

**BETA UNIT GEOPHYSICAL SURVEY**  
ENHANCED IMAGING OF THE SUBSURFACE  
GEOLOGY OF AN EXISTING LEASE AREA





# **BETA UNIT GEOPHYSICAL SURVEY**

MORE EFFICIENT RECOVERY  
OF REMAINING RESOURCES

FEWER NEW  
WELLS REQUIRED

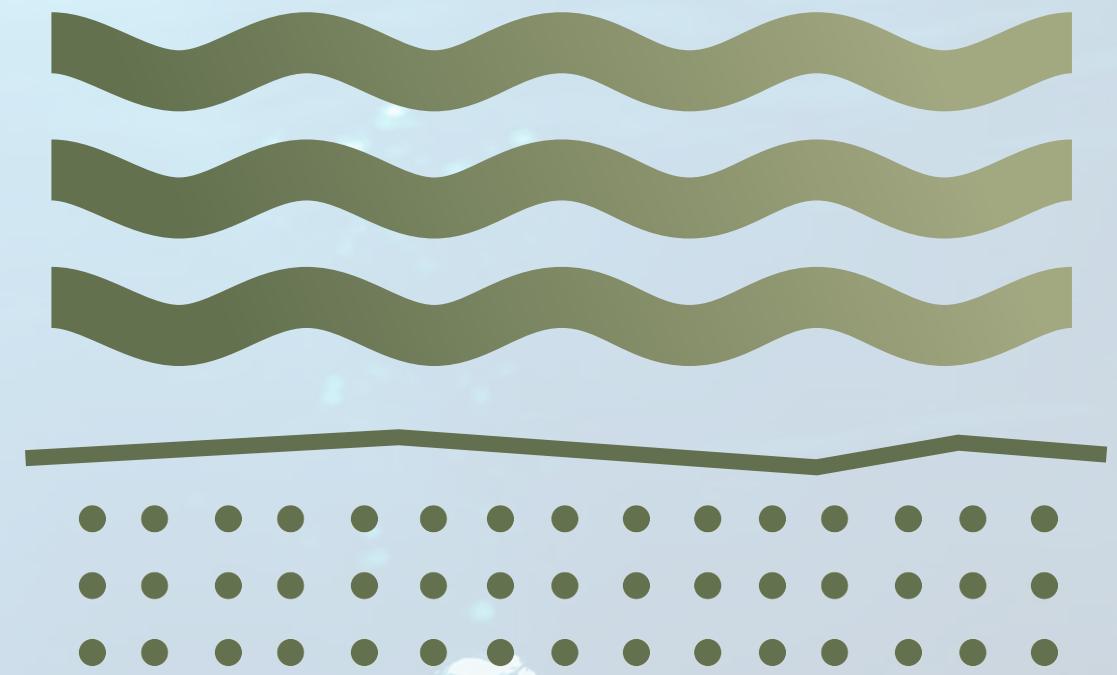
# GEOPHYSICAL SURVEY



**Proven sound  
wave technology**



**Used for more than 40  
years by the U.S. Geological  
Survey, the National  
Science Foundation &  
academic institutions**



**Maps the ocean floor  
and the geology  
underneath**



**GEOPHYSICAL SURVEY**

# HOW IT WORKS



**EXISTING BETA PLATFORM "EUREKA"**





# **GEOPHYSICAL SURVEYS**

USE SOUND TO UNCOVER  
WHAT CAN'T BE SEEN

**HOW IT WORKS**



# GEOPHYSICAL SURVEYS

Like an ultrasound at  
the doctor's office.

