Draft Summary Report:

Slave Geological Province Regional Wildlife Monitoring Workshop

November 26-28, 2013

Northwest Territories Environment and Natural Resources

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1 INTRODUCTION

The Slave Geological Province (SGP) Regional Wildlife Monitoring Workshop was held November 26-28 in Yellowknife, Northwest Territories. The workshop, organized by the Wildlife Division of the Government of the Northwest Territories' (GNWT) Department of Environment and Natural Resources (ENR), included representatives from government, industry, Aboriginal governments and the independent monitoring agencies. The Agenda and List of Participants are contained in Appendices A and B, respectively.

The purpose of the workshop was to discuss the status and direction of wildlife monitoring activities in the SGP with an emphasis on alignment of monitoring objectives and approaches among different partners to build a monitoring program for wildlife that will support cumulative effects assessment and management initiatives. A series of on-going workshops have been held since 2009 to discuss and set objectives for wildlife monitoring conducted primarily by the diamonds mines and government. These workshops have typically focused on sharing results of monitoring activities, harmonizing monitoring objectives and the development of monitoring protocols. In the March 2013 workshop, clear direction was given toward the development of initiatives to address monitoring, assessment and management of cumulative effects on wildlife, particularly Bathurst caribou herd. As a result, ENR drafted a discussion paper for this workshop titled *Guidance for Developing a Multi-scale Cumulative Effects Monitoring Program for Wildlife (November 2013)*, which took stock of the current monitoring activities in the SGP, proposed some objectives for the development of a regional monitoring program and provided some suggestions for moving forward. Over the course of this workshop, discussion focused on identifying a potential structure and process to provide guidance on monitoring activities, appropriate decision making frameworks for setting objectives and adjusting monitoring programs, and establishing monitoring protocols for wildlife in the region.

2 WORKSHOP SUMMARY

Summary of the workshop discussion is organized around the objectives set in the agenda for each day. A list of action items agreed to during the discussion follows each summary.

2.1 Day One – Working Together

Day one, "Working Together", focused on establishing a vision and process for developing a collaborative, multi-scale cumulative effects monitoring program for wildlife in the Slave Geological Province.

Day One Objectives:

- Update on ENR work towards a CE Framework;
- Discuss vision and process for the development of a collaborative, multi-scale cumulative effects monitoring program for wildlife in the SGP; and
- To clarify a process for modifying mine-related monitoring objectives and approaches.

Objective 1: Update on ENR work towards a CEAM Framework

Presentation Summary

Nicole McCutchen, Manager of Wildlife Research and Management with ENR, provided an overview of the draft Framework for Cumulative Effects Assessment and Management (CEAM) for the Bathurst Herd that ENR has been circulating in response to measures and recommendations coming out of recent environmental assessments (i.e. Gahcho Kue, NICO Project, Nechalacho Project) (Appendix A). The presentation began with an overview of some of the human and natural drivers of population change on the Bathurst herd, and the idea that not all of these can be managed. The presentation outlined the framework being proposed to place assessment, monitoring and mitigation of impacts to the Bathurst herd from industrial development projects within the broader context of CE management at a landscape level. Nicole explained how a number of new initiatives led by the Department of Environment and Natural Resources (ENR), existing land-claim based processes and the regulatory structure can fit together to adaptively respond to and manage CE from multiple, manageable factors on the Bathurst herd. This workshop aims to realign existing wildlife programs in the SGP so they are better suited to provide information for feeding into the framework and to test the effectiveness of management actions coming out of these processes.

Copies of the draft framework diagram were provided in print for people to review.

Key discussion points

- The biggest concern raised was how it incorporates other jurisdictions (such as the Government of Nunavut (GN)). Nicole acknowledged that this was a concern and explained that the GNWT Minister of the Environment has approached the GN regarding calving ground protection and discussions are on-going. Details regarding the specific nature of these discussions could not be provided by ENR's representatives at this workshop. Also, the GN had representation at the Bathurst Range Planning meeting in early October. Finally, ENR is registered as an intervener in environmental assessment processes for proposed projects located on or near the Bathurst calving and post-calving grounds in NU. ENR will continue to seek opportunities to engage with NU at both operational and decision-making levels.

Action Items

- Parties are to review the CEAM Framework and provide concerns or comments to ENR.
- ENR will to develop and circulate a written document that explains the relationships in the diagram.

