

# Minutes of the 17<sup>th</sup> Meeting of the IUCN/SSC Polar Bear Specialist Group, Fort Collins, Colorado, USA 9-14 June 2014

## Monday June 9th

### 1. WELCOME

The 17<sup>th</sup> Meeting of the IUCN/SSC Polar Bear Specialist Group (PBSG) was called to order by D. Vongraven, Chair of the Group, at the US Geological Survey Science Center in Fort Collins, Colorado, USA. He welcomed the delegates to Fort Collins and thanked Todd Atwood and the USGS for hosting the meeting. T. Atwood provided a series of introductory and administrative remarks.

D. Vongraven noted that this meeting was a departure from recent Meetings, at which there was participation by invited specialists and observers and updated presentations from each country on their respective research and management. With the active work of the Polar Bear Range States, increased requests for advice from the PBSG, and concerns for the capacity of the Group to meet these requests in a timely manner, it was important that this meeting focussed on the structure, function, and form of the PBSG.

PBSG members Andrei Boltunov, Rune Dietz, Markus Dyck, Morten Ekker, Nikita Ovysanikov, and Christian Sonne were unable to attend the meeting. Jon Aars, Karen Rode, and Greg Thiemann were unable to attend the opening of the meeting but would be joining later.

Dena Cator (IUCN) and Erik Born (previous Chair PBSG) were introduced and welcomed as guests for the meeting. Simon Stuart (IUCN/SSC Chair) has also been invited to the meeting and will join us on Wednesday morning.

### 2. FORMAL MATTERS

#### Minutes

The PBSG discussed the importance of keeping minutes as a record of this meeting and making these available on the website, particularly given the need for transparency because it is a closed meeting. A small group volunteered to take minutes throughout the meeting and would be combined into a single document for circulation to all members for comments.

**Meeting Rapporteurs** – *Steve Amstrup, Todd Atwood, Dena Cator, Andy Derocher, Kristin Laidre, Nick Lunn (lead), Evan Richardson, and Geoff York.*

#### Presentation and Participation of Nikita Platonov

D. Vongraven indicated to the Group that Nikita Platonov, who is not a member, will be giving a presentation on Russian research later this week. Originally he had been told that he could attend the sessions on Tuesday afternoon through Thursday morning only. The PBSG discussed and agreed that he could attend all of the meeting.

### Research and Management Reports

At previous meetings, each country provided updated reports on research and management that had occurred since the last meeting. As the focus of this meeting was on addressing important business issues of the PBSG, there were not going to be the usual presentation of research and management reports. There was agreement that there was value in continuing with these reports being made available and a general discussion as to how to best proceed. Making these available on the website was felt to be one good place but concern was expressed that these reports might not get done because there is nothing to push the authors to prepare these. Using the website would also enable updating of content rather than waiting 3-5 years. However, it was also noted that there was value in having a definitive product with a 'date and time' stamp that can be referenced by the public rather than having a living document that is constantly being updated.

Questions were asked as to whether there would be a published proceedings arising from the meeting. There was general agreement that there was not a need for the publishing of a hardcopy but that the electronic material could be gathered together and formatted following the previous IUCN proceedings, which could then be made available on the web.

The PBSG is in a period of transition between the traditional way of meetings and proceedings and opportunities afforded by the internet age. People are looking for more immediate updates than having to wait 3-5 years for a hardcopy publication. It was felt that it would be useful to draft templates of the material expected to be in the research and management reports in order to avoid unnecessarily long reports. Concise overviews are preferred, although it was recognized that some flexibility should be maintained because the content of these reports will vary by country.

***Working Group (draft template structure for reports) – Steve Amstrup, George Durner, and Ian Stirling.***

### Resolutions and Press Release

As with discussion of minutes, the Group decided that it was probably important that some type of a press release summarizing the main points of discussion at the meeting be drafted. Dena Cator indicated that the IUCN could help distribute the press release.

***Working Group (draft press release if this was needed) – Eric Regehr, and Geoff York (lead).***

Although there were no resolutions circulated for discussion prior to the meeting, that would not preclude members drafting and looking for support for them during the meeting. Eric Regehr suggested that one possible resolution could be on the importance of cooperation amongst jurisdictions.

### Agenda

No additional agenda items were raised.

### **3. REPORT FROM 2013 MEETING OF THE PARTIES (RANGE STATES), MOSCOW**

Dag Vongraven and Steve Amstrup represented the PBSG at the most recent Meeting of the Parties that was held in December 2013 in Moscow. The main points of discussion were the ongoing efforts in the development of a circumpolar action plan, a request to the PBSG for advice on threats to polar bears, the declaration encouraging the PBSG to consider ways in which TEK can be used alongside science in the development of the PBSG status table, and a discussion of the PBSG presentation on status. The Canadian Delegation had questions and concerns with respect to how the PBSG develops the table; particularly why in some cases abundance estimates were used that had not yet been seen by the responsible management authorities in Canada. It was noted that there was strong support from the Range States, particularly the United States, for the work done by the PBSG.

CITES was an underlying theme throughout the meetings and a working group was struck to address issues of legal and illegal trade in polar bears.

It was noted that there was an international forum immediately preceding the meeting of the Range States. The forum was partially organized to recognize the 40<sup>th</sup> anniversary of the signing of the international Agreement and included high level attendees and participation not only from the Contracting Parties to the Agreement but also from NGOs. Thor Larsen gave an invited presentation on the history of the PBSG. Steve Amstrup gave a presentation on global conservation and potential threats to polar bears.

This was the third official meeting of the Range States since 1981 (2009 – Norway, 2011 – Canada) and each meeting has been different. The Range States, like the PBSG, are trying to find the right format and structure moving forward.

### **4. ADVICE TO THE RANGE STATES**

D. Vongraven advised that the next meeting of the Range States will be in 2015 in Greenland. As scientific advisors to the Range States, there has been an increase in requests and advice asked of the PBSG. This has increased the Group's workload, particularly that of the Chair. Collectively, the PBSG membership needs to 'step up' in order to meet these demands. Currently, much of the work is being done by a small proportion of the membership. Thus, the PBSG should decide whether or not it wants to continue to be the advisor to the Range States.

There was agreement amongst the members that the PBSG should continue in this role because it does have influence within the Range States and that the Group will continue to be invited to participate in the meetings of the Range States unless the PBSG decides it does not want to.

Capacity within the PBSG was identified as a concern; members volunteer their time, which is on top of working for their own agencies/organizations. Members noted that for some of the requests we have received, such as identifying threats, the PBSG members put a lot of time over email working, going through iterations, and ending up with something that was readily

available in the monitoring framework document written by D. Vongraven and E. Peacock. Sometimes, the answer to a particular request could simply be a quick summary and a collection of published papers.

A partial solution to the issue of capacity is for the Chair to delegate requests for advice to an individual or small group to develop a response rather than sending a general email and wait for members to respond. The draft response would then be sent to the membership with a firm deadline, after which the issue is closed based on those members that did respond. It was stressed that part of accepting membership on the PBSG is taking on a fair share of the delegated work and responding in a timely manner.

The Group felt that if the Chair had an assistant that a lot of the day-to-day overseeing of member responses to requests from the Chair could be handled by the assistant. D. Cator indicated that other Specialist Groups have taken a similar approach and have employed Program Officers to assist Group Chairs.

It was also felt that the PBSG should not necessarily agree to undertake all the requests it receives, but rather review the request and determine whether it is something we should answer and whether it can be answered within the time frame requested.

***Working Group (develop process by which the PBSG should or should not take on requests for advice from the Range States or other body) – Kristin Laidre (lead), Lily Peacock, and Jim Wilder.***

It was agreed that the PBSG should approach the Heads of Delegations of the Range States to clarify roles and expectations, indicate that the PBSG is part of the IUCN and not solely advisors to the Range States, and to request financial support for an assistant for the Chair and a limited amount for travel for members who have no means of attending meetings other than using research grants or personal funds.

#### Status of the Circumpolar Action Plan

J. Wilder reviewed and provided an update on the status of the Circumpolar Action Plan (CAP) initiative of the Range States. The Range States agreed to the need of the CAP in Norway in 2009, agreed on a Table of Contents and a work plan in Canada in 2011, and, in 2013 in Russia, committed to finalizing the CAP prior the next meeting of the Range States in Greenland in 2015. The foundation of the CAP is the 1973 Agreement and the PBSG is recognized as being the best source for the scientific support and advice needed in the plan.

The Range States are developing national action plans and the CAP will link to these as well as linking to other relevant initiatives being developed elsewhere (e.g. Arctic Council).

There are six primary objectives of the CAP: 1) minimize threats to polar bears, 2) communicate the importance of mitigation of greenhouse gases, 3) responsible harvest practices, 4) preserve suitable habitat, 5) manage human-bear interactions, and, 6) ensure that international legal

trade is based on sound conservation practices and illegal trade is curtailed.

The CAP will follow guiding principles including actions to be taken at appropriate levels, consultation and collaboration, engagement of local people, taking a precautionary approach, use of science and TEK, and regular assessments of the status of all subpopulations by PBSG and Range States.

The CAP is being written in two parts – Part I provides the background and Part II provides the actions to be taken, implementation, and review and evaluation. As part of the review of the CAP, the PBSG will be asked to review Part I during September-December 2014 and Part II during December 2014-March 2015.

