DEPARTMENT OF FISHERIES AND OCEANS CANADA SUBMISSION TO THE NUNAVIK MARINE REGION WILDLIFE BOARD

IN RESPONSE TO THE NOTICE OF WRITTEN HEARING OF January 21-23, 2020:

Modification of the Total Allowable Take and Non Quota Limitations for Eastern Hudson Bay Beluga in the Nunavik Marine Region.

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1. Background:

The Nunavik Inuit Land Claims Agreement (NILCA) recognizes the rights of Inuit to harvest, but also states the need for an effective system of wildlife management (i.e. management framework) that protects the renewable resource economy and follows the principles of conservation. These principles include the maintenance of vital, healthy wildlife populations capable of sustaining harvesting needs and also the restoration and revitalization of depleted populations of wildlife.

Hunters from Nunavik harvest beluga belonging to at least 3 different stocks: Eastern Hudson Bay (EHB; Aerial survey estimate = 3,800 animals), Western Hudson Bay (WHB; Aerial survey estimate = 54,500 animals) and James Bay (JB; Aerial survey estimate = 10,600 animals) stocks. A fourth group of belugas in Nunavik waters occurs in Ungava Bay, but this stock is thought to number less than 100 animals and has been protected from harvesting in its core area around the Mucalic River. The EHB stock summers in the eastern Hudson Bay arc, then migrates to overwinter with the WHB stock in Hudson Strait. The EHB stock may have numbered approximately 8,000-12,000 belugas in the 19th century, but intensive commercial hunting resulted in depletion of the stock. Continued high subsistence harvests have since limited recovery. The EHB beluga was designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC)as Threatened in April 1988; then Endangered in May 2004.

Conservation concerns for EHB belugas resulted in the implementation of management measures in the Nunavik Marine Region (NMR) in the 1980s. These management measures included seasonal and regional closures and harvest limits. The management approach is known as sustainable yield where the objective is to maintain a constant population. The Total allowable take (TAT) is set so that the probability of a decline in the population does not exceed 50%, however, it also implies that the probability of a population increase does not exceed 50% as well. This management framework is considered as a high risk approach. Within this management framework there is no buffer for unusual mortality events, overharvesting, uncertainty in catches or in the scientific framework.

A more suitable management framework would incorporate the Precautionary Approach (PA) which defines resource use strategies to scale resource use to its condition in a manner that avoids undesirable outcomes. In wildlife resource management, the PA is, in general, about being cautious when scientific information is uncertain, unreliable or inadequate to avoid serious harm to the resource. That would also increase the probability for the population to recover to healthy levels.

During the late 1990s to early 2000s, reported harvests declined as harvests were limited to stabilize the EHB stock, which reached a minimum in the late 1990s. This reduction required a lot of work on the part of hunters. Since then the abundance of EHB beluga has stabilised or increased slightly. Fitting the population model to the aerial survey data, and taking into account the most recent harvest data, including the TAT over run in 2019, the model suggests that the population may have declined to 3,200 animals in 2019 (Fig. 1).

The development of new genetic testing methods now provides a way to distinguish between the EHB and WHB beluga stocks. Hunters provide skin samples from their catches, which once analyzed

provide insights into the regional and temporal differences in the composition of the harvest. This allows for harvesting pressure to be shifted away from the EHB beluga towards the non-endangered beluga stocks such as the WHB and JB stocks by identifying when and where EHB and/or WHB and JB belugas are harvested. Incorporating this information into the management framework resulted in overall catches increasing, in all three zones, Eastern Hudson Bay, Hudson Strait (HS) and Ungava Bay (UB) but especially in HS and UB (Fig. 2).

Inuit in Sanikilluaq also harvest beluga from the EHB stock at different times of the year. Data on total harvests by Sanikilluaq hunters since 2016 were not available at the time of preparing this document.

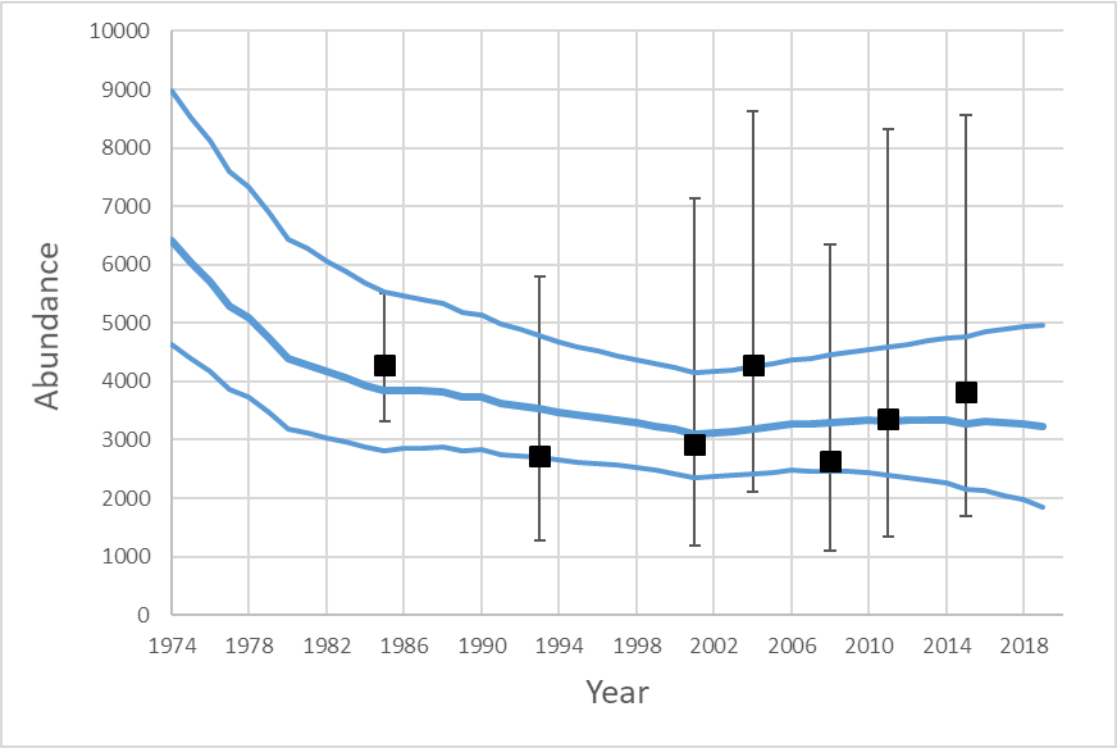

Figure 1. *Estimated trajectory obtained by fitting a population model to seven aerial surveys (1985-2015), taking into account harvest data (1974-2019). Surveys (dot), median (solid line), 25th, 75th percentile (inner dotted lines) and 95% Confidence Interval (outer dotted lines). The 2018 abundance estimate from the population model is 3400 (CV=23%, 95% CI=2000-5100) EHB belugas.*

2. Science

An overview of the scientific information requested by the Nunavik Marine Region Wildlife Board (the Board) is presented below. The Science sector collects information on beluga abundance from aerial surveys and composition of the harvest using the genetic methods to analyze the hunter provided samples from the catch. This information is incorporated into a population model that is then used to provide advice to the Board on the likelihood that different Total Allowable Takes (TAT) will

achieve the management objectives.

2.1. Abundance estimates for beluga stock inhabiting the NMR

Abundance estimates are obtained from visual aerial surveys (DFO 2018). Estimates are corrected for diving animals using data from the deployment of satellite transmitters that provide information on the time that animals spend under water. The surveys provide an estimate of abundance, but with considerable uncertainty associated with this estimate. The last aerial survey was flown in 2015. The next survey is planned for 2020.

Table 1. *Latest beluga abundance estimates from systematic aerial surveys. No belugas have been seen on transect in UB. However, belugas have been detected offline. This information has been used to generate an estimate of less than 100 animals for this summer stock.*

Year	EHB estimate (SE)	WHB estimate (SE)	JB estimate (SE)	UB
1985	4 282 (557)		4 720 (614)	*
1987		31 124 (6 967)		
1993	2 729 (1 092)		8 205 (1 969)	*
2001	2 924 (1 404)		17 285 (4 148)	*
2004	4 274 (1 581)	51 761 (15 875)	8 364 (2 509)	
2008	2 646 (1 244)		19 439 (12 830)	*
2011	3 351 (1 642)		14 967 (4 490)	
2015	3 819 (1 642)	54 500 (5 329)	10 615 (2 654)	
				<100*

*** No belugas have been seen on transect in UB. However, belugas have been detected offline. This information has been used to generate an estimate of less than 100 animals for this summer stock.**

2.2. Genetic data based on the hunt sampling program

Inuit hunters have provided samples from their catch since the 1990s. The genetic analysis of these samples is used to estimate the proportion of EHB occurring in the NMR. Samples from the 2019 season were not available for genetic analysis at the date of the public hearing.

