



Final Report

Hudson Bay Front-Line Operators Workshop on Human-Polar Bear Conflict Reduction

March 21-24, 2016

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About the convening organizations:

Polar Bears International. The PBI mission is to conserve polar bears and the sea ice they depend on. We also work to inspire people to care about the Arctic and its connection to our global climate.

University of Saskatchewan, School of Environment & Sustainability. The School of Environment and Sustainability (SENS) mission is to enable sustainable communities and environments through collaborative research and teaching, graduate student engagement, and community involvement. We broaden understanding and develop champions of environmental sustainability by creating, exchanging, and translating knowledge using diverse perspectives.

World Wildlife Fund – Canada. WWF is one of the world’s largest and most experienced independent conservation organizations, with over five million supporters and a global Network active in more than 100 countries. WWF’s mission is to stop the degradation of the planet’s natural environment and to build a future in which humans live in harmony with nature, by conserving the world’s biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

For further copies of this report or related information, contact:

Pete Ewins, WWF-Canada, 245 Eglinton Avenue East, Suite 410, Toronto, Ontario. M4P 3J1. Canada.

pewins@wwfcanada.org www.wwf.ca 1-416-484-7711



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Contents of this report are a record of the workshop participants' dialogue, and do not necessarily reflect the positions of the organizations listed above or elsewhere in this report.

Executive Summary

Forty-one ‘Front Line Operators’ from around Hudson Bay participated in a workshop convened at the Churchill Northern Studies Centre, Manitoba, from March 21-24 2016. The objectives of the workshop were to share experiences and information about the increasing conflicts between polar bears and people and to explore ways to improve management activities to increase the safety of people and polar bears.



FLOW participants, Churchill, March 23, 2016 (© John Main)

This was the first workshop to focus on all aspects of polar bear–human conflicts in the Hudson Bay ecosystem. Representatives from communities, businesses, governments, NGOs, academia, and other specialist organizations actively engaged in professionally-facilitated, solutions-focused discussions for polar bear-human conflict management.

The workshop focused on ***six main questions*** for the Hudson Bay region:

1. What is happening now between polar bears and people?
2. What are the main issues and root causes?
3. What are we doing to deal with polar bear conflicts?
4. What works, and what doesn't work?
5. What needs to change to reduce polar bear-human conflict?
6. How can we make change happen?

Eighteen ‘***Action items***’ were identified and prioritized by the group to better address the challenging situations in the region. These items were clustered into seven general initiatives, which the workshop participants recommended as necessary in order to satisfactorily address the apparent increase in polar bear – human conflicts around Hudson Bay:

1. Proactively manage attractants and eliminate potential food rewards.
2. Educate, train, and equip people well.
3. Tie regulations to safety requirements.
4. Fill key knowledge gaps and make information readily available.
5. Complete site/community bear safety audits and reflect in key plans & procedures.
6. Routinely monitor, review and upgrade the effectiveness of tools & approaches.
7. Secure necessary funds and political will to implement these agreed priority actions.

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Introduction

Polar bears and people living and travelling in and around Hudson Bay (see map on p. 3) have experienced challenges and interactions for centuries. However, in recent years, those interactions appear to be increasing in both frequency, geography, and in negative outcomes for both people and polar bears. So, a 'Front-Line Operators' Workshop (FLOW) for the Hudson Bay region was convened, for the first time, in March 2016, at the Churchill Northern Studies Centre, Manitoba. The participants were people directly involved with interactions between polar bears and people, at the regional, community and camp level, along with representatives from the tourism industry, NGOs, other specialists and government officials focused on these issues.

The primary goal of the workshop was to bring together key people to share information, experiences, and to help develop a connected network of key people. Secondly, the organizers hoped to help improve shared learning and the development of the best possible management measures to address the identified challenges.

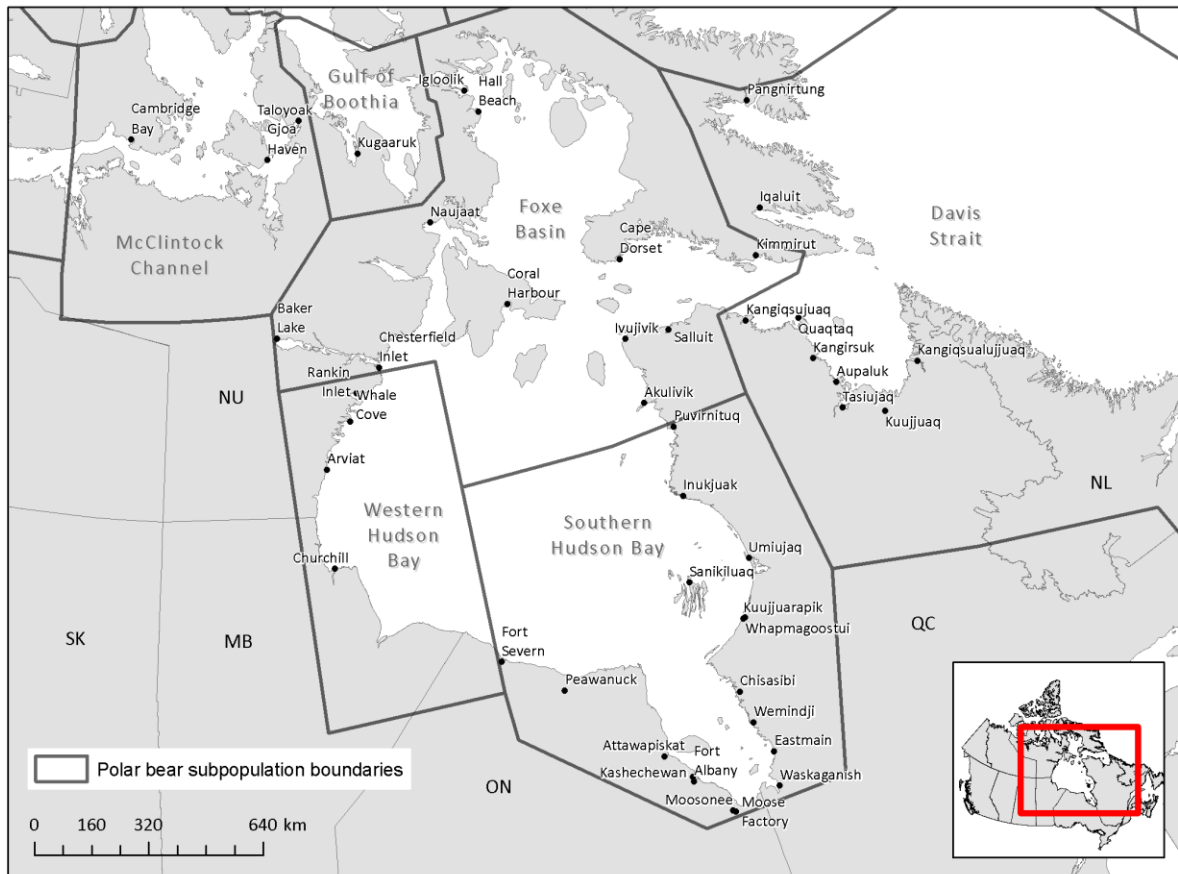
Polar bears in Hudson Bay now spend longer periods ashore, waiting for the sea-ice to reform in November or even into December. Concurrently, the human population around Hudson Bay has been growing, concentrated in about 30 communities around the Bay. Since the 1900s, but particularly since the 1950s, this region has seen transportation infrastructure development, industrial projects such as mines, and increases in nature-based tourism. All these make Hudson Bay a busier place for people and polar bears. Communities, management agencies, and researchers alike agree that polar bear-human conflicts in the region appear to be becoming more common. Increasing encounters between humans and polar bears have also been documented in many other parts of the polar bear's range (covering five nations, with Canada responsible for about two-thirds of the total world population of wild polar bears).

The best-known polar bear community by far is the Town of Churchill, in northern Manitoba, where increases in polar bear sightings near and in town are of concern for residents, visitors, and governments. The Manitoba Government 'Polar Bear Alert Program', based in Churchill, is the largest and longest-running polar bear conflict management program anywhere, and many useful lessons have been learned. However, the majority of the communities around Hudson Bay are Inuit settlements, mainly in Nunavut, but also in Nunavik, northern Quebec, and have not historically required such programs. Ontario is the other jurisdiction in Hudson Bay, at the very southern limit of the polar bear's global range, with several communities near the main coastline of James Bay (no representatives from Ontario were able to participate at the FLO Workshop).

A glossary of key terms and acronyms is presented in Appendix VII.

