WESTERN GRAY WHALE ADVISORY PANEL **WGWAP-8**

8th Meeting **16-18 April 2010**

Geneva, Switzerland

REPORT OF THE WESTERN GRAY WHALE ADVISORY PANEL AT ITS EIGHTH MEETING

CONVENED BY THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE

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LIST OF ACRONYMS USED

AIS	**= Automated Information System**
AUAR	**= Automated Underwater Acoustic Recorder**
DMNG	**= DalMorNefteGeophizika**
EIA	**= Environmental Impact Assessment**
EMTF	**= Environmental Monitoring Task Force**
ENL	**= Exxon Neftegas Limited**
FEB RAS	**= Far East Branch, Russian Academy of Sciences**
IBM	**= Institute of Marine Biology**
IUCN	**= International Union for Conservation of Nature**
IWC	**= International Whaling Commission**
IWG	**= Interdepartmental Working Group on Western Gray Whale Conservation of Russian Federation**
MMO	**= Marine Mammal Observer**
MMPP	**= Marine Mammal Protection Plan**
MNR	**= Ministry of Natural Resources of Russian Federation**
NGO	**= Non-Governmental Organization**
RHIB	**= Rigid Hull Inflatable Boat**
SSG	**= IWC-WGWAP Scientific Steering Group**
SSTF	**= Seismic Survey Task Force**
WGWAP	**= Western Gray Whale Advisory Panel**

1 OPENING

The eighth meeting of the Western Gray Whale Advisory Panel (WGWAP-8) was held at Hotel Warwick, Geneva, Switzerland, from 16-18 April 2010 under the chairmanship of R.R. Reeves.

Panel members present are listed in Annex 1. Greg Donovan had made plans to attend the last two days of the meeting (after an IWC meeting in Washington, D.C. immediately beforehand) but he did not make it as his flight was cancelled due to volcano ash. Brian Dicks was able to attend only the last two days of the meeting because his flight too was cancelled and he had to drive to Geneva from the UK. Most other participants were also affected, in different ways and to different degrees, by the travel chaos following the eruption of Eyjafjallajökull volcano in Iceland starting on 14 April. Deliberations during the meeting itself were also disrupted as participants scrambled to make alternative travel plans to avoid becoming stranded in Geneva.

In addition to the Panel members, Brandon Southall attended the meeting of the Seismic Survey Task Force immediately before WGWAP-8 and, at the request of the Panel, stayed on to provide technical support during the main meeting.

Representatives of the following organisations also attended the main meeting (see Annex 1):

AEA Group	Standard Chartered Bank, UK
Credit Suisse	Pacific Environment
International Union for Conservation of Nature (IUCN)	Sakhalin Energy Investment Company Ltd
Ministry of Natural Resources and Environment of Russian Federation	WWF International
	WWF Russia

Rinat Gizatulin of the Ministry of Natural Resources, chairman of the Russian inter-departmental working group on conservation of western gray whales, was present and gave a presentation on Day 1 of the meeting.

Finn Larsen and Béatrice Riché of IUCN facilitated meeting preparations and logistics (which became exceptionally challenging because of the travel difficulties caused by the volcano). Sarah Humphrey served as meeting rapporteur. The efforts of Larsen, Riché and Humphrey in support of the Panel's work are greatly appreciated.

1.1 Introduction and logistics

The plenary meeting of the Panel followed a meeting of the Seismic Survey Task Force held at the same venue on 13-14 April.

1.2 Adoption of agenda

The draft agenda had to be reorganised somewhat to accommodate the fact that some participants arrived late or left early. This report is organised according to the agenda as drafted prior to the meeting (Annex 2) rather than the exact order by which material was presented and discussed.

1.3 Documents

The list of documents, including slide presentations, is given in Annex 3. Those designated as public are available at www.iucn.wgwap.

Contrary to the past, the reports on Sakhalin Energy's 2009 work programme were presented as a single 2-volume set with chapters by topic.

Reeves thanked Sakhalin Energy and the NGOs who submitted documents for consideration at WGWAP-8.

1.4 Reporting procedures and timelines

As for previous WGWAP meetings, the Panel anticipated that its draft report would be ready for Sakhalin Energy review approximately 2 weeks following the meeting and that the final report would be ready for posting on the IUCN website before the end of May. However, on this occasion the schedule could not be met because of the travel delays and disruptions experienced by key contributors.

1.5 Update on status of recommendations

Reeves recalled the long cumulative list of recommendations made by the various western gray whale panels beginning in 2005. This list, organised in batches by topic, is available at www.iucn.wgwap. The intention is that all recommendations will be assigned a status in terms of whether they have or have not been implemented, and that status designations will be updated regularly. The only batch of recommendations not up-to-date at the time of WGWAP-8 was that concerning environmental monitoring, and Reeves promised to work with VanBlaricom to ensure this batch is completed soon.

Bell commented that substantial progress had been made, thanks to the efforts by all involved parties (IUCN, Sakhalin Energy and the Panel), towards developing and maintaining a coherent, transparent system for tracking recommendations.

2 RESULTS OF 2009 DISTRIBUTION, BEHAVIOUR, NOISE AND BENTHIC MONITORING

2.1 Recap of Sakhalin Energy/ENL 2009 distribution monitoring programme

Muir provided an overview of information collected during the joint Sakhalin Energy/ENL 2009 distribution surveys. Much of this information had already been presented, in nearly complete form, at WGWAP-7. Since that time, however, final editing and quality assurance of the data had been completed and the results finalised (see WGWAP-8/10, 8/11).

Overall, the 2009 effort mirrored that of previous years in both scope and timing (WGWAP-8/10). Poor weather, on shore and offshore, greatly hindered the 2009 vessel and shore-based research efforts. Despite the unfavourable conditions, the results presented indicate that the relative abundance of whales off Sakhalin in 2009 was similar to that observed in years prior to 2008, when notably low numbers were documented (see the report of WGWAP-6). Whale distribution in 2009 was characterised by few individuals observed at the most northern shore stations (sites 1 and 2). In contrast, high densities of whales were observed off the mouth of Piltun Lagoon and, to a lesser extent, off the southern part of the survey area. This same pattern of distribution was documented by the shore-based behaviour teams (see WGWAP-8/11) and both Muir and Gailey noted that it appeared similar to the overall pattern observed in 2008.

In further discussion of the 2009 distribution results, the Panel highlighted several features of the data that are of potential significance, including:

(1) The low number of whales observed in the northern parts of the study area. While acknowledging the hypothesis put forth by Fadeev that this apparent change in whale distribution could reflect reduced availability of sand lance in those areas (WGWAP-8/11), the Panel considers this matter unresolved.

(2) The complete absence of whale observations at stations 10 and 11 in September 2009. This seemingly anomalous pattern has not been explained but the Panel considers it worthy of note and hope that future analyses, including integration of benthic and acoustic data with distribution data, will provide some insight.

(3) The unusual observations of relatively high numbers of gray whales off-transect to the east of the offshore feeding area during systematic vessel surveys. Although an extension of the standard transect grid to cover the area of these sightings had been planned for 2009, poor weather prevented the additional lines from being covered. Photo-ID and benthic sampling in this area did take place however, and the Panel again stressed the value of analytical assessments of observed distribution patterns as a function of prey availability. Such analyses are needed to understand why certain areas are the focus of whale feeding activity on an annual basis while feeding in other areas seems to be episodic or ephemeral.

2.2 Results from 2009 observational effort by non-industry groups

Tsidulko had summarised the results of the photo-ID work by the Russia-US team in 2009 at WGWAP-7. Particular interest had been expressed then in the distribution of whales in the study area that year and how it compared with the previous year. Therefore, at this meeting Tsidulko summarised the Russia-US team's shore-based distribution information. The methods and survey grid have been consistent and unchanged since 1997. In 2009, the field season was longer than in 2008 – 80 vs 61 days – owing to the earlier arrival of the team in 2009 (June).

Whale numbers in July 2008 were higher than in July 2009 but in both years, numbers increased towards the end of August. Numbers in August were higher in 2009, which is consistent with the findings by the industry-sponsored teams. There was an inconclusive discussion about trends in whale numbers in the Russia-US team's study area in relation to the pile-driving activities by ENL, which occurred before 4 July and after 10 September in 2008 (according to Bell) and throughout the open-water season in 2009 (again according to Bell).

Tsidulko reported that relatively large numbers of whales were observed in 2009 offshore beyond the Russia-US team's survey grid, especially in June and July. He was unable to determine exact positions and therefore could not comment on depths at those sighting locations although the farthest offshore part of the study area has depths of approximately 18-22 m. When asked about the timing of the whales' first appearance, Tsidulko stated that the observation teams rarely arrive by early June, but in 2005, when they reached the lighthouse in June, the whales appeared immediately after the ice left.

In response to a question about Piltun Lagoon, Tsidulko confirmed that gray whales very rarely reach the inner part of the connecting channel between the lagoon and the ocean but they do not enter the lagoon itself.

2.3 Results from Sakhalin Energy/ENL 2009 whale behaviour monitoring programme

Gailey provided an overview of the results of the joint Sakhalin Energy/ENL behaviour monitoring effort in 2009 (WGWAP-8/11). Overall, the 2009 effort mirrored that of previous years in both scope and timing (WGWAP-8/10). That being said, the 2009 sampling protocol was modified somewhat to accommodate a request for increased monitoring while pile-driving work was being conducted by ENL near behaviour Station 07 (as discussed below).

Whale movement patterns, including distance from shore, and respiration parameters observed in 2009 were similar to previous years (except 2002). Scan sampling gave results with regard to relative abundance and whale distribution broadly similar to those recorded by the distribution teams. In general, the numbers of whales observed in 2009 were higher than the exceptionally low numbers observed in 2008 but similar to the numbers in other previous years (2002-2007). Few whales and little feeding behaviour was observed at the most northern shore stations while relatively high densities of feeding whales were observed at the central and southern shore stations, particularly off the mouth of Piltun Lagoon.

Onshore pile-driving by ENL occurred near behaviour Station 07 (53°07'30.0"N, 143°16'12.3"E; see Fig. 1 in WGWAP-8/10) beginning in June and ending in September. The specific periods and schedule of pile-driving activity were not available to the Panel for review, however. A preliminary examination of the potential impacts of this activity on whale behaviour was presented in WGWAP-

8/11. In summary, a suite of analyses were conducted that compared the behaviour, movements and distribution of whales observed closest to the activity (at Station 07) to that of whales observed elsewhere in the overall study area. Distance from shore was the only variable found to be significantly different: the whales seen at Station 07 were significantly closer to shore. None of the differences in other movement and respiration response indicators were statistically significant. The Panel emphasised that these preliminary results must be viewed with caution until more sophisticated multivariate analyses that incorporate consideration of acoustic measurements, other anthropogenic activities and environmental variability are conducted. For example, the possible influence of a seismic survey conducted in 2009 to the north of the Piltun feeding area has not been accounted for in the distribution and behaviour analyses thus far.

Two issues raised in WGWAP-8/11 require further attention:

(1) The possibility that sound propagation near Station 07 caused pile-driving noise to be higher further from shore and, in turn, resulted in whales moving closer to shore at that site.

(2) The possibility that whales were displaced from the area of pile-driving, if even only temporarily. The rationale for this point is that between 6-18 August the mean and maximum daily abundance off Station 07 was particularly low compared to periods before and after that interval. The station 10 km to the south of Station 07 (named '2nd Station'; see Fig. 1 in WGWAP-8/10) also had a decrease in abundance during the same 6-18 August interval while other stations further to the south (*i.e.* '1st Station' and 'South Station') had increases in abundance during that time.

Further, mother-calf pairs, which are expected to be most sensitive to noise, may have been excluded from the area closest to the pile-driving. To address this, the Panel **recommends** that a more finite analysis be undertaken to examine the presence/absence of mother-calf pairs off Station 07 in comparison to the other sampling stations. If feasible (*e.g.* adequate sample size), this analysis should also consider movements and respiration patterns of mother-calf pairs to determine if their behavioural patterns differed as a function of proximity to pile-driving. Such an analysis does not require access to detailed acoustic data. Rather, periods of 'exposure' and 'non-exposure' can be defined for the purposes of the analysis simply as periods when pile-driving was and was not underway according to published information (*e.g.* IWC 2010, p. 156).

In a broader discussion of this topic, Sakhalin Energy noted that ENL was working on a detailed analysis of the potential effects of the 2008 and 2009 pile-driving activities, including incorporation of acoustic measurements with distribution and behaviour data. The Panel acknowledged that the 2008 and 2009 pile driving had been conducted by ENL, not Sakhalin Energy, and expressed its appreciation to Gailey and colleagues for providing the preliminary analysis for review. At the same time, the Panel again highlighted the great importance of tracking the activities of other operators on the Sakhalin Shelf and incorporating available information and data pertaining to those activities into any analysis conducted. Failure to control for potentially confounding variables compromises interpretations of so-called baseline or undisturbed behaviour and in turn calls into question the validity of conclusions concerning behavioural responses to disturbance.

The Panel again expressed its disappointment that the acoustic data collected annually by the joint Sakhalin Energy/ENL monitoring programme had not been fully integrated with the behaviour and distribution data sets. The Panel **recommends** that Sakhalin Energy establish such integration – of acoustic, behaviour and distribution data as well as benthic data – as a priority action item in its work programme.