Data in Table 2 is used to estimate the number of EHB beluga at any given time in different areas. It provides us with the percentage of the total number of belugas harvested that belong to the EHB or WHB stock. For example, from Table 2, there is a 11.7% chance that a beluga harvested in the Hudson Strait in the Spring is from the EHB stock. In raw numbers, this means that if 27 belugas were harvested, we would expect that 3 of them would belong to the EHB stock (11.7% of 27 ≈ 3). It is also evident that the concentration of EHB belugas changes seasonally. The conversion rate for the Hudson Strait in the fall is 29.1% or 3 EHB belugas for every 10 that would be harvested at that time.

All the belugas harvested in Eastern Hudson Bay, in an area referred to as the Arc, from mid-June (annual spring migration) to end of November (fall migration of the belugas), are considered as EHB belugas. There seems to be no exchange between the EHB and James Bay stocks. Thus the proportion of EHB beluga in the Long Island and James Bay areas is zero.

Table 2. *Results of the genetic mixture analysis using the Pella-Masuda model to determine the proportions of beluga (%) from each source stock in the harvest of Nunavik hunt areas (upper part) and Sanikiluaq harvest (lower part). The model run used the same baselines as in the 2017 assessment (Mosnier et al. 2017). In this run, samples up to 31 January 2019 are included in the analysis. N samples: number of individual samples; N events: number of different hunting dates; WHB: Western Hudson Bay; EHB: Eastern Hudson Bay; 95%CI: 95% confidence interval based on variance among hunting events; CV: coefficients of variation based on individual samples / hunting events. ND: not determined (small sample size).*

	N samples	N events	% WHB	95% CI	(CV samples / events)	% EHB	95% CI	(CV samples / events)	% Unknown
Spring (Feb 1 - Aug 31)									
Hudson Strait	770	347	82,9	78.5 - 87	0.02/0.03	11,7	8.1 – 16	0.15/0.17	5,3
NE Hudson	2	1	ND			ND	-	-	-
Ungava Bay	122	76	87,4	77.8 - 94.6	0.04/0.05	6,0	0.8 - 15.8	0.63/0.65	6,6
Fall (Sept 1 - Jan 31)									
Hudson Strait	454	180	67,6	60.3 - 74.5	0.04/0.05	29,1	22.4 - 36.3	0.09/0.12	3,3
NE Hudson	31	14	49,1	26.4 - 72	0.23/0.24	44,5	23.5 - 66.5	0.26/0.25	6,5
Ungava Bay	4	4	ND	-	-	ND	-	-	ND

Sanikiluaq Season	N samples	N events	% WHB	95% CI	(CV samples / events)	% EHB	95% CI	(CV samples / events)	% Unknown
Spring (Apr. 1 - Jun. 30)	301	107	76,8	69.2 - 83.7	0.02/0.05	1,6	0 - 6.6	1.01/1.17	21,6
Extended spring (Apr. 1 - Jul. 14)	324	120	75,1	67.2 - 82.2	0.03/0.05	4,6	1.1 - 10.2	0.43/0.52	20,4
Summer (Jul. 1 – Aug. 31)	31	18	61,5	32.8 - 86.2	0.16/0.23	25,6	4.9 – 56	0.37/0.53	12,9
Fall (Sept 1 - Nov 30)	45	30	97,8	91.8 - 99.9	0/0.02	0,0	-	-	2,2
Winter (Dec. 1 - Mar. 31)	56	7	31,3	6.1 - 65.6	0.24/0.51	36,6	9 - 70.7	0.21/0.45	32,1

Prior to 2019, no genetics samples were obtained from the Mucalic and Whale rivers, which are the source rivers for the Ungava Bay beluga stock. Thus it has not been possible to examine the association between this beluga stock and animals from the EHB, WHB and JB stocks. Similarly, very few samples have been obtained from the NE Hudson Bay area. There is considerable uncertainty associated with the proportion of EHB animals in the harvest from this area.

2.3. Genetic information - Nunavik Inuit knowledge related to beluga and specially related to Nunavik Inuit approaches to wildlife management

Hudson Strait pilot project

Hunters from the Hudson Strait suggested that two different populations of beluga can be seen during autumn migration. The first one which are associated with EHB animals appears earlier and is composed of smaller and younger animals moving close to the coast. The second group, considered as WHB animals, occur in larger groups composed of larger individuals migrating further away from the coast. From this consideration, a pilot project was put in place to allow the hunt to take place later in the season, with the objective to determine if the proportion of EHB would be smaller than what was expected in the management plan for this period of the year and thus contribute to reducing the impact of the hunt on the EHB beluga population.

Sampling periods for the eastward fall migrating belugas were after 01 Nov in Ivujivik, after 05 Nov in Salluit, after 10 Nov in Kangiqsujuaq, and after 15 Nov in Quaqtaq. A total of 31 and 14 samples were collected in 2017 and 2018 respectively. From these, 6 (19.3%) were considered as EHB in 2017 and 2 (14%) in 2018. The results of this pilot project were used to "update" the TAT by considering the difference between the proportion observed and the proportion expected to estimate the number of EHB belugas under or overharvested during this period.

However, the method used to compare the proportions did not consider the potential uncertainties around the classification (EHB vs not EHB) and the small sample sizes collected during the pilot project period. To account for this uncertainty, it is more appropriate to include the samples collected in 2017 and 2018 in the genetic mixing model (Mosnier et al. 2017). When this is done, we see that overall, the proportion is extremely uncertain with possible values ranging from 6.6 to 50.3%, but overall, 25% of the samples from animals harvested during the pilot project belonged to the EHB stock, which is essentially the same as determined using the larger sample from all harvesting (see Fall harvest Hudson Strait in **Error! Reference source not found.**).

Table 3. *Results of the genetic mixture analysis based on the samples collected during the Hudson Strait Pilot project in 2017 and 2018.*

	N samples	N events	% WHB	95% CI	(CV samples / events)	% EHB	95% CI	(CV samples / events)	% Unknown
Hudson Strait Pilot Project	45	9	68.5	48.7 - 85.2	0.13/0.14	24.9	6.6 - 50.3	0.35/0.46	6.7

Mucalic area (Ungava bay) collaborative project

The Ungava beluga stock is considered to number less than 100 animals and some suggest may be extirpated. However, hunters do report that belugas still visit the Mucalic area during summer, suggesting that the stock continues to persist albeit at very low levels. A collaborative project with the RNUK was conducted during summer 2019. Inuit hunters obtained biopsies from 3 belugas using this area. Samples have not been analyzed at the time of writing, but results will be available for the hearing in January. These samples represent the first data from the UB stock, but with N=3, the sample size is too small to develop a definitive understanding of this stock at the current time.

2.4. Beluga population model

A population model is used to estimate the current population size and trend. This model, incorporating information from harvest statistics (1974-2019) and stock composition (based on the results from the genetic mixture analysis; see previous section), was fitted to seven aerial survey estimates (1985 – 2015) from the EHB stock (Table 1, Fig. 1).

The model is a surplus production model. Two population dynamic parameters are estimated by the model. The carrying capacity, also referred as "K", corresponding to the maximum size of the population that the environment can sustain; and "λmax" which is the maximum growth rate of the population. The model also estimates the struck and lost corresponding to the proportion of whales killed but not recovered or reported. These parameters were entered in the model as distributions, called "priors" (see Table 4), representing the expected value range and uncertainties around these values. The model updates these parameters taking into account the information provided by the harvest, the genetic analysis and the aerial survey. The updated distributions, referred to as "posteriors", indicate the estimated value for each parameter along with the uncertainty around this estimate.

Table 4. *Population model priors and estimated values (posteriors) and credibility intervals, which are similar to confidence intervals. K is the estimated carrying capacity. The Population 1974, is the estimated population when modeling started. Lambda is the maximum rate of increase. Population 2020 is the estimated population in 2020, assuming that 2019 catches did not exceed the allocated TAT.*

	Mean	SD	2.5%	25%	Median	75%	97.5%
Population 1974 prior	8522	3753	2319	5258	8569	11754	14676
Population 1974	6894	1143	4960	6080	6781	7593	9412
K prior	11 010	5 202	2 439	6 498	11 054	15 512	19 559
K	10 003	4 185	5 369	6 691	8 249	12 968	19 239
Struck and lost prior	0.429	0.175	0.118	0.297	0.42	0.554	0.778
Struck and lost	0.397	0.169	0.105	0.27	0.386	0.514	0.745
Lambda prior	0.025	0.014	0.002	0.013	0.025	0.038	0.049
Lambda	0.029	0.012	0.004	0.02	0.03	0.039	0.049
Population 2020	3263	789	1848	2720	3226	3745	4949

The model estimated a median carrying capacity of 8,200 animals, a population at the start of the modeling period in 1974 of 6,900 animals, and an estimated population in 2020, of around 3,200 (95% Credibility intervals=1,800-4,900), if the 2019 TAT was respected. The maximum rate of increase estimated by the model is 3%. The model provided some update on K, the starting population and struck and loss, but there was no change in lambda, suggesting that there is not enough information in the data to inform this parameter.