Map of Hudson Bay

The Hudson Bay region with community place-names and boundaries of the three main subpopulation management units for polar bears: Foxe Basin, Southern Hudson Bay, and Western Hudson Bay.



Sources: Population Status, Trend and Range
Boundaries, IUCN/SSC PBSG, 2014

Goals of the Workshop

The overall goal of the workshop was to share experiences on successful practices, to develop more effective and coordinated solutions, and to build a connected network of front-line operators around Hudson Bay. That overall goal integrates the following specific aims:

- Establish strong, lasting connections among all who deal with polar bear human conflict issues around Hudson Bay
- Discuss the current full range of measures available for both reacting to bears threatening human life and property, and for significantly reducing the main attractants (municipal waste, stored country food, field camp operations, etc.), with local field-level activities
- Start a discussion towards an agreed set of regional best-practice measures for deterrence methods, waste management options, tailored to different coastal situations, and research priorities for future focused collaborations
- Share findings with other polar bear range state communities experiencing similar problems
- Produce a full workshop report with recommendations for the key stakeholders

The workshop was organized to achieve these aims by focusing on six main questions:

1. What is happening now between polar bears and people?
2. What are the main issues and root causes?
3. What are we doing to deal with polar bear conflicts?
4. What works, and what does not work?
5. What needs to change to reduce polar bear-human conflict?
6. How can we make change happen?



The Churchill Northern Studies Centre (© Pete Ewins)



FLOW session underway (© Pete Ewins)

Workshop Structure and Approach

A steering group jointly developed the objectives, framework, and agenda for the workshop, and authored this report. That group comprised representatives from the three co-convening organizations: World Wildlife Fund-Canada, Polar Bears International, and the University of Saskatchewan; plus the Facilitator (contracted by WWF- Canada), the Department of the Environment of the Nunavut Government, and the Department of Sustainable Development of the Government of Manitoba.

The agenda was geared towards active participation, rather than a more typical presentation-focused session. A facilitated series of plenary sessions geared to the main topics was followed in each case by four parallel breakout group discussions, and then reconvening as the whole group to present and discuss summary thoughts and suggestions. This model was based on the conveners' experiences, helpful input from the entire steering group, and best practices from published literature on group process in the north. It enabled constructive and widespread participation.

The topics covered were:

1. The current situation for Hudson Bay.
2. The main issues, with strong community focus.
3. Management measures.
4. Training and education.
5. Identifying areas for improvement.
6. Making recommendations.

There were a few summary presentations (visual and oral) made at the front end of some of the sessions. For those presentations with a larger number of powerpoint slides (Pete Ewins; Andy McMullen; Daryll Hedman), these will be deposited later in 2016 at either an upgraded IUCN Polar Bear Specialist Group (PBSG) website (<http://pbsg.npolar.no/en/>), or at a website for the Polar Bear Range States Conflict Working Group (see via <http://www.polarbearsinternational.org/media/images/polar-bear-range-states-conflict-working-group-table>).

Participants' observations and points were written onto flipcharts by the workshop facilitator or an assistant, and these formed the permanent record of what was said at the workshop. So that participants could speak openly and not feel inhibited, electronic recordings were not made during the workshop. A full list of the Participants is presented in Appendix II.



One of the workshop breakout groups (© John Main)

The main presentations to the group were as follows:

Tuesday March 22nd:

Pete Ewins, WWF: Human-Polar Bear conflict management: Hudson Bay – What’s Happening Now?

Jon Neely & Joe Savikataaq, Govt. of Nunavut: Summary of current Nunavut approaches and various community measures.

Daryll Hedman, Govt. of Manitoba: Polar Bears of the Western Hudson Bay. (summary points given in Appendix IV).

Mark O’Connor, Makivik Corporation, QC: The Case of Nunavik. (summary points given in Appendix VI).

Andrew Maher, Parks Canada: Review of Parks Canada Polar Bear safety and management measures.

Wednesday March 23rd:

Daryll Hedman, Govt. of Manitoba: Polar Bear Management (in Manitoba, especially the Churchill Polar Bear Alert Program). (summary points given in Appendix IV).

Andy McMullen, BearWise Consultants: HuManagement Measures. (summary points given in Appendix V).

The out-of-town participants were lodged at the Churchill Northern Studies Centre (CNSC), which allowed us to use evenings for follow-up discussion of topics, networking, and reviewing available videos on polar bear–human conflict management and safety issues. With sufficient time to allow deeper discussion of topics, this was an excellent set-up for achieving the goals of the workshop, aided by the world-class facilities and accommodations at the CNSC.

In addition, each day of the workshop had a field component to some of the key Churchill areas for polar bear conflict management (the L5 waste segregation facility, the D20 polar bear holding facility, and key town polar bear management zones), along with a demonstration of different polar bear deterrents. These first-hand visits to the key facilities, along with the expert guidance from Government of Manitoba staff, were invaluable for participants to see and discuss the infrastructure, costs, operations, and other details of an active deterrence program.

Summary for Each Topic Covered

Note: Appendix III provides fuller notes of daily key points made/discussed, under each topic, and Appendix IV contains a summary of the Govt. of MB presentation by Daryll Hedman on the Churchill Polar Bear Alert program.

Topics 1 & 2: The Current Situation, and Main Issues

The break-out groups all reported very similar conditions across Hudson Bay - ongoing increases in conflicts near and in coastal communities and increasing length of the ice-free season causing polar bears to be on shore longer. There have been few research programs to test existing or develop new bear deterrent tools, however the Hudson Bay region presents some unique opportunities to conduct research.

It was agreed that while reactive measures to deter bears are a necessity when a polar bear is in a community or camp, ultimately preventing conflicts is a top priority. More effective attractant management is critical to reduce conflicts in both communities and camps. Everyone agreed that there was a need to 'Keep both people and Polar bears safe'.

Observations regarding the ready sources of polar bear attractants are:

- Weak/unsatisfactory disposal, storing and management of municipal human waste;
- The butchering and storage of country food; and
- The location and management of dog-team yards near communities.



Polar bear in the Arviat garbage dump in November.
(© Sybille Klenzendorf)



Dog-musher Michael Akaralak with new solar-powered electric fence around dog-yard, Arviat. (© Pete Ewins)

The main points captured by participants in characterising the current situation and main issues were:

- A shared sense of an increasing number of interactions between polar bears and people
- Polar bears appear to be less wary of people – including in their response to deterrence measures
- There may be increasing loss of stored country food and damage to human property:
 - Garbage containers are not secure
 - Country food storage approaches are often insecure
- Changing climate and ice conditions are apparent and challenging
- Many people, especially visitors, are not ‘bear aware’, or knowledgeable
- There are significant shortfalls in legislation, policies, and funding, to address concerns
- Increasing ‘Defence of Life and Property’ (DLP) kills have a negative impact on the polar bear hunting quota – less opportunity to harvest
- The location of dog-yards and garbage dumps in relation to the community and housing is important
- There are clearly variations in response and situations regarding polar bear interactions in different locales
- Pete Ewins presented summary data (from Govt. Nunavut) showing 7 of the 10 Nunavut communities with the highest annual DLP polar bear kills are around Hudson Bay
- The Arviat management situation mirrors Churchill in many ways, with a polar bear emergency Hotline and a suite of mainly reactive measures that are deployed. Most other communities have nothing comparable.
- Despite considerable radio-telemetry of western Hudson Bay polar bears, there remain important knowledge gaps on movements of ‘problem’ bears that are trapped then released away from Churchill.
- There was general concern about the risks associated with increasing polar bear viewing initiatives that take people very close to polar bears on the ground. Hence the need for satisfactory safety measures, training, monitoring, and regulations.
- Participants generally acknowledged that it is very important to keep people and property safe, and to avoid unwarranted killing of polar bears (‘Safe People and Polar Bears is the overall aim). Funding priorities should be established to ensure that these measures are deployed, concurrent with building more political support.
- The main organizational experience and efforts with polar bear-human conflict management in Hudson Bay has been in Churchill, followed by Arviat. Other Nunavut communities have been observing similar escalating issues, but have not yet initiated formal programs to address the problem. In Nunavik, Quebec, very little attention has been given to this issue historically. That is likely to change following this workshop, as they also feel that incidents are increasing, and are working towards a new harvest management system for polar bears.

Topic 3: Management Measures.

Discussions centered on two basic categories of management measures that have been either tried or considered somewhere around the Hudson Bay ecosystem: Reactive, and Proactive.

