

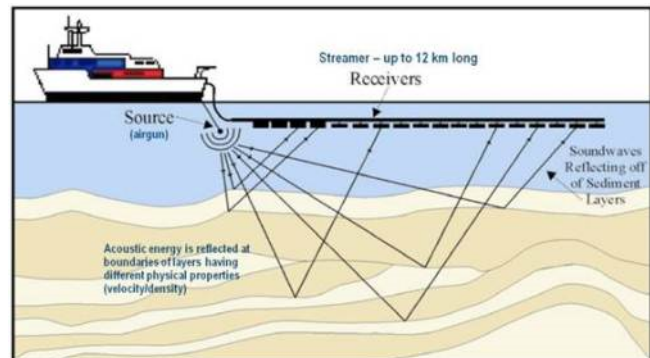
## Debunking Offshore Oil & Gas Exploration Myths: Seismic Surveys

The United States has an 80-year history of uncovering critical scientific data from marine seismic surveying. Seismic surveying, which began in 1937 in the Gulf of Mexico, offers a detailed analysis of underwater structures, like a CAT scan of the ocean. Currently, less than 10 percent of federal waters are open for energy exploration due to current laws and regulations. Also, to date, there is no scientific data indicating that there have been any adverse effects to marine life from sound from seismic exploration activities. While various suggestive speculations about possible adverse impacts have been promoted over the past 15-20 years, the facts remain that the hypothetical impacts still have not been confirmed, despite extensive efforts to find them.

The geophysical industry takes pride in being safe, accurate and above-board, and there are [no confirmed instances](#) of harm to marine creatures resulting from sound from seismic surveying, according to the Bureau of Ocean Energy Management's (BOEM) Chief Environmental Officer and the National Marine Fisheries Service (NMFS). Survey contractors comply with all required regulatory measures including those by the NMFS, federal protection acts, and the BOEM.

### How do seismic surveys work?

Seismic surveys use low-frequency sound pulses from compressed air that is released into the water. The sound reflects off the rock layers, building an image of the underlying geological layers. The sound source, typically an array of different sized air-chambers, is towed behind a seismic survey vessel and releases a pulse of air into the water, generating sound. The returning sound waves are detected and recorded by hydrophones that are spaced out along a series of cables, and the series of returning sound waves is turned into maps, which help us safely determine the location of potential energy supplies.



*Seismic Survey Vessel Acquiring Data: Source BOEM*

Before operations begin, marine mammal observers (MMOs) also referred to as protected species observers (PSOs) check for marine mammals and other species within a specified precautionary exclusion zone. Other mitigation measures used to complement visual monitoring include passive acoustic monitoring, as well as power-downs and shut-downs when marine animals enter the exclusion zones.

### Seismic survey characteristics:

- Data acquisition, and thus sound production, is not continuous.
- The “duty cycle” of a seismic survey is typically one pulse of a tenth-of-a-second duration every ten to 20 seconds or a duty cycle of 1% or less.

- While a single survey may last weeks or even a few months, the ship is moving constantly at about 4 knots (5 miles per hour), with an average of approximately 20 to 30 percent of downtime due to a variety of factors.
- The sound source array directs most of its energy downward, rather than laterally, which the National Marine Fisheries Service has determined is in itself a mitigation measure.
- While it is possible for seismic operations to be detected at great distances under certain oceanographic conditions and locations, so can sound waves generated by earthquakes and baleen whale calls. These special acoustic properties of the ocean typically occur at depths of 800 meters or half a mile, well below the diving depth of most marine mammals.

## Why are seismic surveys used?

Because seismic survey activities are temporary and transitory, they are the least intrusive way to explore the earth's geology and its dynamic processes which impact human lives in many ways. Whether for renewable energy sources or oil and gas, seismic surveys are used in a variety of ways, from siting renewable energy projects to helping to locate ground water and checking the foundations for roads and buildings. Seismic survey technology is a part of the solution, not the problem.

According to the [BOEM](#), "Newer surveys are needed to make decisions concerning potential oil and gas leases, renewable energy project construction, and the composition and volume of sand and gravel resources for coastal restoration projects."

Atlantic seismic surveys would not be used exclusively for oil and gas exploration. The survey data are also helpful in identifying sand used for restoration of our Nation's beaches and barrier islands following severe weather events and for protecting coasts and wetlands from erosion. Seismic and geologic coring surveys also provide information for siting and development of offshore renewable energy facilities.

## Where are surveys being considered?

The BOEM is considering seismic surveys in Federal waters of the Mid- and South Atlantic OCS and adjacent state waters.

G&G surveys also help to advance fundamental scientific knowledge and are currently conducted in the Gulf of Mexico and in countries around the world.



Atlantic OCS G&G Programmatic EIS  
Area of Interest

## Overview of Potential Biological Impacts on Marine Life

Although it has been asserted that sound from seismic survey activity could injure as many as 138,000 marine mammals, the fact is this figure does not reflect the actual expectation of the number of mammals that will be injured. In its March 9, 2015 Science Note, the BOEM itself, says, "This characterization of our conclusion, however, is not accurate; that is actually not what we estimate."