2.5. Harvest data

The composition of annual harvest (in numbers of beluga landed) was broken down by zones and communities (Figure 2), showing a general increase in number of animals harvested since 2008 in all three zones but especially in the Hudson Strait. For 2019, the numbers do not include harvests after Nov 17th (n=36, which brings the annual total at 367 belugas for 2019). Also note that the numbers presented here correspond to harvest by community and are not necessarily representative of precise hunting location. Complementary to Figure 2, the composition of annual harvest was also summarized by the proportions of the annual harvest distributed amongst zones and communities (Figure 5). The proportion of the annual harvest represented by belugas hunted by the communities located in the three zones remained relatively consistent, with a small increase in the Strait. However, this does not take into account the precise location of harvest for communities that hunted in a different zone.

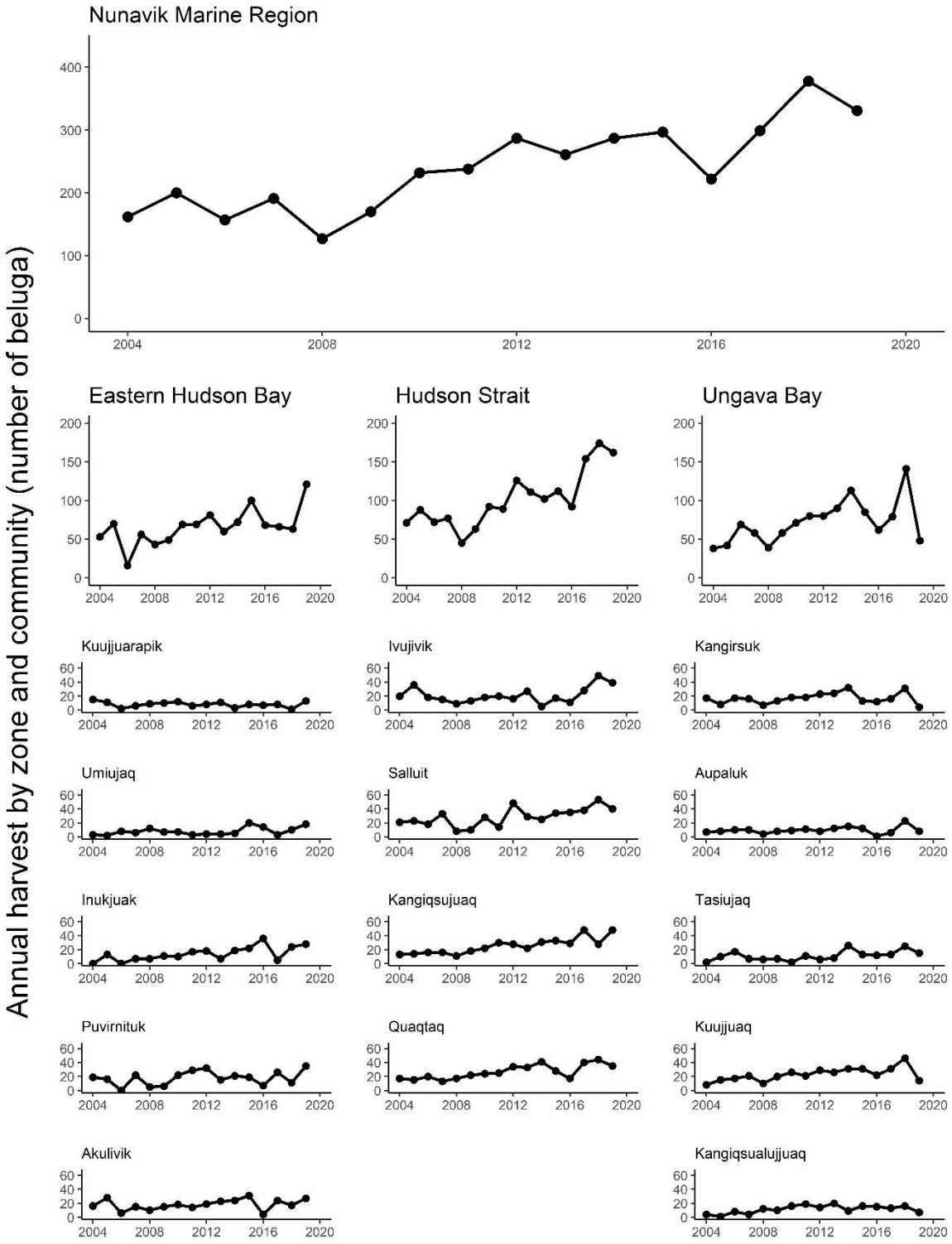

Figure 2. *Number of belugas harvested annually by zone and community (2004 to 2019). They do not include animals killed after November 17 2019 (n=36, which brings the annual total at 367 belugas for 2019). Also note that the numbers presented here correspond to harvest by community and not necessarily representative of precise hunting location.*

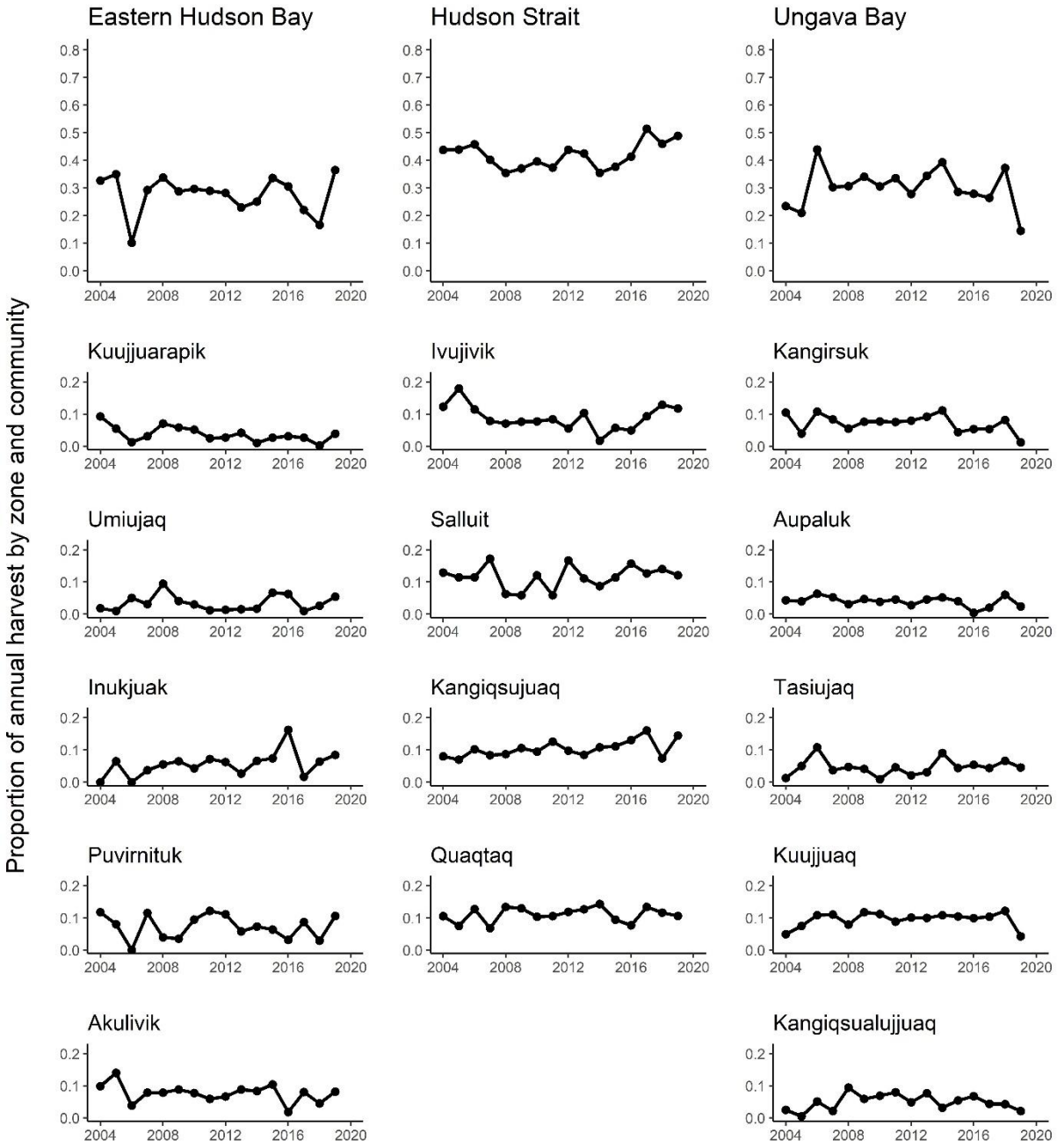

Figure 3. *The proportion of the annual harvest occurring in each zone and by village within the zone (2004-2019). Animals killed after November 17 2019 are not included (n=36, which brings the annual total at 367 belugas for 2019). Also note that the numbers presented here correspond to community reports and not necessarily according to the precise hunting location.*

