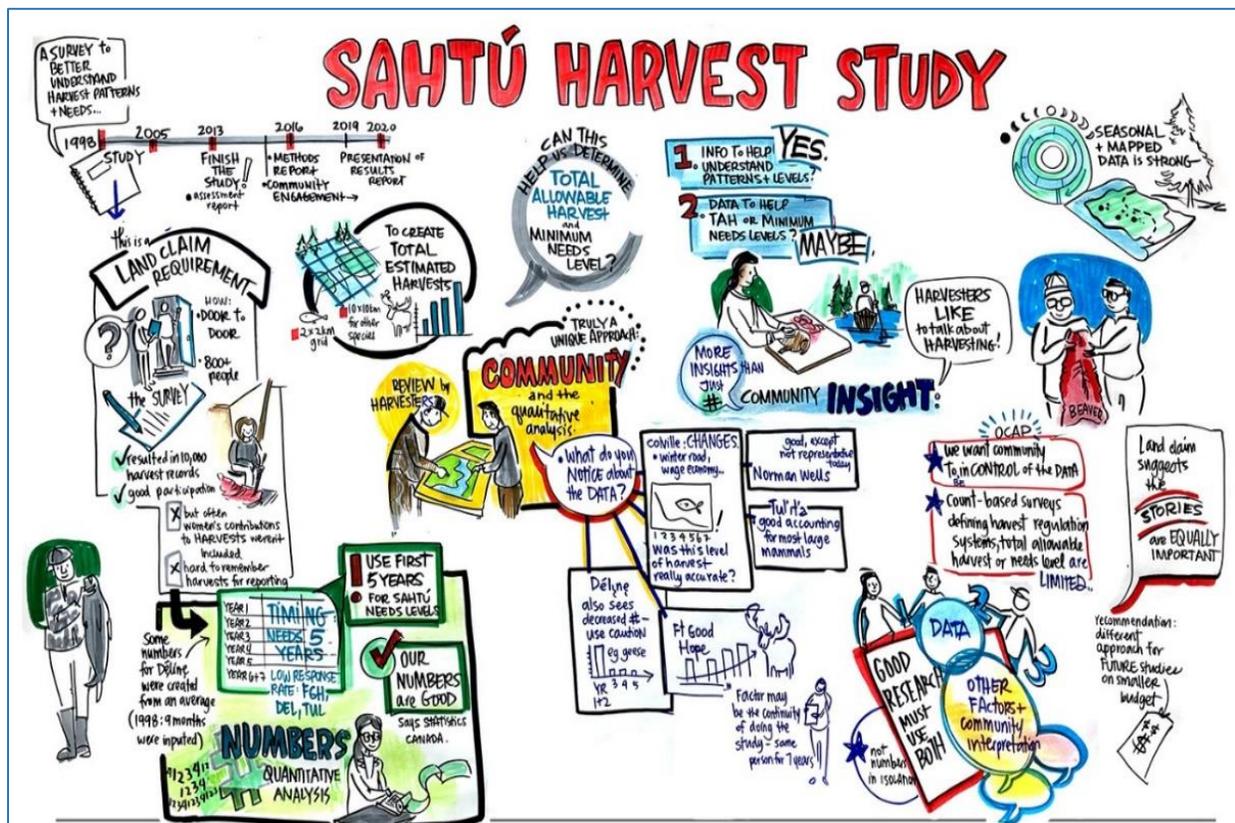


FINAL REPORT OF THE SAHTÚ HARVEST STUDY



Consultant's report prepared by Janet Winbourne for:
 ʔehdzo Got'İneᑕ Gots'ę Nákedı (Sahtú Renewable Resources Board)

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Cover art: In January 2020, the ʔehdzo Got'Inę Gots'ę Nákedı (Sahtú Renewable Resources Board – SRRB) and the Colville Lake ʔehdzo Got'Inę (Renewable Resources Council) / Behdzi Ahda First Nation Band Council hosted a Public Listening Session regarding Sahtú Ragóʔa (Hunting Laws) and Approaches to Wildlife Harvesting. During the session, a presentation was made about the completion of the Sahtú Harvest Study. Sam Bradd (Drawing Change) captured the themes of that presentation in the graphic recording displayed on the cover of this report.

This report is the final one in a series prepared as part of the ***Sahtú Harvest Study Completion Project***, as work progressed between 2013 and 2020. The other reports include:

1. **Review and Assessment of the Sahtú Settlement Harvest Study, 1998-2005** (2013) – a preliminary assessment of the status of the Harvest Study and data, including a limited literature review and expert interviews. Consultant's report prepared by Janet Winbourne for the Sahtú Renewable Resources Board, July 2013, Tulít'a, NT. 100 pp.
2. **Sahtú Harvest Study Methods Report, 1998-2005** (2016) – a detailed account of the Harvest Study methods, implementation, and results of a statistical analysis of the data. Consultant's report prepared by Janet Winbourne for the Sahtú Renewable Resources Board, 2016, Tulít'a, NT. 47 pp.
3. **Community Results Reports (2020)** – harvest study results are the property of the individual ʔehdzo Got'Inę (Renewable Resources Councils – RRCs) and the SRRB. As a result, data resulting from the study are included in five individual reports as follows:
 - Sahtú Harvest Study Results Report for Colville Lake, 1998-2005
 - Sahtú Harvest Study Results Report for Dél'Inę, 1998-2003
 - Sahtú Harvest Study Results Report for Rádel'Inę (Fort Good Hope), 1998-2003
 - Sahtú Harvest Study Results Report for Norman Wells, 1998-2005
 - Sahtú Harvest Study Results Report for Tulít'a, 1998-2003.

Each report contains summarized results of the Sahtú Harvest Study for that community, plus five years of comparative results for the Sahtú Settlement Area as a whole. It also includes detailed results of a community review of the information. Further distribution of the information in those results reports is at the discretion of the SRRB and the ʔehdzo Got'Inę.

This final report replaces the 2016 Methods Report, as includes the content of that report, with an additional qualitative analysis of the information and recommendations for its use. This and other public reports are available from the SRRB:

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ACKNOWLEDGEMENTS

Many people were involved in carrying out the Sahtú Harvest Study and bringing it to completion. First and foremost, I would like to acknowledge the 802 harvesters who took part in the original study. Each month, they voluntarily provided information about their hunting, fishing and trapping activities – without their participation, the study could not have taken place.

The efforts of former Study Coordinator Ed McLean are also especially appreciated, as the thoughtful and careful job he did in designing, promoting, and initiating the study ensured its success in later years. Once work was underway, the study was well-coordinated by Jody Snortland-Pellissey and Janet Bayha. All of the past Community Interviewers deserve extra recognition here – they were instrumental in making the study a success.

Thank you also to the Harvest Study Working Group for their support over the duration of the survey. This includes representatives of the following organizations:

- ʔehdzo Got'Inę (Renewable Resources Councils) in Norman Wells, Tulít'a, Délıne, Rádelıhkó (Fort Good Hope), and Colville Lake
- The Canadian Wildlife Service staff
- Department of Fisheries and Oceans staff
- Environment and Natural Resources staff.

Several people who were formerly involved in the Sahtú Harvest Study took time years after data collection was complete to provide helpful insights and feedback in completion of the study. I would like to thank the following people for doing phone interviews:

- Janet Bayha, former Study Coordinator, Tulít'a, NWT
- Walter Bayha, former member of Sahtú Harvest Study Working Group; Sahtú Renewable Resources Board Member, Délıne, NWT
- Richard Popko, Wildlife Management Supervisor, ENR, Sahtú Region, GNWT
- Jody Snortland-Pellissey, former Study Coordinator, Yellowknife, NWT
- Alasdair Veitch, former Wildlife Management Supervisor, ENR, Sahtú Region; former Sahtú Harvest Study Working Group member; former Sahtú GIS Project Supervisor; retired certified biologist.

Kristi Benson, Joe Hanlon, and Calvin Pittet were extremely helpful in preparing the data for analysis – their assistance was so important and appreciated. Asma Alavi of the Statistical Consultation Group of Statistics Canada analyzed the data, assisted in writing methodological parts of the report, and provided much-needed advice and support throughout the data analysis and reporting period.

Lastly, it was the patience, knowledge and careful attention to detail provided by harvesters over numerous community validation sessions that shone a light on the strengths and weaknesses of the study data in a way that ultimately determined how the results should be presented and shared. Their wisdom and insights were invaluable in bringing this study to completion. A special thanks also goes to the interpreters, who tirelessly explained very technical terms and concepts into Dene language.

Community Workshop Participants

Colville:

Anne Kochon Orlias, Cameron Boniface, Charles Gully, Charles Oudzi, Daniel Tutcho, David Codzi, Dennis Blanco, Fred John Barnaby, George Oudzi, Hyacinth Kochon, Kyle Tutcho, Laura Tobac, Jackie Kochon, Jennifer Lafferty, Jimmy Kochon, Johnny Blanco, Kyle Tutcho, Kyra Kochon, Richard Kochon, Rita Kochon, Shannon Oudzi, Trudy Kochon, Tyrell Kochon, Chief Wilbert Kochon

Déjñę:

Alfred Taniton, Alphonse Takazo, Bobby Modeste, Charlie Neyelle, Freddy Vital, George Baton, George Baptiste, Greg Kenny, Jimmy Dillon, Leo Modeste, Michael Neyelle, Morris Modeste, Russell Kenny, Walter Bayha

Rádeljkhó (Fort Good Hope):

Brenda T'seleie, Camilla Rabisca, Edward Kelly, Gabe Kochon, Harry Harris, Henry Tobac, Joe Orlias, Joseph (Trapper) Rabisca, Lawrence Jackson, Lawrence Manuel, Michel Lafferty

Norman Wells:

Barry Harley, Doug Whiteman, Garrett Harley, Jaryd McDonald, Johnny McDonald, Leon Andrew, Margaret R. McDonald, Roger Odgaard, Ruby McDonald, Stuart Pope, Violet Doolittle

Tulít'a:

Chief Frank Andrew, Frederick Andrew, Frederick Clement, Gary Yakeleya, Gordon Yakeleya, Janet Bayha, Leon Andrew, Paul Bernarde, Peter Silastiak Jr., Ricky Andrew, Rocky Norwegian, Roderick Yallee, Wilfred Lennie, William Horassi

Interpreters:

Laura Tobac, Leon Andrew, Lucy Jackson, Michael Neyelle

EXECUTIVE SUMMARY

Study Background

The Sahtú Harvest Study was a survey of Sahtú Dene and Métis hunters, trappers, and fishers that took place in all communities of the Sahtú Settlement Area between 1998 and 2005. It was a requirement of the Sahtú Dene and Métis Comprehensive Land Claim Agreement, undertaken by the ʔehdzo Got'ıne Gots'ę Nákedı (Sahtú Renewable Resources Board). The objective was to estimate the total number of animals, fish, and birds harvested by Sahtú Dene and Métis for a period of five years, to provide information for fish and wildlife management and to protect harvesting traditions.

The results from the study were intended to have a direct impact on determining how many animals should be allocated to Sahtú Dene and Métis in the event that a harvest had to be limited in the future. The process to be followed when limiting harvests is outlined in the Land Claim as the Total Allowable Harvest – this represents the total number of a given species that can be harvested by all parties in the region or in a particular area/community. The Board is responsible for allocating a portion of all available animals to Sahtú Dene and Métis; this is called the Sahtú Needs Level.

Various things are considered when setting or adjusting the Sahtú Needs Level, such as:

- Historical use / harvesting patterns
- Personal needs of Sahtú Dene and Métis for food, clothing, culture, dog food
- Trade needs
- Availability of animals to meet these needs based on scientific studies
- The Sahtú Minimum Needs Level calculated from harvest study counts.

The Sahtú Minimum Needs Level represents the lowest level at which a Sahtú Needs Level can be set.

Study Methods and Implementation

Similar to other studies done across the north around the same time, the Sahtú Harvest Study was a census-type survey that attempted to interview all harvesters in the region, once a month, to record their harvest numbers and locations. The information reported by individual harvesters was then used to estimate total harvests for the whole community, district or region, using a method called 'proportional projection'.

The Sahtú study was designed and piloted with guidance from local harvesters and implemented by the Board in conjunction with the local ʔehdzo Got'ıne (Renewable Resources Councils). Local interviewers were hired in each community and a study coordinator was based in Tulít'a. A number of steps were in place to make sure that there was good communication and good information coming in throughout the duration of the study. An independent assessment of the work done after the survey was finished found that while the Sahtú study did suffer some of the same challenges or sources of error as other harvest studies, overall, it was done carefully, there were very few errors in the data, and there had been good participation in most communities. As a result, it was concluded that the Sahtú Harvest Study should produce results at least as strong as any other northern harvest study.

Statistical Analysis

The numerical results (count data) were sent to an independent contractor to perform a statistical or mathematical analysis in 2014. The analysis concluded that the survey produced five years of data suitable for calculating total estimated harvests and Minimum Needs Levels for each of the five Sahtú communities; it therefore met the requirements of the Land Claim at the level of individual communities.

Because the survey started nine months later in Délı̨ne than in the other communities, a different approach had to be taken to be able to make comparisons among communities, or to compile results for the Sahtú Settlement Area as a whole. In order to have five years of comparable information (*i.e.*, the same months and years in each community), it was necessary to ‘impute’ or estimate nine months of data for Délı̨ne – this was done by calculating estimates based on Délı̨ne’s other years of data.

The statistical analysis also concluded that even though the survey took place over seven years, not all years of data are considered reliable. This is due to the fact that while the study was only intended to last five years, it was continued for an additional two years, but the list of harvesters was reduced in most of the communities and the interview schedule was changed from monthly to quarterly interviews. This resulted in lower participation levels and higher instances of ‘recall failure’ (people had a harder time remembering what they harvested) in some communities. This means that information recorded in 2004/05 in Tulít’a, Rádelı̨kó (Fort Good Hope), and Délı̨ne did not meet the necessary tests for reliability and should not be used in the calculation of total estimated harvests or Minimum Needs Levels; data for Colville and Norman Wells for 2004/05 are considered reliable enough for use.

STATISTICAL ANALYSIS MAIN MESSAGES AND RECOMMENDATIONS:

The statistical analysis made the following recommendations regarding use of the harvest study data:

- The data that are presented in monthly tables that summarize information by individual community have higher reliability and should be used if necessary to calculate Minimum Needs Levels or to make important management decisions.
- If it is necessary to calculate Sahtú Needs Levels at a regional or Settlement Area-wide level, or make comparisons across communities, the first five years of data should be used.
- The ‘maximum harvest year’ used in Minimum Needs Level calculations should not be the year with imputed (estimated) data.
- Because it is not possible to quantify the level of error associated with the imputed data, the total estimated harvests and estimated variances presented in the data tables for the Sahtú as a whole should be used with caution, keeping in mind that the bias due to assumptions not being met could be sizeable.

Additional sources of error uncovered during the study review and statistical analysis include the following:

- There were several harvesters that consistently declined to take part in the study throughout its duration. Some of these individuals were described as ‘intense’ or ‘super-harvesters’. Their omission would likely result in estimates that are lower than actual harvest levels, but it is difficult to know how big the influence is on the results.

- In some cases there were individuals on the interview list who didn't hunt regularly and likely should not have been included. Inclusion of these individuals would result in a bias in response rate calculations and estimates that are higher than actual harvest levels.
- Very few women took part in the study. This could result in some underestimation of total harvests, especially if these individuals were active or intensive harvesters.
- In 2004/05, when the survey changed to quarterly interviews and harvesters had a harder time remembering their activities, this could result in an increase in the amount of error in the data through recall failure and lower estimated than actual harvest levels.
- Also in 2004/05, because eligibility lists do not appear to have been kept, accurate response rates could not be calculated. Instead, that data was also imputed (estimated) for those years, based on information from previous years.

Some of these errors are common to many harvest surveys while others are unique to the Sahtú experience; none have been explored in a way that provides an understanding about the size or scale of their impact on the reliability of the study results. It is difficult if not impossible to measure the magnitude of their influence on the resulting data set using only statistical methods.

Community Analysis

Considering the study weaknesses outlined above, the potential consequences of using the results in important management decisions, plus an evolving socio-political landscape that is redefining appropriate ways of working with Indigenous Peoples and their information, a decision was made to bring the Sahtú Harvest Study to completion in a collaborative manner with the participating harvesters and local governance organizations. A series of validation workshops was done in the communities between 2015 and 2019. The objective of the community work was to have knowledgeable harvesters provide feedback on and a context for the Sahtú Harvest Study data that could go beyond the interpretation provided by the statistical analysis. The over-arching goal was to provide further information regarding the validity of the survey responses and how well they measure the true picture of harvesting in the Sahtú.

Over 70 Sahtú Dene and Métis community members were engaged in multi-day focus group sessions to identify any factors that could have influenced the harvest study data set, to identify and quantify possible errors, and to provide a local interpretation of the results. In each focus group session, summaries of representative numerical data as well as mapped harvest locations were presented for review and interpretation. In all cases, participants were able to provide very detailed and thoughtful feedback regarding how well the total estimated harvests and the spatial information represented their knowledge and experience of harvesting. They were able to point out instances where the data seemed problematic or inaccurate, and to make suggestions about the factors that could have influenced the data and/or data collection. They provided insights into the context of the study at that time period, such as specific socio-economic, regulatory, or ecological conditions that may have affected harvesting activities. They confirmed that some of the challenges that commonly plague this type of survey were present in the Sahtú study (*e.g.*, interview fatigue, recall failure, problems with the participant list, mistrust, lack of participation of super-harvesters, *etc.*), as well as identifying other Sahtú- and time-specific challenges to data reliability.

In Colville, harvesters observed a pattern across the data for most species – that is, harvest estimates tended to be much higher for the first year or two of the study and then dropped off sharply in the

following years. Harvest studies are known to go through something called a ‘honeymoon’ phase at their initiation (*i.e.*, at the start of the study, when there is a lot of study promotion and education going on, participants are keen to take part; after this point, there is often a drop in participation over the years as interview fatigue sets in and people become less likely to report their harvests). This was confirmed by the Community Interviewer as a problem in the Colville survey.

Important additional socio-economic factors were identified to be at work in Colville during the years of the study that may have made this trend worse. Some participants in the focus group suggested that people were becoming suspicious of the study and feared that the results might be used against them. Perhaps more importantly, they identified a boom in the resource economy that strongly influenced day to day life in Colville starting after the year 2000. Harvesters said that during the time of the harvest study fewer people were hunting, trapping, and fishing because they were busy with the new wage economy. They felt there were widespread inaccuracies in the harvest study data – this includes data for large and small mammals, fish, and birds alike. There was consensus that the resulting annual average harvest estimates were too low to be representative of Colville’s actual harvesting needs.

In Délı̄ne a similar trend to that found in Colville was observed in most species’ data – that is, harvest levels in Years 1 and 2 appeared much higher than those in the following years. In fact, in several cases, people felt that the harvest levels in Year 1 were too high and overestimated actual harvesting. This could indicate a possible problem with the initial participant list. Again, harvesters suggested that the high level of study promotion in the early stages influenced peoples’ involvement and interest in reporting their harvests, and that by Year 3, participants were starting to experience interview fatigue and becoming less likely to report their harvests. In addition, they felt that harvest levels may have dropped over the time of the survey due to factors such as the introduction of new traps, increases in wage labour in the oil and mining sectors, and a change in the levels of income support and/or financial support for trapping. A former Community Interviewer in Délı̄ne identified several additional potential causes of error, each of which could have resulted in harvest estimates being lower than actual.

Overall, the community analysis indicated that the study results are mixed for Délı̄ne – that is, data accuracy seems to vary greatly between species and species groupings, with some estimates appearing much too high, some much too low, and others reasonably accurate. In one interesting example, Délı̄ne harvesters noted that barren-ground caribou harvests were unexpectedly high in the first year of the survey, and explained that during that time period, Bluenose-East caribou were very near their community – for five or six years in a row hunters didn’t have to travel very far to harvest. It was suggested that because the harvest study collected data at a time when the caribou were unusually accessible, the total estimated harvests could be an over-estimate of actual harvesting levels, if averaged over a longer period of time.

In Rádeljkhkó (Fort Good Hope), harvesters named industrial activity, road construction, wage employment, and unusual environmental or weather events as possible influences on the study data reliability and accuracy. Nonetheless, the consensus of the group was that generally, most of the average annual harvest estimates seemed to be a good accounting of the community’s actual harvesting patterns at that time. Harvesters were able to identify two cases in which specific harvest estimates did not appear reasonable; these included some bird and small mammal harvests. It was felt that hunters may not have reported their harvests at a species level due to recall failure, and as a result, the data should not be considered at the species level. Very few other problems were identified. It is likely that the overall success of the harvest study, and the possibly higher level of reliability in the data for this community, is due in part to the commitment and continuity of the Community Interviewer to the

project over its seven year duration. Nonetheless, some harvesters noted that the patterns recorded by the study are likely no longer relevant and not a good reflection of more recent harvesting patterns.

Focus group participants in Norman Wells also concluded that many of the total estimated harvests were a reasonably accurate representation of their harvesting activities during the time period of the study. They felt that overall, the annual average harvest estimates looked good for many types of large mammals, furbearers, birds, and even fish. Some observations regarding specific possible inaccuracies were noted for barren-ground caribou, woodland caribou, lake whitefish, ptarmigan, and grouse; in some cases participants felt the harvest estimates seemed too high, and in other cases too low. There was a strong message in the Norman Wells session that the harvesting patterns recorded by the study for the 1998-2005 period are not representative of peoples' current harvesting activities.

In Tulít'a, the annual harvest estimates were assessed to be a good accounting of the community's harvesting for most large mammal species with some isolated exceptions (*e.g.*, woodland caribou), but results were felt to be less accurate for some species of birds, fish, and small mammals. Some of the external socio-economic factors identified that may have influenced harvesting patterns during the time of the harvest study included road construction / operation, wage employment, and unusual environmental or weather events that changed animal movements and behaviour. There were also several situations identified where differences in English species names and Dene terminology may have resulted in incorrect reporting, such as for some fish, birds, and small mammal species.

COMMUNITY ANALYSIS MAIN MESSAGES AND RECOMMENDATIONS:

The community analysis of the numerical or count data indicated that the reliability and accuracy of the harvest estimates resulting from the Sahtú Harvest Study vary by year, by species, and by community. While some common sources of error were found to influence the data set (*e.g.*, interview fatigue, recall failure, *etc.*), additional local and / or regional factors likely also had at least as strong an influence on the data and are important to consider in any interpretation of the results. Recommendations for use of the data based on the findings of the community review and analysis include:

Colville

- It is unlikely that the data resulting from the harvest survey in Colville represent a true and accurate picture of the actual average annual harvest needs or activities for that community. The author recommends that the total estimated harvests of the Sahtú Harvest Study for Colville should not be used as a basis for important management decisions or Needs Level calculations.
- Caution should also be exercised when using the spatial data documented by the study, as those results likely also under-represent actual harvesting levels and patterns for Colville.

Déłjñę

- The author of this report advises that caution be exercised if the total estimated harvests for Déłjñę should ever be used as a basis for important management decisions or Minimum Needs Level calculations. Because the community analysis indicates high variability in study data accuracy and reliability, it is important that the results be assessed on a species by species basis, and it is essential that the interpretation provided by the community is considered along with any use of the study results.
- Caution should also be exercised in any use of the spatial data – some harvest locations were questioned for barren-ground caribou, marten, and fish.

Rádeljĥkǫ (Fort Good Hope)

- It is likely that the total estimated harvests could be used as a basis for important management decisions or Minimum Needs Level calculations for Rádeljĥkǫ (Fort Good Hope) if necessary, and with an understanding of the recognized general limitations of this type of data collection plus the specific weaknesses of this data set.
- For some species of birds and small mammals, the information may be less accurate at the species level.
- Overall, spatial data representing harvest locations recorded for Rádeljĥkǫ (Fort Good Hope) also appear to be reliable and accurate, with the exception of some questionable fish and duck harvest locations.

Norman Wells

- The total estimated harvests for Norman Wells seem to be a reasonable reflection of the harvesting that was taking place between 1998 and 2005 in that community, with the exception of some fish, some birds, and two species of large mammals. The information could be used as a basis for important management decisions or Minimum Needs Level calculations for some species as necessary and with an understanding of the limitations of this data set.
- The spatial data showing harvest locations for Norman Wells appear to be reliable and accurate in most cases.
- Overall, the results are not a good reflection of more recent harvesting patterns in the community, and should not be used to represent current harvesting activities.

Tulít'a

- For many fish, bird, small mammal, and some large mammal species, the total estimated harvests resulting from the study in Tulít'a are likely not a true and accurate picture of the actual average annual harvest needs or activities for that community. Caution should be used if the total estimated harvests for Tulít'a are ever needed to be a basis for important management decisions or Minimum Needs Level calculations.
- Because the community analysis indicates high variability in study data accuracy and reliability, it is important that the results be assessed on a species by species basis, and it is essential that the interpretation provided by the community is considered along with the data.
- The spatial data showing harvest locations for Tulít'a appear to be generally reliable and accurate, with the exception of some isolated instances of questionable harvest locations for caribou, marten and fish.

Discussion: Lessons Learned and Moving Forward

While the statistical analysis of the Sahtú Harvest Study data concluded that the requirements of the Land Claim agreement were fulfilled and the results are reliable enough for use, the community analysis revealed that in many cases, the total estimated harvests resulting from the study may *not* represent a true and accurate picture of Sahtú Dene and Métis harvesting activities during 1998-2005, nor are they necessarily representative of current harvesting needs.

KEY LESSONS LEARNED

The community focus group sessions were the first opportunity for harvesters to review and comment on data they had contributed to the Sahtú Harvest Study between 1998 and 2005. Participants were

able to provide extremely valuable feedback not only about the accuracy and reliability of the numerical data, but also important ecological, social, economic, political, and regulatory factors that may have influenced the results. In addition, the validation process itself turned out to be a very positive experience in each community – harvesters enjoyed having a chance to discuss the data with their peers and take some ownership over the study results. Several other key insights that resulted from the community review and analysis are outlined below.

- 1. Methods Matter: Study Design, Principles, and Parameters are Key** – Participation levels are directly affected by study design and survey tools; these factors in turn affect the reliability and accuracy of the results. Collective experience and cultural understandings can also strongly influence the success of a study. Appropriate cultural frameworks and methodologies, as well as standards for the ownership and protection of harvester information, are important.
- 2. Context is Critical** – Harvesters’ activities are adaptive, responding to changes in environment, regulations, species abundances, access, employment opportunities, *etc.* The ‘snapshot in time’ provided by short-term harvest surveys fails to reflect this fuller picture and may not capture typical years of harvesting, meaning results can greatly over or under-estimate actual harvests. These factors can have such a strong influence on the study results that it is questionable whether it is realistic or valid to extrapolate the results to other years.
- 3. Numbers aren’t Enough: Why Count-based Surveys are Inadequate to Define Indigenous Harvest Monitoring and Regulation Systems** – Count data vary in reliability and should be considered on a species by species basis with local interpretation before it is determined if they make a good basis for defining a harvest regulation system, determining Needs Levels, or making other important management decisions. Harvest studies done with a more Indigenous research methodology and framework would likely account for more factors than ‘kill data’ and function with a more adaptive cycle of constant evaluation, feedback, and adjustments.
- 4. There is Diversity and Resilience in Sahtú Dene and Métis Harvesting** – The study documented an extraordinary amount of information about the diversity of Sahtú Dene and Métis food systems that can help shape local / regional management priorities, decision-making, and planning.

BEYOND TOTAL ESTIMATED HARVESTS AND NEEDS LEVELS

The large quantity of information gathered by census-type harvest surveys are seldom used for any purpose other than using count data to calculate total estimated harvests and inform regulatory mechanisms such as the Total Allowable Harvest. Quantitative or statistical analyses of the other types of information recorded by these studies are seldom done, and there are few to no published studies showing results compiled in alternate ways. There are countless other ways that harvest study data could be used to answer research questions; some potential topics could include: harvester demographics / characteristics, household needs, trends in effort, assessments by region / specific area, *etc.* among many other possibilities.

In both the assessment of the study and the community analysis of the Sahtú harvest study data, the results that were reviewed included mapped information. Time was also spent in the focus group sessions considering data compiled and presented in novel ways, such as charts of harvest composition and graphs of seasonal trends in harvesting. Harvesters consistently found that the seasonal results (presented in graphs showing monthly harvests as well as ‘seasonal rounds’ or circular calendars)

represent an accurate reflection of their community's harvesting patterns. The results indicated some differences between communities, and could be useful in management planning and education.

The spatial or mapped information recorded by the study was also found to be very strong, and in most cases represents an accurate reflection of communities' harvesting patterns. The spatial data has been found to be especially valuable in planning, such as in development applications. Further use of the information could include the identification of ecological or cultural 'hotspots' – mapping the information using a coloured density gradient to help identify areas that tend to be consistently important to a species and / or the people who harvest there. Local organizations can use the mapped results to demonstrate broader land use patterns, and provide evidence of and plan for areas that are important for Sahtú Dene and Métis land use and harvesting.

Numerical data from the harvest study were also presented showing the composition of the harvest or relative proportions of species harvested in each community. These data could be compiled by harvester, community, district, or the entire Settlement Area; they also be compiled by season. The resulting charts can be informative in community discussions and planning decisions.

IMPLICATIONS FOR FUTURE HARVEST MONITORING: WHERE DO WE GO FROM HERE?

The Total Allowable Harvest is a controversial regulatory tool in the Sahtú region. Opposition has been so strong in some areas that this territorial monitoring system has at times been ineffectual. The findings of recent public hearings suggest that regulatory mechanisms such as the Total Allowable Harvest may present a significant infringement of the Aboriginal rights of Sahtú beneficiaries, calling into question the appropriateness and the premise of the past harvest study.

The community review and analysis of the Sahtú Harvest Study data indicates that many of the numerical results do not represent a true and accurate picture of Sahtú Dene and Métis harvesting and are likely not reliable enough to use as a basis to inform important management decisions and regulatory systems such as the Total Allowable Harvest. It is also clear that the study methods, objectives, and cultural framework are no longer appropriate. As a result, future harvest monitoring and harvest regulation will not look like past models.

Since 2016 the Sahtú Renewable Resources Board has supported and promoted 'self-regulation' as a more appropriate mechanism for conservation in Sahtú Dene and Métis communities, suggesting it has greater potential of successfully achieving conservation outcomes than other available options. The approach recommended by the Board is the development of 'Community Conservation Plans'. In contrast to territorial systems, community-driven plans are based in traditional Dene laws, principles, and the agreements that guide Dene relationships with other beings. They may include traditional stories, language, and concepts as a cultural foundation, and use a much broader approach to conservation, with program areas for hunting, habitat, governance, and knowledge.

Harvest monitoring and regulation will be an important component of future community conservation planning, and the past harvest study can help in two main ways: first, by providing data and information compilations that can improve understandings of Sahtú Dene and Métis food systems; and secondly, by providing key insights into the principles and practices that will ensure that future, locally-controlled harvest monitoring programs produce reliable, accurate results.

The lessons learned from the harvest study indicate that the following ideas will be important in setting up a future harvest monitoring programs for success:

- Good community buy-in is essential for successful harvest research and monitoring.
- Programs need to be focused on local interests, priorities, and objectives.
- Community interests need to be protected through formal principles and standards regarding local ownership, control, access, and possession of information.
- Diverse Indigenous food systems and adaptive harvest strategies are best captured through long-term monitoring programs.
- Ecological, regulatory, and socio-economic factors need to be documented and locally interpreted for their influence on customary harvesting activities and patterns.
- A monitoring program that includes indicators of ecosystem health, trends in disease, species other than fish / birds / mammals, etc. may better approximate an Indigenous research methodology and framework as well as help account for changes in harvesting over time.
- An iterative, community-controlled harvesting monitoring program, able to adapt to changing needs and interests can accommodate different conservation priorities.
- Because harvest composition and other factors can differ from community to community, management priorities will also likely need to differ.

Conclusion

While the statistical analysis determined that the Sahtú Harvest Study met the objectives laid out in the Land Claim – that is, the survey resulted in five years of data that could be used to calculate total estimated harvests – the community analysis had very different conclusions. Instead, the numerical data were found to vary widely in reliability by species, by year, and by community, and much of the information was not seen to be a good representation of local harvesting patterns and needs. As a result, in no case should the numerical data alone be used to inform such important management actions as calculating Minimum Needs Levels or determining Total Allowable Harvests.

This is not to say that there is no value in the results of the Sahtú Harvest Study. Other data resulting from the study have proven very useful in planning work to date, such as the spatial or mapped data. The community analysis also pointed to other aspects of the data that are consistently accurate and reliable, such as the seasonal harvesting patterns documented by the study. It is expected that novel ways of compiling and looking at the information that go beyond tables of total estimated harvests can be a useful tool for gaining insights into each community's complex harvesting system, and help support and inform local decision-making.

As Community Conservation Plans take shape across the region, and local programs for harvest monitoring and regulation are developed, the lessons learned from this past harvest study and its completion can be applied to the design of new approaches that better accommodate Sahtú Dene and Métis priorities and perspectives. In fact, the insights provided during the community analysis demonstrate that Sahtú Dene and Métis are already closely monitoring and regulating their harvesting activities – meaning this is likely to be less about designing something new than returning to a more traditional process and cultural framework, in which communities can meaningfully direct the process of inquiry, own the information, and affect decision-making on their own terms.

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INTRODUCTION

The ʔehdzo Got'jneᑕ Gots'ę Nákedı (Sahtú Renewable Resources Board – SRRB) is the main instrument of wildlife and forest management in the Sahtú Settlement Area (SSA). As a regional co-management board, it represents beneficiaries of the Sahtú Dene and Métis Comprehensive Land Claim Agreement (SDMCLCA, 1993), the federal and territorial governments, as well as non-beneficiaries and the non-Aboriginal population of the Sahtú Settlement Area. The Board works together with ʔehdzo Got'jneᑕ (Renewable Resources Councils – RRCs) in the five communities of the Sahtú Region to maintain Dene and Métis harvesting traditions, and to keep the land and animals healthy for future generations.