As in previous years, the joint programme's behaviour monitoring team conducted shore-based photo-identification work in addition to following its standard data collection protocol. The number of whales identified in 2009 (N = 65) was similar to previous years (although higher than 2008 when only 29 whales were identified). Of the 65 whales identified in 2009, seven were recorded as calves (four of these calves were still with their respective mothers). The shore-based photo-identification data have been included in the IBM catalogue in previous years but for the first time in 2009 the shore-based team photo-identified whales not photo-identified by the vessel-based team in the same season (see item 5, below). As always, the Panel welcomed these results and encouraged the continued integration of shore- and boat-based photo-identification data.

The Panel noted the excellent work of the behaviour team and the importance of the time-series of data they have collected. For this reason, it is hoped that Sakhalin Energy/ENL will make every effort to ensure continuation of this monitoring programme in 2010 and beyond.

2.4 Results from Sakhalin Energy/ENL 2009 acoustic monitoring programme

Sakhalin Energy presented some of the results of the extensive 2009 acoustics programme, which were acknowledged as being wholly the outcome of the work by A. Rutenko and his scientific team at the Pacific Oceanological Institute, FEB RAS, Vladivostok (WGWAP-8/15). The presentation included a brief review of the geographic and temporal extent of the programme and the equipment that had been used in its various subtasks (*e.g.* AUAR bottom-deployed long-term recorders, DT-AUAR long-term recorders and digital telemetry transmitters, and mini-AUAR rapidly deployable short-term recorders). Results were shown in the form of temporally paired sonograms and broadband-level plots in various passbands for different anthropogenic activities.

The results shown included the recording at one of the northern acoustic stations of a third-party seismic survey carried out in September to the north of the Piltun feeding area. These data clearly showed periodic elevations above ambient noise within the feeding area as shot lines approached and reductions in those levels as the vessel apparently receded from the recording site. There was also a marked cessation as the operation of the airgun array was terminated while turning at the end of a line and then was resumed as the next line began (sailed on a reciprocal heading). Regarding the latter, there appeared to be a somewhat gradual onset of received noise levels as shooting resumed for the next line, presumably due to mitigation ramp-up. The data further suggested that the seismic survey was conducted during some periods of relatively high sea state. Racca identified this as an indication that the survey may have made use of receiver cables laid on the seabed instead of towed streamers, which in principle is similar to the planned Lebendenskoye survey and reduces the sea state restrictions of operations to some extent. The Panel **noted** that for seismic surveys operated in high sea states, any monitoring and mitigation efforts that depend on detecting animals visually are rendered, at best, less effective. Also, the Panel **expressed continuing frustration** at its inability to gain access to information about other human activities occurring in the area that may affect the whales.

Another example presented was of recorded sounds associated with pile-driving operations carried out by ENL on the Odoptu ocean coastline at the north end of Piltun Lagoon. The only data shown were from a recording taken at a site ~20 km south of the pile-driving over a period of several daytime hours during which pile-driving took place intermittently for about an hour separated by pauses of similar duration. The acoustic energy from these pulses was concentrated in relatively narrow frequency bands between about 15-25 Hz. The acoustic levels averaged over 48 seconds in a broadband frequency range showed little variation during pile-driving phases; a temporal pattern with clear structure was detected only in the 10-100 Hz range plot. The Panel and Sakhalin Energy briefly discussed a curious feature in the acoustic record when pile-driving was being monitored, namely an apparent narrowband tone around 120 Hz. The Panel **agreed** with the assessment of Sakhalin Energy that this was almost certainly an artefact in the recording, perhaps from the activation of a hard drive in the recorder, rather than acoustic energy in the water at this frequency.

The remaining examples of recordings were all from stations near the oil production platforms PA-B and PA-A (Molikpaq). In the case of PA-B, the time-synchronised data from two recorders collinear with the source on a shoreward radial, one at the 20 m depth contour and the other at the 10 m contour, were compared and discussed. This comparison showed that the acoustic levels at the 10 m line were, on average, 6 dB lower than at the 20 m line, indicating the expected sound propagation loss with decreasing water depth. Indeed the attenuation was more than 10 dB in the band from 20-100 Hz and thus noise at the 10 m line had been reduced to near ambient levels in that frequency band. Broadband SPL at PA-B-10 over the full frequency range from 20-15000 Hz was always below 110 dB re: 1μPa except during brief increases associated with a passing vessel or during strong weather events. The final data presented were sonograms and SPL plots as measured at the Molikpaq station about 10 km shoreward of the PA-A platform. These recordings showed clear narrowband components in the range from 30-400 Hz lasting a few hours at most, suggesting they were associated with intermittent industrial activities at or near the platform. Brief episodes of broadband noise (20-15,000 Hz) rising above 120 dB re: 1μPa were measured in August, a period in which PA-A was undergoing upgrade and maintenance operations. The Panel **noted** that these levels are high and sustained and that additional time will be needed for further investigation of this somewhat surprising result (the DVD containing the data was not provided to the Panel until the day before the beginning of WGWAP-8). Sakhalin Energy concurred that these levels were elevated, on the order of 20-30 dB higher than ambient, but also noted that they were temporary.

The Panel expressed continuing disappointment that the recommendation from WGWAP-6 related to presentation of data in sonograms had still not been addressed. Specifically, the **Panel has requested, and again requests,** that instead of or at least in addition to the current logarithmic depiction, acoustic data be plotted on a linear scale from 1-1000 Hz, which had been discussed in detail with Sakhalin Energy at the last meeting. Racca provided a comparison of linear and logarithmic scales for data collected around the Molikpaq construction site, noting that the linear plot compresses the data, but the Panel noted that its recommendation was very clear and called for a plot from 1-1000 Hz (not 1-15 kHz as on Racca's figure). In a similar vein, the Panel **noted** the previous agreement reached at WGWAP-7 regarding the presentation of data and that any segments of data requiring additional analyses were expected to be provided in tabular format following recommendation WGWAP-7/002. Sakhalin Energy expressed some doubt as to whether these data can be provided as requested. The Panel **reiterates recommendation WGWAP-7/002**, noting its importance to future analyses. Moreover, the Panel **emphasises** that this recommendation was intended to reduce, not increase, the burden on Sakhalin Energy because only data that are needed for additional analyses would be requested.

2.5 Results from Sakhalin Energy/ENL 2009 benthic monitoring programme

Fadeev provided a synopsis of data collected from benthic sampling in the Piltun region in 2009 (WGWAP-8/10, 8/11). This sampling was carried out in the two recognised primary feeding areas for western gray whales ('Piltun' and 'Offshore'), in an area offshore of Chaivo Lagoon sometimes used by foraging whales ('Chaivo'), in the area between sampled plots off Piltun Lagoon and Chaivo Lagoon ('Intermediate') and at various 'Feeding Point' sites located in areas where feeding activity by gray whales has been observed recently. Sampling of benthos at all site categories was conducted with a Van Veen grab sampler deployed from the research vessel *Academic Oparin*. The sampling of benthos was at randomly selected stations within each site category, as in previous years. In addition, samples of epibenthic and midwater biota were collected with epibenthic and midwater bongo nets, respectively, at Feeding Points only. The benthic sampling was augmented by collection of ocean temperature and salinity data at the surface and near the bottom (Piltun and Offshore areas), sediment samples for measurement of sediment grain size distribution (Piltun and Offshore areas and Feeding Points) and sediment samples for analyses of petroleum hydrocarbons, heavy metals, and organochlorine pesticide residues (Piltun and Offshore areas).

Results of the 2009 surveys indicated patterns similar to those observed in previous years. Following are summaries of benthic animal data by sampled area:

1. <u>Piltun feeding area.</u> At depths less than 15 m, benthic communities were dominated by benthic and epibenthic amphipods and isopods at high densities. The principal taxa, as defined by numbers of individuals and biomass densities, were generally suitable as prey for foraging gray whales. The likely predominant prey species for western gray whales, the amphipod *Monoporeia affinis*, was common throughout the area at depths less than 15 m. Densities of likely whale prey species at less than 15 m in the Piltun area in 2009 were similar to densities observed in 2007 and, depending on the type of statistical test applied, similar or slightly higher than densities estimated from 2008 samples. Sampled densities of the sand lance (*Ammodytes hexapterus*) in the northern part of the area were lower in 2009 than in 2008. Fadeev suggested that sand lance, when present in significant numbers,

attract the interest of foraging gray whales and may influence the spatial distribution of whale foraging effort.

There was a consistently sharp transition in benthic community structure at depths between 15 and 20 m. The pattern of transition has been present during all years of the benthic survey programme (2001-2009) and apparently is a fundamental attribute of the assemblage. In habitats at depths greater than 20 m, the benthos was strongly dominated by sand dollars (*Echinarachnius parma*) at high densities (>95% of total benthic animal biomass) in 2009 as in previous years. Consistent absence of preferred whale prey species and lack of observed whale foraging activity, over nearly a decade of study, indicate that the sand dollar assemblage is of no substantive value as prey for foraging whales. Exceptions have been observed in cases of high sand lance densities, which most often develop within the sand dollar assemblage.

2. <u>Offshore feeding area</u>. Cluster analyses of 2009 benthic data in the Offshore area indicated four recognisable assemblages. Three included substantial densities of large amphipods (especially *Ampelisca* spp.). Observations of foraging whales suggested a preference for feeding in 'assemblage II', dominated by *Ampelisca* and cumaceans, the latter a small but highly abundant group of pericarid crustacean species closely related to amphipods. Fadeev also documented benthic patches characterized by 'assemblage IV', a group dominated by *Ampelisca* and generally similar in species composition to feeding areas used by eastern gray whales in the North Pacific and Bering Sea region. Mean biomass densities of amphipods were positively correlated with bottom depth in the offshore feeding area. Biomass densities in the area have been generally similar among years since 2007, and typically are substantially (5-10 times) higher than those measured in the Piltun feeding area.

3. <u>Chaivo area</u>. Sampling of benthos in the Chaivo area focussed on locations at which gray whale feeding activity was observed. The benthic assemblages in the area were found to be quite similar to those of the Piltun area in terms of species composition, spatial patterns and biomass density.

4. <u>Intermediate area</u>. Benthic data from the intermediate area indicated that benthic community patterns are generally similar to those observed in the Piltun feeding area. Samples taken at depths less than ~15 m were dominated by amphipods and isopods thought to be suitable prey for gray whales. Data from greater depth indicated domination of the benthos by the sand dollar assemblage as observed in the Piltun feeding area. A third benthic assemblage observed in the area was dominated by ascidian tunicates and was highly patchy in distribution. The ascidian assemblage is likely not of interest to foraging whales.

5. <u>Feeding points</u>. Biomass densities in 2009 benthic samples from gray whale feeding points were dominated by amphipod and isopod crustaceans. In the Piltun feeding area, most feeding points occurred at depths less than 15 m in areas dominated by amphipods and isopods. The major exception in the time series was observed in 2004 and 2005, when feeding activity occurred in deeper water in the northern part of the Piltun feeding area, in response to the presence of dense patches of sand lance within the assemblage dominated by sand dollars. In the offshore feeding area, feeding points tended to be more frequently observed in deeper portions of the area, and typically were dominated by amphipods, especially *Ampelisca* spp. Sediment type at identified whale feeding points was predominantly 'well-sorted fine sands', indicating sands with mean particle diameters between 125 and 250 µ with relatively low variance.

Samples collected by epibenthic and midwater nets in 2009 indicated low densities of planktonic crustaceans that would be of interest to gray whales as prey. The data indicated a low likelihood that gray whales would have foraged on midwater crustacean swarms in areas sampled during the 2009 field season.

Contaminant data were collected from the benthos in 2009 for nine heavy metals (aluminium, arsenic, barium, cadmium, chromium, copper, mercury, lead and zinc), petroleum hydrocarbon and organochlorine (DDT and HCH congeners) residues. All measured contaminant levels for all categories were reported to be low, at levels well below threshold concentrations thought to have the potential to damage benthic communities or foraging gray whales.

Panel members have had sustained interest in the hypothesis that effluent waters from Piltun Lagoon, transported out of the lagoon via estuarine circulation and tidal forcing, provide a trophic subsidy to benthic communities in the Piltun feeding area. Fadeev reviewed available data bearing on the hypothesis, including analyses of samples for stable isotope (SI) and lipid biomarker (LB) variables. Data indicate that, in general, the principal source of primary production for benthic assemblages in the Piltun feeding area is local new production by phytoplankton. SI and LB data do not support suggestions that detrital or bacterial biomass in lagoon effluent waters are broadly important to the benthic ecosystem in the feeding area, although some species may benefit from the subsidy. In ensuing discussion, Fadeev acknowledged that the lagoon subsidy probably is not trivial, but that the mechanism remains unknown. He suggested that the overall productivity of the Piltun feeding area may benefit from the combined effects of subsidies of inorganic nutrients (*e.g.* nitrate, phosphate) from three sources: Piltun Lagoon effluent, upwelled nutrient-rich deep water to the shallows of the north-eastern Sakhalin shelf and influx of nutrient-rich effluent waters from the Amur River.