2.6. Observational data

Weekly observations of beluga have been collected by community wardens since the 1990s. They have been compiled for Quaqtaq and Kangiqsujuaq (Figure 4 and 5), two communities, with the most complete data series (1993-2019). In both figures, the distribution of harvests was overlaid on top of observations and both variables were logged to facilitate the visual comparison of annual distributions. From Figures 4 and 5, there appears to have been a change in the observation-based data. In 2018 and 2019 for Quaqtaq and in 2018 for Kangiqsujuaq, the observation data coincide with the reported harvest data. This suggests that the migration was rapid and synchronous with harvesting, or that data were not collected outside of the harvesting period. Observation-based data provides highly valuable information for current work on the temporal variations in the migration phenology of belugas.

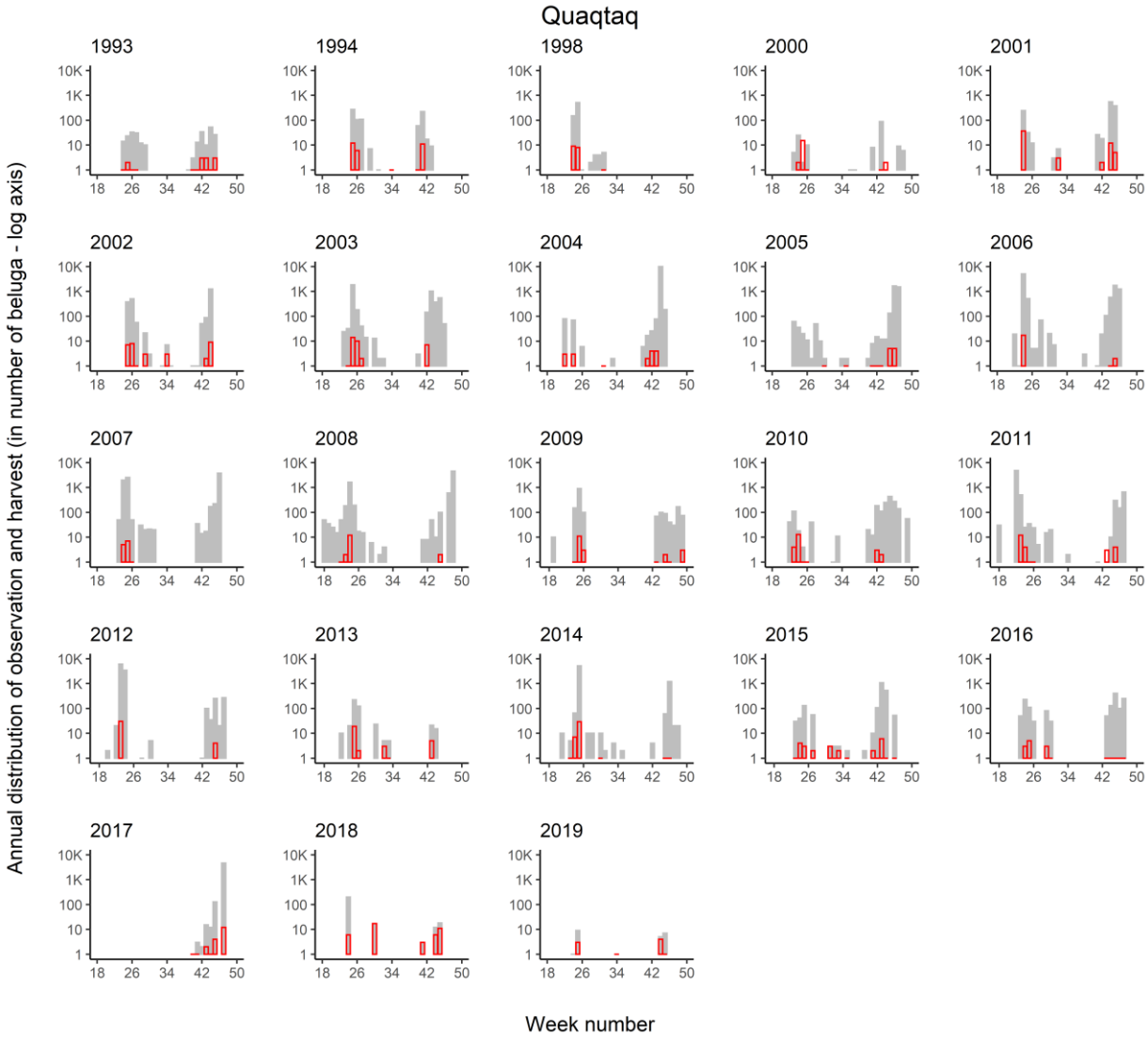

Figure 4. *Annual distributions of observation and harvest (in number of beluga on a logarithmic axis) for Quaqtaq during the period of 1993-2019. The red identifies when harvesting is reported by the community, the grey when belugas are observed. Week 1 starts January 1st.*

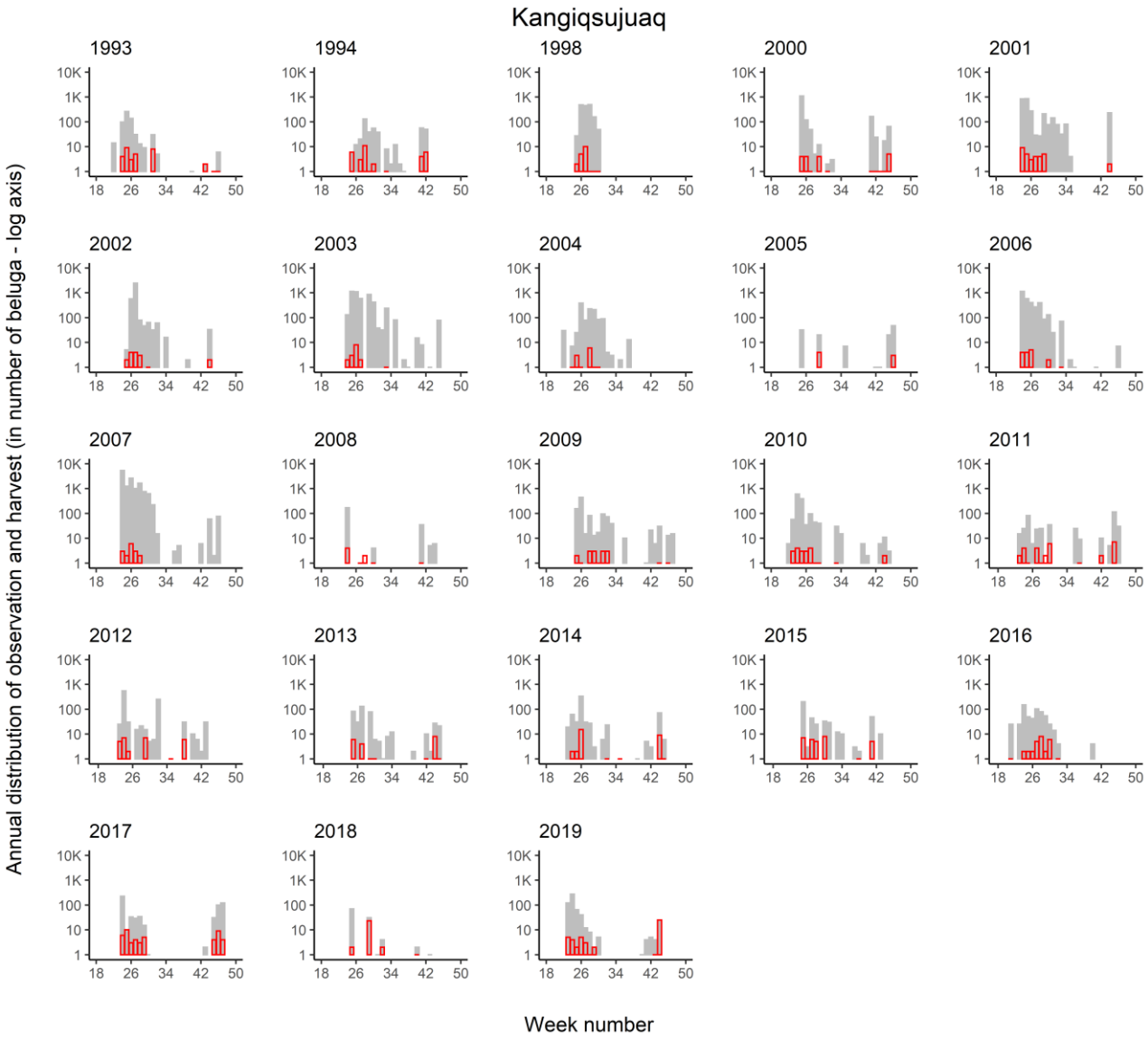

Figure 5. *Annual distributions of observation and harvest (in number of beluga on a logarithmic axis) for Kangiqsujuaq during the period of 1993-2019. The red identifies when harvesting is reported by the community, the grey when belugas are observed. Week 1 starts January 1st.*

