WESTERN GRAY WHALE ADVISORY PANEL **JPTF-3**

JOINT PROGRAMME TASK FORCE

REPORT OF THE JOINT PROGRAMME TASK FORCE AT ITS 3RD MEETING

9 NOVEMBER 2016

MOSCOW, RUSSIA

CONVENED BY THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE

CONTENTS

ACRONYMS

ENL	Exxon Neftegas Limited
IBM	A.V.Zhirmunsky Institute of Marine Biology (now called National Scientific Centre for Marine Biology)
IUCN	International Union for Conservation of Nature
Joint Programme	Sakhalin Energy/ENL Joint Programme on Gray Whale Monitoring and Research
JPTF	Joint Programme Task Force
MVA	Multivariate Analysis
NTF	Noise Task Force
Panel	Western Gray Whale Advisory Panel
Photo-ID	Photo Identification
PSA	Production Sharing Agreement
RGWP	Russian Gray Whale Programme (formerly called Russia-US programme)
WGWAP	Western Gray Whale Advisory Panel

1 INTRODUCTION

The 3rd meeting of the Joint Programme Task Force (hereafter JPTF) was held at the World Trade Centre (Congress Centre), Moscow, Russia, on 9 November 2016 under the co-chairmanship of Greg Donovan and Randall Reeves. The List of Participants is given as Annex A, the Agenda – as Annex B and the List of Documents – as Annex C.

The aims of the meeting were to: (1) review and reconsider key issues from the previous JPTF meeting (JPTF-2); (2) update Panel members of the task force on any changes in company priorities and plans with regard to the Sakhalin Energy/Exxon Neftegas Limited (ENL) Joint Programme on Gray Whale Monitoring and Research (hereafter – the Sakhalin Energy/Exxon Neftegas Limited (ENL) Joint Programme); (3) give Panel members a chance to respond to company presentations, elaborate or expand upon issues carried over from JPTF-2, and offer their suggestions on how the Sakhalin Energy/ENL Joint Programme should change and continue; and (4) agree on a strategy for reporting the results of this meeting and determine whether and how the Panel can provide further advice on changes to the Sakhalin Energy/ENL Joint Programme.

2 PROGRESS SINCE JPTF-2 AND SETTING THE SCENE

2.1 Brief summary of the JPTF-2 meeting

The report of the May 2016 meeting of the Task Force (JPTF-2) was available for participant review prior to this meeting (Document JPTF-2/Report[1]). The meeting was preliminary in nature and did not result in any specific recommendations. Among the subjects identified for further consideration by the companies were the following:

- Formal publication of monitoring results, with an emphasis on evaluation of the effectiveness of mitigation efforts;
- Making full and complete use of existing (i.e. already available) data in rigorous scientific analyses;
- Collecting more distribution and abundance data early in the open-water season (June-July) and in ‘quiet’ years (i.e. years without offshore construction, pile-driving, or seismic surveys);
- Conducting more collaborative work on population structure throughout the range of gray whales;
- Introducing greater efficiencies in photo-ID work (e.g. acquiring fewer photos and reducing redundant effort);
- Making dedicated efforts to detect stranded cetaceans and investigate causes of mortality through necropsies;
- Integrating new technologies (e.g. drones) into aspects of whale monitoring;
- Merging gray whale photo-ID catalogues (e.g. National Scientific Centre for Marine Biology (formerly called A.V.Zhirmunsky Institute of Marine Biology (IBM), Far Eastern Branch of the Russian Academy of Sciences), Russian Gray Whale Programme (RGWP), Kamchatka) into a single repository, possibly facilitated by the International Whaling Commission (IWC);
- Using all relevant data (not only data from the RGWP) in population modelling;
- Reducing the regularity or intensity of acoustic monitoring effort;
- Mining ‘historical’ acoustic monitoring data (e.g. from 2001 onwards) for whale vocalizations, initially as a pilot effort;
- Re-evaluating safety concerns associated with sampling benthos in waters less than 8 m deep and testing alternate sampling approaches or methods;
- Carrying out focussed, well-designed studies of drivers of benthic productivity in the gray whale feeding areas;
- Carrying out focussed, well-designed studies of the diet of gray whales that feed off Sakhalin;

[1] https://www.iucn.org/sites/dev/files/content/documents/jptf-2_may_2016_report_final.pdf

- Investigating prey quality as well as biomass and density;
- Summarizing available data on contaminants in and near the study area and evaluating (or re-evaluating) their potential for affecting gray whales and their prey;
- Spending more effort to collect baseline data on gray whale behaviour at Sakhalin;
- Introducing more training in the use of various research and monitoring tools and testing new technologies on a routine basis;
- Making event-specific monitoring (e.g. during seismic surveys) part of the Sakhalin Energy/ENL Joint Programme, thereby generating larger sample sizes and increasing statistical power;
- Incorporating a cumulative impact component within the Sakhalin Energy/ENL Joint Programme;
- Reviving the idea discussed in previous WGWAP reports of organizing a cumulative impacts workshop of recognized international experts, possibly under IWC auspices.

3 RESULTS OF THE 2015 SAKHALIN ENERGY/ENL JOINT PROGRAMME

These presentations were the same as those presented to the WGWAP-17 meeting that followed immediately after JPTF-3. Therefore, rather than duplicating effort, the summaries provided in this report have been taken directly from the respective summaries provided in the WGWAP-17 report.

3.1 Photo-identification

3.1.1 Presentation

Samatov presented Document WGWAP-17/8 on behalf of the authors (Yakovlev, Tyurneva, Vertyankin, van der Wolf).

<u>WGWAP-17 report summary:</u>

> Photo-ID effort was considerably greater than in the past as a result of five teams being dedicated to collecting data in 2015. These teams included one based on the large research ship working mostly in the Offshore feeding area between 26 June and 27 October, one surveying the Near-shore (Piltun) feeding area by operating from a small boat launched from Piltun Lagoon between 1 August and 30 September, and three vehicle-based teams collecting images from shore between 1 June and 31 October as well as between 20 November and 1 December. In combination, these teams collected nearly 77,000 photographs of gray whales and identified 168 individuals. A total of 259 whales were identified by Sakhalin Energy/ENL Joint Programme scientists from 2002 through 2015.
>
> The ship-based effort resulted in identification of 102 whales in the Offshore area and 31 in the Near-shore area. The small-boat effort resulted in identification of 44 whales in the Near-shore area. The vehicle-based effort resulted in identification of 107 whales in the Near-shore area.
>
> Of the 168 whales identified in 2015, 102 were sighted in the Offshore feeding area and 113 were identified in the Near-shore (Piltun) feeding area. A relatively high degree of mixing between the Offshore and Near-shore (Piltun) areas was recorded: 47 of the 102 whales sighted in the Offshore area were also sighted near shore and 52 of the 113 whales sighted near shore were also sighted in the Offshore area.
>
> The 2015 effort recorded 11 calves and three previously unidentified non-calves. Nine of the calves were still associated with their mothers when first sighted while two apparently had already been weaned and appeared to be independent of their mothers. No mother-calf pairs or independent calves have ever been reported from the Offshore feeding area.
>
> The assessment of body condition continued in 2015 and 29 whales were reported to be in ‘poor’ condition. This is the highest total number of whales considered to be in poor condition since assessment by the Sakhalin Energy/ENL Joint Programme started in 2003. However, the condition of many of these whales reportedly improved over the course of the feeding season.
>
> Besides the 1 June to 31 October vehicle-based photo-identification work, effort was undertaken between 20 November and 1 December. During that time, 11 days of effort in the Near-shore area (between 52°47'N and 53°50'N) resulted in identification of 19 whales (although the photographs for two of them were reported as being of poor and unusable quality). All of the identified individuals had been sighted earlier in the 2015 field season. With the exception of one whale characterized as an adult based on its sighting history, 12 of these

late-season whales were reported to be $\leq$ 4 years of age and four of them were calves first identified in 2015.

Document WGWAP-17/8 reported on two gray whales photographed on 1 and 2 November 2015 by D. Lisitsyn (Sakhalin Environmental Watch) in the Vostochny Wildlife Refuge (zakaznik), about 220 km south of Piltun. These whales were not found in the Sakhalin Energy/ENL Joint Programme/ National Scientific Centre for Marine Biology (formerly IBM) photo-identification catalogue and therefore were assigned new catalogue subject numbers. Additionally, V. Vertyankin provided photo-identification images of seven gray whales observed on 9 August 2015 in Olga Bay, south-eastern Kamchatka. One of these whales had been sighted off Sakhalin in previous years.

