and record of beluga harvest monitoring activities and data collected in the ISR each year. The publication of the annual report ensures a long-term standardized record of harvest and basic morphometric data, accessible for use by the co-management partners working under the Inuvialuit Final Agreement (i.e., FJMC, IGC, ISR HTC's, and DFO) for monitoring, research, and future decision-making.

INTRODUCTION

Beluga whales (*Delphinapterus leucas*) are an important component of Inuvialuit diet, tradition, and culture (McGhee 1988; Day 2002; Usher 2002; Hoover *et al.* 2016). Each spring, beluga from the Eastern Beaufort Sea (EBS) stock migrate along open ice leads to their summering grounds in the marine waters of the Inuvialuit Settlement Region (ISR) (Fraker and Fraker 1979; Storrie *et al.* 2022; Figure 1). Belugas that enter the Mackenzie River Estuary are traditionally harvested for subsistence by hunters from the communities of Inuvik, Aklavik, and Tuktoyaktuk (Figure 2). Beluga are also widely distributed throughout the offshore Canadian Beaufort Sea and Amundsen Gulf, and are harvested by the communities of Paulatuk, Ulukhaktok and Sachs Harbour for subsistence (Harwood *et al.* 2020; Figures 1 and 3).

The management of the population is based on the best available scientific and Indigenous Knowledge obtained through hunter observations, continued annual harvest-based monitoring of the stock, and the Beaufort Sea Beluga Management Plan (FJMC 2013). Additionally, within the ISR, two Marine Protected Areas (MPA) have been designated under Canada's *Oceans Act* for the protection and conservation of a number of components of the ecosystem, including beluga whales (Figure 1). Both the [Tarium Niryutait Marine Protected Area \(TNMPA\)](#) (2010) and the [Anguniaqvia niqiqyuam Marine Protected Area \(ANMPA\)](#) (2016) require regular monitoring and reporting to ensure conservation objectives are being met (DFO and FJMC, 2013 TNMPA Management Plan).

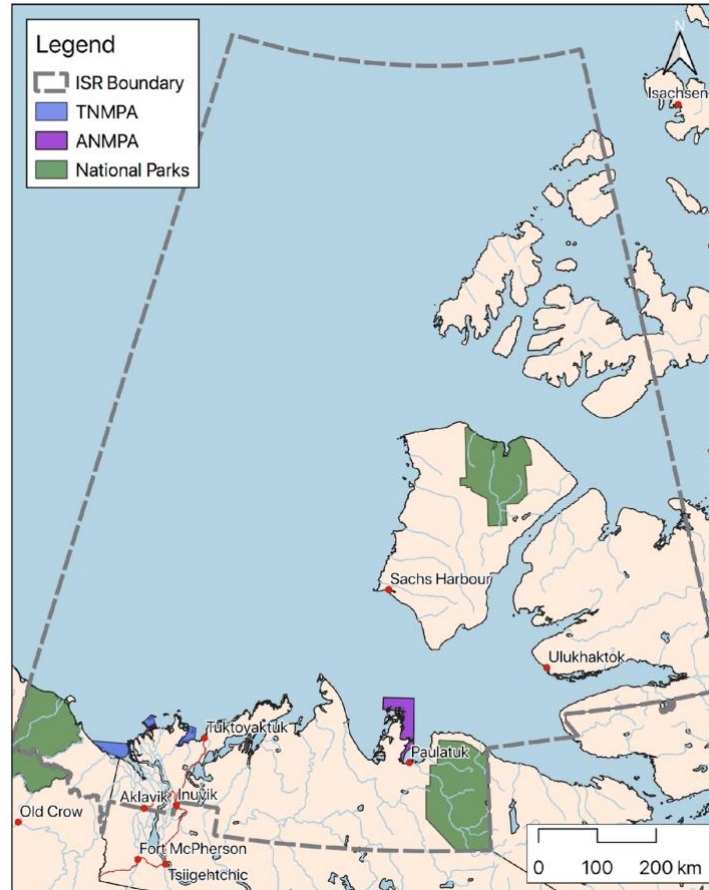


Figure 1. Map of the Inuvialuit Settlement Region (gray dashed line), as outlined in the Inuvialuit Final Agreement (1984), and communities of the western Canadian Arctic. The Tarnum Nirvutait Marine Protected Area (TNMPA) and the Anguniaqvia niqiqyuam Marine Protected Area (ANMPA) are shown in blue and purple, respectively.

A formal harvest monitoring program was started on the Mackenzie Estuary beluga harvest from 1973–1975 by the Fisheries and Marine Service of the Government of Canada (Hunt 1979). An oil and gas industry-sponsored program followed this from 1977 through 1982 (Fraker 1977, 1978, Fraker and Fraker 1979, 1981, Norton Fraker 1983). DFO assumed the role of coordinating from 1981 through 1986 and implemented standardized data collection protocols (Strong 1990, Weaver 1991). Finally, with the implementation of the Inuvialuit Final Agreement (IFA) in 1984, the FJMC assumed responsibility for the program in 1987 and has continued in that role to present (Harwood *et al.* 2002).

The program is conducted jointly with the HTC of the six Inuvialuit communities as part of the Fish and Marine Mammal Community Monitoring Program (FJMC 2013), with ongoing support and collaboration from DFO. The objective of the beluga monitoring program is to collect annual beluga harvest data to support the management and conservation of the EBS beluga stock, and to monitor and evaluate changes in the stock trend and condition of individual whales (e.g., blubber

thickness measurements) (Harwood *et al.* 2015). Each summer local community members are hired as Beluga Monitors to deliver the field portion of the program. Beluga Monitors are stationed at the main subsistence whaling camps during the hunting season, and work with the Inuvialuit hunters to document the size, efficiency, location and timing of harvest and to record characteristics of the individual harvested whales (e.g., color, sex), as well as indicators of health based on Inuvialuit Knowledge (Ostertag *et al.* 2018). Beluga Monitors also collect aging structures for stock assessment and tissues used for long-term contaminants monitoring under the Northern Contaminants Program (Government of Canada 2018).

Beginning in 2000, the ISR Beluga Subsistence Harvest Monitoring Program expanded to include enhanced scientific, health-based collections including reproductive information (Harwood *et al.* 2015), incidence of disease (e.g., Nielsen *et al.* 2018, Sharma *et al.* 2018), contaminant loads (e.g., Loseto *et al.* 2015, Noel *et al.* 2018) and hormone levels (Loseto *et al.* 2018). The program has continued to evolve and respond to community questions and resource management needs (Loseto *et al.* 2018), and has engaged innovative scientific methods to understand beluga health and responses to emerging stressors such as climate change (Choy *et al.* 2019). The expanded Health Research and Monitoring is led by DFO and sampling occurs at Hendrickson Island (Figure 1). Similar to 2020, in 2021 due to COVID-19 related travel restrictions, a new model was required that involved collection of a reduced suite of samples by a community Research Monitor at Hendrickson Island as well as the hiring of a locally based Research Support Services technician.

The objective of this report series is to provide a summary of harvest and morphometric data collected (e.g., harvest, time and location, physical observations and measurements), as well as field sampling methods. The reports serve to document the extent and type of sampling that occurred at various sites across the ISR each year, and any unusual events (e.g., rare species, standing or mortality events, atypical weather) observed and shared by local harvesters. The data reports will act as the repository of raw data for applications assessing the status and trend of the EBS beluga stock, including for MPA monitoring. Results from analyses of tissues/samples collected are reported elsewhere in discipline-specific articles.

MATERIALS AND METHODS

Study Area

Traditional whaling camps are land-based sites where families camp and hunt in coastal waters (Figure 2). However, hunt locations can vary annually depending on access and availability of whales. Community members from Inuvik typically camp and hunt from Kendall Island and East Whitefish. Harvesters from Tuktoyaktuk typically hunt in Kugmallit Bay and land their whale at Hendrickson Island for butchering, with some hunters towing their catch to Tuktoyaktuk Harbour. Beluga harvesters from Aklavik are typically based at Shingle Point (see Worden *et al.*

2020 for more information). Beluga harvesters from Paulatuk access and use a number of harvest locations in and around Darnley Bay, including Brown's Harbour, Johnny Green Bay, Fish Lake, Argo Bay, Egg Island, and Tippitiuyak (Figure 3).