2.7. Struck & Lost data

The data on struck and loss (S&L) is limited for Nunavik harvests and rely on self-reporting. Struck and lost data from the reported harvest sheets were compiled for the entire Nunavik Marine Region

for an estimated rate of 5.7 % (20/331) in 2019, which is higher than the average annual S&L of 3.1 % for the period of 1993-2019 (Figure 6). According to a recent report by the Committee of Hunting Methods of the North Atlantic Marine Mammal Commission (NAMMCO), reported struck and loss estimates from other jurisdictions vary, but appear to range between 5.4 and 25.0 % for beluga and narwhal in open water hunts of the Beaufort sea and Baffin regions (NAMMCO, 2018a). In the Greenland beluga hunt where animals are supposed to be harpooned first, S&L rates used in national quota setting vary between 10 and 30 % depending on regions (NAMMCO 2018b).

The population model for Nunavik beluga estimates a median struck and loss of 39%, which is considerably higher than Nunavik estimates and reports from other jurisdictions. However, while the differences reflect reports of struck and loss by hunters, the model is also estimating the non-reporting of harvests in addition to struck and loss.

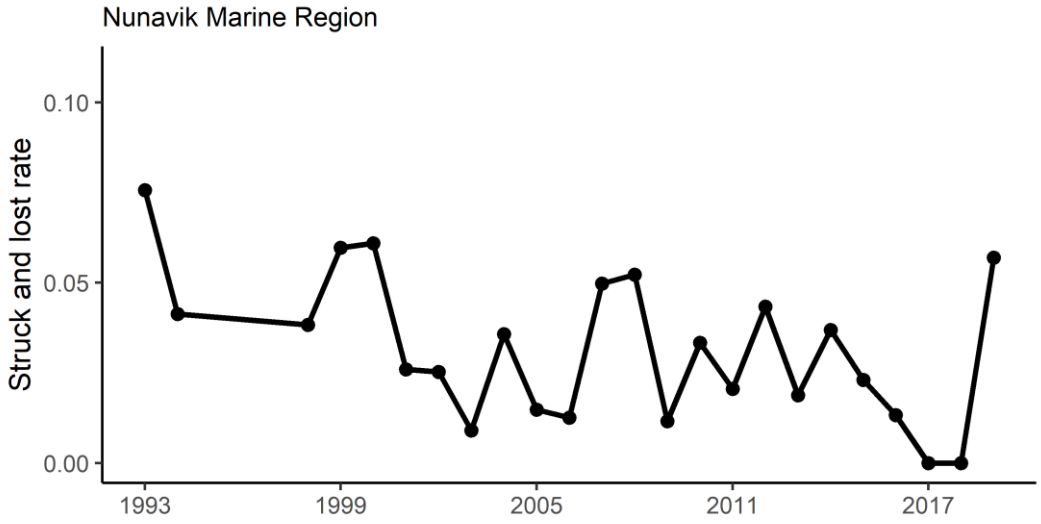

Figure 6. *Annual struck and lost estimate for beluga harvest in the Nunavik Marine Region from 1993 to 2019.*

2.8. Total Allowable Take (TAT)

In the last advice provided to the Board , the suggested annual TAT that respected the management objectives was 68 EHB whales (see DFO 2018). This estimate included removals by Sanikiluaq and Nunavik hunters. Re-running the model, incorporating the new harvest and genetic information, including the TAT over run in 2019 resulted in a much lower TAT of 58 belugas that would respect the management objective of sustainable yield (Fig. 7). However, although this calculation included new harvest and genetic information, it also assumed that the dynamics of the population have not changed since the last assessment. A new aerial survey is needed to determine how accurately the model has predicted the population trend.

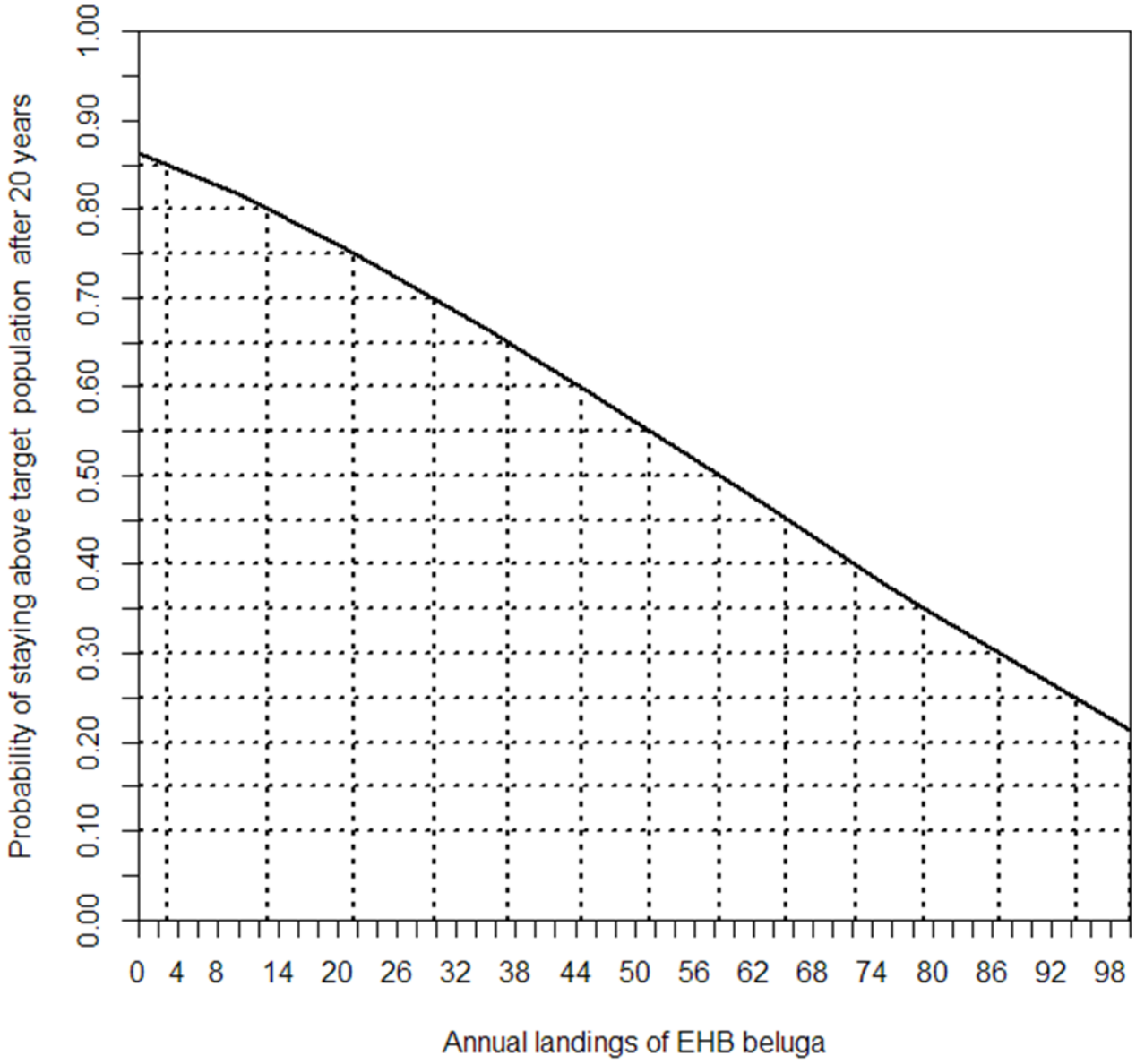

Figure 7. Probability of a population decline (Y-axis) over the next decade for a given harvest (X-axis).