Reactive measures (once a polar bear is already in close proximity to humans and their property):

- Trained dogs
- Bear spray
- Flares
- Less-lethal projectiles such as 12-gauge cracker shells, 12-gauge bean-bags, pen-launcher or starter pistol projectiles (multiple participants noted that these seem to be decreasing in reliability), and both 12-gauge and 38mm rubber bullets
- Rocks and other projectiles
- Human body language (jumping, waving arms),
- Automated alarms-noise-makers, lights (e.g., Critter-Gitter, LRAD, alarm systems)
- Manual noise-making (e.g., engine noise, voice, siren, air horns)
- Vehicles (truck, quad, skidoo, boat, aircraft)
- Phone hotline
- Well-trained bear guards and monitors in communities
- Live-rounds as a last resort



Canadian Ranger Kevin Burke demonstrating how to use cracker shells in a 12-gauge shotgun (© John Main)



Nunavut Conservation Officer Joe Savikataaq Jr. demonstrates a 38mm baton launcher (© John Main)



Natural Habitat Ecotourism Guide Drew Hamilton demonstrates a marine flare (© Doug Clark)

Proactive measures (to significantly reduce the likelihood of polar bears approaching humans or their property/infrastructure) that have been tried or considered around Hudson Bay:

- Storage of country food (e.g., bear-proof steel containers, safe buildings-community freezers)
- Dog-food storage
- Human waste management/disposal and storage
- Siting of attractant sources relating to polar bear movement corridors and habitations of people (i.e., via municipal zone-based plans, camps)
- Luring (diversionary scent) stations
- Live traps, for relocation of polar bears from sensitive areas
- 24-7 community patrol/guard team
- Electric and/or rigid fencing (around camps, infrastructure, dog yards, sensitive sites)
- Training-education of locals and visitors, including clear, effective guidance materials
- Site Safety Audits (see the Andy McMullen, BearWise presentation etc.), which could be extended from camps-industrial sites, to communities
- Comprehensive community plans developed and adhered to that address bear-safety issues
- Polar bear guards
- Polar bear guard training, covering tools, firearms, and management of people



Manitoba Conservation Officer Brett Wlock demonstrates the Polar Bear Alert program's traps and holding facilities (© John Main)

There was considerable experience across the participants in many of these aspects over many years. All recognized that the approaches (and sometimes the responses of polar bears) varied tremendously across the communities, and by incident, and that training and resources (human and financial/equipment) have been big constraining factors to this point. Some international experience was also folded in by those who have been involved with very similar considerations within the Conflict Working Group of the Polar Bear Range States and other initiatives (notably Geoff York, Douglas Clark, and Daryll Hedman).



Polar bear guard Leo Ikakhik on patrol in Arviat (© Pete Ewins)

The break-out sessions focused on the pros and cons of this full range of management options to help identify the main lessons learned about them, and needs for further efforts to confirm, refine, and then provide advice as to which measures are most important, cost-effective, and can be implemented in the various situations.



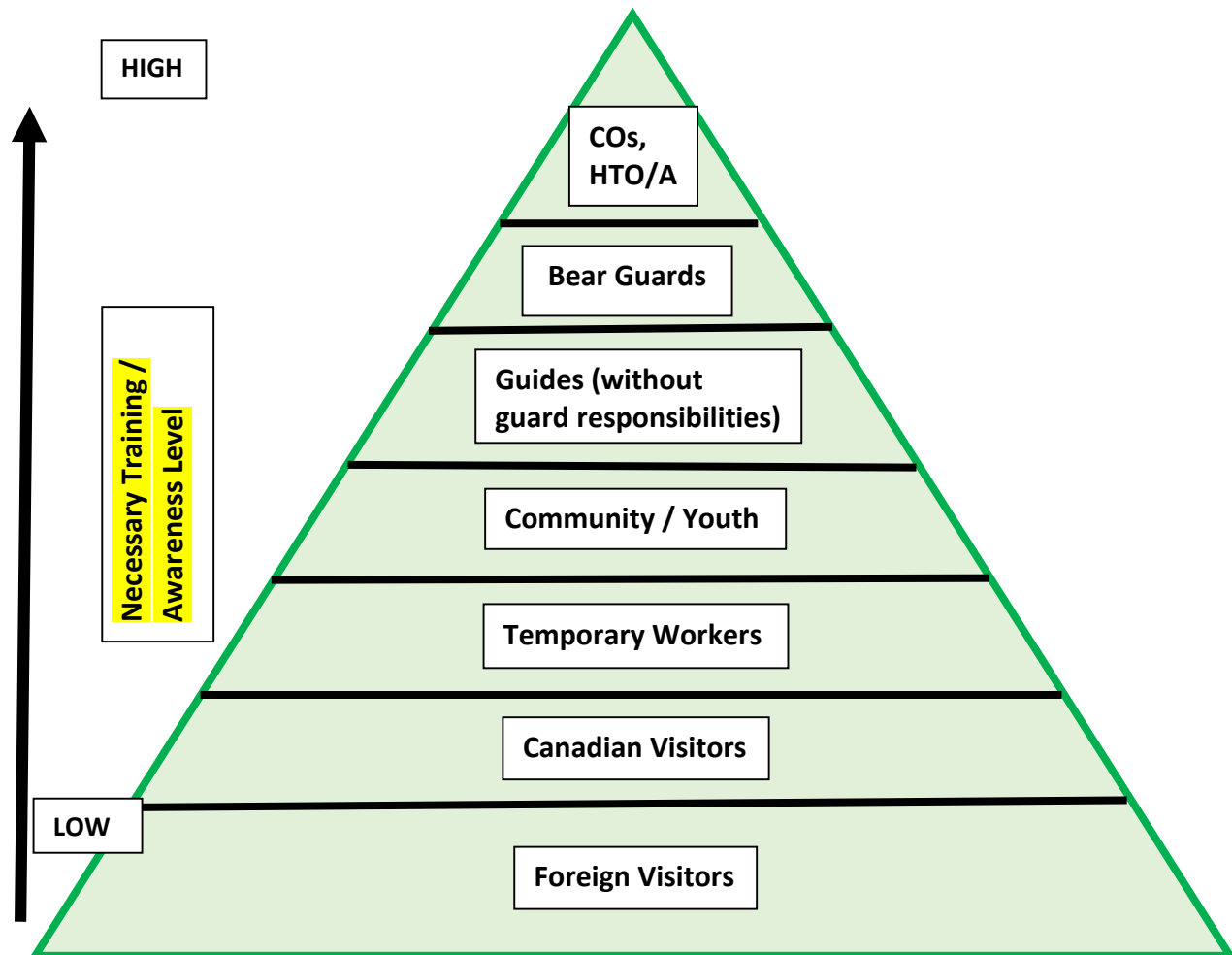
Churchill's polar bear-resistant municipal waste transfer-sorting building (L5). (2013, © Pete Ewins)

Topic 4: Training and Education

Participants agreed that the recording and collation of information is one key aspect that generally needs more effort. By characterizing the range of incidents and the effectiveness of conflict management approaches taken, more effective advice will be possible for the management of different situations. It was agreed that there is a considerable amount of variation among communities regarding conflict responses at present. The FLO Workshop and subsequent networking of key people and organizations were widely seen as helpful steps to improving overall knowledge transfer, relationship building, and education. Importantly, this was not seen as a need to replace traditional or local knowledge with scientific results, but to bring together and share the best that all forms of knowledge can offer.

It was widely agreed by participants that much greater and impactful training and education needs to occur, and be sustained, both for community members and for visitors to the communities.

A diagram generated in the workshop captures the general situation for the main categories of people, which should help responsible organizations prioritize their resources and efforts in training and awareness improvements:



The workshop participants generated many suggestions on training and education, some based on existing initiatives that have been developed and deployed elsewhere. It was envisaged that from this collated list of recommended initiatives, organizations can make choices in order to set solid and effective priorities for their specific situations.

In Nunavut, Parks Canada, the Govt. of Nunavut, and WWF-Canada collaboratively developed a detailed Polar Bear Guard training program and manual, and held the first Nunavut training session in 2013. Similar training sessions have been held across Canada's north, especially for

industrial mine sites and tourism camps. These have often been combined with site safety audits.

A comprehensive range of topics was identified for inclusion in the materials used to raise awareness and educate people living and working/travelling within the range of polar bears. Ideas ranged from the more reactive considerations like bear deterrent tools, firearms, bear avoidance techniques, and communication methods, to the more proactive steps necessary to successfully manage attractants (e.g., stored country food, dog-yards and dog food, household and camp food/waste, and community garbage dumps).