The Sahtú Settlement Area Harvest Study (Sahtú Harvest Study – SHS) was a requirement of the SDMCLCA (1993, Section 13.5). The objective of the study was to estimate the number of animals, fish, and birds harvested by Sahtú Dene and Métis hunters, trappers, and fishers for a period of five years. The survey was conducted from April 1998 to December 2005, at a time when similar studies were being done in the Inuvialuit and Gwich'in settlement areas and in Nunavut.

After a considerable delay, work to finalize the Sahtú Harvest Study began in 2013 when the SRRB hired consultants to review the study and assess its status. The review concluded that due to a lack of capacity and resources, the study had not been finalized when data collection stopped in 2005 – that is, the data had not been compiled, no statistical analyses had been done, and there were no final results available for use. The Board then decided to commit funds to completing the study using a collaborative and qualitative approach that represents a departure from standard harvest study methods and better reflects the Board's commitment to community-driven planning and conservation work that is rooted in Dene ts'jlı (Dene ways of life).¹

About the Harvest Study Completion Project

The harvest study completion project included a review of the data and data collection methods (2013); a quantitative / statistical analysis of the data (2014); qualitative / community analyses of the results (2015-2019); and final compilation and reporting of results (2020-2021). Initial stages of completing the project were complicated by the fact that due to high staff turn-over, none of the individuals that worked during the survey phase of the study were employed by the Board at the time of the review and assessment. As a result, early work involved identifying and contacting former staff, locating relevant hard copy and digital data files, and reviewing data collection, storage, and management methods.

Expert interviews were conducted as part of this work, both within and outside of the Sahtú, as a means of clarifying particular aspects of the Sahtú Harvest Study, as well as identifying 'best practices' in harvest study methodologies. The interviews helped to inform discussions of how well the SHS met its objectives, how it compares to other studies, and the strengths and weaknesses of these types of

¹ At its July 2017 Board meeting, the ʔehdzo Got'jneᑕ Gots'ę Nákedı (Sahtú Renewable Resources Board – SRRB) formally adopted an approach rooted in Dene ts'jlı (Dene ways of life) and community conservation planning as a basis for its strategic plan, and as guidance moving forward (SRRB 2020a).

surveys for future consideration. A detailed report is available from the SRRB (2013) that includes a comparison of harvest study methodologies, a limited review of relevant literature, results of the expert interviews, plus a series of 'next steps' recommended to complete the Sahtú study.

Following the 2013 assessment, the Sahtú Harvest Study raw data were then sent to Statistics Canada for a quantitative analysis; this included an estimation of how well study assumptions were met, estimates of error levels associated with the results, and calculations that enable the results to represent annual and total estimated harvests for each community or for the whole Sahtú region.

Data summaries based on the statistical analysis were provided to knowledgeable community members for review and comment in a series of workshops. Harvesters and knowledge holders were able to provide an interpretation of the study results that goes beyond that of the statistical analysis. Their review of the information raises questions not just about the validity and reliability of the results, but of the premise underlying this type of harvest survey.

About this Report

This final report details the how the Sahtú Harvest Study was done, including each of the steps that were taken to conclude the study, and a fuller consideration of the results based on findings from the community review and analysis.²

This report does not contain SHS data tables or compiled results. That information is co-owned by the ʔehdzo Got'ıneę (Renewable Resources Councils – RRCs) and the SRRB. Data resulting from the study are included in five individual community reports as follows:

- Sahtú Harvest Study Results Report for Colville Lake, 1998-2005
- Sahtú Harvest Study Results Report for Délıneę, 1998-2003
- Sahtú Harvest Study Results Report for Rádelıhkó (Fort Good Hope), 1998-2003
- Sahtú Harvest Study Results Report for Norman Wells, 1998-2005
- Sahtú Harvest Study Results Report for Tulıt'a, 1998-2003.

Each community report contains summarized results of the Sahtú Harvest Study for the individual community, plus five years of comparative results for the Sahtú Settlement Area as a whole. This includes tables of harvester response rates, recall periods, and total estimated harvests by species. The community reports also contain maps showing spatial data for several representative species of big game, furbearers, fish, and birds, plus detailed results from that community's review of the information. Further distribution of SHS information and reports is at the discretion of the SRRB and the RRCs.³

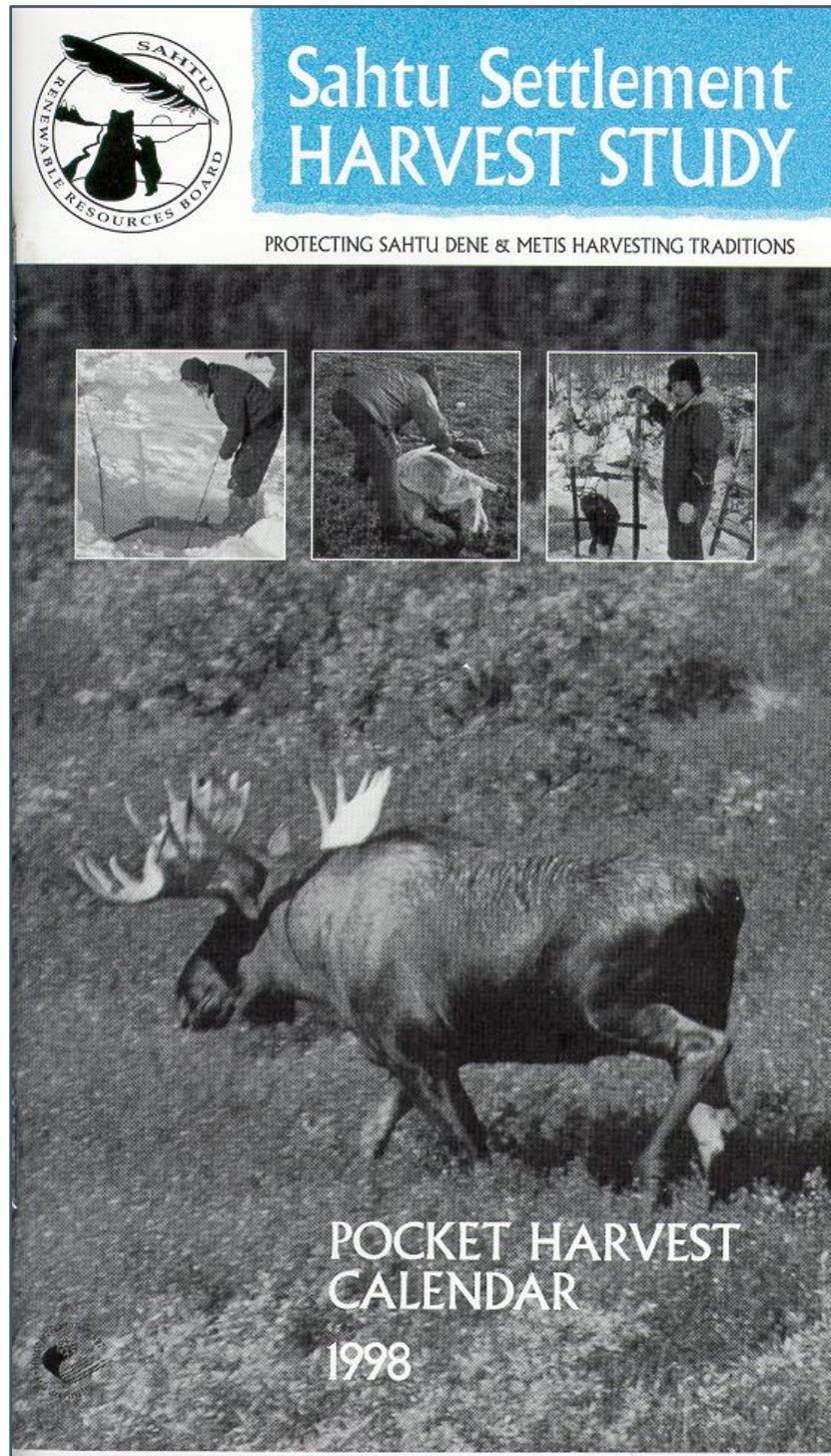
² A detailed account of study methods and implementation, including results of the statistical analysis of the data, were included in the interim **Sahtú Harvest Study Methods Report** (SRRB 2016). Note that this 2021 **Final Report** includes the content of the 2016 Methods Report with an additional qualitative analysis of the information and recommendations for its use. It therefore replaces the interim 2016 report.

³ An explanation of the information-sharing protocol for access and use of the Sahtú Harvest Study results and results reports is available on the SRRB website: www.srrb.nt.ca.

This final report on the Sahtú Harvest Study has five main sections:

- 1. Study Background** – An overview of Land Claim requirements and objectives of the study, harvest regulation based on the results, and implications for Sahtú Dene and Métis harvesting.
- 2. Study Methods and Implementation** – Details on how the study was done, including study area, design, coordination, survey timing and methods, information storage and management.
- 3. Statistical Analysis** – Description of the statistical tests, calculations, and conclusions of the analysis for estimating total harvests and using data recorded by the study, including recommendations.
- 4. Community Analysis** – Description of the methods and the results from focus group sessions held in each community to review, verify, and interpret information recorded by the study, including recommendations.
- 5. Discussion** – A consideration of how well the study met the objectives of the Land Claim based on lessons learned in the statistical and community analyses, as well as what else can be learned from the results and how this can be applied to harvest monitoring and community conservation planning in the future.

1. STUDY BACKGROUND



Cover of the 1998 Sahtú Harvest Study calendar. Image credit: SRRB.

1.1 The Land Claim Agreement and Requirements for a Harvest Study

The Sahtú Dene and Métis Comprehensive Land Claim Agreement (the Land Claim) was signed by the Sahtú Tribal Council, Canada, and the Government of the Northwest Territories in 1993. The Agreement established the Sahtú Settlement Area (see Figure 1) which includes:

- Over 280,000 km² of land, of which over 41,000 km² are privately owned Dene and Métis lands
- The communities of Délı̨ne, Tulı́'a, Norman Wells, Rádeljı̨kó (Fort Good Hope), and Colville Lake.

Under the Land Claim Agreement, a co-management board, the ʔehdzo Got'ı̨ne Gots'é Nákedı (Sahtú Renewable Resources Board), was set up to act as the main instrument of wildlife and forestry management in the Sahtú Settlement Area. The SRRB has equal representation from Sahtú beneficiaries and Territorial/Federal government agencies.

The Land Claim also outlined the mandate of the ʔehdzo Got'ı̨ne or Renewable Resources Councils (RRCs) in each Sahtú community, “to encourage and promote local involvement in conservation, harvesting studies, research and wildlife management in the community” (Vol. 1, Section 13.9.1). RRCs are mandated to participate in the collection and provision of local harvesting data to Government and to the Board. Each community’s RRC also has the responsibility and authority to:

- Allocate Sahtú Needs Levels for that community
- Manage the local exercise of participants’ harvesting rights
- Establish or amend group trapping areas in the SSA and
- Advise the Board with respect to participants’ harvesting and/or concerns (Vol. 1, 13.9.4-13.9.6).

The SHS was initiated as a requirement of the Land Claim (Vol. 1, Section 13.5.6). The Sahtú Renewable Resources Board conducted the study in close cooperation with the Renewable Resources Councils.

1.2 Objectives of the Sahtú Harvest Study

The Sahtú Land Claim Terms of Reference (Sahtú Settlement Area Harvest Study, Schedule 1 to Chapter 13, 1993), states that fish and wildlife harvest estimates are intended to be used for two main purposes:

- To provide information on harvesting necessary for the effective management of fish and wildlife in the Sahtú Settlement Area by the Sahtú Renewable Resources Board and Government, and
- To determine the Minimum Needs Level for Sahtú beneficiaries so that their harvesting traditions can be protected.

The Dene name for the Sahtú Renewable Resources Board – ʔehdzo Got'ı̨ne Gots'é Nákedı – means “helpers of the ʔehdzo Got'ı̨ne, the Trap People.” The SRRB works together with ʔehdzo Got'ı̨ne in the five communities of the Sahtú Region to maintain Dene and Métis harvesting traditions, and keep the land and animals healthy for future generations.
(<http://www.srrb.nt.ca/>)



Figure 1: Map of the Sahtú Settlement Area, showing the five communities that took part in the Sahtú Harvest Study, 1998-2005.

1.3 Harvest Limitations, the TAH, and Sahtú Needs Levels

From time to time, it may be necessary for the SRRB to limit harvesting on a temporary basis to allow an animal species or local population at risk to recover from the effects of things like disease, habitat loss, or over-harvesting. The process to be followed when limiting harvests in the region was outlined in Section 13.5 of the Land Claim as the Total Allowable Harvest (TAH). The TAH represents the total number of a given species that can be harvested by all parties in the region or in a particular area/community. The results from the SHS were intended to have a direct impact on determining how many animals should be allocated to Sahtú Dene and Métis in the event that a harvest had to be limited in the future.

Until a Total Allowable Harvest has been set for an animal population or species, harvest by Sahtú Dene and Métis is not limited under the terms of the Land Claim. Once a TAH is set, the Board is responsible for allocating either a portion of or all available animals to Sahtú Dene and Métis. The Dene and Métis share of the Total Allowable Harvest is called the Sahtú Needs Level. If the Sahtú Needs Level is equal to or less than the total number of animals available to harvest (that is, the TAH), Sahtú Dene and Métis needs are met first. If the Sahtú Needs Level is greater than the total number of animals available to harvest, the Land Claim states that Dene and Métis will get no more than the total number available for harvesting.

The SRRB, in conjunction with territorial and/or federal agencies, sets or adjusts the Sahtú Needs Level only after consultation with the affected RRC(s). Various things are considered when setting or adjusting the Sahtú Needs Level:

- Historical use/harvesting patterns
- Personal needs of Sahtú Dene and Métis for food, clothing, culture, dog food
- Trade needs
- Availability of animals to meet these needs based on scientific studies
- The Sahtú Minimum Needs Level calculated from Harvest Study counts.

The ‘Sahtú Minimum Needs Level’ represents the lowest level at which a Sahtú Needs Level can be set. Generally, the Sahtú Needs Level can be set above or at, but never below, the Sahtú Minimum Needs Level. The only exception to this is when the total number of animals available for harvest (*i.e.*, Total Allowable Harvest) is less than the minimum amount required by Sahtú Dene and Métis.

According to the Land Claim, the Sahtú Minimum Needs Level for a species or population of wildlife is equal to one half of the sum of the average annual harvest by participants over the first five years of the study and the greatest amount taken in any one of those five years (SDMCLA 1993:49).

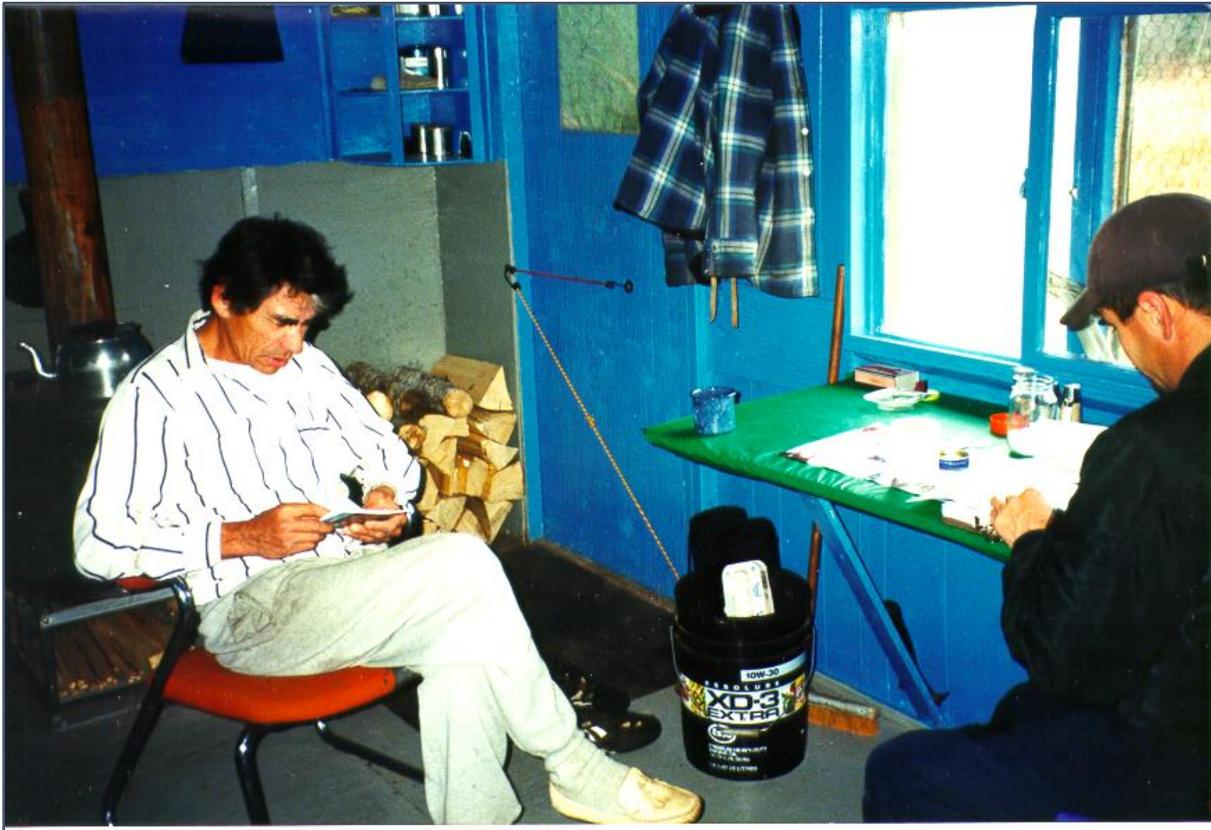
The Sahtú Minimum Needs Level is to be calculated for a particular species harvested using the following formula:

$$\frac{[H_1+H_2 +H_3+H_4+H_5+ H_{max}]}{5} \times 0.5$$

Where

- H₁**= # animals harvested in Study Year 1
 - H₂**= # animals harvested in Study Year 2
 - H₃**= # animals harvested in Study Year 3
 - H₄**= # animals harvested in Study Year 4
 - H₅**= # animals harvested in Study Year 5
 - And **H_{max}**= greatest # taken in any year between study Years 1-5.
-

2. STUDY METHODS AND IMPLEMENTATION



Harvest Study interview. Photo credit: SRRB (photographer unknown).

2.1 Study Design

The SHS was a cooperative effort between the SRRB, RRCs, and various territorial and federal government agencies. Terms of Reference for conducting a SHS are laid out in the Land Claim (Schedule I to Chapter 13, SDMCLCA 1993:65).

2.1.1 PARTNERS IN THE DESIGN PROCESS

Following instructions in the Terms of Reference, the study was designed by members of a Harvest Study Working Group. This group was made up of:

- Three Sahtú Dene and Métis members appointed by the District Land Corporations, and
- Three members appointed by various government agencies involved in fish and wildlife management in the Sahtú, including Resources, Wildlife and Economic Development (RWED; today known as Environment and Natural Resources or ENR), the Canadian Wildlife Service, and the Department of Fisheries and Oceans (Fisheries and Oceans Canada).

The RRCs in each community played an important role in study design and coordination. The RRCs were also responsible for:

- Promoting the study in their communities
- Selecting harvesters to participate in a short pilot study
- Building up-to-date lists of harvesters to be interviewed for the study
- Assisting in the selection of the Community Interviewers who would collect data.

2.1.2 DESIGN CONSIDERATIONS

The methods used in the SHS were based on approaches used in previous or ongoing land claim-mandated harvest studies in the Inuvialuit, Gwich'in, and Nunavut settlement areas (Joint Secretariat 2003, Gwich'in Renewable Resources Board 2009, and Nunavut Wildlife Management Board 2004 respectively). The objective of using similar methods was to collect data that would be comparable across different regions of the NWT and Nunavut. This was intended to assist the Sahtú region when negotiating for the harvest of animals shared by participants of different land claims (*e.g.*, barren-ground caribou).

The study design was intended to provide only the information required to meet the two study objectives. This approach was chosen to avoid burdening the harvesters with too many extra questions that try to address secondary issues (*e.g.*, human consumption, animal disease, *etc.*).

The approach used to collect harvest information was the same for each community in the Sahtú. A standardized approach was chosen so that information collected from each Sahtú community could be compared and analyzed in relation to other communities.

2.1.3 THE PILOT STUDY

The proposed study approach developed by the Harvest Study Working Group in October 1997 was field-tested in January 1998 in a pilot study. Eleven Dene and Métis harvesters from three Sahtú

communities participated in pilot study interviews. The harvesters had an opportunity to comment on the questions asked and materials used in the interviews. Comments and suggestions made by harvesters participating in the pilot study were then used to improve the initial design proposed by the Working Group. The final study design was approved by the SRRB in February 1998.

2.2 Coordinating the Study

The SHS was coordinated by the SRRB in close cooperation with local RRCs. Dedicated staff was hired by the Board; the staff then hired and trained Community Interviewers.

2.2.1 STAFF AND SUPPORT

The Harvest Study Coordinator was an employee of the SRRB whose responsibilities included:

- Assisting the Harvest Study Working Group in study design
- Implementing the project
- Managing the day-to-day business of data collection, analysis, and reporting.

A Community Interviewer was hired in each community to collect harvest information for the study. Interviewers reported to the Harvest Study Coordinator. Their responsibilities included:

- Interviewing all eligible harvesters on the official harvester list for their community
- Maintaining and updating the official harvester list for their community
- Promoting the study
- Attending RRC meetings to give progress updates.

One Harvest Study Assistant Trainee was also hired to assist the Harvest Study Coordinator in managing the study and to collect information for the study in Tulít'a; responsibilities included:

- Interviewing all eligible harvesters on the Tulít'a official harvester list plus carrying out all of the other duties of a Community Interviewer
- Assisting the Harvest Study Coordinator with administrative tasks
- Assisting the Harvest Study Coordinator with compiling, entering and analyzing data
- Preparing reports and presentations.

During the study, the Harvest Study Coordinator maintained regular contact with Community Interviewers, RRCs, and the Harvest Study Working Group.

2.2.2 RENEWABLE RESOURCES COUNCILS – ʔEHDZO GOT'JNE

The ʔehdzo Got'jne (Renewable Resources Councils – RRCs) had a very important role to play in the SHS; each RRC working with the SRRB received an annual administrative fee to do the following tasks:

- Assist with local promotion of the study in the community
- Help build and maintain official list of eligible harvesters to be interviewed each month
- Provide some local support for the Community Interviewer
- Provide quality control (*e.g.*, Is the interviewer doing their job? Do the numbers seem right?)

- Assist with hiring by providing name(s) of the best candidate(s) available for the Community Interviewer position.

2.2.3 HARVESTER CONFIDENTIALITY, INFORMATION SHARING, AND RELEASE OF RESULTS

The Sahtú Land Claim (Terms of Reference, Schedule 1 to Chapter 13, 1993) states that the SHS must be conducted in a manner to ensure that harvester confidentiality is protected. Steps taken by the SRRB to protect harvesters' privacy and confidentiality included:

- Assigning every eligible harvester a unique personal Harvester Identification Number, and storing data in a way that kept harvesters' names and personal information separate from their harvesting information
- Restricting access to the Harvest Data Management System that contained personal information on harvesters and their harvesting activities
- Password protection for digital files and locked filing cabinets for storage of all Harvester Record forms collected and any other sensitive materials
- Requiring any persons working with Harvest Study data to sign a Data Release and Usage Agreement to assure no confidentiality breaches occurred
- Withholding information such as harvester gender, age, or community affiliation when any raw data was released
- Any requests for 'raw' or unprocessed harvest data were considered on a case-by-case basis. Once the study was complete and before statistical analyses could be done on the raw data, a data-sharing agreement was developed to guide and restrict the potential release of data that had not yet been adjusted for response rates or assessment in regards to accuracy or reliability. These agreements established further protocols for data storage, data access, and data release (e.g., in documents or publications).⁴

While the study was underway, communities received the following updates and interim reports from the Harvest Study Coordinator:

- **Monthly Community Harvest Update** – Each community received a harvest summary with a tally of harvests for their community and details on overall local harvester participation. Summaries were sent to RRCs as well as Band and Métis local offices
- **Annual Reports** – Public reports containing more detailed harvest count summaries and harvest maps were distributed on request. The contents of this public report were dictated by guidelines on public release of information established by the SRRB.

For all internal updates and interim reports produced by the SRRB, the harvesting activities of individual hunters, trappers, and fishers remained confidential and were never released; only combined counts for the community were shown.

⁴ Since completion of the study, a new information-sharing and release protocol has been established and is available on the SRRB website.

2.2.4 HARVEST STUDY PROMOTION, COMMUNICATION, AND INCENTIVES

A number of approaches were used to help launch and promote the Sahtú Harvest Study, such as:

- **Brochures and Posters** – Mailed to all beneficiaries living in the Sahtú, RRCs, Band and Métis Local offices, Land Corporations, and Territorial Department offices of Resources Wildlife, and Economic Development (ENR) in the Sahtú Region. A series of posters were distributed and made for display in RRC, Band, and Métis Local offices. These posters included space available to post a Monthly Community Harvest Update table
- **Meetings and Engagements** – Public information meetings were held in each community, featuring the Chair of the SRRB, the local District Working Group Representative, and the Harvest Study Coordinator. Door-to-door canvassing was done by the Community Interviewers of all harvesters on the official community list
- **Harvest Study Merchandise** – Give-aways included items such as ball caps, thermos mugs, lighters, pencils, etc. Participants also received an annual pocket calendar and harvest diary for recording harvests
- **Advertisements** – Local radio and community channel announcements were used to promote the Study, announce meetings, and the names of prize draw winners.

Many promotional activities began before the study launch date in spring 1998 so that harvesters were aware of the study and understood why it was important to participate. Communities were kept informed and educated throughout the duration of the study. The Harvest Study Coordinator and Harvest Study Assistant Trainee visited communities regularly and gave annual community presentations of interim study results.

Two types of prize draws were used as incentives for participation in the study:

- **Monthly Prize Draw** – One winner was drawn in each community, using the names of eligible harvesters who were interviewed that month
- **Sahtú-wide Regional Draw** – One winner was drawn every quarter. Each eligible harvester participating in the study got one ballot for every month they participated over the last three months.

Prize winners were announced in SRRB publications, on CBC Radio's lunchtime programming, local radio and community television channels, as well as other publications.

2.3 Defining Harvests, Eligible Harvesters, and Survey Units

2.3.1 DEFINITION OF A HARVEST

The study was designed to record the number of any species of animal, fish and bird killed and retrieved by an eligible harvester. Wounding losses were not captured by the survey. Harvests for any purpose were included (*e.g.*, personal use, trade, commercial, *etc.*), as were harvests both inside and outside the Settlement Area. Most of the time, identification of harvested animals was at the species level, but sometimes harvests were reported by species group (*e.g.*, goose species). This was most common for birds, but also occurred for some small mammals (*e.g.*, fox sp., hare sp., squirrel sp.).

2.3.2 DEFINITION OF AN ELIGIBLE HARVESTER

To be eligible to take part in the study, harvesters had to meet the following conditions:

- Was a Sahtú Dene, Métis, or a non-participant of the Land Claim who provides for their Sahtú Dene-Métis family
- Lived in the Sahtú at the time of the study
- Was an adult of at least 16 years-of-age
- Was an active hunter, fisher or trapper.

Participants did not have to be registered with the Sahtú Enrollment Board to be included in the study.

2.3.3 HARVESTER COVERAGE AND UNIT OF SURVEY

The study design relied on the collection of harvest information using a census approach – that is, every eligible harvester in the Sahtú was to be interviewed. One designated parent or guardian who was eligible to be interviewed for the study (typically the head of the household) was, in addition to their own harvest, required to include the harvest(s) of their dependents or children under 16 years old who lived in the house and who harvested. A profile of the population in the Sahtú around the time the study was initiated is shown in Table 1.

Table 1: Population profile of Sahtú communities at the time the harvest study was started.

Total population ⁵ (1996)		Number of Sahtú Dene and Métis		
		# of North American Indian and Métis (1996)	# of enrolled Sahtú participants ⁶ (1997)	Estimated # of Sahtú Dene and Métis aged 15 yrs and older ⁷
Colville Lake	90	85	53	62
Déline	616	550	562	372
Fort Good Hope	644	575	607	384
Norman Wells	798	165	100	99
Tulít'a	450	400	395	264
TOTAL	2,598	1,775	1,717	1,181

Note that in 2004/5, due to decreasing participation rates, a decision was made to reduce the list of eligible harvesters in three of the five communities. This topic is covered in greater detail in section 3.3.2.

⁵ Total population number and number of North American Indian (excluding Inuit) and Métis, from 1996 census.

⁶ Number of enrolled participants from the November 1997 Sahtú Enrollment Board registry.

⁷ The estimated number of Sahtú Dene and Métis aged 15 years and older was calculated using total population data from the 1996 Census and age/ethnicity data from the 1991 Census.

Group and community hunts

Multiple reporting of harvests can sometimes occur when people harvest together (*i.e.*, it is possible that two or more harvesters from a group may each report taking the same animal). Community Interviewers were trained to be aware of this problem, to ask which reported harvests were done as a group, and to ensure that the harvest was only recorded once.

In reviewing the Harvest Study files, it was unclear whether the study recorded information about community hunts. Only two harvests were found in the records that were identified as such. It is possible that harvest totals from community hunts were split and reported by those in the hunting group, reported by one representative, or reported to the RRC and not the Harvest Study Coordinator.

2.3.4 BUILDING AND MAINTAINING AN OFFICIAL LIST OF ELIGIBLE HARVESTERS

The Harvest Study Coordinator built an initial list of every man, woman, and child in the five Sahtú communities using various sources, such as the current Sahtú Enrollment Board Registry list and the GNWT's General Hunting License records.

For each community, the initial list was then passed on to the ʔehdzo Got'ıne. Each RRC used this list as a foundation to build the official list of eligible harvesters for interviews in each community based on the eligibility criteria described in the previous section. Before data collection started, Community Interviewers then went door-to-door to canvas all harvesters on the official list. During this visit, interviewers checked on the accuracy and completeness of the list and collected personal information from each harvester, including:

- Date of birth
- Harvester gender
- Community affiliation (*e.g.*, Dene, Métis, Other Provider)
- Presence of children or dependents under 16 years of age in the household who harvested, as well as names and ages. The Interviewer then designated one adult head of the household to be responsible for reporting harvests of their children along with their own each month.

Once the study was started, the official list of harvesters was maintained and updated by the Community Interviewers in the following ways:

- **Adding any new eligible harvesters to the official list** – This could include adults who just started harvesting or under-age harvesters who had or would be turning 16 in that study year; people who resumed harvesting after some inactivity (*e.g.*, due to illness); or eligible harvesters who had always harvested but were initially overlooked
- **Removal of harvesters from the official list** – Harvesters were removed from the list if they didn't hunt/fish/trap (*e.g.*, never harvested or recently stopped harvesting); moved out of the Sahtú; or were deceased. Harvesters who refused to participate were removed from the monthly list of harvesters to be interviewed.

Lists were reviewed and updated on a monthly basis throughout the first five years of the study. The Harvest Study Coordinator, Community Interviewers and local RRCs also reviewed the official list annually each spring. Once the interviews switched to a quarterly schedule and the number of participants interviewed reduced (2004/5), the official list was not tracked as closely (see section 3.3.2).

2.4 Data Collection

2.4.1 STUDY AREA AND TIMING

The Sahtú Harvest Study took place in all communities of the Sahtú Settlement Area. However, the timing of survey waves was not the same for all communities for all years of the study. In Colville Lake, Rádeljĥkó (Fort Good Hope), Tulít'a, and Norman Wells the study ran from April to March each year for the first five years of the study (1998-2003). An initial delay in Déljñę meant that surveys in that community started nine months later, in January 1999.

The survey ran on a monthly basis for five years, as mandated by the Land Claim, until 2003. Data collection paused in Tulít'a, Norman Wells, Rádeljĥkó (Fort Good Hope), and Colville Lake between April and December 2003, to allow for completion of the survey in Déljñę. The study then continued on a reduced harvester list and quarterly interview schedule for another two years (January 2004 to December 2005).

2.4.2 INTERVIEWS

Harvest information was collected during face-to-face interviews conducted by Community Interviewers in Norman Wells, Rádeljĥkó (Fort Good Hope), Colville Lake, Déljñę, and by the Harvest Study Assistant Trainee in Tulít'a. Interviews mostly took place in harvesters' homes, but also occasionally took place in other locations. Interviews were conducted in either English or the local dialect, except in Norman Wells where interviews were done in English only. For five years (1998-2003), door to door interviews were done on a monthly basis. For the last two years (2004/5), interviews were done every three months.

Throughout the study, harvesters were asked to report the numbers and general locations of animals, fish, and birds they harvested in the past month. Interviewers were provided with documentation of the animals they were asking about, including photographs and a species list with English, common, and Dene Language names. This list included a total of approximately 80 species of birds, fish, and mammals and is provided in **Appendix A**. It was also included in SHS interim reports with reported annual harvests.

During interviews, harvesters were asked to recall what they had hunted, fished, and/or trapped in recent months. Information collected was most often based on what a harvester could remember over a one month period. However, this recall period was at times longer in cases of backlog where a harvester could not be contacted in a given month because he/she was out the on the land or out of the Sahtú Settlement Area.

Activity codes used by the Community Interviewer if a harvester was interviewed:

- 1 = Went out harvesting and was successful*
- 2 = Went out harvesting but was unsuccessful*
- 3 = Did not go harvesting*

Activity codes used if an Interviewer was unable to collect harvest information:

- 4 = Harvester could not be contacted – still out harvesting*
- 5 = Harvester could not be contacted – Other reason*
- 6 = Harvester moved*
- 7 = Harvester deceased*
- 8 = Harvester does not want to participate*
- 9 = Does not harvest*
- 10 = Other*
- 11 = Greater than 6 mos recall*

All eligible harvesters participating in the study received a Pocket Calendar and a Harvest Diary to keep track of how many animals, fish, and birds they harvested. During the interview, the harvester was asked to refer to these aids to help remember the details of their harvest.