Objective 2: Vision and process for a collaborative, multi-scale cumulative effects monitoring program

Summary

Andrea Patenaude, Environmental Assessment and Habitat Biologist with the Wildlife Division of ENR, presented "Putting the sled behind the dog team: Developing a multi-scale cumulative effects

monitoring program for wildlife in the Slave Geological Province." The presentation was based on the discussion paper prepared by ENR and circulated prior to the workshop entitled *Guidance for Developing a Multi-scale Cumulative Effects Monitoring Program for Wildlife.*

The objective of the presentation was to assess where monitoring is right now and stimulate thinking on how it can be enhanced or modified to make it better support the CEAM Framework that Nicole talked about. CE monitoring requires monitoring of key demographic variables for the species of interest as well as potential drivers of population change (environmental, landscape level and local level variables) at an appropriate scale and having this information available to support CE assessment and management initiatives (i.e. Range Planning, management planning, CE modeling etc.). In the same way that Wildlife and Wildlife Habitat Protection Plans and Wildlife Effects Monitoring Programs developed by industrial operators are used to monitor and adaptively manage project level impacts, a Cumulative Effects Monitoring Program for Wildlife in the Slave Geological Proving can provide the basis for integrating project-level assessment into regional level assessment and for adaptively managing impacts at the cumulative level. Collaborative monitoring among partners is a key way of achieving this. One of the main conclusions is that we already have a Cumulative Effects Monitoring Program for Wildlife in the Slave Geological Province as many of the key pieces for some species are already being tracked and some collaborative partnerships are in place. The question is what more do we need?

Stemming from this presentation, three main discussions topics were identified:

1. Do we have it right?
2. What is missing?
3. How to do we get there?

Key discussion points

- The Discussion Paper was well received by those who had reviewed it; however it was clear others needed more time. As such, minimal discussion followed the presentation.
- There was an identified need for the discussion paper to be revised to have a more substantive assessment of what has worked well and what are lessons learned from past regional or CE programs (i.e. Beaufort Regional Environmental Assessment, West Kitikmeot Slave Study) and collaborations that can help guide program development moving forward. For example, the WKSS was an early approach to regional monitoring, but it did not link well back into management. Some suggested that this could be a model to look towards, but it was made clear that there is no big funding envelope on the horizon as there was for the WKSS, so we need to look to a model that is more reflective of the current situation.
- Those who had not reviewed the Discussion Paper were asked to do so and provide comments directly to ENR. If ENR does not receive any further feedback, they will proceed on the assumption that the content is reflective of the current state of monitoring and options for future direction on monitoring will also come from further discussion on specifics at this workshop.
- The group identified a need for clear management direction, as stakeholders are looking for more direction. ENR recognizes that in the past there has not been an organization that has taken the lead, resulting in the lack of an integrated approach to cumulative effects monitoring, assessment and management; however ENR is moving towards becoming that lead.

- There were comments that the Framework presented by ENR seems to focus disproportionately on how regulatory processes (EA, effects of development) contribute to CE. Some considered this focus misplace given that cumulative effects are much broader. However, ENR suggested that because there is already a clearly defined regulatory process it is easier to envision how those pieces fit together. Other potential causative mechanisms are captured in the other side of the framework diagram.
- There was an identified need for the discussion paper and approach to better include Traditional Knowledge.
- There is a need for flexibility to adjust monitoring if it is determined it can be modified to makes make a better contribution to understanding impacts at a regional scale.
- Something missing from this is a clear strategy for data management including storage, sharing and maintenance. This needs to be considered for the long run.
- Options how this monitoring program should be structured were discussed. The group entertained the suggestion that there should be two levels. First level is a guiding working group which will set objectives and determine monitoring and research priorities; it will be their responsibility to provide the direction for the multi- scale CE monitoring program for wildlife. The second level will consist of a series of technical working groups or task groups, focused on areas of expertise or particular questions. These task groups could be responsible for advising the overall guiding working group on potential research questions and priorities.
- Upon considering these levels as a way forward, it was noted that priorities and questions related to caribou will be identified through various processes such as the Bathurst Range Planning Process and ENR's Barren-ground Caribou Management Strategy and even through these workshops and that having this type of working group at this time may simply be adding another level of unnecessary complexity and duplication or striking it could slow down momentum.
- Some felt that the status quo could be enhanced by establishment of technical working groups being established around particular questions and reporting back to larger forum.
- Some participants felt that there was enough understanding of the information gaps and monitoring priorities at an operational level that progress could be made on some things in the interim, without having to wait for a guidance committee to be established. To support this, workshop participants were provided worksheet to list priorities (Appendix D)

Action Items

- Revisions to the Discussion Paper will include some analysis of CE regional monitoring programs undertaken in the past or elsewhere in order to learn from and build on these examples;
- Individuals will contact ENR in writing if they have any issues with the discussion document, otherwise ENR will move forward with the general approach proposed in in it;
- ENR to ensure message that they will take lead on CEAM initiatives is clear;
- ENR will provide a tally of research priorities identified by workshop participants and develop some guidance on data gaps for cumulative effects assessment on the Bathurst herd.