In 2021, beluga monitors were selected by the local HTC's to record, sample, and measure beluga harvested at Hendrickson Island, East Whitefish, Kendall Island, Darnley Bay (and surrounding area), Shingle Point (and surrounding area), and Ulukhaktok. Monitors in the Mackenzie Estuary area were stationed at camps for approximately one month from early to late July in an attempt to be available for the core harvest period. Specific dates vary between camps and years. Darnley Bay had two monitors that were staggered over time and traveled throughout the Bay to where harvest occurred. Ulukhaktok monitors were also staggered over time, and were stationed on-call in the community to sample any whales landed in or around Ulukhaktok. A Harvester Reward Program was also in place for hunters to collect and submit samples and measurements from their harvested whales when a Beluga Monitor was not present (i.e., due to the harvest taking place at a time or in a location outside of the regular monitoring areas).

Due to COVID-19 travel restrictions there were once again no Science teams at Hendrickson Island or East Whitefish, and instead a Research Monitor was stationed at Hendrickson Island to collect a reduced suite of samples. Lionel Kikoak, who had experience with these sampling methods from the previous six seasons as a Youth Monitor, Monitor-in-Training, and Research Monitor, was hired to collect priority samples from approximately June 30 - July 26. Youth positions usually stationed at Hendrickson Island, East Whitefish, and Kendall Island were also not hired due to concerns related to COVID-19. Other program adjustments related to the COVID-19 pandemic included adjusted shipping protocols to account for limited access to DFO offices and reduced flight schedules, the need to purchase new equipment and adopt new sampling protocols to abide by national and territorial public health guidelines, and considerable effort for communication and planning between all program partners including virtual communication with HTC directors for program coordination and preparation, and weekly teleconferences between JS and DFO staff.

Beluga harvest data and samples were collected from the various ISR whaling camps between June 18 and August 5, 2021 (Table 1). The collection dates are not a reflection of the entire harvest period at each hunt location and while the Beluga Monitors make every effort to sample all landed whales, not all whales were sampled.

Table 1. Periods of recorded beluga harvest in each area of the ISR, as well as names and timing of Beluga Monitors stationed in each area.

Area	Date Range of Recorded Harvest	Monitor(s)	Monitoring Period
Mackenzie Delta (Hendrickson Island, East Whitefish, and Kendall Island)	June 27 to August 3, 2021	Hendrickson Island – Ronald “Innung” Felix (Sr. Monitor) and Jonas Lucas	June 29 to August 10, 2021
		Hendrickson Island – Lionel Kikoak (Research Monitor)	June 30 – July 26, 2021
		East Whitefish – Rose Day	July 1 to July 31, 2021
		Kendall Island – Freddie Rogers	July 1 to July 31, 2021
Darnley Bay and surrounding area	July 10 to August 5, 2021	Joe Ruben Jr. and Jody Illasiak	July 8 to August 13, 2021
Shingle Point	June 23 to July 16, 2021	Cody Kogiak and Frank Dillon Jr.	June 23 to July 17, 2021
Ulukhaktok	June 18 to July 4, 2021	Corrie Joss and Buddy Alikamik	June 11 to July 8, 2021
Sachs Harbour	July 26, 2021	N/A	N/A

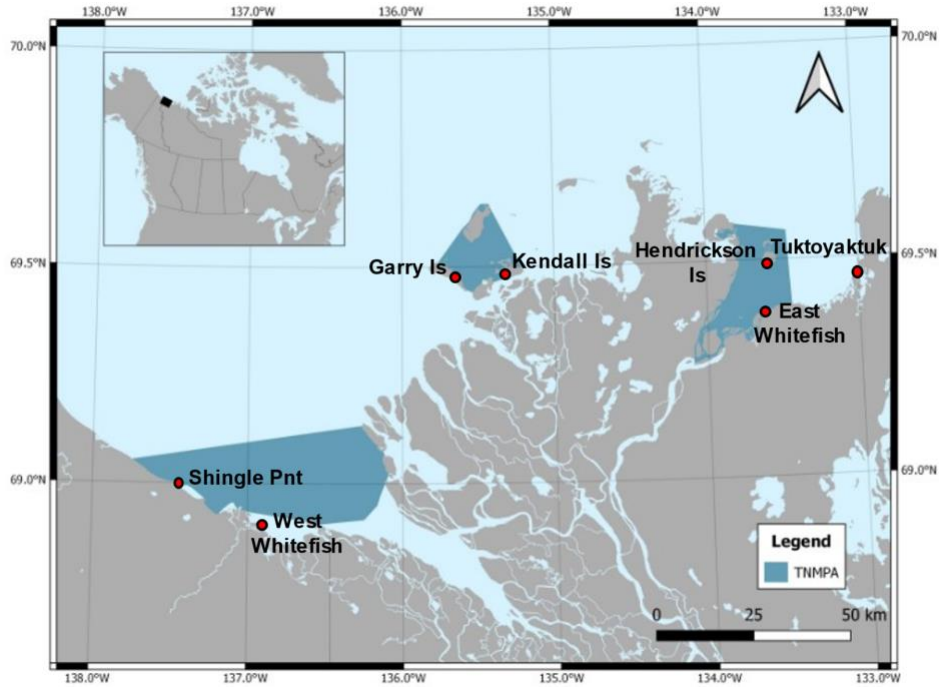


Figure 2. Traditional whaling camps and general locations of the beluga harvest in the Mackenzie Delta area of the Inuvialuit Settlement Region.

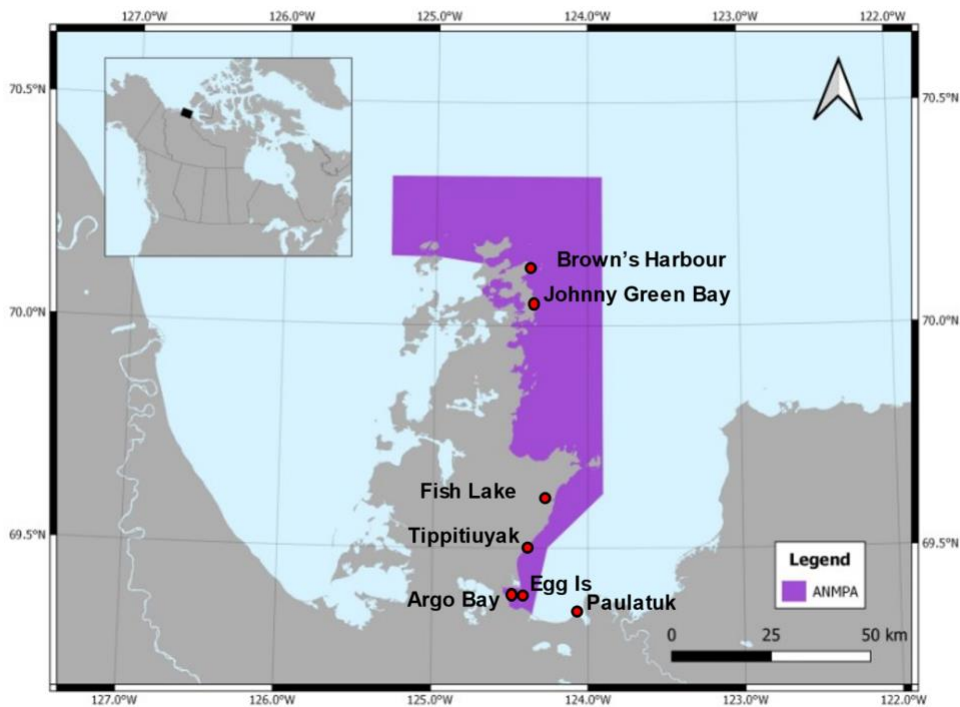


Figure 3. Traditional whaling camps and general locations of the beluga harvest in the Darnley Bay area of the Inuvialuit Settlement Region.