2.4.3 RECORDING THE NUMBER OF FISH AND WILDLIFE HARVESTED

The Community Interviewer asked every eligible harvester who went out harvesting and was successful questions about what they hunted, fished, or trapped that month:

- What animal, fish, and bird species did you harvest?
- How many of each species did you harvest and where did you get them?

Harvest information was recorded on the Harvester Record form, included in **Appendix B**. If a harvester had hunted, fished, or trapped in the previous month the Interviewer chose the appropriate code on their Harvester Record form to describe the harvester's reported activity last month. Similarly, if the Interviewer was unable to collect harvest information from a harvester, they marked down a code to explain why.

For certain big game species, the age class and sex of the animal(s) harvested was also recorded whenever possible (*e.g.*, adult bull). This information was collected for:

- Moose
- Caribou (barren-ground, woodland)
- Muskoxen
- Dall's sheep
- Mountain goats
- Black and grizzly bears
- White-tailed deer.

The age classifications that were used included adult, juvenile (including calf, lamb, yearling, cub), or unknown. Sex classifications used were male, female, or unknown. Information on specific barren-ground caribou herds was not collected (*e.g.*, whether a harvested caribou was from the Bluenose-West or Bluenose-East herd). The study also did not differentiate between Northern Mountain Caribou and Boreal Woodland Caribou – all were recorded as woodland caribou.

2.4.4 LOCATION OF HARVEST AND THE GEOGRAPHIC INFORMATION SYSTEMS (GIS)

Harvest locations were recorded using two pieces of information:

- **Place name** – Either the common English or the name in the local dialect was recorded, as identified by the harvester
- **A mapped location** – Using grid blocks on a 1:250,000 scale National Topographic System (NTS) map, with a Lambert Conformal Conic projection mapping technique, a grid consisting of 10 x 10 km² cells was superimposed on the Sahtú Settlement Area and surrounding areas. Each cell was uniquely numbered.
 - The 10x10 km grid blocks were used to indicate locations of harvests for all animals except fish (*e.g.*, big game, furbearers, birds).

- To provide more detail on specific lake and river systems, 2 x 2 km² grid blocks were used to indicate locations of all fish harvests. To get these coordinates, the Interviewer used a map jig featuring a single 10 x 10 km grid block divided up into twenty-five smaller 2 x 2 km blocks. This grid was printed on a transparent acetate so that it could be overlaid on top of a 10 x 10 km block on the 1:250,000 NTS map.

Community Interviewers were provided with a binder containing two page-referenced general maps (1:800,000 scale) of the entire SSA and surrounding areas, plus a series of more detailed (1:250,000 scale) NTS maps of all the areas covered by the general reference maps. On the appropriate 1:250,000 NTS map, the harvester indicated the actual grid block where the harvest took place. The Interviewer then recorded the block's unique grid number on their Harvester Record form. An example of the type of mapping system used to record harvest locations is shown in Figure 2 on the following page.

For harvesting that occurred over a large area (*e.g.*, along a trapline, or when hunting from a boat) the harvester was not asked to give a location for each animal taken. Instead, when harvests of this type occurred over several 10 x 10 km grid blocks, the Interviewer evenly divided the total number of animals harvested to the closest whole number over the entire reported area. Any animals left over after this were assigned randomly by the Interviewer to one of the grid cells in the harvest area.

A Geographic Information Systems (GIS) Specialist employed by the SRRB was responsible for developing the maps used during the interviews, managing all SHS data entered into the Sahtú GIS Project's computer system, and for producing maps containing harvest information to be used in reports and presentations for the study's duration.

2.4.5 OTHER INFORMATION COLLECTED BY THE HARVEST STUDY

Community Interviewers were also asked to record:

- The total number of days a harvester spent out on the land harvesting
- Any observations made by a harvester during the interview (*e.g.*, animal condition, parasites, predation, numbers, *etc.*) in the Comments Section of the Harvester Record.

Comments were only recorded when harvesters mentioned things they had noticed, and these generally centered on animal health – there are notes about when animals appear to be 'fat', 'good' or in 'very good shape'. There are also numerous comments that include information about disease – most of these observations are for fish and caribou.

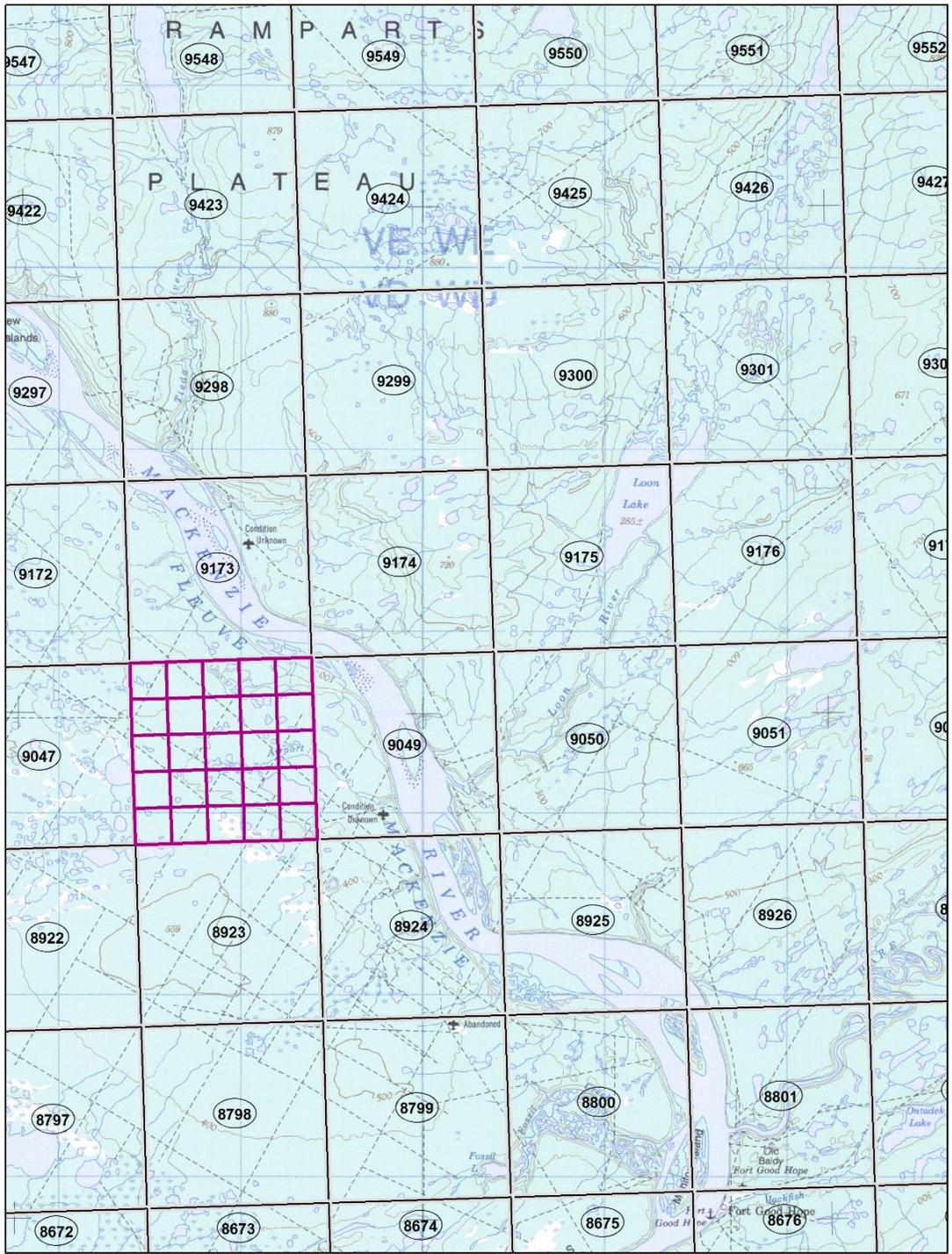


Figure 2: An example of the type of map and grid overlay system used to record locations for the harvest study. Bird and mammal locations were recorded on a 10 x 10 km² grid, and fish locations were recorded on a 2 x 2 km² grid (shown in pink) overlaid on NTS maps.

2.5 Data Management

2.5.1 HARVEST DATA MANAGEMENT SYSTEM AND GIS

The SHS data is stored in a free relational database management software called '**Firebird**'. The database is organized around a harvest trip – in other words, a single harvest trip is the node around which other types of information (who, what) is linked (see Figure 3). The interview table records each separate harvest trip taken by a participant. The harvester's name, date of birth, and other relevant information are contained within a harvester table. Other tables hold information about what was harvested. Therefore, most queries or questions flow through the Harvest Trip records to link different pieces of information. Unsuccessful harvest trips are also recorded, as are instances when the harvester did not go out on any trips.

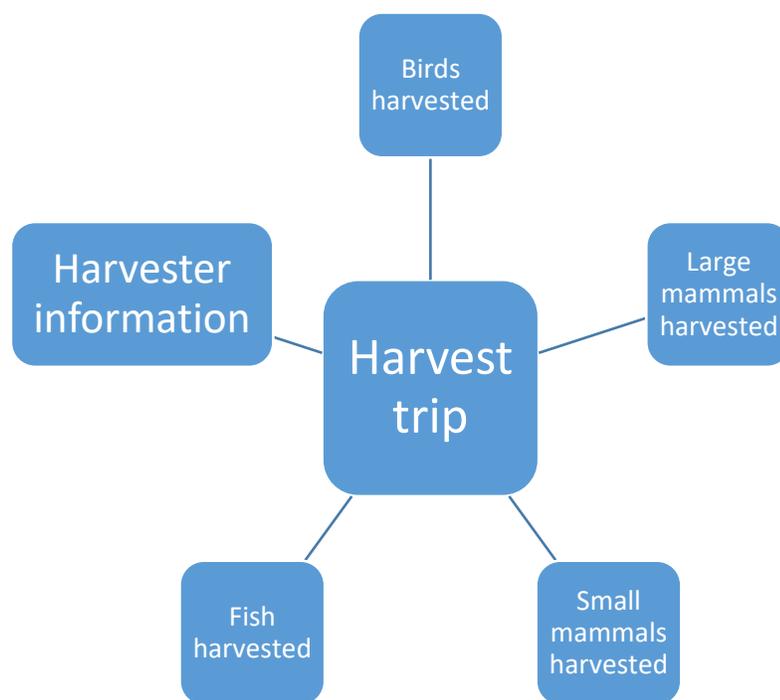


Figure 3: Generalized diagram of Sautú Harvest Study Database.

Therefore, by linking tables through queries, many different types of research questions can be explored. This topic is considered in more detail in section 5.2 of this report; further details regarding the data management system is included in the SHS assessment report (SRRB 2013).

2.5.2 INTERVIEW FOLLOW-UP AND DATA-CHECKING

All harvesters who were interviewed signed their names on the Monthly Harvester List to confirm that they participated that month. At the end of a given month, the Interviewer in each community faxed a copy of the signed Monthly Harvester List for that month, and mailed the original Harvester Record forms and signed Monthly Harvester Lists to the Harvest Study Coordinator. Upon receipt of these

materials, the Harvest Study Coordinator and Harvest Study Assistant Trainee followed a series of steps to process and check the newly collected data:

STEP 1 - Prepare Updated Monthly Harvester Lists for the Current Month

- Any additions or changes appearing on the faxed copy of last month's Monthly Harvester List (*e.g.*, harvester could not be contacted, moved, does not hunt, *etc.*), were entered in to the official harvester list in the Harvest Data Management System
- By the end of the first week of the current month, a new Monthly Harvester List (with names of those to be interviewed for the current month plus any backlogs to be collected) were faxed or mailed out to each Community Interviewer.

STEP 2 - Sort and Edit

- When data arrived at the SRRB by mail, Harvester Record forms were sorted by: 1) month of harvest and 2) within a given month, by Harvester Identification Number
- Each Harvester Record form was checked against the signed Monthly Harvester List for that month to check for any missing or duplicate forms
- Harvester Record forms were checked for incomplete, missing, or inconsistent data. If there were concerns or questions, the Community Interviewer was contacted.

STEP 3 - Data Entry

Either the Harvest Study Coordinator or Harvest Study Assistant Trainee entered data from Harvester Record forms into the Harvest Data Management System. A number of features were built into the system to reduce data entry error:

- Clickable 'check-box' value lists that reduce or eliminate the need to type information
- 'Smart data fields' that have preset value ranges and/or require data to be entered before proceeding to next data field
- Automated 'sort and clean' features to maintain and update the data file by searching for duplicate/missing or outdated records and revise the master computer record when backlog months are cleared.

STEP 4 - Verification

After data had been entered, all new information put into the Harvest Data Management System was checked against actual Harvester forms for any data entry errors. Both the Harvest Study Coordinator and Harvest Study Assistant Trainee did the verification. Additional checks on data included:

- The Harvest Study Coordinator and/or Assistant Trainee did random checks to confirm that interviews had been conducted as recorded and that the recorded information was correct by telephoning participating harvesters periodically
- Staff would also telephone individual harvesters and/or Interviewers as necessary for verification if they noticed any reported harvests that did not seem 'correct' (*e.g.*, species hunted in an unusual number, location or season)
- Before releasing the Monthly Community Harvest Update, RRCs could review the summary table for their community overall and comment on whether or not the numbers seemed accurate.

2.5.3 MANAGING BACKLOGGED DATA

Backlogs occurred when eligible harvesters could not be interviewed for several months because they were out on the land or away from the Sahtú Settlement Area. When the Community Interviewer did have the opportunity to interview these harvesters, he/she would then collect harvest information for the past month plus all other backlogged months for which information was outstanding. It should be noted that recall periods were consistently longer once the interview schedule was reduced to every three months.

Part-way through the study, Interviewers reported that harvesters were having difficulty accurately remembering some of their harvests when the recall period was six months or longer. To address concerns that long recall periods could be lowering the reliability of the data, the SRRB decided to introduce a 'six-month rule' in March 2001. This meant that for Years 4 and 5 of the study, any harvests that had occurred more than six months before the interview date were not to be collected by the Interviewers. This topic is considered more in section 3.3.3.

2.5.4 RULES FOR MANAGING UNUSUAL DATA

In some cases unusual harvest data was collected. Rules were in place to deal with these cases in a standardized way. For example, if a harvester reported the harvest of six caribou over three months, the Community Interviewer evenly divided (to the nearest whole number) the total number of kills between the multiple months (*e.g.*, two caribou per month). A similar rule was in place for mapping harvests that occurred over multiple grid blocks (see section 2.3.3). Anything left over was assigned randomly by the Interviewer to one of the months or grid blocks. In some cases, harvesters were unable to recall some details of their reported harvest (*e.g.*, the species, its age and/or gender, location where harvested, *etc.*). The Community Interviewer collected whatever information was available and assigned a special code for anything else the harvester couldn't recall.

2.5.5 ADDITIONAL DATA CHECKING AND EXPERT INTERVIEWS, 2013/14

The finalization of the SHS results – including statistical analysis, calculation of total estimated harvests, and report production – was initially delayed due to a decision to continue the study beyond the five-year mark originally mandated by the Land Claim. Once data collection stopped at the end of 2005, further work to complete the study was hampered by a lack of capacity and resources for several years.

In late 2012, consultants were hired to assess the status of the study, the existing database, and the resulting data. Some of the first findings of the assessment revealed that many of the automated functions of the SHS database were not functional, and the study was incomplete in that there had been no statistical analysis or final reporting done (SRRB 2013).

Because there was little continuity between the different personnel that designed, conducted, and were responsible for bringing the study to completion, the contractors decided it would be prudent to further assess the quality of the work and the results before embarking on any statistical analysis of the SHS data. The objective was to verify that the study methods had been carried out as initially described and that adequate quality control mechanisms had been in place. Further data-checking and a series of expert interviews were conducted in 2013.

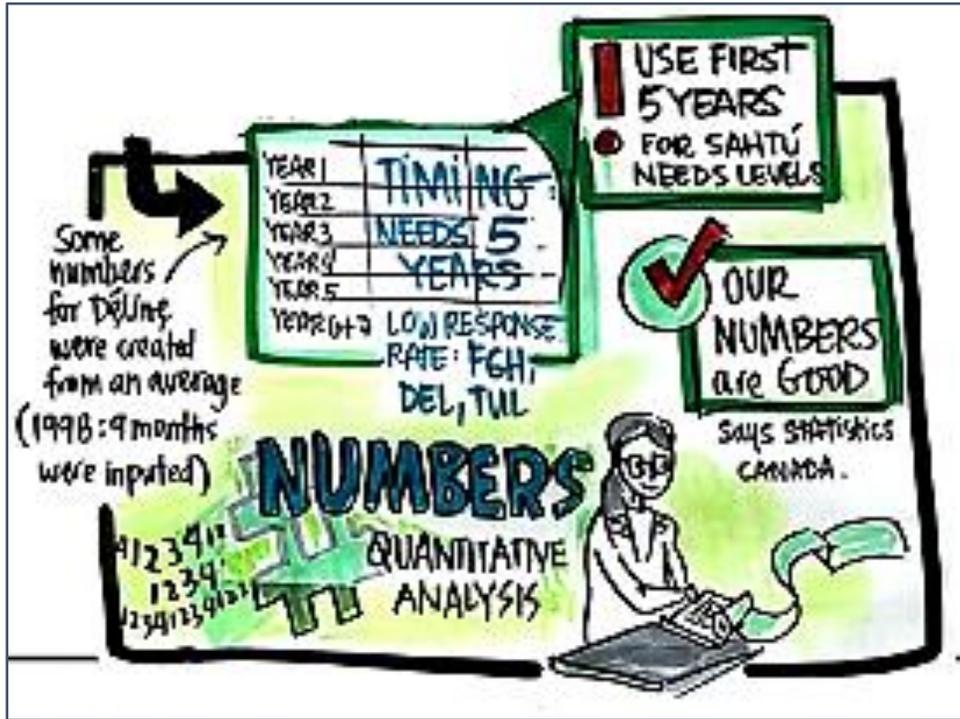
Expert Interviews

Several harvest study experts with direct experience of the SHS were also interviewed as part of the 2013 data assessment. They included the two former SHS coordinators, two former members of the Harvest Study Working Group, and the ENR Wildlife Management Supervisor for the Sahtú Region. During phone interviews each individual was asked about their personal experience with the study, whether they were aware of any particular challenges encountered during the study that could affect the data, and what they perceived its main strengths and weaknesses to be.

Overall, it was felt that the study had received good support and participation in the communities, it had been carefully done, and had been successful at surveying most harvesters and capturing a reliable estimate of their harvests at that point in time. Individuals that had worked with the results felt that the spatial data were especially useful for land use planning at the community and regional levels. Some insights into the data provided by the phone interviews are included in this report; a fuller discussion of the interview results can be found in the 2013 SRRB report.

At this point, the study team felt confident that no real problems existed in the database and the data were sent for statistical analysis.

3. STATISTICAL ANALYSIS



Graphic illustration of a 2020 presentation about the statistical analysis performed on the numerical data from the Sahtú Harvest Study. Drawing by Sam Bradd, Drawing Change.

Surveys such as the Sahtú Harvest Study attempt to achieve census coverage of eligible harvesters – that is, they try to interview every eligible harvester about their harvesting activities on a regular basis. In most cases an actual census is not achieved however, and the data that are recorded capture the reported harvest of most but not all eligible harvesters. The numbers of fish and animals taken by a small number of eligible harvesters that are not interviewed remain unknown.

In order to calculate a ‘total estimated harvest’ for all eligible harvesters, a ‘proportional projection’ method is most often employed (see also Joint Secretariat 2003, Gwich’in Renewable Resources Board 2009, and Nunavut Wildlife Management Board 2004). This section of the report describes the rationale and methods of the proportional projection method, as well as the types of statistical analyses that were done on the data resulting from the SHS.

Only the quantitative or numerical data recorded during the SHS were analyzed statistically. No analysis was done on the spatial data or the qualitative information recorded by the study (*e.g.*, comments on health, *etc.*); data regarding the number of days harvesters spent out on the land were also excluded from the analysis. Relatively little qualitative data was recorded during the SHS – of the 62,273 records, only 2,822 (approximately 4.5% of the records) had a comment associated with them. A cursory review of those comments did not suggest that they had been recorded consistently enough to be able to indicate broad trends or patterns.

3.1 Calculation of Harvester Response Rates

The amount of actual coverage or participation in a harvest survey is represented by the **response rate** – this measures the proportion of harvesters participating in the study in a given month out of all possible eligible harvesters in the community that month. The response rate is used in calculations that help to account for the harvests of eligible harvesters who did not take part in the study. Generally, response rates greater than or equal to 75% are considered adequate for use (Nunavut Wildlife Management Board – NWMB, 2004). Once rates consistently fall below 75%, the data are not considered reliable.

Response rates are calculated each month using the following formula:

$$R = \frac{a+b+c}{N}$$

Where

R= harvester response rate

a= number of eligible harvesters interviewed who went out harvesting last month and got something

b= number of eligible harvesters interviewed who went out harvesting last month but didn't get anything

c= number of eligible harvesters who did not harvest last month

And N= total number of eligible harvesters in the community last month (including eligible harvesters who do not want to be interviewed or could not be contacted)

3.2 Estimating Total Harvests from Reported Harvests

To calculate total monthly harvest estimates from monthly reported harvests within a community, there is an assumption that the respondents are a simple random sample from the population of harvesters in a given community and month.

Therefore the total harvest for a month *m* in community *c* is estimated as:

$$\hat{Y}_{cm} = \frac{N_{cm}}{n_{cm}} \sum_i y_{cmi}$$

where,

N_{cm} is the number of harvesters in month m and community c ;
 n_{cm} is the number of responding harvesters in month m and community c ; and
 y_{cmi} is the harvest reported by responding harvester i in month m and community c .

The variance of the estimated total \hat{Y}_{cm} is estimated by,

$$\hat{V}ar(\hat{Y}_{cm}) = \frac{N_{cm}^2}{n_{cm}} (1 - f_{cm}) s_{cm}^2$$

where,

$f_{cm} = \frac{n_{cm}}{N_{cm}}$ is the sampling fraction in month m and community c ; and

$s_{cm}^2 = \sum_i (y_{cmi} - \bar{y}_{cm})^2 / (n_{cm} - 1)$ is the sample variance of reported harvest by harvesters in month m and community c .

For the purpose of variance estimation, it is assumed that the survey was independent from community to community and from month to month. As each month is a separate survey within a community, it is possible to estimate the variance of the estimated annual total harvest as the sum of estimated variances of the estimated monthly total harvests. Thus,

$$\hat{Y}_c = \sum_m \hat{Y}_{cm},$$

and

$$\hat{V}ar(\hat{Y}_c) = \sum_m \hat{V}ar(\hat{Y}_{cm}).$$

To obtain the estimate of total annual harvest for all communities combined and its estimated variance, a similar procedure, as described above, would be used. Thus the estimate of the annual total harvest for five communities combined would be the sum of annual total harvest estimates from each community. Similarly, the estimated variance of annual total harvest estimate for all communities combined would be the sum of estimated variances for each community. Thus,

$$\hat{Y}_T = \sum_c \hat{Y}_c = \sum_c \sum_m \hat{Y}_{cm}$$

and,

$$\hat{V}ar(\hat{Y}_T) = \sum_c \hat{V}ar(\hat{Y}_c) = \sum_c \sum_m \hat{V}ar(\hat{Y}_{cm}).$$

Variance was used to produce two indicators of the reliability of the annual harvest estimates:

- **Margin of error** – The margin of error provides a range of values within which the true harvest is likely to lie and the confidence that the true value falls within this range. Margins of error were calculated at 95% confidence and are reported with estimated total harvests. The Confidence

Interval (*CI*) is used to indicate the accuracy of an estimate. A 95% *CI* for the total annual harvest estimate for community *c* is constructed as:

$$\left(\hat{Y}_c - 1.96 \times \sqrt{\hat{Var}(\hat{Y}_c)}, \hat{Y}_c + 1.96 \times \sqrt{\hat{Var}(\hat{Y}_c)} \right),$$

where 1.96 is the value corresponding to the level of confidence *i.e.*, 95% from a standard normal distribution table.

- *Coefficient of Variation (CV)* – A large margin of error does not necessarily indicate an unreliable estimate. The margin of error is in the units of the reported species, so what is large for one may be small for another. The *Coefficient of Variation (CV)*, expressed as a percent, is unitless and provides a better indicator of the reliability of the annual total harvest across species. CV is a measure of relative variability of an estimate. It is the ratio of standard error (*SE*) of an estimate to the estimate, expressed as a percentage. The *CV* for total annual harvest estimate for community *c* is calculated as,

$$CV(\hat{Y}_c) = \frac{SE(\hat{Y}_c)}{\hat{Y}_c} \times 100\% = \frac{\sqrt{Var(\hat{Y}_c)}}{\hat{Y}_c} \times 100\%.$$

The smaller the CV, the more reliable the estimate is. The guidelines shown in Table 3 can be used in judging the quality of estimates.⁸

Table 3: Guidelines for using Coefficients of Variation as indication of data quality.

If the Coefficient of Variation is:	Then the data quality is considered to be:	Associated warnings include:
Less than or equal to 16.5%	Sufficient accuracy for all purposes	None
Greater than 16.5% and less than or equal to 33.3%	Potentially useful for some purposes	Use with caution
Greater than 33.3%	Not recommended for release	Data contain a level of error that makes them so potentially misleading that they should not be released in most circumstances

Tables of the SHS results indicate any cases where the Coefficient of Variation of a total estimated harvest exceeds 33.3% and is therefore considered unreliable.

⁸ These guidelines are based on the *Guide to the Labour Force Survey* (catalogue number 71-543-G) http://www23.statcan.gc.ca/imdb-bmdi/document/3701_D2_T2_V3-eng.pdf.

3.3 Assumptions for Statistical Estimation

Using the proportional projection method to calculate reliable total estimated harvests from harvests reported to the study relies on meeting several assumptions. This section of the report considers how well the SHS met these assumptions. It also includes a discussion of findings regarding the specific strengths and weaknesses of the SHS data set, and how they may influence calculations of total estimated harvests and Minimum Needs Levels.

This discussion of data reliability does not rely on applying any numerical or quantifiable criteria, but is limited to a subjective consideration by those that coordinated the study and those who reviewed the data. Potential errors or other issues arising from the spatial data (mapped harvest locations) are not included in this discussion.

The reliability of harvest estimates and estimates of their sampling errors based on the reported harvests in the SHS depend upon the following assumptions:

1. **Survey Coverage** – That the list of eligible harvesters in a given community and month accurately reflects the harvester population, that is, there is no undercoverage (missing eligible harvesters) or overcoverage (including ineligible harvesters on the list)
2. **Non-response Bias or Representativity** – That the responding harvesters form a representative sample of the population of harvesters (e.g., there is no systematic bias where harvesters with a lot of harvest are not responding or vice versa)
3. **Measurement Issues and Response Error** – That the harvest numbers are accurately reported and recorded, that is, there is no response bias on the part of respondents, no recording error on the part of interviewers, and no coding error on the part of data entry.

Each of these topics is considered in regards to how the survey was designed and executed, what the potential sources of error could be, and their magnitude in the following three sub-sections. The information presented here results from a review of the Sahtú harvest data and methods, as well as an assessment of the study and expert interviews conducted in 2013.

3.3.1 SURVEY COVERAGE

How well did the survey frame represent the harvester population?

As outlined in section 2.2, the Harvest Study Working Group and SRRB staff worked closely with the RRCs to build an official list of eligible harvesters based on sources such as the Sahtú Enrollment Board Registry list and the GNWT's General Hunting License records. Community Interviewers then canvassed all households to identify and confirm eligible harvesters. Once the study was underway, monthly checks were in place to ensure that the list remained as current as possible.

Past Harvest Study Coordinators reported that the survey achieved a good cross-section of the harvester population in the first five years, and that family representation was thought to be good. For the last two years of the study, the harvester list was not as carefully managed and it is likely that the survey coverage was not as good in 2004/5. It was acknowledged that there were several harvesters that consistently declined to take part in the study throughout its duration.

Overall, women were not very well-represented in the harvester list. This is in part due to the fact that there was no emphasis on foods traditionally harvested by women in the species list (*e.g.*, berry and plant harvesting were not recorded). Also, most often, men reporting a household’s total harvest included harvesting done by women. The number of women harvesting in the five Sahtú communities at the time of the study is not known.

Refusal to participate and exclusion of women could result in some under-enumeration, which in turn would result in an unquantified underestimate of total harvests, especially if these individuals were active or intensive harvesters.

A past Harvest Study Coordinator and Community Interviewer reported that some community members felt there were some individuals on the list who didn’t hunt and shouldn’t have been included. This also could have influenced the study results, and their inclusion would result in a bias in response rate calculations.

3.3.2 NON-RESPONSE BIAS OR REPRESENTATIVITY

What were participation levels like in the SHS?

Documentation found on the harvest study server and interviews with past Harvest Study Coordinators provided some details on the process of engaging communities and harvesters in the study. One interviewee suggested that support for the study was not good in Colville Lake, and harvesters had some reluctance to participate. Others stated that once Déljne began participating in 1999, harvester participation was good in each community after that point.

Response rates were calculated for each community and for every month that the SHS took place between 1998 and 2005; average annual response rates were also calculated as an average of the community rates from 12 separate consecutive months. Average numbers of eligible harvesters and respondents, as well as response rates for the first five years of the SHS are shown in Table 4.

Table 4: Average numbers of eligible harvesters, respondents, and response rates for the first five years of the Sahtú Harvest Study.

Community	Number of Survey Occurrences	Average Number of Eligible Harvesters	Average Number of Respondents	Average Response Rate (%)
Colville Lake	60	39	33	85.46
Déljne	51	175	164	93.43
Fort Good Hope	60	149	135	90.86
Norman Wells	60	108	103	95.00
Tulít’a	60	141	128	90.88

Generally, response rates exceeding 80% are considered to be very good – this means that for the first five years of the SHS, participation rates were consistently high in all communities and adequate to do the necessary statistical analyses for estimating total harvests.

By 2003, Harvest Study Coordinators were starting to see signs of participant fatigue or response burden. Community Interviewers reported that harvesters were increasingly not wanting to participate or saying that they had not harvested in the preceding months. Participants were said to be quitting

towards the end of the first five years, and prize incentives were no longer as effective in encouraging people to participate.

Because there was interest in continuing the survey beyond the claim-mandated five years, it was decided that the study would continue in 2004 with a reduced number of participating harvesters. The process followed was if a harvester hadn't reported harvesting for a year, the Study Coordinator consulted with the RRC as to whether the individual should still be on the list or not, and the list was adjusted accordingly. The number of harvesters on interview lists were reduced in Rádeljĥkó (Fort Good Hope), Déljne, Norman Wells and Tulít'a. This apparently was not the case in Colville Lake, where the number of harvesters on the interview list increased slightly.

Knowing the total number of eligible harvesters in a community for each month the survey is conducted is a critical piece of information for harvest estimation. Because eligibility lists do not appear to have been kept for the last two years of the study, and it is not possible to re-create those lists after the fact, accurate response rates for 2004 and 2005 could not be calculated from the existing data. Using the information available would have resulted in artificially inflated response rates. This in turn would result in total estimated harvests that are lower than actual.

In order to present as accurate a picture of harvesting as possible, the preceding four years of data (January 1999 – December 2002) were used to determine an average number of eligible harvesters in the study area, then this average was used to calculate the necessary response rates for the remaining two years of the study (2004/05). This decision was based on assumptions that the majority of the harvesters that were taken off the interview list remained in the study area and were still eligible, but were no longer interested in taking part in the study. While there would be some additions to the eligibility list over this period of time (*e.g.*, people turning 16 or moving into the study area) as well as some deletions (*e.g.*, people passing away or moving away) an assumption was made that these changes would be minimal and not account for a significant change in harvester numbers. Average annual response rates estimated for the last two years of the study are shown in Table 5. Years in which the response rates are considered too low to calculate reliable harvest estimates are italicized and shaded.

Table 5: Average numbers of eligible harvesters, respondents and response rates for the SHS, January 2004 – December 2005.

Community	Number of Survey Occurrences	Average Number of Eligible Harvesters ⁹	Average Number of Respondents	Average Response Rate (%)
Colville Lake	24	41	32	78.29
<i>Déljne</i>	24	175	99	56.34
<i>Fort Good Hope</i>	24	149	106	70.86
Norman Wells	24	108	83	76.43
<i>Tulít'a</i>	24	141	101	71.76

⁹ Actual eligibility lists were not available for 2004/05. Response rates were estimated using average numbers of eligible harvesters based on previous years of the study for all communities except Colville Lake where the number of participating harvesters increased.

These calculations determined that estimated response rates for 2004 and 2005 are adequate for total estimated harvests to be calculated in Colville Lake and Norman Wells. In Rádeljĥkó (Fort Good Hope), Délĥneĥ and Tulít'a however, response rates were consistently under 75% for most months of 2004 and 2005, sometimes even dropping below 50%. Generally, response rates less than 75% are considered to produce unreliable data for use in calculating total estimated harvests. This means that for the last two years of the study, it was not possible to calculate reliable total estimated harvests for three out of five Saktú communities.

Are there significant differences in harvesting between participants and non-participants?

As mentioned above, past Study Coordinators said that in each community, some harvesters refused to take part in the survey. Some of these individuals were described as 'intense' or 'super-harvesters' that never registered with or reported to the study, fearing prosecution or simply not supporting the study objectives. It was estimated that one or two of these very productive harvesters were missed in each community.

The omission of these harvesters would likely result in an underestimation of actual harvest levels, but it is difficult to know the magnitude of the resulting influence on the data set. Generally, low rates of intentional non-response ($\leq 5\%$) will not have a strong influence on a survey's results (NWMB 2004). Past Study Coordinators felt that it was very likely that some of the other participants were reporting some of the super-harvesters' harvests. Overall, they summarized that there were so few people that were *not* participating, that most family's harvests were likely being reported to the study (SRRB 2013).

It was also pointed out during the expert interviews that people who harvest part-time tend to be the easiest to contact for the monthly interviews. The full-time harvesters – who are harder to contact as they are out of town a lot – are necessarily more difficult to interview, but do tend to harvest significantly more than others. This means that within the sample of participating harvesters, it is possible that there could be a slight bias towards information from people that harvest less than others. It is possible that this effect has also influenced the SHS data set, again leading to a possible unquantifiable underestimation of total harvests.

