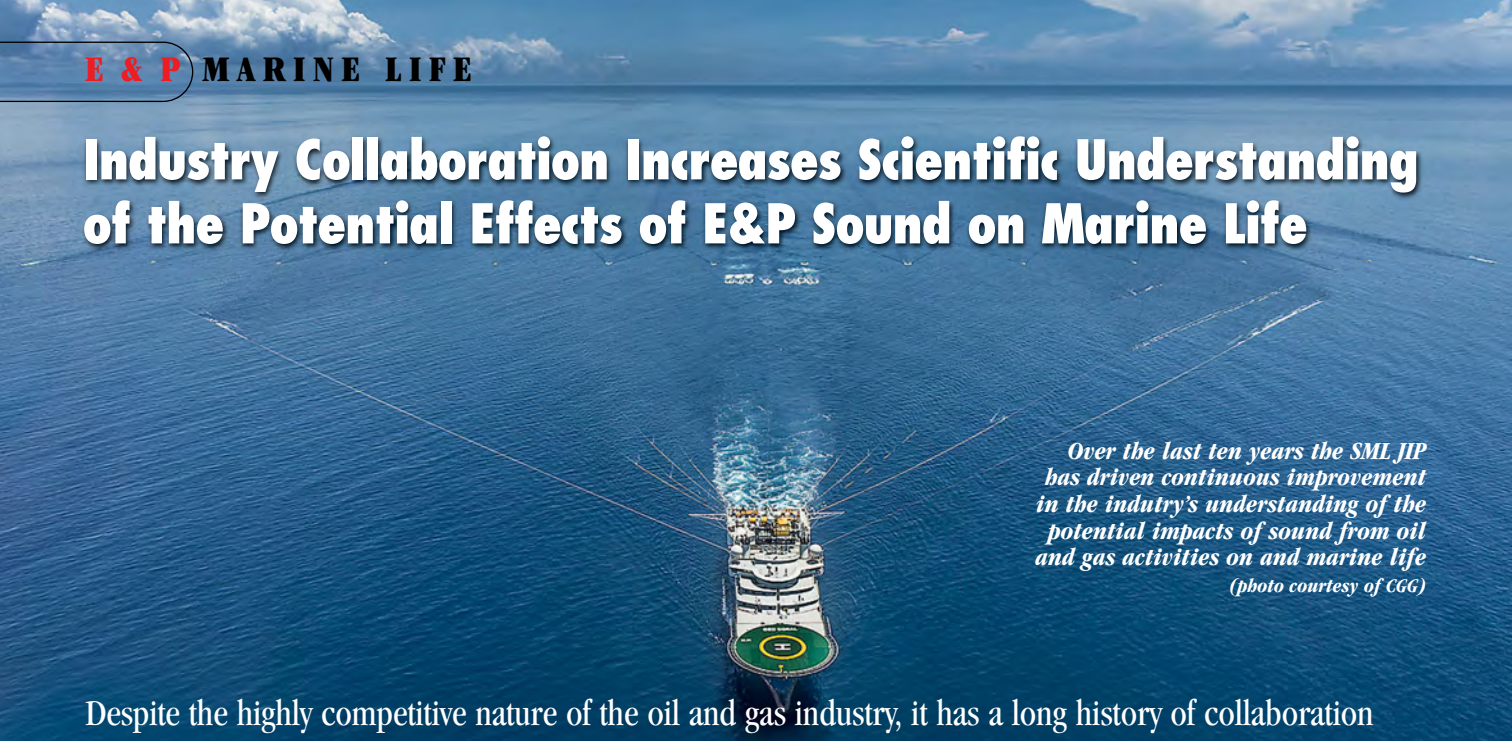
Industry Collaboration Increases Scientific Understanding of the Potential Effects of E&P Sound on Marine Life



Over the last ten years the SML JIP has driven continuous improvement in the indutry's understanding of the potential impacts of sound from oil and gas activities on and marine life (photo courtesy of CGG)

Despite the highly competitive nature of the oil and gas industry, it has a long history of collaboration to develop a better understanding of the potential impacts of our activities. For example, the industry collaborates exceptionally well on its first and foremost priority of managing health, safety and environmental issues. The Joint Industry Programme (JIP) on Exploration & Production (E&P) Sound & Marine Life (SML) is a sterling example of this.

BY PAUL SHONE

We are a partnership of 12 oil and gas companies and the International Association of Geophysical Contractors (IAGC), and together we form the largest non-governmental sponsor of research to increase understanding of the potential effects of industry sound on marine life.

Although financially supported by exploration and production companies, all research is carried out independently by researchers receiving contracts awarded by a competitive bid process. SML JIP policies require that all research is shared in public reports and published in peer-reviewed scientific journals to ensure maximum transparency and value to the wider research community.

To advance understanding of the interaction between sound from oil and gas operations and marine life, the SML JIP identifies and commissions research to:

- support planning of E&P projects and risk assessments,
- provide the basis for appropriate operational measures that are protective of marine life, and
- inform policy and regulatory development.