Educational tools (e.g., bilingual posters, online apps, websites, and videos) were identified as well-suited to meet the awareness building needs around the Hudson Bay communities and camps. In some communities there was very little access to such knowledge and materials/resources, and sometimes significant misunderstanding of ‘conventional wisdom’ about the effectiveness of some tools and approaches. Further specifics from the flipcharts are given in Appendix III.

Topic 5: Identifying Areas for Improvement, and Topic 6: Workshop Recommendations

We have combined these two topics since they merged naturally during the latter portions of the workshop. So this summary (in Table 1) is the amalgam of the workshop deliberations and consensus by the end of the final day.

The Action Items in Table 1 were generated from the previous days of work and discussions across the main topics. Table 1 summarizes the 18 activities that participants felt are necessary to address the conflict issues between polar bears and people around Hudson Bay. The participants were given ‘Post-it’ stickers, according to the categories of organization they represented (government, business, community, and NGO/others), and allowed to assign them to what they felt were the top priority ‘actions’. The resultant table is broken out by category of organization, but everyone recognized that this is not as important as the final collective total score. After plenary discussion, there was general agreement across participant/organizational type, on which were the most important Actions.

The Table ranks the actions that were recommended (wording retained as on the flipcharts) based on the tally of participant ‘votes’ that were given. This suite of recommended actions is not targeting any particular individuals, governments, or organizations. It is a collective expression from the workshop of what needs to be done to better address the challenging bear-human conflict situation across the region. It is hoped that those with the ability and responsibility to act on these suggested actions, will find this guidance useful.

It is also important to note that ideally ALL of these actions should be pursued – many are highly inter-dependent, some overlapped, some broader and some much more specific. For

example, without adequate consistent funding, or political will/motivation, little additional progress can be expected on many aspects of this sensitive conflict reduction work.

In the next section, the Summary and Discussion, we have attempted to boil these down, and aggregate into a smaller number of main concluding points – which we call ‘Recommendations’ from the FLOW.

Table 1. The 18 Action Items, ranked in decreasing order of importance (by number of participant votes) for follow-up in the Hudson Bay region.

ACTION ITEM	TIMELINE	TOTAL VOTES
Attractant Management - e.g.: landfill solutions; bear proof bins; Education and Enforcement; Reduce interactions; targeted projects i.e. Videos; web material	2 years	52
Standard Training Requirements - e.g.: PB Guard Courses; MB, NU, Nunavik	1-2 years	38
Help tie regulations to safety requirements - i.e., Bear guard requirements; tourism operators	Long-term	33
Increase availability of Deterrent Tools - e.g., Rentals in NU	ASAP	30
Fill Knowledge Gaps – i.e., Where do Churchill bears move; Arviat work; why more bears and communities; effects of sea ice; bear viewing changes behavior, mgmt. info.	1-2 years	27
Formally sharing knowledge/programs i.e., Regional workshops, shared training	N/A	20
Community-Site Safety Audits – e.g.: 24-hour taxicabs for bear season; lighting and building safety; enforcement of local bylaws; strategic planning	N/A	19
Youth Education and Awareness - incl. L/TEK, teach dangers; use visuals and coordinate with those already doing this	N/A	19
Increase Support for Education - behaviour; biology; safety; create incentivized education programs	ASAP	15
Identify one or two Key Leaders - Identify 'who', create a forum	April 1st	15
Harmonized Messaging – e.g.: Continuity of info; same message from multiple sources	N/A	14

Bottom-up Community-based safety plan to provide guidance; approved and implemented by committee members and gets FLO's the resources and support needed	N/A	14
Enhanced reports of Observations - ex. PBHIMS, Increased reporting on success and incidents	N/A	14
Secure Funding & Resources - to allow for actions to take place	N/A	13
Sustain the Forum - including future meetings; make an impact	N/A	12
Communicate Conclusions and Priorities - generate results that have impact	N/A	11
Identify "who else"? - there are people missing from the group (e.g., Ontario); scale the forum appropriately; right size of group	N/A	7
Resource Library of Educational materials - for next meeting like this; to be shared among all	ASAP	3

Summary and Discussion

This workshop was the first regionally-focused event on polar bear-human conflicts in Canada, and the largest such event held to date across the Range States. The bringing together of so many interested and key people, from a diverse range of organizations dealing with increasing conflicts and challenges, was an important first step towards securing far more efficient and effective ways to manage these problems. The whole tone and focus of the daily discussions was positive, respectful and committed to the shared goal of coordinated and effective solutions.

Participants from around Hudson Bay were in agreement on their observations of increasing numbers and activity of polar bears ashore, especially in the lengthening ice-free season. From the community reports, there seem to be general increases in polar bears more boldly approaching human habitations, infrastructure, and people - all of which present major safety and financial challenges. These issues for people were very similar across all the communities, though variable in rate and timing to date. The responses to these changes and safety issues also vary tremendously across the different communities and jurisdictions, so not surprisingly increased training and resourcing for front-line people emerged clearly as the highest priorities.

The list of priority actions presented in Table 1 was the collective reflection of what participants felt the next steps should be. Since these 18 action items were taken directly from the workshop flipcharts, and there is clearly some cross-linkage and overlap inherent there, we have below tried to group these into a smaller number of main topics for follow-through, in roughly the same priority order as in Table 1. The following seven priority initiatives are what the FLOW Participants recommended as necessary in order to more satisfactorily address polar bear – human conflict situations:

1. Proactively manage attractants and eliminate potential food rewards.

Proactive measures are crucial to achieving the workshop participants' stated goal of "safer people, safer bears," especially efforts to manage attractants and eliminate any potential for bears obtaining food rewards from human activities. Suggestions were discussed regarding municipal waste management that included waste segregation, fencing, burial, and burning options. Community waste storage sites remain an ongoing source of habituation and food conditioning of polar bears across the north, requiring significant discussions around solutions and resources going forward. Storage of country food, and dog-yards, are also known attractants in some communities.

2. Educate, train, and equip people well.

Some participants have considerable experience with a variety of tools and techniques for dealing with polar bears and human interactions. These experiences have created centres of

expertise in Churchill and Arviat. For the rest of the communities on Hudson Bay, and especially those in Nunavik, there are few non-lethal tools or approaches taken to this point to deal with polar bears in the communities. All participants welcomed assistance and guidance on how to introduce and sustain both proactive and reactive initiatives in their communities. The community phone hotline seems to work very well for the general public in Arviat and Churchill, and is an excellent way for a designated team to quickly resolve a potential conflict situation. Education, awareness and training all need to be ramped up substantially so that more people and communities can benefit from what is known, and enhance safety. The group also flagged the need for more reliable deterrents, and sufficient training for those who would be required to use these tools.

3. *Tie regulations to safety requirements.*

Participants wanted to see government agencies adopt training standards for bear guards, guides, and other responsible operators, and to make those standard requirements in the operating permits that they issue (e.g., in national parks and provincial wildlife management areas). They also felt the same should apply to safe operating standards for travel on the land in polar bear country. This was remarkably uncontroversial among workshop participants.

4. *Fill key knowledge gaps and make information readily available.*

Several applied and management-relevant knowledge gaps were identified. These include: learning more about the movement of bears (especially relocated and/or problem bears) between communities in western Hudson Bay; a desire for more locally-focused and community-based research on polar bear-human interactions in Arviat; examining why there appear to be more bears coming into communities and the role of sea ice and other factors in this apparent trend; investigating whether and how bear viewing changes their behaviour, and assessing the effectiveness of management measures at reducing polar bear-human conflicts.

5. *Complete site/community bear safety audits and reflect in key plans & procedures.*

Participants were very interested in the Polar Bear Site Safety Audit initiatives presented by Andy McMullen of BearWise. These comprehensive audits have mainly been done for camps of tourists or industrial projects to this point. Such audits completed at a community level, especially for ones with known regular relative high numbers of polar bear encounters, could become key elements underpinning effective municipal plans for zoning, policies and bylaws.

6. *Routinely monitor, review and upgrade the effectiveness of tools & approaches.*

Participants recognized a need to learn more about the effectiveness of different tools and techniques on an ongoing basis. Notable changes they've observed include 12-gauge cracker shells becoming less effective over time, in multiple locales (i.e., bears appear to be habituating, or responding less to them), and some deterrent devices becoming less reliable (attributed to changing manufacturing practices and less-stringent quality control). New deterrent and

prevention technologies are becoming available all the time, and there is a need to stay current with those options and their capabilities.

