WESTERN GRAY WHALE ADVISORY PANEL **NTF-7**

NOISE TASK FORCE

REPORT OF THE NOISE TASK FORCE AT ITS 7TH MEETING

3-5 OCTOBER 2014

YUZHNO-SAKHALINSK, RUSSIAN FEDERATION

CONVENED BY THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE

Report of the 7th Meeting of the Noise Task Force

MEGA PALACE HOTEL, YUZHNO-SAKHALINSK
3-5 OCTOBER 2014

CONTENT

ACRONYMS

AIS	Automated Information System
AUAR	Automated Underwater Acoustic Recorder
BOEM	U.S. Bureau of Ocean Energy Management
Company	Sakhalin Energy Investment Company
CMP	Conservation Management Plan
DFB	Delineated Feeding Boundary
DMNG	Dalmorneftegeophysica
DTAGs	Digital Acoustic Recording Tag
EIA	Environmental Impact Assessment
ENL	Exxon Neftegas Limited
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
JIP	Joint Industry Program
JNCC	UK Joint Nature Conservation Committee
L-DEO	Lamont-Doherty Earth Observatory
MMO	Marine Mammal Observer
MMP	Monitoring and Mitigation Programme
MNR	Ministry Of Natural Resources and Ecology of the Russian Federation
MVA	Multivariate Analysis
NTF	Noise Task Force
OBN	Ocean Bottom Node (OBN
POI	V.I. Il'ichev Pacific Oceanological Institute, Far Eastern Branch of the Russian Academy of Sciences
Photo-ID	Photo Identification
PML	Perimeter Monitoring Line
RF	Radio Frequency
SEIC	Sakhalin Energy Investment Company
SEL	Sound Exposure Level
SPL	Sound Pressure Level
SSTF	Seismic Survey Task Force
WGW	Western Gray Whale
WGWAP	Western Gray Whale Advisory Panel

1 INTRODUCTORY ITEMS

1.1 Introductions and logistics

The 7th meeting of the Noise Task Force (NTF-7) was held at the Mega Palace Hotel in Yuzhno-Sakhalinsk, Russian Federation, from 3 to 5 October 2014 under the chairmanship of G.P. Donovan. The list of participants is given as Annex A.

Donovan reminded the participants that the last meeting of the Task Force[1] had been six months previously. That meeting had made a number of important recommendations and as considerable material was expected for review, three days had been allowed for the present meeting. The minimum requirement from this meeting was to have an agreed set of conclusions and recommendations by the end.

Bos welcomed the participants on behalf of the International Union for Conservation of Nature (IUCN).

1.2 Adoption of agenda

The adopted agenda is given as Annex B.

1.3 Available documents/materials

The list of documents and presentations is given as Annex C, along with information on their availability.

2 UPDATE ON OTHER ACTIVITIES ON THE SAKHALIN SHELF IN 2015 (PRIOR TO, DURING OR AFTER THE SEIC SURVEY)

2.1 Discussion

Donovan referred to the news of the proposed Exxon Neftegas Limited (ENL) seismic surveys for 2015 received during WGWAP-14 (Items 5.3 and 5.4 in the WGWAP-14 report) as well as the information received from Berzina on other companies' activities (Item 5.3.1 in the WGWAP-14 report). The available information suggested that the proposed Rosneft 2015 work will be subsumed within the ENL surveys and that Rosneft's other seismic work was completed in 2014. The NTF spent some time discussing the potential options, such as 'time-sharing', for managing any overlap in timing of Sakhalin Energy Investment Company (SEIC) and ENL seismic surveys in 2015. However, given the scale of the operations, it was recognised that it would be extremely challenging to complete all of the proposed surveys prior to late July-early August before peak occurrence of whales, even if both (or all) companies were willing to work together towards doing so. This is clearly of concern given the proximity of the surveys to gray whale feeding and calf-rearing areas.

The NTF recognised that there would be a number of serious practical difficulties in trying to follow the guidelines developed for the 2010 Monitoring and Mitigation Programme (MMP) and in Nowacek *et al.* (2013)[2], regardless of intent to observe them as much as possible. Apart from the difficulty of completing the survey(s) before the majority of whales have arrived (which is the most important 'guideline'), there are others including the logistical problem of finding suitable numbers of trained personnel to implement mitigation and monitoring effectively.

There was also some discussion within the NTF about necessary permitting. It was noted that Dalmorneftegeophysica (DMNG), the company being used by ENL to carry out its seismic programme in 2015, has a 'blanket' permit for up to 2020 such that individual Environmental Impact Assessments (EIAs) are not needed for each survey. It was recognised that whilst permitting is an important concern for the companies, it is outside the remit of the NTF, which instead needs to focus on the expected

[1] http://cmsdata.iucn.org/downloads/ntf6report_final_en.pdf

impacts of the surveys on whales and on the criteria and procedures for assessing and limiting and managing those impacts.

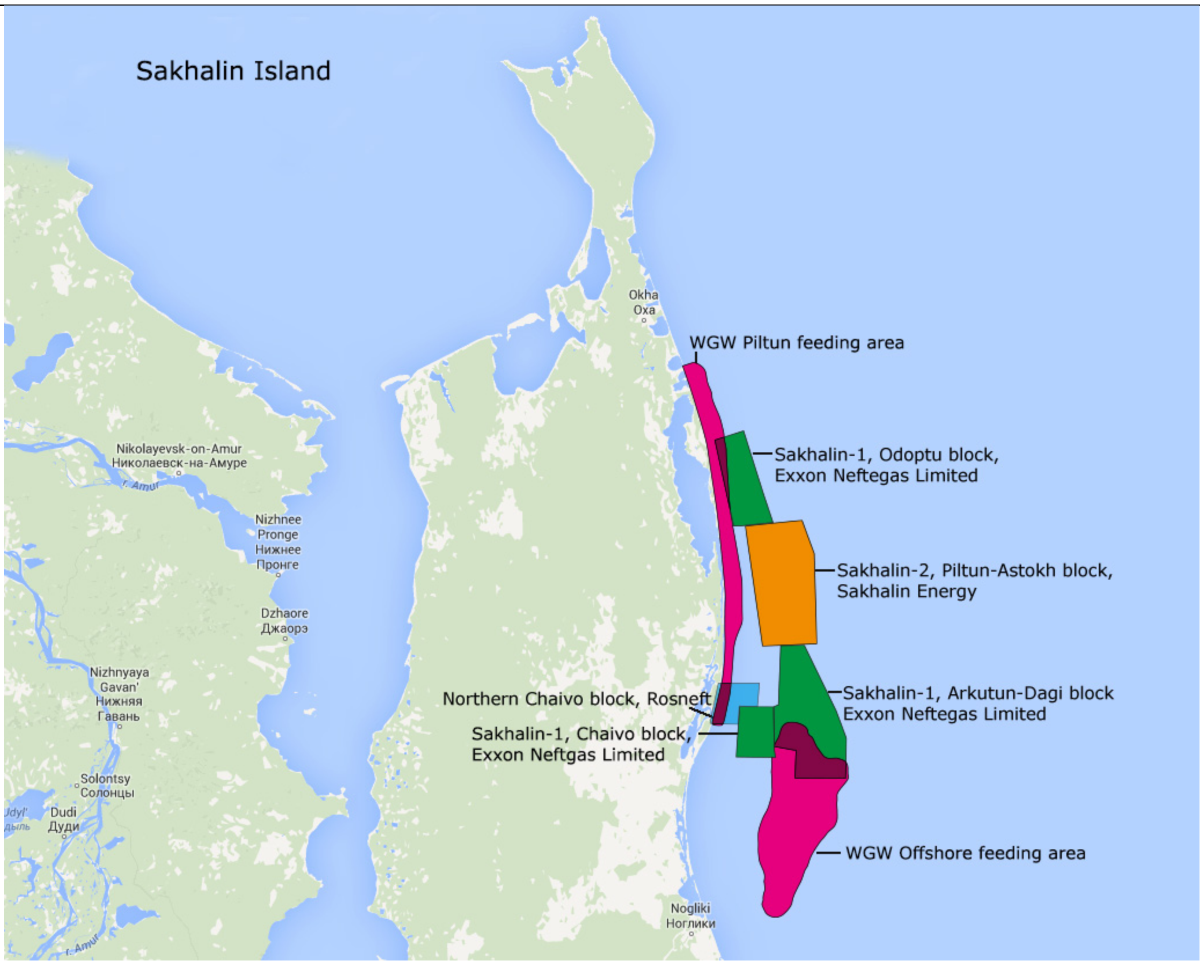

Figure 1. Schematic showing the approximate development blocks where seismic surveys are planned / announced for 2015 on and near the gray whale feeding areas off north-eastern Sakhalin.

(Note: This schematic is based on publicly available information and included only for illustrative purposes. The designation of areas in this map and the presentation of the material, do not imply the expression of any opinion whatsoever on the part of IUCN or NTF concerning the legal status of any area, or of its authorities or operators, or concerning the delimitation of its boundaries. Coordinates, boundaries etc. on the map are not exact and therefore should not be used as such.)

