

IAGC Seismic Bracing 10/25/16

## The Marine Mammal Protection Act: Much Needed Improvements

- When it was enacted in the early 1970s (and subsequently amended), the congressional intent behind the MMPA was cutting edge and forward-thinking. However, decades of regulation and litigation have exposed some significant flaws in the MMPA. Fixing these flaws would increase regulatory efficiency, decrease uncertainty, and ultimately benefit all stakeholders and the implementing agencies.
- The primary flaws stem from poorly written statutory language that creates (1) ambiguity and uncertainty in the application of the MMPA's legal standards, and (2) procedural inefficiency. Fixing some of the most obvious flaws in the MMPA could result in tangible regulatory benefits. The following addresses some of the key problematic areas, as well as potential solutions.

*regulatory efficiency*

### MMPA STANDARDS

- To issue an incidental take authorization under Section 101(a)(5) of the MMPA, the agency must show that the authorization will have no more than a negligible impact on marine mammal populations and result in only small numbers of incidentally taken animals.
  - **Problems:** (1) "Negligible impact" is not clearly defined; (2) "small numbers" is not defined at all; and (3) there is significant overlap between these two ambiguous standards. These problems have led to regulatory uncertainty, inconsistent application by agencies, and much litigation.
  - **Solution:** Create a redefined unambiguous "negligible impact" standard, and eliminate the "small numbers" requirement. A single, clear standard for authorizations would result in regulatory efficiency and predictability.
- To issue an incidental take authorization, the agency must require "other means of effecting the least practicable impact." These "other means" typically take the form of mitigation measures included as conditions of the authorization.
  - **Problem:** "Least practicable impact" is not defined in the statute or in the implementing regulations. As a result, it is not consistently applied by agencies, there is very little guidance for the regulated community, and, most recently, the phrase has been unreasonably interpreted by the Ninth Circuit Court of Appeals.
  - **Solution:** Create a new, clear definition for "least practicable impact." The definition should state that operational concerns and economic feasibility are primary factors in determining what mitigation is "practicable."

*consideration of economics  
to also feasibility done*

- The MMPA permits the authorization of incidental take by harassment.
  - **Problem**: The definition of “harassment” is overly broad and ambiguous, and confusingly refers to “potential” harassment rather than actual harassment. This results in serious problems in the estimation of incidental take and unrealistic assumptions made by the implementing agencies.
  - **Solution**: Redefine “harassment” to remove the word “potential” and to establish a more specific standard that provides better clarity for the agencies and the regulated community.

### **PROCESS ISSUES**

- The process for issuing incidental take authorizations is routinely delayed by the implementing agencies. The current procedural requirements create little accountability for agencies because they are either ambiguous or establish no consequences or solutions for unreasonably delayed agency action.
  - **Solution #1**: Revise the procedural requirements to set clear and firm deadlines for each stage of the permitting process, and establish consequences for when agency deadlines are not met (*e.g.*, default approvals).
  - **Solution #2**: Create a streamlined authorization process for certain low-effect, but common, activities (similar to the nationwide permit process under the Clean Water Act).
- The MMPA creates a 5-year limit on “incidental take regulations” that requires applicants to petition for a new set of regulations every 5 years. This results in unnecessary and burdensome administrative processes that create frequent opportunities for litigation.
  - **Solution**: Remove the 5-year limit or, alternatively, create a simple and straightforward 5-year renewal process.
- Issues involving the overlap of the MMPA, the Endangered Species Act (ESA), and the National Environmental Policy Act (NEPA) have proven difficult for the agencies, the courts, and the regulated community. Because the MMPA sets the most rigorous conservation-oriented standards of all these statutes, additional reviews and administrative processes under the ESA and NEPA are often unnecessary and redundant.
  - **Solution**: Make statutory revisions to minimize or eliminate the need for duplicative ESA and NEPA review processes for certain MMPA authorizations. This would substantially increase regulatory efficiency.



