



## Statement of Concern about Seismic Activities to Explore Hydrocarbon Resources in the Waters of the Maldives

We the undersigned draw your attention to concerns about seismic activities to explore hydrocarbon resources in the waters off the Maldives.

The Maldives enjoys some of the richest marine biodiversity of any region in the world. The country's coral reefs are the seventh largest in the world, representing some 5% of the global reef area. These reefs are a precious resource because of their beauty and biodiversity. They provide shelter for a wide variety of marine life, humans with recreation, a valuable source of organisms for potential medicines, create sand for beaches, serve as a buffer for shorelines, and protect the islands from natural disasters. The some 21,000 square kilometers of reefs in the Maldives are home to 250 species of coral, which teem with over 1,000 species of fish.

Most importantly, the Maldives' unique environment is the bedrock of its economy. Fisheries and tourism – the two largest industries – heavily depend on a healthy and diverse marine ecosystem. Together, these two industries provide three quarters of the jobs, 90% of the GDP and two thirds of the foreign exchange earnings in the Maldives.

Placing long-term economic and environmental health in jeopardy because of short term profit through exploration and exploitation of oil & gas could have severe socio-economic consequences in the fisheries and tourism sector, but could also affect food security and safety of the Maldivian people.

### THE IMPACT OF AIR GUNS

Offshore exploration for oil & gas primarily use seismic surveys (air gun arrays). Similar surveys are also used for research purposes. Seismic surveys produce sound by introducing air into the water at high pressure, usually directed toward the sea floor, with up to 20 guns being fired in synchrony, while “streamers” of hydrophones listen for echoes. Air gun pulses penetrate tens to hundreds of kilometres into the Earth's crust, after having already travelled through sometimes thousands of meters of water. Surveys can last for many weeks at a time. During the surveys, every air gun in the array produces a pulse of noise lasting 20 to 30 milliseconds which is repeated on average every 10 to 15 seconds, often for 24 hours a day

over many weeks. Air guns located 3000 km away were the predominant part of the background noise heard over hydrophones placed in the middle of the North Atlantic Ocean.

As oil and gas reserves become more scarce, offshore exploration is moving into more environmentally sensitive and difficult habitats. Seismic surveys generate a great deal of waste noise (anything over 100 Hz up to as high as tens of kHz) that is unused by the petroleum industry or geophysical researchers. They also produce a loud pulse that is damaging to marine life because it is a sharp sound, with a fast rise time. More environmentally benign alternatives exist, yet these are not being used by industry.

We draw your attention to Annex I: A Review of the Impacts of Seismic Air Gun Surveys on Marine Life

### **THE IMPORTANCE OF ENVIRONMENTAL IMPACT ASSESSMENT**

We are concerned that there was no public consultation and that no appropriate Environmental Impact Assessment was undertaken for preliminary research conducted by the German Research vessel “Sonne” in the region.

The Scientific Council of the Convention on Migratory Species (CMS) recently determined that Environmental Impact Assessments for Offshore Petroleum Exploration Seismic Surveys should provide a science-based tool for decision-makers to better understand the consequences of their decisions, evaluate alternatives and mitigate impacts.

Around the world, offshore exploration proposals are presented to Governments with generalized, unsubstantiated information and often without having conducted basic consultation. Subsequent decision-maker approvals or rejections of such poor Environmental Impact Assessments are being made on the basis of erroneous information and are vulnerable to criticism of bias or tokenism.

Environmental Impact Assessments should provide level of technical information that gives confidence to decision-makers.

### **IMPACT ON FISH SPECIES AND FISHERIES**

Criticism and concerns are arising within various economic sectors, including tourism, against the proposed exploration of oil and gas resources. In this section we draw your attention to the potential impact of seismic activities on fish stocks and therefore the potential economic harm to the fisheries sector.

Three decades of controlled scientific studies leave no doubt that intense sound damages fish and impacts fisheries. Ocean noise has a negative effect on at least 55 marine species. Even the viability of fish eggs was reduced in one study when the eggs were exposed to moderately loud sound for several days.

In 2003 researchers exposed pink snapper to seismic air gun sounds and found that their ears were severely damaged. The auditory hair cells did not regenerate after almost two months. This damage was seen at exposure levels that might occur several kilometres away from the sound source. The authors note the ears of pink snapper are typical of the majority of commercially important species such as cod, haddock, salmon, and tuna.

The authors also point out that fish with hearing impairment are more vulnerable to predators and less able to locate food and communicate acoustically. A review paper on the effects of

noise on fish in 2003 concluded that current studies suggest that noise affects fish behaviour and thereby, fisheries.