2.2 Conclusion and recommendations

The NTF noted the extensive discussion that had occurred on this matter at WGWAP-14 (including Panel recommendation WGWAP-14/002).

Given the number and scope of the potential surveys and their proximity to the feeding grounds, the NTF **reiterates** that it is not possible for all of these to operate independently at the same time whilst meeting the overarching goal of minimizing disturbance to the gray whales. The NTF **urges** all involved to work together to ensure:

(1) that seismic activities near to the gray whale feeding areas are synchronised appropriately to ensure that the primary mitigation measure can be met (recognising that this may result in it not being possible for all projected surveys to be undertaken in 2015); and

(2) that monitoring and mitigation measures are established and implemented in accordance with the guidelines and principles endorsed by IUCN and International Whaling Commission (IWC).

3 UPDATE ON PROGRESS FOR THE 2015 SEISMIC SURVEY BY THE COMPANY

3.1 Status of tender including technical parameters – vessel size, arrays, streamers, etc.

Van der Veen reported that no change had occurred in the scope of work and technical parameters since NTF-6 (April 2014). Requirements for the technical survey parameters such as vessel type, number of streamers and source size have not changed since the public tender was announced earlier in 2014. In the absence of further updates from Company, information shared at NTF-6 remains the most up to date.

The Company's desire is to reduce the acoustic footprint of the source, while maintaining a source spectrum that can be compared to the 2,620 in^3 source used in 2010. The matching of the data obtained with a different source to the earlier results for the purpose of achieving time-lapse (4D) imaging can be achieved in part through advanced post-processing.

3.2 Project plan

Van der Veen reported that at present the 4D streamer seismic survey is firm for 2015 with a planned start date in Piltun-Astokh of early June. Due to external circumstances, provision of Ocean Bottom Node (OBN) equipment and services (which were part of the original scope of work) to Sakhalin has proven to be challenging. The Company is studying its options for taking OBN forward, while progressing the streamer seismic survey so that the relevant permits and approvals can be obtained in time for the survey to begin in June 2015.

3.3 Deadlines for NTF input both internal and EIA

3.3.1 Discussion

Van der Veen informed the NTF that while the final contracts have not been agreed, progress in this matter was such that the modelling work with the correct source (which will not generate a larger footprint than in 2010, on which the modelling to date has been based) should be completed in time to allow the Company to provide the necessary inputs for NTF-8. As soon as the details are known the Company will finalise the EIA for the Russian Federation (the responsibility of the contractor); this process of Ministry Of Natural Resources and Ecology of the Russian Federation (MNR), which includes public consultations, takes 4-6 months. The 'international' EIA required by the lenders to show compliance with International Finance Corporation (IFC) standards, which will be the responsibility of Donaghy, has a more flexible timeline.

Vladimirov noted that in addition to permits for the survey, permits are also required for the scientific activities associated with it. Information must be submitted six months in advance. He also noted that the 3-year permit for radio transmission of real-time acoustic monitoring information expires in 2015.

3.3.2 NTF conclusion

The NTF understood that the mid-December deadline for its work stands (and see WGWAP-14 report, Item 9.2)

4 UPDATE ON WORK/ANALYSES FOR 2015 SEISMIC SURVEY

4.1 Progress on acoustic modelling including work completed for Piltun-Astokh survey

Racca reported that until the contracts are awarded he has no new information to update the modelling reported to NTF-6 (see Item 3.3.1).

4.1.1 NTF conclusion and recommendations

The NTF recognised that the Company is not able to undertake the final acoustic modelling until the actual equipment and configuration are known; this is expected to be imminent. It **agrees** that the preliminary modelling presented at NTF-6 is sufficient for continued work on the MMP as the final choice will not result in greater ensonification of the feeding ground than predicted and may result in less. That being said, the NTF **reiterates** that the acoustic modelling work should be completed and circulated to the NTF as soon as possible after the final details are known.

4.2 Update on appropriate sound levels with regard to mitigation

The NTF referred to the discussion of this topic at NTF-6 and **reiterates** that the thresholds agreed for the 2010 and 2012 seismic surveys are appropriate for the proposed 2015 survey. This item should be kept on the Panel and NTF agendas in the future and the levels should be reviewed if and when new information becomes available.

4.3 Delineated Feeding Boundary (DFB) and Perimeter Monitoring Line (PML) for 2015

NTF-5 had agreed that work on PML and the DFB needed to be given high priority and had identified a 5-step process. Although the Company had nothing new to report at NTF-6, it assured the NTF that new analyses were underway and would be reported at this meeting. The NTF-6 report had specified four factors to be addressed in the new document that should be presented at least one month ahead of the NTF-7 meeting.

4.3.1 Presentation

In its confidential Technical Note, the Company did not provide a full report addressing all four factors but rather argued that the PML calculation method was developed and adopted by the Panel for the 2010 4-D Seismic Survey. An independent review of various suggested methods had been undertaken prior to that survey by St. Andrews and the Report was provided to IUCN. Given the amount of resources, time and effort spent in the past to calculate and establish the PML, it was argued that the purpose of any additional analyses was not the re-calculation but the validation of the existing 2010 PML. The Company believed that the efficacy of 2010 PML was proved by the successful implementation of 2010 MMP as well as by separate ‘Behaviour’ and ‘Distribution’ Reports of Multivariate Analysis (MVA).

The only new early season distribution data is available from 2010 4-D Seismic Survey. As outlined in Distribution MVAs Report prepared by LGL Ltd. the distribution of whales in June-July 2010 could be potentially affected by the seismic survey however there was not enough data on whale sightings to justify the presence or the absence of any statistically significant impact due to successful implementation of the primary mitigation measure to start and finish the survey as early in the season as possible. On this basis the 2010 observations cannot be included in PML calculation, similarly to the 2005 distribution dataset that the Seismic Survey Task Force (SSTF) had previously agreed to exclude from the 2010 PML calculation. So, there are no new distribution data to which the analysis described in NTF-6 Report can be applied.

In order to verify whether the 2010 PML was still sufficient for the 2015 4-D Seismic Survey, the Company created weekly maps of the distribution of whales during the 2010 Seismic Survey in order to identify the number and the proportion of gray whales outside PML, recognising that a much more comprehensive spatial and temporal analysis was done as the part of the ‘Distribution’ MVAs. Only a few gray whales (less than 1%) were sighted outside PML in 2010. The Company therefore believed no further analyses were necessary and that the 2010 PML was appropriate.

4.3.2 NTF conclusions and recommendations

The NTF **agreed** that for the 2015 survey, the DFB/PML will be that used for the 2010 survey. However, it noted that this would need to be revisited for future surveys in the light of (a) new analyses of existing data that are being undertaken as part of the Joint Program and (b) new data that should become available. In particular, the NTF **reiterates** its recommendation that new information on distribution and abundance be collected (e.g. by the Joint Program) for the early season (June-July). i.e. the period recommended for seismic surveys to take place. This is needed to ensure that the assumption of relatively low numbers of whales being present remains valid (it has been several years since data on whale distribution in June and July have been collected).

4.4 Review of behaviour and distribution monitoring

4.4.1 Discussion

Finalising the 2015 MMP is the major component of the NTF's work. In light of the differences and much greater scale of the proposed 2015 survey compared to that in 2010, several important issues related to the behaviour and distribution monitoring which need to be fully considered by the NTF. This is particularly the case since the Company has indicated that it intends to make some major changes to the 2010 protocol in that the scope will be reduced by: (i) not employing teams dedicated solely to the collection of distribution data; and (ii) not deploying either a scout boat or an observation boat (see Item 5.3.2).

The 2010 MMP was implemented by having observers collect data on distribution and behaviour data from vessels and shore platforms. The Company's verbal justification for not including a distribution component stemmed largely from the fact that previous analyses had not detected any change in distribution and that the focus in 2015 should be on mitigation. Some participants expressed concern that this major change was being proposed without adequate documentation, stressing amongst other things that (a) the survey is much greater in scale and scope than the 2010 survey, (b) lack of detection of change in one year is insufficient as a reason not to continue to monitor and (c) information from early in the season is important and an agreed part of the 2010 approach by the Panel and the Company had been to collect data for improving future MMPs.

After some discussion, Donovan appointed a small group under Nowacek to examine the practical and related issues surrounding the behaviour and distribution component of the MMP, in the expectation that progress can be made towards resolving and finalising the MMP at NTF-8. Factors considered included: the behaviour data collection protocol, the number and locations of shore stations and the number of teams to staff them, the aberrant behaviours that would trigger a shutdown, and the whale distribution sampling protocol.