Fadeev also briefly discussed possible effects of interannual variation in winter/spring ice cover and spring ice breakup date on productivity of benthos on the northeastern Sakhalin shelf. The data suggest a weak negative correlation of ice cover extent with subsequent summer abundance of the amphipod *Monoporeia affinis*, thought to be an important prey species for gray whales. However, statistical evaluations indicate that the relationship is not significant.

3 REVIEW INFORMATION ON RELEVANT ACTIVITIES BY OTHER COMPANIES IN 2009 AND 2010 (*E.G.* PILE-DRIVING, SEISMIC SURVEYS)

In response to the Panel's request at the previous meeting (see WGWAP-7 report, item 4.3; also recommendation WGWAP-7/001), Larsen presented an updated and redesigned map of the available information on industrial activities planned or ongoing on the Sakhalin Shelf. This map has been included here as Annex 4, but with the caveat that the information on it is not authoritative. It was assembled from a variety of sources, including verbal exchanges with company representatives and conference presentations. Also, it was noted during discussion that at least some portion of the 2D seismic survey(s) planned by Elvary Neftegas (Rosneft-BP) for the Kaigansky-Vasukanskiy licence area in 2010 or later (according to the map) had been conducted in 2009. However, it was not possible to determine from the information available whether this work had been completed or would continue in 2010.

The Panel thanked Larsen for his efforts to assemble and present this information in the manner requested.

Of all activities planned by other companies for summer 2010, the seismic survey in the Lebedinskoye block continues to be of greatest concern to the Panel (for detailed discussion, see item 4 of this report as well as the report of the Seismic Survey Task Force). In view of that concern, the Panel sent a letter to R. Gizatulin, chairman of the Russian Interdepartmental Working Group on Western Gray Whale Conservation (IWG) (see item 11, below), requesting support for the Panel's position that the Lebedinskoye seismic survey should be postponed until at least 2011, and that it should proceed only after a suitable monitoring and mitigation plan has been put in place (see http://cmsdata.iucn.org/downloads/wgwap_letter_to_gizatulin_190410.pdf).

The Lebedinskoye issue goes beyond the immediate matter of the seismic survey. Unfortunately, the Panel has received no information from either Rosneft or ENL on their plans for the Lebedinskoye and Odoptu fields, respectively, and thus can only speculate on what these might be. If Rosneft were to place a platform anywhere in the Lebedinskoye field, this could be the single greatest threat to western gray whales of any of the ongoing or planned oil and gas activities in Sakhalin waters. It would unavoidably cause major disturbance to females and calves during the feeding season.

Another issue raised by observers (WGWAP 8/Inf.02) was a briefing note recently sent out for public comment by the seismic survey company DMNG (DalMorNefteGeophizika), concerning a preliminary Environmental Impact Assessment (EIA) of that company's planned seismic surveys in the Sea of Okhotsk and adjacent areas over the next ten years (Program for Geological Geophysical Surveys in Russian Federation Far East and East Arctic Seas for the period to 2020). The Panel concluded from its examination of WGWAP-8/Inf.02 that the preliminary EIA was seriously flawed, specifically with regard to its superficial and dismissive treatment of the potential impacts of the extensive proposed seismic survey activities on western gray whales. The EIA is to be used by authorities as a basis for authorizing seismic survey activity over a vast area and for a long period of time, yet it fails to recognize that specific areas are critically important to the whales at specific times of the year. As such, the EIA misleads those responsible for ensuring the protection and recovery of the whale population.

It was noted during discussion that the DMNG programme as laid out in the briefing note should not be taken at face value because the company's work is carried out both on a speculative basis (acquiring data in new areas in hopes of eventually selling it to other companies) and under contract to lease holders. Therefore, a document such as this one generally tends to cover a range of possible work sites and thus overstates the scope and scale of activities that ultimately take place. At the same time, however, it was pointed out that once blanket approval has been given for a standing EIA such as this one, in practice it allows DMNG to proceed without the need for public hearings or further assessments, and any oil and gas operator is free to contract DMNG without conducting a separate EIA for a specific seismic survey regardless of the environmental or other risks. In this regard, Terwogt stated that DMNG had approached Sakhalin Energy for approval to carry out seismic acquisition in the Sakhalin II project area (on speculation) in 2009. The request was turned down in light of the fact that Sakhalin Energy had already decided to postpone its own Astokh 4-D survey in response to the Panel's recommendation and out of concern for the anomalous whale distribution in 2008.

The Panel expressed its concern about the proliferation of seismic surveys in the current and historical range of western gray whales in the letter to Gizatulin (see http://cmsdata.iucn.org/downloads/wgwap_letter_to_gizatulin_190410.pdf) and in this way sought to bring the matter to the attention of the responsible Russian governmental authorities.

During discussion, the Panel reiterated and re-emphasised that the noise from activities by other oil and gas companies (*e.g.* seismic surveys, pile-driving, other construction) could influence whale behaviour and distribution at times when Sakhalin Energy is attempting to monitor 'baseline' (*i.e.* presumably undisturbed) conditions or trying to manage the effects of its own activities on the whales, such as during the upcoming seismic survey. The confounding effects of such disturbance by 'external forces' should not be overlooked or dismissed in either planning or analysis.

Several additional points were raised and noted, as follows:

- The satellite tagging project, if it proceeds in late summer and early autumn 2010 (August-September) as currently planned (see item 7), may represent an additional source of disturbance to the whales at that time.
- In view of the need to deploy multiple behaviour teams in June-July for the seismic survey monitoring and mitigation programme, effort by Sakhalin Energy to collect behaviour data will be correspondingly reduced from previous years during August-September, meaning that only limited data will be available to assess effects of non-Sakhalin activities later in the 2010 season.
- Racca pointed out that although the joint programme's buoys provide a reliable acoustic record of received levels in the Piltun feeding area, what is generally missing is detailed information on the locations and activities for non-Sakhalin Energy noise sources (*e.g.* seismic vessels, construction). It was suggested that the Panel attempt to obtain such

information through the Interdepartmental Working Group on Western Gray Whale Conservation.

- The importance of recognising and accounting for cumulative effects of human activities on the Sakhalin Shelf has been emphasised in previous panel reports, starting with that of the Independent Scientific Review Panel (Reeves *et al.* 2005). The current Panel acknowledges that cumulative effects are a major concern and welcomes the efforts by interested NGOs (specifically Pacific Environment and WWF) to highlight that concern and provide relevant information.
- Yablokov drew the attention of participants to the fishing sector and the potential for entanglement and disturbance by fishing vessels. It was agreed that the Panel would informally approach contacts on Sakhalin for more information on the types and amounts of fishing activity on or near the gray whale feeding areas.
- Hancox suggested that the existing monitoring and mitigation programme for the Astokh 4-D seismic survey could be developed into a set of generalised guidelines or protocols for good practice and that as such, they could be used by the Panel, IUCN, the IWG and others to promote improved efforts by companies to manage the impacts of other seismic surveys. He noted that once a code of good practice is available and has become widely recognised as legitimate, operators feel pressure to adopt it. Even though some aspects of the Astokh 4-D situation are exceptional or unique (*e.g.* the near-shore setting, the single-species focus, the long pre-existing data series on whale distribution, behaviour etc.), the Panel agreed that the basic features of Sakhalin Energy's monitoring and mitigation programme, including the involvement of an independent oversight body, would be amenable to the development of a good practices document, on the understanding that it would need to be adapted to specific local conditions.

4 4-D SEISMIC SURVEY

4.1 Summary of Sakhalin Energy seismic plans for 2010 including the earliest start date based on ice data

Sakhalin Energy reported that the contract with the acquisition company, DMNG, was in place after some renegotiation earlier in the year, and the supporting contracts (*e.g.* for the observation vessel) were also in place. The contract with DMNG includes a significant incentive to ensure the survey takes place as early as possible in the season, and Russian approvals are proceeding according to plans, handled by DMNG. The monitoring and mitigation programme has been submitted to MNR for approval. A plan for deployment, logistics and training has been developed based on a notional start date for the seismic survey of 10 June. This date implies having the vessel at location on 8 June, leaving its current location in Malaysia around 20 May. Construction of the base camp would start in the last week of May, training would start around 24 May and acoustic buoys would be deployed around 7-8 June.

Seismic acquisition will start as soon as the sea off north-eastern Sakhalin is ice-free. The ice-free date is influenced by ice thickness and extent and by sea surface temperature, and data on current weather and ice conditions and projections were given at the meeting. Input obtained for estimating the start date has come from remote sensing data available from public sources, historical data and internal company experience. Monitoring had been conducted since the beginning of 2010 and compared to previous years, the maximum ice extent had passed by the time of WGWAP-8, with ice retreat beginning around 31 March. The company's best estimate for a start date was, at the time of the meeting, between 11 and 15 June.

4.2 Seismic Survey Task Force

4.2.1 Review and summary of inter-sessional tasks and pre-meeting workshop

Nowacek presented an update on the Seismic Survey Task Force meeting (SSTF-5) that immediately preceded WGWAP-8. The SSTF had several specific issues to address, including:

i) truncated A-line proposal
ii) behavioural data collection protocol and triggers
iii) contingency plan for acoustic monitoring
iv) data management and integration plan
v) independent observer.

All of these issues are discussed in detail in the SSTF-5 report, which will be available on the IUCN website when finalised. The main points are described briefly here.

As discussed in past SSTF and Panel meetings, some of the relatively near-shore seismic survey acquisition lines (known as 'A-lines') include portions sufficiently far from shore that they would not be expected to produce levels in excess of 156 dB SEL at the perimeter monitoring line (PML). The SSTF reviewed a plan prepared by Sakhalin Energy to reclassify these lines so that the survey can progress as fast as possible (*i.e.* when the 'B' portion of the line is being acquired, only 'B-line' mitigation protocols apply, which hopefully will shorten the duration of the survey).

Gailey and Weller led inter-sessional work on the behavioural protocol, guided by the desire to ensure that the data collected in 2010 will be analytically compatible with the data on whale behaviour collected in previous years. Assurance was given that Gailey would be setting up the data collection methods and would be present for observer training, and therefore the data will be standardised. The SSTF agreed, and the Panel **recommends**, that three behavioural triggers, besides the acoustic modelling predictions and measurements, be used for temporary shutdowns of the seismic survey operations. These triggers for precautionary shutdowns are intended to refer to unambiguous signs of aberrant behaviour or distress in individual animals. The three triggers were defined as (i) repeat breaching, (ii) mother-calf pair separation of more than five body lengths and (iii) fast travel (>10 km per hour as measured from the shore stations). The first two of these triggers should be visible (depending on conditions) by teams on both the Observation Vessel (OV) and the shore platforms, although only the shore-based teams (equipped with theodolites) will be able to report on rapid travel to trigger a shutdown.

Initial plans had included the use of a rigid-hull inflatable boat (RHIB) for behavioural work, but there was some disagreement regarding its efficacy and the possibility that use of such a boat would additionally disturb focal whales. Based on discussions during previous SSTF meetings, some task force members had been operating on the assumption that a second team would be aboard the OV (*i.e.* two behavioural teams on the water) and that one could be deployed with the RHIB without compromising data collection from the OV itself. However, this was not formalised into a specific Panel recommendation for Sakhalin Energy to consider and possibly implement. Sakhalin Energy consequently developed the operational protocols such that only one team would be aboard the OV. Since it would be undesirable and possibly detrimental to remove the visual observer team from the larger vessel, the Panel concluded that given the presence of just one behaviour team, there would unfortunately be no RHIB operations to observe the animals or to make real-time acoustic measurements at or near the positions of focal whales. A RHIB will be used to service the acoustic buoys, and the Panel **recommends** that during these operations the crew on the RHIB record whale sightings and make acoustic recordings.

A contingency plan has been developed in case the shore-based acoustics team loses contact with the acoustic monitoring buoys. Behavioural, MMO and acoustics teams aboard the OV (most likely the *Pavel Gordienko*) would be expected to assume the responsibility for acoustic monitoring under such circumstances. This would require that the OV remain close enough to the buoys to receive signals reliably, although it could move parallel to the seismic survey vessel and still maintain contact with the buoys that are broadside to the array (*i.e.* those receiving the highest sound levels).

In such a contingency, observers aboard the OV would not be able to conduct behavioural follows as intensively, although they should still be able to follow whales at significant ranges using the mounted 'Big Eye' binoculars.

Arrangements for the OV had not yet been finalised at the time of the meeting, but there was some concern that the *Pavel Gordienko* would not be suitable for one primary reason. Panel members of the SSTF have repeatedly emphasised that the observers should be located as high off the water surface as possible, and this pertains equally to the location of the Big Eyes. During SSTF-5, the task force was told that there may be problems mounting the Big Eyes on the flying bridge and therefore that they may have to be located next to the bridge. Such a location is not acceptable, as it limits the observer's ability to see a sufficient area in front of and alongside the OV. Sakhalin Energy understood this concern and agreed that such placement of the Big Eyes would restrict visual monitoring. The Panel **reiterates** its position that having the OV with the capabilities specified by the SSTF is integral to the monitoring and mitigation plan and that without this vessel, properly equipped, the plan cannot be implemented effectively.