3.1.2 Discussion

It was noted that because of the numerous changes in platforms, personnel, and effort over the years, year-to-year comparisons of sighting frequencies of individual whales may be problematic. It was also suggested that the Sakhalin Energy/ENL Joint Programme consider investigating how often individual whales are approached for photographs (or to obtain biopsies) to evaluate the potential for undue disturbance.

3.2 Acoustic Monitoring

3.2.1 Presentation

Fershalov presented Document WGWAP-17/9 on behalf of the authors (Gritsenko, Rutenko, Sosnin, Ushchipovsky).

WGWAP-17 report summary:

> The document describing the companies' acoustic and hydrological monitoring activities for the 2105 season (WGWAP-17/9) provided a useful broad overview of operations but included only a few summary figures and data reporting the 2015 results. A DVD that contains all of the 2015 acoustic data in the previously agreed formats is mentioned in WGWAP-17/9, but neither this DVD nor the data included in it were submitted for the Panel's consideration before or at the meeting. With respect to the 2016 field results, the Panel was provided with a one-slide summary of the acoustic monitoring efforts. With few details, this summary mentioned that (i) 'new generation' acoustic stations were installed at the standard points, (ii) the average level of anthropogenic noise matched levels of previous years, (iii) the most significant sources of anthropogenic noise were platform supply vessels and (iv) noise from ENL seismic survey was registered on the southern border of the Near-shore (Piltun) area and impulses from pile driving on shore were registered in the northern Odoptu part of the area.

3.2.2 Discussion

Surprise was expressed by some JPTF members that the acoustic environment did not change between 2014 and 2015 despite the seismic surveys in 2015. It was explained that data from the companies' seismic survey monitoring programmes are not included in the Sakhalin Energy/ ENL Joint Programme, and most of the acoustic monitoring data referred to in Document WGWAP-17/9 came from the month of August, after the seismic survey work near the Near-shore (Piltun) feeding area had been completed.

3.3 Benthic Monitoring

3.3.1 Presentation

Ivin presented Document WGWAP-17/6 on behalf of himself and his co-author (Demchenko).

WGWAP-17 report summary (Benthos and Ecology section):

> According to Document WGWAP-17/6 and the presentation by Samatov [at the WGWPAP-17 meeting], the most significant finding from the sampling of benthos in the near-shore (Piltun) feeding area was that the decline in total amphipod biomass (47% to 89% of which consisted of *Monoporeia affinis* in 2015) has continued. Maximum values were observed in the years 2002-2004 and minimum values in 2013-2015. A significant increase in sand lance (*Ammodytes hexapterus*) biomass over 2013-2014 values was observed in 2015, with greatest concentrations in the northern part of the study area.
>
> As in previous years, high densities of *Ampelisca* amphipods were recorded in the Offshore feeding area, with a marked gradient at around 50 m of depth – amphipod biomass values $\geq$ 300 g/m^2 are found consistently at depths greater than 50 m (Document WGWAP-17/6). A shift in the peak biomass to greater depths than in previous years was suggested by the 2015 results.

3.3.2 Discussion

Discussion of this topic was brief and generally inconclusive. Ivin and V.Vladimirov emphasized that the recent decline in biomass of benthic amphipods in the Near-shore (Piltun) feeding area has been coincident with the increasing trend in the number of whales using the area, leading them to infer that whale foraging is responsible for the decline. Other task force members (from the Panel) insisted that this inference may represent one working hypothesis but that it should not be the only one considered in a rigorous analysis of the data. In fact, additional data and a different study design would be needed to reach firm conclusions on the cause(s) of the observed changes in benthic biomass. Panel members also stressed the importance of having sufficient control sampling sites, a subject that was discussed in greater detail under Item 4 (see below).

3.4 Distribution Monitoring

3.4.1 Presentation

V.Vladimirov presented Document WGWAP-17/7 on behalf of himself and his co-authors (Timokhin, Tyurin).

<u>WGWAP-17 report summary:</u>

> Distribution surveys were conducted by offshore (vessel-based) and onshore teams following (for the most part) the same transect lines and survey protocols as in 2014. Exceptions to previous protocols included: (1) four low-lying onshore stations (stations 8-10 and 13) in the southern portion of the study area were washed away by winter storms and subsequently moved to the nearest elevated points, and (2) vessel transects in the Offshore feeding area were shifted by one transect south so that lines 2-7 were surveyed instead of lines 1-6. This was done to account for a more southerly distribution of whales in 2015. In 2015, bad weather frequently interfered with both offshore and onshore data collection.
>
> Shore-based observations were made in the Near-shore (Piltun) feeding area from 1 August through 30 September. The average number of whales sighted on 13 complete, synchronized surveys was 25.7 and the maximum number was 40, which is the lowest total number recorded since 2004. The majority of whales (73% of sightings) were seen in waters adjacent to the mouth of Piltun Lagoon. Another 13.8% of sightings were made in the northern part of the study area, north of Station 4. Most of the whales (76%) were seen inside the 10m isobath and 54.8% were inside the 5m isobath.
>
> While the distribution of whales in 2015 was similar to previous years (2004-2014), Document WGWAP-17/7 mentions several exceptions to this, including: (1) the lowest maximum number (40) of whales counted during synchronous shore surveys since 2004, (2) a decrease to 25.7 (34.6 in 2014) in the average number of whales counted and (3) the presence of a small localized aggregation of whales observed north of survey station 4 and up to 5 km from shore over the entire survey period.
>
> In the Offshore feeding area, four complete surveys were conducted in July-August. Sightings were made mostly in the south-eastern portion, similar to what was observed in 2014, in waters 60–65 m deep. Whales were seen feeding, however, throughout the entire Offshore area. Results from synchronized onshore and offshore surveys on 24 August 2015 indicated that the total abundance of gray whales off NE Sakhalin was 107 individuals. On that day, 40 whales were sighted in the Near-shore (Piltun) area and 67 in the Offshore area.

3.4.2 Discussion

There was no discussion following the presentation.

4 EXAMPLE APPROACH: POTENTIAL RESTRUCTURING OF ‘BENTHIC MONITORING’ COMPONENT

This session was led by Pomerleau, who had outlined a potential refocused, restructured ‘benthic monitoring’ component for the Sakhalin Energy/ENL Joint Programme (Document JPTF-3/1). This effort by Pomerleau was meant to serve as an example of how the Panel’s independent expertise might be used to improve the companies’ programme.

Pomerleau emphasized that the long time series of data produced by the current Sakhalin Energy/ENL Joint Programme is exceptional and that it has particular value in the context of rapid global climate change. There is, however, a need for more thorough and rigorous analyses of the data. Differences in sampling design and methodology between years means that data need to be somehow standardized for multiyear analyses.

A number of suggestions were offered on how the current programme could be improved. For example, the use of grab samplers means that mysids and other epibenthic organisms are not sampled, and these are known to be important prey of gray whales in some parts of their range (e.g. off Vancouver Island in Canada). Also, the lack of good control sampling sites hampers interpretation of analytical results, as does the concentration of sampling in the month of October, towards the end of the feeding season. Sampling before, during, and after the whale feeding season would be ideal (but admittedly may be impractical). Gray whales produce feeding pits which can compromise the quality of sampling as it is not known whether samples come from ‘disturbed’ or ‘undisturbed’ areas (and whether the feeding pits represent sites of successful foraging or only ‘exploratory’ probing and not necessarily productive foraging by the whales).

Pomerleau suggested that costs could be reduced by decreasing the number of sampling stations. One approach could be to reduce the number of stations for each of the feeding areas to around 30 (plus controls). Side-scan sonar would be used to map the sea floor and detect feeding pits. Areas found from the sonar to have a high density of such pits could be assumed to be where the most intense foraging occurs. Fifteen of such ‘disturbed’ sites and 15 others where gray whale foraging is apparently less intensive (‘undisturbed’ sites) could be selected and sampled, along with 10-15 control stations for each of the two main feeding areas.

The companies may feel they already have sufficient data to make inferences concerning foraging intensity and to map the relative importance of different parts of the feeding areas. However, the use of side-scan sonar or some other means of ‘ground truthing’ visual observations of surface behaviour should be considered for corroboration, or correction, of such inferences.