A) Field Sampling

Materials and methods for the 2021 core sample collection were conducted similar to past field seasons (e.g., Harwood *et al.* 2002). The form for beluga monitors to record data was redesigned in 2021, to improve useability and more closely follow the flow of information being collected by the monitors. Blubber thickness was recorded only in metric units, to allow for more sensitivity in the data (see MacMillan *et al.* 2019). Contents and the assembly processes for Marine Mammal Sample Kits are included in Appendix 2. Local and Traditional Ecological Knowledge (TEK) indicators (Ostertag *et al.* 2018) were recorded for each whale. Beluga Monitors also recorded daily observations of weather, marine mammals, birds, and fish in notebooks.

COVID-19 safety measures followed Government of Northwest Territories public health guidance and included social distancing between Monitors and harvesters (and wearing a mask when not possible to distance), wearing gloves, frequent hand washing and/or use of hand sanitizer, disinfection of shared sampling gear, and only collecting samples after harvesters were finished butchering their whale to minimize close contact.

I) ISR Beluga Subsistence Harvest Monitoring Program - Core Program

After each hunt, Beluga Monitors interviewed each hunt captain to collect information based on Traditional Ecological Knowledge indicators (Ostertag *et al.* 2018), including the duration of the hunt, the number of whales seen, the number of calves seen, the presence of ‘love handles’ (abdominal fat deposits) on the harvested whale, if the harvested whale seemed tired, and the number of whales that were struck, landed, and lost (Figure 4 and 5). The Beluga Monitors also examined the harvested whale and recorded descriptions of any scars present and potential signs of sickness like unusual smells or signs of infection (Figure 4 and 5).

The Beluga Monitors then asked the hunt captain for permission to measure and sample each harvested whale. All data were recorded on the monitoring data sheet labeled with a unique ID for each harvested whale (Figure 4 and 5). The colour of the whale was recorded as white, yellow, grey, dark grey, or brown. Sex was determined through external examination and palpitation of the genitalia. Standard length, fluke width, maximum half girth, half girth at anus, and ventral blubber thickness at sternum and at anus) were measured using an open reel tape measurer and a ruler. Measurements were recorded in imperial units to be comparable with past data.

2021 FISH & MARINE MAMMAL
COMMUNITY MONITORING
PROGRAM DATASHEET

date _____ monitor name _____
location _____ AR _____-DL-21- _____
match sample kit number _____

hunt

hunter's names: _____
captain _____

total # hours hunting _____
whales seen on hunt _____

chase time for this whale _____
first whale of the season:
yes no
whales harvested previously _____
group size _____ no unsure
calves seen _____ no unsure

calf with whale:
yes no unsure
calf colour:
brown grey black unsure
other _____
whales lost on hunt:
_____ no unsure
whale tired:
yes no unsure

measurements

total length *snout to tail*
ft _____ in _____

blubber thickness
at breast bone
mm _____

½ widest girth
halfway around
ft _____ in _____

muscle meat
sample

½ girth at anus
ft _____ in _____

blubber thickness
above anus
mm _____

fluke (tail) width
ft _____ in _____

whale information

'love handles':
yes no

backbone 'sticking out':
yes no unsure

colour:
brown
dark grey
grey
white
yellow

circle the shapes which best match the whale's back

front view back view

tissue collection **freeze** » all tissues as soon as possible (*fst size*) **dry** » only jaws

lower jaws *attach tag, remove meat & dry before bagging*

eyeballs

blubber *with skin, full depth*

liver

skin *small piece in DMSO vial*

feces

blood vial

if present

muscle meat

urine

stomach contents:
empty full
some food
didn't check

if food was present, collect sample & photo

sample collected

photo taken

flip page ↻

Figure 4. Data collection sheet used by Beluga Monitors for the 2021 Beluga Monitoring Program, front-side.

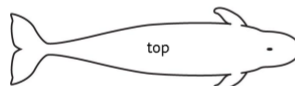
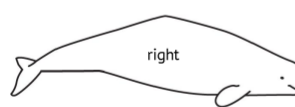
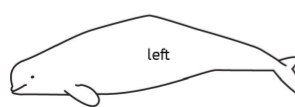
<p>sex</p> <p>male female</p>	<p>female</p> <p>giving milk: yes no didn't check milk colour _____</p> <p><i>collect sample in milk vial provided</i> <input type="checkbox"/> sample collected</p>	<p>fetus</p> <p>yes no didn't check</p> <p>4-5ft foot fetus: ft ____ in ____ male female don't know</p> <p>smaller fetus <i>bag, label & freeze whole fetus</i></p>
<p>signs of infection, wounds or abnormalities</p> <p>spots on the liver: yes no</p> <p>'different' or unusual smell when whale was opened up: yes no</p> <p>unusual scarring yes no</p>	<p>sign of infection: <i>i.e. infected wound, disintegrating muktuk, lump in muktuk</i> yes no ↓ if yes, take photo and collect sample of the infected area including uninfected area next to wound <input type="checkbox"/> sample collected <input type="checkbox"/> photo taken <input type="checkbox"/> location of infection marked on diagram below</p>	<p>hunter said whale seemed tired: yes no ↓ if yes, sample the following organs, put samples in ziploc bags, label bags with whale id and freeze <input type="checkbox"/> liver areas with & without spots <input type="checkbox"/> kidney <input type="checkbox"/> lung <input type="checkbox"/> heart <input type="checkbox"/> photos of unusual looking organs</p>
<p>draw abnormalities</p>   	<p>description & comments</p>	<p>photo</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>
<p>overall health of whale (circle one) very healthy healthy unhealthy very unhealthy</p>		

Figure 5. Data collection sheet used by Beluga Monitors for the 2021 Beluga Monitoring Program, back-side.

Blood was collected from skeletal muscle beneath the scapula in one scintillation tube and blubber/skin was collected (full depth) from the side of the whale in line with the breastbone (1 sample with skin frozen at -20°C, 1 sample preserved in DMSO for genetic sex determination.

The lower jaw was removed by the monitor using a hacksaw, and whole eyeballs were extracted using a knife. Dorsal muscle was collected and a subsample was provided to the Research Monitor (if present). The abdominal cavity was then opened to sample liver tissue, and the stomach opened to check for contents (and collected if there were). Microplastic sampling was modified from collecting digestive tracts in past years (Moore *et al.* 2020) to only collecting fecal samples, as this was more feasible without the Science crew present while still monitoring for microplastics, which was identified as a research priority by the FJMC. If the whale was a female the monitor would check for lactation and collect a sample of milk if present, as well as the presence of a fetus, and record fetus sex and crown-rump length. If a fetus was present and first term (12-18cm), it was frozen intact and whole. If a fetus was near full-term (e.g., 1.5m), measurements and samples were taken and recorded as a separate whale.



Figure 6. Senior Monitor Ronald Nuyaviak with beluga (ARDL-HI-21-05) landed at Hendrickson Island, July 8, 2021. Photo Credit: DFO.

II) Expanded Beluga Health Research and Monitoring

At the Hendrickson Island Camp additional samples were collected by the Research Monitor for a subset of the harvest monitoring period (June 30 - July 26). Blood from skeletal muscle beneath the scapula was collected (avoiding contamination with ocean water) and processed for the collection of serum (using BD SST™ vacutainers) and plasma (using BD Sodium Heparinⁿ vacutainers). Additional samples of skin, blubber, liver, and muscle were taken, as well as spleen, brain, and heart samples). Samples of kidney and as well as any kidney parasites found

were also collected, and unique to 2021 a trachea from 1 whale was collected. This represented a reduced suite of samples compared to what is typically collected by the DFO Science team due to the reduced capacity. However, more whales were sampled overall for these additional analyses due to the Research Monitor remaining on the Island for longer than the Science team usually would, based on a recommendation by the Tuktoyaktuk HTC (June 15, 2020).

B) Sample Processing

Tissue samples taken by Beluga Monitors for the core ISR Beluga Subsistence Harvest Monitoring Program were frozen at camp in household electric chest freezers (0.11m³, ~ -18°C) except for the jaws, which were cleaned, split, labeled with a paper tag, and hung to air-dry.