The small group identified the following issues that need to be resolved in addition to the question of distribution monitoring, recognising that other fundamental parts of the MMP (e.g. implementation of the 'A' zone) are still not finalised:

(1) ability to monitor the entire 'A' zone, which is defined the same as it was in 2010 although the final means of implementing the A zone is still being decided – regardless of how it is implemented, the capability to observe this zone must be in place;

(2) transmittal and integration of data collected at the observation platforms into the command centre, where *inter alia* the real-time acoustic data are to be reviewed – e.g. implementation of the 'rolling A zone' (see Item 5.1.2) will require careful integration of data from the observation platforms with real-time acoustic data and the location of the seismic survey vessel;

(3) final determination of which aberrant behaviours would trigger a shutdown.

On the final day it was confirmed that the presence of mother-calf pairs would trigger a shutdown and Tsidulko presented a preliminary analysis of the presence and distribution of mother-calf pairs from the Russia-US data. He noted that the number of such pairs increases towards the end of June and beginning of July. Tsidulko **agreed** to investigate this further and report back to NTF-8 with plots of distribution if possible.

4.4.2 NTF Conclusions and Recommendations

The NTF **agreed** that it was unable at this time to reach conclusions about the implementation of the behaviour and distribution aspects of the MMP due to their relationship to other factors (e.g. implementation of the A zone) and the lack of documentation and materials needed to thoroughly review and finalise these protocols.

It **recommends** that the following work be undertaken and provided to NTF-8 at least one week in advance of the meeting.

(1) A comprehensive map of the 2015 theatre; this map would preferably be built in ArcGIS or a similar program so that different layers can be switched on/off when needed. The data for the map should include:

(a) shore station locations, including the area over which whales can reliably be sighted from each;

(b) the sighting areas should be specified by activity, e.g. range for behaviour observations vs. distribution observations

(c) acoustic station positions;

(d) the PML as defined for the 2010 MMP;

(e) the maximum extent of the 156 dB per-pulse SEL isopleth for each set of survey lines – the inner two sets of 13 lines are expected to impinge on the feeding area, i.e. 'A' lines, while the outermost 14 lines are not, i.e. 'B' lines;

(f) whale sightings data (e.g. as used in the simulation study under Item 5.1.3) and distribution data (e.g. those used for the PML definition for 2010 survey).

(2) Updated information on documented reactions of gray whales to seismic surveys so as to *inter alia* refine definitions of aberrant behaviour triggers[3].

(3) Detailed protocols for the field teams including:

(a) Number of observers in each team and their roles;

(b) Sampling schedule, e.g. timing of scans vs behavioural data collection;

(c) Communications strategy between the teams and the command centre, particularly streamlining the protocol such that observers can focus on sighting whales

4.5 Progress on possible use of DTAGS

NTF-6 had recognised the potential for digital acoustic recording tags (DTAGs) (as had the NTF and Panel previously) and had asked a small group to try to provide a more detailed proposal, recognising that this did not commit the Company to support such work for 2015.

4.5.1 Presentation

Nowacek provided a presentation of a short document on the use of DTAGs to monitor fine-scaled behaviour of gray whales exposed to seismic exploration. This would allow simultaneous measurement of sounds to which the animal is exposed along with a fine-scaled record of its behaviour including while underwater. Information that has been missing from behavioural data obtained from visual observation at the surface is feeding rate. A benefit of sampling individual animals for prolonged periods (as can be done with DTAGs), is that it provides a rich sub-surface record of behaviour including feeding rate. The technology was first used on right whales in 1999 and DTAGs were deployed successfully on gray whales in 2006 (Woodward and Winn, 2006).

The DTAG is attached to the animal with a non-invasive and temporary suction cup (it can remain for periods of up to about 36 hours). The data logger is not long-term because it is archival and 'fills up' quickly. Fast-lock GPS (which most devices don't actually include, only some newer devices do) can easily be attached. This technology allows a quick grab of satellite time data. It is possible to obtained very fine-scaled information, including inferred feeding, from the accelerometer and magnetometer data.

[3] It was agreed that the protocol should be revised to indicate that mother-calf separations of >5 body lengths, as used for the 2010 survey as a shutdown criterion, are considered aberrant in June and July when calves are young but can represent natural behaviour later in the season.

He noted that it may be worth considering the Accusonde or OpenTag as an alternative to the DTAG because these can be permitted into Russia.

4.5.2 Discussion

With respect to when (which part of the season), where and how many DTAGs to deploy, it was suggested that ideally the tagging programme should start as early as possible, even before the seismic survey begins, and continue through at least part of the survey. For practical reasons, in particular, deployment should be at Piltun, probably in the area in front of the lighthouse. The matter of how many tags to deploy is complex because there tends to be a lot of variability in whales' behaviour; 3-5 tag deployments before the start of the seismic survey would be a minimum to aim for. A good guiding principle is to tag as many animals as feasible (logistically and financially) under each of the conditions or scenarios of interest i.e. before disturbance, during disturbance and post-disturbance.

Regarding the question of feasibility of finding, approaching and tagging animals early in the season when density is expected to be low, it was noted that unlike during the satellite tagging efforts when there was concern about applying the implantable tags on 'skinny' individuals, there should be no such concern about applying suction cup tags. In addition, experience had shown that as soon as the ice disappears, at least some whales are present, such that least small numbers should be available for tagging early in the season. DTAGs are sufficiently robust to function well in cold conditions; Nowacek's team have successfully deployed 32 of the tags in the Antarctic.

In terms of the relevance of such tagging, Nowacek referred to publications (Madsen *et al.* 2006) that provide the scientific results of DTAG studies of sperm whales near seismic surveys in the Gulf of Mexico. Reduced feeding rates were observed in response to seismic sounds, with precise (measured not modelled) information on received levels and distances from source.

Further discussion primarily concerned whether DTAGs would be used primarily for obtaining data to inform future seismic surveys or instead for real-time monitoring and mitigation during the 2015 seismic survey. Differing views were expressed. There were also differing views on whether DTAG work should be undertaken (and paid for) by a single company in relation to MMPs for its own seismic surveys, be undertaken as part of the SEIC/ENL Joint Programme (which however normally does not begin until August, which is well after the expected timing of the seismic surveys) or be funded as a completely separate project (e.g. through the Joint Industry Programme, JIP).

Sakhalin Energy emphasized the importance of having a complete, detailed and realistic budget and research proposal (with a value proposition, methodology, procedures, work schedule etc.) in-hand before giving serious consideration.

4.5.3 NTF conclusions and recommendations

The NTF **agreed** that there was great merit in the use of multi-sensor acoustic recording tags in the context of understanding the reactions of whales to anthropogenic noise including seismic surveys (as well as understanding their behaviour in general). However, there are a number of financial, logistical and operational safety considerations to be addressed if tags are to be used for the 2015 season. The NTF **suggests** that IUCN, Sakhalin Energy and other parties consider these aspects further in co-operation with the NTF. A detailed costed proposal is being developed by several Panel members.

4.6 Update on progress with photo-id data on within-season re-sightings

NTF-6 noted that information on movements may perhaps provide some information on the likely cumulative exposure individuals that individuals may receive.

At this meeting, Cooke examined the only data he had available, i.e. the Russia-US dataset, to look at within season residence and within season movements. The dataset is rather small so doesn't really give much indication of movement between season. Looking at the residence time of individuals versus total whales it appears that once the whales arrive, they stay in the area, at least for the first part of the season. Thus it is not unreasonable to assume from these data that when whales arrive in the area, they would normally remain there for the period that the seismic survey is likely to take place. It was suggested that the telemetry study provided by Mate to WGWAP-14 which had suggested small home ranges in the Sakhalin area corroborates the idea that they do stay in the area.

4.7 Other

The NTF briefly referred to discussions within the WGWAP-14 (Item 5.4 in WGWAP-14 report) related to satellite tagging that is being considered for 2015 by ENL. It was noted that ENL had indicated a desire to undertake additional satellite work (as previously recommended by IUCN and the Panel, as well as the IWC and in the draft Western Gray Whale Conservation Management Plan (CMP) and that it was not necessarily linked to investigating the effects of seismic surveys.

5 MITIGATION AND MONITORING PLAN FOR 2015 SEISMIC SURVEY (& BEYOND)

5.1 Update on proposed modifications to mitigation measures & shutdown criteria for the 2015 survey

5.1.1 Use of night-vision technology

DISCUSSION

As agreed at NTF-6, the NTF had expected to receive full documentation of the system proposed to be used, especially sufficient documents to verify its efficacy under a range of environmental conditions. It had noted that without this it would not be possible to evaluate the use of the technology as a basis for relaxing the 2010 conditions for A-lines for the 2015 survey.

Van der Veen had presented to the Panel web links to possible equipment within a technical note submitted to NTF-7 and stated that the Company would certainly use infra-red night vision technology in 2015 to allow it to shoot at night although the final equipment had not been chosen. It may combine this with remote sensing technology but for confidentiality reasons, the Company would only provide general information on the latter which was ‘radar-based’.