Pomerleau concluded her presentation with the following four specific recommendations or points of emphasis:

- Establish sampling stations based on degree of utilization (high vs low), preferably using side-scan sonar, along with control stations;
- Consider a design consisting of 15 disturbed and 15 less disturbed stations in both the near-shore (Piltun) and Offshore feeding areas (grids) and 10-15 stations in two control areas (near-shore (Piltun) and Offshore);
- The sampling plan would measure the spatial and, with the time series, temporal variability of what are assumed to be the gray whales’ principal prey in the region;
- In the event of a change in benthic and/or epibenthic community composition, species abundance, or biomass, this new sampling design based on relative intensity of gray whale foraging (with inclusion of control sites) would allow a more rigorous and credible assessment of underlying causes.

The entire Task Force welcomed this input and thanked Pomerleau for her rigorous efforts.

5 SAKHALIN ENERGY/ENL JOINT PROGRAMME ‘REFRESH’

5.1 Presentation

Following is Lock’s summary of background and context:

> ENL and Sakhalin Energy conduct oil and gas activities off north-eastern Sakhalin as operators of their respective Sakhalin-1 and Sakhalin-2 projects. Both companies are committed to managing and mitigating the risks to whales from their activities. The Sakhalin Energy/ENL Joint Programme, initiated in 1997, has generated a large amount of new data and information on the gray whales off Sakhalin. The data collected and analysed under the Sakhalin Energy/ENL Joint Programme have increased the knowledge base on these whales and their habitat, aided the companies in assessing real and perceived risks to the whales, and enabled more effective management through science and risk-based decision making.
>
> Following completion of construction activities by ENL in 2017, both companies will be in operational phase for offshore assets. During this phase, the companies expect to come under increasing pressure from the Russian Party (and other stakeholders) to demonstrate value from the Sakhalin Energy/ENL Joint Programme. At the same time, it is likely that the gray whales, currently classified by the IUCN Red List of Threatened

Species™ as a Critically Endangered subpopulation, will retain an endangered classification over the long term, so environmental risk and societal expectations will remain.

The Sakhalin-1 and Sakhalin-2 projects both operate under Production Sharing Agreements (PSAs) with the Russian Federation. As such, the companies are accountable to their respective Authorized State Body of the Russian Federation for budget approval and stewardship of any and all programmes that they conduct.

Other companies that operate in the region are not part this Joint Programme, nor do they operate under PSAs. Their obligations for wildlife protection fall under the relevant environmental legislation of the Russian Federation.

5.2 Discussions at JPTF-2

Following is Lock's review of the discussions at the May JPTF meeting (JPTF-2) and the companies' response:

> After the companies had communicated their intention and opportunity to 'refresh' their Joint Programme for the long term, the Panel decided to convene a JPTF, which in this instance included the entire Panel membership.[2]
>
> For the first meeting of this 'new' task force (JPTF-2), the companies prepared a briefing document on their plans to 'refresh' the Sakhalin Energy/ENL Joint Programme for the operational phase. This document included a summary of 'achievements' to date and initial thoughts on the programme's future. The JPTF-2 meeting provided various early comments and advice, some of which are summarized above under item 2. Two of the most significant take-home messages noted by Lock were: (1) Listed 'achievements' would be accorded greater credibility if they were <u>supported by relevant publications;</u> and (2) The companies were encouraged to <u>consider suspending fieldwork</u> altogether for a year, or even two, and to concentrate their resources instead on the completion of scientific manuscripts for publication.
>
> The companies have proposed to the Russian Ministry of Natural Resources and Environment (MNR) a programme that focuses resources on data analysis in 2017 and 2018. The 2017 field programme has not yet been finalized; the final 2017 scope of work of the Sakhalin Energy/ENL Joint Programme is subject to approvals of the Russian Party and the the two companies.

5.3 Restatement of Companies' Intentions in 'Refreshing' their Programme

Lock restated the companies' intentions as follows:

> The companies' intentions in 'refreshing' the Sakhalin Energy/ENL Joint Programme are to (i) realize value from the large quantity of data and information already collected, (ii) revise (sub-)objectives for the medium to long term, and (iii) design a monitoring and mitigation programme that achieves those (sub-)objectives and demonstrates due diligence. As indicated at the JPTF-2 meeting, the draft long-term overarching objectives for the Joint Programme are to: (i) determine any significant impact on gray whales off Sakhalin from the companies' activities, (ii) describe and maintain mitigation measures to prevent or minimize any such significant impacts, and iii) publish information produced by the Joint Programme for the wider use of industries and agencies.

5.4 Companies' Expectations from this Meeting

Lock explained that the companies were seeking input from the JPTF at the start of their Joint Programme 'refresh'. She emphasized that the final programme will be determined only after giving due consideration to regulatory requirements, limitations of scope applicability to company activities under the PSAs, and risk-benefit analyses. Following this meeting, the companies intended to jointly review the feedback received, finalize the 2017 field programme together with the Sakhalin Energy/ENL Joint Programme scientists, and draft Terms of Reference for 2017-2018 analyses and the development of detailed options for a 'refreshed' Sakhalin Energy/ENL Joint Programme. The companies stated their intention to engage a project manager to lead these efforts.

[2] The first incarnation of a JPTF, referred to retroactively as JPTF-1, had been convened in February 2013 as an ad hoc task force, the remit of which was to ensure that logistical changes to the Sakhalin Energy/ENL Joint Programme announced at WGWAP-12 (November 2012) would "meet the same scientific objectives to at least the same level and degree as was intended by the 2012 programme and … not compromise the Panel's ability to provide advice on the potential impacts of the South Piltun development."

6 'WORKING SESSION'

6.1 Overview

Lock explained that during what she called a 'working session' of the meeting, breakout groups would meet separately to consider four key programme components: (1) population structure; (2) distribution, abundance, health; (3) benthos and ecology; (4) behaviour and disturbance. For each of these components, she charged the corresponding breakout group to discuss the following subjects:

- Inputs. What do we already know? For this item, the groups would summarize existing information and data and identify 'peer-reviewed' conclusions.
- Short-term work (2017-2018 programme). What needs to be done to realize the results of the Sakhalin Energy/ENL Joint Programme to date? Under this item, they would start to draft 'sub-objectives' and a '(peer-reviewed) analysis programme'.
- Longer-term work (2019 onwards). What should the 'refreshed' Sakhalin Energy/ENL Joint Programme consist of for longer-term operations? Here, the groups were expected to begin considering 'justifiable' options for the Sakhalin Energy/ENL Joint Programme components.

The four breakout groups worked in two consecutive parallel sessions, which meant that all participants were able to join two of the groups if they chose to. Two of the groups were led by Donovan (population structure; distribution, abundance, health), one by Pomerleau (benthos and ecology), and one by Southall (behaviour and disturbance). The group leaders were responsible not only for leading the discussions and reporting back during the plenary session, but also for preparing a summary worksheet intended to capture the input of group members. No such worksheet was prepared for the population structure group because the group agreed that this subject should be pursued by the companies within the context of the ongoing work of the IWC's Scientific Committee.

Summary worksheets from the other three groups were completed soon after the meeting and forwarded immediately to Lock in order to ensure that the companies had the benefit of access to this input for their ongoing planning work. These three worksheets are appended to this report as a matter of transparency, with the caveat that they were not reviewed by participants (only by the group leaders and Reeves) and must not be interpreted as representing any form of consensus (Annex D, Annex E, Annex F).

6.2 Plenary Discussion

The Task Force emphasized that a full understanding of the conservation status of Sakhalin gray whales depended on data from other areas to and from which these whales are known or suspected to move. Taken in isolation, there are limits to what can be inferred from analyses of Sakhalin data alone. The companies explained that the Sakhalin Energy/ENL Joint Programme can only conduct research in their areas of operation and that in the future this restriction is likely to be enforced even more strictly than in the past. Noting this, the Task Force emphasized the importance of sharing data with groups operating in other areas of potential relevance, including Kamchatka, the northern Okhotsk Sea, the coast of Japan and the East China Sea. In particular, data collected by the Sakhalin Energy/ENL Joint Programme from Kamchatka in the past should be made available to groups resuming gray whale research in Kamchatka, so that the time series can be continued and the previously collected data can be used.

With regard to the possibility of suspending fieldwork in 2017, the companies indicated their willingness to consider suggestions concerning what elements of the programme could be downsized, suspended temporarily, or eliminated altogether, as well as elements that should be continued in some fashion. It may depend, at least in part, on what analyses are required to meet pressing needs, e.g. Sakhalin Energy's planning for its next large-scale seismic survey (in 2018) and ENL's for its 'sealift' operations in summer 2017. Among other issues raised was the possible need for the companies to enlist additional expertise to complete certain analyses to a level that will be suitable for publication in reputable journals.