## SEISMIC SURVEYING 101

### WHY ARE SEISMIC SURVEYS NEEDED IN THE ATLANTIC OCS?

The first step in exploring for offshore oil and natural gas resources is often conducted through **seismic surveys**, which are like ultrasounds of the earth that help scientists “see” below the ocean floor.

- The last surveys of the Atlantic Outer Continental Shelf (OCS) were conducted over 30 years ago. Due to technological advances, the existing estimates of 4.7 billion barrels of oil and 37.5 trillion cubic feet of natural gas are out of date.
- Advances in seismic imaging technology and data processing over the last decade have dramatically improved the industry’s ability to locate oil and natural gas offshore.
- Exploration and development activities generally lead to increased resource estimates. For example, in 1987 the Minerals Management Service estimated only 9.57 billion barrels of oil in the Gulf of Mexico. With more recent seismic data acquisition and additional exploratory drilling, that estimate rose in 2011 to 48.4 billion barrels of oil – a fivefold increase.

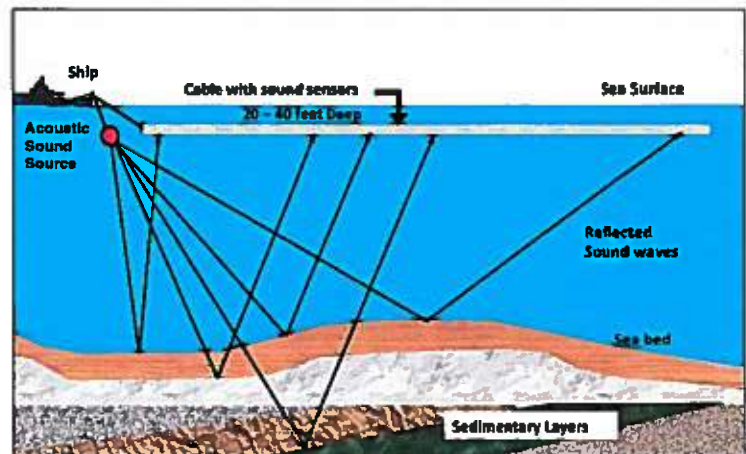
Seismic surveys are a safe and proven technology that help make offshore energy development **safer and more efficient**.

- Governments and the private sector have used this method of exploration in the U.S. and around the world for over 40 years.
- In addition to the oil and natural gas industry, seismic surveys are commonly used by the U.S. Geological Survey, the National Science Foundation, and the offshore wind industry.
- A rigorous permitting process ensures that seismic surveys are properly managed and conducted so they have **minimal impact** on the marine environment.

### HOW DO SEISMIC SURVEYS WORK?

Sound waves help scientists map the ocean floor and geology beneath it.

- Surveyors release compressed air into the water to create short duration sound waves that reflect off subsurface rock layers and are “heard” by sensors being towed behind the vessel.
- Scientists analyze the collected data and use it to create maps of geologic structures that could contain energy resources beneath the ocean floor.
- The sound produced during seismic surveys is comparable in magnitude to many naturally occurring and other man-made ocean sound sources, including wind and wave action, rain, lightning strikes, marine life, and shipping.
- Survey operations are normally conducted at a speed of approximately 4.5 to 5 knots (~5.5 mph), with the sound source typically activated at 10-15 second intervals. As a result, the sound does not last long in any one location and is not at full volume 24 hours a day.





## How do Seismic Surveys Impact Marine Life?

After examining decades of scientific research and real-world experience, federal regulators determined that seismic surveys in the Atlantic OCS will have no measurable impact on fish or marine mammal populations.