Objective 3: Modifying mine-related monitoring objectives and approaches

Summary

- There was discussion to address how mine-related monitoring objectives and approaches could be modified when appropriate. It stemmed from a recent issue regarding the mines' decisions to seek a temporary reprieve in aerial surveys in their caribou monitoring programs during the summer of 2013 due to low numbers of caribou approaching the mines. The mines approached ENR with this plan, ENR agreed with the rationale and issued a letter to that effect with the caveat that other parties to the Environmental Agreements would need to be consulted. This approach was not well-received.
- The mines explained some of the constraints they are up against when planning monitoring programs from year to year and the need for flexibility to accommodate changing conditions, and figuring out what level of consultation is required for what types of changes is not always straightforward. A multi-year research programs might help with flexibility.
- Representatives from the First Nations and the independent monitoring agencies felt ENR letter didn't provide enough details on when zone of influence monitoring would be resumed or how obligations in the mines Environmental Agreements would continue to be met.
- All agreed they would like to see better communication; however what that communication involves was not defined and is still left to ENR to intuitively decide.
- There was agreement that some type of further information regarding when and how ZOI monitoring would be resumed is still needed.

2.2 Day Two – Caribou

Day Two Objectives:

- Discuss and reach an agreement on refined monitoring objectives and approaches;
- Discuss and reach agreement on the when and how ZOI monitoring that satisfies local and regional requirements; and,
- Discuss next steps for caribou monitoring in the context of the CE Framework.

Objective 1: Agreement on Monitoring Objectives and Approaches

Andrea Patenaude presented the three (3) objectives for caribou monitoring drafted at the March 2013 meeting for discussion.

1. Determine if caribou behaviour changes with distance from the mines;
2. Determine whether ZOI changes in relation to mine activity; and
3. Determine if caribou abundance and disturbance changes in the study area over time.

Key discussion points

- Collectively the group agreed the first objective is fine.

- The group was reluctant to agree to the second as stated until there is some common understanding of under what conditions monitoring of ZOI is appropriate and statistically justified. Some felt it was too narrow in scope and misses out capturing causation or potential for mitigation.
- The third objective, as it currently reads was too simple. The group agreed that it is already known that caribou abundance and distribution do change in the study area. There was discussion around the need to revise the third objective to focus on determining the factors that drive change.
- The third objective will be amended to: "Determine what drives caribou abundance and distribution over time".

Action Items

- ENR to redraft the third objective to focus on causes of abundance and disturbance changes; and,
- In the interim, continue to focus on the first objective, with more thought and research on the second objective.

Objective 2: Discuss and reach agreement on ZOI monitoring

Summary:

Two presentations were given to provide context for the ZOI monitoring discussion:

1. Daniel Coulton of Golder presented "Zone of Influence: Review of the Aerial Survey Approach." Dan reviewed the approach to monitoring ZOI at Diavik & Ekati between 1998-2008 that detected a ZOI of between 12-15.5 km. With establishment of an estimate for the size of a ZOI, the question being raised is whether there is a benefit for continued ZOI monitoring to support CEA purposes. Overall, aerial surveys are easy to implement, can provide information on other wildlife, record actual conditions versus assumed conditions and are conducive to community participation; however, detecting a ZOI is dependent on weaknesses in current design, they require a sufficient number of caribou to be present, may disturb caribou, and do not feed into adaptive management of mine operations.
2. John Boulanger, of Integrated Ecological Research, presented "Estimation and monitoring of the zone of influence of mine areas". The presentation also reviewed the approach his team took to estimating ZOI for the Ekati/Diavik area. Generally, they estimated ZOI by assessing a change in habitat selection as a function of distance from the mine area. While they did provide an estimate based on aerial survey data, it is important to realize that ZOI can vary temporally and spatially. ZOI cannot be determined if there are no caribou to monitor, although data can be pooled across years to increase sample size. ZOI can be estimated with smaller sample sizes if the calculation is based on an already existing habitat (resource selection function) model, otherwise analysts have to develop and validate their own models, which requires a large amount of data. John provided some general recommendations for assessing bare minimum sample sizes, suggested that an adaptive approach to conducting aerial surveys could be considered, and highlighted the need for regional base habitat models to support ZOI estimation.

Key Points of Discussion

The discussion following these presentations was meant to focus on when and how to monitor ZOI, however consensus could not be reached on a process for moving forward. As a result, it was decided a technical working group would be developed, including representatives from industry, ENR and technical experts who will develop appropriate guidelines for monitoring ZOI. ENR committed to driving this process.

Action Item:

- ENR to set-up and coordinate a technical working group to develop guidance on when and how ZOI monitoring should occur.

Objective 3: Discuss next steps for caribou monitoring in the context of CE Framework

Summary:

Brian Milakovic of ERM Rescan provided a presentation on the application of remote cameras for wildlife monitoring. He provided an overview of how the method was used to detect activity patterns near Sabina's proposed Back River project as well as to record caribou behaviour along Ekati's Misery Road. Cameras may be particularly helpful for studies in Nunavut where aerial surveys by industry are not permitted. There is a good opportunity to include TK holders in determining design and placement of cameras to maximize wildlife triggers. He notes some of the pros and cons of this method and recommended some general types of questions that can be addressed with cameras. This method provides a good way to capture location data at distinct locations on the landscape. There are heavy data processing requirements, although recognition software is developing all the time and can make it more feasible.