Another issue discussed at SSTF-5 is the need for reliable and regular vessel tracking. The Panel **recommends** the use of an automated information system (AIS) to report and track the locations of vessels during the seismic survey. Sakhalin Energy acknowledged that AIS is preferred and that it is essential to obtain at least archived locations of every vessel during the seismic survey. The company assured the Panel that locations would be recorded at least every 30 seconds, 24 hours/day. The Panel stressed that AIS is preferable for maintaining an operational picture of the survey. For instance, if shore-based teams detect a whale, they can more easily direct the OV using a GPS; latitude/longitude directions are more cumbersome when communicating over radios.

A post-survey data analysis approach, to ensure that all necessary data streams are collected, had not been developed at the time of the meeting. A sample data management and integration protocol was presented to the SSTF and is included in the SSTF-5 report.

Southall made a brief presentation on noise exposure criteria, based primarily on Southall *et al.* (2007). He reported that relevant available scientific information based on actual operations is limited and that the detailed and comprehensive programme planned for the Astokh 4-D seismic survey has the potential to inform other monitoring and mitigation efforts in other operations (*e.g.*, in Alaska).

4.2.2 Independent Observer

Early in its deliberations, the SSTF had recommended that an Independent Observer (IO) be included in the overall plan for the 4-D seismic survey in order to, among other things, evaluate the monitoring and mitigation plan, gauge its effectiveness and raise a flag if problems arise during field implementation of the plan. Several key points about the role of the IO and the practical operations were discussed during the plenary as well as by a break-out group. The current plan is for the IO to be on shore, though the original plan had been to have this person stationed on the seismic survey vessel as was done on the 2001 ENL seismic survey. After extensive deliberation, the SSTF concluded that it was preferable to have the IO on shore at the base camp. This is where all of the data used to implement the monitoring and mitigation plan, other than observations from the observation vessel of whales in the overlap zone, will be processed and applied in operational decision-making.

The terms of reference for the IO are included here as Annex 5. The IO will be on-site during observer and safety training prior to going on-site for the survey. The IO may not be on-site for the whole survey, especially if weather delays the survey substantially, but it is anticipated that by two weeks into the planned survey time, the monitoring and mitigation programme will be operational and tested. (Note: During the period between the end of the WGWAP-8 meeting and the completion of this report, Brendan Hurley was identified as the IO and preparations for his contract and Russian visa were well underway.)

In lieu of an observer on the observation vessel, the SSTF suggested that a post hoc analysis be conducted by Sakhalin Energy to compare shore-based and vessel-based observations and evaluate the effectiveness of the vessel-based observation effort. At WGWAP-8, Sakhalin Energy agreed to undertake such an analysis, with the caveat that there may not be much data if the survey is completed early in the season as planned, when relatively few gray whales should be present in the Piltun feeding area. The Panel **recommends** that this analysis be done with whatever data are available after the survey.

4.2.3 Work plan

Other than finalising the terms of reference for the independent observers and filling that position, only two items remain open and require attention before the seismic survey. Firstly, the Panel **recommends** that a log of all events associated with the monitoring is kept. For example, any event that requires a communication between the teams (*e.g.* acoustic and behavioural) should be logged. Secondly, Hancox (AEA) asked about the status of the Environmental Impact Assessment (EIA) that was to be updated. Sakhalin Energy noted that this document was being finalised and would cover the issues addressed in detail by the SSTF and Panel. Sakhalin Energy gave assurances that he updated EIA would be made available by the end of May 2010.

5 PHOTO-ID

It was recalled that the Photo-ID Task Force had been disbanded at WGWAP 7, with the understanding that Photo-ID results and issues would henceforth be given adequate attention in the full WGWAP.

5.1 Presentation on 2009 photo-ID

5.1.1 IBM/Sakhalin Energy photo-ID research

The photo-ID research conducted in 2009 is described in document WGWAP-8/10 (English) and WGWAP-8/12 (Russian). The results are reported in document WGWAP-8/11 (English) and WGWAP-8/13 (Russian). Photo-ID work was conducted in 2009 on the north-eastern Sakhalin shelf (Piltun area, Offshore feeding area and a small area offshore of Chayvo Bay) and on the eastern Kamchatka shelf (Olga Bay and Vestnik Bay). In addition to the vessel-based work, photo-ID was conducted by the shore-based behaviour team on Sakhalin led by Gailey. A total of 118 whales were identified in 2009 off Sakhalin, including at least eight calves and a further three whales that had not previously been identified. A total of 73 whales were identified in 2009 off Kamchatka, including 38 individuals (including 7 calves) seen off Kamchatka for the first time. Of the 38 new Kamchatka whales, 18 (including 5 calves, all of which were sighted in Olga Bay) are not in the IBM Sakhalin catalogue. There was no photo-ID effort off western Kamchatka in 2009.

In Olga Bay, the separation or break-up of cow-calf pairs was observed from 21 July to 14 August. There is some indication that cow-calf break-up may occur earlier in Olga Bay than off Sakhalin, but it is too early to judge whether there is a consistent difference. Overall numbers declined markedly through the season.

The migration routes between Kamchatka and Sakhalin are not yet known, but it may be significant that whales tended to be seen off Kamchatka early in the season, and later off Sakhalin. This could indicate that some whales arrive at Sakhalin from the north or east (*e.g.* Kamchatka) rather than from the south. One whale first seen in Vestnik Bay in 2009 was later sighted off Sakhalin and then again in Vestnik Bay in November, representing the first observation of such a within-year Kamchatka-Sakhalin-Kamchatka movement pattern.

Cooke noted that the population assessment has in most years indicated a larger number of calves were born in the population than were actually recorded off Sakhalin. A. Bradford has previously expressed doubt that so many could be missed off Sakhalin. The Kamchatka sightings may account for these ‘missing’ calves. However, the relationship between the Sakhalin and Kamchatka aggregations has yet to be fully elucidated: some Kamchatka whales may never visit Sakhalin. If that is the case, assessments using only Sakhalin data might underestimate the total population.

5.1.2 Russia-US team

Results of the 2009 photo-ID field season of the Russia-US team had been presented at WGWAP-7 in December 2009. No further report was received; processing of the data is still underway.

5.2 Review of photos of (2009) stranded whale

At WGWAP-7 the Panel had recommended that photos (taken before its death) of the whale found stranded near Chayvo in September 2009 be re-examined to look for any evidence that might be related to the subsequent death, such as body wounds or marks indicative of anthropogenic interaction. Tyurneva reported that she had re-examined the photos but found nothing suggestive.

5.3 Progress and work plan

Just three items on the Photo-ID work plan were agreed at WGWAP-7 as follows:

(i) Annual updating of catalogue cross-matching:

- Cross-matching through to the 2009 season is scheduled to be completed by September 2010 and reported to WGWAP-9.

(ii) Re-examination of the pictures of the whale found dead in 2009:

- This item is now closed (see 5.2 above).

(iii) Joint population assessment:

- This has now been conducted and results are presented under item 6 below.

6 POPULATION ASSESSMENT

6.1 Update on population assessment

A population assessment combining data collected off Sakhalin by both the Russia-US and IBM photo-ID teams up to and including the 2008 field season was conducted and presented as document WGWAP-8/9.

The Russia-US team based at Piltun Lighthouse has operated each season from 1995 to the present, except for 1996. The IBM vessel-based team has been operating since 2002. These have been parallel efforts, and WGWAP-1 had recommended cross-matching of the catalogues and a workshop to discuss methods and procedures. A Photo-ID Task Force was established that first met in October 2007. The catalogues were successfully cross-matched and the Task Force recommended that a population assessment be carried out using both data sets. Later the Task Force recommended specifically that the assessment be based on the model originally developed for the Independent Scientific Review Panel (Reeves *et al.* 2005) and which had been used for subsequent population assessments presented to WGWAP meetings and to the IWC Scientific Committee.

The model is an individual-based, stage-structured population model which tracks individuals, by sex, through the various stages: calves, immatures and mature animals. The mature females are further divided into pre-calving, calving and post-calving females, to account for the 2-3 year reproductive cycle. The model makes use of the annual sighting histories of each identified individual but does not assume these to be complete: the gaps are filled in probabilistically by estimating the probability of animals of each stage being observed off Sakhalin. The mature males were found to be the most reliably seen population stage, the immatures had the greatest tendency to be absent and the mature females were in an intermediate position in terms of the likelihood of being seen.

The original model had assumed that calves could be distinguished from non-calves unambiguously. While this appeared to be a safe assumption for the Russia-US data set (as discussed in the 4th Photo-ID Task Force report), not all calves were recognised as such in the IBM data set. The model was modified to allow for this extra degree of indeterminacy in the IBM data set (see document WGWAP-8/9 for details).

The model was fitted to three data sets, as follows: (i) the joint data set through 2008, (ii) the Russia-US data set alone and (iii) the IBM data set alone. The results from fitting the joint data set were very similar to those obtained from fitting the Russia-US data set alone, and also very similar to previous years' assessments using the Russia-US data set. The results from fitting the IBM data set alone showed much wider confidence intervals, particularly with regard to the population trend. While the results from the joint data set and the Russia-US data set clearly indicated an increasing population trend, the results from the IBM data set yielded a wider range of uncertainty such that a decreasing population could not be excluded. This was attributed mainly to the shorter length of the IBM time series (from 2002). Experience with such models shows that for trend estimates with reasonable precision, a data span of at least 10 years is typically required.

Using the joint data set, the median estimate of population size in 2009 (excluding calves) was 134 animals (90% Bayesian confidence interval 120-142), of which 33 (CI 29-38) are estimated to be reproductively mature females. The estimated annual survival rate is 0.69 (CI 0.58-0.78) for 'calves' (see discussion below) and 0.985 (CI 0.977-0.991) for non-calves. Assuming no additional anthropogenic mortality, or other deterioration in conditions affecting the population, the population is predicted to increase with over 99% probability (Fig. 6.1).

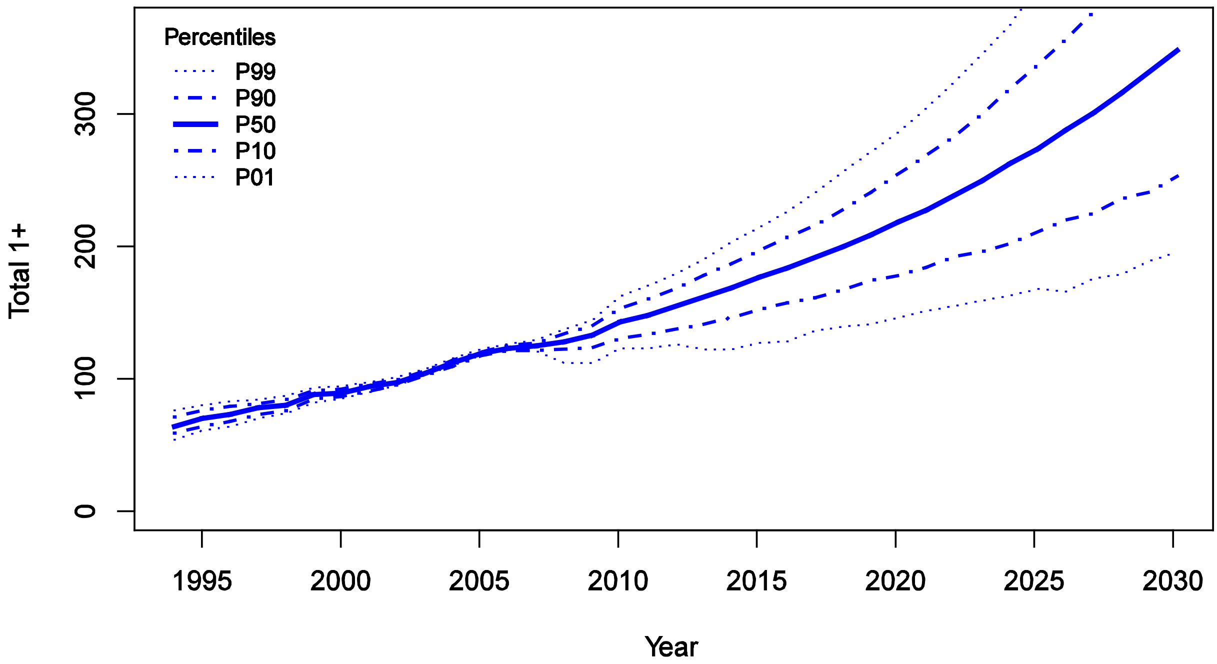

Fig. 6.1. Predicted population trend from joint data set.

6.2 Discussion of results

The Panel noted that, if desired, the resilience of the population could be estimated by using the model to make forward projections with different assumed levels of additional mortality, as has been done in previous years.

The previous assessment, presented in 2008, had projected that the recent rate of mortality in Japanese fisheries (five females in two years) would likely not be sustainable, and that if this level of mortality continued, the population could decline. The Japanese authorities had responded by including the gray whale on the protected species list, thus making it illegal to knowingly kill gray whales or market gray whale products in Japan. It is encouraging that no further gray whale deaths have been reported in Japanese waters during the past two years.

Data from the Kamchatka catalogue were not available for the joint assessment. Without doing the analysis, it is hard to guess whether inclusion of Kamchatka data would simply fill some of the gaps in the sightings histories, or instead would lead to a higher estimate of the total population size. This would depend on the precise pattern of re-sightings across the two areas.

The male bias in the sex ratio appears to have eased slightly: the previous male bias in the sex ratio of calves may have been mere ‘bad luck’ rather than an intrinsic bias in the population sex ratio, but it is still considered premature to draw a definite conclusion.