The question of whether and how to integrate activity-specific monitoring work by the two companies into the Sakhalin Energy/ENL Joint Programme was discussed but no clear way forward was identified. The companies acknowledged that closer collaboration and the pooling of resources, data, and expertise was desirable in principle, but they also pointed out that there are often practical constraints because of the way activities are governed (e.g. subjected to environmental assessment and permitting) and paid for (normally by one company or the other).

The companies suggested that in order to maximize the value derived from the Sakhalin Energy/ENL Joint Programme, highest priority should be assigned to studies that they see themselves as being in an especially good position to carry out (e.g. studies specific to the ecology of the Sakhalin feeding grounds) and lower priority to work that could be duplicative with other programmes or that is more appropriately undertaken by another group or groups. One example of the latter might be gray whale population structure, which, as mentioned under the preceding item, is already being investigated systematically and holistically by the IWC Scientific Committee.

A major topic of discussion was the importance of integrating the various components of research and monitoring that make up the Sakhalin Energy/ENL Joint Programme so that the programme as a whole provides the best possible understanding of individual- and population-level responses of gray whales to industrial activities in the region. Attempts to date have been of limited value (e.g. Villegas-Amtmann *et al*. 2015; Gailey *et al*. 2016; Kriksunov *et al*. in press) but every effort should be made to learn from past integrative analyses and to improve all aspects of future studies, from design and field data collection to analysis and interpretation. An initial step in this direction might be for the companies to establish, jointly, a comprehensive relational database that is designed to support relevant kinds of multivariate analysis.

Recently developed (or even novel) modelling and other analytical techniques might be needed to accomplish the type and degree of integration being sought. This problem of integration is far from unique to the Sakhalin gray whale case, and there is broad interest on the part of experts around the world to work collaboratively towards developing and refining ways to derive maximum benefit from very large datasets. In fact, WGWAP has been promoting this approach for nearly a decade (e.g. see reports of WGWAP-2, item 8 and Annex 4; WGWAP-5, item 8.3; WGWAP-9, item 12.2; WGWAP-11, items 11.3 and 11.4). A series of carefully planned workshops, possibly organized and sponsored by the IWC Scientific Committee, was envisioned, and all participants in the current JPTF effort are encouraged to become aware of previous Panel thinking on this matter by referring back to earlier reports.[3]

7 REFERENCES

Gailey G, Sychenko O, McDonald T, Racca R, Rutenko A, Bröker K (2016). Behavioural responses of western gray whales to a 4-D seismic survey off northeastern Sakhalin Island, Russia. Endang Species Res 30: 53-71.

Kriksunov, Y., Alyautdinov, A., Bobyrev, A. and Chistov, S. (in press, 2016). Study of associativity between the spatial distribution of gray whales and their prey species offshore north-east coast of Sakhalin Island. Regional Studies in Marine Science. http://dx.doi.org/10.1016/j.rsma.2016.03.011

Villegas-Amtmann, S, Schwarz LK, Sumich JL, Costa DP (2015).A bioenergetics model to evaluate demographic consequences of disturbance in marine mammals applied to gray whales. Ecosphere 6(10):183. http://dx.doi.org/10.1890/ES15-00146.1

[3] All Panel reports are available at https://www.iucn.org/western-gray-whale-advisory-panel/panel/meetings/glance-meeting-reports

ANNEX A – LIST OF PARTICIPANTS

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ANNEX B – AGENDA

1. **INTRODUCTORY ITEMS (CO-CHAIRS, IUCN, LOCK)**
   1.1. Introductions and logistics
   1.2. Adoption of agenda
   1.3. Available documents/materials

2. **PROGRESS SINCE JPTF-2 AND SETTING THE SCENE**
   2.1. Panel (Reeves and Donovan lead) (Document Nr. JPTF-2/Report)

3. **2015 RESULTS OF THE JOINT PROGRAMME (DOCUMENTS NR. WGWAP-17/5 TO 10)**

4. **TERMS OF REFERENCE (TOR) FOR THE JOINT PROGRAMME REFRESH**
   4.1. Introduction (Lock)
   4.2. Example approach: Potential restructuring of ‘benthic monitoring’ component (Document Nr. JPTF-3/1)
   4.3. Break-out groups – First session
      4.3.1. Ecology & Feeding
      4.3.2. Distribution & Abundance
   4.4. Plenary discussion
   4.5. Feedback presented by group leads. Discussion.
   4.6. Break-out groups – Second session
      4.6.1. Behaviour & Disturbance
      4.6.2. Population Structure
   4.7. Plenary discussion
   4.8. Feedback presented by group leads. Discussion.

5. **STRATEGY FOR COMPLETION OF FINAL REPORT AND PLANNING OF FUTURE WORK (IF ANY) BY THE JPTF**

ANNEX B – LIST OF DOCUMENTS

DOCUMENT #	TITLE	LANGUAGE	STATUS
WGWAP-17/5-Ru (also for JPTF-3)	Отчет по Программе мониторинга серых китов у северо-восточного побережья острова Сахалин в 2015 г. (основной доклад)	Russian	Public
WGWAP-17/5-En (also for JPTF-3)	Report on the Gray Whale Monitoring Program off the Northeast coast of Sakhalin Island, 2015 (main report)	English	Public
WGWAP-17/6-Ru (also for JPTF-3)	СОСТОЯНИЕ БЕНТОСА В РАЙОНАХ НАГУЛА СЕРЫХ КИТОВ (*ESCHRICHTIUS ROBUSTUS*) У ПОБЕРЕЖЬЯ СЕВЕРО-ВОСТОЧНОГО САХАЛИНА В 2015 ГОДУ	Russian	Public
WGWAP-17/6-En (also for JPTF-3)	Benthos studies in the feeding grounds of gray whales (*Eschrichtius robustus*) off the Northeast coast of Sakhalin in 2015	English	Public
WGWAP-17/7-Ru (also for JPTF-3)	РАСПРЕДЕЛЕНИЕ И ЧИСЛЕННОСТЬ СЕРЫХ КИТОВ В ШЕЛЬФОВЫХ ВОДАХ СЕВЕРО-ВОСТОЧНОГО САХАЛИНА В ИЮЛЕ – СЕНТЯБРЕ 2015 г.	Russian	Public
WGWAP-17/7-En (also for JPTF-3)	Distribution and Abundance of Gray Whales in North-East Sakhalin Coastal Waters in July -September of 2015	English	Public
WGWAP-17/8-Ru (also for JPTF-3)	ФОТОИДЕНТИФИКАЦИЯ СЕРЫХ КИТОВ (*ESCHRICHTIUS ROBUSTUS*) У СЕВЕРО-ВОСТОЧНОГО ПОБЕРЕЖЬЯ О. САХАЛИН В 2015 ГОДУ	Russian	Public
WGWAP-17/8-En (also for JPTF-3)	Gray Whale (Eschrichtius robustus) photo-identification off the Northeast Coast of Sakhalin Island in 2015	English	Public
WGWAP-17/9-Ru (also for JPTF-3)	Акустико-гидрофизические исследования на северо-восточном шельфе о. Сахалин в 2015 г.	Russian	Public
WGWAP-17/9-En (also for JPTF-3)	2015 Acoustic Hydrophysical Survey in the Offshore Waters of Northeastern Sakhalin Island	English	Public
JPFT-2/REPORT (also for JPTF-3)	2nd Joint Programme Task Force report (May 2016)	English	Public
WGWAP-17/10-En (also for JPTF-3)	Presentation on the Sakhalin Energy/ENL Joint Gray Whale Monitoring Programme 2016 preliminary results	English Russian	Public
WGWAP-17/10-Ru (also for JPTF-3)	Презентация о предварительных результатах Совместной программы «Сахалин Энерджи»/ЭНЛ по мониторингу серых китов в 2016 г.	Russian	Public
JPTF-3/1 (working document only for JPTF-3)	Suggestions for an updated benthic monitoring program for 2017 and onward (by C.Pomerleau and P.Archambault)	English	For internal use at this stage

ANNEX D – DISTRIBUTION, ABUNDANCE, HEALTH BREAKOUT GROUP WORKSHEET

Participants: Donovan, Cooke, Tsidulko, Weller, Southall, Burdin, Nowacek, Tsarenko, V.Vladimirov