There are a number of actions in the plan that may be of interest to the PBSG or the PBSG may be asked to be involved: develop recommendations for protection of terrestrial refugia, identify denning areas and assess potential impacts to these areas; map sensitive polar bear areas (spatial and temporal) for use in oil spill response; map shipping routes, projected shipping routes, and magnitude of shipping; tourism impact assessment; assess trade impacts; develop plan to determine status/trend for all subpopulations; assess cumulative impacts; and coordinated monitoring of human-bear conflicts.

A discussion followed that noted that there is a long list of tasks that the PBSG could be asked to be involved with and that the bureaucratic process and expectations are often unrealistic. One option could be to give advice and input where we can but identify knowledge gaps that need to be addressed but which cannot be done within the current timeframe. There is an opportunity for the PBSG to be proactive by reviewing Range State timelines and identifying what can and cannot be done within these rather than waiting for a request to come. It was also noted that 6 members of the PBSG are on the drafting committee of the CAP representing national interests, which further limits the ability of the PBSG.

This might be an opportunity for the PBSG to ask the Range States for resources in order to meet deadlines.

#### Traditional Ecological Knowledge

At the International Polar Bear Forum held in Moscow in December 2013, the Responsible Ministers of the Polar Bear Range States issued a Declaration that included:

“Encourage the IUCN Polar Bear Specialist Group to determine how to best use Traditional Ecological Knowledge together with scientific approaches and analyses of polar bear population status for more effective decision-making and consider their recommendation at the 2015 regular meeting of the range states”

Prior to this meeting of the PBSG, Ian Stirling was asked to take the lead to develop a draft response statement that would be sent to the Range States after discussion by the PBSG membership. I. Stirling noted that in developing the draft that he had asked for and received

valuable input from several other members on earlier drafts.

There was a general discussion and agreement with the statement. Much of the discussion focused on improving the wording of the statement rather than issues of substantial disagreement. It was noted that local ecological knowledge (LEK) was probably a better term to use than traditional ecological knowledge (TEK) as these have different meanings. It was agreed that the statement should clearly define what the PBSG means when it refers to TEK and, in the case of this statement, it would include not only TEK but also LEK.

It was noted that scientists are often critical of one another as part of the scientific process. However, when aspects of TEK are questioned by others, it is viewed as questioning culture and beliefs. There was concern expressed that, in trying to provide ways in which TEK could be collected to make it perhaps more useful, it seems like we are trying to turn it into science. Often TEK is not time or date-stamped but is more of a generalized knowledge. It was pointed out that TEK can be supported by quantitative evidence, for example, quantifying hunter observations.

Ian agreed to redraft the statement based on the discussion and to circulate a new version to the membership.

Following the Declaration, there had been informal discussions among PBSG members about the value of a peer-reviewed publication that would discuss the strengths and weaknesses of both science and TEK. The PBSG recognized that the sending of a short statement to the Range States would not end the debate and that discussion of TEK, its incorporation into management decisions and periodic disagreements with science are likely to continue and evolve.

There was general agreement of the value of a peer-reviewed publication but that it should not be a PBSG-authored paper – the PBSG statement was sufficient. Those individuals interested in being involved in the writing of a paper were encouraged to pursue it independently.

## **5. TERMS OF REFERENCE**

Prior to the meeting, a sub-committee developed draft Terms of Reference for the PBSG and circulated to the members for review. Initial discussion began on reviewing the text starting with a line by line review of the mission and objectives. However, it was recognized that this approach could end up focusing significant amounts of time addressing minor issues of wording at the expense of tackling some of the bigger issues around membership, selecting the Chair, responsibilities, and so on. It was agreed to focus the initial attention on the ‘nuts and bolts’ of how the PBSG will function. It was further recognized that this would not be completed in the first afternoon of the meeting and that additional time has been allocated in the agenda.

It was agreed that the PBSG should be a science-based group and therefore membership must reflect scientific knowledge and expertise. The Group felt that such language would not restrict membership to only polar bear scientists but that it was important not to broaden the language so that anyone with knowledge of polar bears could be a member.

The Group agreed that the Chair would be elected by the members, preferably by consensus. In the event that consensus could not be reached, then a vote would be taken that would require approval by a majority (50+1) of the members. In the event that the Chair cannot continue to the end of his/her term, that an email vote would need to be taken to select a new Chair who would serve until the next regular election. The IUCN formally approves the Chair.

It was agreed that membership on the PBSG should align with the IUCN quadrennial, which would likely mean another meeting of the Group in 2016. Responsibilities of the Chair and the membership were discussed. The Chair is responsible for appointing the members and has the authority to remove members. It was noted again that part of the responsibility that comes with accepting an appointment to the PBSG, is that the member will be active and help share the workload of the Group.

It was reinforced that the desire is that the PBSG would act on a consensus basis. However, it was also recognized that there may be times when this would not be possible. In such cases, a vote would be taken and a decision based on support from two-thirds of the members voting. It was agreed that individual names would not be identified only that a decision was passed by consensus or majority. Minority statements could be noted.

## **Tuesday June 10th**

PBSG members Karyn Rode and Jon Aars were introduced and welcomed to the meeting.

The Group continued discussions of the Terms of Reference and focused on Rules of Procedure, which are important for the orderly process of the PBSG.

With the desire for the PBSG to align with the IUCN quadrennial meetings, the next working meeting of the PBSG would have to occur in 2016. Thereafter, the regular meetings should be held at least every four years; which does not preclude meeting more frequently if that is deemed necessary. There was recognition and general agreement that the location of the regular meetings should rotate, as much as practical, among countries represented by the PBSG membership. The working language of the PBSG is English; reports and findings of PBSG subcommittees and working groups should also be presented in English.

Attendance and participation of invited specialists, observers, and the media was discussed. There was little discussion with respect to invited specialists as their participation was clearly understood – individuals that have expertise relevant to specific agenda items or to the overall content of the meeting (e.g. sea ice, genetics, population modelling). It was also agreed that the meetings of the PBSG are technical and, in order to foster open and frank discussions, that the media would not be invited to attend.

There was greater discussion of the role of observers at the working meetings, what their level of participation should be, and the difference between observers and invited specialists. It was felt that there is potential value in allowing individuals to sit in on the meetings to provide some transparency as to how the PBSG operates, especially if the observers then go back to their communities or agencies and communicate this. However, there was concern of allowing observers to raise questions and make statements, especially if these would detract from the meeting. Given the high profile of polar bears, there is considerable interest from NGOs, wildlife management boards, user groups, and other interest groups; thus, the PBSG needs to be very careful in deciding who is allowed to attend and participate. The Group decided that observers could attend future meetings but that they would not have any direct participation beyond their attendance and that specific language with respect to expected behavior of observers should be drafted.

It was also agreed that the total number of invited specialists and observers would not exceed the number of PBSG members; a deadline of 90 days prior to a technical meeting for which invited specialists or observers could be proposed; and, the Chair has the final decision with respect to the attendance of invited specialists and observers.

The Group also agreed that parts of the technical meeting may be closed to non-PBSG members and that both invited specialists and observers should be advised of this as part of the invitation process to minimize problems arising at the meeting.

It was agreed that the IUCN Secretariat, SSC Chair, and the Chair/Co-Chairs of the Bear Specialist Group should have permanent specialist status to all regular working meetings of the PBSG.

## **6. REVIEW OF METHODS OF POPULATION AND POPULATION TREND ASSESSMENTS**

S. Amstrup led a discussion on population and population trend assessment and whether or not the PBSG should develop and publish guidelines on the strengths, weaknesses, and limitations of the available methods. Historically, physical mark-recapture was the method of choice because in addition to an estimate of abundance, additional information and samples could be collected. Such studies were accepted in the communities but, more recently, changing opinions on the use of physical mark-recapture have arisen as climate change has emerged as a significant issue. Concerns with the level of invasiveness, high cost, logistical difficulties, and lack of administrative support have resulted in other techniques being investigated and used (e.g. aerial survey, genetic mark-recapture). However, it is important to be aware of the trade-offs and limitations of other methods, the ability to directly compare estimates derived from different methods, and that managers be aware of the levels of risk and uncertainty in order that they can develop management actions based on their levels of risk tolerance.

E. Born noted that several years ago the Scientific Working Group to the Canada-Greenland Joint Commission on Polar Bear developed a working paper comparing the merits and feasibility of estimating the abundance the Baffin Bay subpopulation using physical mark-recapture,



genetic mark-recapture, and aerial survey methodologies. This working paper would be a useful starting point for a PBSG discussion.

In addition, the utility of projection models was discussed. Such models are particularly useful for providing managers with opportunities to assess risk tolerance under differing future scenarios rather than simply providing a single projection. The PBSG agreed that developing a projection model was important and that it would be useful to approach the Range States for funding. It was noted that the upcoming Red List assessment has a projection component to it and would have benefitted tremendously.

***Working Group (to develop an overview document on the strengths and weaknesses of abundance methodologies/techniques) – Steve Amstrup, Andy Derocher (lead), Kristin Laidre, Nick Lunn, Lily Peacock, Eric Regehr, and Øystein Wiig.***

## **7. CLIMATE CHANGE SESSION**

S. Amstrup organized a session on climate change and invited three specialists to give presentations: Marika Holland (National Center for Atmospheric Research, Boulder, CO), Jennifer Kay (National Center for Atmospheric Research, Boulder, CO), and Mark Serreze (National Snow and Ice Data Center, Boulder, CO). The broad topics of the presentations were 1) Basics of climate models; 2) Projections of arctic climate and sea ice changes; and, 3) Impacts of arctic climate change.