3.3.3 MEASUREMENT ISSUES AND RESPONSE ERROR

Are the survey responses valid? Do they measure the true harvests of responding individuals?

During the expert interviews conducted for the study assessment in 2013, no reasons for harvesters to strategically bias their answers could be identified by former Study Coordinators; there were no known species-specific or other resource management issues that were likely to have created biases in reporting or the study results. For the most part, harvesters were said to have had good recall of both their harvest numbers as well as locations. No major issues were reported in regards to harvester reporting, Community Interviewer reliability, data management, or any aspect of how the survey was conducted (SRRB 2013).

There were however differing levels of acceptance in the different communities. One resource manager felt that because there was not as good a trust established with harvesters in Colville Lake, the data for that area may be less reliable than for the other communities. However, it was also stated that overall, the harvesters and elders in the Saktú communities (Colville Lake included) are very supportive and committed to the conservation of wildlife.

There were two instances where reported harvests were falsified. This was the result of an action either on the part of the harvester or the Interviewer. However, due to a rigorous data-checking procedure, as well as the Coordinator’s local knowledge of seasonal harvesting activities, the inaccuracies were found, and it was felt that these were isolated incidents and unlikely to significantly influence the data.

Throughout the study, Coordinators worked closely with the RRCs in each community. There was also good communication between staff and harvesters – for example, if a harvester had missed an Interviewer, he would often call the office for follow-up. In addition, Study Coordinators did data checks by calling harvesters to confirm their activities and harvests. Good communication and tight quality control should have helped to ensure data reliability.

Recall failure and backlogged data

One weakness identified in the SHS was recall failure when data backlogs occurred – this happened when a harvester couldn’t be contacted for several consecutive months, and became even more prevalent when the study switched to a quarterly interview schedule. Community Interviewers felt that when harvesters were out on the land, and an Interviewer was unsuccessful at interview attempts for two or three months at a time, harvesters were more likely to give inaccurate numbers or ‘guesstimates’ of their actual harvests. This tended to occur seasonally – for example, when harvesters were out for extended periods hunting caribou or ducks and geese, as well as during fish runs. The Board decided to introduce a ‘six-month rule’ in order to address this problem. Table 6 shows the number of records coded as 11 (*i.e.*, having a recall period greater than six months) during the first five years of the study.

Table 6: Records with greater than six month recall periods during first five years of the study.

Community	Number of records >6 months recall period				
	1998	1999	2000	2001	2002
Colville Lake	53	17	0	1	7
Déljñę	N/A	967	175	19	48
Fort Good Hope	85	147	214	31	20
Norman Wells	31	9	7	8	2
Tulít’a	0	39	0	0	0
TOTAL	169	1,179	396	59	77

After the six-month rule was introduced in March 2001, there is a significant drop in the number of records in the database with a long recall period, however, some harvests with a long recall period were still recorded after the introduction of the rule. At this point, so long after data collection ceased, it is not possible to know whether these records were kept for a particular reason (*e.g.*, could be attributed to harvesters using a calendar or diary). Nonetheless, any harvests that were *not* recorded or entered as a result of the six-month rule should have been accounted for by the statistical analysis (*i.e.*, harvesters would have been counted as eligible but not interviewed).

In 2004 and 2005, when the survey changed to quarterly interviews, the Study Coordinator felt that harvester recall failure began to be a bigger and more consistent problem, as harvesters had a harder time remembering their activities over the three month period. Long recall periods can increase the potential for measurement error, resulting in an underestimation of true harvest levels.

3.4 Survey Timing and Resulting Data

As mentioned in section 2.1, the timing of the Sahtú Harvest Study survey was not consistent between all communities for all years of the survey. The SHS started in April 1998, but Déljne did not start participating until January 1999. In order to balance out the number of months surveyed across communities due to Déljne's missed nine months of survey, the SHS was suspended in Colville Lake, Rádeljkhqó (Fort Good Hope), Norman Wells, and Tulít'a from April 2003 to December 2003. These two facts resulted in nine months of data missing for each community.

It is necessary to have five years of SHS data to meet the requirements in the Land Claim – if calculated on an individual basis, each community in the Sahtú has a complete five year data set that could be used for total estimated harvests. However, to compare annual totals or Minimum Needs Levels across communities or for the Sahtú as a whole, it is desirable to have *comparable* years of data (*i.e.*, to compare the same years and/or months for each community). Because Déljne did not join the study for the first nine months of data collection, there are no comparable data for 1998 for that community. In addition, because response rates were low in three communities during the last two years of the study (2004/05), these data cannot be used in the necessary area-wide or comparative calculations.

Based on the study team's understandings of 1) the study methods, and 2) the resulting reliability of the data, and in order to have five years of comparable data for all communities, the following decisions were made:

- For the nine months of 1998 data that are lacking in Déljne, harvests were imputed (estimated)
- from the other five years of data that were collected in that community. Imputed values were calculated as averages of harvest estimates from the corresponding months for January 1999 – December 2003, and are only used in area-wide and comparative calculations.
- Monthly and annual data are presented in results tables that summarize information for each community according to the actual survey waves – that is, for Colville Lake, Rádeljkhqó (Fort Good Hope), Tulít'a, and Norman Wells, data are displayed seasonally, from April 1998 to March 2003; for Déljne, data are displayed according to the calendar year (*i.e.*, January to December).
- Data for Years 6 and 7 in Rádeljkhqó (Fort Good Hope), Déljne and Tulít'a (where response rates are below 75%) are considered unreliable and are not recommended for use.
- Data for Years 6 and 7 in Colville Lake and Norman Wells (where response rates remained above 75%) are included in reports as are considered reliable, however due to the lack of eligible harvester lists for those two years, error margins on those years of data are very large.

Information on survey timing and which data were used in calculations is summarized in Table 7. The actual survey waves for the full seven years of the harvest study are shown in the first two columns of the table; data are presented at the community level according to these actual survey waves.

The last column of Table 7 indicates how data are compiled across communities and presented in annual comparisons for the entire Sahtú Settlement Area. Shaded rows indicate the years/data that were used in calculating means. Imputed data for Year 1 in Déljne are indicated in blue.

Table 7: Harvest Study survey timing in the five communities of the Sahtú.

	Surveys done in Colville Lake, Fort Good Hope, Tulít'a, and Norman Wells	Surveys done in Déljñę	Data used in annual comparisons and mean calculations
Year 1	Apr 1998 – Mar 1999	Jan 1999 – Dec 1999 ¹⁰	Apr 1998 – Mar 1999 ¹¹
Year 2	Apr 1999 – Mar 2000	Jan 2000 – Dec 2000	Apr 1999 – Mar 2000
Year 3	Apr 2000 – Mar 2001	Jan 2001 – Dec 2001	Apr 2000 – Mar 2001
Year 4	Apr 2001 – Mar 2002	Jan 2002 – Dec 2002	Apr 2001 – Mar 2002
Year 5	Apr 2002 – Mar 2003 ¹²	Jan 2003 – Dec 2003	Apr 2002 – Mar 2003
Year 6	Jan 2004 – Dec 2004 ¹³	Jan 2004 – Dec 2004	LOW RESPONSE RATES – FGH / DEL / TUL
Year 7	Jan 2005 – Dec 2005	Jan 2005 – Dec 2005	LOW RESPONSE RATES – FGH / DEL / TUL

3.4.1 RATIONALE

Presenting the results in this way allows the use of the maximum amount of data that were collected during the study. It also allows for data comparisons between communities on a monthly basis for most years of the survey. Again, using imputed data for Déljñę for the nine months of 1998 is restricted to tables of annual comparisons and five year means – the imputed data constitute 15% of the first five years of data for Déljñę, and 3% of the first five years of data for the SSA as a whole.

3.4.2 CONSIDERATIONS FOR CALCULATING THE MINIMUM NEEDS LEVEL

The five shaded rows of data in Table 7 are those that should be used if it is necessary to calculate Sahtú Needs Levels at a regional or Settlement Area-wide level. Otherwise, the data that are presented in the monthly tables that summarize information for communities individually would be preferable should Minimum Needs Levels be calculated by community. In any case, the 'maximum harvest year' used in Minimum Needs Level calculations should not be the year with imputed data.

3.4.3 CONSIDERATIONS FOR USING THE SHS HARVEST LOCATIONS

As mentioned, the statistical analysis of the SHS results was limited to the numerical data – no quantitative analysis of the mapped harvest locations (spatial data) was done. Due to the complexity of the information management system construction, the SHS spatial data have not been and likely will never be adjusted for participation or response rates in the communities as was done for the numerical data. This means the data are in effect raw and do not represent total estimated harvests in the region.

¹⁰ No data were collected in Déljñę for nine months of Year 1 of the Study (April – December 1998).

¹¹ In order to calculate annual totals and five year means, as well as make annual comparisons between communities, nine months of data (shown in blue) were imputed for Déljñę.

¹² No data collected for Colville Lake, Fort Good Hope, Norman Wells and Tulít'a March to December 2003.

¹³ Of the 2004/5 data only that collected for Colville Lake and Norman Wells is included in this report, as the response rates were too low to produce reliable harvest estimates for the other communities.

This should be made clear in any distribution or publication of the spatial information; the 2013 assessment report recommended that a standard written disclaimer be developed to make this clear on any maps containing SHS spatial data (SRRB).

Further qualitative assessments of both the spatial and numerical results took place during community validation workshops between 2015 and 2019. Some findings and analysis resulting from the community workshops are summarized in the next section; more detailed results are included in each community's results report.

3.5 Summary of Statistical Analysis: Main Messages and Recommendations

The statistical analysis of the Sahtú Harvest Study data concluded the following main points:

- Data collected during the first five years of the study (1998-2003) produced results suitable for use in calculating total estimated harvests and Minimum Needs Levels for each of the five communities individually.
- Response rates for the last two years of the study (2004/05) are adequate for total estimated harvests to be calculated in only two out of five communities: Colville Lake and Norman Wells. In Rádeljkhkó (Fort Good Hope), Déljñę and Tulít'a, response rates were too low to enable the calculation of reliable total estimated harvests in those years. That information should not be used to calculate Minimum Needs Levels and has not been included with the summarized results.
- Only the first five years of data should be used in calculations for Sahtú Minimum Needs Levels or any other regional or Settlement Area-wide purposes. At a sub-regional level, data that are provided for communities individually should be used (*e.g.*, if Minimum Needs Levels are needed at the community level), as there is variation in the strength or reliability of the data, by community and by year.
- Due to irregularities in data collection, some data needed to be imputed (*i.e.*, estimated based on a statistical process). Years with imputed data should not be used as estimates of "maximum harvest years" in Minimum Needs Level calculations (SDMCLCA 1993).

Additional unquantifiable sources of potential error uncovered during the review and statistical analysis included:

- There were several harvesters that consistently declined to take part in the study throughout its duration. Some of these individuals were described as 'intense' or 'super-harvesters'. Their omission would likely result in estimates that are lower than actual harvest levels, but it is difficult to know how big the influence is on the results.
- A past Harvest Study Coordinator and Community Interviewer reported that some community members felt there were some individuals on the list who didn't hunt and shouldn't have been included. This also could have influenced the study results; their inclusion would result in a bias in response rate calculations.
- Very few women took part in the study. This could result in some underestimation of total harvests, especially if these individuals were active or intensive harvesters.

- In 2004/05, when the survey changed to quarterly interviews, harvesters had a harder time remembering their activities. This may increase the amount of error in the data and result in lower estimated than actual harvest levels.
- Also in 2004/05, because eligibility lists do not appear to have been kept, accurate response rates could not be calculated. Instead, that data was imputed for those years, based on information from previous years.

Further cautions regarding specific data and their use based on the statistical analysis are provided in each of the five community results reports.

4. COMMUNITY ANALYSIS



Focus group participants review and comment on maps showing harvest study data with Deborah Simmons in Rádeljkkó (Fort Good Hope), October 2016. Photo credit: Janet Winbourne

As indicated in the preceding section, five years of the Sahtú Harvest Study data met the statistical assumptions necessary for use. This means that according to the quantitative analysis, the study achieved the objectives laid out in the Land Claim – that is, the resulting estimates can be used to provide information for fish and wildlife management purposes, and to inform calculations of ‘Minimum Needs Levels’ for Sahtú beneficiaries so that their harvesting traditions can be protected.

However, the statistical analysis also indicated that there are numerous problems with the harvest study data that affect their reliability – those data reliability issues can differ not only among communities, but also between different years of the study, and among different species. Some of the factors that affect the reliability of the data are not unique to the SHS but common to surveys of this type (see Suluk and Blakney 2008; Usher and Brooke 2001; Berkes 1990; Usher and Wenzel 1987; Usher *et al.* 1985 among others). Some of the weaknesses known to be common to harvest surveys are listed here; a more thorough consideration of the literature is available in the SRRB’s 2013 assessment report:

- Harvest studies only offer a very narrow ‘snapshot in time’ of land and resource use, usually less than ten years in duration. As a result, they may fail to reflect the complexity and variability of Indigenous resource use over time.
- Harvesters’ resource use is adaptive; if one species is in decline or perceived to be low one year, harvesters redirect efforts to other species to meet their needs.
- Harvest regulations such as quotas can impact customary harvesting patterns.
- Despite the fact that there are several important potential influences on the reliability and/or accuracy of the data (*e.g.*, as non-response bias, response bias) generally, very little attention is paid to these problems in the literature.
- Recall failure is suspected to be low for most species and in most northern communities, but varies by species. Recall tends to be especially unreliable for groups of species such as waterfowl, fish and small mammals, and less so for large mammals.
- Strategic bias exists in the north – based mostly on a fear of prosecution and/or the imposition of quotas resulting from the collective data from a harvest survey, but reasons may also include income tax, social welfare programs, and harvesting support programs.
- No Canadian studies have presented results within a socio-economic or ecological context to indicate or attempt to quantify the numerous potentially influencing and complicating factors.

It is difficult if not impossible to measure the magnitude of the influence of these various potential sources of error on the resulting data set using only statistical methods. In order to honor the collaborative planning approach adopted by the SRRB, and to provide greater insights into the reliability and accuracy of the SHS data, a community validation process was initiated in 2015.

4.1 Engaging Sahtú Communities in the Interpretation of Harvest Study Data

4.1.1 RATIONALE

Apart from the numerous sources of measurement error that can create problems in harvest survey data, there are also broader criticisms regarding the gathering and use of that data on socio-cultural or political grounds. Over the last 20 to 30 years, there have been significant changes in awareness of the connection between Indigenous rights and the health of the planet’s ecosystems. This has been

facilitated by some key international developments such as the **Convention on Biological Diversity**, and the **United Nations Declaration on the Rights of Indigenous Peoples** (UNDRIP), as well as **Canada's Truth and Reconciliation Commission's 'Calls to Action'** closer to home.¹⁴ There is a growing recognition that the conservation of biological diversity is intricately linked to the preservation of Indigenous cultural diversity.

There has been a parallel evolution in perceptions of what are appropriate research methods and frameworks. Today, research involving Indigenous Peoples and their information can be guided by a set of principles such as those developed by the First Nations Information Governance Centre (2015). The OCAP® principles are a set of standards that establish how First Nations data should be collected, protected, used, or shared. Standing for Ownership, Control, Access and Possession, OCAP® asserts that First Nations have control over data collection processes in their communities, and that they own and control how this information can be used.¹⁵

Considering the study weaknesses outlined above, the potential ramifications of using the SHS results in important management decisions or to determine Minimum Needs Levels, plus a shifting socio-political landscape that increasingly recognizes the rights of Indigenous Peoples to own, manage and use the information they contribute to research, the study team decided to finalize the study in a more collaborative manner with the communities and participants. This approach also fit within the community conservation planning framework adopted by the Board in their current strategic plan (SRRB 2020a).

Community or qualitative reviews and interpretation of data are not generally conducted as part of standard harvest surveys in the north. There was only one example found in the literature – Nunavut did a limited review of information in some communities in cases where data were found to not meet statistical assumptions (NWMB 2004). However, the Sahtú Land Claim specifies how and when data from the harvest study may be used, and suggests that community consultation is appropriate in considering Minimum Needs Levels (SDMCLCA 1993, section 13.5.5).

Some critics argue that harvest surveys have most served biologists (to assess predation on populations) and while they are embedded in land claim agreements, there is less evidence that the data have been used to benefit Aboriginal people. There are criticisms that the intent of harvest surveys is not clear to community members or harvesters, and that the numbers that are being collected are often not shared. Some researchers feel that there has been a disconnect between the data acquisition and use, and the holders of that information throughout the north. This can have important implications for data accuracy. (SRRB 2013:10)

¹⁴ For further information see: Convention on Biological Diversity <https://www.cbd.int/>; United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf; Truth and Reconciliation Commission of Canada: Calls to Action http://trc.ca/assets/pdf/Calls_to_Action_English2.pdf.

¹⁵ First Nations Principles of OCAP® / PCAP® is a registered trademark of the First Nations Information Governance Centre (FNIGC). The full definition is available at: www.FNIGC.ca/OCAP.

13.5.5 When establishing and adjusting a Sahtu Needs Level, the Board shall consult with Renewable Resources Councils and shall consider all relevant factors including in particular:

- a) the usage patterns and levels of past harvests by participants;
 - b) personal consumption needs of participants, including their nutritional, clothing and cultural needs and fish for their dogs;
 - c) trade among participants to meet their needs described in (b); and
 - d) the availability of various wildlife species and populations to meet these needs. (SDMCLCA 1993:49)
-

4.1.2 OBJECTIVE

The objective of the community review and analysis was to have knowledgeable harvesters provide feedback on and a context for the Sahtú Harvest Study data that could go beyond the interpretation provided by the statistical analysis. The over-arching goal of the work was to provide further information regarding the validity of the survey responses and how well they measure the true picture of harvesting in the Sahtú. Specific questions explored during the community review included:

- How comprehensive was the study coverage?
- How representative are the results?
- How accurate are the data?

Because it was important to assess whether the results are an accurate record of the harvesting levels and patterns of Sahtú Dene and Métis over the study period, the communities were engaged to uncover any additional factors that could influence data reliability and accuracy, to identify and quantify any possible errors missed by the statistical analysis, to help inform understandings of the known sources of error, and to provide a local interpretation of the results.

4.1.3 METHODS

Qualitative assessments of the harvest study data took place during community validation workshops between 2015 and 2019. In a series of focus group sessions, harvesters that had participated in the 1998-2005 survey were presented with representative data and given an opportunity to comment on it.

Focus group meetings were held in each of the five communities of the Sahtú Region. The sessions lasted between one and three days and were attended by a total of 74 people. Table 8 shows the dates and numbers of participants at each workshop.

Table 8: Dates and numbers of participants in the Sahtú Harvest Study community validation sessions.

Community	# Participants	Workshop dates
Colville	24	Nov. 12-14, 2019
Déljne	14	Dec. 1, 2 & 4, 2015
Fort Good Hope	11	Oct. 25-27, 2016
Norman Wells	11	Nov. 16, 2019
Tulj't'a	14	Nov. 24-26, 2016
TOTAL	74	

Most of the participants were knowledgeable harvesters that had taken part in the original survey. Community Interviewers, representatives of local governments and youth were also present as much as possible. Janet Winbourne (independent consultant) and SRRB staff facilitated the meetings and documented the results. A list of participant names is provided at the front of this report.

Because the harvest study data collection phase ended in 2005 and the community analysis was initiated ten years later, each focus group session started with a detailed overview presentation about the study to re-familiarize people with the work and its objectives. Harvesters were then asked to consider participation levels in the study, and review four categories of species data (large mammals, furbearers, fish, birds), with a more in-depth look at one or two representative species within each category. Data were presented in tables, graphs, and on maps. Harvesters were asked to consider the following questions:

- Do the results look reasonable to you for that species at that time?
- If not, in what way do they not seem right?
- What factors could have influenced harvesting or harvest data collection at that point in time?

The community interviewer was asked to provide additional information on topics such as:

- What biases or errors might be in the data based on your knowledge?
- Was anything unusual going on at the time of the study?
- Were there any main or 'super' harvesters that did not take part? What were their harvest levels like?
- Do you think those five years are representative of actual harvesting during those years? Would they represent harvesting patterns today?
- Did you encounter any problems conducting the monthly survey that could influence the results?

Some additional work was also done in each community towards drafting future harvesting monitoring programs and/or community conservation plans. The results of this work are mostly included in the individual community results reports.

4.1.4 LIMITATIONS

Due to the delay between the end of the data collection and community validation phases of the harvest study, the data were 10 to 20 years old by the time they were presented to knowledge holders. Sadly, some of the people who took part in the study were no longer able or around to provide their insights. It was at times difficult for participants to remember particular harvesting conditions in certain years or for individual species so far back; as a result, it is likely some specific information was forgotten.

4.2 Results: Community Data Analysis

Focus group participants provided a lot of thoughtful feedback and ideas about how well the total estimated harvests represented their knowledge of actual harvesting in the communities during the period of the Sahtú Harvest Study. They commented on trends and patterns they saw in the numerical data, as well as the accuracy and reliability of the mapped or spatial information. They were able to identify specific harvest estimates and / or trends that did not seem right, and to confirm instances

where the information did appear to be reliable and accurate. When estimates appeared incorrect, participants were often reluctant to suggest adjustments or estimates of what the actual harvest levels may have been, but instead usually limited their comments to the general representativeness of the data and possible reasons for the unexpected results.

Concise summaries of the main messages documented during each community focus group session are included here; more detailed lists of the comments recorded are provided in **Appendix C**, organized by species / species group and community. Much fuller accounts of harvesters' perspectives on and interpretations of the harvest study numerical and spatial data, including qualitative descriptions of reliability and accuracy by species or species group, plus the SHS data for that community and for the SSA as a whole, are included in the individual community results reports.

4.2.1 COLVILLE LAKE



Figure 4: Janet Winbourne reviewing information about the Saulti Harvest Study with focus group participants in Colville, November 2019. Photo credit: Deborah Simmons

The statistical analysis determined that data for all seven years of the SHS in Colville met study assumptions and produced reliable results. Conversely, a careful review of the SHS data with Colville workshop participants revealed a general pattern across most species and species categories (large mammals, furbearers, birds, and fish) – that is, the harvest estimates tended to be much higher for the first two years of the study and lower in the following five years.

Harvest studies often go through a ‘honeymoon’ phase when they start; this is the time when there is a lot of study promotion and education happening, and participants are keen to take part. After this point,

there can be a progressive drop in participation over the years as interview fatigue sets in and people become less likely to report their harvests. This was confirmed by the Community Interviewer as a problem in the Colville survey. Again, this problem is not unique to Colville but common to surveys of this type.

Harvesters identified several additional factors that likely exacerbated this trend in the Colville data. Some participants in the focus group suggested that people were becoming suspicious of the study and that the results might be used against them, but perhaps most importantly, there was a boom in the resource economy that strongly influenced day to day life in Colville starting after the year 2000.

The study was initiated in April 1998, and by the winter of 2001 a winter road was being constructed. From 2002 on there was a significant increase in oil exploration and drilling that lasted for about three years; the road construction lasted until 2005. There were additional important economic spin-offs at the time – for example, 2002/03 is when homes got furnaces and running water – meaning most people were working. A new store was built and deep freezers became common in the community around this time. All focus group participants agreed that around 2002 was the real start of the wage economy in Colville and this initiated significant change in peoples’ lifestyles. They remembered that around 2002/03 there were barren-ground caribou around, people were seeing them, but they weren’t shooting them because they were busy with the wage economy.

Yes, I saw interview fatigue. People would tell me to come back, to do it later or whatever, but they didn’t ask to be taken off the list. Some of them didn’t want to participate at all, and they were important harvesters. But for everybody at that time, about 70% of their lives were spent on the land. After the oil companies came around, there were flushing toilets and roads and the necessary manpower to keep all that running, then within five years people were more into the community and only a handful of us kept going out annually.
(Colville Community Interviewer)

It is also apparent that during the years Colville reported low barren-ground caribou harvests (2001-2005) there is no evidence that people ‘switched’ to moose or woodland caribou; those harvests are also extremely low – even zero some years – during that time period. This pattern is not restricted to large mammal harvests, but present across all species groups in Colville’s data.

Figure 5 shows an example of this trend in the total estimated harvests for fish in Colville. A pattern like that shown in Figure 5, when present across many different species / species groups, likely indicates a problem or artefact with the survey tool that acted in addition to the socio-economic impacts affecting the results. Both factors could result in lower than actual total estimated harvests for Colville.

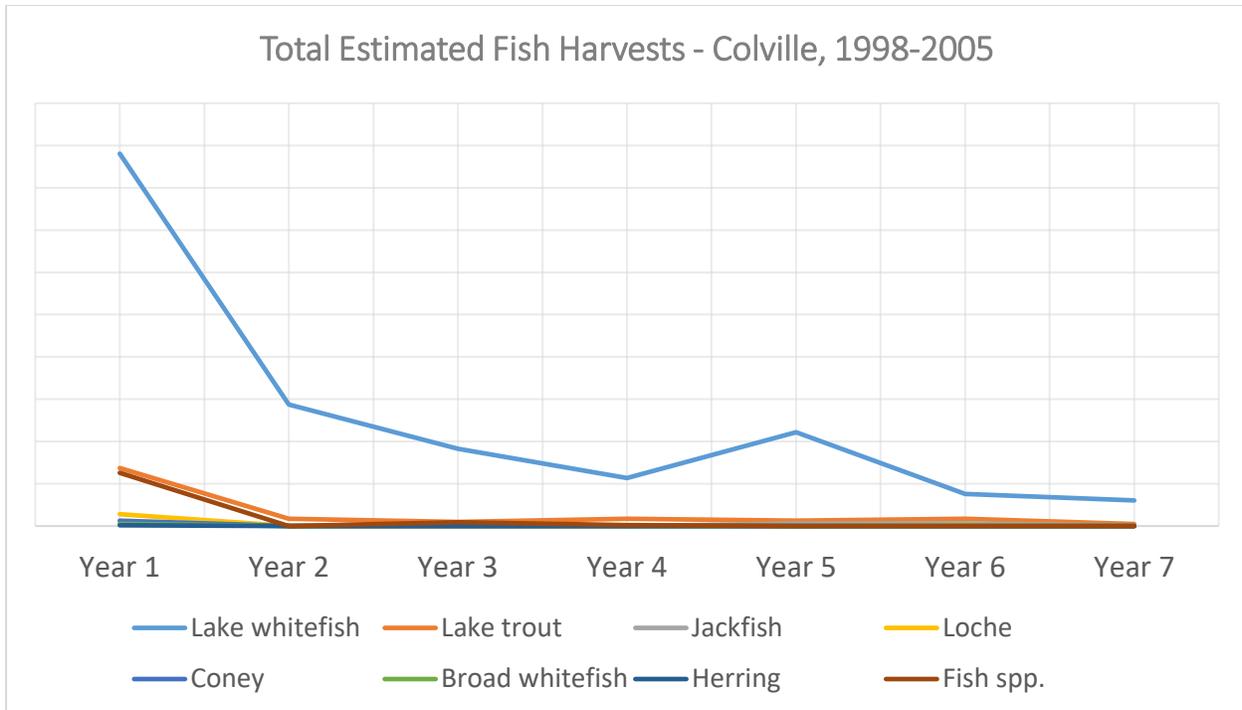


Figure 5: Example Sahtú Harvest Study results for Colville, 1998-2005. Total estimated harvests of main fish species show a trend seen throughout Colville's data – that is, high harvest estimates in the first year or two of the study, followed by a drop to extremely low numbers or even zeroes for the remaining years.

In addition to this overall trend in the data, participants in the Colville focus group also offered the following broad observations about the harvest estimates:

- Moose estimates are too low; a year showing a zero harvest can't be right
- Muskrat – the Year 1 estimate seems too high
- Marten estimates are too low and should be more consistent from year to year. Also, the map doesn't show enough harvests, so people likely didn't report their marten harvests
- Fish – there should be grayling harvests documented but there are none; the lake whitefish estimates are way too low; broad whitefish estimates are likely not high enough – they definitely don't represent how many people harvest now. Fish harvests should be pretty consistent from year to year. On the map, every lake should show up as a fish lake
- The study shows several years of zero harvests for ptarmigan and grouse – that is not accurate; people must have not reported their harvests to the study in those years. The harvest numbers should be consistent from year to year – everybody harvests some every year
- There could be more variability in waterfowl harvesting – that can change from year to year with weather, etc., but for some species of ducks the harvest estimates look too low.

Again, a list of the specific observations offered about data for the representative species and/or species groups discussed during the Colville workshop is included in **Appendix C** and discussed in greater detail in the Colville Community Results Report.

Conclusions and Recommendations from the Colville Community Analysis

Due to the problems identified by harvesters during the community data review and analysis, Colville's harvest study results and any potential use of those results need to be re-assessed in light of what was learned – that is, the unusual socio-economic context during the time the survey was done in that community likely resulted in significantly lower estimated annual harvest levels than actual for most years of the study. Non-response bias also likely significantly impacted Colville's results throughout the duration of the survey. As a result, harvest estimates for many species of large mammals, furbearers, fish, and birds alike all demonstrate the same pattern – totals spike in Year 1 and 2, then drop dramatically, to extremely low numbers or even zero harvests, during the period of the economic boom.

- It is the author's opinion that it is unlikely that the resulting data from the harvest survey in Colville (1998-2005) represent a true and accurate picture of the actual average annual harvest needs or activities for that community. The author recommends that the total estimated harvests of the Sahtú Harvest Study for Colville Lake should not be used as a basis for important management decisions or Minimum Needs Level calculations.
- Caution should also be exercised when using the spatial data documented by the study, as those results likely also under-represent actual harvesting levels and patterns for Colville – spatial data for some species of fish and furbearers were noted as especially problematic.

4.2.2 DÉJŃŃ

Similar to Colville, during the community validation sessions in DéłŃŃ a trend in most species' data was consistently noted by participants – that is, harvest levels in Years 1 and 2 (1999/00) appear much higher than harvest levels in the remaining years of the study (Years 3 through 5). In fact, in several cases, people felt that the harvest levels in Year 1 were too high (*e.g.*, for woodland caribou and moose) and likely overestimated actual harvesting. This could suggest a possible problem with the initial participant list.

Alternately, harvesters in the focus group sessions suggested it is possible that the high level of promotion in the early stages of the study influenced peoples' involvement and interest in reporting their harvests. It is possible that by Year 3, study promotion efforts were declining, and participants were already starting to experience interview fatigue and becoming less likely to report their harvests. Due to high turn-over in DéłŃŃ it was difficult for any individual Community Interviewer to comment on overall trends in participation levels and interview fatigue.

Harvesters also suggested that annual estimated harvest estimates may have dropped over the course of the survey due to the introduction of new traps, an increase in wage labour in the oil and mining sectors, and a change in the levels of income support and/or financial support for trapping.

A former Community Interviewer on the study identified several other potential causes of error that could have resulted in the estimates being lower than actual harvests, including:

- Some data sheets were lost in Year 1 or 2 of the survey
- Five to ten main harvesters refused to take part in the survey
- Some people did not participate due to concerns about how the information could be used.

When estimates appeared inaccurate, participants were reluctant to suggest adjustments or make estimates as to what the actual harvest may have been. They were realistic about not being able to know what another harvester did, and most often limited their comments to the general representativeness of the results.

People in the focus groups offered the following specific observations about the total estimated harvests that were discussed during the Délı̄nę meeting:

- Boreal woodland caribou and moose harvests seem too high, especially in Years 1 and 2
- Estimated harvests for barren-ground caribou, black bear, and muskox seem accurate
- Barren-ground caribou harvests appear accurate; for five to six years in a row caribou were near Délı̄nę and hunters didn't have to travel very far, however, Year 1 (1999) numbers are the highest of the five years and the numbers should be more consistent from year to year
- Wolf harvests were unlikely to be zero in 2002 and 2003. Pelt prices may have gone down and affected trapping, however some Délı̄nę harvesters get wolves annually and don't report the harvest when the pelt is used locally for crafts
- The data for hares don't seem accurate; people trap many every year, even when populations are low. Again, the first two years of the study have very high harvest estimates, then the numbers decline for the last three years
- Year 2 (2000) had the highest prices for marten pelt, so many people trapped; Year 3 and 4 totals (2001/02) seem too low following that. Marten might be underreported because people use it locally for crafts instead of selling to ENR
- Some fish harvest levels appear reasonable, however they are very high in Year 1 again compared to the other years. The years with the decline in harvesting coincides with the years when a lot of caribou were available, so people possibly harvested more caribou and less fish
- Loche estimates are too low overall
- Trout, lake whitefish and grayling numbers look reasonably accurate
- For ducks and geese, again Year 1 (1999) harvest numbers appear high, then decline drastically, so estimates for Year 2 seem too low (e.g., pintail, geese)
- Swan harvests seem low, but that might be accurate because the hunt was restricted in the past, so people may be reluctant to harvest them and to report their harvests
- For ptarmigan and grouse harvests, again, the data seem inaccurate with a big drop after Year 1.

Black ducks were one species group that harvesters pinpointed as having an unusual trend in harvest numbers. For example, the black duck harvest was estimated at over 1,000 in Year 1 and less than 30 in Year 5. Figure 6 shows the total estimated harvests for black ducks resulting from the harvest study in Délı̄nę.