In discussion, it was noted that the web links did not provide sufficient information to evaluate the effectiveness of the technology or to assess the likelihood of false positives (which would be counter-productive in terms of causing unnecessary delays). Several participants noted that although the technology was improving in this field, experimentation under field conditions is necessary and welcome. However, in their view insufficient information was available to consider night vision technology as an important mitigation tool at this stage.

NTF CONCLUSIONS AND RECOMMENDATIONS

The NTF **welcomes** the fact that the Company will use this technology for 2015, although it is not possible to comment on its likely effectiveness in comparison to the 2010 protocol. As noted in NTF-6 this would require information on field experiments undertaken in a range of likely environmental conditions and survey conditions that have either not taken place or been reported. It notes that some simulations using different levels of efficiency for the night vision approach will be included in the simulation study discussed under Item 5.1.3.

5.1.2 Modification of the concept of A- and B-lines

PRESENTATION

Racca gave a presentation regarding the possibility of a revision to the original concept of a static boundary for the behavioural mitigation protection zone. This is an extension of the modification proposal made at NTF-5 and further discussed at NTF-6. In the 2010 Astokh seismic survey, the boundary was defined by the envelope of all individual single-pulse footprints along a seismic acquisition line, and it remained unchanged regardless of the progress of the seismic source along the line. In the NTF-5 revision it was proposed to maintain the leading section of the protection zone (the area ahead of the broadside of the seismic source) static, but progressively withdraw the trailing section as the predicted acoustic level from the advancing source falls below the behavioural threshold. In the

NTF-7 presentation Racca proposed to further revise the protection zone to exclude areas estimated to be below threshold both in front of and behind the source. The protection zone then becomes a moving "swath" centred on the shoreward broadside beam of the source array footprint and advancing with the seismic vessel.

Racca argued that this further revision of the definition of the protection zone is necessary to avoid a weakness of the original static boundary approach that would still exist in the NTF-5 proposal – namely the fact that mitigation measures (e.g. shutdowns) could be called for due to the presence of whales in areas estimated not to be ensonified above the threshold. This would act contrary to the recognised primary mitigation strategy which is to complete the survey as early in the season as possible, when whale numbers are relatively low. By causing lines to be interrupted unnecessarily and reacquired later, an excessively restrictive protection zone could result in a worsening, rather than mitigation, of the potential disturbance over time.

Racca presented an example, based on the 2010 4D survey layout, showing the shoreward lobe of the modelled single-pulse 156 dB Sound Exposure Level (SEL) footprint extending into the feeding area and defining the bounds of an idealized straight-edged swath. Although the width of such a swath would vary along a line because of changes in the bathymetry and the relative distance between the line and the feeding area, Racca indicated that in the practical implementation of the approach the width would be held constant for a given line and noise model case to keep the protocol simpler. This would be achieved in a precautionary manner by basing the width of the swath on the modelled single-shot footprint that gave the widest projection into the feeding area. Racca proceeded to show a conceptual data flow diagram of the operational software that would be used to implement the mitigation scheme. The software would combine the modelled sound exposure footprint, the position of the seismic source along the line (automatically updated from the seismic vessel coordinates provided by an Automated Information System (AIS) receiver) and the locations of whale sightings reported by the observation and tracking posts into an integrated situational information display. A dedicated mitigation coordinator referring to that screen would determine whether any sighted whales were within the bounds of the advancing protection area, in which case the appropriate action would be called for.

The presentation covered details of how the process would be implemented in practice, focusing on the requirement to avoid overburdening the observers with tasks or information that would detract from their effectiveness at tracking whales and monitoring their behaviour. To this end the situational data provided to the observation posts on their tracking screens would be limited to the static boundary of the selected model case for the current line (similarly to the 2010 paradigm), with no overlay of the moving swath. The observers would track and log electronically the position and behaviour of all whales visible within their sector, with monitoring priority given to animals within the static boundary. The geo-referenced sighting locations obtained from the theodolite data feed and local software at each post would be relayed via point to point wireless network to the control centre at the main camp for immediate echoing within the situational information display, with no manual transcription or verbal communication required. All situational data streams would be archived for post-operation auditing and review of calls for mitigation.

NTF CONCLUSIONS AND RECOMMENDATIONS

The NTF welcomed the presentation by Racca and the work to develop an operational plan. It **endorsed** the approach in principle. However, it agrees that further work is required to determine its feasibility in the field. It **requested** that further details as to how it will be implemented in the field are provided to NTF-8 (e.g. in the context of real-time communication between the various components of the mitigation and monitoring schemes and the command centre, including the ability to identify whales within the moving 'swath'). The effectiveness of the approach is also considered under the simulation work detailed under Item 5.1.3.

5.1.3 Simulations to optimise protection of whales and survey efficiency

At NTF-6 the Company was requested to explore scenarios, through simulation, whereby various modifications of previous approaches and assumptions would enable attainment of the goal of minimising disturbance to whales without significantly compromising timely completion of the survey. Among the possibilities identified were the sliding-boundary protection zone concept, dividing the survey area into a northern and a southern block, sequencing line acquisitions within the single block, and various scenarios for down time (e.g. assuming that the night vision approach works without error or with varying degrees of error – including underestimation and overestimation of gray whale presence).

PRESENTATION

Van der Veen summarised the work undertaken to date and discussed the preliminary findings from those simulations.

The progress of the planned 2015 Sakhalin Energy seismic survey across Piltun-Astokh was simulated as a factor of external influences, such as start date, weather and the number of whale sightings and 'vessel response' to the latter.

Extrapolating from the 2010 Astokh 4D seismic survey experience, and adopting the same mitigation protocols as in 2010, the 2015 survey is predicted to take 42 days. Taking into account that weather was favourable in 2010, there is a chance of even longer duration if weather proves less favourable in 2015. During this six-week period, a significant number of whales will move into the Piltun near shore area and this is a concern to Company, since some impact on at least behaviour would appear to be unavoidable.

The agreed primary mitigation measures are (1) starting as early in the season as possible and (2) finishing the seismic programme as soon as possible.

The secondary mitigation measures adopted in 2010 are amongst others: restrictions on operating at night and temporary source suspension in cases of potential behaviour impact.

Company's desire is to rationalise the secondary mitigation measures such that they do not detrimentally affect the ability to achieve the primary mitigation measures. The simulations are intended to show the effect of several variations of the implementation of the secondary mitigation measures.

To this end, an Excel spreadsheet was developed, in which the survey state was simulated in 30-minute increments, with bad weather and whale sightings modelled as external influences on the survey. The survey state could be one of the following: acquiring data, line turning, or suspended due to external factors.

A model for such random events has been used:

(a) whale sightings were modelled based on field data gathered over 2004-2012 off Piltun Lagoon, during onshore and offshore monitoring campaigns;

(b) bad weather was modelled based on historical weather data.

WHALE SIGHTING DATA

The data used for making a model of whale sightings are a set of observations made during 2004-2012. In several seasons, the observation teams started in late June and continued their work for 100-120 days. The exception was that in 2010 during the 4D seismic campaign, observations started on 7 June in the lead up to the seismic survey.

The whale sightings were plotted against time (during each season) and a simple regression formula was derived, to predict the number of whale sightings per day in future (2015) along the coast near Piltun Lagoon. The most appropriate regression was a linear increase from no sightings on 1-June to 90 sightings per day on the 60th day, increasing by 1.5 whale sightings per day in between. After 60 days the number of whale sightings was kept constant at 90 per day near Piltun Lagoon. Any further refinement of this approximation was felt to be unjustified. There is no preference for timing of whale sightings throughout the day in the model.

The "near shore area" (elsewhere referred to as the A-zone) is the area of 95% percentile population distribution. The data show that fewer than 5% of sightings take place further offshore. Even so, the likelihood of whale sightings outside the near shore zone was taken to be 5/95x the likelihood of whale sightings inside it.

RESPONSE TO WHALE SIGHTINGS

In the field, two temporary source suspension criteria have been used;

(a) Suspension upon exposure of a whale to more than 180dB rms SPL, which could happen at close range and lead to subsequent injury.

(b) Suspension upon exposure of the near shore zone to more than 156dB per-pulse SEL (approximately equivalent to 63dB rms SPL in the local propagation conditions), which potentially leads to impacts on behaviour of whales, but not to injury.

During the simulations, these criteria were modelled as follows.

(a) If a whale was simulated to be within 2km of the survey vessel (exposing it to 180dB rms SPL or more), the vessel would suspend shooting and the current line would therefore fail to be completed and have to be reshot later (after completion of the primary lines). This simulation approach is consistent with the source suspension criterion used on the seismic vessel in the field. However, in reality the line may be reshot on the fly before completion of the primary lines, but this would be at discretion of the crew in the field.

(b) If a random whale sighting were to occur during the simulation in the near shore zone and the vessel was far enough offshore such that the near shore levels were below 156dB per-pulse SEL, then the vessel would continue.