7. *Secure necessary funds and political will to implement these agreed priority actions.*

During all of the discussions on management measures, it was widely recognized that beyond Manitoba, consistent financial and human resources to address this issue had been lacking across most Hudson Bay communities. Sufficiently engaging key people at the political levels, from mayors upwards to ministers, was agreed by all to be essential if resources and priority attention to address these safety issues are going to be provided

By the end of the workshop, it was agreed that ongoing coordination across this new regional network of front-line people and their organizations was extremely desirable, and beneficial in changing and challenging circumstances. Everyone agreed that they wanted to see progress on the priority issues they raised, and expressed desire to stay closely connected as a group of key front-line people. They recommended reconvening the FLOW workshop/forum at least every two years.



Eco-tourists and polar bears in close proximity - SW Hudson Bay. (© Francoise Gervais)

Key Resources and Publications

Internet links

(For the best publicly accessible library for conflict management materials repository, see IUCN PBSCG website – to be fully renovated in winter 2016-17).

IUCN Polar Bear Specialist Group:

<http://pbsg.npolar.no/en/>

Manitoba Govt. Polar bear information:

<http://www.gov.mb.ca/conservation/wildlife/spmon/pbear/>

Nunavut Govt. on wildlife:

<http://www.gov.nu.ca/environment/information/species-management>

Polar Bear-Human Information Management System of the Polar Bear Range States:

<http://www.arcticbiodiversity.is/program/presentations/december-4/1300-1430-2/human-pbear-conflicts/215-regehr-2014-pbhims-presentation-abc-04dec14/file>).

Quebec Govt. on wildlife:

<http://mffp.gouv.qc.ca/english/wildlife/index.jsp>

Parks Canada:

<http://www.pc.gc.ca/eng/index.aspx>

Environment Canada:

<https://www.ec.gc.ca/nature/default.asp?lang=En&n=A997D1CC-1>

Third International Bear-People Conflicts Workshop:

<http://www.rdsience.ca/bear/bear.html>

Town of Churchill:

<http://www.churchill.ca/>

Polar Bears International:

<http://www.polarbearsinternational.org/>

University of Saskatchewan, bear research:

https://www.usask.ca/sens/our-people/faculty-profile/Core/Douglas_Clark.php

WWF-International on polar bear conflict:

[http://wwf.panda.org/what we do/where we work/arctic/wildlife/polar bear/conflict/](http://wwf.panda.org/what_we_do/where_we_work/arctic/wildlife/polar_bear/conflict/)

WWF-Canada on polar bears:

[http://www.wwf.ca/conservation/arctic/wildlife/polar bear/](http://www.wwf.ca/conservation/arctic/wildlife/polar_bear/)

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<http://margosupplies.com/public/>

International Association for Bear Research & Management:

<http://www.bearbiology.com/>

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HUDSON BAY FRONT-LINE OPERATORS WORKSHOP (FLOW)

ON POLAR BEAR-HUMAN CONFLICT REDUCTION MEASURES

COORDINATED BY WWF-CANADA WITH POLAR BEARS INTERNATIONAL & UNIVERSITY OF
SASKATCHEWAN

CHURCHILL NORTHERN STUDIES CENTRE

CHURCHILL, MB

MARCH 21 - 24, 2016

Overall Goals:

To share experiences on best practices, to develop more effective well-coordinated solutions, and to build a solidly connected network of front-line operators around Hudson Bay and beyond.

FLOW will focus on the following questions:

What is happening now between polar bears and people?

What are the main issues and root causes?

What are we doing to deal with bears?

What works, and what doesn't work?

What needs to change to make things better?

How can we make change happen?

March 21 – Day 1: Familiarization with the group, issues, and Churchill

- Various times - AM and PM – participants arrive and check in to CNSC

13:00 - 15:30

- Informal Gathering – set ups and display of key materials on bear-human conflicts at CNSC
- Videos/Pictures/Posters on display
- Other participants' props-gear on display
- Also on display – Map of Hudson Bay communities/areas
- Refreshments and snacks available

15:30 – 17:30 Field Visit - Tour of CNSC and surrounding area

19:00 Informal - Optional Networking

- Presentation by Grant MacNeil on Churchill and the CNSC
- Presentation by Darryl re; General bear populations, background
- Relevant TV and/or Documentary programs
- Refreshments and snacks available

March 22 – Day 2: Confirming the Key Issues Facing Hudson Bay and Finding Common Ground

08:30 - Registration for all participants

08:45 - Welcome and Introductions

- Opening Prayer
- Welcome from Churchill representative
- Introduction from John Main, facilitator and co-facilitators
- Brief Introductions from all participants

First Topic: What is happening now?

- A brief summary of Hudson Bay history, scale, scope, and key dimensions on this issue.
Presenter: Pete Ewins
- Opening presentations from major organizations participating:
 - Government of Nunavut –Jon Neely
 - Government of MB – Daryll Hedman
 - Quebec region - Mark O'Connor, Makivik
 - NTI/KWB - TBD

Group Breakout discussion - 'Our current situation'

- *Objective: Establish connections among all who deal with polar bear human conflict issues around Hudson Bay and beyond.*
- Following the group discussion, the larger group will reconvene and groups will share findings with each other.

- Identify common trends, common observations, and unique situations.

13:00 Field Visit

- Churchill Waste Management Sites, D20, and Churchill CBA control zones
- *Objective: To understand bear encounters in and around Churchill, and to facilitate relationship building between participants*

15:00 Second Topic - What are the main issues? Hamlet presentations (NU and MB and QC) – Arviat, Chester, Whale

- This session will focus on the issues each community/operation is facing, with an aim to identify common issues across the Hudson Bay region.
- Community perspectives on main issues being faced in different locations – Arviat, Chesterfield Inlet, Churchill, Whale Cove

Group Breakout discussion – ‘Our key issues’

- *Objective: Connect the ‘current situations’ in each community to the larger issues being faced by many.*
- Following the group discussions, the larger group will reconvene and participants will share findings.
- Adjournment for the day

19:00 Informal - Optional Networking

- Slide Presentations, Doug Clark and Aimee Schmidt, University of Saskatchewan
- Darryl Hedman, re; Bear Safety (example of bear messaging)
- Video/TV documentaries regarding Polar Bear conflict
- Refreshments and snacks available

March 23 – Day 3: In-depth Discussion on Bear Management

8:45 A brief recap of the previous day’s discussions

Third Topic: Management Measures

- 2 government-led presentations on recent incidents/maulings to set the stage for breakout discussions
- Review of existing conflict guidance materials
- Discussion on conflict management measures/options
- Andy McMullen will present on Management measures that he uses for training in different parts of the polar bear range.
- Questions and Answers

Group Breakout discussion - Managing Bears

- *Objective: Share knowledge on equipment, tactics, ideas and systems used in different locations.*
- Following the group discussions, the larger group will reconvene and groups will share findings.

13:00 Field Visit: Bear Deterrent Demonstrations on CNSC grounds back road area

15:00 Fourth Topic: Training and Education

- Identifying specific groups with training needs tied to bear issues - Facilitator: Geoff York

Group Breakout discussion – ‘How to Train Up’

- *Objective: Focus on training and education in order to strengthen capacity throughout the range of management measures.*
- Following the group discussions, the larger group will reconvene to share findings.
- Adjournment for the day
- Organized by Polar Bears International at the Seaport Hotel
- Transportation to and from town will be provided
- This dinner will give the FLO workshop a public face locally and bring delegates together in an entertaining setting

March 24 – Day 4: What can we improve, and how?

8:45 A brief review of previous day’s discussions

Fifth Topic: Identify Areas for Improvement

- Discussion on possible changes to improve bear management
- Setting overall objectives and goals
- Identifying the broad areas needing change

Group Breakout discussion - Envisioning Change

- *Objective: Compile a list of possible changes at the different levels of influence that will lead to better bear management.*
- Following the group discussions the larger group will reconvene to share findings.