While the results indicated a near-certainty of population increase during 2000 to 2007, the possibility of a levelling off or slight dip since then could not be ruled out. The question of whether the apparently anomalous distribution in 2008 has had a demographic impact cannot be answered until data for at least 2009 and perhaps more years have been analysed.

The high estimate of survival rate for non-calves suggests that there is no significant level of non-calf mortality that could jeopardise recovery. However, the estimated ‘calf” mortality is substantial at around 30%. ‘Calf” mortality in this context refers to mortality between the first and second field seasons, *i.e.* the mortality over the age range of approximately 6-18 months. There is likely to be some additional loss of calves during the first 6 months of life, prior to the first appearance on the feeding grounds. The model does not attempt to estimate the early calf mortality as a separate factor: it is subsumed into the estimates of calf production. The annual estimates of calf production refer to the estimated number of calves reaching the feeding grounds. The gross numbers of births is likely to be somewhat higher.

6.3 Follow-up

At WGWAP-7 it had been agreed that an independent review of the population model and results of the assessment should be conducted if possible. Larsen had subsequently established a review process with the University of St Andrews. He confirmed that the scientists there are available to work on this. There was some discussion as to whether this review was still necessary, given that the joint assessment had yielded essentially the same results as previous assessments and they indicated nothing particularly significant or remarkable.

It was agreed that the independent review would still be worthwhile, although considerable work would be required to prepare the detailed documentation for meeting the review specification that the information should be sufficient to enable independent implementation of the model. It was further agreed that publication of the assessment could be considered after receipt of the independent review, subject to the need to implement any changes or further analyses called for by the independent review.

7 OIL SPILL PREVENTION, PREPAREDNESS AND RESPONSE

Dicks reported on outstanding oil-related issues, including those arising from existing recommendations and site visits. The site visit to inspect oil spill response equipment stockpiles in October 2009 revealed that a number of earlier recommendations had been fulfilled and could be closed. The remaining recommendations were considered in chronological order, as follows.

WGWAP-3/015: Additional environmental monitoring of Piltun Lagoon. This has been ‘Rejected’ by Sakhalin Energy on the grounds that the studies conducted so far are adequate for the company’s purposes. However, as noted at previous Panel meetings, several panellists have a different opinion and feel that further studies and regular monitoring are justified by the potential importance of the lagoon to the prey base of gray whales in the Piltun feeding area. Whales have frequently been observed to aggregate and feed around the mouth of the lagoon (see items 2 and 5 of this report).

The Panel concluded that making a new recommendation on this topic is something that should be considered by the Environmental Monitoring Task Force.

WGWAP-3/016: Pipeline monitoring. This recommendation is currently classified as 'Open – in need of clarification/expansion'. All aspects have been implemented, with one exception – weekly dedicated over-flights. The pipeline monitoring programme presently consists of opportunistic daily (weather-dependent) crew-change flights, annual assessment by a remotely operated vehicle (ROV), unscheduled ROV assessments after major storm or other events, flow and pressure monitoring and regular pigging of the lines. Sakhalin Energy has taken the position that weekly over-flights would likely not improve leak detection significantly and the Panel accepts that this recommendation can be considered 'Closed – implemented satisfactorily'.

WGWAP-3/026: Post-spill monitoring of gray whales. This recommendation is currently classified as 'Open – in need of clarification/expansion'. A section on this subject was recently added to the company's Marine Mammal Protection Plan (see item 9.3) and the Panel intends to review the issue further in the context of the Environmental Monitoring Task Force.

WGWAP-6/024: Aromatic analysis of Vityaz crude oil. Analyses and reporting by a reputable Korean laboratory (Korda) was completed in early April 2010 and Sakhalin Energy provided the report for Panel review. Former Panel member Tim Ragen has an interest in this subject and has volunteered to assist Dicks with a preliminary review. Dicks and Ragen will report back to the Panel and Sakhalin Energy by the end of May 2010.

WGWAP-7/019: Oil spill exercises in remote coastal areas, *e.g.* adjacent to Piltun Lagoon, especially to evaluate access via unimproved roads. Sakhalin Energy reported that no progress had been made towards carrying out such exercises and that it was reluctant because of the environmental sensitivity of such areas. The Panel confirmed its view that the benefits of such drills were likely to outweigh their potential harm. Therefore, this recommendation stands.

WGWAP-7/020: Sakhalin Energy to provide lists of exercises (conducted since last WGWAP and planned before next WGWAP), including exercise reports. The list provided shows 13 offshore exercises conducted since November 2009 and a further 22 planned by December 2010. This represents a comprehensive programme. However, due to an oversight, no onshore exercises were included in the list. Sakhalin Energy agreed to rectify this immediately. Also, an exercise report provided prior to WGWAP-8 proved to be less informative and useful than a report provided to Dicks during his 2009 Sakhalin site visit. At the end of the meeting, Bell provided additional exercise reports to Dicks for review.

An additional oil-related item – the need for Panel review of two documents – was identified in the WGWAP-7 report but not presented as a formal Panel recommendation. Sakhalin Energy reported that no action had been taken on this item. Therefore, the Panel **recommends** that the company provide an update for WGWAP-9 on progress with the two documents, one a manual on spill response in ice and the other a handbook for monitoring and assessment of oil spill response operations (see WGWAP-7 report).

Dicks also pointed out that Sakhalin Energy had conducted a major oil spill response exercise prior to his 2009 site visit and that this exercise had been observed by PCCI on behalf of the Lenders. The Panel **requests** that Sakhalin Energy make the PCCI report available for the Panel prior to WGWAP-9.

Two other matters were raised and discussed under this item. First, Yablokov raised the issue of whether oil and gas extraction affects the frequency and/or intensity of earthquakes and thus aggravates the risk of well damage or pipeline rupture. In discussion, Sakhalin Energy stated that the company had commissioned a number of studies and these had indicated that the company's activities would not increase earthquake risks significantly relative to natural background. The topic had been considered briefly at WGWAP-7 (see report, item 18) and the Panel had concluded that it did not have the necessary in-house expertise to evaluate the evidence and arguments. Thus, the matter was, and remains, deferred pending appropriate expert advice.

Second, Knizhnikov (WWF-Russia) called the Panel's attention to a recent independent review of a report by the Mineral Management Service on oil spills in ice. The Panel welcomed the offer by Knizhnikov to make this review available for the Panel's consideration. Also, the Panel reiterated its ongoing concern about the inadequacy of the industry's capacity for responding effectively to oil spills in ice.

8 SATELLITE TAGGING

8.1 Report on eastern gray whale tagging in 2009

Mate gave a slide presentation updating participants on the results of his group's efforts to tag eastern gray whales off Oregon and northern California in September-December 2009 (see report of WGWAP-7, item 7.1). Two new tags with contemporary electronics produced by Wildlife Computers and a simplified construction technique (achieving substantial cost reductions) were used. The aim was to identify the least invasive tag to accomplish a 125-day operational objective. Nine 2- and 3-battery versions of the tags were deployed on a total of 18 whales between 1 September and 4 December 2009. Biopsies identified the sex of 14 of the tagged whales. Tags applied > 6 inches from the midline performed better than those that were closer to the midline. The longer version of the tag lasted longer than the shorter version, with three of the 3-cell tags and one of the 2-cell tags still transmitting in early April 2010.

Summer and autumn movements in the North American west-coast feeding range during this El Niño year were greater than anticipated in terms of both range and speed. The speed of whales moving between feeding areas was similar to that of migrating whales, which suggests that they did not spend appreciable time 'sampling' the environment while en route. Seventeen of the 18 whales were known from previous photo-ID work to belong to the 'Pacific Coast Feeding Aggregation' (Calambokidis *et al.* 2002). Tag data for some individual whales 'duplicated' in a matter of 2-3 weeks what was known previously about their movements as inferred from photo-ID records (in one case collected over a span of 25 years). At the time of WGWAP-8, data collection was ongoing for up to 227 days after tagging; four animals were still transmitting in early April 2010. The aggregate group had thus far travelled 47,000 km and some individuals had travelled > 8000 km. The tags transmit for 4 hrs/day and had thus far provided an average of > 2 locations/day.

Follow-up photographs have been taken of 12 of the 18 tagged whales (some on as many as six occasions) and have shown the progression of tag loss and subsequent healing. The photo record shows expected small divots that are formed because the entry of the tag cuts through the fat cells of the blubber layer. Even when the tags are lost and the site heals, these fat cells are not replaced. No significant health issues have been observed so far. Some tag sites have attracted cyamids but these are not permanent and their presence or absence can vary from one day to the next. One tag failed after 18 days because it lost its end cap but this was the only mechanical malfunction noted.

The departure timing of eight whales, *i.e.* when they initiated their south-bound migration from the feeding range, varied by > 2 months (from early December to mid-February). South-bound migration took an average of 17 days at 4.7 km/h. The migration speeds of different whales were consistent and nearly identical, except for one whale that stopped for a week near San Miguel Island where it had been observed previously. All six of the whales that completed the south-bound migration went to the same reproductive area destination: Laguna Ojo de Liebre, also known as Scammon's Lagoon. Tag data provided the first information on the proportions of time spent in lagoons vs 'offshore' areas and the first data on the duration of stay in the reproductive areas, which was approximate 3 weeks. At the time of this meeting, the north-bound migrations of three tagged whales were underway or completed (at an average speed of 4.2 km/h) with one whale migrating as far north as Icy Bay, Alaska. Interestingly, one tagged adult never migrated south but stayed instead off of Crescent City, California. Its tag was still transmitting in early April 2010.

The Panel commended Mate and his team for their dedicated research efforts to not only test and deploy the newly designed Wildlife Computers tags on eastern gray whales but importantly also to obtain follow-up observations, including photographs, to assess the wounding and healing processes at the tag sites. This kind of documentation should prove invaluable in ongoing evaluations of the health risks to whales from implanted tags. It is the uncertainty surrounding such risks that led to the decision to tag only known males off Sakhalin even though the movements of females are of greatest interest from a scientific and conservation perspective.

In response to questions, Mate indicated that given the duty cycle settings for the tags, the transmission times and the satellite coverage, he would expect to get at least one reliable location per day for a tagged western gray whale. Data return from the tag, however, greatly depends on its placement and orientation on the animal. Although for present purposes the tags transmit only location data, other options could be added in the future. Considering that the principal objective of the planned western gray whale tagging is to track whale movements to and, if possible, from the wintering area(s), there is no intention to change from the location-only data collection in 2010.

Mate was asked to elaborate on what the photographs of whales before, at and after tagging revealed about changes in the appearance of tagging sites on the bodies of the whales. Based on post-tagging photographs of 12 animals, some of which had been relocated as many as six times, he was able to follow such changes through time. The general pattern was for cyamids (‘whale lice’) to invade the tagging site and infest the area around the wound. Such infestations can appear and disappear over remarkably short periods of time (only a few days). On about a quarter of the tagged whales, there was a roughened area around the attachment site, possibly caused by irritation from the cyamids. This area was discoloured and sometimes appeared as a ‘rash’ but these features eventually disappeared. The characteristic divot typically remained. Weller noted that a pale ‘halo’ of discolouration often surrounds wounds related to biopsy sampling but that this generally diminishes over time.

Weller asked Mate to elaborate on the issue mentioned in his presentation concerning tags hitting a whale’s dorsal vertebral process during deployments on eastern gray whales. Weller stated that he was not aware of any discussion of this topic in the literature (*cf.* Weller 2008). Specifically, Weller asked about the possible health and healing implications of striking bone with the tag. Mate reported that he too was unaware of any previous experience in this regard. He noted that there is connective tissue close to the body’s dorsal midline and that the tagger generally aims for this tissue mass. The angle of tag implantation is important. In this instance, Mate said he had discussed the consequences with experts who suggested that if there was no major swelling, there should be no concern about an immune response. Nevertheless, Mate agreed to follow up on this matter at the 26-27 April 2010 meeting of the IWC/IUCN co-ordination group (SSG, see later).

In response to another question about the comparability of field conditions and whale behaviour between Sakhalin and the two areas where Mate now has experience tagging gray whales (2005 in the Mexican lagoons and 2009 off northern California and Oregon), Mate acknowledged that the circumstances were quite different between the lagoons and the feeding areas farther north. He added that although the 2009 tagging programme in the feeding areas was more likely to mimic the conditions expected off Sakhalin, he also realised that tagging western gray whales could well be more difficult than tagging eastern gray whales.

8.2 Plans for western gray whale tagging in 2010

Mate presented an initial proposed decision tree for western gray whale tagging operations in Russia (Annex 6). A 7 m tagging vessel (a RHIB) will be launched from the larger ‘mother’ vessel in good weather conditions to approach whales. Whales will not be tagged on the first approach by the tagging vessel. Instead, the tagging vessel will stand off to identify the whales as males and assess their body condition (as agreed, these decisions will be made only by Amanda Bradford) to determine suitability for tagging. The potential tagging pool consists of 79 males and the objective is to place tags on 12 of them. The tagging boat will approach whales at a modest speed and hope to apply tags within 6-12 inches of the mid-dorsal line. The tags will be deployed at a distance of 3-4 m from the whales.