(c) If a random whale sighting were to occur during the simulation in the near shore zone and the vessel was close enough to ensonify the near shore zone to 156dB per-pulse SEL or greater, then we looked at three scenarios to deal with this:

  i. suspending the source irrespective of where the whale is within the near shore zone;

  ii. suspending the source following the "Racca" modified concept of the near shore zone, restricting the assumed area of potential impact to a 10km wide strip adjacent to the source;

  iii. continue shooting.

WEATHER DOWN TIME

Based on historical weather data, bad weather was assumed to occur 10% of the time. It was distributed randomly over the survey period, occurring in blocks of 6 hours each, reflecting the reality on the ground that a short spell of bad weather will not affect the survey (with accurate weather forecasts available, the vessel would continue during short spells). During simulated bad weather, survey activity is paused and the line on which the vessel was engaged would fail to be shot, such that it would need to be reshot upon completion of the primary line programme.

OTHER EXTERNAL FACTORS

Other external factors were not taken into account. Thus:

(a) line shooting order can be adjusted such that night time restrictions on A-lines could honoured or ignored;

(b) platform obstructions were ignored;

(c) technical downtime was ignored.

START DATE

The start dates could be chosen any date after 1-June. Start date refers to the date of first seismic survey production/acquisition and not streamer deployment (this precedes the start date as defined here). The difference between these two scenarios is the number of whale sightings; starting later implies more whale sightings.

SHOOTING ORDER

As the 2015 survey is a 4D survey, sail line azimuth is fixed. The 2015 4D survey will consist of some 40 survey lines, 27 of which will possibly expose the near shore zone to > 156dB per-pulse SEL. Half of these lines will be acquired heading north, the other half heading south. The near shore lines will be acquired first, in order to minimise the potential impact on whales. The 27 lines making up the near shore swath can be accomplished with “hour glass line turns”. This order is optimum in terms of minimising impact, in that lines closest to shore are completed first when whale numbers are low. It is not the fastest way of acquiring the survey as hour glass line turns are slower than race track turns.

SURVEY MODELLING

Only primary acquisition lines were modelled so far, no infill or re-shoots. A tally was kept of how many primary acquisition lines were completed, and the number of suspensions (due to whales, weather) was tracked. A line was deemed successfully completed if no suspension occurred while acquiring the line.

At the end of the primary acquisition lines, the percentage of completeness was tracked and the number of stoppages due to presence of whales (either in the A-zone or near the source) can be inferred. Re-shooting was not modelled at this stage, but inevitably re-shoots would take place later when more whale sightings are expected. Thus, the chance of success of re-shoots is lower than the chance of success of the primary lines.

SUMMARY

The survey simulations show that honouring the full near shore zone in response to whale sightings - approach (i) above - leads to only a small portion of the near shore lines being completed.

Responding to sightings in the ‘restricted’ near shore zone - approach (ii) above - is significantly more effective in terms of completing the survey, arguably without negatively affecting the behaviour of more whales than approach (i).

Allowing the vessel to continue shooting irrespective of whale sightings in the near shore zone - approach (iii) above - is the most effective in terms of rapid survey completion, but at the cost of ignoring between 0 and 10 potential instances of impact on whale behaviour.

Overall, Van der Veen concluded that the simulations confirm what was already known and they reinforce the importance of the primary mitigation measure, which is to start the survey as early in the season as possible and to complete the work in the shortest time possible. Suspending acquisition to prevent potential behavioural impact on a few whales that are in the near shore zone early in the season upon exposure to 156dB per-pulse SEL inevitably leads to reshooting lines later when more whales will be at risk of exposure to problematic levels of sound from the source pulses.

NTF CONCLUSIONS AND RECOMMENDATIONS

The NTF **welcomed** the results of the simulations presented by the Company. It **agreed** that these provided a good start to being able to evaluate the different proposed strategic options and mitigation measures including relaxation of some measures agreed for the 2010 survey. It is clear from the results that it will not be possible to implement the full 2010 strategy and complete the entire survey before the end of July; it may not be possible to complete the survey at all under such conditions. The broader implications of this are discussed under Item7.

The NTF **recommended** that the following aspects should be incorporated into the simulation process and reported to NTF-8. Progress on these (especially on those aspects that need further development indicated below) will be monitored and facilitated by a Steering Group comprising Cooke, Donovan (convenor), Racca and Van Der Veen.

(1) Performance statistics: these need to reflect factors related to operational success and to potential numbers of whale exposures. It was agreed to include:

(a) Expected # whales exposed > 156 dB per-pulse SEL (behavioural threshold)

(b) Expected # whales exposed > 180 dB rms SPL (acoustic injury threshold)

(c) Whale-related downtime

(d) Days to complete survey (including reshoots)

(e) Number of lines completed by [25] July

With respect to the exposure measures, these can be calculated from the existing model but Cooke will investigate potential ways to look at cumulative exposure

(2) Modelling of whales: in addition to the present assumed uniform distribution, two additional options will be investigated – one with fixed numbers of animals assumed near Piltun Lagoon (to be developed by Van Der Veen) and one that broadly reflects the distribution data available (to be developed by Cooke).

(3) Scenarios: in addition to the existing scenarios, the present model will need to be extended to include: (a) time to complete the survey including the need to reshoot lines (to be developed by Racca and Van Der Veen); (b) different assumptions regarding the efficacy of night vision technology (to be developed by Van Der Veen); (c) assumptions with respect to the time-share option to allow estimation of whale exposure statistics for the ENL operations (to be developed by Cooke based on whatever data are available or can be assumed for the ENL seismic survey).

The NTF **agrees** that the report of the Steering Group and the results of the simulation study should be made available at least one week before NTF-8. This will require a number of teleconferences to be organised by IUCN.

5.2 Real-time and acoustic monitoring/mitigation

A subgroup of the NTF consisting of Racca (chair and rapporteur), Nowacek, Rutenko, Vedenev and Vladimirov met to discuss technical aspects of the proposed acoustic monitoring infrastructure for the 2015 P-A 4D seismic survey. Their terms of reference were to consider whether the proposed level of instrumentation of the PML for 2015 and the new telemetric acoustic stations developed by V.I. Il'ichev Pacific Oceanological Institute, Far Eastern Branch of the Russian Academy of Sciences (POI) are fit for purpose.

5.2.1 Level of instrumentation

PROPOSAL

The proposal of the Company can be summarised as below.

(1) An arrangement of nine telemetric acoustic stations along the PML in two closely spaced (2.5km pitch) clusters of three stations at each end, with the remaining three stations evenly spaced along the intervening length of the PML.

(2) PML radio stations to be distributed over a length of about 40 km, matching the north-south extent of the survey region.

(3) South of the mouth of Piltun Lagoon it is possible to use line of sight RF transmission to shore station for full-waveform data telemetry. North of the lagoon mouth the range is too long for direct RF link and thus Iridium satellite uplinks will be used there.

(4) For near-shore monitoring, two recording stations will occupy the same locations on the 10-m bathymetry line as the southern and northern-most stations for the 2010 survey; in addition there will be a station at the regular annual acoustic site PA-B-10 and one near the northern boundary of the 2015 survey area. The northern 10-m station will be roughly aligned with the third PML station from the north, or some 5km from the end of the PML; this is symmetric with station positions in the south.

DISCUSSION

The small group discussed and agreed that the primary purpose of PML real-time monitoring is to provide ongoing verification, during line runs, of the consistency of the selected model case (on which the mitigation boundary is based) and actual measurements; it is meant to allow verification of the actual received levels at the PML in order to ensure *inter alia* that the predefined B lines (no exposure above 156 dB per-pulse SEL inside the feeding area) indeed fit that classification. To this end, the integrity of the full set of sensors is an important but not mission-critical requirement of the monitoring and mitigation process, and the failure of any one of the stations does not require immediate suspension of line acquisition. If a PML station fails, Sakhalin Energy should be committed to reactivating it as soon as possible; a maximum timeframe of 48 hours was recommended by the subgroup. Selection of the appropriate model case for a line requires that each of the "terminal clusters" has at least 2 operational stations; if a cluster is for some reason reduced to a single operating station, then no A lines starting at that end should be acquired until the condition is remedied.

5.2.2 New technology telemetric AUAR units

PROPOSAL

Rutenko gave a brief overview of the characteristics of the new systems.

(a) Easier deployment design with a pyramid frame mounted hydrophone and a single electronics and batteries canister on the sea floor, tethered to a surface buoy containing additional batteries and the radio systems (line of sight RF and Iridium satellite). Bottom components are held in place by a heavy iron anchor from which they can be decoupled for retrieval using an acoustic release.

(b) 30 kHz sample rate sigma-delta digitization at 24-bits; this provides a 2 Hz to 15 kHz acoustic frequency range for internal recording and on-board processing.

(c) Full waveform RF transmission at 4 kHz sample rate, 16 bit digital resolution.

(d) RF transmission (radio modem) can be switched on or off through commands sent to the unit via Iridium satellite link, resulting in much longer battery autonomy.

(e) Sound level metrics and spectral density in one-third octave bands are computed on-board and can be telemetered via Iridium satellite uplink. Processing is continuous, in half-second time windows with 50% overlap.