- In the words of the federal Bureau of Ocean Energy Management (BOEM), “there has been no documented scientific evidence of noise from air guns used in geological and geophysical (G&G) seismic activities adversely affecting marine animal populations or coastal communities.”
- According to BOEM, seismic surveys in the Atlantic OCS “should not cause any deaths or injuries to the hearing of marine mammal[s] or sea turtles.”
- Dr. William Brown, chief environmental officer for BOEM, told National Geographic that claims to the contrary are “wildly exaggerated and not supported by the evidence.”
- While fish and some whales may swim away from an area and return after the survey vessel has passed, bottlenose dolphins are known to swim toward survey vessels to ride their bow waves.



Despite the already negligible risks, the industry follows standard operating procedures known as “mitigation measures” to provide even more protection for marine life.

- Trained protected species observers (PSOs) are onboard to watch for animals. Operations stop if certain marine animals enter an “exclusion zone” established around the operation and are not restarted until the zone is all-clear for at least 30 minutes.
- When starting a seismic survey, operators use a ramp-up procedure that gradually increases the sound level being produced, allowing animals to leave the area if the sound level becomes uncomfortable.

## WHAT IS THE CURRENT STATE OF SCIENCE AND RESEARCH?

The best science and research indicates that seismic surveys have little-to-no impact on marine wildlife populations.

- Based on both available scientific knowledge and operational experience, there is no evidence to suggest that the sound produced during an oil and gas industry seismic survey has resulted in any physical or auditory injury to a marine mammal.
- Seismic surveys are predominantly low frequency. Not all marine life hears the same frequencies equally well. Just as humans, bats and dogs hear differently, some marine animals hear better at higher frequencies while others hear better at lower frequencies.
- The best available scientific information also indicates that any sound related injury to dolphins occurs at levels higher than the sound generated by a seismic survey.
- Animal strandings can occur for a number of reasons, e.g., sickness, disorientation, natural mortality, extreme weather conditions or injury, but no correlation has been found with seismic surveys.

The industry remains committed to improving the scientific understanding of the impacts of our operations on marine life.

- To provide the utmost safety precautions, seismic surveys in the U.S. Outer Continental Shelf are only conducted with measures in place to protect animals from high sound exposure levels.
- Industry continually monitors the effectiveness of its mitigation strategies and funds research to better understand interactions between offshore operations and marine life, including fish.

To find out more, visit [www.iagc.org](http://www.iagc.org)



## Seismic Surveys and Protecting the Marine Environment

Seismic surveys are the key tools used in oil and natural gas exploration and the siting of renewable energy facilities. The use of modern seismic technology is similar to ultrasound technology which is commonly used in the medical profession for imaging the human body. Today's advancements in seismic technology, which can pinpoint the most fruitful areas for hydrocarbon potential, have contributed to reducing the overall environmental footprint associated with oil and gas exploration. Seismic technology has also helped to decrease operational and safety risks associated with oil and gas development. Contrary to what has been said, seismic surveying is very well understood and a very safe industry practice.

More than four decades of worldwide seismic surveying and various 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 mammal populations. The seismic industry is committed to conducting its operations in an environmentally responsible manner, including compliance with mitigation and monitoring guidelines and regulations. Industry supports a process of developing and implementing effective mitigation measures that are based on assessing the level of risk or significant impacts on marine animals. Such an approach helps to ensure that the scope of mitigation measures implemented in the field are appropriate to the level of risk and specific to the local population of marine animals.



## Taking Precautions to Protect the Environment

The seismic industry employs a number of measures to ensure that marine life is protected from direct or indirect harm from its operations.



*Protected Species Observer*

### *Impact Assessments*

Environmental Impact Assessments (EIAs) are an integral part of developing and implementing a seismic survey. Many countries have environmental impact assessment requirements. The assessments include identification of marine species, including protected species, other environmental sensitivities and the human uses of the proposed area of operations. These assessments are conducted during the survey planning stage and evaluate the potential impacts and risks to marine life. The assessments also identify and consider measures to avoid or mitigate such potential impacts and risks. Seismic surveys are generally considered not to be harmful or damaging to the marine environment. Seismic surveys are comparable to many naturally occurring ocean sound sources, are temporary and transitory and the vast majority are conducted at frequencies below the hearing range of many marine species.