Joint Programme Component	**Distribution, Abundance and Health**

STEP 1 – INPUTS		
OBJECTIVES	As currently stated in Joint Programme	• Determination of temporal and spatial distribution of the gray whale population off north-eastern Sakhalin during the main feeding period. *Note: Companies undertook the Joint Programme to initially obtain an adequate knowledge base of the whales and their habitat, to assess real and perceived risks to the whales, and enable more effective management through science and risk-based decisions.*
	Comments on the Objective as stated	• The objective as stated makes no reference to 'abundance' which in fact was (and should continue to be) a key population parameter to be monitored. • The objective contains no indication as to why 'determination' required. For monitoring, this should involve (a) obtaining a baseline (which should include at least 2-3 'quiet' seasons); (b) detecting changes should they occur; and (c) understanding the drivers behind the temporal and spatial distribution. These may include 'natural' explanatory variables (both static e.g. bathymetry and dynamic e.g. SST, 'prey') and, especially in the case of change, 'human' factors (related to oil and gas but also other factors that may affect whales). • Any new objectives must include short- medium and long-term objectives and stress need for characterizing human activities and refer to both intra- and inter-seasonal. • New objectives need to be linked to the overall objectives and the other JPTF 'sub-groups' – see the final slide on the company presentation on the Sakhalin Energy/ENL Joint Programme refresh at JPTF-3 which provides suggestions for objectives and style that was produced by Donovan.
PUBLICATIONS TO DATE which have drawn on companies' data	Company Documents	• Annual Reports for topics for years 2002 – 2015. • Need consolidated full list of datasets available – this should be a full inventory/archive in an accessible electronic format – ideally a relational database including potential explanatory variables.
	Peer Reviewed Publications	Better for company to develop a full list that can be referred to. Obvious papers include: the Endangered Species Research special issue and Moscow State University Regional Studies in Marine Science paper (Kriksunov *et al.* 2016). Nowacek *et al.* (2013) paper with company and Panel authorship.
	Guidelines etc.	The various papers (e.g. Nowacek *et al.* 2013) on Guidelines drew on company data including those on distribution and abundance.

<table>
<tr><td rowspan="2">CONCLUSIONS</td><td>“Achievements” mentioned by Companies Apr-2016</td><td>Estimates of population size and population dynamics (population continues to increase).
JPTF-2 comment: listed achievements would be accorded greater credibility if supported by relevant publications, including, whenever possible, multiple studies that use different approaches to address a given question and studies that are integrative, synthetic or comparative.</td></tr>
<tr><td>List of actual “Conclusions” (peer reviewed)</td><td>NB: abundance estimates are based on the RWGP (formerly called Russia-US) team data
Population continues to increase (needs some discussion of population structure and possible implications) – no peer-reviewed publications.
Whether activities including seismic surveys have affected whales.
Some good analyses have been done and published but company conclusions often over simplify with little mention of difficulties to detect change with sufficient power given data.
Needs ‘full’ period analysis using all data from both programmes.</td></tr>
</table>

<table>
<tr><th colspan="3">STEP 2 – SHORT TERM WORK PROGRAMME</th></tr>
<tr><td rowspan="4">INPUTS TO SUB-OBJECTIVES</td><td>Draft overarching objectives (provided by companies at JPTF-2)</td><td>To determine any significant impact on Gray Whales off Sakhalin from company activities.
To describe (maintain) mitigations to avoid or minimise any such significant impacts.
To publish information produced by the programme for use by the wider industry/agencies.</td></tr>
<tr><td>Comments on above draft (if any)</td><td>There is a need to recognize that an individual company’s activities are very difficult if not impossible to consider/analyze in isolation from other companies’ activities and other general activities (e.g. fisheries, tourism, ship traffic etc) and natural changes.
Should consider the need for data sharing and joint analyses.
Need to clarify spatial and temporal scales (e.g. within season, across season).</td></tr>
<tr><td>Applicability of component for company activities
What drives the long term justification?</td><td>Without information on distribution and abundance will not be able to address overall objectives.</td></tr>
<tr><td>Potential draft sub-objectives which would be relevant for this Joint Programme component</td><td>Develop and populate full relational database of relevant data collected thus far and include as much synergistic environmental data as possible (also consider external data sources);
Evaluate the effort required to be able to detect changes in key abundance, distribution parameters (of a certain level) with a certain level of power and develop the long-term monitoring accordingly, taking into account explanatory variables;
Evaluate possibility of using acoustic monitoring of whales (as well as noise) in longer term.</td></tr>
</table>

<table>
<tr><td rowspan="9">POTENTIAL ANALYSES AND PUBLICATIONS</td><td colspan="5">Intention is to:
• consider peer-reviewed conclusions (to date) compared to the above sub-objectives,
• identify analysis gaps that need to be addressed to gain the most value from existing data (data gaps may exist but these are to be considered in Step 3);
• start to draft a programme to conduct identified analyses, which should be peer-reviewed and published (validity);
(Note that this excludes the routine annual Joint Programme reports by scientists submitted to the regulators.)</td></tr>
<tr><td>Tentative Topic of publication</td><td>Objective of analysis</td><td>Priority</td><td>Resources required</td><td>Lead(s)</td></tr>
<tr><td>Monitoring of distribution and abundance off Sakhalin: a power analysis</td><td>Examine the existing data and effort and evaluate the effort required to be able to detect changes in key abundance, distribution parameters (of a certain level) with a certain level of power and develop the long-term monitoring accordingly, taking into account explanatory variables</td><td>High</td><td>Existing data</td><td></td></tr>
<tr><td>Errors in estimating distance and potential effects on spatial analysis</td><td>Revisit the question of distance correction factors using the full dataset and examine sensitivity in spatial analyses. If necessary, suggest future methods to improve the situation</td><td>Medium/high</td><td>Distance data collected using various methods where known distances can be used (may be to other objects than whales</td><td></td></tr>
<tr><td>Movements (and habitat/areas) use of different classes of gray whales within and amongst seasons</td><td>Examine movements of known individuals (within and amongst seasons) from photo-identification/genetics/telemetry, taking into account age/sex and reproductive condition where data exist or can be inferred. Should data support it, consider possible reasons for different area use by different classes</td><td>High</td><td>Full sightings histories from all data holders.</td><td></td></tr>
<tr><td>Spatial analysis of monitoring data collected off Sakhalin Island up to 2016</td><td>Spatial modelling approaches to distribution/density data with an emphasis on possible changes due to human activities, including time lag effects</td><td>High</td><td>Full data set including biological and anthropogenic variables</td><td></td></tr>
<tr><td>Feasibility of using acoustic data to detect and monitor gray whales</td><td>Examine all acoustic data collected to determine whether gray whale sounds are audible – knowing yes or no both valuable outcomes although with different implications. If yes, consider potential value in monitoring</td><td>High</td><td>Use of automatic detection software to determine feasibility of detecting gray whales from existing data</td><td></td></tr>
<tr><td>Review of use of Piltun Lagoon area by gray whales</td><td>Existing data plus literature review (see Pomerleau proposal)</td><td>Medium-high</td><td></td><td></td></tr>
</table>

	Status of gray whales off Sakhalin	Population modelling using all photo-ID data (compare results using different datasets and also try censoring data to see effect of not 'surveying' every year to enable future planning)	High	Full photo-ID datasets, Justin's model	
	Comparison of distribution of photo-ID effort over time, by research groups etc	Examine data to provide insights on effort needed to obtain robust results and minimize disturbance	High	Photo-ID data (time, position, group) including effort used to get photographs	
OTHER ACTIVITIES / NOTES	Are there further actions recommended to: • improve broader sharing of outcomes/ learnings? • anything **else** that may need to be done to realize the results of the Joint Programme?	Present at specialist conferences. Increase data sharing opportunities and collaborative studies.			
FIELD PROGRAMME 2017-2018	Comments / proposals from the group regarding 2017-2018 for this component	• Co-ordinated effort – monitoring (at least land-based) as early as possible. • Investigate use of drones e.g. (a) for photo-ID – are they compatible with boat-based photos; (b) distribution e.g. check distance estimation, coverage (fly transects – endurance, optimum height, lenses. • If lower effort, focus on mother-calf pairs. • Link calves to mothers – compare photos and genetics.			