(f) Both RF modem and Iridium links are resilient to oscillation of antennas on the surface buoy caused by waves and wind.

(g) SMS-like transmission via Iridium channel at one-minute intervals of various sound level metrics including peak and rms sound pressure level (SPL), one-second SEL, and spectral power density in one-third octave bands; other pulse metrics such as kurtosis are optional.

(h) Algorithms have been tested on archival data from the 2010 Astokh 4D survey acoustic monitoring, using pulse sequences received from seismic lines ranging from the most inshore to the farthest away from shore; they worked robustly on all samples.

(i) Details of operating principles and specifications can be found in the advance draft of scientific article "Radio hydro-acoustic station for monitoring the parameters of human-induced pulse and noise signals on the shelf" by A.N. Rutenko, S.V. Borisov, D.G. Kovzel, and V.A. Gritsenko that has been provided to NTF members in English translation.

DISCUSSION

Discussion within the small group of the information about the new systems resulted in a general request to be kept appraised of the results of further field tests still due to be performed on the systems which have not yet been deployed for active service on the Sakhalin shelf. No fundamental reservations or concerns were expressed about the design or the performance of the new acoustic stations as presented.

5.2.3 NTF conclusions and recommendations

On the subject of the instrumentation of the PML and additional non-telemetric stations, the NTF **agreed** that the proposed design with nine telemetric AUAR stations (some used in line of sight RF mode, others in Iridium satellite mode) with three-station clusters at each end is adequate for the purpose of acoustic effects monitoring and mitigation. It further agreed to the proposal of four non-telemetric stations deployed on the 10-m bathymetry line for post-survey analysis of near-shore exposure levels. It **recommended** that the Company commit to maintaining functional integrity of the real-time monitoring infrastructure of the PML by reactivating any failed node as soon as possible but in any case within a period not to exceed 48 hours (subject to weather conditions that might prevent reactivation and delay the seismic survey itself).

The NTF **endorsed** the design and specifications of the new technology telemetric automated underwater acoustic recorder (AUAR) stations described by Rutenko as meeting the requirements for real-time monitoring, and **requested** that updates on ongoing operational testing of the units be communicated at a later meeting or intersessionally if possible.

5.2.4 Future possibilities

The NTF was informed that the Lamont-Doherty Earth Observatory (L-DEO) is experimenting with measuring air gun pulse levels directly from the streamers (see discussion of this issue at NTF-6).

NTF CONCLUSIONS AND RECOMMENDATIONS

The NTF **welcomed** the information that work is ongoing on this issue and agreed to keep the matter on its agenda.

5.3 Behavioural monitoring/mitigation associated with the 2015 survey

5.3.1 Update on MMO recruitment, training

PRESENTATION

Vladimirov verbally announced the Sakhalin Energy's plans for the mobilization of Marine Mammal Observers (MMOs). Up to 20 MMOs will be required for the Company's 2015 4-D seismic survey; six of them will be stationed on the vessels involved in the operations. A Senior MMO and three other experienced MMOs will stay onboard the seismic vessel and two MMOs on the supporting vessel. The seismic vessel MMOs will operate on 2hr shifts. At NTF-6 the Company had announced its plans to certify six offshore MMOs. Vladimirov confirmed that the Company is still planning to do this but for various reasons cannot make a firm commitment. There are no official national standards for MMO certification in the Russian Federation and therefore the Company is considering the certification of MMOs according to U.S. Bureau of Ocean Energy Management (BOEM) or UK Joint Nature Conservation Committee (JNCC) standards. The original intent had been to bring the trainer to Sakhalin and have the training and certification take place in Russia. It is not possible for JNCC to certify the MMOs trained in Russia but it is possible for BOEM to do so. However, taking into account the current political situation, it may be difficult (or impossible) to implement this approach. Another option would be to send the MMOs outside Russia for BOEM or JNCC training and the certification but there are a number of constraints, e.g. difficulties to obtain visas. The Company will nevertheless continue to investigate all possible solutions. If this is not successful, the Company will ensure that the most experienced MMOs available, with the proper training for seismic operations, are on the vessels. In fact the current internal Company MMO training programme is based on JNCC and BOEM standards and complies with international requirements.

From 12-14 additional MMOs are expected to be deployed on the shore-based behaviour monitoring teams. They will be involved primarily in the distribution scanning and focal animal follows (behaviour tracking) with binoculars at the behaviour stations.

NTF CONCLUSIONS AND RECOMMENDATIONS

The NTF **welcomed** this update on MMO training and recognised the difficulties in certification arising out of the present political situation. It reiterated its previous views on the importance of experienced, well-trained MMOs and **recommended** the Company to continue its efforts to ensure the availability of experienced and appropriately trained personnel.

5.3.2 Vessels

At NTF-6 it was requested that more information should be provided to allow it to evaluate whether the supply and seismic vessels are able to fulfil the at-sea obligations established as part of the 2010 monitoring and mitigation protocols.

PRESENTATION

Vladimirov reported that based on experience in the field and various reports describing the 2010 4-D seismic survey, the Company has decided not to use a dedicated scout vessel or a separate PML observation vessel during the 2015 survey. He summarized the elements of reasoning that went into this decision as follows:

- It appears that in 2010 most of the gray whale sightings were made from the PML observation vessel. The support encountered gray whales only twice, none were seen from the scout vessel and gray whales were sighted 13 times from the seismic vessel, Pacific Explorer.
- There is no guarantee that gray whales will be spotted from the scout vessel in such a way that the sightings can be relied upon to help mitigate the potential impacts from the seismic source. Considering the greater length of the survey lines in 2015 and the ability of cetaceans to move almost at random, the Company has no confidence in the efficacy of the using a separate scout vessel to assist in seismic survey mitigation.
- The risk of ship strikes on marine mammals is greater with more vessels in the area. In 2010 the major risk of ship strikes is believed to have come from the PML observation vessel. No potential ship-strike incidents with cetaceans were reported from the seismic vessel, nor were any gray whales reported as having entered the acoustic exclusion (‘safety’) zone. The 2010 data have been interpreted by the Company as showing that, in general, MMOs onboard the seismic vessel observed the same whales as the MMOs on the supporting boats.

Vladimirov concluded his presentation by stating that the Company’s intention is to minimize the potential risks associated with the use of additional vessels. Instead, it plans to rely upon efficient technological means deployed from onboard the seismic vessel to ensure proper detection and tracking of the different marine mammals. A night vision detection system combined with a radar system will be installed on the vessel to work 24 hr (round the clock) and simultaneously with the visual observation efforts of the MMOs.

During discussion, Vladimirov also stated that additional vessels also complicate communications and that this added to the challenge of implementing the MMP fully in 2010.

DISCUSSION

Several NTF members expressed concern about the lack of a more detailed explanation of the rationale for eliminating these components of the previously agreed MMP (2010). They noted that the planned 2015 survey will be much larger and last much longer than the 2010 survey, and as indicated under previous items in this report, the Company expects it will be necessary to relax various other key features of the MMP from 2010 in order to complete the planned Piltun-Astokh 4D survey. Particularly under such circumstances, these members were uncertain how to interpret the Company’s decision. For example, the NTF's reasoning for the 2010 MMP was that the scout vessel was needed for periods of poor weather and times when, for whatever reason, shore-based observers were unable to observe the entire A-zone. However, in 2010 the weather was good and it proved possible to complete the survey in a reasonable timeframe and without major whale-related delays. If the weather is worse in 2015, it could be difficult to maintain visual coverage without the scout vessel. Again in the view of some members, the fact that no sightings were made from the scout vessel in 2010 is not sufficient reason to discount the potential contribution of such a vessel to the MMP in 2015.

The NTF **agreed** that its focus at this point should be on considering whether either a scout vessel or a PML observation vessel, or both, should be included in the MMP for the planned 2015 seismic survey.

In 2010, one of the requirements was that some A-lines could not be acquired in conditions of poor visibility or darkness if the scout vessel had seen whales there within a prescribed number of hours. Without the scout vessel to patrol lines in advance of the seismic vessel, some of them presumably could not have been shot in darkness or poor weather. The question to be asked now is not whether the scout vessel saw whales but rather how many lines could not have been shot in 2010 if the scout vessel had not been scouting in advance? Sakhalin Energy indicated that the only way to address this question would be by going through the Acquisition Report from 2010. Donovan **stressed** that this task is the responsibility of the Company, considering that all parties had agreed that the 2010 MMP is the baseline and the Company is expected to provide documentation explaining why any aspect of that baseline set of protocols should be changed for 2015.

Regarding the PML observation vessel, it was noted that its purpose was to sail in the A-zone and watch for whales not visible from shore. It was also noted that a thick fog bank along shore, with visibility from shore impaired but visibility good just seaward of this fog bank, is not unusual at Sakhalin. Having a vessel to patrol the PML and vicinity would potentially improve the chances of being able to continue A-line acquisition at times when shore-based surveillance is impractical. Without some kind of analysis, it is not possible to evaluate the implications of eliminating this vessel from the 2015 MMP. Again, it is the Company's responsibility to provide such an analysis, which should incorporate consideration of how any decision regarding the use of a PML observation vessel might affect the primary mitigation measure of completing the A lines as early and as quickly as possible. This analysis should also consider the potential effects of additional vessel noise along and near the PML should an observation vessel be stationed there.

