

## Discussions of Day 2 (June 18, 2002)

Combined reports by R. D. Larter<sup>1</sup> and J. Caldwell<sup>2</sup>

Note: Format followed here will comprise name of presenter and title, then the questions/comments raised by participants. No notes of the formal presentations have been included as the presenters are all providing abstracts of their talks. "?" indicates unidentified questioner during discussions.

S. HEMILÄ

Audiograms of whales and dolphins: effects of ear size and predictions based on a middle ear model.

1. Ketten - asked about assumptions from cat model. How will partition in cat ear affect model. Model appears to be based on partitioned ear in cat, but using whole volume for dolphin. Also asked about effect of air in ear.

[Air not considered in model because sound content relatively insignificant - but would become important in deep diving.]

2. Miller - asked about resonance in dolphin ears.

[Ear is highly damped so there should not be large resonance.]

R.E.J. WOehler

Hearing abilities in Antarctic penguins.

1. ? - What is reference for vocalization study?

[Eric says it is a long monograph and he can give the reference to anyone who is interested.]

2. Hofman - asked for more information on diet and use of sound in diving: active or passive?

[Eric said diet mainly consists of krill in the Peninsula region (or crustaceans in general but no fish). No information on how penguins use sound in diving, but dive profiles show they are very efficient at finding food at sea floor - they spend very little time at sea bed.]

3. ? - A question was asked about genetic isolation of colonies.

[Not known.]

4. ? - Why haven't studies been conducted on captive penguins?

[Don't have a good answer to this, particularly as to how they find food at depth. Someone else made comment that the interest has not been high enough to study penguins in captivity.]

5. ? - What are reasons for species distribution?

[Emperor Penguins breed on winter pack ice - there is not

as much of this in Antarctic Peninsula region. Several other species that breed on islands have requirements that are similar to one another.]

6. ? - Do Emperor penguins still have air in lungs when they dive to great depth? If so this could make them vulnerable to strong sound signals.

[Don't have an answer to this.]

7. Scheifele - commented aquaria will commonly turn down research applications on penguins until they have stable breeding population.

8. Nachtigall - stated that there are some old papers (60's, 70's) that discuss the idea penguins might use echo location.

H. MILLER

Acoustic parameters and hydroacoustic equipment: natural noise, industrial exploration and basic science.

1. Weilgart - asserted that proposed low impact is not a justification for lack of regulation.

[Miller answered that perhaps life in general is too much regulated - why add new regulations where there is no need?]

2. van Franeker - asked if icequakes are a significant source of noise in the Southern Ocean.

[Miller agreed that icequakes are an important source of high amplitude noise and they look like earthquakes of magnitude 3.5]

3. ? - The validity of earthquake noise levels quoted was questioned, and it was pointed out that many are sourced in deep water.

[Miller pointed out that the examples he had chosen were from relatively shallow water areas, i.e., Juan de Fuca Ridge and South Sandwich arc.]

4. ? - Can various working groups obtain some of the data that have been shown in these last two talks?

[Ketten answers: Christine Erbe has written papers about earthquake and ice-cracking noise and effects on belugas. I have seen no data tying strandings to earthquakes and ice cracking. The ice-cracking events are singular high intensity events.]

5. ? - You mentioned aggregations of whales who do not flee from areas of high numbers of earthquakes. We go into discos and do not leave. Antarctica is a special area and such comparisons should not be made here.

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[The first point is yes, the food brings them to the arc. If you see that.]

W.M.W. ZIMMER

Underwater acoustics and whales in the Mediterranean Sea.

1. ? - Can active sonar be used to locate whales?

[As yet, SACLANT attempts to get an echo from whales have never been successful. - However, Caldwell said, that the U.S. Navy has developed a high frequency active sonar, reportedly capable of detecting whales at ranges up to 2 km, to be used in conjunction with the LFA sonar.]

2. Weilgart - asked if active sonar pings affected whale behaviour in any way.

[No change in behaviour has been observed.]

3. Kock - asked if the knowledge that Sperm Whales are found mostly in upwelling areas would be used to direct military exercises away from that area.

[SACLANT will certainly avoid such areas for their own active sonar experiments, but Walter Zimmer said he could not answer for NATO military as a whole.]

4. Comment from Hofman - If you combine research and mitigation measures, you can leave yourself in a bind. For example, if, as a mitigation measure, the research protocol limits sound exposure levels to less than is assumed to have possible adverse effects, we will never know if the assumed "safe" exposure levels are in fact safe.

5. Miller - asked if the HYDROSWEEP multibeam echo sounder system was active during the Sperm Whale study described.

[No, it was not.]

6. Nachtigall - mentioned that Sperm Whales have been monitored calling at 230 dB re. 1  $\mu$ Pa, so he suggested that this observation can inform application of the pre-cautionary principle.

R.D. LARTER

Seismic and sonar investigations carried out by the British Antarctic Survey in the Southern Ocean.

1. Weilgart - asked why the table of source parameters that was presented did not include amplitudes for GLORIA and HAWAII-MR1.

[Because I have not yet been able to find these figures, either from the literature or from the people responsible for these systems.]

2. ? - Can't you find them or measure them yourself?

[I don't have the equipment.]

3. ? - Are the North Sea guidelines practiced in Antarctica?

[No, I just heard about them.]

CHR. DE MOUSTIER

Modern oceanographic research vessels.

1. ? - Can you comment on units of your source levels? [They were probably close to your RMS source levels.]

Z. CRUTCHFIELD

Seismic surveys and marine mammal observers.

1. Szelinski - asked if these regulations applied to Antarctic expeditions.

[Regulations only apply to UKCS, but some operators apply guidelines voluntarily elsewhere.]

2. ? - Your guidelines deal with seismic sources, how do you deal with sonars and fish finders?

[I am only talking about air guns. I can send you a document from DTI that deals with other acoustic sources that come under other guidelines.]

3. Arntz - expressed his concern that such regulations will make biological research in Antarctica impossible, because biologists need to work in areas where wildlife is concentrated. He suggested that the only way forward is to distinguish between seismic and other sources. [Swath bathymetry and sidescan surveys are not subject to same regulations on UKCS.]

4. ? - Is there anything done about any diving birds?

[No. JNCC uses a different approach for birds]

5. Kappen - asked how different marine mammal sounds detected by hydrophones may be distinguished.

[There are some expert systems being developed that use neural networks. (e.g. Seamap "rainbow click", from Singapore). This is a developing field.]

Caldwell - commented that this is still in development - not ready for widespread application.

R.J. HOFMAN

United States laws and regulations applicable to U.S. citizens and U.S. activities in Antarctica.

1. Crutchfield - informed about a meeting that JNCC has assembled information on how to assess what constitutes a "significant effect".

2. De Moustier - asked for definition of "take" to be clarified.

[The term harassment is defined in the U.S. Marine Mammal Protection Act to mean "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." In 1994, the term harass was defined to differentiate between activities that could injure a marine mammal or marine mammal stock in the wild (level A harassment), and activities that are likely to have no more than minor effects on behaviour (level B harassment). The purpose of the amendment was to enable implementation of a general authorization for marine mammal research expected to result in level B harassment only.]

3. ? - How many CEE's have been prepared since 1991? [One - the rebuilding of South Pole Station.]