### Modeling the Climate System – Marika Holland

M. Holland reviewed the basics of climate models and what the primary drivers are; highlighting the importance of the effects of greenhouse gases (GHG's) in modeling the earth's climate system. The complexity of climate models has increased over time with the inclusion of coupled processes that take into account factors such as fluid motion, thermodynamics and hydrological processes. Models are developed to assess average long-term conditions and include a certain level of uncertainty. It was emphasized that climate models provide a means of doing controlled experiments to see how the earth's climate system responds to perturbations such as increases in GHG's with the ultimate goal of gaining a better understanding on how the climate system work. Validation of climate models is typically done by comparing model predictions to empirical data (e.g. sea ice extent). The use of climate models for climate predictions was reviewed. M. Holland noted that there is a limit in the predictions of climate models in terms of the degree to which you can forecast into the future. Scientists are mostly interested in predicting future conditions based on potential perturbations/forcing dynamics. What can we expect? What does the distributions of potential climate scenarios look like (what are the range of trends)? How might extremes change in terms of atmospheric temperatures?

M. Holland summarized her presentation by highlighting that 1) climate models are useful tools, 2) simulations can provide insight into climate systems, and 3) climate models can provide insight into potential long-term changes in the earth's climate system.

### Arctic Sea Ice Observations and Projections – Jennifer Kay

J. Kay reviewed the linkages between climate and sea ice trends and the role of climate models in understanding what is happening with the sea ice system. In terms of understanding what controls the sea ice extent, climate models can help us understand the year to year variability (e.g. increase in sea ice in 2013). Climate models contain the key processes that let us understand how climate warming influences sea ice trends. Using ensembles (groups of climate models) scientists can gain a better understanding of model physics and sources of variability in the climate system that influences sea ice trends. Ensembles are a group of models in which you change one of the model parameters (e.g. air temperature) to generate variability in the system. By doing, so scientists can get a distribution of the future climate conditions instead of a single model realization.

A. Derocher asked why there is an increase in the variance in the models over time. J. Kay indicated that models exhibit rich variability which is influenced by model parameters and starting conditions. M. Serreze emphasized the importance of initial conditions in future projections of climate models. S. Belikov then asked why no models predicted the 2012 sea ice cover. M. Serreze replied that models are not built to predict a given year because they are parameterized for the mean conditions. He emphasized that the statistics of the weather in these models are correct but that the sequencing of events are not expected to line up with reality.

J. Kay then reviewed investigations into whether observed sea ice trends can simply be explained by natural variability in the earth climate system? She noted that natural variability alone cannot explain observed trends in sea ice loss and that shifts in sea ice are best explained by forcing in the climate system. J. Wilder asked whether sun spot activity was important in climate models. In general it was indicated that sun spots (or solar variability) have little influence on these climate models. A. Derocher asked about the probability of the 1979-2013 ice trend given climate conditions in 1850. M. Serreze indicated that it was very low (~1/1000). S. Amstrup asked about the role of solar forcing. M. Serreze said that it was variable depending on factors such as stratospheric ozone but that it alone cannot explain the long-term trends in the earth's climate system. J. Kay noted that model predictions indicate that sea ice has the potential to temporarily expand in a warming world over 10 year time scales (i.e., in any one decade you could see a relative increase in sea ice cover); however, projections of 20 years tend toward sea ice decline. J. Kay then touched upon the question of whether the Arctic will be ice free in the summer by the end of the century and noted that it depends on the model physics and atmospheric conditions in the future. J. Kay concluded her presentation by highlighting that concluded her presentation by highlighting that 1) summary observed trends in 1979-2013 sea ice cannot be explained by natural variability; 2) Arctic sea ice extent could increase or decrease over the next decade and that all future conditions are highly dependent on model physics, and 3) large ensembles from credible climate models are needed to understand Arctic sea ice trends in a warming world.

There was a general question about tipping points in the earth's climate system. J. Kay indicated that research shows that tipping points are not likely to happen (e.g. if you decrease GHG forcing sea ice will recover); however, there may be tipping points for melting land ice

(e.g. glaciers). She noted that there are other types of tipping points in the climate system (e.g. methane release) that could be crossed, which would have a significant influence on changes in sea ice cover.

There were questions regarding what the summer sea ice might look like mid-century and whether it would be ice free. M. Serreze indicated that the range at which you reach an ice free Arctic will likely happen over a 20 year period and that there was no exact date because there are a range of model predictions; however, generally the models tend to predict an ice free Arctic some time mid-century.

#### Environmental Impacts of Sea Ice Loss within and Beyond the Arctic – Mark Serreze

M. Serreze reviewed the work at the NSIDC, its roles in distributing data, conducting research, supporting data users, providing data tools, facilitating education on the cryosphere, and supporting Traditional Ecological Knowledge initiatives. He then reviewed the impacts of sea ice loss, which included coastal erosion, increased access to natural resources, and potential increased commercial shipping.

He reviewed the concept of Arctic amplification that is related to increased amounts of warming in the Arctic compared to the rest of the globe, which is influenced by Arctic albedo, cloud cover and changes in atmospheric circulation. He discussed whether Arctic amplification leads to “whacky” weather or what is referred to as stuck weather patterns and explained how the polar vortex is related to climate conditions in the Arctic. The polar vortex can be defined as the region of the atmosphere encompassing cold Arctic air that is bounded to the south by the jet stream which typically has winds that travel from west to east. Mark indicated that Arctic amplification weakens the temperature gradient between high and mid-latitudes resulting in changes in pressure gradients influencing the speed of the jet stream. Differences in the speed of the jet stream then result in increased waviness in the polar vortex leading to stuck weather patterns. Mark indicated that there was lots of controversy about this notion but that there is model evidence that reduced sea ice cover is likely to influence weather in mid-latitudes.

There was a discussion of whether more heat in the atmosphere will lead to more extreme weather patterns. M. Serreze indicated that there is no expectation that weather patterns will remain static and that a big component is increased water vapor in the atmosphere, which intensifies the hydrologic cycle – some areas will get wetter and others will get drier. Wet areas tend to get wetter and drier areas tend to get drier. The Arctic is an area predicted to become wetter. This led to a discussion of whether models predict higher frequency of extreme weather events. M. Holland indicated that most climate models are too coarse to predict extreme weather events but that people are looking at these sorts of questions at finer scales.

Were AO and NAO variability related to sea ice loss? M. Serreze noted that these indices can be very limiting because they are influenced by certain conditions in certain places.

How does the NSIDC organize the communication of research materials? M. Serreze indicated that the NSIDC has a communication committee and that its basic tenant was to make the information scientifically accurate but accessible at the same time.

Polar bears have seen warming climatic conditions before – are there good estimates of what sea ice looked like in the paleoclimate record? M. Serreze indicated that there is not a lot of data and that it is hard to reproduce the historical sea ice record.

## Wednesday June 11th

PBSG member Greg Thiemann and Simon Stuart, IUCN Species Survival Commission Chair were introduced and welcomed to the meeting.

### 8. RED LIST ASSESSMENT

The IUCN is planning to update the Red List Assessment of all species listed on Appendix II in 2015; this includes the polar bear. Ø. Wiig is the PBSG lead for this assessment. Members were provided with an update on the status of this assessment through a series of presentations – 1) overview (Ø. Wiig); 2) generation length (E. Regehr); 3) current perspectives of assessments (R. Akçakaya); 4) possible use of a PVA approach (E. Regehr); and 5) proposed way forward (Ø. Wiig).

#### Overview of Red List Assessment Process – Øystein Wiig

The Red List Assessment is an estimate of extinction risk; what is the likelihood of a species becoming extinct in the near future? The IUCN has developed specific criteria to assess this, including data quality requirements. There is recognition that lack of data should not prevent an assessment. Under the IUCN, there are nine Red List categories (in increasing degree of risk):

1. Not Evaluated (NE)
2. Data Deficient (DD)
3. Least Concern (LC)
4. Near Threatened (NT)
5. Vulnerable (VU)
6. Endangered (EN)
7. Critically Endangered (CR)
8. Extinct in the wild (EW)
9. Extinct (EX)

Categories 5-7 comprise a broader category – Threatened. Polar bears are currently listed on the IUCN Red List as Vulnerable, which is the lowest of the three threatened categories.

There are three important terms used in the Red List Assessment process:

1. Population = total number of individuals in taxon = global population

2. Population size = number of mature individuals – the estimated, known, or inferred number capable of reproduction
3. Subpopulations = geographically or otherwise distinct groups among which there is little demographic exchange. Little demographic exchange is limited to very small numbers (e.g. 1 successful migrant or gamete transferred per year).

Thus, there is a significant difference between the IUCN and PBSG definitions of subpopulation, which will need to be addressed in the upcoming assessment.

Five separate criteria can lead to a species being listed under one of the Threatened categories:

- A. Population Size Reduction
- B. Geographic Range restriction
- C. Small population size that is declining
- D. Very small population size or restricted population range
- E. Quantitative analysis such as PVA or other projection model approach

Of these five, only three potentially apply to polar bears – A, C, and E. Each criterion has thresholds that are quantitatively assessed.

**Criterion A** (Population Size Reduction) can be met in 4 ways

**A1:** Population reduction in **past** and **causes of decline now ceased**

**A2:** Population reduction in **past** and **causes of decline ongoing**

**A3:** Population reduction expected in **future**

**A4:** Population reduction in **past AND future**

Whether the population reductions in A1-A4 have occurred can be based on:

- a. Direct Observation
- b. An Index of abundance
- c. Decline in Area occupied, extent of occurrence or habitat quality
- d. Actual or potential levels of exploitation
- e. Effects of: introduced taxa, hybridization, pathogens, pollutants, competitors, or parasites.