Key discussion points:

- Further technical features of this method were discussed.
- Brian indicated that they have an annotated bibliography that can support further discussion
- No further discussion took place on the next steps for camera monitoring in the context of ZOI monitoring as it was determined that the technical working group could address this.

2.3 Day Three - Carnivores

Day 3 Objectives:

- Updates on carnivore monitoring;
- Discuss and agree upon monitoring protocols for wolverines; and
- Discuss and agree upon monitoring protocols for grizzly bears

Objective 1: Discuss and agree upon monitoring protocols for wolverine

Presentation Summary:

John Boulanger presented "A review of wolverine monitoring with power analysis to plan future field efforts" based on data collected at Daring Lake by ENR, and at the Ekati and Diavik mines. In the presentation, John reviewed two main methods for handling DNA-hair snagging data (a. mark-recapture models, and b. the Pradel model which can generate trends in local demography based on apparent survival and additions), provided a summary of past results and used power analyses he conducted to provide recommendations for the development of new programs and ongoing projects. It finished with a discussion of optimal survey intervals and designs to detect change.

Key discussion points:

- The question was raised regarding whether wolverine are learning from repeated visits to baited posts (i.e. no reward after initial visit might decrease later capture probability); however this is not really an issue as the initial detection rate for wolverine is high (0.5-0.6/session) and they tend to visit multiple posts, even with a large grid size (5km X 5km). Also, new wolverines are nonetheless being detected throughout.
- For start-up projects a key point is that you need a sufficient sample size (# of wolverine) in the beginning to be able to detect change in subsequent years. A minimum study area of 1500km^2 is recommended to detect at least 20 animals, the bare minimum needed to detect a 5% annual decline over 10 years. If you have 40 initially, you can increase your power, but you may need to >2000km^2 to get it. A larger cell size will allow you to cover more area. A single study are might have trouble achieving that alone.
- Based on findings so far, there appears to be movement among the individual project grids (i.e. Daring Lake, Ekati, Diavik) which brings the initial assumptions that the study areas are independent and that Daring Lake serves as a control into question. This then has implications for where we are going with this study and if we are monitoring at the right scale. If our objective is simply to track trend, which is useful for basic management purposes and possibly as an input into a caribou CE model, then what we are doing is probably good. But if we want to start looking at CE to wolverine and the possible impact of the mines on wolverine (i.e. ZOI) or other regional influences, then we need to adjust our design. For example, we need a real control (which is difficult), we need to start incorporating covariates into the design or we need to make the grid finer. Better knowledge of mortality factors would help.
- This sampling approach is probably not appropriate for forested habitat and some logistical considerations and potential other approaches (i.e. collaring, trees as posts etc.) were discussed.
- For continuing projects, the design has been sufficient to detect a ~10% decline /year. In fact current individual study designs can detect 5% change per year. But to detect a smaller change (2.5%), only a pooled analysis (among mine sites) would work. This raised the question: how much of a change do we need to be able to detect in trend? Comes back to objective. If we are mostly interested in trend detection and are satisfied with higher change detection level, might we scale back on the regional program? Smaller survey intervals? Smaller study area? These questions have resourcing implications for mines, and need to be addressed.
- The point that we need to be adaptive and check in as new results come in was made.

Discussion on Draft Standardized Protocol:

After the presentation, a discussion formed around the wolverine protocol developed by ENR. It was identified that the objective in the protocol is not correct. ENR acknowledged this and will be update the protocol with the appropriate objective. However this does not have a significant impact on the drafted protocols, ENR wanted to fill in the missing pieces of information. The group determined that any gaps could be filled by the technical experts, it was unnecessary for this group to complete. The general comments that were received on the protocols include:

- Covariates linking to a larger CE discussion need to be addressed;
- A section is required regarding context, and how monitoring is going and how it will feed into species legislation (for both wolverine and grizzly bear documents).
- The protocols are more specific than expected. It was expected there could be more discussion on the trade-offs and cell size, written as if it is just for Daring Lake or Diavik etc. rather than a general regional approach for new mines coming in. This approach would ensure that new mines can tailor this to consider their mine; and
- A positive start, glad to see work under way.

Action Items:

- John Boulanger was going to provide some references on wolverine monitoring in forested areas.
- ENR will fix the error regarding the objective of the monitoring program in the draft protocol to reflect the March 2013 agreed upon objective.
- Written comments on the protocols will be received and compiled by Andrea Patenaude to incorporate in the next draft of the protocol to be discussed at next regional carnivore monitoring discussion.

Objective 2: Discuss and agree on monitoring protocol on grizzly bear

Summary:

Two presentations on regional grizzly bear monitoring were given.