13:00 Final Topic: Making Recommendations

- Finding consensus on needs and action items
- A summary of information captured in the prior days’ discussions

Hands-on Group Activity - Setting Priorities

- *Objective: To summarize the workshop discussions and identify key items for follow-up work*
- Participants will work together to decide on priority items.
- Larger group gathers to review the results together.
- Creating a list of recommendations (action items)

14:30 Closing and Follow-up

- Participants’ closing comments
- Plans for follow-up
- Closing Prayer

Appendix II. The workshop participants and their affiliations

Organisation	Name	email address
Arviat - Hamlet	Leo Ikakhik, Patroller	lo_ikakhik@hotmail.com
Arviat - HTO	Gordie Kidlapik	gkidlapik@gmail.com
Chesterfield Inlet	Mayor - Barney Aggark	chester_mayor@qiniq.com
Chesterfield Inlet - Aqigiq HTO	Harry Aggark, Aqigiq HTO Director/Chair	htochester@qiniq.com
Whale Cove – Issatik HTO	Simon Enuapik Sr.	whalecovehto@qiniq.com
Whale Cove – Issatik HTO	Michael Angutetuar	whalecovehto@qiniq.com
Churchill PB Safety Cttee.	Bill Ayotte	
Canadian Rangers	Kevin Burke	sandkev@mymts.net
Nature 1st	Paul Ratson	nature1st@mymts.net
Arctic Kingdom	Francoise Gervais	francoise.gervais@arctickingdom.com
Arctic Kingdom	Jason Curley	jason.curley.92@facebook.com
Frontiers North	Brendan McEwan	brendan.mcewan@frontiersnorth.com
Frontiers North	Bob Debets	bob.debets@frontiersnorth.com
Churchill Wild	Andrew Macpherson	polarguide@hotmail.com
Nature 1st	Sheldon Olivier	nature1st@mymts.net
Natural Habitat Adventures	Drew Hamilton, Alaska	drew.h.hamilton@gmail.com
Nunavut Tunngavik Inc. – Rankin Inlet	Robert Karetak	RKaretak@tunngavik.com
DOE, NU Govt. (Arviat CO)	Joe Savikataaq Jnr.	jsavikataaqjr@gov.nu.ca
DOE, NU Govt.	GN lead of COs-mgmt., Jon Neely	JNeely@GOV.NU.CA
DOE, NU Govt.	Wildlife Deterrence Specialist, Vicki Sahanatien	vsahanatien@gov.nu.ca
Manitoba Govt, Dept. Sust. Devel.	Daryll Hedman	Daryll.Hedman@gov.mb.ca
Manitoba Govt, Dept. Sust. Devel.	Wayde Roberts, Director	Wayde.Roberts@gov.mb.ca
Manitoba Govt, Dept. Sust. Devel.	Jack Batstone	jack.batstone@gov.mb.ca
Parks Canada	Melissa Gibbons	melissa.gibbons@pc.gc.ca
Parks Canada	Brady Highway	brady.highway@pc.gc.ca
Parks Canada	Andrew Maher	Andrew.Maher@pc.gc.ca
Parks Canada	Dave Allcorn	david.allcorn@pc.gc.ca
Makavik Corp., Quebec	Mark O'Connor	moconnor@makivik.org
Kativik Regional Govt., QC	Steven Kleist, Nunavik	skleist@krg.ca
Nunavik HFTA , (in Puvirnituq)	Paulusi Novalinga, President	president@rnuk.ca
Churchill N Studies Centre	Matt Webb	webb@churchillscience.ca
Itsanitaq Museum & Churchill community	Lorraine Brandson	chhbay@mts.net
Univ. SK	Doug Clark	d.clark@usask.ca
Univ. SK	Aimee Schmidt	aimeelschmidt@gmail.com
BearWise Consultants	Andy McMullen	andysbearwise@gmail.com
PBI	Geoff York	gyork@pbears.org
PBI	Krista Wright	kwright@pbears.org
WWF-Canada	Pete Ewins	pewins@wwfcanada.org
Lead facilitator (from Arviat)	John Main	mainjohn@hotmail.com
Greenland Patrol lead	Kaare Hansen (Nuuk, WWF)	k.hansen@wwf.dk
Ittoqqortoormiit (East Greenland)	Erling Madsen, local wildlife ranger	Jagtbetj.itt@greenet.gl

Appendix III. Condensed workshop points from the participants, for Topics 1-4

Topics 1 & 2: The Current Situation and Main Issues. (not in any particular order)

It's "about time" for a workshop like this.

Polar bears seem to be attracted to virtually anything.

Increasing numbers of polar bears in communities, more at odd/unusual times of year, but big annual variability. Increasing numbers of humans around Hudson Bay.

When the community is situated right on the coast, then since this is right in the fall movement corridor for bears, there are many more bears in town. But when the community is sited a little inland (such as for Rankin Inlet) then often bears don't come to town, and can access sea-ice and an uninterrupted travel corridor more readily.

General concerns for rapidly changing and less-predictable climate and sea-ice patterns. With freeze-up happening ever-later in the year now, increased time that polar bears are ashore, and hence near-in human communities. Ice-out is now happening ever-earlier in the spring.

Increasing numbers and activity of ecotourism operations. "Some tourists are putting themselves in dangerous situations"

Concerns for losses-injuries to dog teams, and equipment-materials at cabins beyond the communities.

Reporting of conflict incidents varies greatly.

Polar bear behavior changing: bolder; coming into town more – especially at night/darkness; learning/habituating to human behavioural patterns; some conditioning to deterrence tools used regularly. "Polar bears are different now than when I was a kid – now a loss of fear around people and vehicles etc." "Polar bears in Churchill have human interactions through being handled."

"Polar bears that come from Churchill are not afraid of bangers, rubber bullets, leading to defense kills."

"Polar bears are being hazed more often, resulting in bears becoming more habituated to people and deterrents".

When a polar bear comes into town, 'crowd control' (of humans) is often quite challenging (re safety etc.). Some people are not scared and try to get way too close to get a snapped picture of the bear when it comes near town = dangerous.

Polar bears seen far more inland nowadays. More killer whales offshore.

General lack of awareness and knowledge about bear-human interface, among people living on Hudson Bay. General sloppy /not smart management-storage of country food or waste material, resulting in big

availability of these attractants for polar bears. People (locals and tourists-visitors) are not knowledgeable, and often very scared.

Big knowledge gaps on trends in incidents, thresholds for persistence of bears encountering people, and the impact of different deterrence techniques in differing settings.

General lack of understanding/quantification of movements and behavior after release of 'nuisance' bears – e.g. green-spot marked Churchill Alert program bears are regularly observed after release at the Arviat dump, but also as far north as Chesterfield Inlet.

Increases in Grizzly and Black bear numbers in southern portions of Hudson Bay coastlines, with some cabin damage.

General reduction in 'camping' around the coast – people staying more in/close to communities.

In Nunavut, Polar bear kills in defense of life and property have declined since 2012. *(see Ewins initial presentation for numbers by individual community)*

The Nunavut aim is to have a polar bear conflict reduction plan for each community.

Most communities do not have anything like the experience or resources of Arviat or Churchill with conflict management.

Churchill residents are generally happy with the Polar Bear Alert program.

In Nunavut, wildlife damage and compensation programs exist but are not well known yet. "Dealing with a polar bear in town is like ordering a pizza – just dial the number and the PBA folks deliver!"

Nunavut has been entering data under the PBHIMS system, but material has not yet been collated/analyzed.

Quebec started recording defense kills-encounters only in 2012.

Concerns on various fronts regarding tranquilizing and intrusive research on polar bears, and how this may affect subsequent bear behavior. Nunavut moving away from radio-collaring and more to biopsy darting.

Dog teams (and their yards/food smells) are also an attractant. But (some individual-good) dogs can be a good warning system. Feed the dogs polar bear meat for them to be good polar bear hunters.

The early October 2015 incident in Arviat is a good illustration of current situation: A 75-year-old elder was chopping meat to feed to the dog team, when the dogs barked at a frenzy, and quickly he was charged by a polar bear. The elder ran to the nearby cabin, where he made the phone call, and the bear stopped at the dog meat. But the bear continued attacking the dogs and the man apparently, so it was shot dead.

Regional cooperation and synergies are weak and insufficient.

Participants generally agreed that in today's world "Killing a polar bear unnecessarily is morally wrong," and so having and using measures to avoid this is really important.

Big shortfalls in both legislation and funding for programs-measures to really address these conflict issues.

For Inuit communities, increasing DLP Kills of polar bears is a big concern as it reduces opportunities for quota-based hunting of the bears.

Polar bears are increasingly stealing fish from nets (Arviat), and walrus meat from caches (Foxe Basin)

Legislation, political will, and priorities for financial-human resources vary widely across the main government jurisdictions covering Hudson Bay.

Nowadays many people with guns, but too many who 'don't know what they're doing' (i.e., weak experience).

In Churchill at least, a 'defense kill' of a polar bear looks very bad on the community, which has a big bearing on the tourism industry (vital to the town), and general region's reputation.

For the Nunavik communities on the E side of Hudson Bay, there appears to be a relatively small number of reported incidents, but these are increasing. Here's one example from 2013: 75 local students staying intents at a field/on-the-land summer camp, were having lunch on a beach, when a young bear swam up on to the beach. Usually the young ones attack first. It was an independent bear, 4 years old. It did not go away in response to noise, waving arms etc, and eventually the camp leaders decided that it had to be killed, for they knew it would come back.