3. Management

A management framework is needed to ensure that Inuit harvesting rights are respected while also conserving the EHB and UB beluga stocks, as outlined in the NILCA. To date, much of the discussion around beluga management has focused on the TAT. Given the importance of the beluga harvest for Nunavik Inuit, it is fundamental that management discussions extend beyond this sole consideration. In 2017, a management plan was prepared, but numerous issues, problems and concerns have been identified in its results and during its implementation. DFO notes that the Board would beneficiate to integrate within its management plan for beluga a consideration for other key components of management including: Organization, Direction and Control in addition of planning. Organization is related to activities that result in offering structures, frameworks and steps forward. Direction is related to activities that offer guidance, an orientation. And control regroups many activities that include monitoring performance, quality control, assessing level of compliance and also the enforcement tools at the disposal of managers

3.1. Management Objectives

A wildlife management plan requires setting management objectives that respect harvesting rights while maintaining healthy wildlife populations. The current management objective follows a sustainable yield approach, an approach that has remained unchanged since the mid-1980s. The objective of the sustainable yield approach is to maintain a constant population. The level of Total Allowable Take (TAT) is set so that the probability of the herd declining does not exceed 50%. This also means that the probability of the herd increasing does not exceed 50% as well. Collapses in many commercial fisheries and declines in subsistence harvested populations, e.g. Cumberland Sound beluga, point to the weakness of the sustainable yield approach and have led to the development of alternative management frameworks incorporating the Precautionary Approach. In fact, the Minister of Fisheries and Oceans Canada invited the Board to move towards developing and implementing a Precautionary Approach management framework when he accepted the 2017-2020 management plan. Fisheries Act (Section 2.5) now indicates that application of precautionary approach is an objective to consider in decision making regarding wildlife management. DFO puts this consideration forward as part of its mandate, as it is considered consistent with the conservation and management system components of NILCA. This is also the privilege approach because it provides room for the integration of many parties in management decisions, as well as the collective preparation of mechanisms to target stock rebuilding objectives and to deal with unexpected events or evolution of the stock. Moving towards a Precautionary Approach framework would also be more consistent with Canadian national and international standards. DFO considers that all of these could generate means to achieve progress in numerous aspects of beluga management.

The current management plan indicates a multi-years flexible TAT relying on the Sustainable yield approach objective of a stable stock. DFO noticed that in addition to this decision, there is a need for additional discussions on a wide range of other topics that are related to beluga management and hunters' objectives. However, facing conservation concerns, hunting limitations are required to promote stock growth in the short term. This implies that discussions are needed to determine how

the limited resource will be allocated amongst hunters and how hunting activities can be maximized while minimizing the risk of harvesting belugas from populations where there is the greatest concern for conservation. These are complex and difficult issues that need to be thoroughly discussed by all partners involved in the management of Nunavik beluga. DFO considers that, the Board should put forward within the next plan the mechanisms and structures in order to organize and direct the actions of each partners given their respective resources and capacities. Also, assessing the performance of the current management, including the science related initiatives mentioned above, will provide valuable information for discussions on improvements. Developing performance measures to evaluate the management plan can also lead to early identification of problems so that proper responses and resources can be allocated.

3.2. Role of each participating organization

Under the NILCA, the Board is responsible for the management of beluga stocks and to set non-quota and/or quota limitations on harvesting as per section 5. The role of the Regional Nunavimmi Umajulirijiit Katujjiqatigiinninga (RNUK) is to determine the allocation of the TAT levels among the 14 Local Nunavimmi Umajulirijiit Katujjiqatigiinninga (LNUKs) members and to ensure that the overall TAT of EHB belugas is not exceeded for the duration of management the plan. The LNUKs are responsible for allocating the community quota and to regulate harvesting practices among members within the community. Under the current organization of roles, the overall TAT has been exceeded in the last year of the two most recent management plans. In any new plan, DFO considers that the Board needs to: identify mechanisms that will adjust for these TAT overruns; develop measures that reduce the probability of exceeding the TAT, and eliminates the need to borrow against future plans. In reality, if the Board needs to borrow animals from future plans, then the management objective is not being respected. Over the long term this will have a negative cumulative effect on the stock.

DFO recognizes that more needs to be done to encourage the engagement of partners. At the same time, more support is needed to assist partners to increase their capacity to assume their roles as identified by the plan and in the NILCA. In front of an issue, there should be in place a process that would seek answers to these questions. A structure should be organized under a general direction: should a partner with a specific role faces a challenge, he can have access to the support he needs from existing resources. In parallel, the Board itself could monitor if partners are fulfilling their roles and investigate the reasons behind burdens so the appropriate mitigation is obtained. DFO wants to remind as well that respecting the TAT within the next management cycle could mean a larger number of harvest available to hunters in the next cycle as no deduction would have to be made to cover for a borrow.

3.3. Develop methods for the equitable allocation

Under the NILCA, section 5, the development of equitable allocation of the TAT is the role of the RNUK. From its standpoint, DFO considers this is a significant challenge for the RNUK because of competing interests between communities with respect to access: should allocation be linked to proximity to harvestable beluga, the importance of the subsistence harvest to food security for the community, or should larger communities receive a larger allocation. DFO noticed that the RNUK are also facing the difficult situation of representing the LNUKs and hunter interests as their elected leaders, as well as being designated by the management plan to ensure that the allocations are

respected, but without the legal tools to enforce the plan. The respect for the allocations of belugas among communities has been uneven. There has also been efforts to make the allocation information format more accessible to hunters with indications that this could still be improved. DFO considers that RNUK group would likely benefit from a supportive structure to organize what comes after the direction they provide with their allocation decisions. The communicational aspect of this type of decision appears very important to DFO for its land-based operations. DFO recommends that the Board initiate a discussion toward monitoring the performance of what follows allocation decisions. This would bring valuable information for discussion over solutions to issues and challenges.

3.4. Monitoring

The NILCA did not alter DFO's fundamental role regarding beluga management. It required establishing a monitoring system that focuses on EHB beluga and reviewing the beluga management zone boundaries (Areas for Northern Quebec Beluga). Harvesting has been monitored in close collaboration with the Kativik Regional Government (KRG) involving a program of community wardens, weekly reporting on marine mammal observations, harvests and collection of scientific samples from the catch.

DFO and Wardens participate in a weekly teleconference which ensures regular reporting practice, and, as importantly, provides Wardens with an opportunity to ask questions to management or Conservation and Protection officers. DFO invests as well in the training of the Wardens, with initial and refresher trainings. DFO considers that this is a positive experience that promotes positive relations and improved communications at the operational levels of hunters, wardens and fisheries officers. The performance is also assessed under the reports that has to be done as per the agreement, and this proves to be valuable information when the agreement is renewed and a rationale for improvements has to be submitted. DFO recommends that the Board explores if this model could inspire the development of other organization in support of its management decisions.

3.5. Best Practices

DFO recognizes that hunters are highly skilled, but unfortunately, not all animals that are shot or struck with harpoons are recovered. The loss of animals that have been shot or harpooned is known as struck and loss. Current estimates are quite high, at approximately 40%, i.e. for 10 belugas shot by hunters in Nunavik, only 6 are recovered, while 4 are lost. These estimates are higher than published estimates from hunts in other jurisdictions. Good information on struck and loss rates are needed, and following a precision by letter in 2019, DFO noticed that Struck & Lost events are now reported. If this is to be an area of research the Board wants to address, it is important that this is conducted properly. DFO expects the results to come with a high level of information, an improvement in hunting methods, and a common trust among partners that all efforts are made to minimize the Struck and Lost during the hunt. All this having the potential to lead to a lower deduction in the population model. Moreover, this represents an important occasion to initiate a dialog on hunt practices between hunters, science and fisheries officers. But for the proper management of the initiative, there will need to be a strategy and a direction in place for a good communication, monitoring and post-mortem analysis of its outcome to manage expectations it will most likely bring. If best practices are being identified and implemented, it should be within a framework that will not lead to unrealistic expectations from hunters and at the same time, will provide acceptable data for science, all of which should be monitored by the

Board. DFO recommends that a structure is organized, a clear direction is widely communicated and that the Board has the tools to assess the performance of such initiative.

3.6. Science and New findings

The challenge of improving the scientific knowledge regarding Nunavik beluga have been addressed by the Board in recent years through initiating pilot projects. DFO is dedicated to his regular commitment and has engaged as well in the pilot projects that were instigated. DFO noted that the pilot projects offer a framework capable of organizing the integration of traditional knowledge within an experimental project. Unfortunately, the goal of having all animals properly sampled during the Hudson Strait pilot project period was never met, and cases of samples improperly labelled or incomplete as to harvest location and date were also encountered. Also, the process of analyzing and classifying samples was not clear, resulting in ad hoc approaches to classifying the samples and unreasonably raising hunter expectations. DFO recommends that additional discussions are made so the Board can identify a direction that could guide on a longer term view for the way research findings are integrated into the management model. Pilot projects researches involve discussions with hunters on how research can be undertaken so it meets their needs. In that sense, a well communicated direction and acceptable level of expectations should be in place. DFO would also see value if the Board develop methods to evaluate if research of all types is meeting their needs, and enabling them to provide management decisions. Pilot projects have to be monitored in their capacity to provide properly documented information that will contribute to the management process. The concept of pilot projects is a good one, but DFO recommends that a proper organization of how and when could findings be applied to management decisions is developed by the Board with a special consideration in assessing if the expected results are supported by probing data and provide a sufficient level of certainty in terms of the conservation principles and in support of a change in management decisions.