- Tyler Jensen, an MSc student from the University of Calgary under Dr. Marco Musiani, presented "Collaborative research on grizzly bears and the barren-ground ecosystem." He shared preliminary results of the grizzly bear DNA sampling he has been conducting on behalf of DeBeers in which more hair samples were collected around Gahcho Kue than around Snap Lake, but still quite a bit lower than the northern portion being sampled by DDEC and DDMI. He is proposing that this work could contribute to a larger collaborative NSERC-funded research program to address four possible objectives including: a) determining distribution and abundance around mines, b) estimating kill rates on barren-ground caribou, 3) modeling range expansion based on bear food at a continental scale and d) evaluating population connectivity and diet. They are open to other collaborators.
- Brian Milakovic of ERM Rescan presented on the 2012 results of the Lac de Gras Grizzly Bear DNA study that is jointly funded by DDEC and DDMI. While analysis of data from 2013 had not yet been analyzed, the indication is that results of "density" consistent with 2012 finding. In

2012, they detected 33 bears through DNA sampling, but 57 through camera monitoring suggesting the DNA was under detecting bears. Over both years they detected 112 bears, with 6 from the Hackett and Izok study areas in Nunavut. While actual density estimates cannot be calculates due to violation of the assumption of population closure, they estimate levels of approximately 7-10 bears/100 km, which would indicate a stable to increasing trend since earlier studies in the region. For continued trend monitoring, the target minimum of 50 bears is necessary, 100 bears ideal, to enable long term monitoring, which is possible through partnering. They propose that a 12 x 12 grid allows for sufficient detection rates. The final report is expected to be released in June 2014.

Key discussion points:

- The discussion from the presentation led to how often monitoring program should occur and what is the appropriate size of the sample area and research cells. While 12x12 cell size appears to work in the North where ranges are bigger, it may preclude using the data to address other objectives for which a 10x10 might be more appropriate. Consideration of the cost of the program balanced against objectives should be reflected in the protocol. Brian acknowledged that without the 2013 set of data it is hard to answer some of these questions.
- Addition of cameras to the study has been helpful for determining effectiveness of poles for capturing DNA and looking at relative age of bears and presence of family groups, since DNA does not capture age.
- A discussion of which models are appropriate for analysing mark-recapture type date ensued, and Brian indicated that they will be using the Pradel model for analysis of the complete dataset.
- Reports from land users in Nunavut suggest that there are more grizzly bears moving north.

Discussion on Draft Standardized Protocol:

- Discussion of the grizzly bear monitoring protocols drafted by ENR indicated that there is more technical work that has to be completed. It was noted that the draft protocols were apparently based strictly on the current regional partnership, with limited scientific basis and further work to substantiate those protocols is needed.
- The biggest items of considerations when redrafting those protocols include:
    - Defining scientifically sound methods for grizzly bear monitoring in the region based on a wider sample of scientific region; and
    - More consideration for trade off and choices on cell size, frequency and flexibility for resources. Taking into account the extent of resources required to monitor.

Action Items

- People are expected to provide any comments to ENR; and ENR will revisit and revise the protocols based on comments received and results of final analyses.

Objective 3: Discuss the need for wolf protocol and update wolf monitoring

Summary:

Dean Cluff of ENR presented "Monitoring Wolves in the North Slave Region" which described the tundra wolf population research he has been involved in since 1996, and results of the most recent collaring program conducted by graduate student Mike Klaczek. Wolf den monitoring has been the main method by ENR to track wolf trends as wolves return to the same sites each year, and many den sites have been identified. Surveys designed to test occupancy starting in 2006 suggest a declining trend until 2011, while the number of adults observed per den and average pup counts have decreased; however program evaluation suggests that collaring is needed to complement these surveys. ENR has been running carcass collection programs and skull collection programs which have provided additional information although, opportunities to collect have been highest near communities. Assessing wolf populations is important as they are a limiting factor on the Bathurst herd. Preliminary results from the collaring study initiated in 2013 suggest that wolves on the tundra are not always associated with caribou, migratory caribou and wolf dynamics are a complex system. Dean suggests that wolf control targeted specifically at the range of one caribou herd may not have desired results for increasing the caribou herd.

Key discussion points:

- Feedback from the harvesters in the room and the individuals working on mine sites indicated there have been wolf more sightings and there are concerns the effect they have on caribou.
- Discussion around the question of whether there is need to develop a wolf monitoring indicate that it is a topic best addressed between ENR and their partners and doesn't need to include industry. Any protocols that are established should be done at a regional scale and not at a project specific scale.

3 CONCLUSION

At the end of the third day of the workshop, closing remarks were provided by representatives from industry, ENR and others. Overall most people were happy with the progress made at the meeting. Industry left a very clear statement that they are expecting ENR to provide the lead and that there is a need to look beyond project specific issues to CE. Industry is still interested in collaborating with ENR and other parties and will work to communicate better, sharing experiences with new mines and others in similar experiences.

With a few more acknowledgements and thanks from other parties, the workshop ended. ENR will now take these results and continue to work towards developing the multi-scale CE monitoring program.