Sample processing for the expanded Beluga Health Research and Monitoring included the collected blood in vacutainers being gently inverted 5-8 times and left to coagulate at room temperature for 20 minutes. The blood was then centrifuged for 10 minutes at 1900g (VWR® Clinical 50 Centrifuge). Separated serum and plasma were pipetted into 2 mL cryovials using plastic transfer pipettes and placed in a cryoshipper (-150°C). Blubber and skin, liver, and muscle samples were placed in a cryoshipper. Heart, brain, muscle, spleen, and kidney samples were placed in a chest freezer. Liver, skin, and blubber were also sub-sampled into RNA preserving solution. The trachea sample was placed in buffering solution and immediately transported to Winnipeg to maintain cell viability. A Research Support Services community position (Jimmy Kalinek - Only Way Outfitting) managed the logistics of shipping, receiving, and staging samples and equipment in Inuvik, alongside DFO Science staff and Area office staff.

C) Laboratory Processing and Analyses

Samples were subsampled and stored at -80°C once received by DFO in Winnipeg, and many different types of laboratory processing were/will be conducted on them. Table 2 summarizes the types of samples collected and the type of analysis conducted (and references for analysis methods if applicable). In 2021 whale ages were estimated through aspartic acid racemization (Pleskach *et al.* 2016, Yasunaga *et al.* 2017), using a calibration developed from an ageing study currently being prepared for peer review (Elliott and Loseto *in prep*).

Table 2. Sampling conducted on beluga whales as part of the 2021 Beluga Monitoring Program, and type of analysis conducted with these samples.

Type of Sample Collected	Research Question or Objective
Eyeballs and Jaw (teeth)	Estimate age of whale (e.g., Stewart <i>et al.</i> 2012, Pleskach <i>et al.</i> 2016, Elliot and Loseto <i>in prep</i>)
Blubber/skin	Fat content, quality and profile to understand diet (e.g., Loseto <i>et al.</i> 2009, Choy <i>et al.</i> 2020), stress hormones (e.g., cortisol, Loseto <i>et al.</i> 2018b), mercury stable isotopes in skin (e.g., Loseto <i>et al.</i> 2015), organic pollutants in blubber (Noel <i>et al.</i> 2018), genetics (sex determination).
Blood (whole)	<i>Archived for Brucella</i> and future requests,
Blood (serum)	Hormones, genomics metabolomics, transcriptomic (e.g., Loseto <i>et al.</i> 2018b, Simond <i>et al.</i> 2022)
Muscle	Stable isotopes, mercury, diseases (<i>Toxoplasma gondii</i>) (Sharma <i>et al.</i> 2018)
Liver	Contaminants, diet indicators (highly-branched isoprenoids, stable isotopes) (e.g., Loseto <i>et al.</i> 2008)
Spleen	<i>Bartonella sp.</i>
Brain, heart	<i>Toxoplasma gondii</i> (e.g., Sharma <i>et al.</i> 2018)
Feces	Presence/absence of microplastics (Moore <i>et al.</i> 2020)
Kidney	Parasites
Stomach contents (presence/absence)	Diet
Milk	Evidence of lactation; archive
Trachea	SARS-COV-2

D) Data Compilation

All information recorded on the Beluga Monitoring Program field sheets in 2021 was compiled in Microsoft Excel and added to the master database maintained by the FJMC. Original (raw) data sheets, photocopies, and scanned copies are archived with the FJMC (Inuvik, NT), and with DFO (Freshwater Institute, Winnipeg, MB). Daily observations from Beluga Monitor daily logbooks were compiled by the FJMC (Inuvik, NT) and notable or consistent observations were included in the results section of this report.

RESULTS

A total of 114 belugas were reported harvested in the ISR in 2021, between June 18 and August 5, 2021 (Table 3 and Figure 7). Overall, 72 of those whales were sampled by Beluga Monitors (Table 3), the Research Monitor sampled 20 whales for the Expanded Beluga Health Research and Monitoring Program (Table A3), and one whale was sampled by hunters as part of the FJMC's Harvester Reward Program. The harvested whales not sampled by beluga monitors or through the Harvester Reward Program were communicated for this report through community members and harvest monitor logbooks. Consequently, those whales have no samples and limited to no data associated with them. Note that the unsampled whales from Ulukhaktok were harvested outside of town where Monitors were not able to access.

One whale was reported struck-and-lost at Kendall Island, one from Ulukhaktok, one from the Darnley Bay area, and two from the Shingle Point area (Table 3). One dead beluga was reported floating 13 km offshore of Shingle Point, with a bullet hole wound on June 27, and one dead neonate was observed floating between Tuktoyaktuk and Hendrickson Island on July 19.

Belugas were also sighted in places they are not usually found, including one seen in Tuktoyaktuk Harbour (July 2) and one young grey beluga spotted up the Mackenzie River, at the Peel River ferry crossing (August 10). Another notable observation included the Shingle Point monitor report of a mother beluga giving birth (near Middle Camp and Elanik Base) on July 10. An unidentified dark-coloured whale was also spotted in Kugmallit Bay (near East Whitefish) on July 19, believed to be around the herring run.

Overall, the Hendrickson Island monitor noted the water levels were very low and there were high numbers of skinny whales over the course of the season. The Shingle Point monitor noted that they did not see many whales compared to other years.

Table 3. Number of belugas struck, landed, lost, and sampled, by hunting area in 2021.

Location	No. Whales Landed	No. Whales Sampled	No. Whales Struck-and-Lost	No. Recorded Strandings
Hendrickson Island	31	26	0	1
Tuktoyaktuk Harbour	7	0	0	0
East Whitefish	12	7	0	0
Kendall Island	11 (1 at Tom Elanik Point, 2 at Baby Island, 2 at Rae Island, 6 unspecified)	10	1	0
Sachs Harbour	2	1	0	0
Ulukhaktok	18	2	1	0
Darnley Bay and surrounding area	28 (13 at Johnny Green Bay, 5 at Flounder Creek, 2 at Billy's Creek, 6 at Egg Island, 1 at Paulatuk Point, 1 unspecified)	23	1	0
Shingle Point Area	5 (1 at Whitefish Station, 2 at Tent Island, 2 at Shingle Point)	3	2	1
Total	114	72	5	2