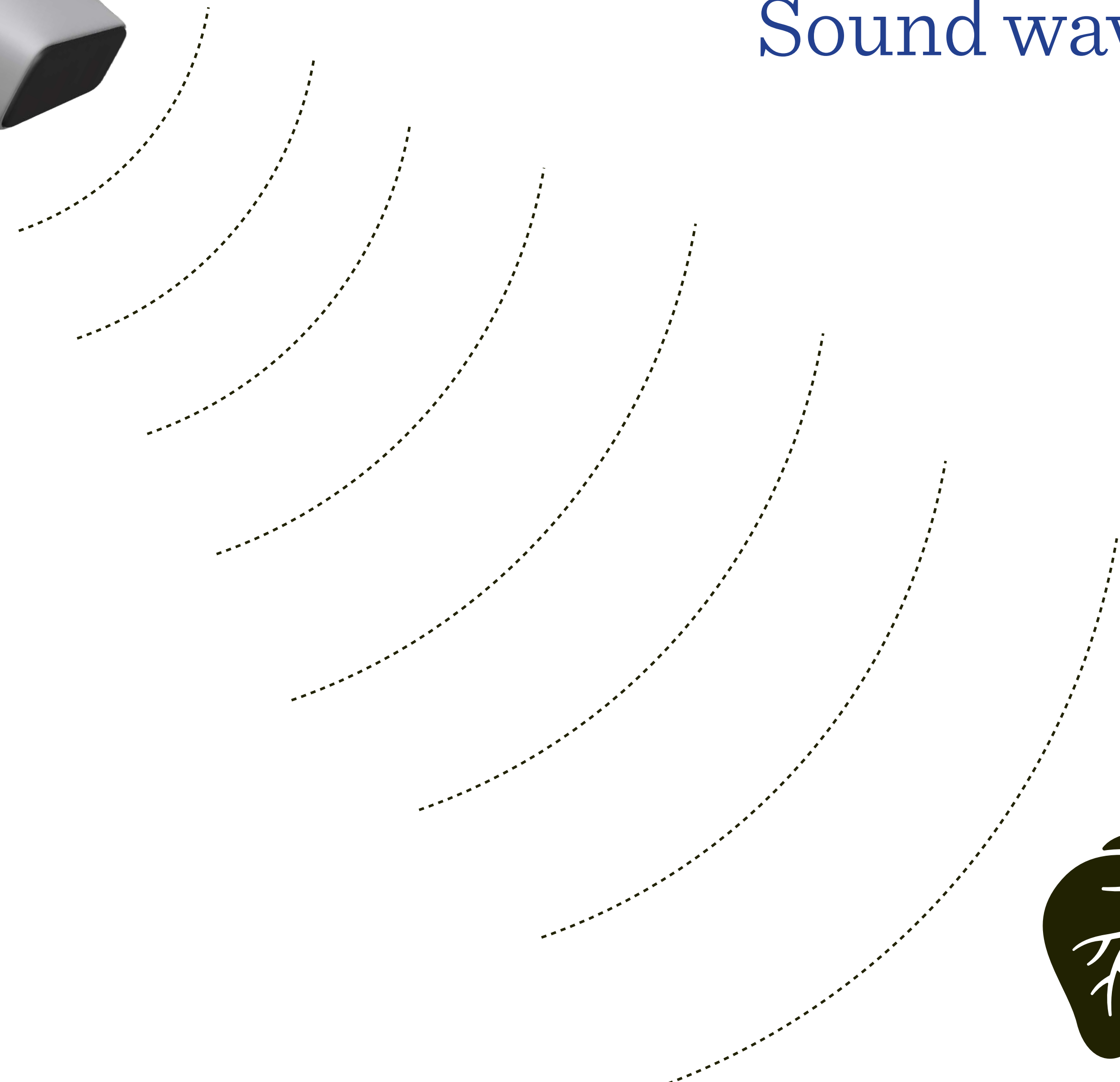


**HOW IT WORKS**



# GEOPHYSICAL SURVEYS

Sound waves are transmitted.