APPENDIX A: AGENDA

REGIONAL WILDLIFE MONITORING WORKSHOP

November 26-28, 2013

Yellowknife Inn, Copper Room, 5010-49th St. Yellowknife, NT X1A 2N4

Workshop Objectives:

Day 1 – Working Together

- Update on ENR work towards a Cumulative Effects Framework
- To discuss vision and process for the development of a collaborative, multi-scale cumulative effects monitoring program for wildlife in the Slave Geological Province
- To clarify a process for modifying mine-related monitoring objectives and approaches

Day 2 – Caribou

- Discuss and reach agreement on refined monitoring objectives and approaches
- Discuss and reach agreement on the when and how ZOI monitoring that satisfies local and regional requirements.
- Discuss next steps for caribou monitoring in the context of CE Framework

Day 3 - Carnivores

- Updates on carnivore monitoring
- Discuss and agree upon monitoring protocol for wolverine
- Discuss and agree upon monitoring protocol for grizzly bear

DAY 1: TUESDAY NOVEMBER 26, 2013

Morning session

8:30 am	Registration
9:00 am	Introductions, review of agenda and objectives (Margaret Kralt / Andrea Patenaude)
9:30 am	Update on action items from the last meeting (Andrea Patenaude)
9:40 am	Progress on work towards a Cumulative Effects Framework (Nicole McCutchen)
10:15 am	**Coffee Break**
10:00	Developing a multi-scale CE monitoring program for wildlife in the SGP (Andrea Patenaude) Discussion: Developing a multi-scale CE monitoring program for wildlife in the SGP • Proposed objectives: do we have it right? • What is missing? • How do we get there?
12:00 pm	**Lunch Break (lunch is not provided – visit local eateries in the area)**

Afternoon session

1:15 pm	Discussion continues.
2:45 pm	**Coffee Break**
3:00 pm	Discussion: Determining a process for changing monitoring objectives and approaches
4:00 pm	Discussion: MOUs – are they needed in the context of earlier discussion
4:30 pm	Wrap up and Next Steps (Margaret Kralt)

DAY 2: WEDNESDAY NOVEMBER 27, 2013

Morning session

8:30 am	Introductions and review of agenda (Margaret Kralt)
8:45 am	Discussion: Tightening up monitoring objectives for caribou
10:30 am	**Coffee Break**
10:45am	Benefits and limitation of the aerial survey approaches (Daniel Coulton) Guidelines for when and how to monitor ZOI (John Boulanger)
12:00 pm	**Lunch Break (lunch is not provided – visit local eateries in the area)**

Afternoon session

1:15 pm	Discussion of when and how to monitor ZOI
3:00 pm	**Coffee Break**
3:15 pm	Approaches and collaboration in monitoring for CE: • Applications of camera monitoring – Brian Milakovic • Other opportunities for collaboration? Behaviour? ZOI mitigation?
4:30 pm	Wrap up and Next Steps (Margaret Kralt)

DAY 3: THURSDAY NOVEMBER 26, 2013

Morning session

8:30 am	Introductions and review of agenda (Margaret Kralt)
8:30 am	Wolverine Power Analysis results - John Boulanger
9:00 am	Discussion of Wolverine Protocol
10:00 am	**Coffee Break**
10:15 am	Update on DeBeers Research Collaboration with U of Calgary – Tyler Jessen Update on 2012 grizzly bear results and power analysis – Brian Milakovic Discussion: Grizzly Bear Protocol
12:00 pm	**Lunch Break (lunch is not provided – visit local eateries in the area)**

Afternoon session

1:15 pm	Update on ENR wolf monitoring (Dean Cluff) Discussion: Should we develop a protocol for wolves?
2:45 pm	**Coffee Break**
3:00 pm	Revisiting “parked” issues
4:30 pm	Wrap up and Next Steps (Margaret Kralt)

4 **NOTE: ALL TIMES ARE APPROXIMATE**

APPENDIX B: LIST OF PARTICIPANTS

DAY 1- WORKING TOGETHER:

- Brian Milakovic – ERM Rescan
- David Wells - DDMI
- Harry O'Keefe - DDEC
- Claudine Lee – DDEC
- Albert Bourque – GNWT South Slave
- Roger Fraser- GNWT ENR
- Karin Clark – GNWT ENR
- Dean Cluff- GNWT – North Slave
- Damien Panayi - Golder
- Daniel Coulton – Golder
- Boyan Tracz - WRRB
- John Boulanger – Integrated Ecological Research
- Jan Adamczewski – GNWT ENR
- Robert Mulders – GNWT ENR
- James Hodson – GNWT ENR
- Joel Holder - GNWT ENR
- Earl Evans – BQCMB
- Trevor Beck – Northwest Territories Metis Nation
- Patrick Simon – Deninu Kue First Nation
- Matt Hoover – North Slave Metis Alliance
- Eric Binion - North Slave Metis Alliance
- Dean Cluff – GNWT – North Slave
- Tyler Jessen - University of Calgary
- Mike Tollis - LKDFN
- Michelle Peters – DeBeers Snap Lake
- Mark Wiseman – Avalon Rare Materials
- Jane Fitzgerald - AANDC
- Jen Potten – MVLWB
- Nichole McCutchen – GNWT ENR
- Andrea Patenaude – GNWT ENR
- Todd Slack - YKDFN
- Phillipe di Pizzo – SLEMA
- Zhong Lui – SLEMA

