

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advances, the existing estimates of 4.7 billion barrels of oil and 37.5 trillion cubic feet of natural gas are out of date.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.

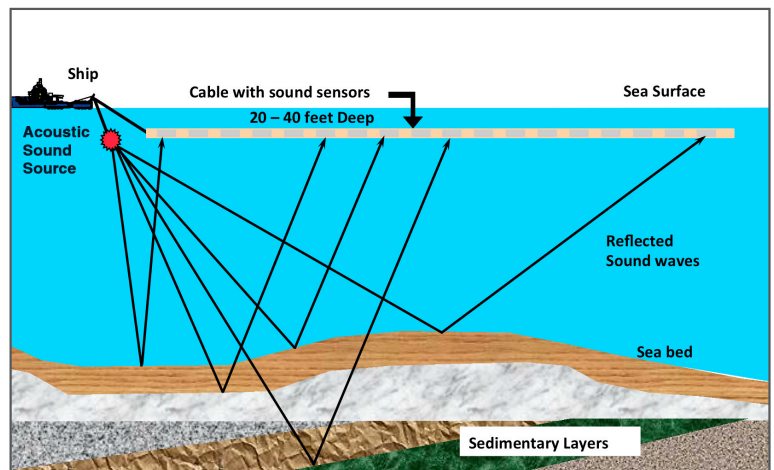
Seismic surveys are a safe and proven technology that help make offshore energy development **safer and more efficient**.

- 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.



To find out more, visit www.api.org/OCS

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.

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