**Population reductions expected in the future (A3)** can be demonstrated by a combination of projected, inferred, and suspected trends of decline. The magnitude of decline over the next 3 generations would determine which threatened category a species would fall into –  $\geq 30\%$  (Vulnerable),  $\geq 50\%$  (Endangered), and  $\geq 80\%$  (Critically Endangered).

Inferred information is based on variables that are indirectly related to the variable of interest—generally in the same or similar units whereas suspected information is based on circumstantial evidence or variation in different types of units related to population abundance.

**Criterion C** (Small Population Size that is Declining) can be met in 3 ways

A global population of  $<10,000$  mature individuals that is

**C1:** Continuing to decline at a rate >10% in 3 generations

**C2:** Continuing decline at any rate

plus **C2a**, all subpopulations are very small (<1000 mature individuals) or most of the mature individuals in the global population reside in one subpopulation, or **C2b**, there is extreme fluctuation in the number of mature individuals.

**Criterion E** (Quantitative Analysis), which can be any form of analysis that estimates the extinction probability of a taxon based on known life history, habitat requirements, threats, and management options. Based on this analysis, a species would be listed as Vulnerable, if there is a 10% chance of extinction in 100 years; Endangered, if there is a 20% chance of extinction in 20 years or 5 generations; or Critically Endangered, if there is a 50% chance of extinction in 10 years or 3 generations.

In summarizing his presentation, Ø. Wiig noted that polar bears were classified as Vulnerable on the last Red List Assessment in 2006. However, criteria are far more stringent now and another assessment is due by **June of 2015**. There are two main issues that the PBSG will need to address for the upcoming Red List Assessment:

1. Calculation or estimation of Generation Length
2. How to relate the rate of habitat loss to a rate of population decline (Criterion A3) or estimate the probability of extinction (Criterion E).

#### Generation Length – Eric Regehr

The IUCN Red List Criteria define generation length as the average age of the parents of the current cohort. Analysis has been undertaken to estimate the generation length for polar bears. Although generation length can be determined from field data or from matrix projection models, the IUCN recommends estimating for pre-disturbance scenarios and not from heavily harvested populations. We should use un-harvested or sustainably harvested populations to develop estimates.

E. Regehr summarized the work that he has been leading on estimating generation length (GL) from data provided by a number of PBSG members.

#### A. Goal = estimated observed GL

1. Field data from multiple populations
  - a. Use ages of females accompanied by cubs and,
  - b. Ages of Females (age -1) accompanied by yearlings
  - c. Recognize numerous potential caveats and assumptions.
2. Evaluate Variation over time and among populations in GL
3. Understand factors influencing GL
4. Identify one or more, or a range of, values to use in conservation assessments

#### B. Goal = Evaluate GL using matrix based models

1. Breakdown the life cycle of polar bears so that every possible age and reproductive stage of females is represented in the model

2. Include mechanistic density dependence based on theory and biology, where ice extent is a proxy for K, includes interannual variability and trends in K based on sea ice extent. Include density independent stochasticity based on variance components
  3. Run model multiple times with realistic vital rates parameters
  4. Model produces a probability for each age and reproductive stage, and from that you can calculate the GL
  5. Estimate standard errors by bootstrapping
- C. Compare field and model estimates.

The data set he worked with had 3,191 observations of adult females with young, from which the observed GL was computed. It was noted that there was much variation among the subpopulations. The median GL was 11.2 years and the mean GL was 11.4 years. Considering all factors, the appropriate GL range was 11-13 years. These preliminary findings may change when the analysis is finalized.

The next steps in the GL portion of the process are:

1. Finalize data and model calculations
2. Sensitivity analyses
3. Possible comparisons of different models (e.g. asymptotic approximations)
4. Write manuscript including theoretical context and recommendations of the most appropriate GL.

#### IUCN Red List Assessment of the Polar Bear – Resit Akçakaya and Kevin Shoemaker

R. Akçakaya is Chairman of the IUCN Standards and Petitions Committee, which ensures that assessments meet the Red List requirements. He gave a presentation, via teleconference, on the perspectives of the Standards and Petitions Committee with respect to the Bayesian Network approach and several options for the upcoming assessment of polar bears.

Four shortcomings of the Bayesian Network (BN) approach (from the standpoint of the work of Amstrup et al. and the Red List requirements) were noted. First, BN models are mainly a vehicle for placing expert opinion into a common framework. They are not straightforward to update on the basis of observed data and there is concern that data would not be able to overwhelm the priors. Second, the BN model structure is not based on population dynamic theory. Third, the results from the BN approach are not applicable to Red List Criteria A or C, which require estimates of the amount of the decline not the probability of decline. Finally, the results are not applicable to Red List Criteria E, which requires quantitative not qualitative states.

It was agreed that the Red List Assessment has quantitative requirements which would not be met by current renditions of the BN model.

R. Akçakaya reviewed two options for an assessment of polar bears that would meet IUCN requirements.

1. Population reduction based on projected habitat loss – This approach will require an understanding and development of the relationship between habitat loss and population reduction. Habitat loss over the next 3 generations would need to be estimated and then the resultant population reduction calculated. This might require that weighted averages of subpopulation reductions be used. The outcome of this would then be assessed using Criterion A3c. The challenges of this approach include integrating summer and winter habitat loss into a single estimate and then determining the link between habitat loss and rate of population decline. It could be done for a single global population or by subpopulation. We already have projections of habitat loss.

2. Population reduction based on population model – This approach requires the development of a functional relationship between projected habitat change for each subpopulation and vital rates over the next 3 generations (i.e., develop a survival-sea ice function for each subpopulation). Weighted averages of subpopulation reductions would be used and then assessed against Criteria A3c, C, or E. The challenges include that a metapopulation model would be needed to relate knowledge about individual subpopulations to the global population if using Criterion E. We also need reasonable estimates of the size of all subpopulations; we cannot simply say, for example, that for subpopulations where estimates are currently poor that in the future these will be 20% lower. Other considerations include that what happens in one subpopulation may not be independent of what happens in another and, similarly, ice metrics may not be independent for neighboring subpopulations.

Regardless of which approach or combination of approaches is taken, the final Red List category will be determined to be the one that is of the highest level of risk (i.e., if Criterion A3c indicates Vulnerable but Criterion E indicates Endangered, the species would be listed as Endangered).

#### Possible Use of a PVA Framework to Assess Under Criterion E – E. Regehr

E. Regehr followed up on Resit's comments with a discussion on how we could use a PVA framework for subpopulation-specific stochastic projections to address Criterion E – population model approach to assessing population decline. The essential components that we would need to include in a PVA model are:

1. Vital rates – We would estimate current vital rates where these were available but use mean values otherwise. We would need to estimate density relative to carrying capacity (K) and then have some idea as to where the population was relative to K at the time vital rates were estimated.

2. Current and future environmental conditions – We will need estimates of environmental conditions. We could use satellite observations and use forecasted ice metrics from IPCC climate models to calculate future conditions on a subpopulation basis.

3. Estimate the relationships between vital rates and environmental conditions – We will need to understand the **Ice**→**K**→**vital rates** relationship. What is unknown is the relationship



between ice and K. For well-studied populations, we could calibrate the **Ice→K** function to match observed population trends.

Other considerations discussed were questions regarding whether or not the **Ice→K** relationship is stable. It is clearly not and will vary with time; can we assess that variation? For all subpopulations, hypotheses for current and future **Ice→K** relationships will need to be developed. Can we develop reasonable approximations for the poorly known subpopulations? Once we have completed this on the subpopulation level, we will need to scale up to the range-wide population in a way that makes sense. We would then evaluate a range of outcomes and evaluate the sensitivity of these outcomes to key assumptions.

#### Proposed Way Forward – Øystein Wiig

The timeframe in which to develop the assessment is tight and requires a subgroup to ensure it is completed in time. Next steps identified included gathering information for each specific subpopulation, complete the analytical assessment, consultations with other members during summer and autumn, holding a workshop of the working group in November/December, revising based on consultations and workshop, and completing assessment by June 2015. The importance of completing this assessment was stressed – it is important for the IUCN, the IUCN PBSG, the polar bear Range States, and the polar bear.

**Working Group (to develop draft Red List Assessment of the polar bear)** – Steve Amstrup, Kristin Laidre, Nick Lunn, Marty Obbard, Eric Regehr, Greg Thiemann, Øystein Wiig (lead), and Resit Akçakaya.

## 9. CITES

D. Cator provided an update on polar bears and CITES. Appendix I species are those threatened with extinction; trade is only allowed under exceptional circumstances (e.g. research). Appendix II species are those not necessarily threatened but trade must be controlled to avoid use incompatible with survival. At CITES CoP16 in 2013, a proposal to list polar bears on Appendix I was rejected. The next opportunity for consideration of uplisting to Appendix I would be at CoP17 in 2016 (South Africa). Parties to CITES would propose species for uplisting; IUCN and TRAFFIC would conduct an analysis of each proposal. If the polar bear was to be proposed again, the PBSG would likely be asked to contribute information/expertise to the analysis process in late 2015.

Between the CITES CoP meetings, technical/scientific meetings of CITES Animals Committee occur at which a Review of the Significant Trade (RST) process is undertaken. This review of trade in Appendix II-listed species is a regular process and is undertaken to determine if there is ongoing information that might affect the next round of proposals and considerations.