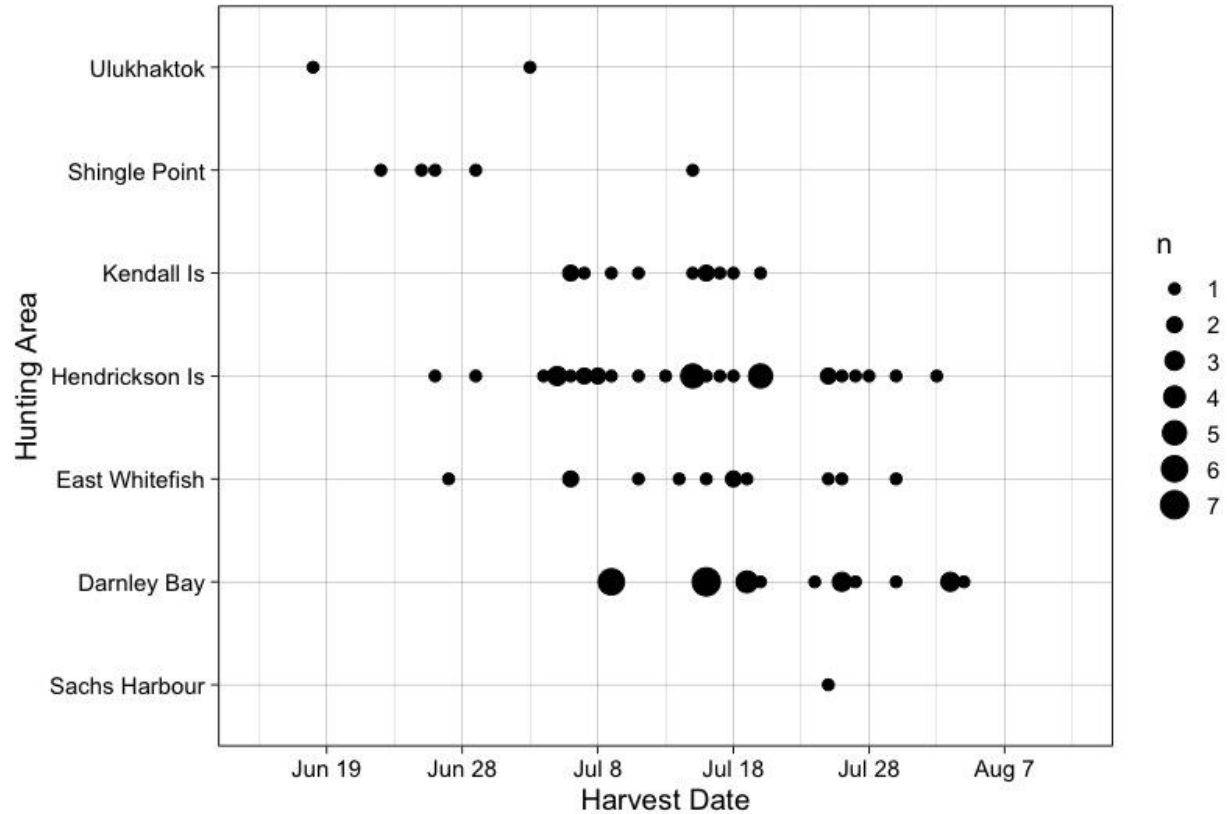


Figure 7. Number and timing of belugas landed in each hunting area. All belugas from the 2021 harvest were hunted between June 18 and August 5, 2021.

Of the 114 belugas harvested in 2021, 57 were male, 14 were female, and the sex of the remaining 43 belugas was unidentified (Figure 7). Beluga from all hunt locations varied in colour from white, grey, and yellow (Table A3). The standard length of all sampled belugas ranged from 294.6 to 467.4 cm for males and 292.1 to 396.2 cm for females (Table A1).

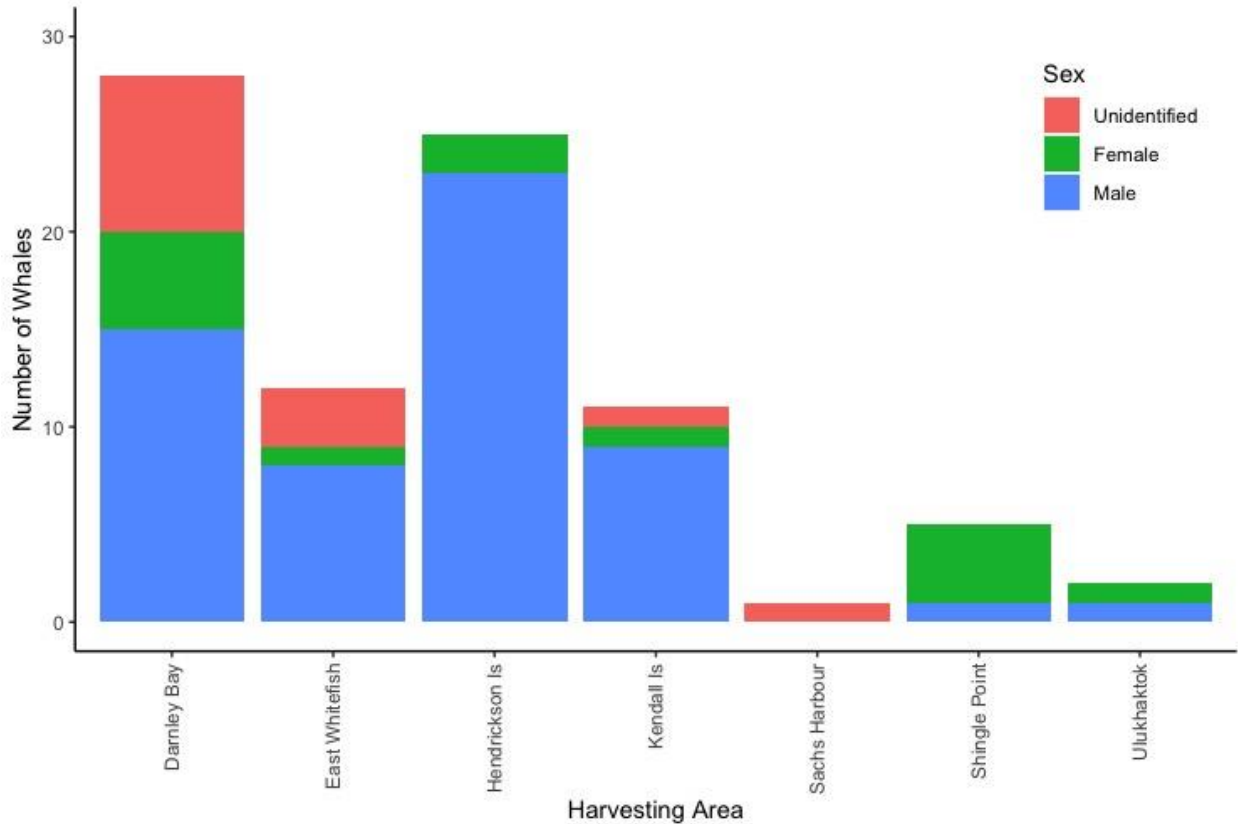


Figure 8. Number of male and female beluga harvested and recorded by beluga monitors and harvesters for each whale camp. Cases where sex was not determined are also reported.

The fluke width of all sampled belugas ranged from 61.0 to 111.8 cm for males and 35.6 to 116.8 cm for females (Table A1). The blubber thickness measured at the sternum of all sampled belugas ranged from 1.9 to 11.0 cm for males and 3.8 to 10.2 cm for females (Table A1). The blubber thickness measured at the anus of all sampled belugas ranged from 1.3 to 11.0 cm for males and 2.5 to 12.0 cm for females (Table 12). The maximum half girth ranged from 68.6 to 231.1 cm in males and 81.3 to 167.6 cm in females (Table A1). The half girth at anus ranged from 35.6 to 147.3 cm in males and 35.6 to 119.4 cm in females. The age of harvested whales ranged from 7.7 to 66.2 years in males and 6.4 to 73.2 years in females. The 73.2-year-old female was harvested at Shingle Point, by Tent Island.

Of the 114 harvested whales, 33 had empty stomachs at the time they were harvested, 6 stomach contained some prey items, three stomach contained “worms”, and the remaining 75 belugas were not checked for stomach contents (Table A4). Of the 14 female belugas harvested in 2021, one was carrying a first-term fetus (SP-02), measured at 12 cm. The fetus was collected. Three landed females were producing milk at the time they were harvested (Table A5). Calves were observed with the harvested females three times. Local and Traditional Ecological Knowledge (TEK) indicators collected from harvesters included that 34 whales were reported to have ‘love

handles' (indicator of a healthy whale), 17 had their backbone sticking out (indicator of a skinnier whale), and 6 had scarring (Table A6). The average number of belugas seen while hunting ranged from 2.0 (Ulukhaktok) to 36.2 (Darnley Bay and surrounding area), by location. The average group size of the landed beluga ranged from 3.0 (Kendall Island) to 45.6 (Darnley Bay and surrounding area), by location. The average number of calves seen while hunting ranged from 0 (Kendall Island and Ulukhaktok) to 2.7 (Hendrickson Island), by location (Table A7). In general, there were low response rates for most TEK indicators.

SUMMARY

This report provides an overview and inventory of beluga data collected in 2021 from the long-term ISR Beluga Subsistence Harvest Monitoring Program. Notable points include:

- There were 114 harvested belugas reported in the ISR in 2021, between June 18 and August 5, with 72 of those whales sampled by Beluga Monitors and 20 sampled under the Expanded Beluga Health Research and Monitoring Program.
- Sex was field-identified for 71 belugas, of which 57 were reported to be male (80.3%).
- Of the 14 females landed, three were reported to have been accompanied by calves, three were lactating, and one had a first-term fetus.
- Two dead belugas were seen floating in ISR waters; one 13 km offshore of Shingle Point (June 27, 2021) and one neonate between Tuktoyaktuk and Hendrickson Island (July 19, 2021). These whales were not sampled.
- The local Research Monitor successfully collected a modified suite of science samples following virtual training and hands-on training with the DFO Science team during the previous six seasons at Hendrickson Island.
- Considerable effort was made to adapt to the COVID-19 pandemic, including the continuation of new community positions (Research Monitor, Research Support Services), increased efforts around communication, and ensuring Monitors were able to follow the appropriate safety measures in the field.