3.7. Compliance and Enforcement

A key aspect to a management plan is identifying what happens in cases of non-compliance with the management objectives. DFO considers that strategies to increase compliance need to be developed in addition to the assignment of role among partners. As the conclusion of the 2017-2020 indicates that the TAT have been exceeded, DFO considers that little information have been available to the Board with regards to the reasons why this have happened in the context where the RNUK had the responsibility to ensure that their allocations were respected. The significant challenges pertaining to the RNUK and the LNUK roles cannot be eliminated, but their tasks could have been facilitated if proscriptive measures had been identified beforehand. DFO recommends that if certain conditions are identified, the management actions are specified like a more active communication strategy to reach the hunters. This moves any management decision away from the individual, and places the responsibility of management actions on all co-management partners. DFO would like to suggest that a plan should integrate toward involvement of science, Traditional Knowledge, establishing the role of all partners, setting allocations and communicating the objectives of the plan to all hunters. Initially, communication should focus on the benefits of compliance, but at some point, hunters need to be aware that failure to comply with the plan could result in sanctions. An approach of last resort will involve legal sanctions, but the Board, RNUK and LNUK need to consider and organize what other options might be considered to ensure that the management plan is communicated to hunters and

that it will be respected. If necessary, what other, non-legal approaches might be developed in cases of non-compliance. DFO considers crucial that a framework guiding the deployment of these evolving measures is developed. Prior to planning a renewed set of measures, assessments of how effective the plan was in meeting management objectives need to be identified. During the life of the plan and afterwards, there needs to be discussions related to how effective the plan has been. To achieve this, different performance measures should be identified and evaluated throughout the plan. Such measures could include uncertainty in science, respect for the TAT, discussions related to allocations, communications related to the plan, and enforcement needs. DFO considers reasonable to expect that the comparison of actual and expected compliance is made prior to any modification of the current management plan.

Regarding enforcement, DFO have purposely tried to implement a more community based approach relying on sensitization, education and prevention. Fisheries officers have noted positive outcomes when there is openness to hear and learn from local partners, including their traditional knowledge, when the goal of their patrols are known in advance and when their presence is regular. But they have also noted a lack in communications and a lack of knowledge of the plan, the TAT system and the intent underlining it. They have witnessed a lack of resources available to LNUK, in terms of structure, means, mandate or expected accountability, and at times, it leads to limited collaboration with the fisheries officers and the Uumajuit wardens, and to frustration and isolation as well. DFO is dedicated at assessing its performance regarding enforcement and solicit our partners for a renewed and open dialog. This aspect is capable of having a durable impact on our relations, and DFO trusts that initiating this dialog regarding enforcement will provide a direction that will guide hunters and other partners toward a better understanding and reasonable expectations. DFO notes positive feedback fisheries officers received locally regarding their approach and recommends that the Board, RNUK, LNUK and all partners provide their input toward improvements regarding the Conservation and Protection role.

3.8. Communications and collaboration

Improved communications and better collaboration have already been mentioned numerous time within DFO's position. DFO considers that every co-management partners should seek to have extended discussions for these to improve. Further evidence of the need for more discussion and communication on the plan objectives and the community allocations is that several hunters still do not understand that the allocations are now given to the LNUK as a converted number of beluga in specific Nunavik Marine Region zones, which are divided into Spring and Fall allocations. In 2019, several comments still pointed out confusion or misunderstanding as some communities thought that they could "save" all of their allocations (Spring and Fall) to harvest them in the Fall. It has to be considered to question this way of doing the allocations as it illustrates the difficulties in having the information reaching the communities and the hunters. A close monitoring of these key components of co-management is also needed in assessing performance and identifying areas for improvements. It appears to fisheries officers that important information is not reaching the community level where they operate, and the opposite is also visible. The ideal situation for DFO would be that all partners can deliver a consistent message regarding management decisions from a communication strategy that guide the efforts of every partners. On collaboration, DFO believes that the Board can have a significant influence over the level of collaboration that partners can have together. When the Board

puts as a conditions for its funding that DFO and the RNUK agree on the Mucalic estuary research tools, it triggered a positive pressure, directing toward an agreement: the project happened. DFO considers that the Board should look for occasions like these to provide a positive direction for a reinforced collaboration and that it monitors if this is evolving well. Much more fundamental than any other considerations in this document, the level of trust between the different partners is an area that would benefit from a closer monitoring from the Board. Especially when the level of trust appears to be low, DFO considers that the Board should have a specific awareness on that issue and it should also look for ways to address this issue toward steps leading to its resolution. DFO considers that having this question at the heart of a discussion would be fruitful in pathways for improvements.

3.9. The last year of a management plan and how to modify it?

During discussions with co-management partners, it is evident that the last year of a management cycle brings a higher level of tensions. All partners bring to the table the changes they would like to see in the system. At the operational level of hunters, wardens, LNUKs and fisheries officers, there is also the relative tension related to the possible closure of the hunt as the TAT is approached. DFO recognizes the importance of beluga harvesting and the importance of management for all partners. To address these issues, DFO considers that considerable discussion is needed to evaluate the effectiveness of the last plan, and to identify improved measures and how they might be implemented in a new plan. Many of these discussions require time and new proposals require a proper evaluation. Last minute proposals have been made to suggest removing all quotas. Such a proposal represents a major shift in a management strategy. When a stock like the EHB is considered Endangered, harvest rate should be kept to a minimum level in order to promote stock rebuilding. If a completely new approach is to be proposed then its mechanisms must be assessed in their ability to address conservation concerns. This cannot be done if completely new approaches are identified during the summer of the last year of the management plan. To provide sufficient time for constructive discussions, including scientific assessment, DFO recommends that the current plan be rolled over until the spring of 2021 at the earliest. DFO also recommends that the Board provide additional direction and guidance as to the type of management plan that they would like to see developed, providing the organization, the framework of key elements allowing the complete process of a peer-reviewed scientific advice and possible experimentation at a small scale and proper assessment of new approaches. It is key to DFO that the way to have changes implemented should be designed by the Board so it is guided through a direction that manages the expectations of partners.

3.10. Conclusion remarks and responses and feedback on the proposed management system options

The public hearing notice identified specific management approaches, which are built on four management options identified in the “Nunavik Beluga Working Group report”. Overall, DFO believes that the additional management measures requires considerable discussion. In particular, discussion is needed as per the responsibilities of each group to ensure the success of the plan and to monitor its effectiveness, how conservation concerns for the EHB and UB stocks will be addressed, what additional monitoring is needed and how compliance will be enforced. Given the lack of time between the end of the current plan and the need to have a new plan in place in time for the new harvesting seasons, DFO strongly recommends that the current plan be rolled over for at least 2 years. This will

allow for new science to be reviewed and for discussions to take place on how any new plan might be implemented with considerations coming from a multi-aspects performance appraisal of the plan, and possible tested adjustments or initiatives.

Option 1: Status Quo (recommended by DFO)

The current management plan proved to be effective in stabilizing the EHB population. However, it does not allow for any population growth or recovery and it does not allow any buffer for unusual mortality events, overharvesting or uncertainty in the scientific framework. Although the current plan is complicated, it is overall, the easiest to understand and implement. However, as in the previous plan, there were significant over-runs with the TAT, meaning that the current management objective is not being respected. The Board needs to develop tools that will ensure that the TAT and local allocations are respected, and possibly identify mechanisms that could be developed to reduce future over-runs.

During the current management plan, the results of one pilot project (Hudson Strait Pilot project) was used to update the planned quota. However, it was shown that uncertainties in genetic classification and the size of the sample collected each year can lead to questionable results. While pilot projects are valuable, their results should not be included in the course of a management plan unless they show a situation having a clear negative impact on the EHB beluga population. Conversely, pooling together multiple year pilot project data would provide more reliable results that should be taken into account when developing the next management plan.