STEP 3 – LONG TERM			
<u>Start</u> to consider justifiable options for this JP component			Notes on Pros/Cons/Comments (Regulatory, Safety, Programme benefit, Cost, etc)
	Scope (general options regarding activities and methodologies)	All depends on results of existing datasets in combination with agreed objectives and priorities • Investigate possibility of acoustics. • Use of new technologies. • Power analyses to better assign limited effort. • Investigate implications for the International Finance Corporation IFC Performance Standard 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012).	
	Technological options (equipment, methodology)	• Drones – see previous sections. • Longer-term tags	Permits

		• Within season tags (noise, depth, behavior) • Photogrammetry? • Distance estimation	
	Field location(s)	Should consider obtaining information (maybe by collaborative studies) with places known or suspected to link with Sakhalin in summer	
	Periodicity of implementation (options)	Depends on results of suggested analyses	
	Duration and level of field effort (options relating to number of days, field personnel)		
	Other comments		

ANNEX E – BENTHOS AND ECOLOGY BREAKOUT GROUP WORKSHEET

Participants: Pomerleau, Reeves, Ivin, Donaghy, Linden, Samatov, Tsidulko, Scott

Joint Programme Component	**Ecology & Feeding**

STEP 1 – INPUTS		
OBJECTIVES	As currently stated in Joint Programme	• Characterization of the composition, distribution and abundance of the gray whale's food resources in the Piltun and Offshore feeding areas. *Note: Companies undertook the JP to initially obtain an adequate knowledge base of the whales and their habitat, to assess real and perceived risks to the whales, and enable more effective management through science and risk-based decisions.*
	Comments on the Objective as stated	• We assume that we know what the western gray whales' prey are (which might not be completely correct). We don't know if they actually feed on sand lance for instance. • The location of the current sampling is linked to observations (whales were observed in these areas) together with prior knowledge of gray whale feeding ecology, then the company decided to focus on these areas. • The driver of the benthic programme was the discovery of the offshore feeding area. The objective was to study the composition of benthic organisms. • Benthos vs epibenthos: the feeding ecology study proposed by Pomerleau (document WGWAP-17/25) will help decide if it's necessary to have both in the programme. An Agassiz trawl would be very effective at sampling epibenthic invertebrates such as mysids. In order to compare community characteristics among stations (by m^2), take into consideration bottom trawling time and vessel speed at each station to calculate towed area.
PUBLICATIONS TO DATE which have drawn on companies' data	Company Documents	• Annual Reports for topic from 2002 to 2015
	Peer Reviewed Publications	• Demenchenko *et al.* (2016) published a paper in PlosOne on life history of Ampeliscidae in the Offshore feeding area. • Articles by Fadeev linked to the annual report. Ivin mentioned a book chapter published before Fadeev's death. Check also his presentations at conferences. • Scott provided a list of publications on gray whales, many of them not directly related to the Sakhalin area (i.e. from studies in Alaska, California etc.). Sixteen of the list of 271 documents listed concern aspects of feeding and benthos and and only three are related explicitly to Joint Programme work. Not included in this list is the paper by Demenchenko *et al.* (2016) in PlosOne on the life history of Ampeliscidae in the Offshore feeding area and another publication entitled "Study of associativity between the spatial distributions of gray whales and their prey species offshore north-east coast of Sakhalin Island" by Kriksunov *et al.* (2016). • The complete time series of benthic data since 2002 has not been published or analyzed using detailed statistical analyses. • Check presentations made at conferences (e.g. Holarctic biennial) and papers presented to e.g. IWC Scientific Committee meetings. • Ivin indicated that he has plans to publish on existing data and indicated that collaboration is possible. No details were provided concerning scope, timeline etc.
	Guidelines etc	• Samatov referred to problems of sampling in shallow water such as the safety of divers. More discussion of this matter is needed.

CONCLUSIONS	CONTRIBUTIONS mentioned by Companies Apr-2016	• Timing and duration of the main feeding period has been determined. Whales arrive in June (or somewhat earlier) and continue to feed into October and possibly later. • Two distinct primary feeding areas off Sakhalin Island have been identified and characterized: Piltun (near-shore) and Offshore. • A secondary feeding area has been identified off southern Kamchatka Peninsula. The Joing Programme has made a useful contribution to documentation of this feeding area but Kamchatka is regarded by the companies as outside the scope of their activities and therefore they are not prepared to invest in research or monitoring there. • Good progress has been made to identify and assess potential benthic prey sources (location, type and abundance). More work is needed to ascertain which species are actually consumed by the Sakhalin gray whales – note that both mysids and sandlance are present in the area, and they may be important alternative prey in addition to amphipods. This will require detailed dietary studies using biochemical tracers in archived (or otherwise available, e.g. newly collected) gray whale skin biopsies and a large number of potential prey species (see Pomerleau documents WGWAP-17/25 and JPTF-3/1). • Physical condition: Some of the whales that arrive on the feeding grounds are in poor body condition, but a large proportion of these whales regain condition over the summer. There is no current evidence (based on analyses of photographic data) that the observed variability differs from what would be expected under natural conditions, i.e. the observed changes have been attributed to natural variability. However, a comprehensive analysis of the entire photo-id dataset, preferably including both the National Scientific Centre for Marine Biology (formerly called IBM) and RGWP (formerly called Russia-US programme) data, is needed to confirm this assumption of natural variability. There was period from around 2006-2008 when concern arose that the whales were not recovering properly during the feeding season, and an environmental problem of some kind was suspected. A definitive analysis of the photographic data in-hand would improve understanding. *JPTF-2 comment: listed achievements would be accorded greater credibility if supported by relevant publications, including, whenever possible, multiple studies that use different approaches to address a given question and studies that are integrative, synthetic or comparative.*

	List of actual "Conclusions" (peer reviewed)	• Not many 'peer-reviewed' conclusions. • The whales return annually on a relatively predictable schedule and in increasing numbers. North eastern Sakhalin continues to be a major (primary) feeding area for gray whales in the western North Pacific despite the declining trend in amphipod biomass in the near-shore feeding area since 2002. **Other points discussed:** • For the future, in terms of methodology: Should sampling shift to, or at least include, shallow-water areas where many whales are seen (including most mother-calf pairs)? There is currently at least a partial mismatch between where the Sakhalin Energy/ENL Joint Programme counts the whales and where it samples the benthos. A company safety policy is said to preclude benthic sampling in shallow water. The recommended approach from a purely scientific perspective would be to use small boats or divers to sample the shallow waters near shore. The vessel that is currently used can sample only in waters deeper than 10 m. • Samatov stated that the benthic communities at depths of more than 10 m and at 5 m are the same. However, the work showing that was conducted before 2010 and therefore we don't know if this is still the case, especially given the decreasing trend in amphipod biomass in waters 11-15 m deep. • It is suggested that side-scan sonar be used to map the bottom and determine which areas are and are not being disturbed by foraging gray whales (the sonar will pick up the feeding pits). [A caveat is that feeding pits indicate feeding attempts but not necessarily feeding success.] Side-scan sonar will locate and quantify the benthic feeding record of gray whales in each feeding area. A side-scan sonar should be added to the programme to map and measure the feeding pits made by gray whales. This method would assess the intensity of foraging in the two known feeding areas and determine whether and how much gray whales forage in other areas on the Sakhalin shelf that may be affected by human activities. This method would allow a more rigorous comparative assessment of prey densities (see document WGWAP-17/25). **Other comments:** • The companies report that they have sent out expeditions to search for other aggregations of gray whales in the Sea of Okhotsk but have found none. Therefore, this effort has stopped. Panel members noted that these expeditions took place many years ago (> a decade?) and also that the coverage was far from complete. • Control site: This would serve the purpose of identifying changes in community composition including changes in biomass or abundance of potential gray whale prey species, whether a function of 'natural' change (e.g. climate, ocean conditions) or human impacts (e.g. disturbance, pollution). Again, see document WGWAP-17/25.

<table>
<tr><th colspan="3">STEP 2 – SHORT TERM WORK PROGRAMME (2017-2018)</th></tr>
<tr><td rowspan="4">INPUTS TO SUB-OBJECTIVES</td><td>Draft overarching objectives (provided by companies at JPTF-2)</td><td>1. To determine any significant impact on Gray Whales off Sakhalin from company activities.
2. To describe (maintain) mitigations to avoid or minimise any such significant impacts.
3. To publish information produced by the programme for use by the wider industry/agencies.</td></tr>
<tr><td>Comments on above draft (if any)</td><td>These should focus on 2017-2018. After that, it may be decided that different questions should be addressed.