As part of this process, the polar bear was identified by UNEP-WCMC as a “high volume” traded species (based on threshold of 50 trades per year). At the meeting of the CITES Animals Committee, the UK proposed polar bears for further review. Initially, Canada questioned this

proposal when considering the work undertaken to review trade in recent years but subsequently agreed that a review would be helpful. Norway also agreed that more information would be helpful. It was confirmed that the polar bear could still be proposed for uplisting to Appendix I at CoP17 while the review by the Animals Committee was ongoing.

As part of the RST, all polar bear Range States will be required to report on any possible problems with the implementation of Article IV of Cites, which relates to how countries determine a non-detriment finding. The CITES Secretariat will inform the Range States of the information required from them and that they will have 60 days to reply.

In 2015, the Animals Committee will review the material provided by each Range State; the PBSG might be asked for additional information. At that time, the Animals Committee will eliminate from the RST process those Range States where existing trade has been determined to be non-detrimental. For those Range States where there are concerns with existing trade, additional review will be undertaken by UNEP-WCMC, which may ask the PBSG for information.

UNEP-WCMC will provide its review to the Animals Committee in 2017. As part of its review, UNEP-WCMC will provisionally categorize the situation with respect to trade in each polar bear Range State under review as being Least Concern, Possible Concern, or Urgent Concern. For the higher two categories, Possible Concern and Urgent Concern, other time bound and specific recommendations will be drafted.

While the RST process is connected to the CITES process, they are currently out of sync. The current RST will not be completed until after CITES CoP17 in 2016. As the two processes are not currently synchronized, the degree to which the RST process informs CITES is not clear-cut.

## **10. OTHER CONSERVATION INITIATIVES**

### Convention on Migratory Species (CMS)

D. Cator provided an update on a proposal to list polar bears under the CMS, a draft of which was reviewed by the PBSG. The CMS recognizes that States must protect migratory species that live within or pass through national jurisdictions. Through the CMS, species that warrant protection are identified by a review and subsequent listing on CMS-specific appendices. Appendix I species are those threatened with extinction, whereas Appendix II species are those considered to be in an unfavorable conservation status and which need or would benefit from international cooperation. CMS Parties must protect Appendix I-listed species and their taking is prohibited. For Appendix II-listed species, global or regional agreements are to be developed that would improve conservation.

Proposals to list species under the CMS can only be made by Parties signatory to the CMS. Polar bears were specifically identified at CMS CoP 10 as a species that is seriously impacted by climate change, which led to a request to identify Arctic species for possible listing on CMS appendices. A CMS working group drafted a proposal to place polar bears on Appendix I and II. Norway, the only polar bear Range State that is a member of CMS, put forward the proposal to list polar bears on Appendix II.

Norway's proposal will be reviewed by the CMS Council at an upcoming meeting in Bonn, Germany (1-3 July). If the Council agrees with the proposal, it will be put forward and reviewed at the CMS CoP 11 in Quito, Ecuador (4-9 November 2014); a decision would be made at that meeting.

There was a brief discussion of the oddity of the proposed listing on CMS Appendix II, which facilitates international cooperation, when there is already the 1973 Agreement in place. It was stressed that the PBSG pay attention to this process in order to be sure that, should polar bears be listed on CMS Appendix II, no other agreements are started that might compromise existing agreements protecting polar bears.

#### World Heritage Convention (WHC)

D. Vongraven noted that there was no update to provide at this meeting. Morten Ekker was going to provide an update on initiatives within WHC but was unable to attend this meeting at the last minute.

### **11. CIRCUMPOLAR STUDIES**

#### Standardization of Sample Collection Measurements – Karyn Rode

Despite everyone's best intentions, there is a clear need to standardize the collection of samples, particularly from dead bears and a need for information on what samples to collect, how to store them, etc. The initial request for this came from the zoo community. Therefore, it would be helpful to develop standard sample and measurement protocols. This could be a single document or several documents – one for the zoo/captive community and one for the field community. Other possible users of such a document might be the Range States and the American Zoological Association. It could also be made available on the PBSG website.

There was support for such an initiative and a general discussion of the value of providing guidance to everyone. Other things to consider including: standardized data sheets that would include footnotes on how to take various measurements and a list of equipment and supplies (including suppliers and part numbers) needed to collect these data/samples. It was noted that the Range States are interested in the coordinated monitoring of pollutants, contaminants, and parasites, which highlights the importance of standardizing methods, samples, and protocols.

It would be important to also include clear instructions with respect to what to do with the samples/data once collected – who to send to, whether to store on site or send for collective storage, etc. It was noted that Christian Sonne and Rune Dietz have very detailed collection protocols so they should be contacted for advice.

With respect to dead bears, one probably needs to assume that the cause of death is unknown and therefore the sampling protocol may need to allow for the collection of an array of samples. It was also noted that in the wild, bears are found where the suspected cause of death is starvation – having some instruction on what to look for or special samples to collect

would be beneficial. It was also important to identify contact points in advance for when events do occur.

Subpopulation Delineation Review – Andy Derocher

There have been past, present, and there will be future challenges trying to address issues of subpopulation delineation. One of the issues is that the PBSG definitions of 19 subpopulations are not consistent with the IUCN, where subpopulation refers to a geographically or otherwise distinct group. The recent advances and use of genetics is probably the most problematic. Some of the issues to consider when addressing delineation are what data to use (e.g. telemetry, hunter tag returns, mark-recapture data, fatty acid clustering), what constitutes a subpopulation (e.g. boundaries based with a focus on harvest or on ecological perspectives), and how to be consistent/compliant with requirements under the Red List Assessment process. Others have suggested subpopulations based on sea ice focus (19 world subpopulations = 4 units) and on ecological perspectives (13 Canadian subpopulations = 5 units).

A. Derocher provided examples of issues based on experiences in the Beaufort Sea where boundaries were based on telemetry but now finding movements of bears from the Northern Beaufort Sea to the Chukchi Sea. Recent research at the University of Alberta (2007-11) indicates that movement in the eastern Beaufort Sea differs by age – subadult bears do not appear to range in Amundsen Gulf on a regular basis whereas adult females do. More recently, Canadian jurisdictions and co-management boards are proposing to shift the boundary of the Southern Beaufort Sea further west – some suggest with little biological justification.

Delineation is further complicated by the lack of adequate techniques to clearly identify cut-points in distribution; the movement and distribution of bears is dynamic so that static boundaries are difficult to detect. New Canada-wide genetic analysis of structure using SNP's may help delineate some spatial units.

A number of unresolved issues remain – many of the current boundaries are arbitrary and don't make sense, some subpopulations overlap, and the general public view populations differently.

A number of questions were raised during a general discussion: How should the PBSG define a subpopulation; who should define subpopulations; how should the PBSG respond to boundary changes where supporting analysis is missing; how often should boundaries be assessed; what techniques are available as there are becoming less opportunities to handle bears and deploy collars; and, how do we deal with age/sex composition bias of tracked animals?

Subpopulation delineation is an important issue and shortcomings in current practices were identified. However, available resources, policies, and politics may prevent us from addressing delineation issues moving forward. There was support for the drafting of a document highlighting the issues that would be sent to the Range States. It was agreed not to wait for the Range States to ask the PBSG for input as some may want to avoid issues of delineation. In addition, subpopulation delineation is important within the Red List Assessment process and within CITES in general, and the 1973 Agreement states that countries should cooperate to set

boundaries using the best available scientific information. Thus, it may be the role of the PBSG to bring such concerns to the Range States.

***Working Group (to develop draft document on subpopulation delineation for circulation for comment to the PBSG membership) – Andy Derocher (lead) and Greg Thiemann.***

Capture and Handling Review – Geoff York

It is important that we share new tools, methods, technologies, and learn from each other what works and what does not.

1. Drug Delivery Systems – There are currently four systems used (Cap-Chur, Pneu-Dart, Dan-Inject, and Telinject). These options use different projection systems and different dart masses. Even though we are not detecting population-level effects, there are likely individual-level effects. The capture of wildlife and the methods used are of concern with respect to issues of permitting, social acceptance, and animal welfare. High velocity, heavy mass darts can cause severe trauma. Research findings from other ursids indicate that side-port injection and low mass darts reduce the risk of injury. It is important to remind ourselves that no capture event should be considered routine.

M. Obbard has been using the Pneu-Dart system since 2003. He commented that it uses a lighter dart and that it is a side-port inject system. He likes the system, which has an added bonus of using disposable darts that require no cleaning at the end of the day.

J. Aars recently tried the Dan-Inject system on the recommendation of wildlife veterinarian, Marc Cattet. Jon indicated having problems with the system in the field. The main problem was low dart velocity, which might be related to altered ballistics when using the large 10 ml darts. E. Born commented that he has used the system for 25 years on walrus and liked it but that there was a problem with the large, 10 ml dart.

2. Immobilizing Drugs – Karyn Rode/Marty Obbard

M. Obbard commented that he has been using a combination of Telazol and xylazine to immobilize polar bears and has been very pleased with it. Volume of drug is reduced (can use 7 ml rather than 10 ml for adult males), it has analgesic properties (unlike Telazol alone), and it is also reversible. He has also used a combination of Telazol and medetomidine, which further reduces the volume of drug to immobilize adult males to only 5 ml. It has analgesic properties and is reversible. However, this combination can depress respiration so it is important that supplemental O<sub>2</sub> is carried and used.

K. Rode noted that there is new research on the use of a combination of dexmedetomidine and Telazol. Dexmedetomidine has not yet been completely evaluated. At trial with zoo bears was not very successful.

In the discussion, there was a question on whether or not there is any indication that the newer drugs and drug combinations have effects that linger beyond those of Telazol. Unfortunately,

at this point in time, there have been no direct comparisons of the various drugs and drug combinations.