There was a brief discussion of logistics and contracting issues, all of which are being addressed and carried forward by individuals and groups outside the Panel. As noted in previous WGWAP reports (*e.g.* WGWAP-7, item 7.2), it is expected that the Panel's interests in the satellite tagging initiative will be represented by members of the IWC-WGWAP Scientific Steering Group (SSG), specifically Brownell, Donovan, Reeves, Tsidulko and Weller. A meeting of this group to evaluate Mate's draft tagging protocol was planned for 26-27 April 2010 in Seattle and that meeting was to be followed as quickly as feasible by a meeting (teleconference) of the Joint Administrative Steering Group to resolve budget issues so that tags could be ordered and vessels could be contracted.

Weller drew attention to the biweekly updates that Mate had provided through the winter and early spring on his tagging work with eastern gray whales. These had been extremely informative and timely, and it was suggested that a similar process for the western gray whale tagging initiative would be welcome. In this regard, a statement from the last WGWAP meeting bears repeating, as follows: "It is important for meetings to be formalised and documented by reports or minutes if the scientific advice of coordination group members not in attendance at the meetings is to be considered. Reeves acknowledged that the responsibility for notification and reporting of such meetings rested with several of the involved parties and agreed that such transparency was essential, given the sensitivities and complexities associated with the satellite tagging component of the overall western gray whale research and conservation effort." Unfortunately, despite what was said and agreed at WGWAP-7, the communications aspects of the tagging programme have not improved noticeably. As one example, no report on the tagging meeting held in Geneva immediately following WGWAP-7 (on 15 December 2009) has been circulated, in spite of clear expectations on the part of those involved that this would happen.

Mate and others involved in the planning work acknowledged that many challenges remain but that there is still reason to hope that the difficulties can be overcome and it will prove possible to carry out tagging in the late summer/early autumn of 2010. Tsidulko advised that considerable progress had been made towards obtaining the necessary permits and he was optimistic that this aspect (permit issuance) would not prevent the work from going ahead on schedule.

The Panel endorsed the suggestion that Mate should take a more active and direct role in planning the work and in communicating with all relevant parties on a regular basis. Further, in a brief meeting between sessions, the IWC/WGWAP SSG delegated Weller to take a lead role and function as its *de facto* chairman. Finally, it was acknowledged once again that the IWC (via Donovan) must remain closely involved as a liaison and broker among the key parties, including the funders (Sakhalin Energy and ENL), Russian scientists and scientific institutions, IUCN, Oregon State University (Mate's home institution) and the international scientific community.

9 GENERAL TOPICS

9.1 Status of tissue sample from 2009 Chaivo stranding

A tissue sample from the gray whale stranded at Chaivo in September 2009 (see WGWAP-7 report, item 9) has been provided to the Russia-US team as requested (recommendation WGWAP-7/013). Therefore this recommendation is 'closed – implemented' and the responsibility now lies with members of the Russia-US team to arrange for genetic analyses of the sample.

9.2 Necropsy experts update

The Panel recommended at WGWAP-7 that Sakhalin Energy prepare and present a proposed way forward for identifying and, as necessary, training regional necropsy experts capable of responding to the next gray whale stranding on Sakhalin (see WGWAP-7 report, item 9.6; recommendation WGWAP-7/016). The only new information presented at this meeting was that the responsible Russian authority, Rosprirodnadzor, views its role as purely advisory and therefore is unwilling to assist in developing the necessary necropsy capacity. Sakhalin Energy gave assurance that it would consider recommendation WGWAP-7/016 in the course of ongoing internal planning of the western gray whale research and monitoring programme. For its part, the Panel considers the recommendation open.

9.3 Marine Mammal Protection Plan feedback from Panel

Sakhalin Energy had requested at WGWAP-7 that the Panel provide feedback on the company's recently updated MMPP, paying particular attention to aspects with implications for the 2010 season and to the expanded post-oil spill monitoring section. Dicks presented a summary of comments on the Panel's behalf.

In broad terms, areas that need attention are as follows:

- The plan makes frequent reference to various types of documents and it is not clear how readily available these are for users.
- There may be value in having Panel members with specialist knowledge of acoustics revisit the noise management sections of the MMPP – those individuals had not been asked to contribute to the current round of review.
- The plan refers to a number of standards and thresholds that, when reached, signify a problem and a need for action. Some of these are vague and poorly defined, and should be replaced by clear and explicit definitions or directions.
- The plan refers to matters of compliance by operational and contracted personnel (*e.g.* vessel speed limits and minimum approach distance to whales) but without indicating how this is to be verified or enforced or what sanctions are to be imposed in cases of non-compliance. Such information should be added.
- A number of background sections of the plan appear to be of marginal value to marine mammal protection and these have been identified in the mark-up prepared by the Panel.
- Interpretation of some of the background material is questionable. For example, the company favours food availability as the primary driver of whale movement patterns in the Piltun region, without giving due consideration to other plausible and reasonable hypotheses such as that anthropogenic activity is at times a significant contributing factor.
- There are many potentially confusing acronyms in the plan. A glossary would be useful.
- The appendices are less well written than the main body of the plan, and in places they are vague, repetitive and of questionable relevance. Where possible, they should be trimmed or deleted.

Two specific items need to be addressed for the 2010 season as follows:

Carcass surveys and tissue sampling: Specific suggestions were provided on the mark-up for modifications and clarification of sampling procedures.

Marine mammal reporting form: Omissions have been identified on the mark-up, mainly related to marine mammal deaths or injuries.

The Panel decided to transmit the marked-up version of the MMPP to Sakhalin Energy for response and action and Reeves requested that Dicks send the document directly to Bell on the Panel's behalf. The Panel **recommends** that Sakhalin Energy provide comments and report back on substantive issues in advance of WGWAP-9. Additionally, given that the MMPP is identified in the commitments to lenders, the Panel agreed that the mark-up should be provided (by IUCN) as a courtesy to Hancox, the lenders' representative.

The Panel noted that the value of Sakhalin Energy's MMPP may go beyond its use by Sakhalin Energy and its contractors insofar as it could become a model plan for emulation by other energy companies operating on the Sakhalin shelf.

10 REPORT FROM ENVIRONMENTAL MONITORING TASK FORCE AND FUTURE WORK PLAN

10.1 Results of request to ENL

In its previous report (item 10.3), the Panel expressed concerns about the environmental effects of ENL pipeline construction activities in Piltun Lagoon in 2009 and about statements by ENL that the anomalous numbers and distribution of whales at Sakhalin in 2008 had been due to changes in benthic prey populations rather than acoustic disturbance. In response to the Panel's request for information on these subjects (Recommendations WGWAP-7/017 and 018), a letter was received from ExxonMobil (WGWAP-8 Inf. 1) containing information on the pipeline work (no response was received concerning the question of what might have caused the 2008 'anomaly'). The letter included a summary of the nature and timing of pipeline installation in 2008-2009 and 2009-2010 and a statement that the entire process had been completed in February 2010. In addition, the letter provided a general summary of the results of ENL's monitoring programme, indicating no significant impact on the lagoon's ecology from the ice road construction and pipeline burial work.

The Panel appreciated the information provided by the company and stressed the potentially considerable value of having more direct communications of this kind. To date, most of what the Panel has learned of ENL's activities has come either from conversations between Panel members and ENL personnel or through representations to the Panel by NGOs. As noted repeatedly in the past, it would be much preferable to have direct input from ENL (and other companies) concerning their activities and the findings from their research and monitoring programmes so that the Panel would be in a position to evaluate data and information for itself rather than having to rely on third-party interpretations and hearsay. Ideally, this would mean having access to actual reports containing data and analyses, not merely general summaries such as those in WGWAP-8 Inf. 1.

10.2 Work plan (including workshop)

VanBlaricom provided a summary of the status and progress of the Environmental Monitoring Task Force (EMTF). Previous activities focused on a site visit and diving observations at the Piltun feeding area in October 2009, and a visit to the Laboratory of Ecology, Shelf Communities, at the A.V. Zhirmunsky Institute of Marine Biology, Far East Branch, Russian Academy of Sciences, hosted by Fadeev, in November 2009. Fadeev is chief of the host laboratory and the lead investigator for monitoring of the benthic biological environment in the Sakhalin II project area. VanBlaricom and Tsidulko represented the Panel during both site visits. Results and conclusions drawn from the site visits were described in the WGWAP-7 report.

Principal remaining tasks for the EMTF are a review of literature on benthic ecosystems of the north-eastern Sakhalin shelf region, and the EMTF workshop. VanBlaricom presented his proposed plan for the development and composition of the literature review. Proposed primary components of the review document are as follows:

1. Descriptive reports of benthic biota in the region
   a) Feeding areas
   b) Lagoons (Piltun, Chaivo).

2. Studies of functional ecological relationships, including trophic and nutrient subsidies from one location to another
   a) Feeding areas
   b) Lagoons (Piltun, Chaivo).

3. Studies of oceanographic attributes in the region
   a) Patterns of upwelling in time and space
   b) Predominant currents.

Literature published in Russian, Japanese and English will be studied and incorporated into the review document, along with material in other languages as recommended by the Panel. The proposed timeline for completion of the review is as follows:

August 2010:	First draft to Task Force members
1 September 2010:	Comments back to Task Force chairman from members
1 October 2010:	Revised draft to Task Force members and WGWAP chairman
1 November 2010:	Comments back to Task Force chairman from members and WGWAP chairman
WGWAP-9 Meeting:	Submission of final version to WGWAP.

VanBlaricom briefly reviewed operational issues that may arise during preparation of the literature review, including the following:

1. Translations of discovered literature, particularly documents written in Japanese
2. Provision of English and Russian draft and final versions of the literature review
3. Changes in Sakhalin Energy representation on Task Force.

VanBlaricom proposed that the EMTF workshop be held in Vladivostok during winter 2010-2011, following WGWAP-9.

In ensuing discussion, Bell acknowledged that Sakhalin Energy representation to the Panel and on the EMTF may indeed change in the coming months but that involvement by company staff in the work of the EMTF would continue. He agreed that Vladivostok is a suitable venue for the proposed workshop. Seattle and Yuzhno-Sakhalinsk were also mentioned as possible venues. Fadeev indicated that he would welcome the opportunity to facilitate the workshop in Vladivostok.

Yablokov questioned the need for the literature review, suggesting that work by Fadeev’s group as reported in WGWAP documents includes excellent referencing of relevant literature. VanBlaricom agreed that Fadeev’s work was comprehensive and indicated that the purpose of the review would be to complement, not duplicate, existing documents.

Reeves expressed concern that the proposed review was ambitious and that the timeline could be difficult to maintain given the need for Panel responsiveness and the difficulty Panel members often experience with competing obligations. He also noted that translation demands represented by the proposed review had cost implications for IUCN. Fadeev commented that in his experience 98% of the literature relevant to the review is in Russian, with the remainder in English and Japanese. The Panel is equipped to manage literature in Russian and English but will require assistance with translation of relevant Japanese literature.

Inter-sessional discussion will be required to allocate resources required for translation support as noted above, to finalise a timeline for development of the literature review and to determine dates and a location for the EMTF workshop.

11 MULTIVARIATE ANALYSIS (MVA)

11.1 Preliminary results of MVA

Gailey provided a summary of progress on the 2006 MVA. The overarching objective of this work is to examine natural variation in whale abundance, movement and respiration patterns and, in turn, assess response variables (abundance, speed, dive time, etc.) as a function of 2006 pipeline construction sound levels and vessel activity. While significant advances have been made in terms of model parameterisation and refinement, a number of outstanding issues highlighted by Gailey are, unfortunately, unlikely to be resolved before further analyses are undertaken. Perhaps the most challenging of these is securing positional and descriptive information on the vessels involved in the construction work, including the following: closest vessel to the feeding area, number of vessels present and active at a given time and noise ‘profile’ for each type of vessel operating.

Pending resolution of those issues, the models have been revised to incorporate two abundance variables (number of pods per scan and pod distance from shore). Gailey emphasised, however, that the abundance models require further refinement or alternative analytical frameworks to better address the questions being asked. Such refinements and consideration of alternative approaches are expected to be among the tasks and outcomes of the proposed MVA workshop (see below).

Monitoring data obtained in 2006, and therefore available for inclusion in the MVA, includes acoustic recordings as well as observations of behaviour and distribution. The integration of these three data sets has revealed a number of interesting preliminary patterns, including: (1) as the number of construction vessels increased, the number of whales in the area decreased, (2) the distance of pods from shore was associated with sound levels from both near-shore and offshore sources and (3) near-shore and offshore models showed different patterns, making interpretation of the results complex.

In discussion of the results, the Panel suggested that the analyses should focus not simply on sound level or loudness but also integrate other contextual factors concerning the vessels (*e.g.* whether they were moving, accelerating, decelerating or changing course, their direction of movement). Further, it was noted that the existing acoustic data are imprecise and not directly measured but, instead, derived from models. Thus, there is no direct information for many of the noise sources in 2006. While acknowledging that this was true, Sakhalin Energy pointed out that a ‘sound level’ grid had been developed based on the available information. This grid had, in turn, been used to generate 11 ‘scenarios’ that provided a general description of noise levels in the construction area.