Topic 3: Management Measures. (not in any particular order)

Bear spray is often not readily available in communities. Old propellant is no use. In Nunavut Cos often loan out spray to anyone who needs/wants.

Very clear that if polar bears are 'rewarded' (i.e., do get food of calorific value), then they will return to that place or settings like it.

Although some of the provided storage containers for country food have proven to not be polar bear proof, used sea-cans are very reliable for storing country food.

Not all of the reactive deterrent tools have the same effect on bears. Need to try, test, review all other possible tools.

More rules for tourism operators could be problematic (e.g. Bears coming up to the viewing vehicles, or groups getting too close to bears at the 'walking-with-the-bears' type initiatives.

Use dogs on the edge of town as an early warning system.

For Churchill, the Polar Bear Alert Program is widely regarded as having significantly helped deal with bears coming into town. But there are many things that could be improved. Some bears apparently now can identify the MB Gov't patrol vehicles/trucks and respond/avoid them.

In Arviat a combination of measures are used currently, including 2 traps, and non-anaesthetized bears released (they just run away) to north of community. Plus luring stations and seal-odour trails to east of

community. This 'luring station' appears to be having a significant positive impact in the Arviat situation, likely since the main corridor used by the northbound polar bears is right along the coast a few km east of Arviat, so if this seal meat-smell is readily available there, fewer bears seem to bother walking west into town. (a similar situation exists in Resolute, NU, and Kaktovik, AK we hear). (The Kaktovik bowhead carcass/bone pile is fairly close to town, and sometimes has 70-80 bears there, but the community is trying to move it further away from town apparently).

The Arviat polar bear patrol initiative is a partnership of the Govt. of Nunavut (led by Conservation Officer Joe Savikataaq), the Hamlet of Arviat and WWF, plus the inhabitants of Arviat. From mid-September through to Xmas usually (peak polar bear season), a team of 2 guards and 3 GN CO's/casual staff, plus a few bylaw officers, are either on patrol, or on-call for immediate response.

The 2 culvert traps used now in Arviat trap bears within the community (especially at night), and these are then towed in the trap northwards about 14-20 km, then released. In the first year of operation, only 1 of the 14 released bears returned to the community. Arviat does not have any bear tranquilizer.

Polar bears released from Churchill, north at the Seal River, tend to walk northwards (although a variable proportion return to Churchill, depending on the year) – towards the Gelini tourism camp, and to Arviat and beyond. These bears have a green spot on their backs so can be readily identified. Gelini camp staff say that they use the conventional range of scaring techniques and that most bears head north, though a few do return to the camp area.

Management of human garbage is very rudimentary in most communities – landfill near town, often burning. Garbage dumps and country food stores are by far the main attractants for polar bears.

In Arviat, the new phone call hotline (# 4444) has been successful, with 90 calls in 2014, and 200 in 2015. But the number of calls does not necessarily reflect the number of significant incidents.

Arviat has 6+ electric fences around dog yards bordering the community, many set up with solar-powered. These were constructed (partnership of GN, WWF, and Hamlet of Arviat) over the past 4 years, and initially were thought to be helping (see some images from remote cameras). But by 2015 the general community view was that for a series of reasons (including snow and/or garbage blowing-accumulating and shorting out the wires; battery issues; and some full-grown bears just somehow walking right through the stands) a better approach was to leave 1-2 key dogs off-leash as sentinels and deterrents for any bears that approached. (This is more similar to the Inuit traditional approach).

Many garbage containers are not polar bear proof (but used sea-cans, especially the half-size ones, can be very effective).

The siting of dog yards and garbage dumps is generally poor in relation to the human community location. Dogs being lost to bears in Rankin Inlet and Arviat.

The re-purposing of the old military buildings in Churchill, and the creative solutions the town has been developing, are good steps to address the conflict situation, but not yet enough.

Many reactive measures have been used in various places – each with pros and cons, including: Trained dogs, motorized vehicles, bear spray, crackers-screamers, flares, non-firearm noise (whistle, voice, horn, 'critter-gitter', LRAD laser-sound projections of male PB roar, lights, electricity, fire extinguisher).

Topic 4: Training and Education. (Not in any particular order)

In Nunavut, Conservation Officers (COs) do go into schools, e.g. the “Junior CO” program for Grades 4-5.

Parks Canada trying to attract more people to visit national parks, so regulations are changing (plus training) to address need for firearms to be carried by guides, especially locals.

Nunavut-wide standardized training program established 3 years ago by GN, PC and WWF, being used now. Summer 2016 Wapusk NP guard training session being held – other Hudson Bay individuals take this course (2.5 d course, with certificate).

Group 1:

- Training and Education: Who, What, How
- Who: Community Members, Transient workers, Tourists, Tour Guides, Bear Guards, Govt. Staff, Researchers, Kids (most vulnerable and unpredictable), Industrial workers, Professional Responders, Canadian Rangers, Hunters
- What: Awareness crash course, Safety brief prior to arrival, Generic base information, Signage with #’s or info (bold), Quality of Trainer who has the audience’s respect, Picture signage, Universal Language
- How: Working Partnerships, Understanding target audience, It’s everyone’s responsible to be vigilant, First language information (so nothing is lost in translation), Demonstrations, ‘live’, ‘show me’, Healthy Fear/ Healthy respect
- Incentives for participation
- Coordinate efforts with elders
- Regular meetings and multi-community workshops
- Cultural Awareness for Guides/Guards to best reach target audience

Group 2:

Education and Training

- HTO’s, students, researchers (priority)
- Children (education) – train in schools, ie. NU junior conservation officer program grades 4/5, and others, this is in the officer’s job, bylaw officers too
- New residents (Education w training) – teachers, nurses
- Long term residents (ED w training) – need reminders
- People being given new technology (training) - training has to come with it
- Tourist Guides (training and education)
- RCMP (training and education) – rotated and new – often work with CO’s, assist with crowd control
- Politicians (education) – distribute \$, so need to be informed
- Bylaw Officers (training) – e.g., doing night patrols in bear season
- Conservation Officers (training and education)
- Tourists (education w training) – guided vs. independent

Group 3:

Diagram on education and training

- Bear guard training – incl. hunter safety, PAL – FAC, Trainer/Training
- What is the job? Need a basic understanding
- Training on deterrents, behaviour, terrain, weather and position
- Seasonal Work, Gun Handling
- Training could be a graduated system
- Public Education – not too complicated
- People management – moving people vs. moving bears

Group 4:

Education and Training – Continuum of training requirements

- From highly trained to basic awareness: CO's, HTO, Bear Guards, Tourist Guides, Community residents/Youth, Temporary Workers, Visitors, Foreign Visitors
- Continuum goes from Basic Bear Awareness (safety) to Professional Manager (knowledge and skill)
- How? Seat back Cards, Ads on Placemats in Restaurants, Brochures, Videos, Signage, Formal/Required Certification
- Use: Consistent Messaging

Appendix IV. Key points from Polar Bear Alert Program for Churchill

(See also Struzik (2014) book and papers referenced earlier summarizing the history of Churchill bears and people interface, including the Polar Bear Alert Program there.

Govt. MB staff now run a significant program through summer and fall season, with many staff and ? ca. 0.5M \$ p.a. budget. The PBA program started in 1980 (Roy Bukowski).

The zone-based approach works quite well in prioritizing effort. Polar bears in Zone 1 (town of Churchill core basically) are removed (often trapped or tranquilized), then moved to the D20 Holding Facility, then eventually released to the north (transported by helicopter sling), or offshore from Churchill once sufficient sea-ice has formed. Bears entering Zone 2 are chased away.

When the Churchill open landfill site was operating (closed in 2005), there were more bears there and fewer in town. In recent years some segregation and diversion of human waste has happened in Churchill, with the large old military building L5 set up as a bear-proof holding and transfer station for the different types of waste (including compaction of recyclables, some of which are shipped south on rail cars for processing).

In 1985-6 it became illegal to bait polar bears in Manitoba, and this practice ceased around the mid-1990s. In that era, cages were regularly used to lure bears to photographers-people ('safely'), but this affected bear behavior – "we created the monsters we have".

In the early days, there was feeding-luring of bears to tundra-buggies and tourism operations, and this likely influenced bear behavior, food begging etc. But this is now stopped (with the one notable exception of the Lagoon dog yard east of town, where food is still left out for polar bears, and tourists encouraged to come/pay).