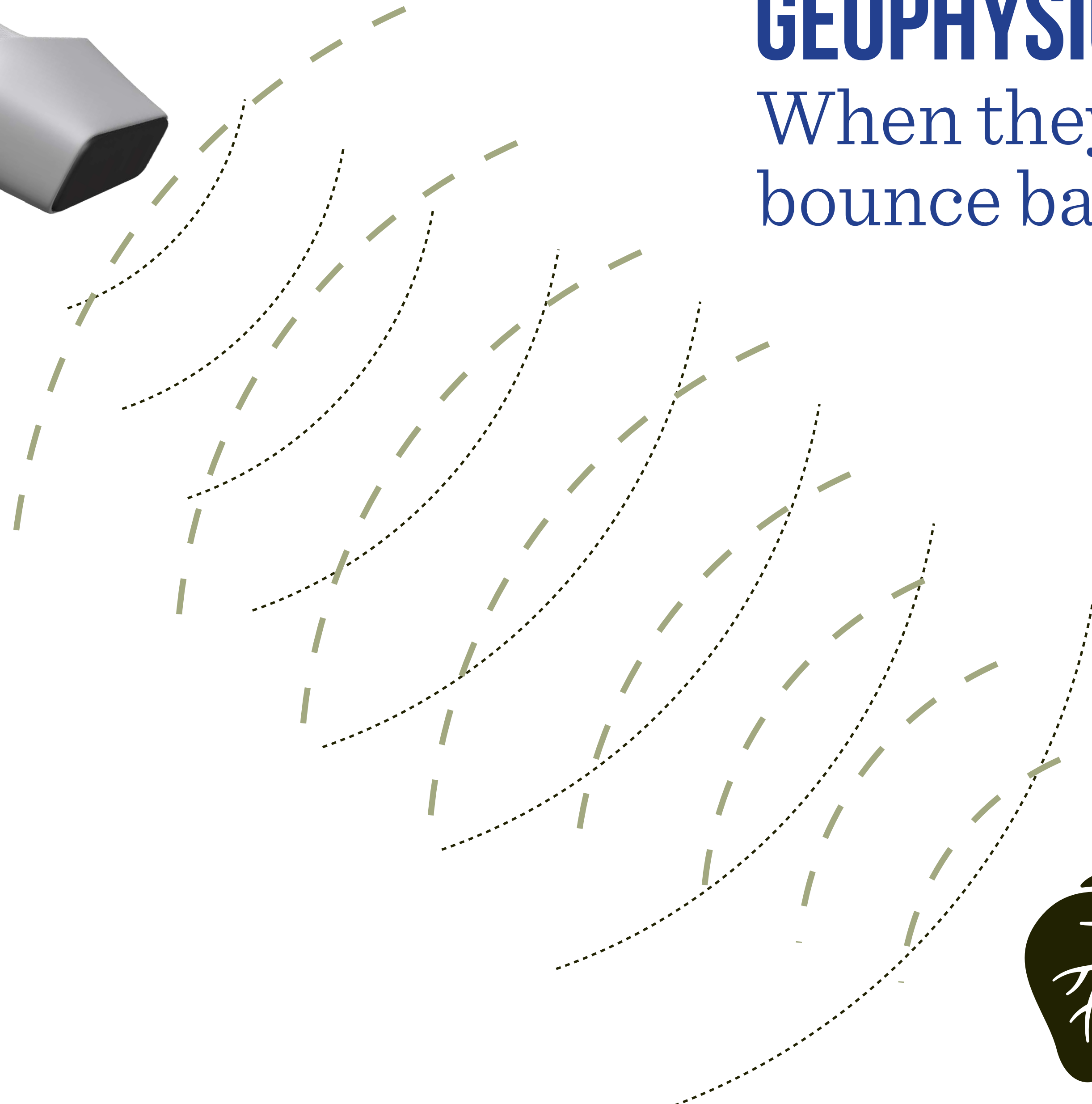


**HOW IT WORKS**



# GEOPHYSICAL SURVEYS

When they reach a surface they bounce back and are recorded.



HOW IT WORKS





# GEOPHYSICAL SURVEYS

Taken together this data provides a picture of the contours below.