This report provides Inuvialuit community members and organizations, co-management boards, and scientists with important information on the subsistence harvest of Eastern Beaufort Sea beluga in the Inuvialuit Settlement Region, including harvest numbers, TEK indicators, basic morphometrics, and the samples collected from harvested beluga whales in 2021. Together with other sources of information and data including scientific research, these monitoring results contribute to the management and monitoring of MPAs in the ISR (e.g., TNMPA and ANMPA). Continued monitoring is important to support resource management to conserve this ecologically and culturally important species, while ensuring continued subsistence harvesting opportunities for the Inuvialuit.

AUTHOR CONTRIBUTIONS

Laura Murray wrote the original draft and supported design, implementation, and logistics for the 2021 Beluga Health Research and Monitoring Program. Kiyoo Campbell supported implementation and logistics for the ISR Beluga Subsistence Harvest Monitoring Program, managed harvest data, and contributed to writing the report. Shannon MacPhee redesigned project proposals, budget and contracts for the Research Monitor and Research Support Services in response to COVID-19, and provided overall program design and coordination between DFO, Joint Secretariat staff, and the Tuktoyaktuk HTC. Ashley Elliot processed and analyzed aging data for 2021 harvested beluga. Kayla Hansen-Craik oversaw MPA funding and administered contracts with the AHTC and PHTC for their beluga monitors. Lisa Loseto is the Principal Investigator for DFO Science and acquired funding and collaborators for sample analyses, as well as for the In-training Monitor at Hendrickson Island through the National Contaminants Program. All authors reviewed and edited the manuscript.

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APPENDIX A: DATA AND METADATA

Table A1. Morphometric measurements, sex, and age of beluga whales landed during the 2021 Beluga Monitoring Program, by camp (NR= not recorded).

Harvest date (2020)	Sample ID	Camp location	Sex	Age	Total length (cm)	Fluke width (cm)	Maximum half-girth (cm)	Half-girth at anus (cm)	Blubber thickness at sternum (cm)	Blubber thickness at anus (cm)
18-Jun	ARULU-DL-21-02	Ulukhaktok	F	17.9	336.6	111.8	167.6	NR	NR	NR
23-Jun	NR	Shingle Point	F	NR	396.2	NR	NR	NR	NR	NR
26-Jun	NR	Shingle Point	M	NR	426.7	NR	NR	NR	NR	NR
27-Jun	ARSP-DL-21-04	Shingle Point	F	73.2	371.2	91.4	96.5	NR	6.0	10.0
27-Jun	NR	Tuktoyaktuk Harbour	M	NR	456.6	99.1	121.9	81.3	6.4	3.8
28-Jun	NR	East Whitefish	NR	NR	NR	NR	NR	NR	NR	
30-Jun	ARSP-DL-21-03	Shingle Point	F	36.4	365.8	35.6	109.2	NR	5.0	6.5
30-Jun	NR	Hendrickson Is	M	NR	381.0	99.1	96.5	81.3	4.3	3.6
4-Jul	ARULU-DL-21-03	Ulukhaktok	M	66.2	467.4	99.1	231.1	147.3	NR	NR
5-Jul	ARHI-DL-21-01	Hendrickson Is	M	NR	391.2	96.5	121.9	78.7	4.5	4.0
6-Jul	ARHI-DL-21-02	Hendrickson Is	F	49.7	370.8	86.4	106.7	78.7	5.0	4.0
6-Jul	ARHI-DL-21-03	Hendrickson Is	M	26.8	429.3	106.7	124.5	81.3	5.5	4.5
6-Jul	ARHI-DL-21-04	Hendrickson Is	M	29.3	414.0	96.5	124.5	86.4	5.8	4.6
7-Jul	AREW-DL-21-01	East Whitefish	M	15.4	373.4	88.9	104.1	50.8	5.0	3.0
7-Jul	NR	East Whitefish	M	NR	368.3	86.4	NR	NR	7.6	NR
7-Jul	ARKI-DL-21-01	Kendall Is	M	12.9	401.3	96.5	104.1	NR	7.6	7.6
7-Jul	NR	Kendall Is	NR	NR	NR	NR	NR	NR	NR	NR
7-Jul	NR	Tuktoyaktuk Harbour	NR	NR	NR	NR	NR	NR	NR	NR
8-Jul	ARKI-DL-21-02	Kendall Is	M	43.9	444.5	106.7	134.6	106.7	8.5	3.0

Harvest date (2020)	Sample ID	Camp location	Sex	Age	Total length (cm)	Fluke width (cm)	Maximum half-girth (cm)	Half-girth at anus (cm)	Blubber thickness at sternum (cm)	Blubber thickness at anus (cm)
8-Jul	ARHI-DL-21-05	Hendrickson Is	NR	11.4	401.3	96.5	76.2	76.2	NR	NR
8-Jul	ARHI-DL-21-06	Hendrickson Is	M	36.5	457.2	101.6	121.9	81.3	8.0	7.0
9-Jul	NR	Tuktoyaktuk Harbour	NR	NR	NR	NR	NR	NR	NR	NR
10-Jul	ARKI-DL-21-03	Kendall Is	M	18.5	442.0	86.4	106.7	78.7	10.2	6.4
10-Jul	ARHI-DL-21-07	Hendrickson Is	M	44.5	335.3	76.2	94.0	76.2	5.2	4.6
10-Jul	NR	Darnley Bay	F	NR	NR	NR	NR	NR	NR	NR
10-Jul	NR	Darnley Bay	M	NR	NR	NR	NR	NR	NR	NR
10-Jul	NR	Darnley Bay	NR	NR	NR	NR	NR	NR	NR	NR
10-Jul	NR	Darnley Bay	NR	NR	NR	NR	NR	NR	NR	NR
10-Jul	ARPA-DL-21-01	Darnley Bay	F	6.39	292.1	66.0	81.3	35.6	NR	NR
10-Jul	ARPA-DL-21-13	Darnley Bay	NR	NR	370.8	NR	96.5	53.3	NR	NR
12-Jul	NR	East Whitefish	M	NR	383.5	86.4	109.2	NR	8.9	NR
12-Jul	ARKI-DL-21-04	Kendall Is	M	19.0	419.1	91.4	106.7	53.3	9.0	4.0
12-Jul	NR	Tuktoyaktuk Harbour	NR	NR	NR	NR	NR	NR	NR	NR
14-Jul	ARHI-DL-21-14	Hendrickson Is	M	22.7	401.3	96.5	97.8	80.0	8.0	7.0
15-Jul	AREW-DL-21-02	East Whitefish	M	30.6	439.4	99.1	114.3	61.0	7.0	7.0
16-Jul	ARSP-DL-21-02	Shingle Point	F	26.9	386.1	91.4	121.9	NR	10.0	12.0
16-Jul	ARKI-DL-21-05	Kendall Is	M	32.1	414.0	94.0	106.7	76.2	6.0	5.0
16-Jul	ARHI-DL-21-09	Hendrickson Is	F	13.1	386.1	116.8	92.7	81.3	5.5	3.8
16-Jul	ARHI-DL-21-10	Hendrickson Is	M	7.73	302.3	66.0	86.4	50.8	5.0	4.0
16-Jul	ARHI-DL-21-11	Hendrickson Is	M	17.0	342.9	71.1	68.6	68.6	5.0	4.0
16-Jul	ARHI-DL-21-12	Hendrickson Is	M	47.8	416.6	96.5	111.8	86.4	11.0	4.0