NTF CONCLUSIONS AND RECOMMENDATIONS

The NTF discussed the proposal of the Company to remove the scout vessel. In the 2010 survey, the scout vessel was a requirement of the seismic survey company and its task was to sail one line ahead of the seismic vessel in order to ensure that the line was clear from the perspective of the seismic vessel to proceed. The Panel and the Company took advantage of this vessel to place MMOs onboard and the MMOs primary function was related to the mitigation measures that stated that lines could only be shot at night or in fog if the line had been surveyed before and no whales had been seen during the previous six hours (it had noted that the period of six hours was arbitrary). The present proposal of the Company was to remove this requirement in the light of the use of night vision technology discussions about the uncertainty as to level of effectiveness of the night vision technology are given under Item 5.1.1).

The NTF **agreed** that before making a final recommendation on the use of the scout boat it should (a) examine the information from the 2010 survey in terms of how many times the scout vessel information was used to allow lines to be shot under 'poor visibility' – it **requests** that the Company finds this information and circulates it to the NTF; and (b) examine the results of the simulation studies discussed under Item 5.1.1.

Related to these discussions was the Company's additional proposal to remove the offshore observation vessel component of the MMP (near the PML) with respect to behavioural monitoring and distributional monitoring (especially in light of onshore fog preventing the work of shore-based teams). As noted above this was based on their view of the difficulties identified after the 2010 survey in terms of the value of these data for monitoring compared to those from the shore-based work.

The NTF refers to its general discussion of the value and extent of distributional and behavioural monitoring under Item 5.3. In light of this it **agreed** that it was premature to reach a final conclusion about the need for vessel-based studies until NTF-8. It noted that discussion of vessel-based behavioural and distributional studies at NTF-8 would take into account any potential increased disturbance of whales from such a vessel.

5.4 Other monitoring (e.g. distribution, photo-identification)

5.4.1 Summary of Joint Programme 2013 and 2014 and plans for 2015

PRESENTATION

Vladimirov gave a brief overview of the lessons learned in 2013 and the changes made to the operations schedule in 2014. In principle, all components stayed unchanged and the differences related to logistics and effort. There was no additional benthic sampling early in the 2014 season as Sakhalin Energy no longer had a requirement for post-stabilization pipeline monitoring and therefore the vessel to conduct benthic sampling was not present. The entire focus of vessel-based distribution surveys was shifted to the Offshore feeding area. No surveys were planned and executed in the Piltun feeding area in view of the incompatibility between the vessel-based and shore-based observations. Vladimirov stated that vessel surveys off Sakhalin Island result in lower numbers of sightings than shore-based surveys. Observers on vessels are unable to detect whales close to shore and, in particular, mother-calf pairs. In addition, calculations of distances to the whales and their locations are less accurate and do not match up with the sightings from shore. As a result, in 2014 the Piltun feeding area was surveyed only by vehicle-based distribution teams which remained completely unchanged from the previous year. Additional early-season deployment of the underwater acoustic stations was conducted in order to monitor industrial noise associated with ENL's Berkut platform topsides installation.

The biggest change in 2014 in terms of logistics and effort was in the photo-ID component. In addition to the vessel-based photo-ID team, two more teams were mobilized from shore. One team used two Zodiacs to go to sea from Piltun Lagoon and carry out photo-ID and biopsy sampling in areas to the south and the north of the lagoon mouth. Another team used vehicles to undertake photo-ID work from shore along the south spit.

There as yet are no firm plans for the Joint Programme in 2015 as the companies usually finalise these in December so that they can be submitted to Russian Federation authorities by the end of the year. In general, Vladimirov stated that he expected the 2015 Joint Programme Scope of Work to be the same as in 2013 and 2014. The actual duration, logistics and number of teams will depend on the working and operational plans of both companies.

DISCUSSION

There was some discussion about the need for two shore-based boats related primarily to collecting biopsy samples (one is a safety boat) which may cause additional disturbance to the whales. Donovan referred to the discussions of this and related issues during WGWAP-14 (see items 7 and 14.4 in that report).

5.5 Other groups (e.g. Russia-US team)

Donovan noted that the Russia-US team reported on its plans at WGWAP-14 (see item 14.1 in that report) and that these would be largely the same as in previous years i.e. in July and August 2015.

5.6 Other (future)

5.6.1 Alternatives to traditional seismic surveys

Nowacek referred to a report from Noise Control Engineering, Inc. (Spence *et al*. 2007) that reviewed ways of reducing underwater sound from oil and gas activities He noted that some of the options considered included: use of silencers over the guns (especially relevant to high frequencies); marine vibroseis; electro-magnetic approaches; and air curtain barriers.

There was insufficient time to review this document fully and it was **agreed** to keep the item on the NTF agenda.

6 REVIEW OF THE PROPOSED REVISED MMP

6.1 Presentation

As requested at NTF-6, the Company provided and briefly presented a track changed version of the MMP.

6.2 NTF conclusions and recommendations

The NTF thanked the Company for providing the track changed version of the 2010 MMP showing proposed changes by the Company for the 2015 survey. Given the additional work requested on many of the proposed changes detailed, it **agreed** that it was premature to discuss the wording of a revised MMP until this work has been completed. However, it **stressed** that it was essential that the revised MMP be completed at NTF-8 if the Panel is to be able to make a recommendation to the Company in time for the mid-December deadline.

7 SUMMARY OF CONCLUSIONS AND WORKPLAN (INCL. ALLOCATION OF RESOURCES & REPORTING TO WGWAP)

The NTF noted that while it had made progress towards completing its work on developing an MMP for the proposed 2015 seismic survey, considerable work remains if this is to be achieved at NTF-8 which will be held from 17-18[19] November 2014.

This is primarily a result of the finding that it is not possible to complete the 2015 survey if the full range of mitigation measures for the 2010 survey are implemented (Item 5.1.3). There is always some degree of trade-off between measures to minimise the *total* number of animals potentially affected by the survey (i.e. the primary mitigation measure of starting and finishing the survey as early as possible) and protecting individual animals (the additional mitigation measures under the 2010 MMP).

The NTF **agreed** that it is essential that the rationale for any proposed changes to the 2010 MMP are fully documented in its report. In addition, the simulation studies outlined under Item 5.1.3 are essential to quantify the nature of any proposed trade-offs. It is clear that whatever mitigation approach is ultimately recommended, considerably more animals will be subject to noise above the behavioural threshold than was the case for the 2010 survey. Thus it is more likely that any effects of the survey on whales will be more detectable than was the case in 2010, even if the primary mitigation measure is successful. The proposed reduction in the monitoring component of the MMP by the Company must therefore be carefully addressed by NTF-8. At the present meeting there was no consensus for these proposed changes. A full discussion will be required at NTF-8.

It **agreed** that given the short timeline for NTF-8 and the importance of the results of agreed recommendations being available in time and in the necessary detail, it is essential that regular biweekly teleconferences are organised to review progress. The NTF **requests** IUCN to organise these in conjunction with the NTF Chair and the Company.

Given the availability of NTF members, the only possible dates for NTF-8 appear to be 17-18[19] November. IUCN will finalise details of the venue as soon as possible taking into account visa requirements and commitments of NTF members. The report will be reviewed by the observers and the Panel in accordance with the procedure outlined at WGWAP-14.

8 OTHER BUSINESS

8.1 Short progress report on 2013 photo-id boat experiment, postponed until late in 2014 season

The NTF received a short report from Vladimirov that the experiment requested in 2013 had been completed in 2014. However, the data had not yet been supplied to Rutenko and thus the results were not yet available. The NTF **reiterated** the previous Panel recommendation (WGWAP-13/006) on this matter.

8.2 Short progress report on publication of 2010 analyses (Reeves, Donovan)

Reeves and Donovan reported on progress with the special volume of Endangered Species Research; this is slower than anticipated as not all manuscripts have been submitted to the Journal yet but it is expected to be ready by the end of 2015 at the latest.

8.3 Update on publication plans for 2012 2-D Seismic results

Racca intimated that pressure of work has meant that he has not been able to work on this at the moment.

8.4 Final report on analyses of noise recordings made in 2013 at PA-B platform

8.4.1 Presentation

Racca gave a presentation on the review and assessment by JASCO (Alex MacGillivray) of POI's 2013 measurements of acoustic and vibration signatures (report "Measurement of Acoustic Noises Generated on PA-B and Molikpaq and Supply Vessels from 23 through 30 September 2013" by Borisov, Kovzel, Rutenko and Uschipovsky). As a preamble he complimented the POI team for the thoroughness and exhaustiveness with which they had conducted the study, pointing out that they had been able to access and measure mechanical equipment in the most remote reaches of the platforms. He provided a summary of the individual units of machinery that had been studied on each platform, ranging from water pumps to generators to gas compressors. The presentation focused on some of the conclusions reached in the POI analysis and identified some potential limitations in the ability of the study to provide unambiguous identification of specific sources as being candidates for engineering mitigation without corroborating work such as isolation of devices e.g. during maintenance periods.