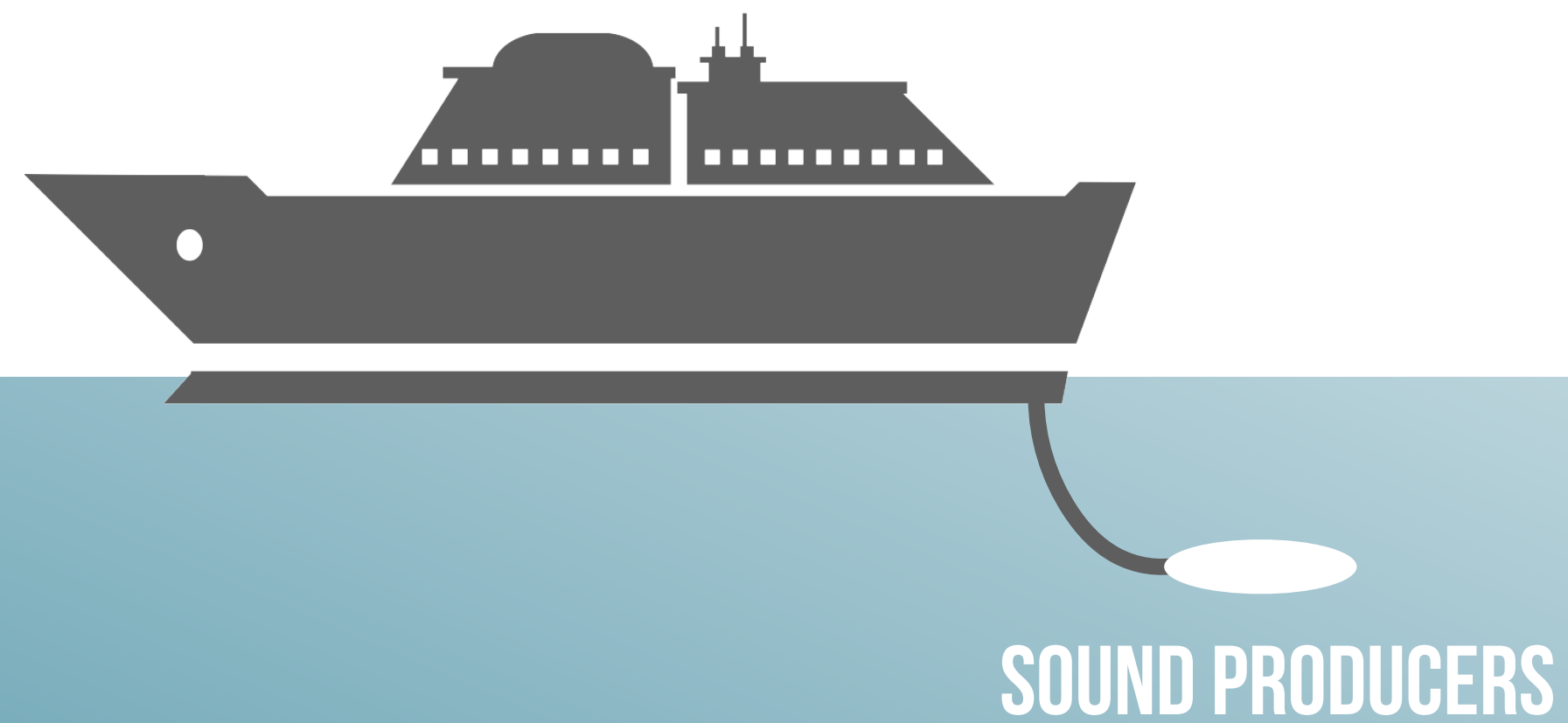
HOW IT WORKS

**MARINE  
GEOPHYSICAL  
SURVEY**



# MARINE GEOPHYSICAL SURVEY