DAY 2 - CARIBOU:

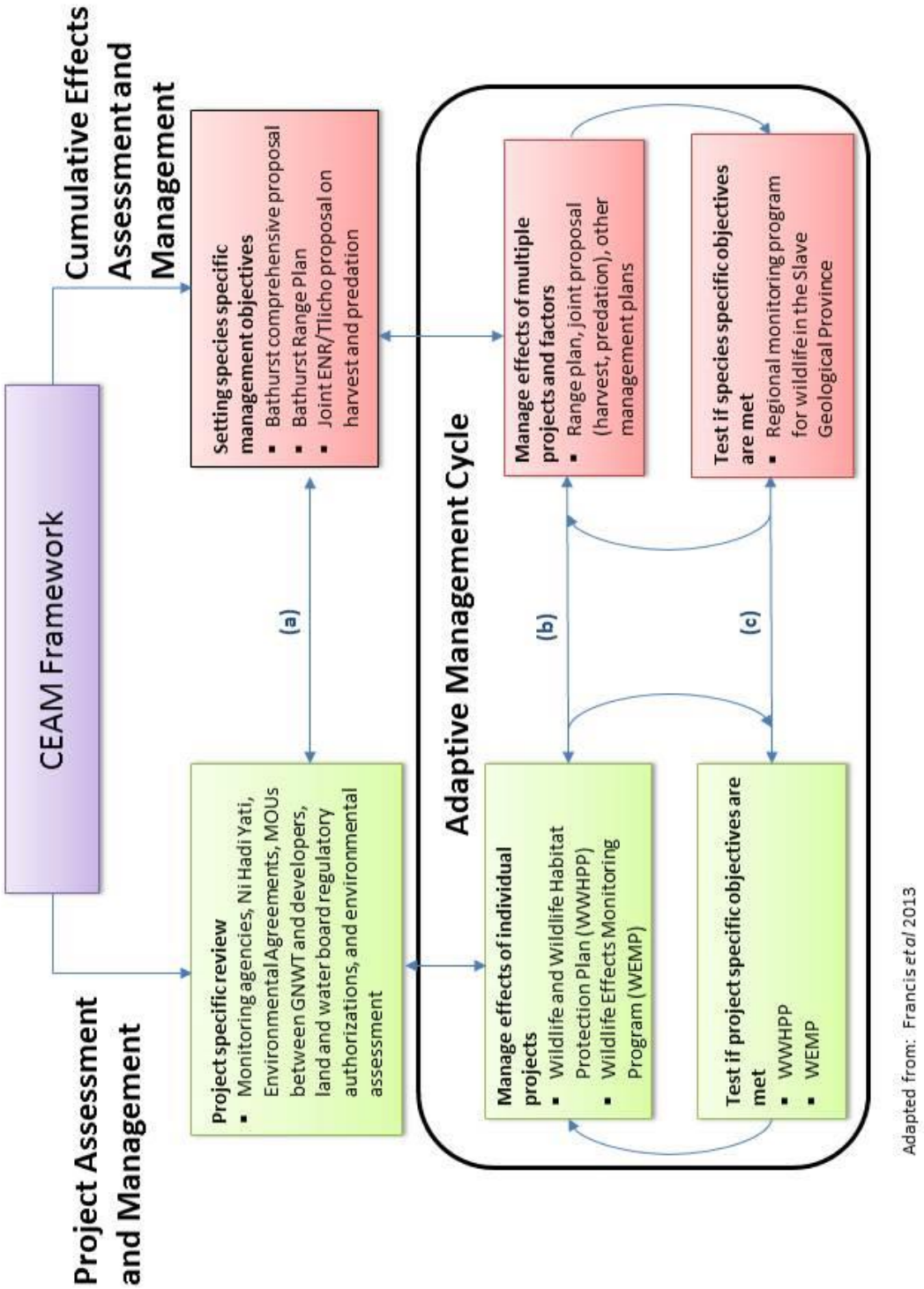
- David Wells - DDMI
- Harry O'Keeffe - DDEC
- Claudine Lee - DDEC
- Albert Bourque – GNWT ENR
- John Virgl – Golder and Associates
- Dan Coulton – Golder and Associates
- Damian Panayi – Golder and Associates
- Boyan Tracz – WRRB
- John Boulanger – IER
- Jan Adamczewski – GNWT - ENR
- Robert Mulders – GNWT - ENR
- Glenn Wagner – MMG
- Earl Evans – Beverly Qamanirjuaq Caribou Management Board
- Trevor Beck - NWTMN
- Patrick Simon - DKFN
- Matt Hoover – North Slave Metis Alliance
- Eric Binion – North Slave Metis Alliance
- Craig Blackie - DeBeers
- Tyler Jessen – University of Calgary
- Michelle Peters – Debeers
- Mike Tollis - LKDFN
- Mark Wiseman – Avalon Metals
- Jane Fitzgerald –AANDC
- Nicole McCutchen – ENR
- Andrea Patenaude - ENR
- Joel Holder – ENR
- Leslie Wakelyn - BQCMB
- Karin Clark – ENR
- Dean Cluff – North Slave
- Brian Milakovic – ERM Rescan
- Charles Klengenbery – DDEC
- Kevin O'Reilly – IEMA
- Todd Slack – YKDFN