*Preparing analysis as part of  
 seismic survey planning*

### *Mitigation and Monitoring*

Mitigation and monitoring must be proportionate to the potential risks identified by an environmental assessment and specific to the local environment and the operation being undertaken. Measures commonly used by the seismic industry include timing seismic surveys to avoid known areas of biological significance, such as whale foraging or breeding areas or avoiding seasonal marine life occurrences such as peak whale and dolphin activity seasons or migration.

Before a seismic operation begins, visual monitoring is undertaken to check for the presence of marine mammals and other marine species within a specified precautionary, or exclusion zone, often using dedicated marine mammal observers (MMOs) or protected species observers (PSOs).



Further monitoring may be done using passive acoustic monitoring technology (PAM), which may detect vocalizing marine animals, especially during low visibility and nighttime conditions. In the event marine animals are detected in the exclusion zone, seismic operation will not begin for a certain time period until the marine animal moves away. Similarly, a seismic survey will shut down if the marine animal is observed entering the exclusion zone once operations have begun.

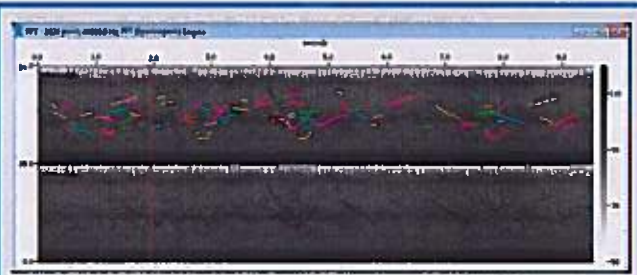


Soft-start or ramping-up procedures are undertaken by seismic vessels as a matter of general operational procedure. Soft starts involve activating a small section of the acoustic sound arrays over a period of time, gradually getting louder until the full acoustic array is operating. This measure also allows a marine animal to swim away before the acoustic source is activated at full strength.

### Environmental Protection Guidelines

Many countries and regional authorities have established guidelines and regulations specific to seismic operations, which are then adapted for the specific location and operation for the permit.

In the absence of regulations or guidelines in a specific area, the industry has committed itself to a set of minimum mitigation measures as outlined in the 2011 International Association of Geophysical Contractors (IAGC) standards document, "Recommended Mitigation Measures for Cetaceans during Geophysical Operations." IAGC has produced additional documents for mitigation and monitoring guidance for seismic operations, "Guidance for Marine Life Visual Observers" and "Guidance on the Use of Towed Passive Acoustic Monitoring during Geophysical Operations."



Dolphin whistles detected using the PAMGuard whistle and moan detector

### Contributing to Science

IAGC, together with a number of oil & gas companies, supports research to fill knowledge gaps about the effects of seismic surveys on marine life. This is helping to remove some of the uncertainty about possible effects of seismic surveys. More information on our commitment to science can be found at [www.soundandmarinelife.org](http://www.soundandmarinelife.org).



Marking up Sperm Whale clicks to localize on the map

### Additional Resources on Seismic Surveys and Protection of the Marine Environment

1. PAM Guidance: <http://www.iagc.org/articles/new-towed-passive-acoustic-monitoring-guidance-for-geophysical-operations/>.
2. Recommended Mitigation Measures for Cetaceans during Geophysical Operations: <http://www.iagc.org/files/4776/>.
3. Sound and Marine Life Protections: [www.soundandmarinelife.org](http://www.soundandmarinelife.org).
4. PAMGuard: <http://www.pamguard.org/>.
5. Marine Mammal Observer Association: <http://www.mmo-association.org/position-statements/111>.
6. Marine Mammal Observers: <http://www.globalseismicmmo.com/mmo-role/>.
7. OGP/IAGC "Seismic Surveys & Marine Mammals": <http://www.ogp.org.uk/publications/environment-committee/seismic-surveys-and-marine-mammals-joint-ogpiagc-position-paper/>.