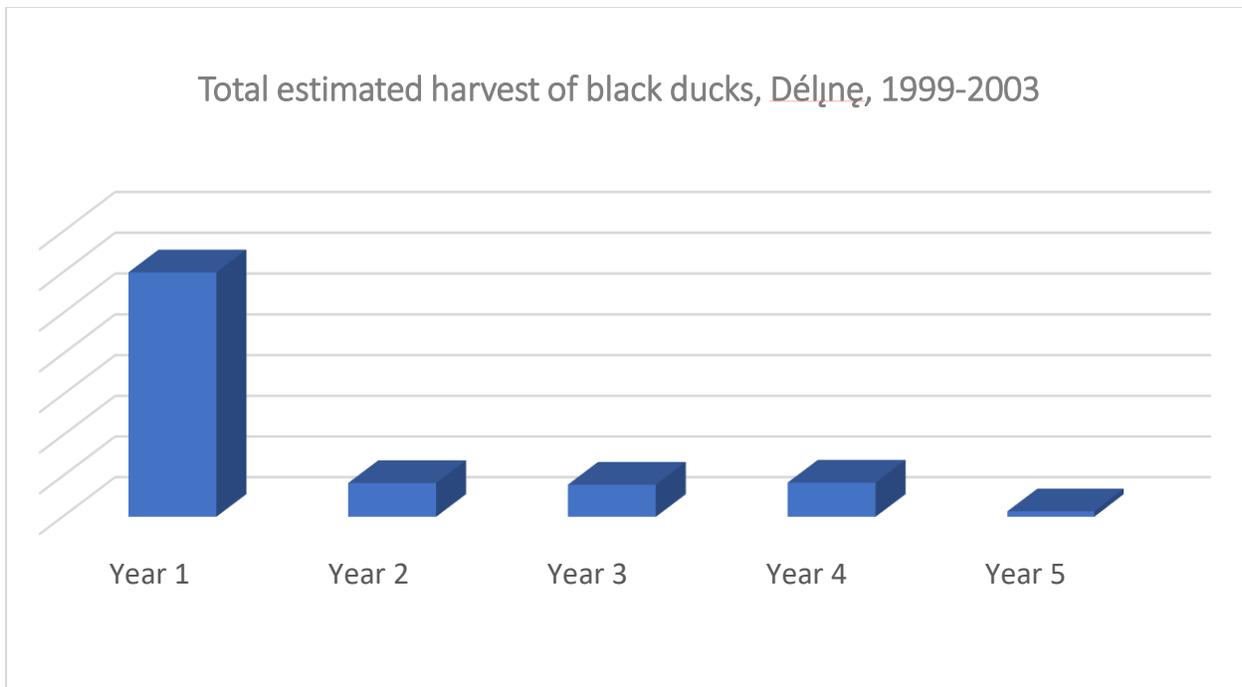


Figure 6: Example Sahtú Harvest Study results for Déljñę, 1999-2003. The total estimated harvests of black ducks show a trend seen throughout most of Déljñę’s data – very high estimates in the first year or two of the study, followed by estimates that are much lower. Because scoters are often not reported by species, the ‘black duck’ species category may include surf scoters, white-winged scoters, and black scoters.

The pattern evident in Figure 6 is typical across many species / species groups in Déljñę’s results and similar to that seen in the results from Colville – that is, very high estimates in the first year of the study, followed by very low estimates in the remaining years. A more detailed list of the specific observations offered about data for the representative species or species groups discussed during the Déljñę workshop are included in **Appendix C** and in Déljñę’s Community Results Report.

Conclusions and Recommendations from the Déljñę Community Analysis

The community analysis indicates that the harvest study results are mixed for Déljñę – that is, data reliability and accuracy seem to vary greatly between species / species groupings. Participants reported that some estimates seem much too high, some much too low, and others reasonably accurate. There are also concerns about a sharp declining trend in some of the data, starting in Year 2 or 3.

- The author of this report advises that caution be exercised if the total estimated harvests for Déljñę (1999-2003) should ever be used as a basis for important management decisions or Minimum Needs Level calculations. Because the community analysis indicates high variability in study data accuracy and reliability, it is important that the results be assessed on a species by species basis, and it is essential that the interpretation provided by the community is considered along with any use of the study results.
- Caution should also be exercised in any use of the spatial data – some harvest locations were questioned for barren-ground caribou, marten, and fish.

4.2.3 RÁDELJHKÓ (FORT GOOD HOPE)

As in other communities, harvesters at the focus group meeting in RádeljHKó (Fort Good Hope) were able to identify several external factors that could have affected peoples' harvesting activities at the time of the survey. Some of these factors include industrial activity, road construction, wage employment, and unusual environmental or weather events.

Nonetheless, the consensus of the group was that generally, most of the average annual harvest estimates seem to be a good accounting of the community's harvesting levels. Participants also concluded that most of the spatial data accurately represent their harvesting patterns.

Figure 7 shows the total estimated harvests for moose resulting from five years of the harvest study in RádeljHKó (Fort Good Hope). The pattern evident in Figure 7 is typical across many species/species groups in that community's results – good consistency in harvest estimates from year to year with no inexplicable or extreme variations in levels.

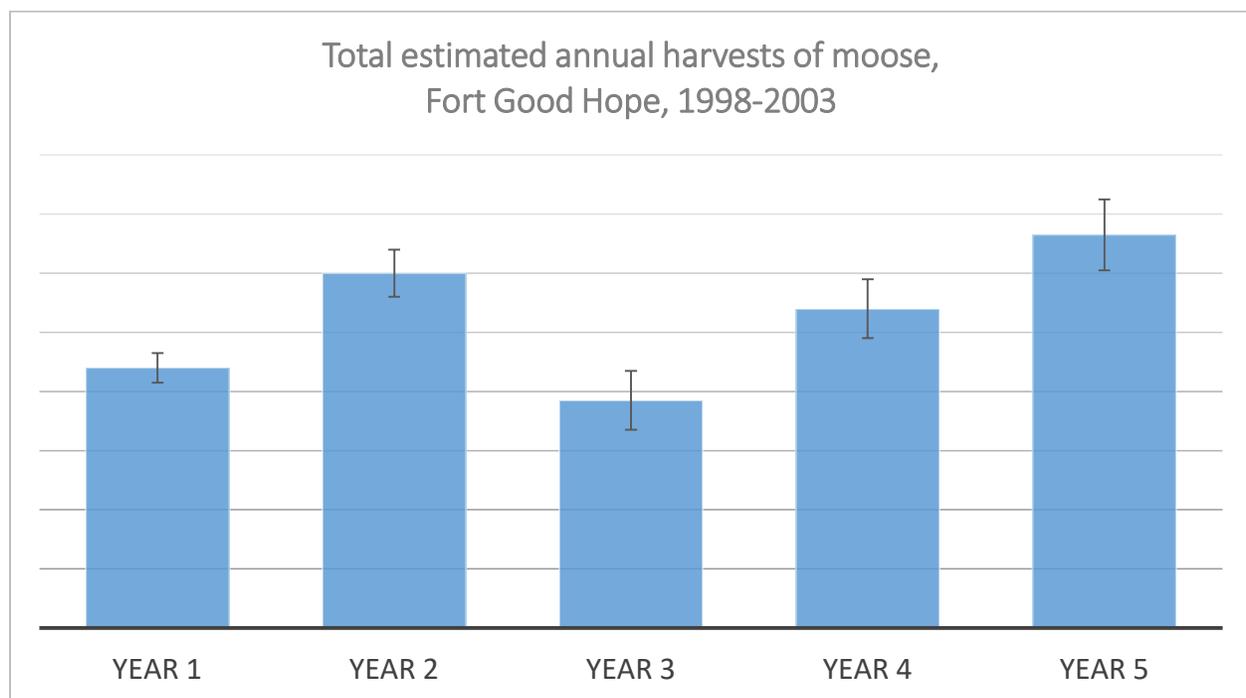


Figure 7: Example Sahtú Harvest Study results for RádeljHKó (Fort Good Hope), 1999-2003. The pattern evident for moose is typical across many species / species groups in that community's results – that is, good consistency in estimates from year to year with no inexplicable or extreme variations in harvest levels.

RádeljHKó (Fort Good Hope) harvesters were able to identify two cases in which specific harvest estimates did not appear reasonable. These include:

- **Some bird harvests:** for several types of birds, it is likely that hunters did not report their harvests at the species level due to recall failure following extended periods of time out on the land. Instead, they often reported their harvest as 'ducks', 'geese' or 'grouse'. As a result, the species-level harvest estimates should not be used without consideration of the larger 'Goose

Species', 'Duck Species' or 'Grouse Species' category totals. It is also likely that due to differences in terminology between English and K'áhsho Got'Inę some types of black ducks were incorrectly recorded by the study.

- **Hare / Snowshoe Hare:** because there is only one species of hare in the Fort Good Hope area, all harvests recorded as 'Hare (Rabbit) Species' are likely snowshoe hare. For a more complete or accurate representation of the total snowshoe hare harvest, estimates for Snowshoe Hare and 'Hare (Rabbit) Species' should likely be added.

A more detailed list of the specific observations offered about data for the representative species or species groups discussed during the Rádeljĥkó (Fort Good Hope) workshop are included in **Appendix C** and that community's results report.

Conclusions and Recommendations from the Rádeljĥkó (Fort Good Hope) Community Analysis

The community analysis of the harvest study results indicates that the Rádeljĥkó (Fort Good Hope) data, for the most part, have a high level of accuracy and reliability. With the exception of some species of birds and small game, the total estimated harvests and average annual harvests are a reasonable reflection of the harvesting that was taking place between 1998 and 2003 in Fort Good Hope. The success of the harvest study in this community is likely due in large part to the commitment and continuity of the Community Interviewer to the project over its entire duration.

Sometimes they can't remember really good how many [grouse] they harvested, especially if they missed doing the survey for a couple of months. [One participant] was really good; he always remembered how many he got. (Fort Good Hope Community Interviewer)

- It is likely that the total estimated harvests (1998-2003) could be used as a basis for important management decisions or Minimum Needs Level calculations for Rádeljĥkó (Fort Good Hope) if necessary, and with an understanding of the recognized general limitations of this type of data collection plus the specific weaknesses of this data set.
- Overall, spatial data representing harvest locations recorded for Rádeljĥkó (Fort Good Hope) also appear to be reliable and accurate, with the exception of some questionable fish and duck harvest locations.

4.2.4 NORMAN WELLS

As in other communities, harvesters participating in the focus group sessions in Norman Wells provided a lot of thoughtful feedback and ideas about how well the total estimated harvests represent their knowledge of actual harvesting in the community during the time of the harvest study. People commented on instances where the numerical data seemed reasonable or problematic, as well as the accuracy and reliability of the mapped information. They also provided insights as to what was going on in that community during the years of the harvest study that may have influenced the results, and how well the results reflect today's harvesting patterns.

For the most part, the study seems to have accurately documented seasonal harvesting patterns in Norman Wells, and many of the total estimated harvests were thought to be reasonably accurate. People mentioned that overall, the annual average harvest estimates look good for many types of large

mammals, furbearers, birds, and even fish. Some observations about specific possible inaccuracies included the following:

- The barren-ground caribou harvest estimates seem too high
- Estimates for woodland caribou should be higher
- The estimated annual harvest of lake whitefish seems too low
- Most of the ptarmigan and grouse harvest estimates seem too high, even for that period of time.

However, focus group participants stressed that the SHS results are not a good reflection of more recent harvesting patterns in the community, saying that harvesting patterns are very different today, especially for large mammals. Figure 8 shows a pie chart of large mammal harvest proportions documented during the harvest study (1998-2003) in which barren-ground caribou harvests make up over 60% of the total harvest and woodland caribou only 6%. Participants in the focus group said this is not an accurate reflection of today's large mammal harvests; now people harvest much more woodland caribou and moose than barren-ground caribou.

Norman Wells Large Mammal Harvest Composition, 1998-2003
(based on five-year means)

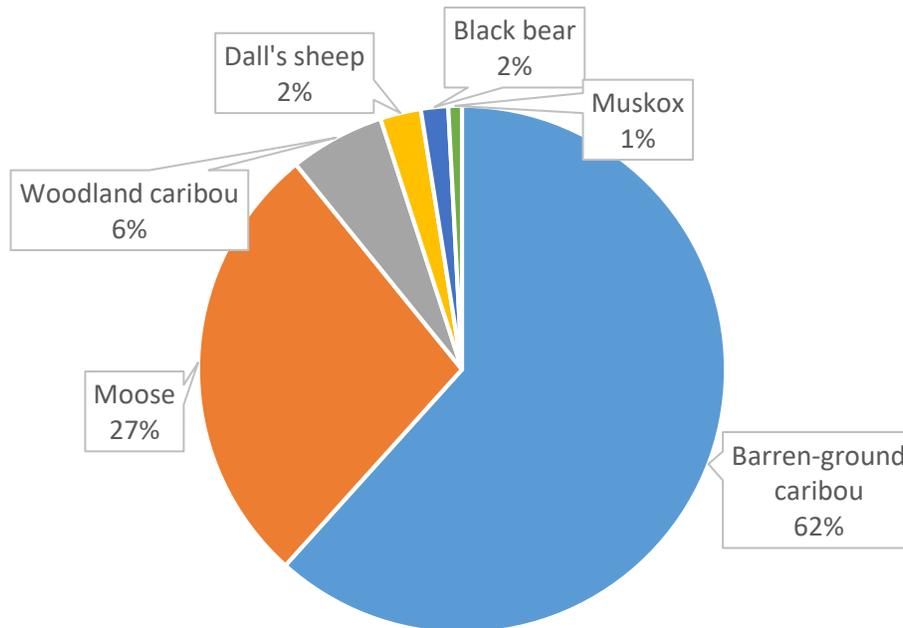


Figure 8: Pie chart showing large mammal harvest composition recorded during five years of the harvest study in Norman Wells. Focus group participants said these results do not reflect the composition of harvesting in more recent times; today people harvest much more woodland caribou and moose than barren-ground caribou.

A more detailed list of the specific observations offered about data for the representative species or species groups discussed during the Norman Wells workshop are included in **Appendix C** and that community's results report.

Conclusions and Recommendations from the Norman Wells Community Analysis

The community analysis of the harvest study data in Norman Wells indicates that the 1998-2005 results for the most part seem to have a high level of accuracy and reliability, with the exception of results for barren-ground caribou, woodland caribou, and some species of fish and birds.

- The total estimated harvests for 1998-2005 in Norman Wells could be used as a basis for important management decisions or Minimum Needs Level calculations if necessary, if the information is considered on a species by species basis (i.e., exercising extreme caution or excluding problematic results for barren-ground caribou, woodland caribou, and some species of fish and birds), and with an understanding of the recognized limitations of this type of data set.
- The spatial data showing harvest locations for Norman Wells appear to be reliable and accurate in most cases.

Backlogs were a problem – interviews were supposed to be done every month, but you’d sometimes miss guys for two or three months. That didn’t work very well; they’d forget what they got and so they don’t give accurate numbers – they are ‘guesstimates’. They remember everything, but if you don’t get them at the right time... You usually get them after they come back to town. With ducks they go out for two to three months; same with the fall hunt. Basically with fall hunts, runs of fish, and with ducks – that’s when you don’t get them, but that’s when you should really [interview them], because that’s when they are really harvesting. That’s the only time it doesn’t work and that’s the time you need to get the harvesters in the community. That was the only problem we came across. (Tulít’a Community Interviewer and Study Coordinator)

4.2.5 TULÍ’TÁ

Participants in the focus group meetings in Tulít’a did a very comprehensive review of the summarized data from the Sahtú Harvest Study that was collected in their community between 1998 and 2003. They were able to not only note possible inaccuracies in the harvest estimates but also provide a qualitative context for the estimates, by identifying external factors that could have affected peoples’ harvesting patterns or levels at the time. Some of the factors identified include road construction or operation, recall failure, wage employment, and unusual environmental or weather events that resulted in impacts on animal movements and behaviour.

The consensus of the group was the annual harvest estimates seemed to be a good accounting of the community’s harvesting for most of the large mammal species with the exception of woodland caribou (boreal woodland caribou and northern mountain caribou). Overall, woodland caribou estimates were thought to be too low, and this was possibly due to community hunts not being consistently recorded by the study. The participants reflected that most of the spatial data accurately represented their harvesting patterns, with only a few outlying points that they found difficult to understand or explain.

The data identified by harvesters that do not appear reasonable or accurate include:

- **Furbearers:** participants observed that some of the annual harvest estimates seem too low – with the exception of the data for hare, beaver, and wolverine, which seem reasonable. This is

likely due to sensitivities around reporting both harvest numbers and locations for certain types of furbearers

- **Fish harvest estimates:** focus group participants felt that the average annual harvest estimates were too low for most types of fish. As in the case with waterfowl harvesting, the Community Interviewer / Study Coordinator noted that during the fall fish runs, people are often out on the land for extended periods of time and may not remember their harvests accurately if interviewed at a later date. Participants noted an unusual pattern in the data for lake whitefish, lake trout and herring; for all three species the harvest estimates in Years 3 and 5 are very low. The consensus is that the supply of fish is consistent from year to year, with a possible exception in that herring numbers can fluctuate. However, all types of fish data display high variability in annual totals
- **Bird harvest estimates:** for many species of birds, it is likely that recall failure affected the accuracy of harvest reporting. Tulit'a hunters spend long periods of time out on the land for duck and goose hunting, and may not accurately recall their harvesting by the time they are interviewed. This problem was clearly identified by the Community Interviewer / Study Coordinator. In addition, focus group participants observed that some younger harvesters may not know some ducks and geese at the species level, and will therefore at times report harvests as 'ducks', 'geese' or 'chicken' (grouse). As a result, the species-level harvest estimates should not be used without consideration of the larger 'Goose Species', 'Duck Species' or 'Grouse Species' category totals. There was consensus that ptarmigan harvest estimates overall seem much too low, as well as data for many types of ducks and geese. The one exception noted was mallards – those estimates were felt to be much too high.

Figure 9 shows example results for SHS annual estimated harvests of geese for Tulit'a, 1998-2003.

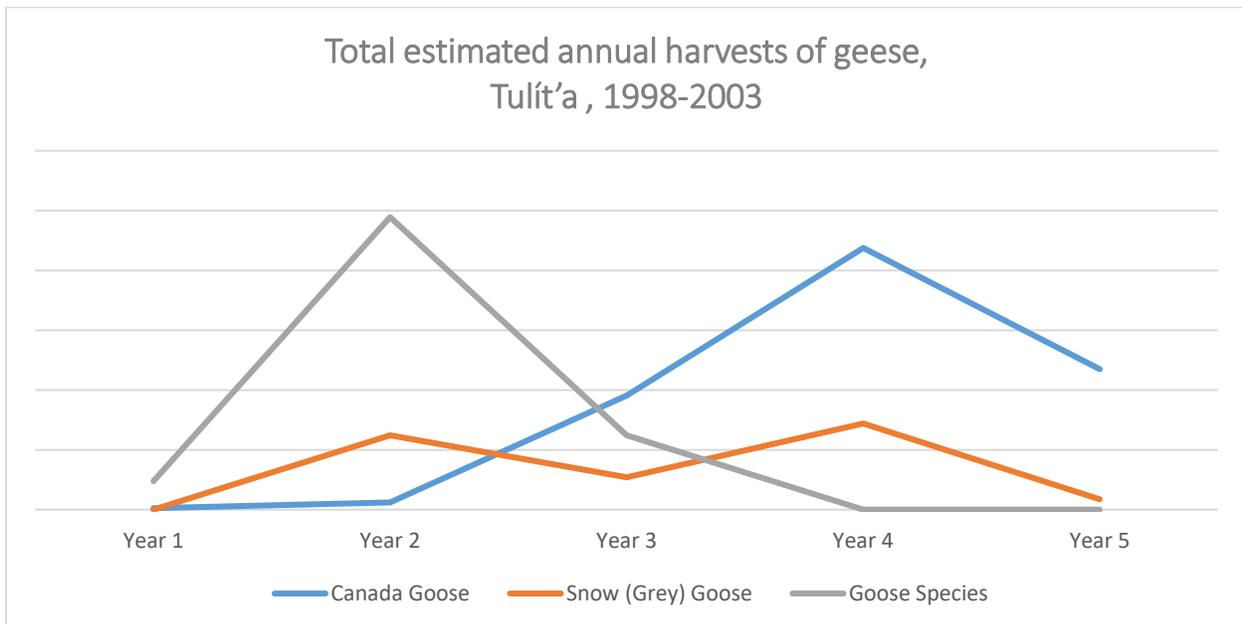


Figure 9: SHS results for total estimated annual harvests of geese, Tulit'a, 1998-2003. It is possible that many Canada goose harvests were recorded as "Goose Species" in Year 2 of the study, and more species-specific information was recorded in other years. This could be a result of recall failure if interviews were delayed.

There were also several places identified where some differences in English species names and Dene terminology may have resulted in incorrect reporting, such as:

- **Whitefish:** people didn't usually differentiate between lake whitefish and broad whitefish when reporting their harvests, so the information should likely be compiled for these two categories
- **Ptarmigan:** all ptarmigan harvests should be of one species only if occurring in the Tulít'a area
- **Ducks and Geese:** harvest data should be compared to current species distribution maps to confirm records (e.g., Brant goose harvests were reported, but participants said they are not in the area)
- **Hare/Snowshoe Hare:** because there is only one species of hare in the Tulít'a area, all harvests recorded as 'Hare (Rabbit) Species' are likely snowshoe hare. For more accurate representation of the total snowshoe hare harvest, estimates for Snowshoe Hare and 'Hare (Rabbit) Species' should be added.

A more detailed list of the specific observations offered about data for the representative species or species groups discussed during the Tulít'a workshop are included in **Appendix C** and in the community results report.

Conclusions and Recommendations from the Tulít'a Community Analysis

Following the Tulít'a focus group sessions it is clear that the results for birds and fish are weakest in the harvest study data set. This situation is not unique to Tulít'a or to the Sahtú but often found in surveys of this type; they tend to capture harvests for large-bodied animals well and small ones poorly.

- The statistical analysis demonstrated that the total estimated harvests resulting from the Sahtú Harvest Study in Tulít'a (1998-2003) do fulfill the requirements of the Land Claim agreement. However, the community analysis of the results leads the author of this report to urge that caution be exercised if the total estimated harvests should ever be used as a basis for important management decisions or Minimum Needs Level calculations. Because the community analysis indicates high variability in study data accuracy and reliability, it is important that the results be assessed on a species by species basis, and it is essential that the interpretation provided by the community is considered along with the data.
- The spatial data showing harvest locations for Tulít'a appear to be generally reliable and accurate, with the exception of some isolated instances of questionable harvest locations for caribou, marten and fish.

4.3 Summary of Community Analysis: Main Messages and Recommendations

The community analysis of the Sahtú Harvest Study data indicates the following:

- The reliability and accuracy of the harvest estimates resulting from the SHS differ by year, by species, and by community over the course of the study. While some common factors were found to influence the data (e.g., interview fatigue, recall failure, the availability of wage labour, caribou distribution, etc.), additional local and / or regional factors likely also had at least as strong an influence on the data and are important to consider.

- The spatial results of the SHS are generally good, and tend to represent actual harvesting patterns well with the exception of some species for which sensitivity of the data, confusion in English / Dene species names, or recall failure could affect the results (e.g., some furbearers, birds, fish, etc.).
- The information resulting from the SHS may not be an accurate reflection of harvesting activities, levels, and needs in Sahtú Dene and Métis communities today.

Specific cautions and /or recommendations for use of the Sahtú Harvest Study data based on the findings of the community review and analysis are summarized by community in Table 9.

Table 9: Summary of main messages heard in community validation sessions of the SHS, including recommendations for use of results.

Community ¹⁶	Harvester Data Analysis	Recommendations for use of Total Estimated Harvests
Colville Lake 1998-2005	<ul style="list-style-type: none"> • Most harvest estimates are much higher for the first two years of results, then drop off sharply – this pattern is seen across all species groups. • The community experienced major change during the years of the study – winter road construction (2001-04), increased exploration and drilling (2002-05), introduction of furnaces, running water, freezers, a store, etc. People were busy with the wage economy. • There was increasing suspicion around the study and how data would be used. 	<ul style="list-style-type: none"> • It seems unlikely that the time period in which the harvest survey was conducted in Colville is representative of the actual average annual harvest needs or activities for that community. • For most species, the total estimated harvests of the Sahtú Harvest Study for Colville Lake should not be used as a basis for important management decisions or Minimum Needs Level calculations.
Déljñę 1999-2003	<ul style="list-style-type: none"> • Harvest estimates are much higher for Years 1 and 2, then decline. • Possible factors: some data were lost, 5-10 main harvesters refused to participate, increasing suspicion about the study. • Data for barren-ground caribou, muskox and black bear seem accurate. Boreal caribou and moose numbers are too high. Furbearer numbers are too low. Some fish data are okay. Bird data are generally not good. 	<ul style="list-style-type: none"> • Factors identified could result in harvest estimates being lower than actual. • For many fish, birds, small mammals, and some large mammals, the total estimated harvests are likely not representative of the actual average annual harvest needs or activities for that community. • Caution should be used if the total estimated harvests for Déljñę are ever needed as a basis for important

¹⁶ Note that only those years of data that met statistical assumptions were presented for review in the communities (i.e., five years of data were presented in Déljñę, Fort Good Hope, and Tuljít'a; seven years of data were reviewed in Colville and Norman Wells.

		<p>management decisions or Minimum Needs Level calculations.</p> <ul style="list-style-type: none"> • Data must be considered with the information provided by harvesters and assessed on a species by species basis.
Fort Good Hope 1998-2003	<ul style="list-style-type: none"> • Most of the average annual harvest estimates seem to be a good accounting of the community's harvesting with two exceptions: <ul style="list-style-type: none"> ○ Some bird harvest estimates – possible confusions with bird terminology and in accuracies at the species level. ○ Rabbits – should lump two species with 'species' category for a total harvest. 	<ul style="list-style-type: none"> • Overall, total estimated harvests and average annual harvests for Fort Good Hope seem to be a reasonable reflection of harvesting that was taking place 1998-2003. • It is likely that these results represent a true and accurate representation of the actual average annual harvest needs or activities for that community, during that time period. • Data could be used as a basis for important management decisions or Minimum Needs Level calculations, however, for some birds and small mammals, the information may be less accurate at the species level.
Norman Wells 1998-2005	<ul style="list-style-type: none"> • Many of the average annual harvest estimates seem to be a good accounting of the community's harvesting with some exceptions: <ul style="list-style-type: none"> ○ Barren-ground caribou harvest estimates seem too high. ○ Estimates for woodland caribou should be higher. ○ Estimated annual harvest of lake whitefish seems too low. ○ Most of the ptarmigan and grouse harvest estimates seem too high. • Results are not at all representative of today's harvesting. 	<ul style="list-style-type: none"> • The total estimated harvests and average annual harvests for Norman Wells seem to be a reasonable reflection of 1998-2005 harvesting, with the exception of some fish, some birds, and two types of large mammals. • Noting those exceptions, it is likely the results for Norman Wells otherwise represent a true and accurate picture of the actual annual harvest needs or activities for that community during that time period. The results could be used as a basis for important management decisions or Minimum Needs Level calculations. • However, the results are not a good reflection of more recent harvesting patterns in the community, and should not be used to represent or estimate current harvesting activities.

<p>Tulít'a 1998-2003</p>	<ul style="list-style-type: none"> • The harvest estimates seem to be a good accounting of the community's harvesting for most large mammal species with the exception of woodland caribou (t̥ɔdzı and shúhta ɤepé). Those estimates are too low. • Harvest estimates for ptarmigan and many types of ducks and geese seem too low, but mallards too high. • Fish harvest estimates are too low for most species. 	<ul style="list-style-type: none"> • Total estimated harvests for Tulít'a vary in accuracy by species/species groupings, and should be considered along with information provided by harvesters, and assessed on a species by species basis. • For many fish, birds, small mammals, and some large mammals, the total estimated harvests are likely not a true and accurate picture of the actual average annual harvest needs or activities for that community. Caution should be used if the total estimated harvests for Tulít'a are ever needed as a basis for important management decisions or Minimum Needs Level calculations.
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5. DISCUSSION: LESSONS LEARNED AND MOVING FORWARD



Participants, facilitators, and interpreter at the Rádełhókó (Fort Good Hope) Harvest Study validation sessions. Photo credit: SRRB (photographer unknown)

The statistical analysis of the Sahtú Harvest Study data concluded that the key study assumptions were met for five years of the survey – meaning that the requirements of the Land Claim agreement were fulfilled, and the SHS results can be used to inform fish and wildlife management in the Sahtú Settlement Area, and to assist in determining Minimum Needs Level for Sahtú beneficiaries so that harvesting traditions can be protected.

In contrast, the community analysis revealed that in many cases, the total estimated harvests resulting from the study may *not* represent a true and accurate picture of Sahtú Dene and Métis harvesting activities during 1998-2005, nor are they necessarily representative of current harvesting needs. Harvesters found that data reliability and accuracy vary greatly by species, year, and community. As a result, it is strongly recommended that any potential users of the information consider the data on a case by case or species by species basis, and take into account the community interpretation of that data. It is also recommended that the numerical data alone should not be used to inform such important decisions as setting Needs Levels or determining Total Allowable Harvests.

Nonetheless, this is not to say that the information is without value. It can be used in combination with other sources of information to inform decision-making, and it can be used in alternate ways to better understand and promote Sahtú Dene and Métis harvesting patterns, levels, and needs.

In this section of the report the following three main topics are discussed:

- What are the key lessons learned about harvest studies in the community analysis?
- What else can be learned from the SHS results? How else can they be used?
- How can this knowledge be applied to future harvest planning and monitoring needs?

5.1 Key Lessons Learned

The community focus group meetings represented the first opportunity for harvesters to review and comment on data collected for the Sahtú Harvest Study. Participants provided a lot of specific feedback regarding how well the total estimated harvests and the spatial information resulting from the SHS represented their knowledge and experience of harvesting in the community at that time period. Their identification and interpretation of local environmental and socio-economic contexts at the time of the survey suggest that ecological, social, economic, political, and regulatory factors all likely had a significant influence on the harvest study results.

In addition, the validation process itself turned out to be a very positive experience in each community – that is, for the most part, under the right set of circumstances, harvesters enjoy getting together to talk about their harvesting, and it can be empowering when their expertise is included in a research and monitoring program in a respectful and collaborative manner. Here we consider these and other key insights resulting from the community review and analysis.

5.1.1 METHODS MATTER: STUDY DESIGN, PRINCIPLES, AND PARAMETERS ARE KEY

Both the statistical and community analyses confirmed that underlying problems with study design, survey tools or methods impact not just participation levels, but ultimately the reliability and accuracy of harvest study results. In the case of the Sahtú Harvest Study, suspicion around how the information was going to be owned and used was a factor that impacted the study results to some degree in each

community (manifested through super-harvesters refusing to participate, *etc.*). This mistrust can stem from personal experience and collective history, but the appropriateness of the study premise, cultural framework, approach, and methods must also be considered. Count-based or ‘kill’ data surveys like this tend to be for the most part imposed on Indigenous Peoples. Strongly rooted in Western scientific frameworks and methodologies, they are largely inappropriate in Dene culture – they exclude all important economic and socio-cultural aspects underlying Indigenous Peoples’ relationships to animals; ignore significant political and cultural objections to counting and reporting harvests to an outside authority; and fail to meet accepted current standards for research with Indigenous Peoples.

Despite being done under land claims with an objective of protecting Indigenous harvesting rights, harvest studies in the north are highly political pieces of work. Without addressing this problem, without a strong collaborative foundation or Indigenous lead and the inclusion of Indigenous perspectives, approaches, and community-based research principles and objectives, they are likely to be plagued with inaccuracies.

In the Sahtú study, the two communities with the strongest data sets are Rádeljĥkó (Fort Good Hope) and Norman Wells; Tulít’a’s results were ‘mixed’, and those for Déljñę and Colville suffered the greatest weaknesses and challenges to data reliability. Overall, Rádeljĥkó (Fort Good Hope) and Norman Wells reported less suspicion than the other communities; they also benefited from greater consistency in local interviewers, study coordination, and implementation.

In regards to study design, principles, and methodology, lessons learned include the following:

- Study design, survey tools and methods can directly affect participation levels and the reliability and accuracy of harvest study results.
- Collective experience, history, and the appropriateness of the study premise, cultural framework, and approach can strongly influence the success of a study.
- Harvest studies are highly political pieces of work and without a strong collaborative foundation or Indigenous lead and the inclusion of Indigenous perspectives, methods, and community-based research principles and objectives they are likely to be plagued with inaccuracies.
- A lack of community control and ownership of information can decrease study success. Suspicion about how the information was going to be owned and used was a factor that impacted the study to some degree in each Sahtú community.
- Application of current standards and principles regarding the ownership, sharing, access and distribution of Indigenous Knowledge can provide assurances that harvesters’ knowledge and information can be protected and under their control and lead to better outcomes.

5.1.2 CONTEXT IS CRITICAL

A known weakness of harvest surveys is that they usually last less than ten years and therefore can only ever present a ‘snapshot in time’ of land and resource use, thereby failing to reflect the full complexity and variability of harvesting needs and activities over the long-term. The community analysis made it clear that Sahtú Dene and Métis harvesting activities are strongly influenced by things like availability of work in the wage economy, changes in animal abundance and distribution patterns, harvester preferences, market prices for fur, regulatory regimes, and environmental change, among other factors. These factors can have such a strong influence on the study results that it is questionable whether it is realistic or valid to extrapolate the results of one five year period to other years of harvesting.

Harvesters in Norman Wells repeatedly stressed that the results recorded by the SHS between 1998 and 2005 are no longer representative of harvesting in that community. A similar theme was heard in Colville, where high levels of wage employment during the years of the harvest study likely means total estimated harvests underestimate harvesting during other time periods. In RádeljĥkŃ (Fort Good Hope) – one of the communities with what could be considered a relatively ‘strong’ SHS data set – trapping activities have changed since the time of the study. A participant in the community focus group sessions stated that a ‘new generation’ of trappers is starting to go out on the land now, driven by a lack of available work in more recent times. Some workshop and interview participants suggested that the information is now so out of date that the survey should be repeated.

An interesting example of the potential magnitude and consequences of this problem was presented in the 2013 assessment report. During the expert interviews, two respondents discussed a specific concern they had in regards to the SHS data for barren-ground caribou. Both suggested that due to the caribou over-wintering close to the community of Déljĥę for several years of the harvest study, the number of harvests reported for those years is unusually high and therefore skews the results. As a result, calculating a Minimum Needs Level based on only the harvest study data could give a falsely high indication of what average barren-ground harvesting patterns are like from year to year. Some experts feel that it would not be possible for the herd to support the level of harvest reported during the years of the study on an annual basis.