In a study done by the Norwegian Institute of Marine Research, air guns caused extensive damage to the inner ears of fish and lowered trawl catch rates 45 to 70% over a 2,000 square mile area of ocean. Catch rates did not recover in the five days surveyed after air gun use stopped. Air gun pulses also caused a catch per unit effort decline of about 50% in the rockfish hook and line fishery off the coast of California.

Several studies show that fish catch rates are significantly lowered by noise from air guns indicating that increasing levels of human-produced noise in the ocean can significantly and adversely impact the food supply, employment and economies of many nations.

A study commissioned by the Namibian government has revealed that the sharp decline in tuna catches is a result of an increase in seismic exploration for oil and gas in the Orange River Basin. The government was concerned that country's tuna catch shrunk to 650 tonnes in 2013 from 4 046 tonnes in 2011, and that the negative effect was as a result of the search for oil and gas on the Atlantic coast driving tuna stock from their normal migratory routes.

A taskforce established to investigate the ecological effects of seismic exploration on tuna fishing has recommended that the government halts further proposed seismic survey for oil and gas in the major tuna fishing ground until more information is available. Industry concerns continued into 2014

Similarly, the Australian tuna industry formally nominated marine seismic surveys as a 'key threatening process' under Australia's environment legislation in 2013. The industry believes that seismic exploration threatens, or may threaten, the survival, abundance or evolutionary development of a native species or ecological community.

These events only underscore the findings made in several studies of significant displacement of commercial fish, and loss of catch, over wide spatial scales. Indeed, the Namibian and Australian events appear to extend those findings to species of tuna, which have not previously been examined.

Noise also results in alterations in fish and squid behaviour, including: alarm responses and changes in schooling patterns, position in the water column and swimming speeds. A relationship between behavioural responses and noise level has also demonstrated.

Disruption of behaviour during critical periods such as mating, spawning and migration could be particularly important. Anecdotally, fishermen around the world have recognized a corresponding drop in fish recruitment in the seasons following a seismic survey, which could indicate that damage might have been caused to larval development or another part of the breeding lifecycle. However, the significant absence of studies before, during and after surveys means that empirical evidence is hard to demonstrate. The absence of studies is mostly because the industry has been reluctant to fund or facilitate the studies. However, *the absence of evidence is not evidence of absence*. Seismic survey proponents cannot empirically demonstrate that their activities cause no harm.

Crustaceans (crabs, lobsters, crayfish, shrimp, krill and barnacles) are the only invertebrates besides insects and spiders that communicate with acoustic signals. An important study carried out on rock lobster has brought forward information that sub-lethal effects have been

observed with respect to feeding and serum biochemistry weeks to months after exposure. A cellular change was also noted in the digestive gland of animals that had been exposed 4 months earlier, which may be linked to organ 'stress'. While these studies are not conclusive, they do indicate a need for caution. The effects on snow crab from close exposure (in a controlled experiment) included effects on developing fertilized eggs, bruising of the hepatopancreas and ovaries, delayed embryo development, smaller larvae.

Mollusc larvae (in this case scallop) exposed to playbacks of seismic pulses have also been researched. They showed significant developmental delays in the animals and 46 percent developed body abnormalities. Similar effects were observed in all independent samples exposed to noise while no malformations were found in the control groups. Noise exposure during critical growth intervals may also contribute to stock vulnerability, underlining the urgency to investigate potential long-term effects of acoustic pollution on shellfish.

Similar studies have produced similar results for cephalopods (octopuses, squid, cuttlefish and *Nautiloidea*) in a number of parts of the world.

The UN General Assembly on sustainable fisheries has called upon the FAO to carry out studies on the socio-economic impacts of ocean noise pollution on fisheries – namely OP153 of doc A/RES/68/71. Specifically, the FAO: *[e]ncourages further studies, including by the Food and Agriculture Organization of the United Nations, on the impacts of underwater noise on fish stocks and fishing catch rates, as well as associated socioeconomic effects*.

The need for such studies should not be underestimated. The use of air guns near fish stocks severely affects their distribution, local abundance as well as trawl and longline catch rates. It has been explained that catch rates do not return to normal even days after noise has abated.