### IAGC Vision Statement

The International Association of Geophysical Contractors is the most credible and effective voice for promoting and ensuring a safe, environmentally responsible and competitive geophysical industry.



## Understanding Marine Mammal 'Takes' Under the U.S. Marine Mammal Protection Act

### Understanding Marine Mammal 'Takes' Under the U.S. Marine Mammal Protection Act

The concept of "take" is unique to U.S. law, in particular, the Marine Mammal Protection Act (MMPA). The MMPA was originally enacted into law in 1972 in response to increasing concerns that significant declines in some species of marine mammals were caused by human activities such as overhunting, overfishing and unscrupulous trade. It was not originally designed to regulate sound in a marine ecosystem. Congress defined "take" in the MMPA as "to harass, hunt, capture or kill" a marine mammal, or the attempt to do so. "Harassment" is defined as "any act of pursuit, torment, or annoyance" that either:

- A. "has the potential to injure a marine mammal or marine mammal stock in the wild" (referred to as a Level A harassment); or
- B. "has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering" (referred to as a Level B harassment).

The MMPA established a prohibition on the "taking" of marine mammals in U.S. waters, unless the take is authorized by the designated U.S. regulatory authorities. The primary agency responsible for administering and enforcing the MMPA is the National Marine Fisheries Service (NMFS) within the U.S. Department of Commerce. NMFS has jurisdiction for whales and dolphins (cetaceans) and pinnipeds (seals, sea lions) other than the

walrus. Walruses, manatees, sea otters, dugongs, and polar bears are protected under the MMPA by the U.S. Fish and Wildlife Service (FWS) within the U.S. Department of the Interior.

Current NMFS policy states that an activity has the potential to injure (Level A harassment) if the marine

mammal receives acoustic (sound) pressure levels at or above 180 decibels relative to 1 micropascal (root mean squared), and has the potential to disrupt (Level B harassment) a behavioral pattern at or above 160 decibels  $1\mu\text{Pa}$  (rms). These threshold decibel levels are based on very conservative assumptions that do not reflect a large body of recent scientific data and do not recognize the frequency sensitivities of different marine mammal species groups. Just as humans and dogs have different frequency sensitivities (i.e., humans cannot hear a high pitched dog whistle), marine mammals also hear at different frequencies.





Under the MMPA, NMFS (and FWS) administers a system of permitting authorities that allows for take in certain situations, such as for commercial fishing permits, scientific research permits, educational activities (e.g., science centers and aquaria) and subsistence hunting in Alaska. For many years, NMFS and FWS have authorized the incidental, but not intentional, taking of marine mammals for activities related to offshore

### The Marine Mammal Protection Act of 1972 As Amended

as amended 2007

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seismic and offshore energy and minerals exploration. This is done through issuance of Incidental Take Regulations (ITRs), which are effective for a period up to five years, and through Incidental Harassment Authorizations (IHAs), which are effective for a period of no more than one year. The best available science and information demonstrate that, whether individually or cumulatively, these authorizations have resulted in no detectable adverse impacts to marine mammal populations.

So, how does one account for the estimates of “takes” of marine mammals? The fact is this estimate does not reflect an actual expectation that marine mammals will be injured or disturbed. US agencies have repeatedly acknowledged these estimates are based on modeling overly conservative assessments and “are not expected levels of actual take.” Instead, the modeled numbers reflect the highest-range estimate at which marine mammals may be exposed to seismic activity, without any consideration of the role of mitigation in reducing risk of exposure. In fact, with successful mitigation the government acknowledges that all estimates of injury would be avoided.

There are no verified injuries or deaths of marine mammals from exposure to seismic arrays. NMFS itself recognizes that “[t]o date, there is no evidence that serious injury, death or stranding by marine mammals can occur from exposure” to seismic air source arrays, even in the case of large arrays. In marked contrast, the greatest source of marine mammal takes come from fisheries bycatch, and these take counts are based on direct observation of marine mammals killed or seriously injured during fishing.