### 3. Effects of Handling – Ian Stirling

Polar bear biologists have an excellent track record with respect to issues of the drugging and handling of animals for research. However, the issue of effects of capture resurfaces from time to time. There have been multiple, independent looks and, to date, no serious effects have been found. At the Range States meeting in Iqaluit, a Working Group was formed to synthesize and review the possible effects of capture for research purposes. A report was written and sent to the Range States that indicated that no detectable effects were found. Consideration should be given to a polar bear specific review being undertaken and published that would look at potential effects on reproduction and survival, as well as behavioral effects. Marc Cattet's paper examined all three North American bear species.

### 4. New Technologies – Geoff York

While the fundamentals of our capture and handling of bears is the same, there are some differences in techniques, drugs, and technology used. There is value in staff exchanges so that we learn how others do things. Also important that we learn experiences of others in applying new technologies, different drugs, etc.

J. Aars reviewed his recent use of PIT tags. He deployed 270 tags and the survival rate of these tags was 92% for females but only 78% for males. He found that both the sex of the bear and the year that the tag was deployed had an effect on the 'survival' of the chips. In general, there was good 'survival' of chips within the first 6 years. He thought that they performed very well as a primary ID method but did caution not to abandon the use of ear tags or tattoos at this point. He also briefly noted that he has been using time-depth recorders to measure temperature and diving in bears and has put out geo-locator tags to detect movement in and out of maternity dens.

In the general discussion, there was agreement that it would be good to pull some of this information together and put it on the PBSG website.

### Sea Ice – Kristin Laidre

There has been discussion about having a standardized sea ice metric for the PBSG status table rather than qualitative assessments. In addition, there is an upcoming need for sea ice metrics for the Red List Assessment. Satellite observations have been used to estimate standardized dates of spring ice retreat and fall sea ice advance for the regions over which the 19 subpopulations are distributed. From this, the trend in the duration of the ice-free season can be determined.

Defining sea-ice thresholds are important because there can be a big difference in the measured length of "ice-free" periods depending on whether 50% coverage or 30% coverage is the threshold used. Another important piece of information is how long a polar bear can go without access to sea ice; Péter Molnár's work can provide some guidance on this. If

information on time to starvation effects can be matched with sea ice duration, we will have a solid metric to measure the biological effects of sea ice duration.

There was further discussion on sea ice thresholds and that telemetry and sea ice do not always line up. For example, recent analysis shows that up to 20% of locations of collared females are in areas where the ice data indicates there is no ice. It was noted that there is tremendous utility in using sea ice metrics but that the type of study may dictate the importance of getting thresholds right; probably more important in energetics than if using to look at trends. Finally, there are a number of different sources for sea ice data – it is important that if using for looking at trends or making comparisons that the same source is used.

#### **4. ADVICE TO THE RANGE STATES (TRADITIONAL ECOLOGICAL KNOWLEDGE) – REVISITED**

Simon Stuart had an opportunity to review the draft statement on TEK and offered some suggested revisions. The main revision was to reconcile the 3<sup>rd</sup> paragraph (suggestions on how to make TEK useful), with the 4<sup>th</sup> paragraph. Some thought this completely changed the meaning of the statement, which previously indicated that it was not the job of PBSG to integrate TEK. The suggested revision gave the impression that if TEK was collected under systematic/rigorous circumstances, then the PBSG would apply that information along with science. The PBSG believes that TEK has value but that it is not the job of the PBSG to integrate TEK with science, which should be done at the discretion of managers. Some changes were made to document to reflect that TEK can be valuable but that the PBSG considers it to be information different from that of dedicated scientific information.

## **Thursday June 12th**

At the start of the day, D. Vongraven noted that I. Stirling had drafted a resolution on the recent boundary changes between the Southern and Northern Beaufort Sea subpopulations and that the review and discussion of this would occur tomorrow. In addition, we would also revisit the draft Terms of Reference tomorrow.

### **12. RUSSIAN STUDIES UPDATE**

Time was provided in the agenda for several presentations on Russian studies because there had been some recent polar bear research undertaken in the Russian High Arctic, which the PBSG was not familiar with.

#### Update on scientific research, 2010-2014 – Stas Belikov

An aerial survey of the Vaigach Island area (Barents and Kara Sea subpopulations) was flown by helicopter in spring 2013. The survey covered an area of 30,000 km<sup>2</sup> and over 3,600 km of transects. A total of 18 bears (singles and groups) were seen and all were encountered along the Vaigach Island coast. During the survey, two incidences of poaching of bears on the island were found; 300 indigenous people live on the island.

An aerial survey, covering 800 km of the Arctic coast of Chukotka, was flown 28 August – 10 September 2013. They encountered 15 polar bears, including 1 female with a yearling cub. Bears seemed to be in good to very good condition. They estimated 28 bears (95% CI: 15-66). One dead bear was found; poaching was thought to be the most likely explanation. Seven stranded gray whale carcasses were found and these would provide food not only for polar bears but also for brown bears. Skin biopsies were taken from 4 polar bears and tissue samples taken from the dead bear.

Observations of polar bears and non-invasive collection of biological samples has been undertaken by communities along the Arctic coast of Chukotka. By mid-October 2013, over 20 polar bears were seen near the village of Billings; 50 were seen near Ryrkaipiy by early November. It is thought that the low numbers of bears seen earlier in the fall is the result of bears moving from west to east, which is also the pattern of ice formation. By late December 2013, polar bears were seen near gray whale carcasses in the villages of Neshkan and Enurmino. There tends to be greater polar bear activity along the coast once the ice comes back.

Over 260 samples (hair, scat, biopsy) have been collected since November 2009 as part of a non-invasive sampling program. While most samples have not been analyzed, 67 samples (60 hair, 4 skin, 2 scat, 1 muscle) collected between September 2013 and May 2014 have. The analysis did not provide any evidence that there were distinct groups of bears and no evidence of multiple 'capture' of bears (i.e., 67 different bears). Some D-loop heteroplasmy was found in the samples.

Next steps of this program are to continue to analyze samples and to expand sample collection (e.g. pairing with sampling on US side; possible collaborative work with Wrangel Island). Preliminary work indicates that there may be a lot of movement back and forth between Chukotka and Alaska.

#### Polar bear studies in the Russian Arctic, 2010-2014 – Nikita Platonov

The goal of the Russian Arctic Polar Bear Research program is the integrated study of polar bears and their ecology – analysis of habitat, prey/food resource distribution, genetics, health (anthropogenic factors), and reproduction. There are six members of the Program – Vyacheslav Rozhnov (Chief), Ilia Mordvintsev (Deputy Chief), Sergey Naydenko (large predator specialist), Evgeny Ivanov (biologist), Nikita Platonov (remote sensing/data analysis), and Ilia Alpatsky (modeler).

They have historical (1988-2006) information from satellite data and sea ice analysis through the Ecological Information Systems and Space Monitoring Group and, since 2007, through the Biodiversity Conservancy and Bioresources Use Laboratory. The Research Group has contributed material to the past 4 working meetings of the PBSG.

The Research Group has undertaken a number of expeditions including incidental aerial, shipboard, and ground observations for marine mammals (2010, 2011, 2012); a preliminary



investigation in Chukotka (July 2011); and, some capture studies (41 immobilizations between 2010 and 2012).

In the Chukchi Sea, the Research Group has been involved in a number of initiatives and studies: scientific collaboration with Wrangel Island Nature Reserve; providing scientific research in collaboration with local people; developed draft for estimating the number of polar bears on Wrangel Island based on data from a single-pass contour aerial survey; develop model to estimate population size based on the number of maternity dens (vital rates, reproductive cycle); estimating multiyear pelagic phenological indicators for the Chukchi Sea; case study for the application of high resolution satellite imagery for the detection of polar bears on Herald Island; historical reconstruction of the size of the Alaska-Chukotka population using modified Prescribed Take Level method; and, forecasting polar bear habitat distribution in the Chukchi Sea for September 2014. They have also developed a model, using sea ice modelling, to make short-term predictions (5 months in advance) for qualitative numbers of bears expected near coastal villages in Chukotka in the autumn.

The Research Group has been active in the Barents and Kara Seas. They undertake collaborative work with the “Russian Arctic” National Park and the Taimyr Nature Reserves. The Group’s work has focused on estimating serum prevalence to various pathogens on the Barents Sea islands; testing the applicability of seasonal RSFs for the Western Russian Arctic; estimating terrestrial movement and land use by radio-collared females on Aleksandra Land (large island in Franz Josef Land) in autumn 2011; estimating the forcing of environmental factors on the presence of polar bears on the islands of Franz Josef Land during autumn; examining behavior and cannibalism on the islands of Franz Josef Land during autumn 2010-2012; estimating polar bear movement patterns related to the pelagic phenology in the Kara Sea in spring 2012; and, undertaking a case study for estimating polar bear movement patterns in relation to sea ice drift.

There was a general discussion on how much innovative research work is being done in Russia and encouragement to publish this information in English but recognize the need for funding to accomplish this. There was a comment about the possibility of getting these translated through avenues at the Norwegian Polar Institute.

**Action** – *Jon Aars and Dag Vongraven investigate possibilities of translation of text of publications from Russian to English.*

Estimates and dynamics of polar bear takes in Chukotka – Anatoly Kochnev

Hunting of polar bears in Russia has been banned for over 60 years so there is little to no information on the relationship between native people and polar bears. Although there is no legal harvest, there has been some illegal take. Since 1999, a series of interviews have been conducted to get information not only on illegal harvest (primary question) but also on hunting and native people, use of skin and meat, hunting methods, and the occurrence of polar bears in

villages. He has published book in Russian resulting from this work and it is currently being translated to English.