### **IMPACT ON CORAL LARVAE**

Free-swimming larvae of tropical corals go through a critical life-phase when they return from the open ocean to select a suitable settlement substrate. During the planktonic phase of their life cycle, the behavior of small coral larvae (< 1mm) that influence settlement success are difficult to observe in situ and are therefore largely unknown. Here, the study shows that coral larvae respond to acoustic cues that may facilitate detection of habitat from large distances and from upcurrent of preferred settlement locations. Using in situ choice chambers, the study found that settling coral larvae were attracted to reef sounds, produced mainly by fish and crustaceans, which were broadcasted underwater using loudspeakers. The discovery that coral larvae can detect and respond to sound is the first description of an auditory response in the invertebrate phylum Cnidaria, which includes jellyfish, anemones, and hydroids as well as corals. If, like settlement-stage reef fish and crustaceans, coral larvae use reef noise as a cue for orientation, the alleviation of noise pollution in the marine environment may gain further urgency.

### **ADDITIONAL INFORMATION**

Annex II entitled 'Recent International Decisions in Relation to Marine Mammals and Anthropogenic Underwater Noise Activities' provides a selective and brief overview of provisions adopted by the Convention on Biological Diversity (CBD), the Convention on Migratory Species (CMS) and ACCOBAMS relating to ocean noise, since 2010. This annex focuses only on the aspects relating to provisions which promote "measures" to mitigate negative impacts of anthropogenic underwater noise, such as applying the usage of the "best available technologies and techniques" and applying "best environmental practice", as well as specific measures to be applied in context to "protected areas".

Annex III profiles a landmark agreement to protect whales and dolphins in the Gulf of Mexico from high-intensity air gun surveys. The settlement requires new safeguards, including: placing biologically important areas off-limits (incl. sperm whale habitat); expanding protection to additional at-risk species (sperm whales, bottlenose dolphins, etc.); requiring the use of listening detection devices to better ensure surveys do not injure endangered sperm whales; and mandatory use of passive acoustic listening devices to detect and avoid marine mammals during times of reduced visibility. It also foresees a multi-year research and development project, to be undertaken by industry, to develop and field test an alternative to air guns known as marine vibroseis that has the potential to substantially reduce many of the adverse environmental impacts of seismic activity.

**We hope that the information presented will be reviewed and taken into consideration when a final assessment is made on the seismic proposal.**

Yours sincerely



Sigrid Lüber  
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Centro de Conservación Cetacea, Chile  
Cetacean Society International, USA  
Clean Adriatic Sea Alliance, International  
Eastern Caribbean Environmental Awareness, Martinique  
Environmental Investigation Agency, International  
M.E.E.R. e. V., Germany  
Morigenos, Slovenia  
NRDC, USA  
Ocean Conservation Research, USA  
Ocean Mammal Institute, USA  
Oceanomare Delphis Onlus, Italy  
Org. Conservación Cetáceos, Uruguay  
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## **ORIGINATING ORGANISATIONS**

### ***OceanCare***

*OceanCare has been working for the protection of marine mammals and oceans since 1989. With research and conservation projects, campaigns, environmental education as well as its contributions to a range of important international committees, OceanCare has undertaken concrete steps worldwide to improve the conditions of life in the world's oceans. In 2004, the UNEP/CMS Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) acknowledged OceanCare as a partner organisation. In 2011, OceanCare was granted Special Consultative Status with the Economic and Social Council of the United Nations to provide expert advice on questions regarding the protection of the marine environment. In 2013 OceanCare initiated the international online campaign «Silent Oceans» to protect marine life from underwater noise.*

[www.oceancare.org/en](http://www.oceancare.org/en) , [www.silentoceans.com](http://www.silentoceans.com)

### ***NRDC***

*NRDC is a major American non-profit organization of scientists, lawyers and environmental specialists dedicated to protecting public health and the environment. Founded in 1970, the organization has 1.3 million members and online activists, supporting national and international work on energy, wildlife, oceans, and other issues. For two decades, NRDC has been a global leader, domestically and in intergovernmental bodies such as the International Maritime Organization and the Convention on Migratory Species agreements, to reduce harm from ocean noise on marine biota.*

[www.nrdc.org](http://www.nrdc.org)

**ANNEX I:** A Review of the Impacts of Seismic Air gun Surveys on Marine Life, Lindy Weilgart, Ph.D., Department of Biology, Dalhousie University, Halifax, Nova Scotia, August 2012

**ANNEX II:** Recent International decisions in relation to Marine Mammals and anthropogenic Underwater Noise Activities

**ANNEX III:** Settlement Agreement between a Coalition of NGOs (incl. NRDC), Department of the Interior; the Bureau of Ocean Energy Management (“BOEM”), the American Petroleum Institute, International Association of Geophysical Contractors, Independent Petroleum Association of America, U.S. Oil and Gas Association, and Chevron U.S.A., Inc., in the United States in June 2013