More than four decades of worldwide seismic survey activities and various 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 mammal populations. The seismic industry is committed to conducting its operations in an environmentally responsible manner and utilizes mitigation measures, such as exclusion zones, soft-starts and protected species observers to further reduce any possibility of impacts to marine mammals.



### Additional Resources on Understanding Marine Mammal Takes

1. Final Programmatic Environmental Impact Statement Atlantic Outer Continental Shelf Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas, pages 1-5 and 4-62, March 7, 2014: <http://www.boem.gov/BOEM-2014-001-v1/>
2. BOEM, Record of Decision, page 12, 7.18.2014.: <http://www.boem.gov/Record-of-Decision-Atlantic-G-G/>
3. Southall, Brandon t., Ann E. Bowles, William T. Ellison, James J. Finneran, Roger I. Gentry, Charles R. Greene Jr., David Kastak, Darlene R. Ketten, James H. Miller, Paul E. Nachtigall, W. John Richardson, Jeanette A. Thomas, and Peter I. Tyack, 2007. Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. *Aquatic Mammals*, 33(4): 411-522.
4. BOEM, MMPA: <http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/MMPA/index.aspx>
5. NOAA MMPA: <http://www.nmfs.noaa.gov/pr/laws/mmpa/>

### IAGC Vision Statement

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## Why Now?

Seismic surveys are currently conducted in the Atlantic Outer Continental Shelf (OCS) for federally funded academic research. These surveys utilize the same technology as used for oil and natural gas surveys, and occur without harm to marine life or coastal communities.

However, the last oil and natural gas seismic surveys of the Atlantic OCS were conducted over 30 years ago, also without harm to marine life or coastal communities. Due to technological advances, these existing estimates of the oil and natural gas resource potential are out-of-date.

- 30 year old estimates using outdated technology for the Atlantic OCS are:
  - 4.72 billion barrels of oil
  - 37.51 trillion cubic feet of natural gas
- Today, seismic surveys using modern technology produce sub-surface images which are much clearer than those from decades ago.
- These advances coupled with Exploration and Production (E&P) activities, generally lead to increased resource estimates. For example, in 1987 the Minerals Management Service estimated only 9.57 billion barrels of recoverable oil in the Gulf of Mexico. With more recent seismic data acquisition and additional exploratory drilling, that estimate rose in 2011 to 48.4 billion barrels of recoverable oil – a fivefold increase.

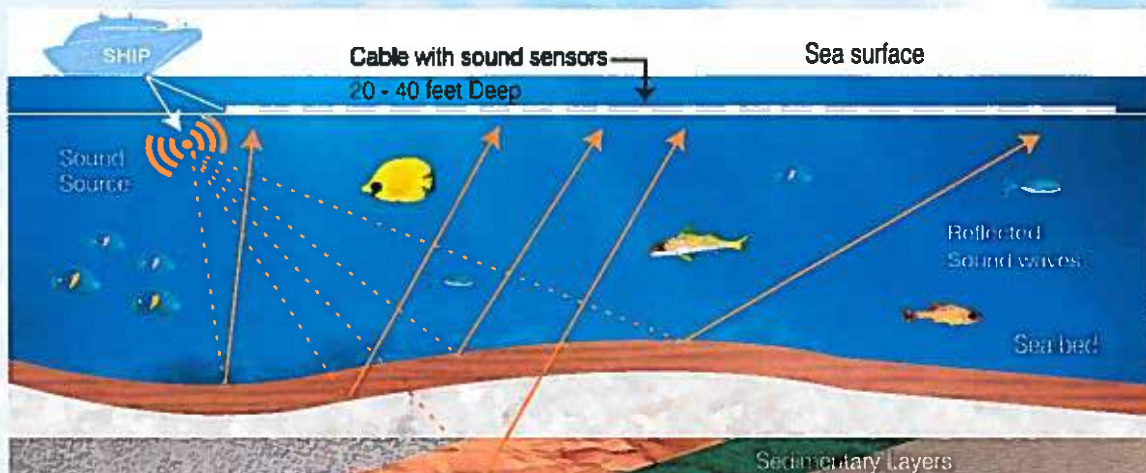
**Modern offshore oil and natural gas exploration requires the use of seismic surveys.**