Harvest date (2020)	Sample ID	Camp location	Sex	Age	Total length (cm)	Fluke width (cm)	Maximum half-girth (cm)	Half-girth at anus (cm)	Blubber thickness at sternum (cm)	Blubber thickness at anus (cm)
16-Jul	<i>NR</i>	Tuktoyaktuk Harbour	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>
17-Jul	AREW-DL-21-03	East Whitefish	M	19.2	383.5	88.9	94.0	53.3	6.4	5.1
17-Jul	ARKI-DL-21-06	Kendall Is	M	30.7	444.5	104.1	116.8	66.0	7.0	3.0
17-Jul	ARKI-DL-21-07	Kendall Is	M	34.3	431.8	106.7	124.5	83.8	11.0	4.0
17-Jul	ARHI-DL-21-13	Hendrickson Is	M	14.5	396.2	91.4	96.5	76.2	5.0	4.5
17-Jul	<i>NR</i>	Darnley Bay	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>
17-Jul	ARPA-DL-21-21b	Darnley Bay	F	<i>NR</i>	378.5	76.2	109.2	78.7	10.2	<i>NR</i>
17-Jul	ARPA-DL-21-11	Darnley Bay	F	20.0	396.2	83.8	91.4	48.3	<i>NR</i>	<i>NR</i>
17-Jul	ARPA-DL-21-12	Darnley Bay	M	37.5	419.1	91.4	121.9	53.3	7.6	<i>NR</i>
17-Jul	ARPA-DL-21-14	Darnley Bay	M	8.07	294.6	73.7	86.4	35.6	5.1	<i>NR</i>
17-Jul	ARPA-DL-21-05	Darnley Bay	M	<i>NR</i>	355.6	81.3	96.5	43.2	10.0	<i>NR</i>
17-Jul	ARPA-DL-21-10	Darnley Bay	M	20.9	424.2	106.7	109.2	53.3	<i>NR</i>	<i>NR</i>
18-Jul	ARKI-DL-21-08	Kendall Is	M	17.5	393.7	86.4	91.4	71.1	5.0	5.0
18-Jul	<i>NR</i>	Tuktoyaktuk Harbour	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>
19-Jul	AREW-DL-21-04	East Whitefish	M	18.6	408.9	91.4	99.1	71.1	6.4	3.8
19-Jul	<i>NR</i>	East Whitefish	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>
19-Jul	ARKI-DL-21-09	Kendall Is	M	19.2	408.9	88.9	104.1	66.0	5.5	5.5
19-Jul	ARHI-DL-21-15	Hendrickson Is	M	18.5	388.6	76.2	106.7	109.2	10.0	10.0
20-Jul	<i>NR</i>	East Whitefish	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>	<i>NR</i>
20-Jul	ARPA-DL-21-15	Darnley Bay	M	14.5	414.0	104.1	106.7	45.7	<i>NR</i>	<i>NR</i>
20-Jul	ARPA-DL-21-06	Darnley Bay	<i>NR</i>	<i>NR</i>	431.8	104.1	114.3	48.3	<i>NR</i>	<i>NR</i>
20-Jul	ARPA-DL-21-16	Darnley Bay	<i>NR</i>	<i>NR</i>	419.1	91.4	109.2	50.8	<i>NR</i>	<i>NR</i>
20-Jul	ARPA-DL-21-08	Darnley Bay	<i>NR</i>	<i>NR</i>	388.6	96.5	109.2	50.8	<i>NR</i>	<i>NR</i>

Harvest date (2020)	Sample ID	Camp location	Sex	Age	Total length (cm)	Fluke width (cm)	Maximum half-girth (cm)	Half-girth at anus (cm)	Blubber thickness at sternum (cm)	Blubber thickness at anus (cm)
21-Jul	ARKI-DL-21-10	Kendall Is	F	24.5	375.9	78.7	94.0	48.3	8.0	9.0
21-Jul	ARHI-DL-21-08	Hendrickson Is	M	9.04	378.5	94.0	96.5	78.7	5.0	5.0
21-Jul	ARHI-DL-21-15	Hendrickson Is	M	28.0	442.0	111.8	134.6	96.5	10.0	11.0
21-Jul	ARHI-DL-21-17	Hendrickson Is	M	17.3	365.8	96.5	114.3	76.2	6.0	5.0
21-Jul	ARHI-DL-21-18	Hendrickson Is	M	19.1	378.5	96.5	101.6	73.7	6.0	6.0
21-Jul	ARHI-DL-21-19	Hendrickson Is	M	31.5	431.8	101.6	119.4	94.0	10.0	8.0
21-Jul	ARPA-DL-21-02a	Darnley Bay	<i>NR</i>	24.8	426.7	99.1	109.2	43.2	<i>NR</i>	<i>NR</i>
25-Jul	ARPA-DL-21-18	Darnley Bay	F	38.8	345.4	76.2	88.9	43.2	3.8	2.5
26-Jul	AREW-DL-21-05	East Whitefish	M	46.9	411.5	106.7	106.7	45.7	5.1	3.8
26-Jul	ARHI-DL-21-20	Hendrickson Is	M	34.2	444.5	94.0	109.2	91.4	7.0	7.0
26-Jul	ARSH-DL-19-01	Sachs Harbour	<i>NR</i>	38.3	375.9	78.7	188.0	<i>NR</i>	3.8	5.1
27-Jul	AREW-DL-21-06	East Whitefish	M	29.1	459.7	111.8	119.4	68.6	5.1	3.8
27-Jul	ARHI-DL-21-21	Hendrickson Is	M	19.0	431.8	96.5	111.8	88.9	7.0	7.0
27-Jul	ARPA-DL-21-02b	Darnley Bay	M	<i>NR</i>	401.3	99.1	121.9	58.4	6.4	3.8
27-Jul	ARPA-DL-21-07	Darnley Bay	M	15.9	401.3	86.4	114.3	45.7	8.9	5.1
27-Jul	ARPA-DL-21-09	Darnley Bay	M	24.5	422.9	101.6	114.3	50.8	7.6	5.1
28-Jul	ARHI-DL-21-22	Hendrickson Is	M	13.4	365.8	86.4	86.4	66.0	5.0	5.0
28-Jul	ARPA-DL-21-21	Darnley Bay	M	<i>NR</i>	431.8	61.0	114.3	55.9	10.2	5.1
29-Jul	ARHI-DL-21-23	Hendrickson Is	M	15.0	386.1	96.5	109.2	81.3	6.0	6.0
31-Jul	AREW-DL-21-07	East Whitefish	F	50.7	360.7	83.8	119.4	119.4	3.8	2.5
31-Jul	ARHI-DL-21-24	Hendrickson Is	M	18.9	398.8	91.4	109.2	85.1	7.0	5.0
31-Jul	ARPA-DL-21-26	Darnley Bay	M	23.4	431.8	106.7	104.1	48.3	1.9	1.3
3-Aug	ARHI-DL-21-25	Hendrickson Is	<i>NR</i>	26.8	419.1	48.3	83.8	61.0	8.0	7.0
4-Aug	ARPA-DL-21-22	Darnley Bay	M	20.3	431.8	88.9	116.8	58.4	7.6	5.1

Harvest date (2020)	Sample ID	Camp location	Sex	Age	Total length (cm)	Fluke width (cm)	Maximum half-girth (cm)	Half-girth at anus (cm)	Blubber thickness at sternum (cm)	Blubber thickness at anus (cm)
4-Aug	ARPA-DL-21-17	Darnley Bay	M	14.0	454.7	94.0	106.7	61.0	6.4	NR
4-Aug	ARPA-DL-21-30	Darnley Bay	M	14.4	421.6	101.6	114.3	58.4	7.0	NR
5-Aug	ARPA-DL-21-03	Darnley Bay	M	22.3	442.0	91.4	96.5	58.4	7.6	5.1
NR	ARHI-DL-21-26	Hendrickson Is	NR	29.4	355.6	NR	91.4	76.2	4.0	4.0

Table A2. Tissue samples taken from belugas harvested as part of the Beluga Monitoring Program in 2021 by camp.