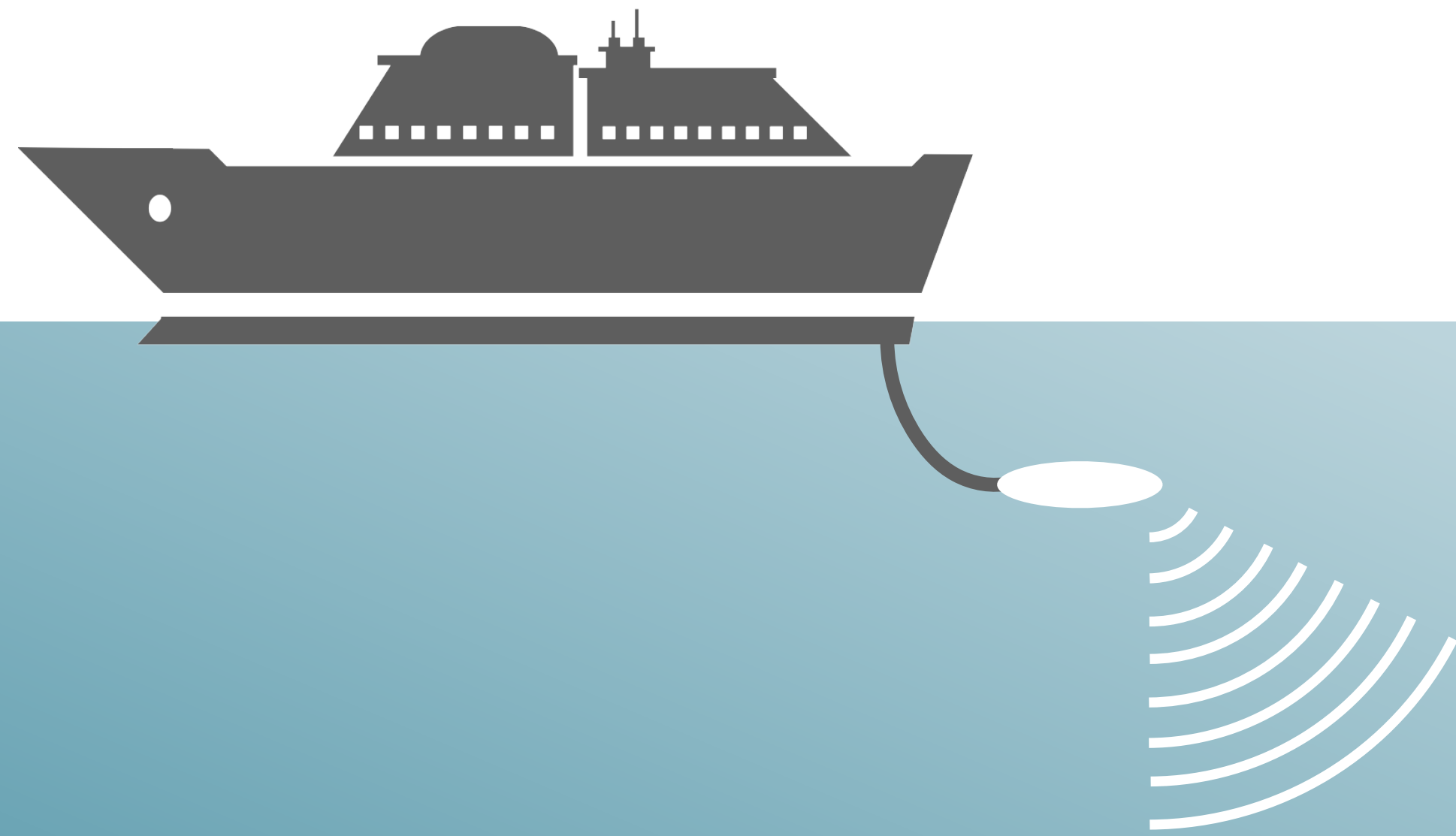
A ship tows sound producers to signal temporary sound receivers placed on seafloor.