Appendix V. Key points from Polar Bear Safety Training presentation

As one of the most experienced trainers in the business, we were very fortunate to have this talk and Andy's presence throughout the workshop.

'HuManagement' is the key term for success of these measures – managing what people do, not as much what bears do!

Getting to the heart of the issue is critical – why bears are attracted to people and their habitations in the first place. And the answer is almost always "Follow the garbage trail".

Community/facility 'Site Audits' are key. There is a standardized protocol now for this assessment-inventory of the waste trail, which ultimately points out the main sources of the odours/elements that are attracting the bears.

For companies such as industrial sites/camps, their attention is totally grabbed when you frame the measures under the 'safety' umbrella, rather than the 'environmental' section.

For Bear Guards, both the client and the actual guard need to know very clearly what the job is. Overall success depends a lot on everyone accepting that this "is a team thing".

Ideally one should train bear guards so that they can make a career/at least part-time out of it, not just one-off initiatives.

Use (the right) elders as co-instructors as much as possible.

Very important to train people in BOTH Deterrents, and Education-awareness building.

"Polar bears behave the same way everywhere".

USFWS advice now is to only use 'bean sacs/bags' projectiles, and not rubber bullets (per PBI).

Don't forget about rocks, or banging cans to make loud irritating noises. The general aim is always to create an unusual stimulus that a bear isn't used to, that convinces it to go somewhere else.

The quality of bangers and cracker shells is apparently decreasing (12-gauge). – and we saw this at FLOW in the outside demonstrations we held – some crackers went off in the gun barrel, and others after a few seconds where the projectile landed.

15 mm bird bangers-screamers work, but have inconsistent performance.

The 15mm pen launchers (of bangers and/or flare/light flash) are getting more dangerous apparently (no longer German made).

15 mm starter pistols can work quite well, packaged in a waterproof case, when loaned to visitors etc.

Body language is a key thing – first-ditch signal as to what the bear intends to do, and also human body language (raise arms, jump, stand tall etc.). (Large number of different resources available out there re 'what to do' – somewhat varied and confusing).

'Critter-Gitter' noise alarm devices can work well on camps, tents etc.

Bear spray is loaned to most parks visitors. There are now 17 cases where it did work well on Polar bears. Need to always check canister expiry date.

Many other tools (e.g. Air horns, bell, personal alarms, voice, swinging rope over your head to make whirring noise etc.).

Rubber bullets available from Margo Supplies, but shipping can be an issue. Only Arviat CO has a specific rubber bullet riot-squad gun. 37mm projectiles, rather inaccurate unless within 10 m of the bear.

Some 'weird stuff' for further testing/development, such as a modified Paint-ball gun with a rubber ball. Slingshot and marbles; and the LRAD sonic beam device that Channel 4 tested out with some success with Arviat guards.

For all of these tools, training and practice are key to successful/optimal performance. If people haven't used them before, then they're far less likely to do so effectively when the crunch moment occurs!

Appendix VI. Key points from Nunavik, N Quebec presentation

Inuit Report a growing number of encounters with polar bears, especially at camps around N Quebec coasts.

Polar Bears are less afraid of humans than before

Difficult to put forward concrete numbers about the rate of increase of human-polar bear interactions, since little if any systematic recording-monitoring was done in the past. But, Quebec started documenting DLP kills in 2012/13.

Since reporting started, 51 DLP kills have been recorded – the majority (31) were “investigating” in camps.

Reporting not yet mandatory in all sub-populations occurring in Quebec.

There are currently no programs in place to provide deterrence tools to Nunavik Inuit.

If there is damage to camps, equipment, etc. no financial compensation programs are yet in place.

Nunavik Inuit (and James Bay Cree) are keen to put in place such measures, during implementation of new polar bear management plan.

All three Quebec participants at the workshop agreed that there was a great need for all key organisations involved in northern Quebec to do some ‘catch-up’, and that this workshop was an extremely helpful start to that.

Appendix VII. Glossary and Acronyms

Many of the terms used in the report are based on the meanings proposed in the main published paper on this topic, by Hopkins et al.:

Hopkins, J. B., S. Herrero, R. T. Shideler, K. A. Gunther, C. C. Schwartz, and S. T. Kalinowski. 2010. A proposed lexicon of terms and concepts for human-bear management in North America. *Ursus* 21: 154-168.

And some others are derived from the Matt report, and our own knowledge:

Matt, C. 2010. Third International Bear-People Conflicts Workshop: Polar bear focus day summary. November 18, 2009, Canmore, AB. Red Deer College, Red Deer, AB. URL: <http://www.rdsience.ca/bear/bear.html>

Anthropogenic food	Foods or attractants having a human origin
Attack	Intentional contact by a bear resulting in human injury. Bear attacks are a subset of <i>incidents</i> .
Attractant	Anything that draws a bear into an area including natural foods (e.g., fish, animal carcasses or guts), human food or food waste, <i>anthropogenic foods</i> , and even items we would consider inedible (e.g. industrial materials such as motor oil, antifreeze, fertilizer, coatings on power cables). Under the broadest definition it could be anything that bears find interesting.
Averse conditioning	A learning process in which deterrents are continually and consistently administered to a bear to reduce the frequency of an undesirable behavior (more long-term and systematic than hazing)
Bear attack	Intentional contact by a bear resulting in human injury.
Bear deterrent	Averse agent (auditory, chemical, or impact) administered to bears to cause pain, avoidance, or irritation.
Bear human conflict	Includes <i>interactions</i> , <i>encounters</i> and aggressive interactions in which people perceive or experience a threat to life or property
Bear incident	An occurrence that involved a human-bear conflict or episodes where bears caused property damage, obtained anthropogenic food, killed or attempted to kill domesticated animals, or were involved in vehicle collisions
CBA	Community Bear Alert
CNSC	Churchill Northern Studies Centre
CO	Conservation Officer

Conditioning	Learning involved in receiving a reward or punishment for a given response (behavioural act) to a given stimulus.
DLP	Defense of Life and Property
Encounter	Synonymous with Interaction.
FAC	Firearms Acquisition Certificate
FLOW	Front-Line Operators Workshop
Food-conditioning	Learning to associate people (or the smell of people), human activities, human-use areas, or food storage receptacles with anthropogenic food. (note; this behaviour is distinct from habituation, though they can occur together)
GMB	Government of Manitoba
GN	Government of Nunavut
Habituation	The waning of a behaviour in response to a stimulus: in this context, it is usually meant as habituation of a bear to the presence of people. (note; this behaviour is distinct from food conditioning, though they can occur together)
Hazing	A technique where deterrents are administered to a bear to immediately modify the bear's undesirable behavior (more short-term than aversive conditioning)
HTO/A	Hunters & Trappers Organization/Association
Human food	Anthropogenic foods that only include human foodstuff and food waste
Interaction	When a person(s) and bear(s) are mutually aware of one another. Bears may react with seeming indifference, by leaving the area, or approaching the person. Synonymous with <i>encounter</i> .
IUCN	International Union for the Conservation of Nature
LRAD	Long Range Acoustic Device
Mauling	An attack on a human being, resulting in death, or injuries requiring medical attention.
Monitor	Someone who gathers and reports observed information through time.
NGO	Non-Government Organization
Non-lethal	A type of deterrent (e.g., pepper spray or stationary noise-makers such as air horns) that will not injure or kill a bear even if misused.
Patrol	A person who routinely travels around the community, to check for presence of polar bears, especially in the peak fall season (also the action of doing so)
PAL	(Firearm) Possession and Acquisition Licence

PC	Parks Canada
PBI	Polar Bears International
PBSG	Polar Bear Specialist Group (of IUCN)
Polar Bear Guard	A person who protects the community, or a specific group or facility, from polar bear incidents
Proactive human-bear management	A population-level management strategy that aims to deter or prevent individual bears not previously or currently involved in bear incidents, from being involved in incidents.
Problem bear	A bear that requires a management action or expenditure of human and/or financial resources. This term covers a broad spectrum, from bears that require periodic monitoring because they are near human infrastructure, to bears that require intensive hazing or lethal removal.
Range States	For polar bears, the five nations that have wild polar bears – Canada, Greenland/Denmark, Norway, Russia, United States
Reactive human-bear management	A management strategy that responds to individual bears involved in bear incidents through immediate and direct action
Relocation	capture and release of bear at a distance away from a high-risk area. Often, but not always, the intent is to remove bear temporarily from a conflict situation.
Repellent	A type of bear deterrent, most notably capsaicin spray
WWF	World Wildlife Fund