While all seismic survey vessels employ extensive means to detect and prevent potential behavioral effects (injurious effects have never been documented), the effects of mitigation are not included in the BOEM estimate and would likely even further reduce any actual risk to negligible. In fact, the BOEM's March 2015 *Science Notes* also states the number of modeled "takes" in the PEIS is grossly over-estimated and does not take into account

mitigation measures that will be employed. With mitigations in place, that estimate is “in far excess of those takes” they actually anticipate.

### Fish

There has been no observation of direct physical injury or death to free-ranging fish caused by seismic survey activity, and there is no conclusive evidence showing long-term or permanent displacement of fish.

Marine seismic surveys have been conducted extensively since the 1960s, and experience shows that fisheries and seismic survey activities can and do coexist. Any potential impacts that might exist to fish from seismic surveys are short-term, localized and are not expected to lead to significant impacts on a population scale. The seismic industry works closely with local fishing organizations to coordinate activities so that fisheries are not adversely affected by seismic surveys.

### Invertebrates (shellfish)

In general, assertions about impacts of seismic sound on invertebrates are incorrect:

- While some studies have shown that various life stages of fish and invertebrate can be physically affected by exposure to seismic surveys, in all of these cases, the subjects were very close to the seismic source or subjected to exposures that are virtually impossible to occur under natural conditions. Research does not support speculation that seismic surveys could harm fish, especially eggs and larvae, over long distances. In addition, many marine crustaceans such as horseshoe crabs congregate in bays and nearshore areas where seismic activities are not proposed to occur.
- For scallops, research concludes that no short-term (< 2 months) impacts on the survival or health of adult commercial scallops were detected following the seismic survey.
- For bivalves (clam-like species), no relevant effects are induced by sound from seismic surveys.
- For squid, there is no conclusive evidence that sound from seismic surveys cause physical injury.
- For zooplankton, the research finding may suggest but does not prove the conclusion that seismic survey air sources negatively impact zooplankton. There is nothing to suggest that productivity has declined in areas where seismic surveys are common. More research is needed and a determination whether that decrease is significant relative to the reproductive output of the species represented

### Whales

More than five decades of worldwide seismic surveying and scientific research indicate that the risk of direct physical injury to marine mammals is extremely low, and currently there is no scientific evidence demonstrating biologically significant negative impacts on marine life populations.

After more 50 years of extensive seismic surveying around the world, including the Gulf of Mexico, and a decade of intense scrutiny by scientists, there is still no scientific support that the sound from survey activities harm marine life populations.

Behavioral response, if they occur, are expected to be of short duration, infrequent, and of little or no biologically significant consequence. An interruption of feeding for a short attentional response to sights and sounds in the environment is a common event in any animal's life and should not be misconstrued as implying that this would happen often enough or long enough to have meaningful effects. Further, potential impacts resulting from behavioral changes have not been demonstrated, but only hypothesized.

## Sea Turtles

There is no area in the world where seismic surveys have resulted in a decline to fish or turtle populations. In addition, no demonstrable or prolonged adverse effects have been observed from seismic survey activity. In the Gulf of Mexico, seismic and other geophysical surveys have been conducted for over 50 years amid turtle populations that at the same time have been recovering dramatically well from historic harvest and fishery bycatch; and in the presence of some of the healthiest and most economically productive fisheries in the world.

Regardless, seismic surveys shutdown for sea turtles detected within a designated exclusion zone and employ any necessary protective measures, such as the time-area closure for nesting sea turtles. In addition, the best available science indicates that seismic surveys, even in preexisting active OCS programs in the Gulf of Mexico, do not result in any significant impact to sea turtles.



*Sea Turtle caught in fishing gear; rescued by seismic crew. Source: IAGC Ghost Net Initiative*

Seismic survey contractors work to tackle marine debris, an international environmental issue, which can entangle marine animals, such as sea turtles. By removing and disposing of debris encountered during operations, installing turtle guards, and carrying out watches for specific marine animals and reporting these activities, seismic survey crews work daily to clean up our marine environment.

The true and ultimate measure of the consequences is in the health of the population. The record of 50-plus years of seismic occurring in the presence of healthy, stable or growing populations of marine mammals, turtles and other protected species in the Gulf of Mexico and around the world suggests that the potential effects of seismic to marine life in the Atlantic will be similarly inconsequential.

## Conclusion

There has been no demonstration of population level effects to marine life from seismic or other geophysical survey activity, individually or cumulatively. The real-life laboratory for long term impacts under actual operating conditions is the Gulf of Mexico, where BOEM has concluded: "Within the [Gulf of Mexico Central Planning Area]...there is a long-standing and well-developed OCS Program (more than 50 years); there are no data to suggest that activities from the preexisting OCS Program are significantly impacting marine mammal populations."

The BOEM has spent more than \$50 million on protected species and noise-related research without finding evidence of adverse effects. The geophysical and oil & gas industries, the National Science Foundation, the U.S. Navy, and others have spent a comparable amount on researching impacts of seismic surveys on marine life and have found no evidence of adverse effects.

The IAGC is committed to ensuring the production of safe, environmentally responsible geophysical data acquisition and results. Through research and more than eight decades of activity around the world, we have found no reason to believe seismic surveying is anything less than the safest, cleanest, most energy efficient technology for generating geological imagery.