QUESTIONS:
• On sub-objective 1. Is the current benthic sampling approach the best way to determine this?
  – Continued benthic monitoring will maintain the existing time series which contains valuable information from a long-term monitoring perspective.
• Can the area be productive enough for an increasing number of whales?
  – This could be assessed using the updated sampling programme presented by Pomerleau (document JPTF-3/1) which would provide information on the % feeding area disturbed (fresh feeding pits) combined with other available information including number of gray whales, size of gray whale feeding grounds (km^2) (Piltun and Offshore), number of days spent there, mean concentrations of prey (e.g., amphipods), main daily food consumption etc
• What type of benthic sampling can add to our knowledge?
  – Benthic sampling stations based on utilization (high vs. low utilization) preferably using side-scan sonar along with control stations to assess environmental variability. This benthic sampling plan would measure the spatial variability and, with the time series, temporal variability. Such an updated sampling programme would provide a better assessment of prey density.</td></tr>
<tr><td>Applicability of component for company activities
What drives the long term justification?</td><td>Need to be prepared to explain changes in the area (including drivers that are not linked to the company's operations) thus the need for control sites.</td></tr>
<tr><td>Potential draft sub-objectives which would be relevant for this Joint Programme component</td><td>1. We still don't know the role of Piltun lagoon; nor do we have baseline information on prey community ecology. Important to <u>improve understanding of the lagoon's role in driving high productivity of near-shore feeding area (see document WGWAP-17/26);</u>
2. <u>Improve understanding of the diet of the gray whales foraging near the Piltun lagoon</u> <u>(document WGWAP-17/25).</u> To understand what affects the Piltun feeding ground (right now there is evidence of a significant decrease in amphipod density which could be linked to an increase in the number of whales using this ground, and/or to one or more other factors). It was noted that the Amur River outflow likely plays an important role.</td></tr>
</table>

<table>
<tr><td rowspan="5">POTENTIAL ANALYSES AND PUBLICATIONS</td><td colspan="5">Intention is to:
• consider peer-reviewed conclusions (to date) compared to the above sub-objectives,
• identify analysis gaps that need to be addressed to gain the most value from existing data (data gaps may exist but these are to be considered in Step 3),
• start to draft a programme to conduct identified analyses, which should be peer-reviewed and published (validity).
(Note that this excludes the routine annual JP reports by scientists submitted to regulators.)</td></tr>
<tr><td>Tentative Topic of publication</td><td>Objective of analysis</td><td>Priority</td><td>Resources required</td><td>Lead(s)</td></tr>
<tr><td>Publication of the time series of the benthic data</td><td>Obtain a clear idea of the trend of the benthos at the 2 sites (Piltun and Offshore feeding areas). Spatial and temporal variability</td><td>High</td><td>Note: datasets will have to be cleaned. All the data are available at the Institute in Vladivostok

Statistical analysis: As indicated in document JPTF-3/1, collaboration to support this has been offered. The Institute can start the analysis and if needed, Pomerleau can step in to assist</td><td>Joint Programme</td></tr>
<tr><td>Feeding ecology study of the gray whales off Sakhalin</td><td>Assess diet by conducting a detailed feeding ecology study of Sakhalin gray whales using biochemical tracers in gray whale skin (Stable Isotopes -SI) and blubber samples (Fatty Acids - FA) and in a wide range of potential prey species</td><td>2018</td><td>Statistical analyses (SI mixing model), laboratory analyses of SI and FA</td><td></td></tr>
<tr><td>Ecology of Piltun lagoon</td><td>Estimate the contribution of Piltun Lagoon-derived production to invertebrates including various whale prey species (e.g., amphipods) in two feeding areas using mass balance isotope mixing models for each sampling site inside the Lagoon and along 2 transects</td><td>2018</td><td>Need to collect samples in Piltun Lagoon and along two transects: Nearshore and Offshore.</td><td></td></tr>
</table>

OTHER ACTIVITIES / NOTES	Are there further actions recommended to: • improve broader sharing of outcomes/ learnings? • anything **else** that may need to be done to realize the results of the Joint Programme?	
FIELD PROGRAMME 2017-2018	Comments / proposals from the group regarding 2017-2018 for this component	See Pomerleau's document JPTF-3/1 for ways to improve the current programme. Also see Pomerleau's document WGWAP-17/26 on how to carry out Piltun lagoon sampling and analysis.

STEP 3 – LONG TERM			
<u>Start</u> to consider justifiable options for this JP component			Notes on Pros/Cons/Comments (Regulatory, Safety, Programme benefit, Cost, etc.)
	Scope (general options regarding activities and methodologies)	The long term was not discussed.	
	Technological options (equipment, methodology)		
	Field location(s)		
	Periodicity of implementation (options)		
	Duration and level of field effort (options relating to number of days, field personnel)		

ANNEX F – BEHAVIOUR AND DISTURBANCE BREAKOUT GROUP WORKSHEET

Participants: Southall, Nowacek, Racca, Vedenev, Reeves, Lock, Blonk, Myklestad, Samatov

Joint Programme Component	**Behavior & Disturbance**

<table>
<tr><th colspan="3">STEP 1 – INPUTS</th></tr>
<tr><td rowspan="2">OBJECTIVES</td><td>As currently stated in Joint Programme</td><td>Monitoring of background and anthropogenic noise within and along the borders of the primary feeding areas of gray whales, and collection of bathymetric and hydrologic data for coast waters of NE Sakhalin.
Note: Companies undertook the JP to initially obtain an adequate knowledge base of the whales and their habitat, to assess real and perceived risks to the whales, and enable more effective management through science and risk-based decisions.</td></tr>
<tr><td>Comments on the Objective as stated</td><td>It was noted at the outset that the current wording is an “activity” rather than an objective. A potential revised objective is: “Obtain an understanding of how gray whales use the Sakhalin area and of factors affecting their ability to carry out activities important to their long-term health and productivity.”

Additional considerations for objectives (not necessarily in priority order):
The stated objective is limited to noise. What about other forms of disturbance/sources of impact? Looking forward, do we need to expand beyond noise?
Need to discretize within objectives (a) understanding of behavior per se and (b) understanding of changes to behavior attributable to disturbance (and identification of associated mitigation measures). These are the two overarching questions.
Need to separate within the objectives, the short- and long-term questions. That is, need to describe discrete types of behavior in general vs discrete types of behavior within feeding periods: these are very different questions. Important to keep them separate rather than mixing.
Need to ensure that the objective addresses the question of interest: why are you doing this?
A needed objective is to develop and implement some direct way to measure the effectiveness or ‘success’ of feeding.
Need for control station / data as the lack of control data will be a big challenge when attempting to publish any results.
Comment: The objective is too restrictive in terms of the physical area specified for monitoring ambient noise. As mentioned many times in the Noise Task Force (NTF) and Panel meetings, and below, evaluating how much the overall ambient noise is elevated above natural ambient levels requires an actual control site that is well outside the heavily industrialized areas within and immediately around the feeding areas.
Need to encompass within objectives or perhaps more appropriately in sub-objectives specifying methods, the potential to monitor behavior and changes in behavior using different types of analysis of existing acoustic data (e.g., more focus on analysis of whale vocalizations) and/or visual and tagging methods.</td></tr>
<tr><td>PUBLICATIONS TO DATE</td><td>Company Documents</td><td>Annual Acoustic Reports and archived data for years 2002-2015
ENL Reports (as available)</td></tr>
</table>

<table>
<tr><td>which have drawn on companies' data</td><td>Peer Reviewed Publications</td><td>A detailed list of publications and reports provided after the JPTF-3 meeting should serve as a good basis for this accounting. It was noted that this list will be checked, amended and updated regularly as an important resource for everyone involved.