11.2 Progress on workshop

The Panel was disappointed to learn that little progress had been made towards the proposed MVA workshop. Donovan had extended an invitation to St. Andrews University to lead this workshop but the response was not favourable. Bell advised that Sakhalin Energy continues to recognise the importance of such a workshop and is seeking alternatives to St. Andrews for convening and supporting it. Sakhalin Energy and ENL have approached the Institute of Marine Biology (IBM) in Vladivostok to determine if people there would be interested and capable of facilitating the workshop. Both companies are, according to Bell, under increasing pressure to keep their research-related activities and spending inside Russia and to support Russian scientists, and therefore having IBM assume a lead role in the MVA workshop would be viewed favourably by company management. Panel members expressed reservations about whether IBM has the necessary analytical expertise to take a central role in the workshop.

In summary, little (if any) progress has been made by the Panel or Sakhalin Energy with regard to the MVA workshop.

12 INFORMATION FROM MEETINGS OF RUSSIAN INTER-DEPARTMENTAL WORKING GROUP ON WGW CONSERVATION

As summarised in the report of WGWAP-7 (item 13), the Russian Inter-departmental Working Group (IWG) on the Conservation of Western Gray Whales was established in late 2009 to: 1) develop an effective strategy for western gray whale conservation and management, 2) improve coordination of western gray whale research and 3) improve the quality of documents on western gray whales submitted by the Russian Federation to the IWC. The Panel was pleased at this meeting to welcome R. Gizatulin, chairman of the IWG, who gave a presentation followed by a question-and-answer session. The current composition of the IWG includes representatives from the Ministry of Natural Resources (MNR), scientific institutions, three major oil and gas operators, and NGOs with a presence on the island of Sakhalin. In general, it is expected that the group will meet once every two or three months. To date, there have been two meetings, one of which was an extended session with extra participants. The next meeting (originally planned for the week following WGWAP-8 but subsequently postponed because of the travel disruption from the Iceland earthquake) will feature presentations by oil and gas operators on their seismic survey plans.

As an advisory group, the IWG makes non-binding recommendations to various licensing and regulatory bodies – MNR, the Ministry of Energy, fisheries management authorities, local regulators and executive agencies. Although several scientists are IWG members, Gizatulin stressed the importance of getting additional scientific and technical input from both Russian and international experts. In its coordinating role, the IWG is expected to serve as a repository and clearinghouse for information on western gray whales and therefore one of its immediate tasks is to collate publications and reports going back to the late 1990s and to ensure that these are accessible to Russian authorities as well as to NGOs and interested parties generally. There are plans to dedicate a section of the MNR website to the work of the IWG. Other IWG priorities in 2010 will be to strengthen its relationships with oil and gas operators and to review results of western gray whale satellite tagging currently planned to take place in August-September.

Gizatulin stressed that the IWG is well positioned to address the issue of cumulative effects and to develop or promote guidelines such as those mentioned under item 3 (above). He gave assurances that the DMNG programme, as well as all other plans for seismic surveys in the known range of western gray whales within Russia, would be a focus of review and recommendations by the IWG. He also pointed to the fact that gray whales do not appear regularly or aggregate in all parts of the Sakhalin coast and therefore that the risks posed by seismic surveys and other industrial activities vary depending on where and when they occur. The Panel, however, noted that the current population of western gray whales is far below its historical carrying capacity level (Weller *et al.* 2002) and had a much more extensive range in the past than it does today (Yablokov and Bogoslovskaya 1984; Reeves *et al.* 2008). If the goal of management is to see the population recover so that it is no longer endangered, it is important to consider the need to maintain habitat quality in other parts of the Sea of Okhotsk so that the population can grow and expand its range.

The Panel thanked Gizatulin for his presentation and for the mutually informative exchange of information. Further, the Panel expressed its wish to maintain close communication links via IUCN and the WGWAP website as well as through the direct involvement of Panel members in the work of the IWG.

13 PROGRESS ON RANGEWIDE INITIATIVE AND WGW CONSERVATION PLAN

Larsen reported that the first draft of the Conservation Plan had been completed and distributed to the review and drafting group. He stated his expectation that a revised draft would be considered at the IWC Scientific Committee in June 2010.

14 WGWAP SELF-EVALUATION

Rather than having a lengthy plenary discussion as at the last WGWAP meeting (WGWAP-7 report, item 17), on this occasion the Panel carried out a self-evaluation during its private session prior to the plenary and delegated Reeves to report back on the results.

As indicated under item 1.5 above, the problem of tracking recommendations has been largely resolved, which means that all parties involved – the Panel, Sakhalin Energy, IUCN and interested NGOs – can better focus their efforts on the issues that remain ‘open’. In contrast to the formal recommendations addressed to Sakhalin Energy, the Panel’s letters, public statements and requests and recommendations to third parties have not been tracked consistently either on the website or in Panel reports. It was concluded that this situation should change and in order to ensure that it does, the Panel **recommends** that IUCN work with the chair to establish a mechanism and procedure for not only posting the original statements but also any follow-up to these items.

Another subject discussed during the Panel’s self-evaluation was the future of the WGWAP process, given that the existing 5-year contract between IUCN and Sakhalin Energy is to end in December 2011. The work plan for the next year and a half must include, in addition to the standing agenda items, seismic survey follow-up analyses (likely to be a major focus of the December 2010 WGWAP-9 and probably also the April-May 2011 WGWAP-10), meeting and reporting of the Environmental Monitoring Task Force, and consideration of results and implications of the planned

2010 satellite tagging programme. Sakhalin Energy reported that it was already engaged in an evaluation of its gray whale research and monitoring programme, including the joint sponsorship arrangement with ENL and the Panel process. Decisions were expected to made over the next few months, well in advance of WGWAP-9. Therefore, the Panel expects to review the company's long-term programme in some fashion at WGWAP-9.

IUCN is required by the WGWAP terms of reference to commission an independent performance evaluation of WGWAP every two years. The next such evaluation is planned to begin in 2011 and will likely be regarded as a wrap-up for the first 5-year phase.

Reeves drew attention to the fact that the WGWAP terms of reference (section 4e) explicitly allow for changes, including expansion of the Panel's geographic scope to include more of the range of western gray whales than just the north-eastern Sakhalin Shelf (also see WGWAP-7 report, item 17). It was suggested that the Panel, Sakhalin Energy and IUCN should reflect on possible changes to the terms of reference and this matter will be included on the WGWAP-9 agenda.

Hancox pointed out that Sakhalin Energy's loan agreement requires that any substantive change to the existing Panel process would have to be approved by the Lenders. Bell confirmed that the latest version of the loan document states that a panel must exist and that it can be disbanded only with the agreement of the Lenders. Hancox added that although some general criteria for the Panel process are given in the loan document, it is made clear that the detailed terms of reference are to be developed and agreed by Sakhalin Energy, the convening body (IUCN) and the Panel.

15 ANY OTHER BUSINESS

It was agreed that the next WGWAP meeting would be in Geneva in early December 2010 and that provision would be made for a meeting immediately beforehand to consider the results of the June 2010 seismic survey.

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SUMMARY OF RECOMMENDATIONS FROM THE 8TH MEETING OF WGWAP

Recommendation Number	Cross-Reference	WGWAP Recommendations & Requests	Responsible Party/ Parties	Target Completion Date	Sakhalin Energy Response
Item 2:	**Results of 2009 distribution, behaviour, noise and benthic monitoring**				
WGWAP-8/001	Item 2.3	The Panel **recommends** that a more finite analysis be undertaken to examine the presence/absence of mother-calf pairs off Station 07 in comparison to the other sampling stations.	Sakhalin Energy	WGWAP-9	This action is not for Sakhalin Energy as the Company does not have the relevant data.
WGWAP-8/002	Item 2.3	The Panel **recommends** that Sakhalin Energy establish such integration – of acoustic, behaviour and distribution data as well as benthic data – as a priority action item in its work programme.	Sakhalin Energy	April 2011	The problem with this is of course these data sets have been collected independently and integration may not be possible and further where there is overlap it may not be fully representative. SEIC proposes this be looked at as potential PhD topics – one on statistical evaluation, a second on the integrated significance. However, Sakhalin Energy recognises the importance of this and will provide increased focus on this in 2010 and 2011.
WGWAP-8/003	Item 2.4	The **Panel has requested, and again requests,** that instead of or at least in addition to the current logarithmic depiction, acoustic data be plotted on a linear scale from 1-1000 Hz, which had been discussed in detail with Sakhalin Energy at the last meeting.	Sakhalin Energy	WGWAP-9	Sakhalin Energy will address this concern.
WGWAP-8/004	Item 2.4	The Panel **reiterates recommendation WGWAP-7/002**, noting its importance to future analyses. Moreover, the Panel **emphasises** that this recommendation was intended to reduce, not increase, the burden on Sakhalin Energy because only data that are needed for additional analyses would be requested.	Sakhalin Energy	When requested by the Panel – with requests making specific	Sakhalin Energy will address this concern and increase liaison with the relevant panel members to ensure that data is correctly provided.

Recommendation Number	Cross-Reference	WGWAP Recommendations & Requests	Responsible Party/ Parties	Target Completion Date	Sakhalin Energy Response
				reference to this recommenda tion	
Item 4:	**4-D seismic survey**				
WGWAP-8/005	Item 4.2.1	The Panel **recommends** that three behavioural triggers, besides the acoustic modelling predictions and measurements, be used for temporary shutdowns of the seismic survey operations. These triggers for precautionary shutdowns are intended to refer to unambiguous signs of aberrant behaviour or distress in individual animals. The three triggers were defined as (i) repeat breaching, (ii) mother-calf pair separation of more than five body lengths and (iii) fast travel.	Sakhalin Energy	4-D seismic survey	Sakhalin Energy has included these in the protocols for the 4D Seismic.
WGWAP-8/006	Item 4.2.1	A RHIB will be used to service the acoustic buoys, and the Panel **recommends** that during these operations the crew on the RHIB record whale sightings and make acoustic recordings.	Sakhalin Energy	4-D seismic survey	Wherever this is possible the team on the RHIB will record whale sightings.
WGWAP-8/007	Item 4.2.1	The Panel **reiterates** its position that having the OV with the capabilities specified by the SSTF is integral to the monitoring and mitigation plan and that without this vessel, properly equipped, the plan cannot be implemented effectively.	Sakhalin Energy	4-D seismic survey	The availability of vessels in the Far East of Russia is limited but the Pavel Gordienko has been secured and mobilised as the observation vessel for the 4D seismic.
WGWAP-8/008	Item 4.2.1	The Panel **recommends** the use of an automated information system (AIS) to report and track the locations of vessels during the seismic survey.	Sakhalin Energy	4-D seismic survey	An AIS recorder has been purchased for the seismic survey monitoring and mitigation.
WGWAP-8/009	Item 4.2.2	In lieu of an observer on the observation vessel, the SSTF suggested that a post hoc analysis be conducted by Sakhalin Energy to compare shore-based and vessel-based observations and evaluate the effectiveness of the vessel-based observation effort. ….	Sakhalin Energy	WGWAP-9	Sakhalin Energy agrees that if the data is available it will be analysed

Recommendation Number	Cross-Reference	WGWAP Recommendations & Requests	Responsible Party/ Parties	Target Completion Date	Sakhalin Energy Response
		The Panel **recommends** that this analysis be done with whatever data are available after the survey.			
WGWAP-8/010	Item 4.2.3	The Panel **recommends** that a log of all events associated with the monitoring is kept. For example, any event that requires a communication between the teams (*e.g.* acoustic and behavioural) should be logged.	Sakhalin Energy	4-D seismic survey	Sakhalin Energy will keep a log of such events during the seismic.
Item 7:	**Oil spill prevention, preparedness and response**				
WGWAP-8/011	Item 7	The Panel **recommends** that the company provide an update for WGWAP-9 on progress with the two documents, one a manual on spill response in ice and the other a handbook for monitoring and assessment of oil spill response operations (see WGWAP-7 report).	Sakhalin Energy	WGWAP-9	Sakhalin Energy will follow-up on these and provide as they are available.
WGWAP-8/012	Item 7	The Panel **requests** that Sakhalin Energy make the PCCI report available for Panel prior to WGWAP-9.	Sakhalin Energy	WGWAP-9	Sakhalin Energy will follow-up on these and provide as they are available.
Item 9:	**General topics**				
WGWAP-8/013	Item 9.3	The Panel decided to transmit the marked-up version of the MMPP to Sakhalin Energy for response and action and Reeves requested that Dicks send the document directly to Bell on the Panel's behalf. The Panel **recommends** that Sakhalin Energy provide comments and report back on substantive issues in advance of WGWAP-9.	Sakhalin Energy	WGWAP-9	Sakhalin Energy will review the comments and respond.
Item 14:	**WGWAP self-evaluation**				
WGWAP-8/014	Item 14	The Panel **recommends** that IUCN work with the chair to establish a mechanism and procedure for not only posting the original statements but also any follow-up to these items.	IUCN	June 2010	

Annex 1. List of participants

PANEL MEMBERS PRESENT

Robert L. BROWNELL Jr.
Senior Scientist
Southwest Fisheries Science Center
National Marine Fisheries Service
1352 Lighthouse Ave.
Pacific Grove, California 93950
USA

Justin G. COOKE
Centre for Ecosystem Management Studies
Alexanderstrasse 10
79261 Gutach
Germany

Brian DICKS
7 High Street
Hadleigh IP7 5AH
Suffolk
UK

Douglas P. NOWACEK
Duke University
Nicholas School of the Environment &
Pratt School of Engineering
135 Duke Marine Lab Rd.
Beaufort, North Carolina 28516 USA

Randall R. REEVES (Chairman)
Okapi Wildlife Associates
27 Chandler Lane
Hudson
Québec J0P 1H0
Canada

Grigory TSIDULKO
Sherbakova str. 7 A-42, Mitishi
Moscow 114008
Russia

Glenn R. VANBLARICOM
School of Aquatic and Fishery Sciences
Fishery Sciences Building, Rm. 116
1122 NE Boat Street
Seattle, Washington 98105
USA

Alexander I. VEDENEV
Head of Noise in Ocean Laboratory
PP Shirshov Institute of Oceanology
Russian Academy of Sciences
Nakhimovskiy Ave, 36
Moscow 117997
Russia

David WELLER
Southwest Fisheries Science Center
National Marine Fisheries Service
8604 La Jolla Shores Drive
La Jolla, CA 92037
USA

Alexey V. YABLOKOV
Councillor
Russian Academy of Sciences,
Leninsky prospect, 33, office 319
Moscow 119071
Russia

Sakhalin Energy Investment Company Ltd.