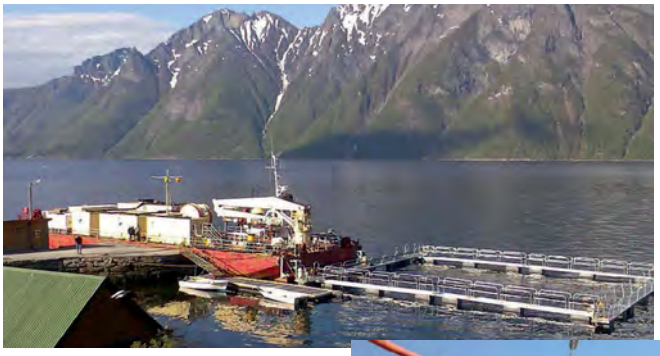
Over the last ten years we have committed USD 55 million to specialist global research, driving continuous improvement in our understanding of the potential impacts of sound from oil and gas activities on and marine life. Some highlights to date have included projects described below.

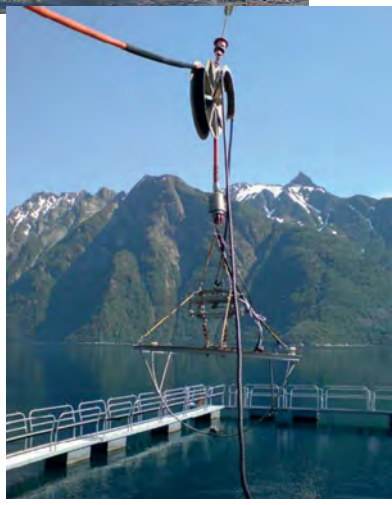
Svein Vaage Broadband Airgun Measurements

This project was designed to determine whether airguns produce very high frequencies (up to 50 kHz) that may affect hearing in marine mammals, as claimed by opponents of airgun use. Since the frequencies most useful to industry are below 1000 Hz, this area had not been extensively researched previously.

Frequency characteristics of 73 types of airguns were measured up to 50 kHz, with measurement carried out in the near-field, mid-field and far-field. Each combination was measured from 1 to 100 metres in depth and at various operating pressures to obtain the most comprehensive airgun output measurements ever made.

This research improves the accuracy of predictions of the sound characteristics likely to be encountered by marine life. Results will guide impact assessments in various marine habitats during seismic operations, leading to more scientifically robust risk evaluation and mitigation strategies.





Broadband Airgun Measurements test platform in Hjørundfjord, Norway (photos: PGS)

Behavioural Responses of Fish to Seismic Sources

The effect of airguns on fish is a high-profile issue, which has been challenging to fully evaluate because fish species are numerous and highly variable, and because no easy method exists for measuring the behaviour of wild, unrestrained fish.

The SML JIP has run a series of workshops, first in Norway and then in Canada, to first discuss the issue and then to discuss various approaches to assessing large scale impacts of seismic activity on fish over time.

These two workshops laid the groundwork for writing Requests for Proposals for fish behavioural studies by assessing existing and future technologies and ways to measure fish behaviour and specifying experimental design and research strategies to meet the challenges of field experiments.

Leiden University was the successful respondent to the RFP and will undertake research into the effects of sound-producing activities, particularly seismic operations, on fish behaviour. The scope of this work includes an assessment of how behavioural responses to seismic surveys might affect factors such as reduced survival and/or reproduction, the potential impacts to fisheries, and those elements of sound stimuli that elicit such reactions.

Airgun effects on Arctic Seals: Auditory Detection, Masking and TTS in Pinnipeds

As Arctic sea ice continues to decrease and previously inaccessible areas are being opened to the public, industry, and military, the indirect impact of sound produced from human activity is of concern. Increasing industry activities in these environments, and the recent listing [in the United States of America] of some Arctic species as "threatened", have increased the need for data on the effects of industry sound on hearing in Arctic pinnipeds. Assessing the risk of hearing effects from E&P sound and developing appropriate mitigation measures depend on good experimental data from the laboratory.

The two-stage approach to this Arctic pinniped hearing study began with training captive ringed, spotted and bearded seals for participation in behavioural hearing tests. Aerial and underwater audiograms and critical ratios have been published for the spotted and ringed seals, and bearded seals are being trained to produce similar data.

These hearing data for spotted seals are the first available for this species. In this first stage, critical ratios, a measure of the ability to hear sound in the presence of a masking sound, have been estimated; they were among the lowest ratios (less effect of masking sound) than in most other mammals.

The second stage of research will involve the hearing effects of exposure to multiple airgun pulses and masking from distant and nearby seismic sources. When completed, this research will describe the auditory capabilities of Arctic seals and improve our ability to predict the effects of sound exposure on these species. The type of data to be provided by this project will serve to fill critical data gaps for some Arctic pinnipeds, provide rationale for extending results to other species of Arctic pinnipeds, and enable decision-making based on best available science.

The results of these and other research studies have ensured that oil and gas producers and international governments and regulators have the science upon which they can make informed decisions. ■

For more information about the studies listed in this article, and other SML JIP activities, visit www.soundandmarinelife.org

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Paul Shone is currently the Acting HES Manager for the Global Technology Centres in London, Aberdeen and Perth WA, based in London. A graduate of Leeds and Portsmouth, with an MSc that included investigation of static electric induced explosions, Mr Shone is the Chair of OGP's Sound and Marine Life JIP Executive Committee and is working to develop Chevron's wave glider and unmanned vehicle strategy.