Notable references identified:
Recent papers by Gailey, Racca, Muir, Bröeker (Endangered Species Research);
Environmental Monitoring and Assessment special issue;
Racca highlighted references to Rutenko technical reports in Russian. Some of them are methodological, others are looking at propagation conditions, others focus on exposure. Racca offered to compile and provide if requested;
Cork meeting paper (reasonable criteria / metrics) and the one about modelling and estimation;
Weller on distribution and benthos (not specifically behaviour but still relevant especially given comments above regarding integrated studies of feeding and consequences of impacts on feeding behavior).</td></tr>
<tr><td></td><td>Guidelines etc</td><td>Finneran 2016 Navy tech report that is basis of National Oceanic and Atmospheric Administration (NOAA) guidelines;
New noise exposure criteria being developed;
Nowacek et al. (2013) paper and 2016 IUCN document on responsible practices for seismic surveys.</td></tr>
<tr><td>CONCLUSIONS</td><td>"Achievements" mentioned by Companies Apr-2016</td><td>JPTF-2 comment: listed achievements would be accorded greater credibility if supported by relevant publications, including, whenever possible, multiple studies that use different approaches to address a given question and studies that are integrative, synthetic or comparative.</td></tr>
<tr><td></td><td>List of actual "Conclusions" (peer reviewed)</td><td>Additional considerations/suggested modifications:
There should be clear recognition within the achievements/conclusions of the difference between animals returning to historical feeding grounds despite high levels of human activity (suggesting that mitigation efforts have been generally successful – although it was noted that the population growth rate remains lower than would be expected for similar systems) does not necessarily support the conclusion that there are no negative impacts or reduced feeding success (which is not being measured);
There are challenges in measuring "natural" behavior and "baseline" ambient noise because of the extensive and near-constant presence of industrial activity of different kinds at the very time when the whales are present on their feeding grounds. All conclusions about behavior and disturbance will have to be considered within this context;
Measurements of specific anthropogenic noise events using acoustic monitoring has been precise and extensive; this is a significant achievement;
Major progress has been made in the ability to validate acoustic modeling and accurately predict levels between monitoring stations;
There has been good progress in statistical studies of potential correlation of sound exposure with broader/group responses of whales (e.g., through multivariate analysis - MVAs), including with both acoustic and non-acoustic (e.g., visual sampling) methods;
Mitigation of activities has been successful in limiting the noise exposure of the animals to levels that don't appear (given the resolution that may be achieved) to have major effects on behavior (e.g., complete habitat abandonment)</td></tr>
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		• There are major limiting factors in evaluating chronic ambient noise, including recent failures in the "control site" recorder in addition to the fact that this no longer remains a control site because it is well within the area affected by high levels of industrial activity; • With assistance of expert scientific and technical groups, rigorous protection measures have been developed and implemented during human activities known to generate high levels of noise, thereby minimizing the risk to gray whales. These protection measures have been made available for the wider Oil&Gas industry through report sharing, presentations and publications.

STEP 2 – SHORT TERM WORK PROGRAM		
INPUTS TO SUB-OBJECTIVES	**Draft overarching objectives** (provided by companies at JPTF-2)	*1. To determine any significant impact on Gray Whales off Sakhalin from company activities.* *2. To describe (maintain) mitigations to avoid or minimise any such significant impacts.* *3. To publish information produced by the programme for use by the wider industry/agencies.*
	Comments on above draft (if any)	
	Applicability of component for company activities What drives the long term justification?	
	Potential draft **sub-objectives** which would be relevant for this Joint Programme component	1. **Measure undisturbed behavior (including feeding behavior), to the extent possible given the level of industrial activity in and near the feeding areas.** [Some comments and questions regarding this: What kinds of analyses could be done? Does the Joint Programme have data on behavior when there are no noise-generating human activities? It would be very useful to be able to characterize "normal" behavior (high-resolution kinematic behavior). There is a time series of high-resolution behavior data from visual observations between 2001 and 2010. And up to 2007, 4 months of observation. These data could be used to characterize normal behavior: feeding, travelling etc. – but there is still a need to collect new data and cross-check with data on prey density. There is also context dependency in behavior (for example diving vs feeding pit size). Compare years with high abundance of prey vs low abundance of prey. No benthos data were available for the period in 2010 when the Sakhalin Energy seismic survey took place, thus precluding their use in the MVAs. Without such data, you can't address some key questions, e.g. whether certain changes in behavior are due to spatial patterns of prey availability. Feeding behavior needs to be analyzed in relation to the simultaneous (or as near to as possible) spatial distribution of pray. Can this kind of analysis be done for years when the requisite data are available? In 2005 and 2006, both construction years, there were several attempts to combine the data but the experiment failed. 2. **Measure disturbed behavior, with particular focus on feeding behavior, with sufficient knowledge of ALL noise exposure contextual variables to evaluate exposure-response.** 3. **Measure/evaluate effectiveness of mitigation measures.** While not a separate sub-objective, it is noted that all three of these sub-objectives are most likely to be achieved if they are assigned a high priority and it is considered standard practice to use publishable statistical analyses to support conclusions.

POTENTIAL ANALYSES AND PUBLICATIONS

Intention is to:

- consider peer-reviewed conclusions (to date) compared to the above sub-objectives,
- identify analysis gaps that need to be addressed to gain the most value from existing data (data gaps may exist but these are to be considered in Step 3),
- start to draft a programme to conduct identified analyses, which should be peer-reviewed and published (validity).

(Note that this excludes the routine annual Joint Programme reports by scientists submitted to regulators.)

Tentative Topic of publication	Objective of analysis	Priority	Resources required	Lead(s)
Baseline behavior (use 2005-2006 data)	Additional analysis of seasons with relatively little known acoustic disturbance	Moderate		
Direct measurements of feeding success in relation to prey distribution	• Integrated analysis of distribution and behavior (especially feeding) with sufficiently detailed measurements of prey distribution	High		
Individual analysis of fine-scale behavior and response	• Need to develop and apply the ability to measure feeding success and potential changes due to disturbance • Identify context-dependencies of behavioral response • This will require more sophisticated and fine-scale tools than have been applied to date	High	– New monitoring and data collection methods (such as tags, drones, more advanced PAM methods)	
Broad-scale analyses of disturbance	• Most of the focus has appropriately been on broad-scale analyses that have been published (e.g., Muir paper). Similar analyses and publications should be conducted	High	Underway – just emphasizing need for this and separation of short- and long-term behavior	
Potential indicators of stress responses to noise	• Likely little additional (biopsy samples) that can be done with data available but this should be evaluated • Mostly related to potential additional data collection	Moderate (long-term)		

OTHER ACTIVITIES / NOTES	Are there further actions recommended to: • improve broader sharing of outcomes/ learnings? • anything else that may need to be done to realize the results of the Joint Programme? •	• Evaluate behavioral monitoring in 2001-2009 focusing on relatively “quiet” years; consider 2002 Yazvenko *et al.* aerial surveys in relation to behavioral observations of feeding attempts. • Feeding success needs to be directly measured in disturbed and undisturbed conditions – this would include sufficiently detailed measurements of individual behavior and temporal/spatial distribution of prey within feeding areas. This was apparently attempted in 2005-06 but the analysis was not successful. • Same comment as in other groups in that there is a pressing need for an integrated meta-data synthesis of available monitoring data and spatial/temporal information on known disturbance events.
FIELD PROGRAMME 2017-2018	Comments / proposals from the group regarding 2017-2018 for this component	Some considerations (not in priority order): • Development of an integrated timeline and map of known/planned major activities ahead of field seasons; compare this post-season with actual times and locations of events and analyze this (for all activities) relative to gray whale distribution; • Establishment of an appropriate noise control station for passive acoustics; • High-resolution measurements of individual behavior with digital acoustic recording tags (DTAGs) or medium-duration archival tags – important that this occur in periods without noise and that this be coordinated with high-resolution measurements of prey as a key component of characterizing behavior in MVAs; • Effort to more systematically measure and integrate into acoustic analyses measurements of gray whale and killer whale vocalizations • Integration of infrared camera systems into shore observation stations • Potentially expanded use of drones, but with careful preparation to use these to collect scientifically useful data; • 2017 programme needs to provide a platform for the testing of logistics etc. for the 2018 seismic programme (see NTF-11 report). There should be a continued priority (as done in 2016) to include monitoring as early in the season as possible; • Potential progress in measuring stress hormones in blubber from biopsy samples – this may more likely be flagged for the long term.

STEP 3 – LONG TERM			
<u>Start</u> to consider justifiable options for this JP component			Notes on Pros/Cons/Comments (Regulatory, Safety, Programme benefit, Cost, etc)
	Scope (general options regarding activities and methodologies)	• Long-term effort to make progress on what are separate short- and longer-term measurements of behavior and disturbance. • Consider quasi-experimental or even experimental approaches to planned/known events (structure before-during-after aspects of monitoring relative to structure and success of field monitoring).	
	Technological options (equipment, methodology)	Many of things identified to start in 2017-18 will require longer-term development and application • Increasingly sophisticated sensor systems (tags, drones). • Stress hormone responses from biopsy samples. • More advanced use of acoustics monitoring stations to identify and characterize marine mammal vocalizations. • Integration of whale distribution/behavior with prey sampling data on relatively fine scales; potentially consider benthos suction sampling methods (Jim Darling). • Sustained passive acoustic monitoring (PAM) to evaluate trends in ambient noise using appropriate control stations to evaluate.	
	Field location(s)		
	Periodicity of implementation (options)		
	Duration and level of field effort (options relating to number of days, field personnel)		
	Other comments	• Consider non-noise-related disturbance	