With land claims it’s going to be very difficult to match those harvesting levels as a Basic Needs Level. Like 1,600 - 1,700 caribou [harvested in Déljĥę] every year – you’ll never be able to get that. In all the years of my grandfather, I don’t think they ever saw numbers like that. You’ll see that in [the mapped] data – it’s all red right around Déljĥę. I don’t think that’s ever going to happen again. When that becomes legal it’s going to be a huge issue. That can’t happen; we’ll never match it. (Walter Bayha in SRRB 2013:37)

On the other hand, ignoring a larger ecological context or longer historical perspective could greatly underestimate Needs Levels based on existing SHS data. Fish are incredibly important to many Sahtú Dene and Métis. In addition to the data set having proven weaknesses for smaller-bodied animals like fish, there is no accommodation for the impact that changing environmental conditions and population abundances can have on harvesting. There are suggestions from several parts of the Sahtú that fish habitat, populations, and abundances have changed significantly over the last 50 years, both as a direct result of past industrial disturbance and habitat destruction, as well as more indirect impacts associated with climate change.

There used to be millions of herring across from Déljĥę since time immemorial. Because of the cold water, the herring is attracted to that area. From the mid-1900s the Northern Transportation Company Limited was barging, and when they load the barges, they would sink about five feet into the water. Because it was too shallow, they dynamited that whole area just for barging. And because of the explosive that they used, they destroyed all that habitat, the food of the herring, and since the time they used explosives to make a channel for the barge, since then, those millions of herring disappeared, the population went down. They destroyed the fish habitat for the herring with their dynamite, and the fish didn’t know what to do, they just scattered, looking for their food. Twice I set net, nothing... Déljĥę people grew up here on the herring. Sometimes a person would catch 300 with one net, but recently you set net and nothing. Today, we’re not catching any. The reason for that may be the habitat is damaged. (Participant in Déljĥę community validation sessions)

In broad terms, the interpretive context provided by harvesters indicates that:

- Harvesters' activities are adaptive, responding to changes in species abundances and what the land will provide in order to meet their needs.
- The 'snapshot in time' provided by short-term harvest surveys fails to reflect the full complexity, variability, and adaptability of harvesting activities over the long-term. It may not capture typical years of harvesting, and therefore can greatly over or under-estimate actual harvests.
- Harvesting activities are strongly influenced by the availability of work, changes in animal abundance and distribution patterns, economic drivers, regulatory regimes, and environmental factors. These factors can have such a strong influence on the study results that it is questionable whether it is realistic or valid to extrapolate the results to other years.
- The results recorded by the study are likely not representative of current harvesting patterns or needs due to ecological and socio-economic changes.

5.1.3 NUMBERS AREN'T ENOUGH: WHY COUNT-BASED SURVEYS ARE INADEQUATE TO DEFINE INDIGENOUS HARVEST MONITORING AND REGULATION SYSTEMS

At this point, it should be quite clear that information from count-based surveys may not be a great basis for defining harvest regulation systems, determining Needs Levels, or making other important management decisions. Such narrowly-focused and short-term surveys of numerical data cannot present an accurate, reliable or representative picture of a community's harvesting activities or needs over time. The community review and analysis of the SHS data suggests the following:

- Data resulting from a count-based survey, provided without any interpretation of the broader context of harvesting during the study, may not be representative of actual or current harvesting needs, and does not constitute a good basis for defining a harvest regulation system, determining Needs Levels, or making other important management decisions
- Numerical data from harvest surveys vary in reliability and need to be considered on a case by case or species by species basis – results are usually strongest for large mammals and poorest for smaller-bodied animals like fish and birds
- Numerical data must be set in a broader context or setting for harvesting – that is, paired with community interpretation and analysis of the information
- An Indigenous research methodology and framework would likely strive to account for more factors and achieve a more wholistic look at the bigger picture surrounding harvesting activities.
- Because conditions surrounding the study are constantly changing, harvest studies would benefit from an adaptive cycle of constant evaluation, feedback, and adjustments, done over a longer, more sustained period of time
- Strong community involvement can drive an iterative cycle, by identifying priority questions, interpreting activities, etc.

5.1.4 THERE IS DIVERSITY AND RESILIENCE IN SAHTÚ DENE AND MÉTIS HARVESTING

Despite the weaknesses described in preceding sections, the SHS resulted in an extraordinary amount of information about harvesting in the Sahtú, documenting Sahtú Dene and Métis regular use of over 80 types of birds, fish, and mammals. The results provide evidence of a Sahtú Dene and Métis food system that is inherently diverse and responsive to changes in the landscape – despite the fact that harvester adaptability and response to changing conditions were likely not captured well in such a short study.

The results show interesting diversity from community to community – for example, in Colville, participants said they don't bother harvesting rabbits too much, but in Délıne people said rabbits are always very important, for both food and fur. Different fish are prioritized in different locales, but these preferences shift over time in response to changing conditions. Délıne's barren-ground caribou harvest is now a fraction of what it was during the years of the study. In Norman Wells, large mammal harvests have shifted away from barren-ground caribou and towards moose and woodland caribou.

This indicates that there is both year to year continuity in harvesting, as well as variability, dependent on ecological, regulatory, and economic contexts. These factors help to make Sahtú Dene and Métis food systems strong and resilient. They may also shape diverse management priorities in each district of the Sahtú. In summary, the study team learned that:

- An extraordinary amount of information has been documented about Sahtú Dene and Métis harvesting, thereby providing evidence of a food system that is inherently diverse and responsive to changes in the landscape.
- There is diversity from year to year as well as community to community – suggesting that different communities and / or regions may have different management priorities, and that those priorities may change over time.

5.2 Beyond Total Estimated Harvests and Needs Levels

Census-type harvest surveys gather a large quantity of numerical information – for example, the Sahtú study database has over 62,000 records about harvests of over 80 different species. The database also includes some qualitative data (*e.g.*, comments on health, *etc.*), data regarding the number of days harvesters spent out on the land, as well as other types of information. There is also spatial or mapped data that resulted from the study that are available for use.

Generally, results from harvest studies are seldom used for any purpose other than using count data to calculate total estimated harvests and to inform harvest regulatory mechanisms such as the Total Allowable Harvest. Quantitative or statistical analyses of the other types of information recorded by these studies are seldom done, and there are few to no published studies showing results compiled in other ways. However, harvest study databases and spatial files represent a rich source of information that could be applied to different research questions and used in novel ways to provide insights into other facets of harvesting.

Despite the fact that weaknesses were found in some of the SHS data that limits their utility as the basis for calculating Minimum Needs Levels and Total Allowable Harvests, experiences during the community validation sessions suggest the results can be an effective learning and planning tool nonetheless – used in a community planning context, they can stimulate discussion and help inform decision-making.

5.2.1 NOVEL RESEARCH QUESTIONS: IDEAS TO EXPLORE USING THE SHS DATA

There are many additional ways to query the data that are not typically done with harvest study results. The 2013 assessment indicated that by linking tables through queries, many types of questions could be answered; some examples include:

- How many rabbits were harvested by young female harvesters during the winter of 2001?
- What percentage of the total moose harvest during fall months was by Colville hunters?
- How many successful hunting trips resulted in the harvest of both large mammals and birds?
- How many hunting trips under two days were successful, compared with those over four days?
- How many bulls were harvested within 25km of each community, compared with further away?

Using the information housed in the SHS database in addition to the spatial data, an interactive map product could be created to look at changes in hunting patterns in relation to, for example, road development and use, hunting patterns, and technology change. The 2013 assessment also outlined other possible uses of the data including the investigation of topics such as:

- Harvester demographics (What can the data tell us about the average age of harvesters? Were many youth involved in harvesting activities?)
- Gender differences and needs (*e.g.*, Do female harvesting patterns differ from male? Are there species that are typically harvested by women? Do women travel the same distances as men? Were participating youth primarily male or female?)
- Assessment of use of areas or resources by age and gender (Are there differences between where and what different age groups or genders harvest?)
- Household statistics (What are the harvest quantities like per household? What is the range of household consumption?)
- Harvester effort or catch per unit effort (Can the data be used to estimate effort? For what species? Do people travel further to harvest in certain years, certain areas, for certain species, or at certain times of the year?)
- Did the number of successful vs unsuccessful harvesting trips change over the course of the study? Does that correlate with any other variables? (*e.g.* caribou numbers or distribution, snowshoe hare population cycles)
- Assessment of average distances travelled for harvesting main species like caribou
- Species information and monitoring (Can hunting or harvesting patterns tell us anything about changing animal behavior, abundance and/or health?)
- Assessments of large mammal characteristics such as sex or age
- Assessments by game management zones, herd ranges, or bioregions
- Assessment of distribution of harvesting vs. known species / population / herd distribution
- Assessment of community use of regions and species (Which areas are important to harvesters from Colville Lake? Where do people from Délı̄nę hunt? What species are harvested most by the different communities? Does this change from year to year?)
- Mapping of harvesting by season, compiled across communities or for individual communities
- Assessment of bio-cultural diversity ‘hotspots’ or areas that are harvested more frequently, by a greater number of individuals, and/or for more types of species. (Are there any areas that are particularly important for harvesting this species? Are these areas close to communities? Close to roads? Far from development? Do they correlate closely with animal distribution (*e.g.*, caribou) or some other variable?) (SRRB 2013).

Many other types of research questions and topics that could be investigated using harvest study data in analyses that go beyond proportional projection and total estimated harvests.

During the focus group sessions as well as the 2013 interviews, knowledgeable participants were provided with opportunities to review and comment on several other types of data that resulted from

the Sahtú Harvest Study, including seasonal harvesting patterns, maps / spatial data, and charts of harvest composition. Overall, participants stated that:

- Seasonal patterns recorded by the SHS are consistently accurate and reliable
- Most of the mapped information appears accurate and reliable
- There is great value in the broad trends the SHS can demonstrate, providing another way to reflect on and understand long term ecological, environmental and socio-cultural change in a qualitative sense
- The spatial data is extremely useful for planning at the landscape level – managers can see at a glance what areas are important for harvesting species and make good management decisions based on that (however, the data are no longer current).

As a result, three topics were explored with harvesters in more detail – seasonal harvesting patterns, mapped information, and harvest composition.

5.2.1 SEASONAL PATTERNS

During the community validation workshops, representative results showing seasonal harvesting patterns were presented – most often for big game like caribou and moose, but also occasionally for small game, fish and/or birds. Harvesters consistently commented that the seasonal results are an accurate reflection of their community’s harvesting patterns. Figure 10 shows seasonal patterns of barren-ground caribou harvesting, by month, for Délı̨ne, between 1999 and 2003.

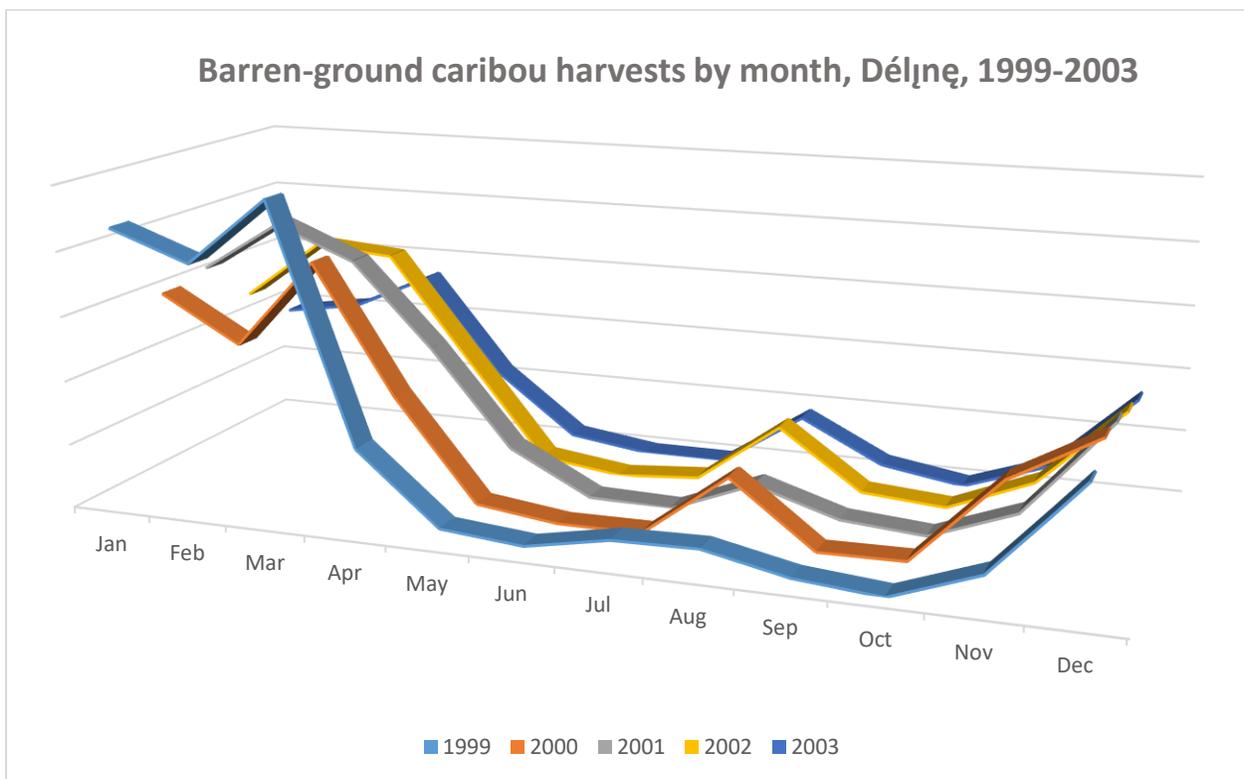


Figure 10: Graph showing seasonal harvesting of barren-ground caribou in Délı̨ne, 1999-2003. Seasonal data were said to be consistently accurate across all species for the Sahtú Harvest Study results.

It is clear that in Déljne, most of the caribou harvests recorded during the years of the harvest study occurred in the winter and spring months – a time when the caribou were more accessible to the community. In contrast, Colville’s seasonal harvesting patterns for barren-ground caribou show more evidence of year-round use (see Figure 11).

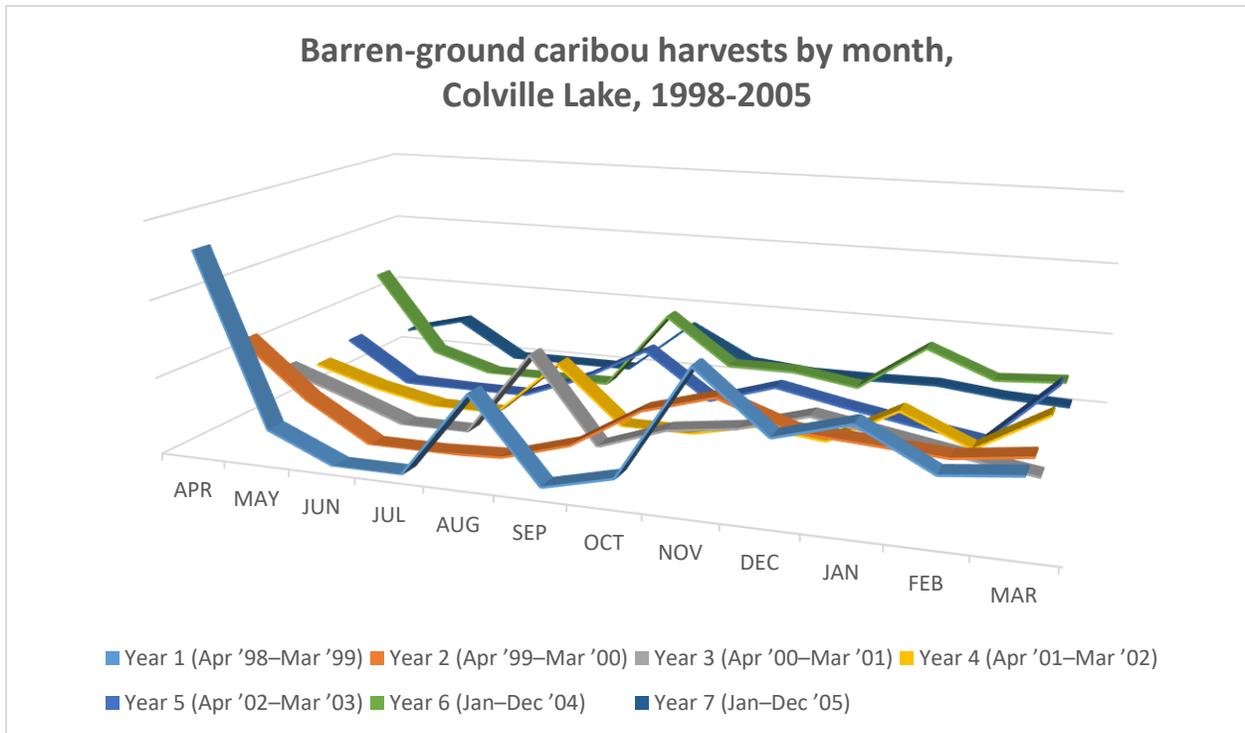


Figure 11: Graph showing seasonal harvesting patterns for barren-ground caribou as recorded by the Sahtú Harvest Study for Colville, 1998-2005.

In Colville, focus group participants confirmed that they harvest barren-ground caribou most months of the year, only stopping around the beginning of October when the bulls are getting into full rut. People start harvesting again in December when the cows are fat. The graph shows a drop in harvesting around June, perhaps during calving, as people do not traditionally bother caribou on their calving grounds.

Seasonal data like these can also be used to understand broader patterns of harvesting throughout the year. Figure 12 shows a ‘seasonal round’ or circular calendar informed by generalized seasonal use patterns documented by the study for the whole Sahtú Settlement Area; this product was used in local materials such as a community calendar. Seasonal rounds specific to each community’s data could also be produced, and would likely demonstrate some local / regional differences. Again, a limitation of the data is that few harvests were documented for women, and no plant, egg or feather use was recorded by the study.

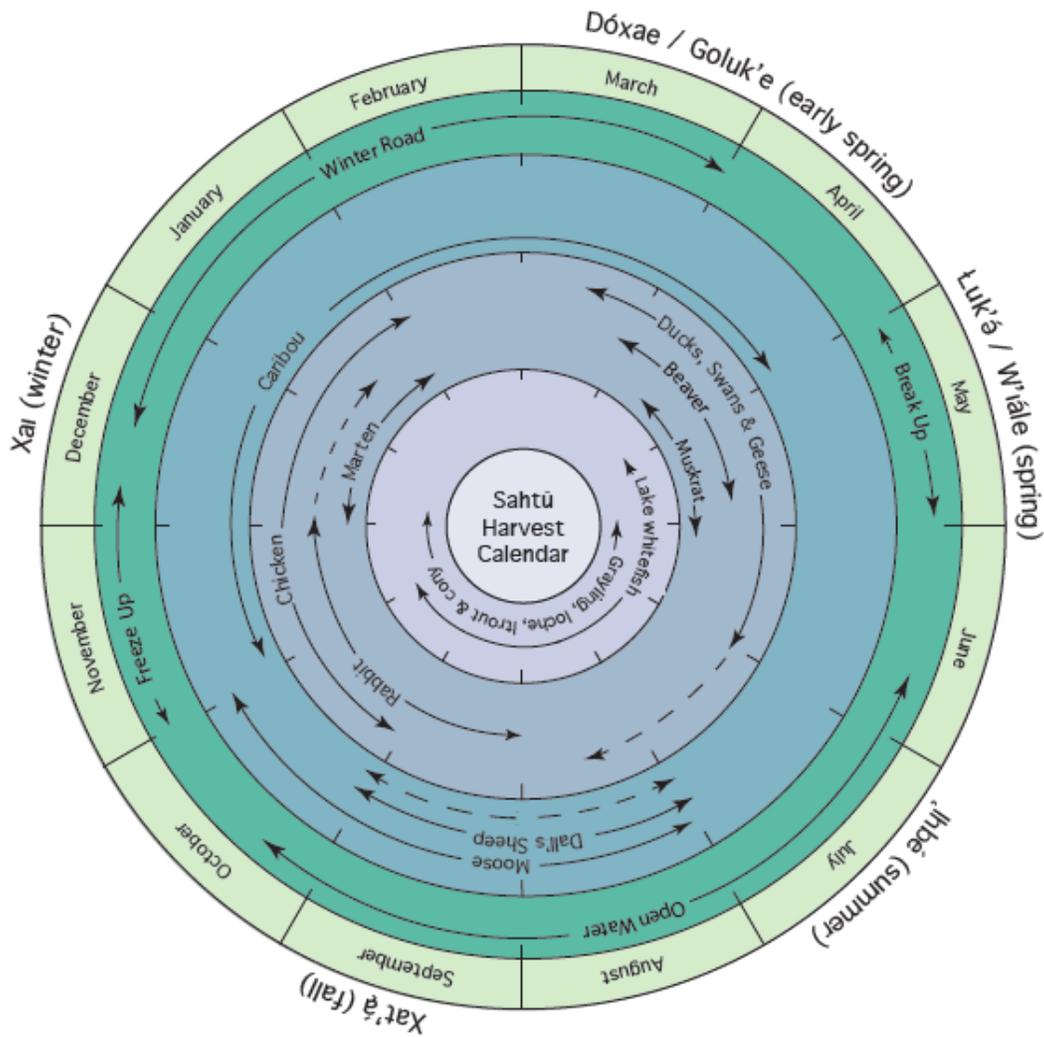


Figure 12: A 'seasonal round' or calendar of annual harvesting patterns for the whole Sahtú informed by data recorded by the Sahtú Harvest Study, 1998-2003.

5.2.2 SPATIAL INFORMATION

As previously noted, representative spatial results were also reviewed during the community focus group sessions. In the majority of cases, the spatial data were felt to be an accurate reflection of communities' harvesting patterns. There were only a few occasions when harvesters felt locations were under-represented (e.g., marten in Colville), incorrect (e.g., a harvest location recorded for barren-ground caribou that was likely woodland) or inexplicable (e.g., several harvest locations that were not typical for a community). Sahtú Harvest Study spatial data for moose are shown in

Figure 13.

Again, a caution to potential users of the information is warranted, in that the spatial data have not been adjusted for response rates and therefore do not represent total estimated harvests, but only the number of harvests reported to the study. Additionally, some of the SHS spatial data may be considered sensitive and could require careful thought, protocols and protections for information-sharing to not present a risk to the communities. This can be true for most species of big game, but may also apply to

important species of furbearers, as well as certain populations of fish and favourite fishing locations. Communities can provide advice on what level of ‘buffering’ is appropriate for sensitive data, but it may not be appropriate to publish some harvest study spatial data at all.

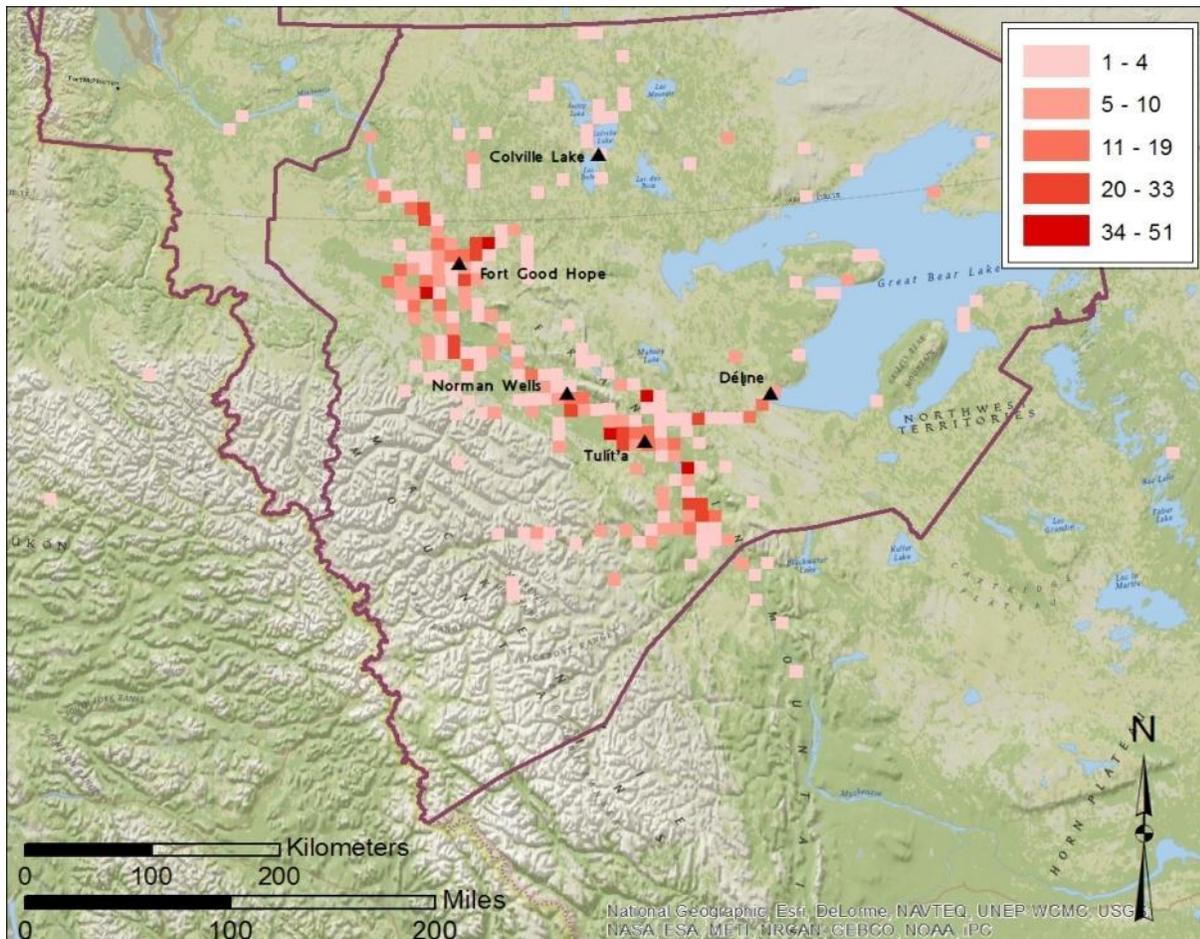


Figure 13: Locations of moose harvests reported to the Sahtú Harvest Study, 1998-2005, shown with a density gradient. Actual locations are protected through the use of 10 x 10 km grids. This map is based on data that have not been adjusted and do not represent the total estimated harvests of Sahtú Dené and Métis. The information on this map is confidential; do not copy or distribute. Contact the Sahtú Renewable Resources Board for conditions of use.

During the harvest study assessment interviews in 2013, wildlife and resource professionals stated that they find this type of spatial data especially valuable when considering development applications. The use patterns indicated by the colour gradient help identify areas that tend to be consistently important to moose and the people who harvest them. Results such as these have been used for planning purposes by Environment and Natural Resources (GNWT) and the Sahtú Land and Water Board. Spatial data can also be a highly effective tool for Indigenous Peoples in negotiation over land ownership or tenure. Locally, the SHS spatial information can be used by the RRCs and communities to demonstrate land use patterns and provide evidence of areas that are important for Sahtú Dené and Métis land use and harvesting (SRRB 2013).

5.2.3 HARVEST COMPOSITION

Data from the harvest study can be used to indicate the composition of the harvest or relative proportions of species harvested; data can be compiled by harvester, by community, by district, and for the whole SSA. Information could also be compiled by season. Figure 14 shows a pie chart of the composition of the large mammal harvest by species, for all Sahtú communities combined, including an inset showing the composition of the large mammal harvest in Norman Wells presented previously for comparison purposes (see section 4.2.4, Figure 8).

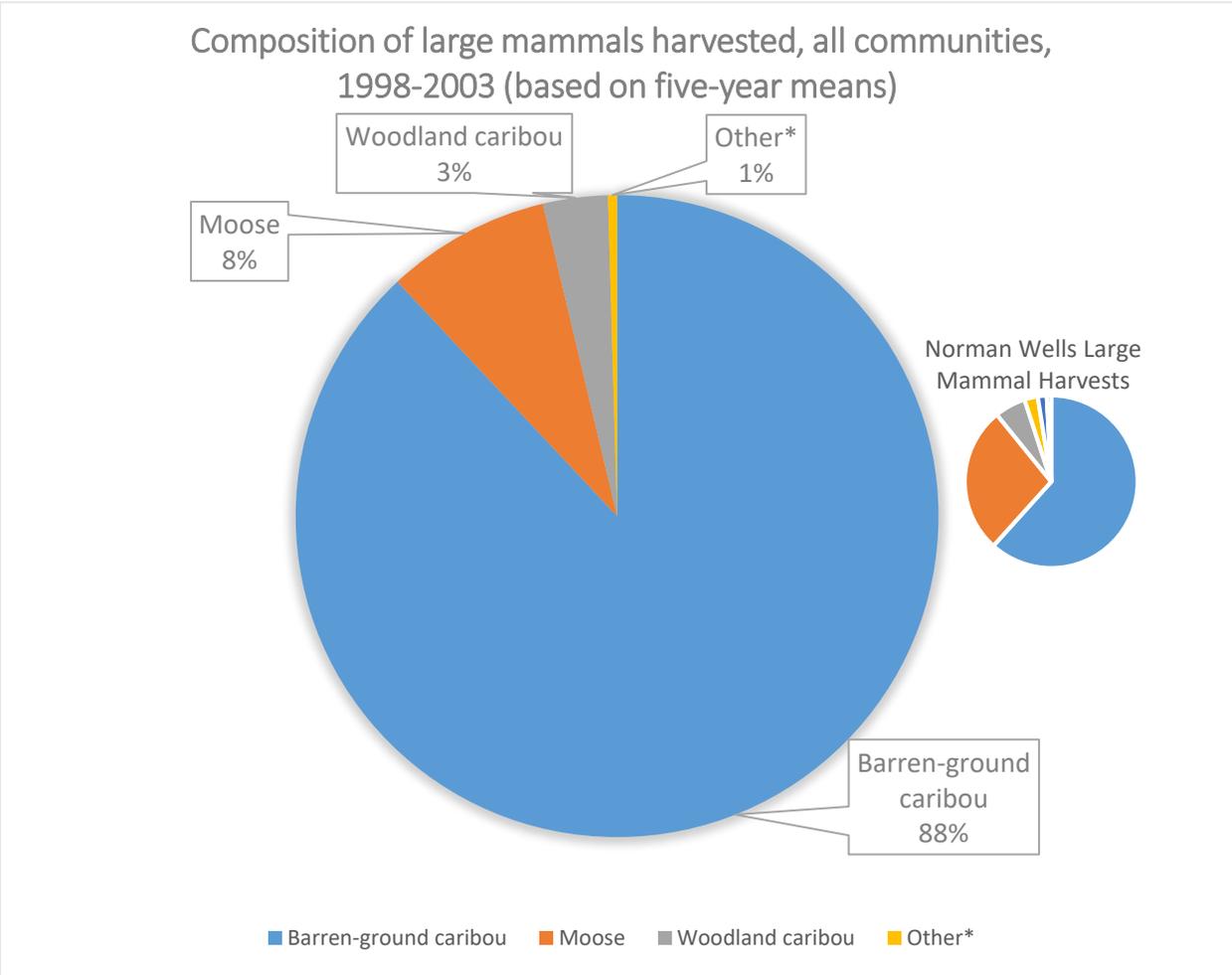


Figure 14: Pie chart showing harvest proportions for big game species for all five communities' results combined; inset shows results for Norman Wells for comparison purposes. *Other species include: Dall's sheep, black bear, grizzly bear and muskox. Data summary is based on annual means.

In contrast, a pie chart for Délı̨ne's large mammal harvest shows that on average, over 98% of the large mammal harvest is made up of barren-ground caribou (likely due to the fact that the survey was conducted in years that the caribou were overwintering very close to the community).

Pie charts such as this can also be another tool to visually demonstrate the extent of harvesting diversity. Figure 15 includes a pie chart showing an example pie chart for bird harvests, by species / species group, for Norman Wells, 1998-2005.

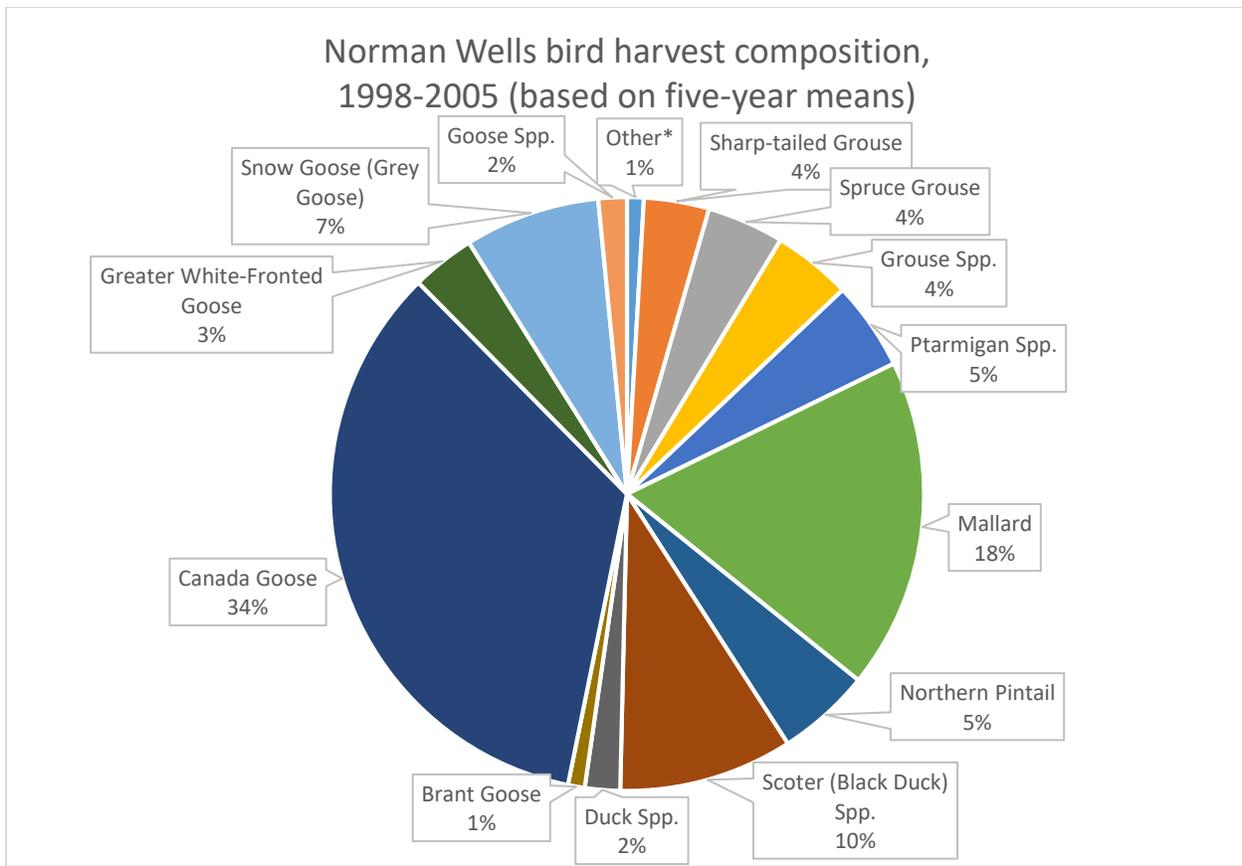


Figure 15: Pie chart showing the composition of main birds harvested annually in Norman Wells, 1998-2005. Additional species harvested but not shown here include: ruffed grouse, willow ptarmigan, canvasback, goldeneye spp., American widgeon, merganser, Northern shoveler, teal spp., trumpeter swan, swan spp., loon spp., sandhill crane. Data summary is based on annual means.