From 1999-2005, 188 individuals in 22 communities were interviewed; 84 individuals from 8 communities were interviewed in 2011; and, 227 individuals from 24 communities were interviewed in 2012. Six geographic zones were established: East Siberia, Long Strait, Chukchi Sea, Bering Strait, Gulf of Anadyr, and Tundra. Prior to the harvest ban, the average annual take was 300/year (1910s-1930s); 200/year (1940s); and 100/year (1950s). Since 1957, which was the start of the official hunting ban, government sanctioned harvest has declined markedly and is only problem bears. However, the native harvesting of bears has continued. The official data suggests that from 1975-1983, there were 3-4 problem bears/year and about 2 illegal takes/year.

The current study showed that the hunting of polar bears in Chukotka did not stop following the 1957 ban. The long-term average has been 74 bears/year, although significant changes over time. From 1993-2003, estimated 209 bears/year (period of hard economic times and starvation) were taken and 123 bears/year in 2004-2005. Methodologies and questionnaires have changed over time. With new methods, it was estimated that about 30 bears/year have been taken in 2011 and 2012. With socioeconomic improvements, there has been a significant reduction in illegal take in recent years. It was noted that hunters estimate their take of polar bears over several years rather than year-by-year and that the reliability of these data is low but that there are no other methods for collecting this type of information. Finally, there is an agreement between the US and Russia with respect to the Chukchi Sea subpopulation; the intent is to move towards establishing a legal and sustainable harvest of polar bears by local people.

### **IUCN SPECIES SURVIVAL COMMISSION**

Simon Stuart, Chair of the IUCN/SSC gave an overview presentation that provided context of where the PBSG fits within the IUCN. The PBSG is unique within the SSC because the Group existed before the SSC, which has resulted in the PBSG having a slightly different history and being somewhat more independent.

The IUCN consists of over 1,100 members from over 160 countries. The members created a Secretariat and 6 Commissions that carry out the work of the IUCN. There are over 10,000 volunteers serving on the Commissions – the Species Survival Commission is the largest. Commission Chairs are elected by the IUCN members and can serve up to two 4-year terms.

Within the SSC, there are approximately 130 Specialist Groups of which the PBSG is but one. Membership within each Specialist Group can be large or small. To deal with the work load, some have hired dedicated Programme Officers. Funds to pay for such a position are raised by the Specialist Group. Although there is no magic formula, a stable model that seems to work is one in which there are a large number of funding sources each providing a small amount of the total funds needed. Thus, if one of the funding sources drops out, there is not a huge impact on the ability of the Specialist Group to maintain a Programme Officer. Often the best funding

agency/organization to approach is one that has an interest in seeing the Specialist Group continue its work.

There was a general discussion and support among the PBSG members of easing the workload of the Chair by looking for funds to hire a Programme Officer.

### **13. MONITORING FRAMEWORK**

There was a review of the history of the monitoring framework, which began in 2010 as part of a CAFF initiative to develop. A number of individuals (PBSG and non-PBSG) worked on developing a framework but it was not accepted by CAFF as a consequence of objections by at least one country. The framework was discussed at the 2011 Range States meeting in Iqaluit and a decision made by the PBSG members in attendance to publish the document as quickly as possible because of the importance of the work; it was published in 2012.

Despite the importance of the framework, there appears to be little happening and are there steps that the PBSG should be taking to keep the framework moving forward? One of the priority studies in the framework was to use existing data and undertake an analysis of sampling frequency for abundance estimates. At the 2013 meeting of the Range States, Canada proposed that a circumpolar inventory schedule be developed and offered to draft a document for subsequent review by the PBSG. In parallel, the US (USFWS, USGS, and some Canadian partners) are working on developing monitoring priorities and schedules. Canada has already developed an inventory schedule for the 13 Canadian subpopulations but it is more of a financial planning tool.

There was a discussion that the PBSG has not been asked by the Range States or anyone else to do this, although it may be asked down the road. It was suggested that perhaps we be more proactive and combine the PBSG thoughts on inventory schedules together with a comparison of methods to estimate abundance and provide these in a document as advice to the Range States. There was some concern about the risks of providing this type of information directly to the Range States, where it could be ignored, rather than making it more publically available on the PBSG website.

There was a discussion of the ability of the Range States to analyze data that they have already collected but have not been doing; little to no analysis of Canadian harvest data (e.g. age structure) has been undertaken. These data are an important component of monitoring subpopulations. How would someone get access to these data if they wanted to undertake such an analysis? In Canada, one would need to approach the owners of the data. It was thought that harvest data in the US and in Greenland would be relatively easy to access. It was felt harvest monitoring is important and therefore that the importance of analyzing these data should be raised with the Range States.

Finally, it was noted that one of the initiatives being undertaken by the Arctic Council, under the CAFF/CBMP program (Conservation of Arctic Flora and Fauna/Circumpolar Biodiversity

Monitoring Program), is the development of historical databases for abundance and for harvest.

**Action** – *The PBSG send a letter to the Range States providing outcomes from this meeting and raising issues of concern.*

#### **14. POLAR BEAR - HUMAN INFORMATION MANAGEMENT SYSTEM FOR THE RANGE STATES**

J. Wilder provided an overview of PBHIMS and shared some preliminary results. The project was initiated at the 2009 Meeting of the Range States in Tromsø. Historically, the presence of sea ice has minimized the frequency of human-bear conflicts. Nutritionally-stressed bears are highly motivated to find food. Thus, continued loss of sea ice will likely lead to an increase in conflicts; the Range States agreed that the issue of human-bear conflicts needs attention and priority. A Human-Polar Bear Conflicts Working Group was formed to focus on current and new techniques to minimize or avoid conflict. As part of this work, the PBHIMS has developed a database on conflicts and natural history and represents a key component of the initiative. Through PBHIMS, it is hoped to be able to examine the factors and circumstances leading up to conflict and also the effectiveness of varying deterrents.

Some preliminary findings were presented on the occurrence of attacks, DLP actions, and demographic characteristics of bears involved. The most dangerous polar bears with respect to human-bear conflicts are those in poor nutritional state – they are the most likely to attack (71% were in below average body condition). In Norway, researchers/government employees are the most likely to be attacked, whereas in the US, it is community residents. In 53% of fatal attacks on people, there were no firearms present. Although preliminary, these types of data are important for managers to be aware of.

The importance of the PBHIMS is recognized by the Range States and is a priority; further funding and resources are required.

#### **15. PBSG WEBSITE**

The PBSG was created in 2002 following discussions at the 2001 meeting in Nuuk. To be effective, a website has to be maintained and regularly updated. Although the website was recently updated (2013) with news, text, literature, and status table, it has not had a much needed upgrade to be a modern platform for the dissemination of information. D. Vongraven and K. Laidre discussed the website at the Range States meeting in 2013 in light of an increased challenge in communicating facts about polar bears and the climate threat.

K. Laidre summarized the need for the PBSG to do a better job of communicating accurate and balanced science about polar bears. One of the ways to improve the PBSG communication is to develop a new website that would be based on newer platforms, which would be easier to maintain and update. To do so, would require a total budget of 50-75,000 USD. Currently, investigating potential funding sources to help defray the costs; it can be hard to raise funds for

websites. A number of sources were discussed including the Campion Foundation, WCS, conservation foundations, and the zoo community.

S. Stuart announced that together with D. Cator IUCN had obtained 5,000 EUR of funding for the PBSG website from the Ouwehands Zoo Foundation.

**Working Group (to develop plan to update the PBSG website and look for potential funding sources)** – Kristin Laidre (lead), Evan Richardson, Dag Vongraven, and Jim Wilder.

## **16. FUTURE CAPACITY OF THE PBSG**

S. Amstrup presented the discussion document that was developed by the Working Group formed to discuss reporting and proceedings of PBSG meetings. It was agreed that for this meeting, there will be no formal proceedings produced but that the minutes would be posted on the PBSG website.

The last regular meeting of the PBSG was held in Copenhagen in 2009. The next meeting should be held within two years as this would line up with the IUCN Quadrennial and coincide with the end of Dag Vongraven's current tenure as Chair. After that, the PBSG would return to holding regular meetings at least once every four years. In addition, formal proceedings would once again be produced.

The proceedings would be similar in format to the previous ones and be published as part of the IUCN Occasional Paper series. The proceedings would include minutes, national management and research reports, status report, and a recent bibliography. To facilitate the work of the proceedings editors, the national reports should all follow the same format. The format should be provided to the members well in advance to facilitate this. The various reports should be submitted to the Chair 60 days in advance of the meeting in order that these are available to include in the proceedings. Minutes should be submitted and finalized within two weeks of the meeting. There was some concern expressed by those that have prepared minutes in the past that two weeks may be unrealistic because there is a lot of work that goes into editing the various days' minutes taken by members; there is often a wide difference in content, writing style, etc. and also in getting members to provide comments back on drafts.

There was general agreement that the PBSG would not publish hardcopies of the proceedings but that the proceedings would be made available in electronic format. Anyone that wanted to make a limited number of hardcopies could do so by taking the electronic copy to a printing shop. In addition, staying with electronic proceedings would be consistent with keeping 'green'.

George Durner and Kristin Laidre will be the editors of the next proceedings.

**Action** – Nick Lunn, Marty Obbard, and Greg Thiemann to provide guidelines to the incoming editors on the production of proceedings.