Doug BELL

Valery CHOLOVSKY

Valeriy FADEEV

Glenn GAILEY

Judy MUIR

Roberto RACCA

Olga TYURNEVA

Dorine TERWOGT de Jonge

Associate Scientists

Brandon SOUTHALL

IUCN

Sarah HUMPHREY

Finn LARSEN

Béatrice RICHE

Observer NGOs

Wendy ELLIOT, WWF International

Alexey KNIZHNIKOV, WWF Russia

Pnina LEVERMORE, Pacific Environment

Observer Lenders

Jon HANCOX, AEA Group

Gary LOWE, Standard Chartered Bank

Bruce MATE, AEA Group

John TOBIN, Credit Suisse

Observer Others

Renat GIZATULIN, Ministry of Natural Resources and Environment of Russian Federation

Annex 2. Final meeting agenda

1 Opening

- 1.1 Introduction and logistics
- 1.2 Adoption of agenda
- 1.3 Documents
- 1.4 Reporting procedures and timelines
- 1.5 Update on status of recommendations

2 Results of 2009 distribution, behaviour, noise and benthic monitoring

- 2.1 Recap of Sakhalin Energy/ENL 2009 distribution monitoring programme
- 2.2 Results from 2009 observational effort by non-industry groups
- 2.3 Results from Sakhalin Energy/ENL 2009 whale behaviour monitoring programme
- 2.4 Results from Sakhalin Energy/ENL 2009 acoustic monitoring programme
- 2.5 Results from Sakhalin Energy/ENL 2009 benthic monitoring programme

3 Review information on relevant activities by other companies in 2009 and 2010 (*e.g.* pile-driving, seismic surveys)

4 4-D seismic survey

- 4.1 Summary of Sakhalin Energy seismic plans for 2010 including the earliest start date based on ice data
- 4.2 Seismic Survey Task Force
  - 4.2.1 Review and summary of inter-sessional tasks and pre-meeting workshop
  - 4.2.2 Independent Observer
  - 4.2.3 Work plan

5 Photo-ID

- 5.1 Presentation on 2009 photo-ID
  - 5.1.1 IBM/Sakhalin Energy photo-ID research
  - 5.1.2 Russia-US team
- 5.3 Review of photos of (2009) stranded whale
- 5.4 Progress and work plan

6 Population assessment

- 6.1 Update on population assessment
- 6.2 Discussion of results
- 6.3 Follow-up

7 Oil spill prevention, preparedness and response

8 Satellite tagging

- 8.1 Report on eastern gray whale tagging in 2009
- 8.2 Plans for western gray whale tagging in 2010

9 General topics

9.1 Status of tissue sample from 2009 Chaivo stranding

9.2 Necropsy experts update

9.3 Marine Mammal Protection Plan feedback from Panel

10 Report from Environmental Monitoring Task Force and future work plan

10.1 Results of request to ENL

10.2 Work plan (including workshop)

11 Multivariate analysis (MVA)

11.1 Preliminary results of MVA

11.2 Progress on workshop

12 Information from meetings of Russian Inter-departmental Working Group on WGW conservation

13 Progress on rangewide initiative and WGW conservation plan

14 WGWAP self-evaluation

15 Any other business

Annex 3. List of documents

DOCUMENT NUMBER	SUBMITTED BY	TITLE	STATUS
WGWAP-8/1	IUCN	Provisional agenda (including time schedule) (English)	Public
WGWAP-8/2	IUCN	Provisional agenda (including time schedule) (Russian)	Public
WGWAP-8/3	IUCN	List of documents distributed in connection with the 8th meeting of the WGWAP	Public
WGWAP-8/4		No document	
WGWAP-8/5		No document	
WGWAP-8/6	IUCN	Information on relevant activities by other companies (PP presentation)	Public
WGWAP-8/7	Mate	Preliminary report on eastern gray whale tagging in 2009 (PP presentation)	Not available
WGWAP-8/8	Mate	Plans for western gray whale tagging in 2010 (PP presentation)	Not available
WGWAP-8/9	Cooke	Joint population assessment of Western Gray Whales using data from IBM and Russia-US photo-identification teams collected off Sakhalin Island through 2008	Public
WGWAP-8/10	Sakhalin Energy	Western Gray Whale Research and Monitoring Program in 2009, Volume I (English)	Public
WGWAP-8/11	Sakhalin Energy	Western Gray Whale Research and Monitoring Program in 2009, Volume II (English)	Public
WGWAP-8/12	Sakhalin Energy	Western Gray Whale Research and Monitoring Program in 2009, Volume I (Russian)	Public
WGWAP-8/13	Sakhalin Energy	Western Gray Whale Research and Monitoring Program in 2009, Volume II (Russian)	Public
WGWAP-8/14	Sakhalin Energy	Final MMO programme 2009 Closeout Report	Public
WGWAP-8/15	Sakhalin Energy	Acoustics and Hydrographic Studies on the Northeast Sakhalin Shelf, 2009 (English)	Public
WGWAP-8/16	Sakhalin Energy	Acoustics and Hydrographic Studies on the Northeast Sakhalin Shelf, 2009 (Russian)	Public

Annex 4. Map of available information on industrial activities planned or ongoing on the Sakhalin Shelf.

Lebedinskoye
- Sakhalin-1 / Rosneft Shelf Far East
- 2-D seismic survey
- June 2010 ?

Kaigansky-Vasukanskiy license area
- Sakhalin-5 / Elvary Neftegas (Rosneft-BP)
- 2-D seismic survey
- 2010-2012

North-Veninskaya area
- Sakhalin-3 / Venineft (Rosneft-Sinopec)
- Exploration wells construction
- Timing ?

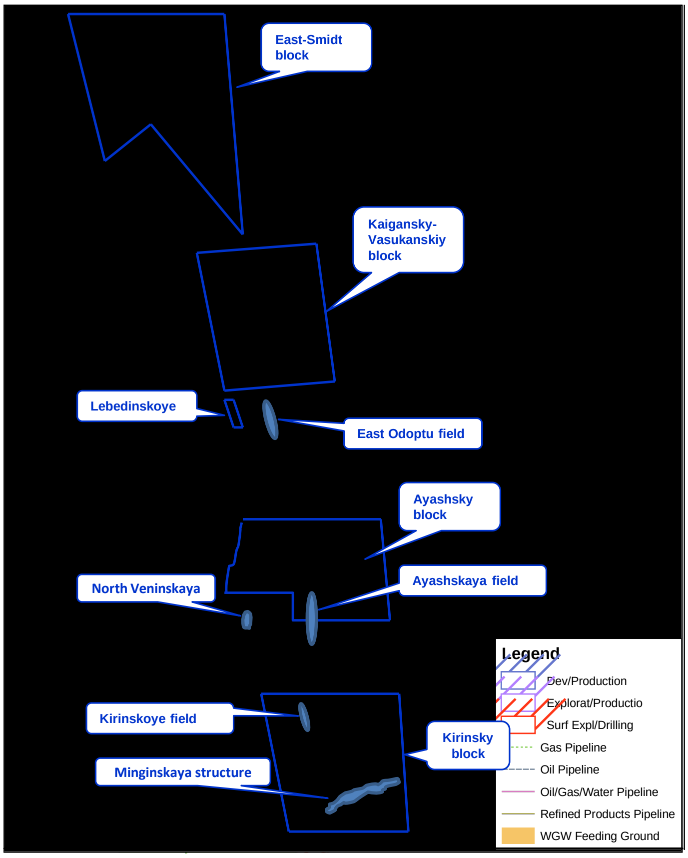
Order #347-348 from 30.04.2009

Ayashskiy field
East-Odoptu field
Kirinskoye field
- Sakhalin-3 / Gasprom
- 2-D and 3-D seismic surveys
- Summer–Fall 2010-2012

Minginskaya structure
- Sakhalin-3 / Gasprom
- 3-D seismic survey; 600 km2
- Timing: Fall 2009, but not started by Oct. 2009; maybe postponed to 2010

East-Smidt
- Sakhalin-5 / East-Smidt Neftegaz (Rosneft-BP)
- 2-D seismic survey
- Timing ?

Order #635-637 from 17.07.2009



Annex 5. Terms of Reference for Independent Observer, Astokh 4-D Seismic Survey

Sakhalin Energy will conduct a 4-D seismic survey of the Astokh lease area during June 2010. Sakhalin Energy and WGWAP, primarily via the Seismic Survey Task Force (SSTF), have jointly developed an integrated monitoring and mitigation program to minimize the effects of the survey on western gray whales and to maximize data collection to assist in the planning of similar programs for future seismic surveys. Inevitably, these programs are complex, particularly in remote areas, and require decisions to be taken in the field in real time based on the guidance provided in the monitoring and mitigation plan. Implementation of the plan will require prompt integration of information of a number of types (*e.g.* acoustic, visual sightings, observed behaviour) from a number of sources (buoys, vessels, shore stations).

In order to evaluate the effectiveness of the monitoring and mitigation program, and also to provide a degree of transparency and public confidence, Sakhalin Energy and the SSTF agreed that an independent observer should be present to develop a firsthand report on the effectiveness and implementation of the plan and to provide any recommendations for improvements. The qualifications and duties of the independent observer (IO) are given below.

Qualifications:

(1) Be able to speak English and communicate on progress with the lead operator offshore.

(2) Be able to communicate effectively in real time with the crew of the vessel including the senior MMO.

(3) Have completed the Sakhalin Energy basic safety training program for shore-based personnel or an approved equivalent.

(4) Be in possession of any Russian documentation needed to undertake the duties outlined in these Terms of Reference.

(5) Have experience in cetacean fieldwork.

(6) Have an understanding of the issues surrounding seismic surveys and whales, including knowledge of seismic acquisition operations and procedures.

(7) Have a good understanding of the monitoring and mitigation plans and the reports that led to their development.

(8) Have a good understanding of the acoustic data expected to be received and the ability to interpret such data in the light of the monitoring and mitigation plan.

(9) Be able to monitor the progress of the vessel in the light of A- and B-lines (and any truncation thereof).

Duties and collaboration:

(1) Comply with all Sakhalin Energy safety requirements.

(2) Behave courteously and responsibly at all times.

(3) Arrive on Sakhalin Island in time to complete necessary safety training and then mobilize with the field teams in advance of the start of the survey. Remain on site for at least half of the actual seismic survey (~10 days depending on weather).

(4) Receive and review, in near real time, visual and acoustic data relevant to implementation of the monitoring and mitigation plan and thus to evaluate compliance with the plan and/or any difficulties in its implementation [the IO will be on shore and will be able to view the acoustic data coming from the real time monitoring buoys].

(5) Co-operate with the senior MMO and provide advice where appropriate on the implementation of the plan, whilst recognizing the existing decision-making structure [the IO has no authority to start or stop any operations].

(6) Provide real or near real-time feedback, while in the field during the survey, to IUCN and to Sakhalin Energy about any apparent gross violations of the protocols set forth or other observations of serious concern.

(7) Present a full report to IUCN on the implementation of the plan and document any exceptions or changes to the protocol should they occur. The documentation should be of sufficient detail to allow for a full analysis and review of the program, including an overall conclusion on the success of the implementation of the plan and recommendations for improvements for future surveys, if appropriate. The report will include:

(a) A general summary of IO schedule, activities and general impressions;

(b) A detailed summary of observations of each on-land team (*e.g.*, acoustics, behavioural stations), including an assessment of efficacy and lessons learned;

(c) A detailed assessment of how well communication did/did not work within and between teams during the survey; and

(d) A detailed assessment of the overall efficacy of the protocols established by WGWAP and Sakhalin Energy for the survey.

The report will be authored by the IO and made public by IUCN after acceptance by the Panel. The draft report will be subject to review by Sakhalin Energy to ensure factual accuracy, following a procedure similar to that used for WGWAP reports.

Other:

(1) All contractual, travel and financial arrangements will be made by IUCN.

(2) There are regular scheduled telephone conference calls to shore from the seismic operations in which it is possible that the observer could participate.

Annex 6. Decision tree for satellite tagging off Sakhalin in 2010 (courtesy of Bruce Mate).