During the years of the harvest study, Norman Wells harvesters reported harvesting at least two dozen types of birds. Alternative approaches to compiling the data in novel ways such as this can help show the complexity and sophistication of each community's harvesting system. More visual and intuitive representations could help to inform community discussions and decisions around priority species, for example, in ways that tables of numerical results cannot.

Priority or cultural keystone species can also be considered visually across communities, such as the example of estimated barren-ground caribou harvests shown in Figure 16.

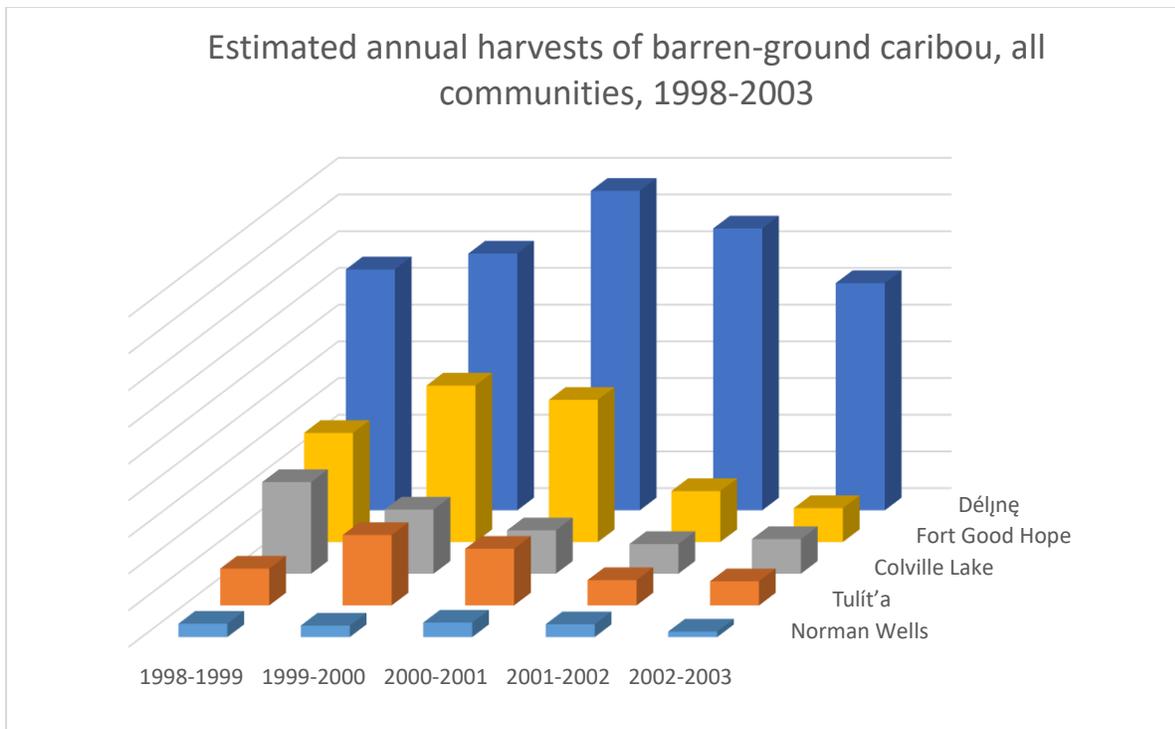


Figure 16: Estimated annual harvests of barren-ground caribou, shown in a community comparison using the SHS results. Note that the very high harvests indicated for Délı̄ne occurred during the years that caribou over-wintered very close to that community, and may not represent longer-term, overall harvesting patterns.

5.3 Implications for Future Harvest Monitoring: Where do we go from Here?

5.3.1 REGULATORY EVOLUTION: MOVING FROM TOTAL ALLOWABLE HARVESTS TO COMMUNITY CONSERVATION PLANNING

The results from the SHS were intended to have a direct impact on determining how many fish, birds, or mammals should be allocated to Sahtú Dene and Métis in the event that a harvest ever had to be limited. Section 1.3 of this report describes how calculations of Minimum Needs Levels using the SHS data are to be used to set quotas such as a Total Allowable Harvest (see also SDMCLCA 1993 section 13.5). However, the community review and analysis of the Sahtú Harvest Study data indicates that many of the numerical results do not represent a true and accurate picture of Sahtú Dene and Métis harvesting and are likely not reliable enough to use as a basis to inform important management decisions and regulatory systems such as the Total Allowable Harvest. The information is likely no longer relevant nor representative of more recent harvesting patterns, and the study methods, objectives, and cultural framework do not meet current standards for research and monitoring work involving Indigenous Peoples and their knowledge systems.

Even before this new evidence came to light, the TAH has proven to be a controversial regulatory tool in the Sahtú region. To date, the TAH has only been applied to barren-ground caribou harvesting, when

raw data from the SHS were used to inform quotas during a 2007 public hearing for the Bluenose-West Herd (SRRB 2007). Some communities reacted strongly to the imposition of the TAH, in part due to concerns about how it could negatively impact their relationships with caribou, but likely also due in some degree to a lack of confidence in the SHS harvest numbers, and ongoing frustrations regarding perceived infringements of traditional rights and responsibilities. The opposition to the TAH was so strong in some areas that there was a refusal to use the tags provided by ENR for regulating the caribou harvest – this rendered the territorial harvest monitoring system largely ineffectual for that herd of caribou during that time period.

In 2016 another public hearing was triggered by the submission of two distinct management plans, this time for the Bluenose-East caribou herd. One plan was submitted by ENR and another by the community of Délı̨nę (a primary harvester of these caribou). The Délı̨nę plan – *Belare Wı̨le Gots'ę ęekwę: Caribou for All Time* – was prepared by Sahtúgot'ı̨nę elders and leaders and is based on the traditional laws or principles and agreements that guide Dene relationships with caribou. It relies on Dene stories, language, and concepts as a cultural foundation, and uses a broad approach to conservation, with program areas that include hunting, habitat, governance, and knowledge (Délı̨nę First Nation *et al.* 2016).

During the hearing, the SRRB heard extensive evidence that the TAH has not succeeded in producing successful conservation outcomes in the Sahtú region. As a result, the SRRB determined that a TAH should be a conservation mechanism of 'last resort', to be used only when Indigenous people can no longer self-regulate (SRRB 2016). In analyzing the evidence and coming to its decision, the SRRB found that the TAH as a regulatory mechanism has less potential of successfully achieving conservation outcomes than other available options. The Board endorsed Délı̨nę's plan based on the evidence presented at the hearing and the Board's recommendations were accepted by the Minister (SRRB 2020b).

In January 2020, another hearing or 'public listening' session took place in Colville – this time in response to conservation concerns about the three caribou ecotypes that inhabit or travel through the Sahtú region, and focused on the topic of caribou harvest regulation (SRRB 2020b). During the Colville hearing, there was considerable evidence provided by community parties that the TAH was not only ineffective but detrimental as a tool for conservation; it and was therefore rejected by the communities in the Sahtú. The Board found the following:

The evidence shows that TAH is a significant infringement of the Aboriginal rights of Sahtú participants. As required by the common law in *R v Sparrow* and *R v Badger*, this infringement is not justified and is not legally valid if there is an alternative that can meet the intended goal—in this case, conservation—while more minimally impairing rights. (SRRB 2020b:75).

Such findings call into question the appropriateness and the very premise of surveys such as the Sahtú Harvest Study. Moving forward, the alternative approach recommended by the Board in its hearing report is the development of Community Conservation Plans (CCPs); "community conservation planning is the most effective tool for conservation in the Sahtú region, and it minimally impairs harvesting and cultural rights protected by the SDMCLCA," (SRRB 2020b:58). It is expected that harvest monitoring and regulation will be an important component of future community conservation planning, but it will not look like past models.

5.3.2 APPLYING THE HARVEST STUDY TO COMMUNITY CONSERVATION PLANNING

The past harvest study can help with community conservation planning in two main ways: first, by providing data and information compilations that can improve understandings of Sahtú Dene and Métis food systems; and secondly, by providing key insights into the principles and practices that will ensure that future, locally-controlled harvest monitoring programs produce reliable and accurate results.

It is reasonable to expect that communities will want to design and develop their own way of tracking harvest activities over time as part of their individual CCPs. Nonetheless, the ‘lessons learned’ laid out in sections previously suggest the following ideas are important in setting a future harvest monitoring program up for success:

- Good community buy-in is essential for successful harvest research and monitoring
- Programs need to be focused on local interests, priorities, and objectives
- Community interests need to be protected through formal principles regarding local ownership, control, access, and possession of information
- Diverse Indigenous food systems and adaptive harvest strategies are best captured through long-term monitoring programs
- Ecological, regulatory, and socio-economic factors also need to be documented and locally interpreted for their influence on customary harvesting activities and patterns
- A monitoring program that enables harvesters to provide observations on broader indicators of ecosystem health, trends in disease, species other than fish / birds / mammals, etc. instead of only ‘kill data’ may better approximate an Indigenous research methodology and framework as well as account for changes in harvesting patterns over time
- An iterative, community-controlled harvesting monitoring program, able to adapt to changing needs and interests can accommodate different conservation priorities
- The composition of the harvest can be quite different from community to community, and depend on many independent variables; in addition, different species and harvesting systems will likely give rise to different management priorities in local areas.

As part of the harvest study completion project, further work was done during each focus group session to facilitate discussions around what future harvest monitoring and community conservation plans could look like. This process differed in the communities, based on individual community objectives and current stages of planning. In Colville and Rádeljĥkó (Fort Good Hope) a planning exercise based on the ‘*Healthy Country Plan*’ model was used.¹⁷ This involved undertaking a series of steps to identify community conservation targets, objectives, indicators, threats, actions, strategies, *etc.*, including a ‘Land Guardian’ or ‘Keepers of the Land’ component for monitoring wildlife and harvesting. In Déljñę,

¹⁷ Healthy Country Planning (HCP) is a participatory process being used by Indigenous communities for land and water planning and conservation. Adapted from the “Open Standards for the Practice of Conservation” methodology that has been used for nearly a decade to help Aboriginal people in Australia look after their ‘country’ – their homelands, waters, culture, and the resources on which they depend – HCP can support Indigenous-led planning efforts by ensuring that Indigenous Knowledge and people are central to the planning process. More information is available at <https://www.ccnetglobal.com/resource/healthy-country-planning/> and <https://www.natureunited.ca/content/dam/tnc/nature/en/documents/canada/healthy-country-planning.pdf>.

Norman Wells, and Tulít’a, discussions were more directly focused on methods for monitoring and regulating harvesting activities. In each case results from the harvest study served as a foundation for the planning discussions.

Despite differences, some strong key themes emerged across all communities (e.g., the need for community control over study design and information ownership; information needs being much broader than just ‘kill data’; and the important role conservation planning can have in maintaining not just wildlife species, but traditional and cultural practices). There was also a clear message that Sahtú Dene and Métis generally already have a ‘plan’ or process for monitoring wildlife and managing harvesting activities in place – it just has not been written down in the past.

It is likely that time will show that no one model will prove to be the best in all situations, but depending on culture, geography, information needs, species, and resource settings, successful future studies may ‘piece together’ numerous methods that are better-suited to each particular situation. (SRRB 2013:24)

Some specific suggestions for harvest monitoring programs resulting from the focus group discussions are summarized in Table 10; more detailed information is included in each community’s results report. There is also a detailed consideration of harvest monitoring ‘best practices’, a review of alternative methods, and recommendations provided in the SRRB’s 2013 assessment report.

Table 10: Ideas for a future harvest study shared during the SHS validation sessions.

Plan topic	Ideas for a future harvest study: Summary of themes across communities
<p>Targets / Goals and Objectives –</p> <p><i>What can a harvest monitoring program as part of a CCP do? What is important?</i></p>	<ul style="list-style-type: none"> • Documenting the harvest would be a big contribution toward a community conservation plan; make harvest monitoring part of a bigger scope plan • A plan is a conservation tool to ensure wildlife and habitat will be there for future generations • Results will be helpful for leadership to see for planning • Information can help in making decisions – how much to harvest, where to harvest, etc. – depending on which animals people want to help • Make seasonal hunting plans (e.g., in August people get together and make a hunting plan for moose; in January get together for a moose group hunt) • Can use to compare harvesting in the past to in the present and future • There is a lot of change happening – a harvest study can show that • Monitor environmental changes taking place and changes in species abundance and distribution • Can monitor health of fish, bird, and animal populations over time • Help to promote traditional practices and balance in harvesting and diet (e.g., rely less on caribou) • Can promote eating a variety of Dene foods • Teach about safety and wellness concerns • Help people keep their knowledge of different kinds of wildlife and harvesting practices, and pass it on to younger generations • See where people are travelling • Can teach outsiders about traditional harvesting laws and practices • Provide information for a harvest authorization system – need to communicate with people from other areas about total harvests • Can provide guidance for how to deal with offenders.

<p>Content –</p> <p><i>What should a harvest monitoring program include?</i></p>	<ul style="list-style-type: none"> • Must include cultural and spiritual elements such as conservation of language, and health of Dene ways of life • Traditional Knowledge and stories; incorporate intergenerational aspects of harvesting • Priorities can differ between communities and over time • The study should adapt to what research questions about wildlife and habitat need to be worked on at that time • Include more on broad trends in fish, bird, and animal health, environmental change, and socio-economic factors affecting harvesting.
<p>Methods –</p> <p><i>How are we going to do it?</i></p>	<ul style="list-style-type: none"> • Needs to be long term to capture all the changes that are taking place • Need a more adaptive study to suit differing priorities (e.g., just a few priorities species, or different species depending on season, new species, environmental change, changes in animal abundance and distribution, etc.) Focal species should change throughout the year depending on what people are doing • Have a committee of experts advising on what information to collect – e.g., harvester feedback should shape the study, have harvesters’ interpret information, re-evaluate priorities, etc. Iterative process • When people harvest, they come back, share and discuss their observations, then it gets written up • Could use a combination of methods – e.g., harvester reporting and seasonal meetings – to get different information in different ways. For example, could do seasonal interviews for things like caribou, moose, ducks; plus periodic small group workshops on trends in health / disease / environment; and annual gatherings to share information and discuss management priorities at a bigger scale and with other areas • Involve each of the main family groups – e.g., one person collecting and reporting information per family • Make sure you include everyone so it’s accurate • Bring language back to life on the land and in the schools – use local herd, fish, bird and animal names that make sense to Dene, local place names • Storytelling and workshops on the land to train youth; combine language and on the land programs; elders teaching workshops • Wellness training is an important part of guardianship; talking circles at on the land camps need to include safety and wellness • Youth-designed activities; youth need more activities out on the land with knowledgeable harvesters, also need to include youth in the meetings • Foster two-way information exchange, e.g, harvester luncheons with elders and youth, etc. • Harvesters need have more of a role interpreting the information (i.e., not just interviewees) • Create more community and educational products.
<p>Threats / Challenges –</p> <p><i>What threatens traditional food</i></p>	<ul style="list-style-type: none"> • Lack of outsider respect and / understanding • Lack of communication, language barriers • Lack of local control • Too many outsiders coming to harvest too much

6. CONCLUSIONS



Shore of Great Bear Lake, Déljñę, NT. Photo credit: Janet Winbourne.

The Sahtú Harvest Study was a survey conducted in all five communities of the Sahtú region from 1998 to 2005. It was a requirement of the Sahtú Dene and Métis Comprehensive Land Claim, with the objective of estimating the number of animals, fish, and birds harvested by Sahtú Dene and Métis for a period of five years. The information was intended to be used for fish and wildlife management and to protect harvesting traditions, however, the study was not completed immediately following the survey.

Census-type surveys like the SHS were common in many regions of the north as land claims were settled around the 1990s; they are known to be susceptible to several sources of error, yet the magnitude of those potential errors is not well understood. In addition to their methodological weaknesses, there are also socio-cultural and political criticisms of this type of survey today. Over the last 20 to 30 years there has been considerable evolution in understandings of Indigenous rights in biodiversity conservation, paralleled by a shift in perceptions of appropriate research methodologies involving Indigenous Peoples and their knowledge.

In 2013 a multi-phased project was initiated to complete the study. As a means of further assessing the reliability of the harvest study data, and bringing the study to completion in a more appropriate collaborative and community-based approach, both a quantitative (statistical) analysis and a qualitative (community) analysis of the results was done.

The statistical analysis of the quantitative data found that the survey achieved good representation and a good cross-section of harvesters in the first five years, and study assumptions were met. This means that data collected between 1998 and 2003 produced results suitable for use in calculating total estimated harvests and Minimum Needs Levels at a regional or Settlement Area-wide level. The statistical analysis recommended that at a sub-regional level, data that are provided for communities individually should be used. For the last two years of the study (2004/05) response rates were adequate for total estimated harvests to be calculated in only two out of five communities: Colville Lake and Norman Wells. In Rádeljĥkǫ́ (Fort Good Hope), Déljñę and Tulít'a, participation levels were too low to enable the calculation of reliable total estimated harvests in those years. That information should not be used to calculate Minimum Needs Levels and has not been included with the summarized results.

The community analysis confirmed that the sources of error known to influence harvest surveys were also present in the Sahtú study, and found that the magnitude of those errors is likely significant. In addition these more well-known sources of error (such as refusal of 'super-harvesters' to participate, recall failure, and lower reliability for small-bodied species' data), additional factors that were thought to have impacted the results include distrust regarding use of the study results, unusual ecological events, changes in species migration / distribution and abundance, as well as various socioeconomic variables. Overall, the numerical data were found to vary widely in reliability and accuracy. There were cases in which harvesters felt the estimates were too high, and cases in which they were thought to greatly under-estimate actual harvesting levels. In addition to inaccuracies for particular species and / or species groups, harvesters were also able to detect trends in the annual averages that span species categories and contradict the consistency that tends to characterize harvesting on a year to year basis.

As a result, the following recommendations arose from the community analysis: the total estimated harvests for Colville should not be used as a basis for important management decisions or Needs Level calculations for any years, any species; results for Déljñę and Tulít'a need to be assessed on a species by species or case by case basis, as they vary in accuracy and reliability; and while many of the total estimated harvests for Rádeljĥkǫ́ (Fort Good Hope) and Norman Wells seem to be a true and accurate representation of actual harvest needs in those communities during that time period, there are some

specific weaknesses across all species categories, and many are not a good reflection of more recent harvesting activities.

It is clear that the numerical data resulting from the Sahtú Harvest Study need to be assessed on a case by case basis, and should not be used without the interpretive information provided by the communities. Even so, much of the information was not seen to be a good representation of local harvesting patterns and needs, and therefore should not be used as the sole source of information for important management decisions, such as calculating Needs Levels and determining Total Allowable Harvests. Accordingly, the data are not being made public, but are to be co-owned by the Board and the Renewable Resources Councils, with any further distribution or use of the results at the discretion of those organizations.

Despite the weaknesses found in the numerical (quantitative) data, the results of the Sahtú Harvest Study can still be a helpful tool in community-based conservation planning. Alternate ways of compiling the numerical data that go beyond total estimated harvests can provide insights into complex and dynamic Sahtú Dene and Métis harvesting systems. Those insights, in turn, can be applied to community information needs, discussion, decision-making, and research questions. Other data resulting from the study have already proven to be very useful in planning work, such as the application of the spatial (mapped) information to development applications.

Harvest monitoring and regulation will be important components of Community Conservation Plans, and the lessons learned during the harvest study completion project can be used to understand what conditions will be necessary for successful future programs. Community-controlled harvest monitoring and regulation are unlikely to resemble past survey models such as those used in the Sahtú however. Many new models are already on the horizon, and reflect a growing awareness that Indigenous Peoples already have systems in place for monitoring and regulating their harvesting activities – keeping a watchful eye on abundance, changing conditions, and then adapting actions are all a part of these systems. The suspicion and reluctance towards accepting introduced research frameworks and monitoring methods that do not acknowledge these pre-existing systems spans pragmatic, cultural, economic, and political realms, and can ultimately manifest in poor study results. It is not just about counting or numbers, but about controlling and embedding those numbers within an appropriate process and cultural framework, where Indigenous People can meaningfully direct the process of inquiry, own the information, and affect decision-making on their own terms.

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APPENDIX A – LIST OF SPECIES

Standard Names	Common/Local Names	Scientific Names	Dene Language Names ¹⁸ (Délne, Tulít'a and K'asho Got'ine Districts)
Large Mammals			
Black Bear		<i>Ursus americanus</i>	sah't'ea/sah dén'jtíé/bədəzi
Grizzly Bear	Brown Bear	<i>Ursus arctos</i>	sahcho/sahsho
Barren-Ground Caribou		<i>Rangifer tarandus groenlandicus</i>	ekwéwá/?ekwé wá gow'j ʔádá
Woodland Caribou	Mountain Caribou	<i>Rangifer tarandus caribou</i>	tədzí
Dall's Sheep		<i>Ovis dalli</i>	do/doge
Mountain Goat		<i>Oreamnos americanus</i>	shúhta do
Moose		<i>Alces alces</i>	jts'é/?jts'é
Muskox		<i>Ovibos moschatus</i>	gokw'i əjiré/gokw'i ʔejire ʔəjire yóné
White-tailed Deer	Deer	<i>Odocoileus virginianus</i>	
Small Mammals / Furbearers			
Beaver		<i>Castor canadensis</i>	tsá/sá
Muskrat	Rat	<i>Ondatra zibethicus</i>	tehk'áe/dzə
Mink		<i>Mustela vison</i>	tehwá
Weasel	Ermine	<i>Mustela erminea</i>	nəba
Northern River Otter	Otter	<i>Lontra Canadensis</i>	nábáə/rábə
Marten	Sable	<i>Martes Americana</i>	nəwhə/zo
Fisher		<i>Martes pennanti</i>	nəwhəcho/zosho
Wolverine		<i>Gulo gulo</i>	nəgha
Marmot	Gopher	<i>Marmota flaviventris</i>	tsele
Arctic Ground Squirrel	Gopher	<i>Spermophilus parryii</i>	dléa/sele
Red Squirrel	Gopher	<i>Tamiasciurus hudsonicus</i>	dléa
Red Fox	Cross, Silver, Black Fox	<i>Vulpes vulpes</i>	nəgére dekwo/depoi yehfe defo
Arctic Fox	White, Blue Fox	<i>Alopex lagopus</i>	nəgére dek'ale
Coyote		<i>Canis latrans</i>	dígatsele/belé ljé

¹⁸ This list of species names was updated in 2013 at the time of the assessment work. Further work should be done to confirm species names and spellings in the different dialects of the Sahtú Region.

Wolf		<i>Canis lupus</i>	díga/bele
Cougar	Mountain Lion	<i>Felis concolor</i>	shúhta ɬewódzi
Lynx	Cat	<i>Lynx lynx</i>	nóda
Porcupine		<i>Erethizon dorsatum</i>	ch'ųą/ch'q
Snowshoe Hare	Rabbit	<i>Lepus americanus</i>	gah
Arctic Hare	Rabbit	<i>Lepus arcticus</i>	gahcho/gahsho
Birds			
Ruffed Grouse	Chicken	<i>Bonasa umbellus</i>	dih/ɬehseré
Sharp-tailed Grouse	Chicken	<i>Tympanuchus phasianellus</i>	?ehtale/etsele
Spruce Grouse	Chicken	<i>Dendragapus Canadensis</i>	dih/ɬehtále
Rock Ptarmigan	Chicken	<i>Lagopus mutus</i>	k'áhba'cho
Willow Ptarmigan	Chicken	<i>Lagopus lagopus</i>	k'ahba
American Widgeon	Whistling Duck	<i>Anas americana</i>	zashishi
Bufflehead		<i>Bucephala albeola</i>	tutsele
Canvasback		<i>Aythya valisineria</i>	dahgare cho
Barrows Goldeneye		<i>Bucephala islandica</i>	
Common Goldeneye		<i>Bucephala clangula</i>	
Ring-Necked Duck		<i>Aythya collaris</i>	nóhta
Harlequin		<i>Histrionicus histrionicus</i>	
Mallard		<i>Anas platyrhynchos</i>	chuho/túriw'élé
Common Merganser	Fish Duck, Pie Duck	<i>Mergus merganser</i>	kw'ole/fole
Red Breasted Merganser	Fish Duck	<i>Mergus serrator</i>	kw'ole
Northern Pintail	Long Tailed Duck	<i>Anas acuta</i>	nagorak'ale/chjhdúwe/yéhxai
Northern Shoveler	Spoon Bill	<i>Anas clypeata</i>	dayéchare
Oldsquaw		<i>Clangula hyemalis</i>	ajléa
Greater Scaup		<i>Aythya marila</i>	dajhgare
Lesser Scaup		<i>Aythya affinis</i>	dajhgare tsele
Black Scoter	Black Duck	<i>Melanitta nigra</i>	tənakeo
Surf Scoter	Black Duck	<i>Melanitta perspicillata</i>	chuk'á
White-Winged Scoter	Black Duck	<i>Melanitta fusca</i>	tənakeo/yawileho dé
Blue-Winged Teal		<i>Anas disors</i>	chutsele
Green-Winged Teal		<i>Anas crecca</i>	chutsele/fik'qne
Brant Goose		<i>Branta bernicla</i>	dat'é/gogaht'á
Canada Goose		<i>Branta canadensis</i>	xah
Greater White-Fronted Goose	Yellow legs, Speckle Belly	<i>Anser albifrons</i>	dahk'é
Snow Goose	Wavy, Blue, Grey Goose	<i>Chen caerulescens</i>	gogarek'ale/gogah
Trumpeter Swan		<i>Cygnus buccinator</i>	

Tundra Swan		<i>Cygnus columbianus</i>	degao
Arctic Loon		<i>Gavia arctica</i>	bedárega/w'ihbé
Common Loon		<i>Gavia immer</i>	tútsi/túsi
Pacific Loon		<i>Gavia pacifica</i>	p'jbe
Red-Throated Loon		<i>Gavia stellata</i>	yanóhʔa
Yellow-Billed Loon		<i>Gavia adamsii</i>	tútsio/túsi
Sandhill Crane		<i>Grus canadensis</i>	deleho/dáleho
Snowy Owl		<i>Nyctea scandiaca</i>	báhdziga/báhdzi dek'ale
Fish			
Arctic Char	Red Fish, Silver Trout	<i>Salvelinus alpinus</i>	ʔuededele/luge dedélé
Sucker	Longnose, White Sucker	<i>Catostomus catostomus</i> <i>Catostomus commersoni</i>	dehdele
Arctic Grayling	Grayling, Blue Fish	<i>Thymallus arcticus</i>	t'áe/t'áa
Broad Whitefish		<i>Coregonus nasus</i>	ʔué wá
Lake Whitefish	Crookedback, Humpback	<i>Coregonus clupeaformis</i>	ʔu
Burbot	Loche, Lingcod	<i>Lota lota</i>	nóhkwá/nóhfá
Walleye	Pickrel, Dore, Perch	<i>Stizostedion vitreum</i> <i>Perca flavescens</i>	ʔéhch'jā/t'á
Chum Salmon	Dog Salmon	<i>Onchorhynchus keta</i>	geo sahba
Bull Trout/Dolly Varden Char		<i>Salvelinus malma</i> <i>Salvelinus confluentus</i>	dehgá sahba
Cisco	Herring, Least Cisco, Arctic Cisco	<i>Coregonus autumnalis</i> <i>Coregonus sardinella</i>	ʔuehya/lugeya
Inconnu	Coney	<i>Stenodus leucichthys</i>	Siho/sih
Northern Pike	Jackfish	<i>Esox lucius</i>	ʔóhda
Lake Trout	Trout	<i>Salvelinus namaycush</i>	sahba

APPENDIX B – HARVESTER RECORD FORM



SAHTU SETTLEMENT HARVEST STUDY

Harvester Registration Form

Community : 1 Deline 2 Nerman Wells 3 Colville Lake
 4 Tulita 5 Ft. Good Hope

Interviewer Name:

Interview Date:
Day Month Year

Harvester's Last Name:

Harvester's ID #:

Harvester's First Name:

Harvester's Sex Male Female

PART 1- ASK ALL
 First, I just want to ask you a few questions to make sure this Study is right for you. Please answer "Yes" or "No" to each of the following questions ...

Do you do <i>any</i> hunting, fishing, or trapping at <i>any</i> time of the year?	<input type="checkbox"/> NO	<input type="checkbox"/> YES
Are you 16 years of age and over?	<input type="checkbox"/> NO	<input type="checkbox"/> YES
Do you currently live in the Sault region?	<input type="checkbox"/> NO	<input type="checkbox"/> YES
Are you a Sault Dene, Sault Metis, or a Non-beneficiary of the Land Claim who provides fish and game for your Sault Dene-Metis family (e.g., non-aboriginal)?	<input type="checkbox"/> NO	<input type="checkbox"/> YES

Year of Birth-
 If answered "YES" to 16 years of age and over, ASK →
 What year were you born?

Dene/Metis or Other-
 If answered "YES" to Dene, Metis, or Other, ASK →
 Are you Sault Dene or Metis
 Non-aboriginal providing for your Dene-Metis family

IF YOU ANSWERED "NO" TO ANY QUESTION IN PART 1, THIS STUDY IS NOT FOR YOU → [Code as "B" on your harvester list, get signature, & then remove name from list] **INTERVIEW FINISHED**

IF YOU ANSWERED "YES" TO ALL THESE QUESTIONS IN PART 1, YOU ARE ELIGIBLE TO TAKE PART IN THE HARVEST STUDY → [Code as "A" on your harvester list and get the harvester's signature] **CONTINUE**

PART 2- ASK ELIGIBLE HARVESTERS-

Who is the one person in your house that does most of the harvesting? (ONLY ONE PERSON PER HOUSE)

Person being interviewed (CONTINUE)

Someone else (WRITE IN NAME BELOW & THEN FINISH. ADD ANY NEW NAME TO YOUR OFFICIAL LIST)

Are there any other adult harvesters aged 16 years plus living in your house? (ADD ANY NEW NAMES TO YOUR OFFICIAL LIST. CONTACT THESE NEW PEOPLE FOR REGISTRATION)

Are there any children under 16 living in your house who harvest? (WRITE IN NAME & YEAR OF BIRTH FOR EACH UNDER-AGE HARVESTER & THEN FINISH)

Child Harvester's Full Name (first & last)	Year of Birth
<input type="text"/>	<input type="text"/>

APPENDIX C – SUMMARY TABLES: COMMUNITY DATA REVIEW AND ANALYSIS

Colville

Representative Species / Species Groups	Comments Recorded during Community Review and Analysis of SHS Information, Colville Lake, 1998-2005
Caribou	<ul style="list-style-type: none"> • People don't like to talk about caribou too much – especially harvest numbers • Sometimes the caribou – all types – go to different places, or disappear for a couple of years and then they come back, so that must be what happened during low harvest years • During the harvest study peoples' lifeways were changing – traditional harvesting patterns were decreasing, people became more settled in Colville, and stopped hunting as much • As Colville got more diesel stoves/furnaces, houses <i>etc.</i>, animals like caribou don't come around so much anymore; they don't like the noise and smell • How can we explain to non-Dene people that harvesting is part of what keeps the caribou alive? When we harvest them they come back the next year • Harvesting is variable from year to year so it's hard to estimate needs • Caribou were close to the community in Year 1 so we see higher harvest levels • Caribou used to come close in spring too; they were at Fort Good Hope but after that community harvested about 50 animals in 1999 the caribou stopped coming there • In 2001 they were building the winter road, from 2002 there was a boom in oil exploration and drilling for about three years, and there was road construction from 2003 to 2005. So in 2002-2003 there were caribou around and people were seeing them, but they weren't shooting them because they were busy with the wage economy. 2002-2003 is when we put in all the furnaces and running water. That was the real start of the wage economy here • Diamond explorations were going on at that time and a new store came in, so there was more store-bought food available – that was another factor • In 2008 there was a recession and the oil industry went away.
Moose	<ul style="list-style-type: none"> • There was more subsistence harvesting 20 years ago, less food from the store and lots of fresh meat, so the moose estimates are not accurate. Every year people would get some; years showing no harvests are not right • The number of participants dropped by about half, Years 3-7 • Moose are starting to come around more now; there are lots of moose and they are moving into the burned areas, so people are seeing them more.