## Friday June 13th

### **16. FUTURE CAPACITY OF THE PBSG – REVISITED**

The PBSG reviewed and agreed on the need of providing a Programme Officer to assist the Chair. Other Specialist Groups have gone this route and sustained the position through a partnership with an NGO, especially one that needs the PBSG to exist. The NGO would accept the funds from the other sources and then provide these funds to the IUCN. This is a better model to follow rather than having the various funding sources send money directly to the IUCN, which would charge administrative costs for each. Given that the Range States ask the PBSG for scientific advice, it may be reasonable to ask each to contribute funds. Should any of the Range States agree to contribute, it would be essential that the funds came with no strings attached in order to maintain the scientific objectivity and independence of the PBSG. The idea of multiple donors rather than one large donor was again stressed as this is more likely to lead funding stability and ensure independence.

**Action** – *Evan Richardson, Dag Vongraven, and Geoff York (lead) to develop a draft document on this process for review and to help move the initiative forward.*

### **17. HEARINGS – HOW AND WHEN TO ENGAGE**

The PBSG is increasingly being asked to provide comments on material presented at public hearings and asked for advice on issues. The Group needs to decide on how we approach such requests, especially those with respect to management actions being taken. As an example, E. Regehr provided background on the Pelly Amendment to the US Fishermen's Protective Act. If a trade partner with the US is found to be diminishing the effectiveness of a conservation agreement, such as the 1973 Agreement, then the US can enact trade sanctions in response. In 2012, the Center for Biological Diversity petitioned the Department of Interior to find against Canada based on management decisions by the Government of Nunavut. Some of the rationale for the CBD's petition was based on written comments from the PBSG that were then somewhat misinterpreted. We need to be aware that we are living in a far more litigious world than in the past and, therefore, we have to be aware that any comments or advice from the PBSG in response to these requests have the potential to be misused.

There was a general discussion on whether or not the PBSG should remain silent on issues or provide comments when asked. Our new Terms of Reference define the PBSG as a science/technical group and, therefore, we need to restrict our comments to science-based considerations. The PBSG needs to be very careful about wading into political/legal issues. The Group recognized that in hindsight some of the statements we have made could have been said differently. Of concern is that we do not go out of our way to get involved and we decide to comment on a case-by-case basis, however, we have little control over what groups do with our comments.

The 1973 Agreement has been used by the PBSG as its guiding document but some consider it to be more of a management than a conservation document. The PBSG origins are conservation-oriented, which is what the IUCN is – a conservation body. There was general agreement that we could have worded some of our earlier statements better. The PBSG should continue to provide science-based comments and also comment on conservation implications but not be seen to be taking a position. The PBSG will maintain its effectiveness if it is consistent in its responses; we need to be aware of the potential ramifications of our comments, which includes alienating stakeholders.

#### **18. RANGE STATES ADVISORY ROLE**

K. Laidre reviewed the discussions of the Working Group formed to provide direction with respect to how the PBSG should respond to requests from the Range States. A Working Group should be established to triage requests from the Range States. The Chair would send the WG the requests and timelines received from the Range States. The WG will review and determine whether it is a request for which a PBSG response is appropriate. Furthermore, the WG will evaluate how best to respond (e.g. provide published papers, undertake analysis) and a realistic timeline in which the PBSG could respond. It is important for the Range States to recognize that some requests can be easily addressed in a one or two page reply but that others are large undertakings that are not trivial.

The PBSG thought it important that the Range States be informed of this new approach and also of the importance of receiving some additional information as part of the request before the PBSG decides to proceed. Members expressed concern that we need to be very careful before accepting requests because members are busy yet felt rushed to review and complete things for the Range States. It was suggested that in responding to the Range States that we make it clear that members volunteer their time to the PBSG and often have to work around busy schedules. It was suggested that Range States Heads of Delegations communicate within their own organizations the high priority of their requests to the PBSG in order that members get financial support to complete tasks or support with respect to organizational time to work on PBSG issues.

All members supported the PBSG continuing in its role as scientific advisors to the Range States. There was also support for the formation of a Working Group to triage requests; there should be at least one member who is from each of the Range States.

***Working Group (to triage and advise the Chair on requests from the Range States)*** – Jon Aars, Anatoly Kochnev, Kristin Laidre, Nick Lunn, Fernando Ugarte, Jim Wilder, and Geoff York.

#### **4. ADVICE TO THE RANGE STATES (TRADITIONAL ECOLOGICAL KNOWLEDGE) – REVISITED**

The PBSG reviewed the latest draft of the statement on the use of Traditional Ecological Knowledge. Corrections were suggested and made; the final draft of the statement was accepted by the members.

## **5. TERMS OF REFERENCE – REVISITED**

The PBSG reviewed the latest draft of the Terms of Reference and Rules of Procedure. There was a discussion as to why the PBSG needed to change the language that was accepted by the members at the Oslo meeting. The members decided to keep the mission statement and objectives agreed upon in Oslo, with the exception of one objective that was redundant. The section on Advocacy was deleted because the PBSG is not an advocacy group and therefore it did not seem appropriate to include in the Terms of Reference something that we did not do.

## **RESOLUTIONS**

Several resolutions were drafted during the meeting for consideration of support by the members.

### Southern Beaufort Sea Boundary Changes

Canada has recently taken unilateral action in moving the boundary between the Northern and Southern Beaufort Seas. Concern was expressed by some that this occurred not based on scientific information and without consulting with the US, which share the Southern Beaufort Sea. A resolution was drafted that reminded countries of the provisions of the 1973 Agreement, the need to consult, and the need to use the best available scientific information. The members discussed the resolution and noted that there had been previous consultation at various meetings and that it was based on published science, although the science used is no longer the most recent. The PBSG did not support the resolution.

### Russian Research

The proposed resolution recognizes the importance of the work going on in Russia and the value that it brings to polar bear conservation efforts and, as such, the PBSG would like to encourage that this work continues into the future and promote opportunities for collaboration. There was agreement that this resolution was valuable and that the wording as presented was fine. The PBSG supported the resolution.

### Collaboration and Research Exchange

The proposed resolution recognized the importance of collaboration and scientific exchange across polar bear subpopulations. It was also felt to be important to make the Range States aware of the value of this type of exchange and that steps are being made towards this. The PBSG supported the resolution.

### Global Population Footnote

Over the years, the global population estimate found in the Proceedings status table has been used and misused by the general public and self-interest groups. Often the global estimate is taken out of context, without reading all the accompanying text, and used to suggest that the numbers of polar bears have been slightly increasing or at least stable over a period in which much has been made of the loss of sea ice habitat. In an attempt to clarify this, a footnote to the website status table was drafted. This footnote has subsequently been used to suggest that



the PBSG does not really know how many polar bears there are and certainly cannot defend the notion that the loss of sea ice has been a threat to the species.

As a result, the global estimate of 20,000-25,000 polar bears is back in the news and has caused problems for the PBSG. The Group should probably reconsider population estimates for data deficient subpopulations for the next status table. In the meantime, there was considered to be value in drafting an explanation for the global population estimate of 20,000-25,000 for the online status table. It was thought that this would be a better approach than to directly engage those who have been misusing the information.

**Action** – *Steve Amstrup and Andy Derocher to draft an explanation of the history of the global population estimate of polar bears of 20,000-25,000 individuals for review and subsequent posting on website.*

## **19. STATUS TABLE**

The Group considered whether the status table should include a sea ice metric rather than a description of habitat quality. While there was support for such an inclusion, it was felt important to keep the qualitative description for the general public. The intent of the status table is that it will be web-based and dynamic, where it would be updated when new information becomes available. There was agreement that the status table needs to be as simple and interpretable as possible. Rather than open up a prolonged discussion on what columns should or should not be included, the Status Table Working Group was tasked with reviewing the structure of the table and making recommendations to the Group.

The group agreed adding a standardized sea ice metric in the Status Table would be valuable and suggested a timeline of December 2014.

**Action** – *Kristin Laidre to send a summary document of a suite of ice metrics summarized by subpopulation around for discussion.*

**Working Group (to review and restructure the status table where appropriate)** – *Jon Aars, Nick Lunn, Marty Obbard, Lily Peacock, Eric Regehr, and Fernando Ugarte.*

## **20. RELATION OF THE PBSG TO THE BEAR SPECIALIST GROUP (BSG)**

There was support for strengthening our relations with the Bear Specialist Group. The Co-Chairs have been identified in the PBSG Terms of Reference as having permanent invited specialist status to meetings of the PBSG. It was thought that there would be value in both the PBSG and BSG linking up on some issues that are shared (e.g. human-bear conflicts, trade).

Members of the BSG get free membership in the International Bear Association (IBA). It was recently mentioned by the IBA Chair that PBSG members were getting free membership; however, no members of the PBSG indicated this to be true.

The International Bear Association will be meeting in Alaska in June 2016. The BSG Co-Chairs would likely be attending this meeting as will some of the PBSG members. Given that the PBSG has agreed to meet in 2016 and that for many PBSG members travel approval is becoming more difficult, we should explore holding our next regular meeting in connection with the IBA meeting. While this would extend the length, it would be a way to reduce costs for everyone, and may result in more polar bear presentations at the IBA meeting. There was general support that the PBSG should explore the feasibility of holding our next meeting in Alaska either before or after the IBA meeting.

## **21. CLOSING OF MEETING**

Dag Vongraven closed the meeting by thanking T. Atwood and the USGS for hosting the meeting; Polar Bears International and World Wildlife Fund for supporting the health breaks; Dena Cator, Nikita Platonov, and Simon Stuart for their participation; and the members for their attendance and contributions.