8.4.2 NTF conclusion

Given the limited time available for discussion, following a brief exchange of comments the Chair proposed that a small group be convened intersessionally to review in greater detail the study and its conclusions as presented. The group should include Rutenko, Vedenev, Nowacek (convenor), Vladimirov and Racca, and should convene by teleconference on a schedule to be decided by the group in consultation with IUCN.

8.5 Progress on recommendation WGWAP-13-007

This recommendation relates to performing a comprehensive analysis of all acoustic records using an automated detector to find periods of loud noise of likely anthropogenic origin. Racca reported that while it is on the 'to do' list for himself and Rutenko, it is not yet complete.

8.6 Independent observer for the 2015 survey

At the end of the meeting, the NTF briefly considered the value of having an independent observer present during the survey as had occurred in 2010 (although he was unable to be present for the whole survey)[4]. The Company stated that it had no objection to the presence of such a person. Reeves commented that in 2010 the responsibility for organising and funding the observer fell to IUCN. It was **agreed** that this should be discussed further with IUCN.

9 ADOPTION OF REPORT

The conclusions and recommendations for each item were agreed on the last day of the meeting. These determined the workplan for NTF-8 and formed the basis of the teleconferences that were held. The full draft report was circulated to the NTF for comment on 8 November 2014.

10 REFERENCES

Madsen, P.T, Johnson, M., Miller, P.J., Aguilar Soto, N., Lynch, J. and Tyack, P. (2006). Quantitative measures of air-gun pulses recorded on sperm whales (*Physeter macrocephalus*) using acoustic tags during controlled exposure experiments. *J. Acoustical. Soc. Am.* 120 (4): 2366-79.

Nowacek, D.P., Bröker, K., Donovan, G.P., Gailey, G., Racca, R., Reeves, R.R., Vedenev, A.I., Weller, D.W. and Southall, B.L. (2013). Responsible practices for minimizing and monitoring environmental impacts of marine seismic surveys with an emphasis on marine mammals. *Aquatic Mammals* 39(4), 356–377. doi:10.1578/AM.39.4.2013.356.

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Woodward, B. L. and Winn, J. P. (2006). Apparent lateralized behavior in gray whales feeding off Central British Columbia coast. Marine Mammal Science, 22: 64–73. doi: 10.1111/j.1748-7692.2006.00006.x

[4] See the Independent Observer Report on the 2010 Astokh 4-D Seismic Survey at http://cmsdata.iucn.org/downloads/wgwap_9_doc_20_independent_observer_report.pdf

Annex A

List of Participants

Justin Cooke (WGWAP)
Mike Donaghy (Sakhalin Energy)
Greg Donovan (WGWAP)
Douglas Nowacek (WGWAP)
Roberto Racca (Sakhalin Energy)
Randall Reeves (WGWAP)
Alexander Rutenko (Sakhalin Energy)
Grigory Tsidulko (WGWAP)
Marko van der Veen (Sakhalin Energy)
Alexander Vedenev (WGWAP)
Alexey Vladimirov (Sakhalin Energy)

IUCN

Anete Berzina
Gerard Bos (Day 1 & 2)
Jennifer Ross-Jones (Rapporteur)

Interpreters

Alexander Danilov
Viacheslav Chudinov

Annex B

Agenda

1 INTRODUCTORY ITEMS (Chair, IUCN)
- 1.1 Introductions and logistics
- 1.2 Adoption of agenda
- 1.3 Available documents/materials

2 UPDATE ON OTHER ACTIVITIES ON THE SAKHALIN SHELF IN 2015 (PRIOR, DURING OR POST- SEIC SURVEY)

3 UPDATE ON PROGRESS FOR THE 2015 SEISMIC SURVEY
- 3.1 Status of tender including technical parameters – vessel size, arrays, streamers, etc. (Van der Veen)
- 3.2 Project plan (Van der Veen)
- 3.3 Deadlines for NTF input both internal and EIA (Van der Veen)

4 UPDATE ON WORK/ANALYSES FOR 2015 SEISMIC SURVEY
- 4.1 Progress on acoustic modelling including work completed for Piltun-Astokh survey (Racca)
- 4.2 Update on appropriate sound levels wrt mitigation (Racca, others)
- 4.3 Presentation on new analyses of distribution data for PML determination (SEIC)
- 4.4 Review of behaviour criteria and data collection protocols (SEIC)
- 4.5 Progress on possible use of D-TAGS (Nowacek et al.)
- 4.6 Update on progress with photo-id data on within-season resightings (Cooke et al.)
- 4.7 Other

5 MITIGATION AND MONITORING PLAN FOR 2015 SEISMIC SURVEY (& BEYOND)
- 5.1 Update on proposed modifications to mitigation measures & shutdown criteria for the 2015 survey (Van der Veen)
  - *5.1.1* Use of night-vision technology (Van der Veen)
  - *5.1.2* Modification of the concept of A- and B-lines (Racca)
  - *5.1.3* Simulations to optimise protection of whales and survey efficiency (Van der Veen)
- 5.2 Real-time and acoustic monitoring/mitigation
  - *5.2.1* Equipment and practical processed in the field (Nowacek)
  - *5.2.2* Future possibilities (Vedenev, Racca, others)
- 5.3 Behavioural monitoring/mitigation associated with the 2015 survey
  - *5.3.1* Update on MMO recruitment, training (Vladimirov)
  - *5.3.2* Vessels
- 5.4 Other monitoring (e.g. distribution, photo-identification)
  - *5.4.1* Summary of Joint Programme 2013 and 2014 and plans for 2015 (Vladimirov)
  - *5.4.2* Other groups (e.g. Russia-US team)
- 5.5 Other (future)
  - *5.5.1* Alternatives to traditional seismic surveys

6 REVIEW OF THE PROPOSED REVISED MMP

7 SUMMARY OF CONCLUSIONS AND WORKPLAN (INCL. ALLOCATION OF RESOURCES & REPORTING TO WGWAP)

8 OTHER BUSINESS
- 8.1 Short progress report on 2013 photo-id boat experiment, postponed until late in 2014 season (Vladimirov)
- 8.2 Short progress report on publication of 2010 analyses (Reeves, Donovan)
- 8.3 Update on publication plans for 2012 2-D Seismic results (Racca)
- 8.4 Final report on analyses of noise recordings made in 2013 at PA-B platform (Vladimirov)
- 8.5 Progress on recommendation WGWAP-13-007

9 ADOPTION OF REPORT

Annex C

List of Documents

Note: these are NTF-7 only documents submitted in addition to a number of WGWAP-14 documents related to noise issues and relevant to NTF-7 discussions

DOCUMENT #	TITLE	LANGUAGE	STATUS
NTF-7/1	Provisional agenda (including time schedule)	English	Public
NTF-7/2	List of documents distributed in connection with the 7th meeting of the WGWAP Noise Task Force	English	Public
NTF-7/3	2015 4D Survey Technical Note by SEIC	English	Confidential
NTF-7/4	2015 Monitoring and Mitigation plan for the 2015 Piltun-Astokh 4D seismic survey by SEIC	English	Confidential
NTF-7/5	Draft proposal: Monitoring fine-scale behavior of WGW exposed to seismic exploration with multi-sensor acoustic tags (submitted by Nowacek, Southall, Racca, Tsidulko and Vedenev)	English	For NTF internal use only
NTF-7/6 -1,2,3	Presentation: 2015 Survey simulations, including two detailed spreadsheets (with update and 2010 line register shared after NTF-7) (M. van der Veen)	English	Confidential
NTF-7/7	Presentation: Discussion proposal for a revised behavioural protection approach for Piltun-Astokh 2015 4D survey (R.Racca)	English	For NTF internal use only
NTF-7/INF.1	Spence et al. (2007). Review of Existing and Future Potential Treatments for Reducing Underwater Sound from Oil and Gas IndustryActivities, Prepared for: Joint Industry Programme on E&P Sound and Marine Life, Prepared Noise Control Engineering, Inc.	English	Public
NTF-7/INF.2	Radio hydro-acoustic station for monitoring the parameters of human-induced pulse and noise signals on the shelf (advance English version of paper by Rutenko A.N., Borisov S.V., Kovzel D.G., Gritsenko V.A. to be submitted in a scientific journal)	English	Confidential
NTF-7/INF.3	Madsen et al. (2006). Quantitative measures of air-gun pulses recorded on sperm whales (Physeter macrocephalus) using acoustic tags during controlled exposure experiments. J. Acoustical. Soc. Am. 120 (4): 2366-79.	English	Public