Camp	Samples taken									
	Eyeballs	Blood Vial	Milk Vial	Genetics Vial	Blubber	Lower Jaws	Muscle Meat	Liver	Kidney	Feces
Hendrickson Is	25	25	0	25	25	26	25	25	-	0
Tuktoyaktuk Harbour	-	-	-	-	-	-	-	-	-	-
East Whitefish	7	7	1	7	7	7	7	7	-	0
Kendall Is	10	10	1	10	10	10	10	10	-	1

Darnley Bay (and surrounding area)	18	20	1	20	21	19	20	20	-	0
Ulukhaktok	2	2	-	2	2	2	2	2	-	-
Shingle Point (and surrounding area)	3	3	2	3	3	3	3	3	-	1
Sachs Harbour	1	1	-		1	1	1	-	-	-

Table A3. Tissue samples taken from the 20 belugas sampled by the Research Monitor at Hendrickson Island, for the Expanded Beluga Health Research and Monitoring Program in 2021.

Sample type	Number of whales sampled
Blood (serum)	20
Blubber	20
Muscle	20
Heart	20
Spleen	20
Brain	20
Kidney	20
Trachea	1

Table A4. Color of harvested beluga whales recorded during the 2021 Beluga Monitoring Program, by camp.

Camp (number of whales landed)	Colour				
	Yellow	White	Grey	Brown	Not reported
Hendrickson Is (26)	0	9	0	0	17
Tuktoyaktuk Harbour (0)	0	0	0	0	0
East Whitefish (7)	0	6	0	0	1
Kendall Is (10)	0	9	0	0	1
Darnley Bay (and surrounding area) (23)	6 (all white/yellow)	7	3 (1 grey/white)	0	7
Ulukhaktok (2)	0	2	0	0	0
Shingle Point (and surrounding area) (3)	1	2	0	0	0
Sachs Harbour (1)	0 (white/yellow)	0	0	0	1

Table A5. Presence/absence of beluga stomach contents for whales harvested during the 2021 Beluga Monitoring Program, by camp. Any details on contents are included as comments.

Camp (number of whales sampled)	Stomach Contents			Comments
	Yes	No	Not reported	
Hendrickson Is (26)	0	5	21	1 tapeworms, 1 'worms'
Tuktoyaktuk Harbour (0)	0	0	0	NA
East Whitefish (7)	0	7	0	NA
Kendall Is (10)	0	8	2	1 with 'worms'
Darnley Bay (and surrounding area) (23)	4	11	8	11 samples collected
Ulukhaktok (2)	1	0	1	2 samples collected
Shingle Point (and surrounding area) (3)	1	2	4	2 samples collected
Sachs Harbour (1)	0	0	1	NA

Table A6. Reproductive information collected on harvested female belugas in 2021. Presence of calves was communicated to Beluga Monitors by harvesters. Information was not able to be collected for all female belugas and asterisks have been used to identify where the recorded values may not be representative of the actual values due to low response numbers.

Camp (number of female beluga)	First-term Fetus	Calf Seen with Female	Lactating Female
Hendrickson Is (2)	0*	1*	0*
Tuktoyaktuk Harbour (not reported)	-	-	-
East Whitefish (1)	not recorded	not recorded	1
Kendall Is (1)	0	0	1
Darnley Bay (and surrounding area) (5)	0**	0**	1**
Ulukhaktok (1)	0	not recorded	0
Shingle Point (and surrounding area) (4)	1**	2**	0**
Sachs Harbour (not reported)	-	-	-

**Information recorded for 1 of the female belugas.*

***Information recorded for 3 of the female belugas.*

Table A7. Other information collected on landed belugas in 2021, based on local and TEK indicators (Ostertag et al., 2018), as communicated to Beluga Monitors by harvesters. Asterisks have been used to provide more information on the scarring or other signs of infection.

Camp (number of whales sampled)	Love handles	Backbone sticking out	Scarring	Signs of infection and other observations
Hendrickson Is (26)	12	1	0	0
Tuktoyaktuk Harbour (0)	not recorded	not recorded	not recorded	not recorded
East Whitefish (7)	6	5	2	0
Kendall Is (10)	4	6	0	0
Darnley Bay (and surrounding area) (23)	8	1	2	1*
Ulukhaktok (2)	1	not recorded	0	0
Shingle Point (and surrounding area) (3)	2	3	2	0
Sachs Harbour (1)	0	0	0	0

*Unusual spots observed covering one of the whales.

Table A8. Other information related to observations made while harvesters were conducting beluga hunts in 2021, as communicated to Beluga Monitors by harvesters. Information was not able to be collected for all beluga hunts and asterisks have been used to identify where the recorded values may not be representative of the actual values due to low response numbers.

Camp	Average number of other belugas seen while hunting	Landed beluga average group size	Average number of beluga calves seen while hunting
Hendrickson Is	4.6	5*	2.7***
Tuktoyaktuk Harbour	not recorded	not recorded	not recorded
East Whitefish	13.6	not recorded	0.5
Kendall Is	11.6	3.0***	0
Darnley Bay (and surrounding area)	36.2	45.6	1.0
Ulukhaktok	2.0*	not recorded	0*
Shingle Point (and surrounding area)	11.7***	7.5**	1.0***
Sachs Harbour	6.0*	4.0*	2.0*

*Average based on 1 response.

**Average based on 2 responses.

***Average based on 3 responses.

APPENDIX B: MARINE MAMMAL SAMPLE KIT CONTENTS

ISR Beluga Subsistence Harvest Monitoring Program - Core FJMC Program

Marine Mammal Sample Kits were assembled by DFO Science staff at the Freshwater Institute (FWI). All sample containers were labelled externally (with a label taped on with packing tape) with Animal ID and tissue type. Beluga Monitor kits included:

- Whirl-pak® for: eyeballs (2), blubber sample, muscle, liver
- Scintillation vials (HDPE) for: milk, whole blood
- Wide mouth Nalgene vial (30 mL) with DMSO for: skin
- Labelled tag for: lower jaw

Harvesting kits were then sent to Inuvik where the FJMC added equipment needed to collect samples before sending kits out to the communities. This equipment included:

- Nitrile gloves (1 - 2 boxes)
- Open reel measuring tape (inches and cm)
- Ruler (cut to 0 cm)
- Hacksaw, extra hacksaw blades
- Waterproof/shockproof camera
- Binder with datasheets for each harvested whale
- Knives (2 or more)
- Pencils, pens, erasers
- Cooler(s) for storage
- Freezer
- Generator
- Marine radio
- 1st aid kit
- Face masks
- Hand sanitizer

Expanded Beluga Health Research and Monitoring - DFO Program

Marine Mammal Harvest Kits, supplementary lab kits, sampling equipment, and general equipment for the Research Monitor was assembled by DFO at the FWI for use at Hendrickson Is. These included:

Harvesting kits:

- Whirl-pak® for tissues (brain, heart, skeletal muscle, spleen, lung)
- Serum collection tubes (x 6) (BD SST™ tubes 8.5 mL with silica clot activator, polymer gel, silicone-coated interior)
- Viral swab (sterile Dacron swab in 2mL capacity Corning cryovial containing virus transport media)
- Latex gloves
- Cotton swab

Lab kits:

- Transfer pipettes (6 x 3 mL)
- Blubber vials (5 x 5 mL)
- Cryovial skin vials (1 x 5 g)
- Cryovial serum (12 x 1.2 mL)
- Scalpels and sharps disposal bin

Sampling equipment ('Go' Kits – 2 kits provided):

- Whale ID and beluga anatomy sheets
- Paper plates
- Butcher knives (2 x 8")
- Boning knife (2 x 6")
- Pens, pencils, white board markers, sharpies
- Camera with SD card

General equipment:

- Centrifuge (Hettich EBA 200) with associated equipment (manual, hex head wrench, fuses, power cord)
- Lab camera
- GoPro (camera, charger, head strap, chest strap, SD card, battery, case)
- Forceps/tweezers
- Lab coats
- Scissors
- Tape (dry erase, packing, scotch)
- Kim wipes
- Aluminum foil
- Face masks
- Hand sanitizer