	<ul style="list-style-type: none"> • People usually get a couple moose every year, so the estimates don't look realistic.
Furbearers	<ul style="list-style-type: none"> • There are more trappers when the prices are forecasted to be higher • 2001 to 2004 everybody was busy working with oil companies, etc. so no one was trapping • Muskrat – people wouldn't bother trapping muskrat, except for food, as the price was low. In Year 1 the estimated harvest is way too high • Beaver – people don't go for them too much, maybe just for eating • Nobody traps squirrels • Wolverine – people go for them, but don't get many. People get one if they're lucky • Wolves – the harvests should be quite a bit higher. Quite a few are harvested now, since ENR is paying for them • There are only Arctic hares here; there should be no snowshoe hare harvests recorded • Some places there are lots, some places there are hardly any • People don't get too many rabbits • Rabbits migrate to different areas and disappear for a while too • Marten – the harvest estimates are way too low; the Year 1 total estimated harvest could represent just two trappers, not the whole community. There should be more year to year consistency in the data. The total estimated harvests are way off. • Spatial data: <ul style="list-style-type: none"> ○ The map doesn't seem to show enough marten harvesting areas or number of harvests. People would be harvesting marten all over the place ○ There should be a lot more red / high density harvest grids ○ Harvests should be spread out more – e.g., you should see them in a long line because people trap along cutlines – they might go 50-75 miles on a straight cutline ○ People wouldn't have wanted to report locations, because if it's on cutlines, then it's easy for someone to go trap along that area if they see a location mapped.
Fish	<ul style="list-style-type: none"> • No grayling harvests were reported to the study – this is not accurate. People do get them • The lake whitefish and broad whitefish numbers are way too low for the whole community • The study recorded tue wa (broad whitefish) harvested in the first year, then none after that. These days, that number should be as high as the lake whitefish harvest • Nowadays there are also more big trout and giant pikes at the end of Belot Lake • Overall, fish harvests should be consistent from year to year, but maybe people were too busy working to set nets once all the development started. Maybe they weren't recorded some years. But it could be that there were less fish nets, less dogs to feed, and jobs meant that people didn't have time to set nets.

	<p>People didn't need as much fish, and they would only harvest what they needed</p> <ul style="list-style-type: none"> • Everybody had dog teams until 1997, and after that, everybody started using snowmobiles • Nowadays we hardly ever catch loche. That's an old days' tradition. Elders used to say if you touch loche you're going to get clumsy, so we don't touch it • We get coney on other lakes, but not around here in Colville Lake • Spatial data: <ul style="list-style-type: none"> ○ People get lake trout and whitefish at [some lakes] and the harvests aren't mapped ○ They're all fish lakes on that map. People are probably just recording where their traditional campsite or cabin is located and they regularly set net ○ People still use the same spots but there are more cabins now – all over ○ People are still going to the same spots for their traplines and there are more cabins nowadays.
Ptarmigan and Grouse	<ul style="list-style-type: none"> • The study shows several years of zero harvests for ptarmigan and grouse – that is not accurate; people must not have reported their harvests to the study • The harvest numbers should be consistent from year to year – everybody harvests some each year • Ptarmigan – only one type lives here • Ptarmigan populations cycle up and down like caribou. They are declining now – they aren't coming around the community anymore but used to be around more in the past. Up to two years ago people were getting them around town • There are two kinds of grouse – dih (spruce hen) and æhtale (sharp-tailed grouse). People get them all year-round.
Ducks and Geese	<ul style="list-style-type: none"> • The harvest numbers could be stable from year to year, but it's hard to say with migratory birds, as they can take different routes depending on ice/weather/temperatures, etc. • Some years the numbers of geese are low or the weather is not good for goose hunting • The goose harvest also depends on the migratory route they take, and that's affected by weather, etc. • People hardly got geese in the early years; harvests went up when they got snow machines • Also, geese used to be protected in the past • Kinds of geese include: snow geese, Canada geese, and white waveys • There is only one kind of swan here, so it should all be tundra swan • The big difference is freezers now – everybody has one – plus people are also going out by helicopter in spring to where the geese are. This started around 2009 • People just shoot what they eat; so some years harvests are low (that's just how it is) • Some years, people really get a lot of geese and swans, and other years less. People go in groups. There should be some recorded for each hunter here

	<ul style="list-style-type: none"> • Merganser (fish duck) harvests are high the first year, but then low after; that harvest can also be dependent on weather. We don't get many fohgah (merganser) when the weather isn't good • People harvest fewer of all types of ducks now, because there are fewer around • Mallards are the first duck to come in spring; there shouldn't be zeros as people always get some. They are also the last to leave in the fall. Maybe people just didn't record their mallard harvest. People harvest a bit of everything for a varied diet • Pintails – hardly anyone gets those anymore as there aren't much around anymore. Even 20 years ago there were less. Some years there are hardly any; some years there are lots. • Loons are hard to pluck so people don't really go for them; they only get loons when they have no choice. • Black duck numbers should be higher; they didn't get recorded by the study. The harvest estimates should be consistent across the board • There are two different types of black ducks – yawile tsele (small) and yawile ɔodé (big) • The harvest numbers could be stable from year to year, but it's hard to say with migratory birds, as they can take different routes depending on ice/weather/temperatures, etc.
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Déljne

Representative Species / Species Groups	Comments Recorded during Community Review and Analysis of SHS Information, Déljne, 1999-2003
Caribou	<ul style="list-style-type: none"> • The estimates for ɔekwé (barren-ground caribou) harvests look good • Tɔdzı (boreal woodland caribou) harvest numbers seem far too high, especially in Years 1 and 2. Could this be a community hunt? Or did some ɔekwé harvests get reported as tɔdzı? • There were a lot of ɔekwé around Déljne during the years of the harvest study; people don't tend to harvest tɔdzı when there are lots of ɔekwé around • Year 1 (1999) numbers are the highest of the five years. Maybe people got suspicious after the first year of the survey and didn't want to take part or report their harvests? • After that, maybe ɔekwé declined during the years or the number of active harvesters declined? • It look like the number of people reporting their harvests drops off drastically in 2003. Somewhere around 2001 to 2003, PetroCan was doing exploratory drilling here, that could be the reason the harvest numbers are down. ɔekwé were coming this way but got turned back by the activity? It might be that fewer people went harvesting that year because the caribou were further away and harder to access.
Moose	<ul style="list-style-type: none"> • Moose harvest estimates seem too high – especially in Years 1 and 2.

Furbearers	<ul style="list-style-type: none"> • Fluctuations in pelt prices explain some of the harvesting patterns – for example, for some years of the study the price for a beaver pelt was low, and there is a high cost to go trapping, so it isn't worth it • From 2001 to 2005 there was a lot of oil company activity and mining activity, so a lot of young people went to work and were not out on the land as much • Another reason why the numbers may have dropped is because ENR introduced new traps and those new traps are really hard to set. It is really dangerous in the cold weather to try and set it, and that is why a lot of people probably didn't go trapping • Levels of income support can also affect harvesting levels. During some of the harvest study years – maybe the first two – the RRC was using CHAP funding to help trappers, so more people were trapping. The level of funding was decreased afterwards • The proportion of furbearer types harvested seems right (e.g., mostly marten) • Year 2 (2000) had the highest prices for marten pelts so everyone was out trapping; Year 3 and 4 numbers (2001, 2002) seem too low following that • Marten might be underreported because people use it locally for crafts instead of selling to ENR, especially when the fur price is low • Wolf harvests were unlikely to be zero in 2002 and 2003; those were years with lots of ɬekwé, so wolves would have also been abundant and some would have been shot • The pelt price may have gone down, however there are some Déljñę harvesters that get wolves annually and don't report the harvest as the pelt is used locally for crafts • Generally, trappers don't like working with wolf pelts, and there are other cultural reasons/Dene laws and beliefs about trapping them that mean people don't harvest many • Gah (snowshoe hare) is the one in the treeline and around Déljñę; gah cho (Arctic hare) is out in the barren-ground – they are not in the Great Bear Lake watershed and people don't harvest them in Déljñę. It is unlikely that that anyone went out to trap gah cho; this is more likely gah • People trap lots of rabbits every year, even when their numbers are low, so the data don't look very good. There should never be a harvest of zero rabbits • There is the same trend here as seen in a lot of the data, that the first two years of the study have very high harvest estimates, then the numbers drop off for the last three years.
Fish	<ul style="list-style-type: none"> • Fish data could be less accurate due to problems with naming. For example, interviewers may not have been knowledgeable about differences between the two different kinds of whitefish – tlu and hati (whitefish with reddish back, or round whitefish). People in Déljñę recognize three different types of whitefish and scientists only two. If there was no English term for the third type, it may have not been recorded correctly • People in Déljñę also have different names for trout • Cisco (herring) used to be the staple fish for people and dogs every day in the 1960s. There are fatty, nutritious, and you can harvest a lot at once. Now people like to get more lake trout, and use cisco as lake trout bait a lot more

	<ul style="list-style-type: none"> • Habitat destruction may have caused a decline in the herring numbers where people from Délı̄nę used to traditionally fish • People used to be able to taste the fuel from the barge in the herring and stopped fishing • Whitefish are also very important, especially on traplines; lake whitefish numbers look okay • Grayling numbers look reasonably correct • Overall, the numbers are reasonable, however they do seem very high in Year 1 again, compared to the other study years • The years where the decline started coincides with the years when people came upon lots of Ɂekwé, so maybe people were focusing more on Ɂekwé and less on fish • Loche numbers are too low; people have a net every year and get more than that; people also catch them with hook and line • Prior to 1999 people had dogs – that might have been the last year that people had a lot of dogs. Prior to that, in the 1990s, they’d be getting lots of fish, but then that probably went down too because there was a lot of other food available, the stores had more alternative food – maybe that’s why fewer people decided to fish. Even though, maybe just one or two nets are set for herring, that’s enough for the community to survive on, for their needs.
Ptarmigan and Grouse	<ul style="list-style-type: none"> • Data show a big drop in harvesting ptarmigan and grouse species after Year 1; this doesn’t seem right • Ptarmigan and grouse change patterns of where they are from time to time. They cycle, so you see large quantities then very few • There are no rock ptarmigan around Délı̄nę, so most of the harvests recorded as ‘ptarmigan species’ should be willow • People have not been seeing ptarmigan lately, so there could have been a decline • Species information for this category of birds may not be very accurate due to naming issues – there are different kinds of grouse and different ways of naming / classifying them • There are also different types of ptarmigan; there are names for two types in English, but names for three types in Slavey.
Ducks and Geese	<ul style="list-style-type: none"> • Overall, the 1999 harvest numbers appear high (again), then drop off drastically • Harvest numbers for Year 2 seem wrong for pintail and geese • There has been an overall decline in waterfowl harvests due to health concerns re: pollutants in migratory birds, and there has been an impact on numbers of birds themselves. People prefer to hunt in fall, when the birds have been feeding in the north and may be healthier • Climate change could be a factor in duck declines also • The swan harvests should maybe be higher, but because the hunt was restricted in the past, people are reluctant to harvest them. If they do harvest them, they are reluctant to report it • Harvest levels may fluctuate as birds change their migration routes from time to time

	<ul style="list-style-type: none"> • Changes in firearm regulations could have impacted duck harvesting – they used to be able to freely purchase shells, but around that time a firearm certificate became required • The trend in black duck harvest estimates seems unusual (i.e., they drop off drastically after the first year of the study), but the map looks good.
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Rádełıhkó (Fort Good Hope)

Representative Species / Species Groups	Comments Recorded during Community Review and Analysis of SHS Information, Rádełıhkó (Fort Good Hope), 1998-2003
Caribou	<ul style="list-style-type: none"> • The harvest numbers are declining because people stay out on the land less now; we all live in houses in the community nowadays. When you're out on the land, you harvest every day. But it's not like that anymore. They just hunt close to the community • Regarding the lower harvest levels in Years 4 and 5: MGM and Paramount [petroleum companies doing exploration] were active around Colville Lake in 2002-2003. They started in November, and there were plenty of people from Fort Good Hope working over there. • There was a winter road built to Colville Lake around that time – there was lots of when Paramount was active. Maybe that affected where the caribou were going • The decline in harvests during Years 4 and 5 is because caribou were farther away • Participation rates were not so good around 2003 and toward the end of the study period. • People were starting to be concerned about declining caribou populations around that time, so they might have stopped harvesting. • Maybe the number of caribou is declining, so people may have been harvesting less. • Also, that year a lot of people went out working on seismic lines so the harvest would have gone down • The cost of going hunting has gone up because of increased gas and equipment costs. • Community hunts have shifted the harvesting system. Some of the super-harvesters don't have as big a burden to provide for the community as a result. There were two hunts at Horton Lake in 2000 and 2002; also one at Tabasco Lake in 2003. • We are starting to see muskoxen here; they feed on the lichen and pee on it, so the caribou stay away from those areas. • Overall, the average annual ɔǎǎ (barren-ground caribou) harvest could be correct • While the study did not differentiate between ɔǎǎ (boreal woodland caribou) and shıhta goǎǎ (Northern mountain caribou), nobody from Fort Good Hope was going into the mountains in those days, so it is likely that all the harvests recorded are ɔǎǎ

	<ul style="list-style-type: none"> • People from Fort Good Hope might not bother going into the mountains when lots of barren-ground caribou were right here • The average annual harvest of t̄odz̄i looks right • Regarding high harvest in Year 5 of the study: around 2002-2003 we did a hunt and never got any caribou in Colville Lake, so we shot a group of t̄odz̄i around Det'one Túé (Airport Lake). That might explain the higher number in Year 5.
Other Large Mammals	<ul style="list-style-type: none"> • Moose average annual harvest estimates seem reasonable • Doge (Dall's sheep) harvest numbers seem accurate – people don't hunt Dall's sheep much. However, participants remember a trip up Mountain River by jet boat in 2000 in which sheep were harvested and there are no harvests recorded for that year by the study • Sah and Sahsho (Black bear and Grizzly bear) harvest numbers look reasonable.
Furbearers	<ul style="list-style-type: none"> • Sometimes people didn't want to talk about their winter harvest, because it's just like bragging. They aren't supposed to talk about their fur harvest either; they would more likely talk about it after the trapping season is over. They might say they're doing good or not so good, but they don't want to give a number. • A couple of times it rained before Christmas, so we had to pull in the traps and thaw them out, and then put them out again. So that might have led to reduced harvests. • There are protocols for certain families and individuals, who aren't supposed to harvest certain things, like wolf and wolverine for example. • Some people avoid wolves and wolverine because they're harder to work on, but sometimes there is a bad season for marten, and they'll take whatever they can get. • There are no trappers going out any more compared to long ago. In those days people lived out there for months, until Christmas. Nowadays people are going out from town • At the time of the study, the younger generation was working, but now the oil industry has gone down so they're turning to trapping to make a living • One obstacle to trapping is that a lot of people don't have equipment for being on the land, and the price of gas is high so people just go from town instead of travelling far • For sá and dzę (beaver and muskrat) after 1999 the river levels were really down, so that might have affected people's ability to trap them. • (Re: fairly big variations in harvesting from year to year) some families are really big on getting beavers, sometimes people go for beaver and sometimes they just leave it. People may not bother harvesting them when there's enough fur in town for clothing. • The harvest numbers for beavers parallel the numbers for muskrats. Somebody at that time (Year 2 and Year 5) must have been harvesting a lot of beaver and muskrats • Muskrat numbers declined roughly two to ten years ago – they disappeared for a while and now they're starting to come back again • The price of muskrat is really down too (trapping slows down when pelt prices are low)

	<ul style="list-style-type: none"> • Marten harvests are probably increasing now as more young people are trapping • Gah cho (Arctic hare) is not available in the Fort Good Hope hunting area – only gah is here (Snowshoe hare) – so the two hare totals should be added • No otter harvests were recorded by the study, it is rare to get them, but there are lots on the Hume River and Ramparts.
Fish	<ul style="list-style-type: none"> • People get a lot of fish in December • Changing water levels can impact fish populations. The water gets too dirty, muddy. When the water drops again and clears up, we start to catch fish again • Some years you catch lots of lugewá (broad whitefish), some years you don't. • When there is an increase in coneys there is a decline in broad whitefish – this may cycle over time • People aren't fishing as much as they used to in the past. People usually make a lot of dry fish in the summer. Now there are no dogs to feed the fish to, so there is no need to get as many biré (lake trout) but it depends if people are going trapping out at those inland lakes • Nowadays people set net out on the lakes but they don't leave it that long; it's just to get some fresh fish before they come back to town • Lugeya (herring) is used for dog food, dryfish, loche bait, and trap bait. People used to make bales of dryfish (~120 herring), and would dry and smoke the eggs for fox trap bait • Lugeya populations declined way back. They used dynamite to blast the channel in the Ramparts in the 1950s and since then we haven't had much herring; it was a spawning area for them • It's hard to get the right kind of fish nets (3.5 inch) for lugeya at the store anymore • Nqhfá (loche) are everywhere • The average annual harvests of qhda (jackfish), dahᓃᓄ (Lake whitefish), lugeya (herring), nqhfá (loche) and sih (coney) look about right.
Ptarmigan and Grouse	<ul style="list-style-type: none"> • There are only two types of grouse around Fort Good Hope – dih (Spruce grouse) and qéhtale (Sharp-tailed grouse) • The average annual harvest for dih seems very high; people haven't been seeing much of these lately • Sometimes young people shoot those birds but don't know the difference between dih and qéhtale. Others could forget not only how many they got, but what kind, so tend to report all types as "chickens" • There is only one type of ptarmigan around Fort Good Hope, so everything recorded under 'Ptarmigan Species' is actually káhba. The average annual harvest is about right • The numbers of ptarmigan cycle up and down over the years, so harvesting also cycles – some years people get a lot, some years fewer • There is lots of chicken available in the store now, so many people don't harvest as many anymore.
Ducks and Geese	<ul style="list-style-type: none"> • Years showing few or no harvests for mallard, pintail and Canada goose correspond with high harvest levels recorded for 'Duck Species' and 'Goose Species' categories – perhaps they were documented but not by species?

	<ul style="list-style-type: none"> • Game hunters that go out shooting other things might shoot a whole bunch of different ducks and they'll just say they got ducks instead of differentiating • Before the 1980s you couldn't shoot ducks and geese due to the migratory bird act. People could only shoot for two weeks in August, so they might still have been reluctant to report their harvests • There is only one type of swan around Fort Good Hope, so all those recorded as 'Swan Species' should actually be degaxo (trumpeter swan) harvests. • Túrí dedele (mallards) - the average annual harvest looks reasonable • There are just two types of black ducks here: surf scoter (yawile) and white-winged scoter (yawilehodé). The average annual harvests look reasonable • The first three years of the survey recording no xah (Canada goose) harvests is wrong • Harvesters probably combined harvests of different types of geese, reporting as unspecified "goose" harvests, as game hunters are out on the land for some months, and there is no way to tell what kind of goose it is after the fact because they were plucked right away. People might go out for three months at a time and not be able to keep track of how many geese they got. Even when harvesters are coming back and forth to town on a daily basis, they are giving away the geese and can't keep track of species numbers very easily • Goga (Snow geese or wavey) average annual harvests are much too low and significantly under-represent actual harvesting levels. Some people get lots when they go out. Goga harvests are likely lumped in with other geese in the 'Goose Species' category. • During the 1960s and 1970s there was enforcement of goose hunting restrictions. Some people would have tried to avoid bragging about their goose harvest • Nowadays a lot more young people go out hunting for geese.
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Norman Wells

Representative Species / Species Groups	Comments Recorded during Community Review and Analysis of SHS Information, Norman Wells, 1998-2005
Caribou	<ul style="list-style-type: none"> • The barren-ground caribou harvest numbers seem too high • In 2005 the caribou were at Bennett Field and very easy to get; people were driving there and getting a truckload of caribou on the winter road. When you're harvesting moose you usually just get one, but you're more likely to get five or more caribou • The harvest proportions have switched between mountain and barren-ground caribou since the study period; now people get more woodland than barren-ground. The proportions have also switched between caribou and moose (i.e., people get a lot more moose than caribou now) • Around this period, not many people were getting mountain caribou; they only started going across the river to get mountain caribou five to ten years ago • The total for woodland caribou should be higher; more people go for mountain caribou nowadays than before

	<ul style="list-style-type: none"> • At that time, t̄qdz̄i (boreal woodland caribou) really weren't taken much, just occasionally taken by chance along the river valley.
Other Large Mammals	<ul style="list-style-type: none"> • The harvest estimates for moose seem reasonable • People get a lot more moose than caribou now • The study shows the moose harvest doubling during the last two years of the study; this is a time that there was more land claim money, and a family with a lot of hunters moved back around then • During some years of the study the caribou numbers were higher and they were more accessible, so you saw less moose hunting in the earlier years. In those days you could go for weeks without seeing a moose, but now it's easy to get a moose. In the past 20 years there are more moose than before • The Dall's sheep harvest estimate appears reasonable • Black bears are usually only shot when they are nuisances • This is around the time the muskox started coming into the area; an annual average harvest of one or two animals is reasonable.
Furbearers	<ul style="list-style-type: none"> • The numbers for beaver harvests are about right; there are hardly any beaver harvested any more • Usually beaver and muskrat are hunted at the same time. Muskrat harvest estimates look reasonable. There are fewer muskrats nowadays • People have been seeing lots of bank beaver nowadays • Trapping all depends on the fur prices • Squirrel is just a by-product of trapping, off-catch • People here don't get wolverine much, they're more in the mountains • Traditionally women wouldn't wear wolf or wolverine because he's a dominant being. They're very respected and very wise • There are only gah (snowshoe hares) here – should add snowshoe and “hare species” categories together • The hare population was cycling over seven years, which likely explains changes in harvest levels • The estimated annual average harvest for rabbits might be low because some people get many, but don't report them. Some families were living on rabbits towards the end of that time; the rabbits were just thick. You could shoot as many rabbits as you want • The estimated average annual harvest looks accurate for n̄qhw̄h̄ / zo (marten). Norman Wells is not a huge trapping town – it's mostly weekend trappers, but the Year 7 estimate looks “haywire” • Some people would do a lot of trapping, but not every year. Some years they had jobs • People would harvest more in years when the fur prices were higher, so there are a few things that can affect marten harvest levels from year to year • One reason harvests may drop is forest fires going through, but marten will come back after a burn.
Fish	<ul style="list-style-type: none"> • A drop in trapping activities would result in a drop in fish harvesting – people need fish for bait when they're living on their trapline – it's the main bait used. Around the year 2000 fewer people went trapping

	<ul style="list-style-type: none"> • Not as much fish is harvested these days because people aren't trying to feed dog teams • The harvest estimates for loche seem about right; people don't go for them • People could get 20 times that amount of bluefish per day, but nobody is making dryfish anymore • The harvest estimates for coney look about right; there weren't that many nets in those days. You have to have the right size net and people weren't allowed to have a net with that small a mesh • Lake whitefish – the estimated annual harvest seems too low for the whole community. Around 1989/90 people were getting really nice whitefish at Little Doctor Lake • By the time freeze-up happens and people can get out for whitefish, they are done spawning and don't have eggs; people miss the run now because the fish are already past their prime • People started seeing more cysts in whitefish in Lennie Lake – maybe related to warming lake temperatures or people not fishing them enough. The trout used to come from Kelly Lake. People go to Great Bear Lake for lake trout by boat or winter road, or they go by Bear Rock at Tulit'a They don't harvest at Kelly Lake anymore because of mercury; they only go to Kelly Lake when the water is high • Kids used to set net and it would be loaded with herring; there's hardly any cisco in Mackenzie R. now • There are rainbow trout and jackfish with cysts between Chick Lake and the Mackenzie River; someone caught about a dozen rainbow trout • There are cycles in fish abundance. Sometimes they're around and sometimes they are not around • Salmon are really coming into the Mackenzie River now; a big silver salmon [sockeye] was caught.
Ptarmigan and Grouse	<ul style="list-style-type: none"> • Most of the ptarmigan and grouse harvest estimates seem too high, even for 1998-2005 • There were more k'ahba, dih and ?ehtale (ptarmigan and grouse) back the; people hardly harvest ptarmigan anymore • Spruce grouse harvest estimates may be a little high; sharp-tailed (prairie chicken) grouse harvest estimates seem fine • People may have got the kinds of grouse mixed up. The most abundant grouse is sharp-tail. Spruce grouse you might see three or four in a tree, with a fan for a tail and really dark; they are more scarce – people only see one or two at a time. The ruffed grouse and pintail are seen in pairs. Ruffed grouse is also called partridge.
Ducks and Geese	<ul style="list-style-type: none"> • Snow geese (white wavy or dat'e) and grey geese (grey wavy) are two different types of birds and the harvests should be separated out. Speckled-belly, cackling geese, and greater white-fronted are all terms related to grey geese • Harvests for Canada geese and grey goose should be consistent year after year • Every three or four years, the "main flock" would come through – 10 Mile and 6 Mile islands used to be just white with all kinds of geese

	<ul style="list-style-type: none"> • The Year 5 harvest estimate for snow geese is way too low, or maybe it was a year when the main flock didn't come by • Maybe geese are changing routes nowadays • Geese are avoiding the area at 10 Mile because there has been too much shooting there • We've been seeing a late moult and later birth time with geese • People haven't heard oldsquaw (long-tailed) ducks lately • 25-30 years ago, there would be ducks waiting for the geese and people would hear them before the geese in spring. Now there are more geese than ducks • For the time period of the harvest study, the Canada goose harvest estimates seem reasonable. Canada geese have been pretty constant over the years • Harvest estimates for mallards seem good • Usually people shoot an equal amount of pintails to mallards – there are not as many of either kind of duck nowadays.
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Tuġit'a

Representative Species / Species Groups	Comments Recorded during Community Review and Analysis of SHS Data, Tuġit'a, 1998-2003
Caribou	<ul style="list-style-type: none"> • There is a lot more fall hunting when there's a lot of employment and funds available to support the harvest • Overall, the harvest estimates are reasonable for nŋdile (barren-ground caribou) • There is some concern that totals seem high around Year 2/3, but this is likely due to the caribou being plentiful or coming closer at that time. After that, fire had a big impact on caribou in that area, and now there's lots of moose there. The higher harvest numbers should correspond to years when caribou came really close • The pattern of harvesting nŋdile in Tuġit'a should match the harvesting pattern in Dŋlŋŋ (e.g., if the Dŋlŋŋ harvest drops, then the Tuġit'a harvest will also drop). • Seasonal harvesting patterns seem about right – the peak in December likely indicates when the winter road opens. Caribou were close to Dŋlŋŋ during the years of the study, so people were travelling there to harvest • The “woodland caribou” results include both boreal and mountain ecotypes (tŋdzi and shŋhta ŋepŋ) as the survey did not distinguish between the two • The annual average harvest of woodland caribou seems a little low; the under-estimation is possibly due to the study not fully capturing community hunts. In Tuġit'a, there is usually a community fall harvest of mountain caribou on the Keele River • The Keele River has become unpredictable and difficult to travel on in the winter recently, so people don't travel to harvest at Drum Lake as much anymore • Caribou are changing their movement patterns – they were designed for certain areas and habitats but now they're moving around more because of

	<p>climate change. The most important thing is habitat, so as it changes they're trying to find the best habitat.</p>
Other Large Mammals	<ul style="list-style-type: none"> • The average annual harvest of ᑭᑭᑦᑦ (moose) seems reasonable; seasonal harvesting patterns also look good • In Tulít'a people mostly hunt moose • The annual average harvest of doge (Dall's sheep) seems correct • Nobody shoots black bears anymore because nobody eats them. In the 1960s people used to shoot black bears and sell them, but people don't do that anymore.
Furbearers	<ul style="list-style-type: none"> • Overall, the estimated annual average harvests seem low, possibly because people didn't want to share information about how much they harvested • The totals for beaver seem about right for that period of time – in those days there were lots of beavers. People are not harvesting beaver as much nowadays, so there are starting to be too many beaver. • If the beaver population goes up the muskrat goes down • Muskrat harvest depends on pelt price • It seems like people don't like killing wolves. There are about 12-14 wolves right around town and nobody bothers them • The wolverine numbers look reasonable • In recent years there has been a big increase in the porcupine population in the Sahtú • The rabbit data look good. However, there are no Arctic hare harvested by Tulít'a Got'jneᑦ, so all the harvests are gah (snowshoe hare) and the two categories of data should be combined • Rabbits cycle in abundance • There was a lot of seismic work during that period, so people were too busy to trap. • The federal government pushed back the border of the Tulít'a District – it was supposed to be through Blackwater Lake and along the river. That would have been a good trapping area – lots of the harvesters' fathers used to trap in that area • People expect to see ᑎᑎᑎᑎᑎ / ᑎᑎᑎᑎᑎ (marten) harvests recorded in some areas that are not showing on the map. People may be trying to hide their trapping spots and not reporting harvests. People are touchy about harvest locations and how much they caught.
Fish	<ul style="list-style-type: none"> • For ᑭᑭᑦᑦ (lake whitefish) the estimated average annual harvest seems too low; you might get that amount out of Kelly Lake or Willow Lake in a weekend. Maybe people were too busy working on the seismic line close to Tulít'a during those years. The supply of fish is consistent from year to year. In Year 3 there is a very low harvest; maybe people harvested less because they got lots of caribou that year? • There is fishing at several lakes that is not showing on the maps; maybe people are reluctant to report favourite fishing areas • For saᑎᑎᑎ (lake trout) the estimated average annual harvest is much too low. The low numbers in Years 3 and 5 correlate with low harvests of lake whitefish.

	<p>Maybe there was under-reporting those years, or people weren't fishing for some reason?</p> <ul style="list-style-type: none"> • People catch trout when they go trapping • Pickerel (walleye) are caught at the outlet of Bear River, but the harvest study didn't record any. People don't eat it because it is too boney; they may have not reported harvests for this reason • The high variability seen in harvest totals from year to year should not be due to variation in fish abundance, as their numbers are consistent from year to year • For t'áa (Arctic grayling) the average annual harvest estimate is too low. There is the same pattern of low harvests in Years 3 and 5 as for lake whitefish and lake trout. It's unheard of that people would get no grayling in a year (e.g., Yr. 5); there must be a problem with the data • For tuezha (herring) the total estimated harvest for Year 3 seems very low again. Herring abundance and harvests can fluctuate from year to year though, and overall there has been a declining trend in herring numbers • For sih (coney) the harvests for Year 1 and 5 seem low, and in those days there were lots of coney. However, people used to set nets to feed coney to their dogs and they don't do that anymore. People don't generally harvest that much coney now • Different from lake whitefish, lake trout and herring totals, Year 3 is the highest annual harvest for coney. There's more people on the land in September – that's when people harvest coney; maybe in Year 3 the interviews were done in fall so people were thinking about coney • Fish harvest records may depend on the month that the interviews took place. For example, if people are busy during lake whitefish and grayling season in spring and summer, interviews could be delayed. Fishing levels can also depend on whether people are employed in the summer months as they don't fish as much when they have jobs • When people have nets, they estimate their catch, and the numbers are usually good. There could be a mistake with the whitefish totals/categories in that people lump the two kinds of whitefish together – they'll say "whitefish" in English, and not use the Dene language terms. Data for the two types of whitefish should maybe be compiled • There is a kind of whitefish, similar to grayling but it doesn't have the high fins – dǫhp'í dehk'ale. This is in the creeks coming out of the mountains. It has a sharp nose • Suckers – dehdele – are everywhere, and there's a similar bigger fish – píozhǰ – only found at Bracket Lake. They are [getting fewer] because of a beaver dam, but more pickerel are showing up at the mouth of the creek that flows into the lake • Dolly Varden – shúhta sahba – are very scarce • No salmon harvests were recorded by the study, but some were likely caught.
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Ptarmigan and Grouse	<ul style="list-style-type: none"> • Káhba (ptarmigan), dih (spruce grouse), ɔehsele (ruffed grouse), and ɔehtále (sharp-tailed grouse) are the birds that are here; another type of ptarmigan is not usually here, but the study recorded some harvests¹⁹ • ɔehtále is more prevalent than dih; people get both of these more than ɔehsele • People usually get more ptarmigan than grouse, but in the data, grouse totals are higher than ptarmigan totals. That doesn't seem right. People mustn't have been reporting them. • There is consensus that the numbers are really low. The people were really working hard on the land in those days – this is less so now.
Ducks and Geese	<ul style="list-style-type: none"> • Seagull eggs do get harvested, but were not recorded during the harvest study • The average annual harvest for widgeon – shjeshjɛ – is too low • The average annual harvest for mallard is too high; all the data for mallard harvesting are too high. The estimated annual harvest for mallards in Year 2 is especially too high; that number should be switched with the pintail data for Year 2. Mallards have eggs in them when they fly up here, so people don't harvest them • The average annual harvest for pintail is too low • There are two types of black ducks here. Nowadays you don't get many black ducks. Maybe they all moved to the Arctic. You used to see them a lot in the fall in the 1970s and 1980s. You hardly see any in the summer • Re: zero harvests for ducks in Years 3, 4, and 5: there should be some records in the 'Duck Species' category for the last three years. A lot of young people shoot ducks and don't even know their names, so there shouldn't be zeros in any of those. This is the same for grouse too – they'll just say they shot chickens. They don't know what kinds of ducks they shoot • Mostly geese are harvested; people very seldom shoot ducks – only when they're out in the bush • The study recorded Brant harvests but no Brant geese come here • People shoot a lot of white-fronted goose, so the average annual harvest is way too low. People from Déljɛ come here; they go to Willow Lake and they shoot them on the islands in the Mackenzie River at Old Fort Point • Willow Lake gets lots of birds – thousands and thousands. When the water level is high it's hard for the ducks and geese to feed so the majority would just fly through, go north. But when the water levels are low you get thousands and thousands (i.e., in the spring time) • For Canada goose the annual harvest totals for Years 1 and 2 and the average annual harvest estimate are really wrong – way too low

¹⁹ There was some confusion around types and distribution of ptarmigan and Dene terminology. Based on scientific distribution maps, it appears that both willow and rock ptarmigan occur in the Sahtú, but willow ptarmigan tend to be more common and rock ptarmigan are not in the region year-round. See: https://www.allaboutbirds.org/guide/Rock_Ptarmigan/id

	<ul style="list-style-type: none">• For gogharek'ale (snow geese – wavey) the numbers for Years 1 and 5 don't seem right and should be a lot higher. People get a lot of geese. Some people make dry geese and swans out at Willow Lake• The average annual harvest of snow geese is way too low; you can see 10,000 in a day• Snow geese are just here in the spring. They are here very seldom in the fall, and don't usually stop here. The harvest depends on the water levels too• Not all the community hunts got recorded by the study. In Tulit'a, there is usually a community hunt for ducks/geese at Willow Lake in spring, and a fall harvest of mountain caribou on the Keele River.
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