DAY 3 - CARNIVORES:

- Brian Milakovic – ERM Rescan
- Harry O'Keefe - DDEC
- Claudine Lee - DDEC
- Albert Bourque - ENR
- Robert Mulders - ENR
- Boyan Tracz - WRRB
- Trevor Beck - NWTMN
- Tyler Jessen – University of Calgary
- Glenn Wagner – MMG
- Dan Coulton - Golder
- David Wells - Diavik
- Patrick Simon - DKFN
- Craig Blackie - DeBeers
- Michelle Peters - DeBeers
- John Virgl - Golder
- Philippe Di Pizzo - SLEMA
- Matt Hoover - NSMA

Facilitator: Margaret Kralt – Dillon Consulting Limited

APPENDIX C: CEAM FRAMEWORK DIAGRAM



APPENDIX D: RESEARCH QUESTIONS AND MONITORING GAPS PRIORITIZED BY WORKSHOP PARTICIPANTS

	MONITORING / RESEARCH QUESTIONS	Count
1	What are the thresholds for disturbance to caribou?	6
2	What are the causative mechanisms of ZOI on caribou? How can we mitigate factors that cause caribou avoidance?	5
3	What are the effects of new roads and increased road traffic on the behaviour and movements of carnivores? Caribou?	5
4	How are range conditions changing on the Bathurst seasonal ranges?	5
5	Where are the high value habitat areas for caribou?	4
6	What is the significance of predation by different carnivores on caribou at high and low points in the herd cycle?	4
7	What are the key indicators that should be monitored regularly and in perpetuity?	3
8	What is a sustainable harvest level for harvested species?	3
9	What are the effects of 'X' mitigation or management action on the species of concern?	3
10	How is the Bathurst summer range condition affecting the condition and pregnancy rate of cows?	2
11	How does caribou foraging affect the range and vice versa?	2
12	What is the relative abundance of grizzly bear/wolverine/wolves in the SGP?	2
13	How are caribou, grizzly, wolves etc. movements, behaviour, energetic costs affected by to industrial development and linear features in the barrens (i.e., movements, avoidance behaviours, energetic costs of disturbance)?	2
14	What trends in fire frequency and extent can be expected for the Bathurst winter range and how does this relate to habitat availability	1
15	What are the best practices for reducing wildlife attraction at small camps, given other environmental concerns such about air quality associated with burning of wastes?	1
16	How do population levels of other ungulate species (musk oxen, moose) affect caribou?	1
17	Can we identify areas that should be protected from fire? Can we identify areas likely to burn in the next 10, 25, 50 years?	0
	MONITORING GAPS / NEEDS	**Count**
1	What is the role of TK in addressing some of the big research questions?	7
2	Is there value in establishing permanent vegetation plots on the Bathurst range? Who will monitor them?	6
3	When and how should monitoring zone of influence for caribou (if and when) occur?	6
4	Are three opportunities for community monitoring programs to coordinate, align monitoring objectives, develop protocols?	6
5	Compilation of different sources of mortality data collected by various means (i.e., harvest, reported defense of life & property kills, export permits, community harvest studies, check stop reporting, carcass collection programs, etc.).	4
6	What information on the health and disease status of caribou do we have? What is needed? How will this information be used to assess and manage cumulative effects?	4
7	What are the opportunities for remote sensing data analysis of disturbance? Is there a role here for collaboration with NASA and for collaboration with the NWT Centre for Geomatics?	4
8	What are the key environmental variables to monitor in the long term and at what temporal scale (monthly, annually, seasonally)?	4
9	What are the key habitat variables to track for caribou, grizzlies, wolverine, wolves?	3
10	How can we facilitate the compilation and use of landscape disturbance information in the SGP specifically?	3
11	Is there a need for a protocol for monitoring caribou behaviour among the mines?	3
12	Do we have the habitat data we need to assess CE on caribou and other species?	2
13	Can we identify areas that should be protected from fire? Can we identify areas likely to burn in the next 10, 25, 50 years?	2
14	Are data on the necessary environmental variables available for the SGP?	2
15	What role can new developments play in improving meteorological data for the region?	1
16	Are there more feasible ways to monitor grizzly bear and wolverine population trend either between hair-snagging study years or instead of hair-snagging (e.g., collaring?)?	0
17	Does the way we currently monitor wolves truly reflect what is happening with wolf trends? Do we need to define a protocol for wolves?	0