- 1 Modern seismic surveys make offshore energy production safer and more efficient by greatly reducing the drilling of "dry holes" (where no oil or natural gas is found).
- 2 Seismic surveys are the only feasible technology available to accurately prospect for oil and natural gas reserves offshore.
- 3 Seismic surveys have been safely used for decades around the world to assess the location and size of potential oil and natural gas deposits, which often lay several miles beneath the ocean floor.

## HOW ARE SEISMIC SURVEYS PERFORMED?

**Seismic surveys use compressed air to send sound waves into the ocean floor and reflect back to the surface.**

- 1 Seismic surveys are undertaken with great consideration of interactions with the marine environment.
- 2 The sound source creates sound waves of short duration by releasing compressed air into the water.
- 3 The data collected is analyzed and used to help locate potential geologic structures and energy resources beneath the ocean floor.
- 4 The sound from the seismic source, which is typically activated every 10-15 seconds, does not last long in any one location and is not at full volume 24 hours per day.
- 5 The sound produced during seismic surveys is comparable to many naturally occurring and other man-made ocean sound sources.





## WHAT PRECAUTIONS DOES THE INDUSTRY TAKE TO PROTECT MARINE ANIMALS?

The oil and gas industry has demonstrated the ability to conduct seismic exploration activities in a manner that protects marine life. Marine seismic exploration is carefully regulated by the federal government and managed by the industry to avoid impacting marine animals. These required mitigation measures include:

1. "Ramp-up" procedure gradually increases sound levels, allowing animals to leave the area before operations commence.
2. Time and area closures to protect breeding, nesting, and migration of certain species.
3. Protected Species Observers are onboard to stop operations if a marine mammal enters an "exclusion zone" around the operation.
4. Passive Acoustic Monitoring allows for around-the-clock observing for vocalizing marine mammals.



## WHAT IS THE CURRENT STATE OF SCIENCE AND RESEARCH?

<p>Based on both available scientific knowledge and operational experience, there is no evidence to suggest that the sound produced during an oil and gas industry seismic survey has resulted in any physical or auditory injury to a marine mammal.</p>	<p>Research studies and operations monitoring programs designed to assess the potential impacts from seismic surveys have not demonstrated biologically significant adverse impacts on marine mammal populations.</p>	<p>Not all marine life hears the same frequencies equally well. Much like the differences in hearing between humans and cats or dogs, some marine animals hear well at higher frequencies, and relatively poorly at lower frequencies. Others hear better at lower frequencies.</p>	<p>"To date, there has been no documented scientific evidence of noise from air guns used in geological and geophysical seismic activities adversely affecting marine animal populations or coastal communities. This technology has been used for more than 30 years around the world. It is still used in the U.S. waters off the Gulf of Mexico with no known detrimental impact to marine animal populations or commercial fishing." (William Y. Brown, BOEM Chief Environmental Officer)</p>

## FOR WHAT ELSE ARE SEISMIC SURVEYS USED?

1. To conduct federally funded academic research on various oceanographic and geophysical conditions. NSF, USGS and NOAA regularly fund seismic surveys in U.S. offshore waters, including the Atlantic.
2. To locate potential sand and gravel sources for beach restoration and sand and gravel mining.
3. To locate sites for alternative energy structures associated with wind, ocean current, and wave-related energy production and transmission.
4. To locate or avoid sensitive resources.

To find out more, visit [www.noia.org](http://www.noia.org).