Option 2: Minor tweaks

Genetic information update and flexibility

DFO recommends that the current management plan be rolled over into the 2021 season to allow for revision of the management framework. The next management plan will benefit from the most up-to-date information on the proportion of EHB beluga found in the hunt (provided in section 2.2). As mentioned for option 1, proportions obtained from pilot project are of interest but need to be considered with their associated uncertainties. It is suggested that pilot plans be implemented for the duration of the management plan, then results be analyzed and implemented in a new plan. At the same time, the pilot projects under the current plan were established under strict conditions that were not followed. This should be considered if a pilot plan is to be continued.

In addition, TAT over-runs showed that additional discussions and management measures are needed to clearly identify the roles of the different players, as well as improved communication to identify reasons for the management plan, the allocations and potential sanctions if the TAT is exceeded.

Management of closed areas

The management of closed hunting areas in Hudson Bay (Nastapoka and Little Whale River) and whether they should be opened (fully or partially)

Belugas congregate in specific areas during summer in particular estuaries. Satellite telemetry data confirm that both male and female beluga exhibit within season site fidelity to specific estuaries. An analysis of subsistence harvest data has shown that beluga are likely to be captured in greater numbers in estuaries. Moreover, genetic analysis indicated that belugas killed on the same day at the

same summering sites are often of the same family group. As a consequence, hunting in estuaries expose the beluga to overexploitation and it is more likely that social groups with knowledge of specific migration routes would be eliminated and recovery efforts would be hampered as has been shown when beluga stocks are over-exploited in other areas and habitats are abandoned. The closure of the Nastapoka and Little Whale River areas was aimed at limiting the overharvesting and protecting a critical habitat.

While beluga have been sighted regularly in these estuaries or their close vicinity during the aerial surveys conducted to estimate the size of their population, studies are needed to evaluate their current use. If hunting in these areas is being considered, then research is needed to understand current use of these estuaries by belugas. Once hunting is initiated, estuary use when hunting occurs is also required to evaluate the impact of hunting on belugas behavior. Furthermore, because of susceptibility to overharvesting, a monitoring plan is needed to ensure that harvest limits are respected. Ideally, this monitoring should also consider daily harvest limits to reduce the risk of eliminating family groups. The above mentioned considerations clearly demonstrate that such initiative should be planned thoroughly if ever considered under a wide scale research program, closely monitoring its evolution, and with a special consideration on managing expectations of all interested participants.

Management of the closed hunting area in southern Ungava Bay (includes the Mucalic estuary, False River, and Whale River) and whether they should be opened (fully or partially)

The same arguments as those provided above for the Nastapoka and Whale River estuaries also applies in the Mucalic area. This includes potential overharvesting and a higher risk of wiping out family units, leading thus to local extirpation due to loss of knowledge. The Mucalic area was closed as a mean to offer protection to what is considered as the remaining individuals composing the Ungava bay population. It was suggested that this population could be extirpated. However, Inuit harvesters have reported that belugas are still visible in the Mucalic area in summer. A project aiming at acquiring observations of the whale use in this area and information on the identity of the belugas present was started this summer (2019). This data will allow to assert or deny the existence of a specific beluga population living in the Ungava bay and will serve as support for the management decisions. However, conclusive results from such project could request several years as the number of biopsies collected each year may be limited. Before opening this area, a great deal of scientific information would be required regarding abundance and genetic makeup. Therefore this area should remain closed to afford protection until there is sufficient evidence that Ungava Bay beluga stock has effectively disappeared.

DFO proposes that efforts be made to determine the abundance and origin of the belugas observed in the Mucalic estuary. This could be done in collaboration with Makivik, RNUK and other Inuit organizations. Biopsy sampling and hydrophones could be deployed in the area

Option 3: Regional sharing and season

Regional TAT

Rather than the all-Nunavik TAT that is currently in place, having separate area TATs (e.g. Ungava, Hudson etc.) or having a TAT solely for Hudson Bay

A division of the TAT into separate regions has been put forward as a way to mitigate the high interdependency of communities harvest in the current system. It has the advantage of relying on the most part on the actual zones that would allow for a possible closing of a single zone, in an attempt to allow the remaining open zones communities to hunt until their own TAT is reached. Preserving the use of a TAT in all regions would maintain the actual conditions of the previous scientific advice. Such proposition, for DFO would need a precautious preparation, as this focus on the management of zones only, but there would be a need for a discussion on the probable visitors in a region like the Hudson Strait during the Fall as it is frequently observed. DFO suggest that a structure regrouping the communities from a zone should be in place for the preparation of a hunt plan that would plan also for the possible visits and access from other beneficiaries. These unit should be able to get support and training from co-management partners in the design of their plan. Given the previous suggestion of DFO to have a two years plan in place before new scientific information is available following aerial survey results, the implementation of regions could be difficult for the next management period. Although, the possibility of having this option experimented at a small scale in order to deal better with the last year of a management cycle could set the tone for a proper preparation of management parties in year one, and a closely monitored experiment of regions in year two. However, DFO would consider that it would be a precipitate initiative to try and implement such subdivision of the NMR TAT at the beginning of the next management cycle.

Having a TAT solely for Hudson Bay

As shown by the genetic, EHB beluga occur among animal hunted everywhere in the NMR. Limiting the use of a TAT to the Hudson Bay area seems difficult as a Non-Quota Limitations in the Hudson Strait or the Ungava Bay can potentially result into the harvest of a high number of beluga and even if the proportion of EHB beluga is lower than in the Hudson Bay it would result into the removal of a high number of EHB individuals. At the present time, DFO consider interesting that a thought process on possibilities for non-quantitative limitations is considered as a way forward for a fruitful discussion among co-managers. But in the actual context, especially in the intention of having a functional management plan in place for hunt season of 2020, this option would come with unacceptable risks related to the conservation. The proposition does not provide enough time and details on its configuration for a peer reviewed scientific advice. Such model would have to describe which other limitations measures, controls and what implementation strategy would be put in place.

Alternative management methods

Managing the conservation of EHB beluga through Non-Quota Limitations (i.e.: closed seasons, limitations on hunting method, etc.) instead of a TAT/Quota

EHB beluga hunt is managed because of conservation concern. The determination of the conservation status of this population is dependent on numbers evaluating its size, but also on the

number of individual predicted to be removed from this population every year. In the case of seasonal harvest, it requested a way to convert expected season back to numbers. It implies estimating correctly the maximal hunting pressure of each community (i.e. the number of beluga each community can catch per day). It also implies that strict enforcement exists to avoid harvesting outside of the hunting period. Other shortcomings include the selection/definition of opening and closing dates in the different areas (i.e.: static dates, potential triggers), the organizational scale at which those decisions are taken (local, regional), the management of people potentially moving from an open area to the next. The current system in place with a quantitative point of reference is actually allowing a lot of flexibility for hunters in terms of letting them hunt when they want, which can be convenient given that weather conditions and also belugas presence are highly unpredictable from one day to another. For DFO, there is no certainty that a potential season would not causes more dissatisfaction to hunters than the actual system. The actual system draw most of the attention to the TAT number, but this option has an interesting potential for experimenting other ways to limit the harvest with the intention of having a reduce impact on the stock. The use of harpoon was shown to limit the struck and loss of animals represents a limit in terms of equipment that can potentially means more harvested belugas and less deductions on the prediction model. This represent as well a much better occasion of dialog between DFO and the hunter over their practice and participation in science related projects. In that regard, DFO don't want to discourage any initiatives that can generate a greater involvement of co-management partners into the possibilities to design more suitable limitations. But DFO has to reiterate that as positive as new initiatives may look, the more controlled context of a TAT system can be seen as the insurance policy safeguarding the conservation principles. DFO expects that any important changes in the management of this stock would have to provide an equivalent level of certainty that the conservation principles are met.

Option 4: No TAT (everywhere)

Such an option would need a completely different situation of the EHB population. The implementation of the management plan was done as a result of conservation concerns about the EHB population. While the current plan seems to have allowed the population to stabilize, the size of this population is small and even a small increase in the number of EHB harvested would cancel the efforts of the last years and lead to the extinction of this population.

The NILCA principles of conservation mention the maintenance of vital, healthy wildlife populations capable of sustaining harvesting needs. The current plan already answers partially to the current demand, but as the Inuit population increase while the number of EHB stay the same, the number of EHB beluga that could be harvest per Inuk will decrease over time. Moreover, another principle of conservation in NILCA requests the restoration and revitalization of depleted populations of wildlife and wildlife habitat. Once again the current management plan does not allow the population to recover so can be seen as not respecting NILCA principles. DFO suggested the development of alternative management frameworks incorporating the Precautionary Approach that would allow the population to recover to healthy levels. This approach was already presented to the Board in 2017 when the Minister accepted the management plan, and on numerous occasions at the Board regular meetings. DFO strongly believe that this approach represents the best tool available for the co-development with our partners of a sound management framework for a revitalize and sustainable EHB beluga population.

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