TEMPORARY SOUND  
RECEIVERS

# MARINE GEOPHYSICAL SURVEY

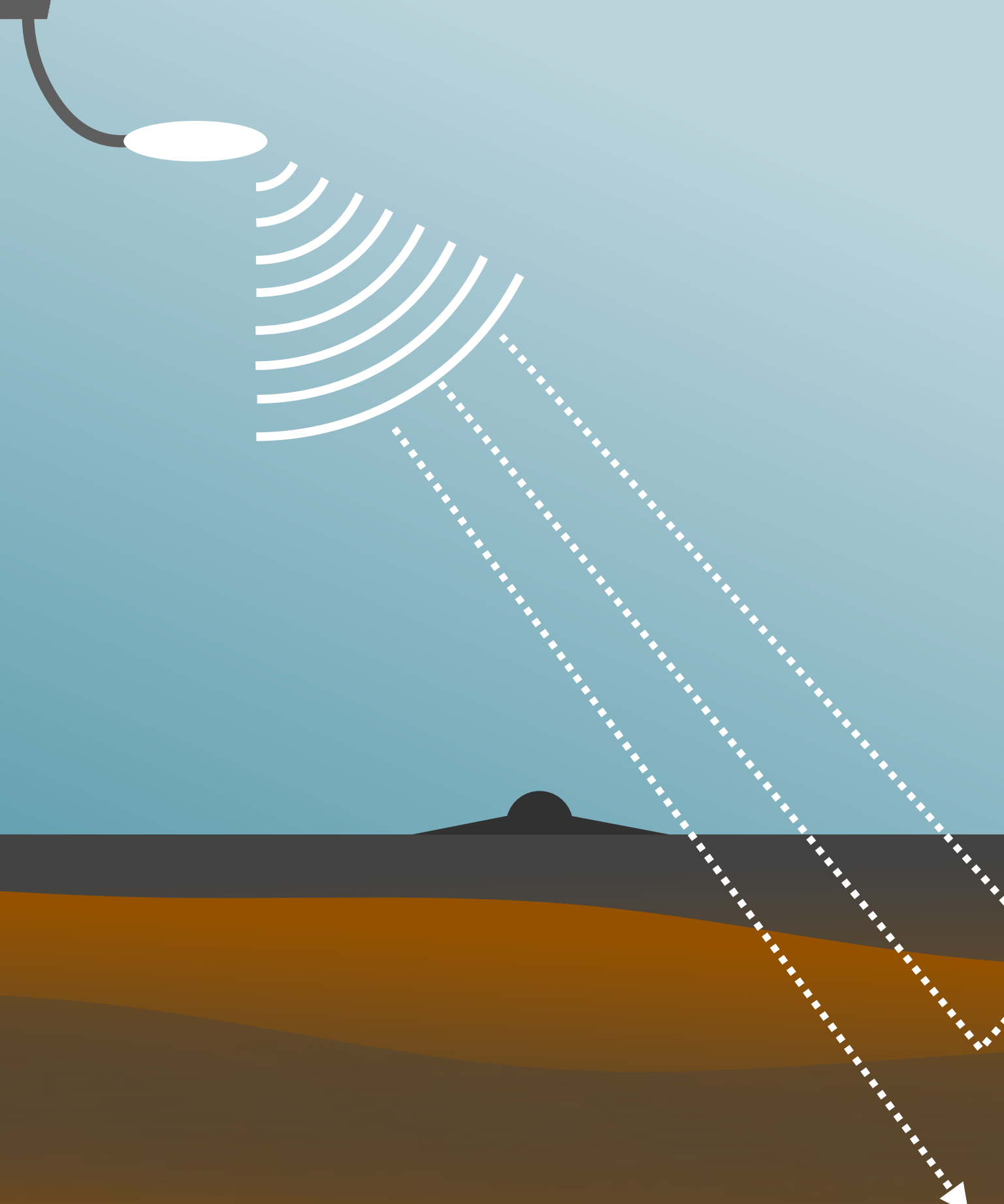
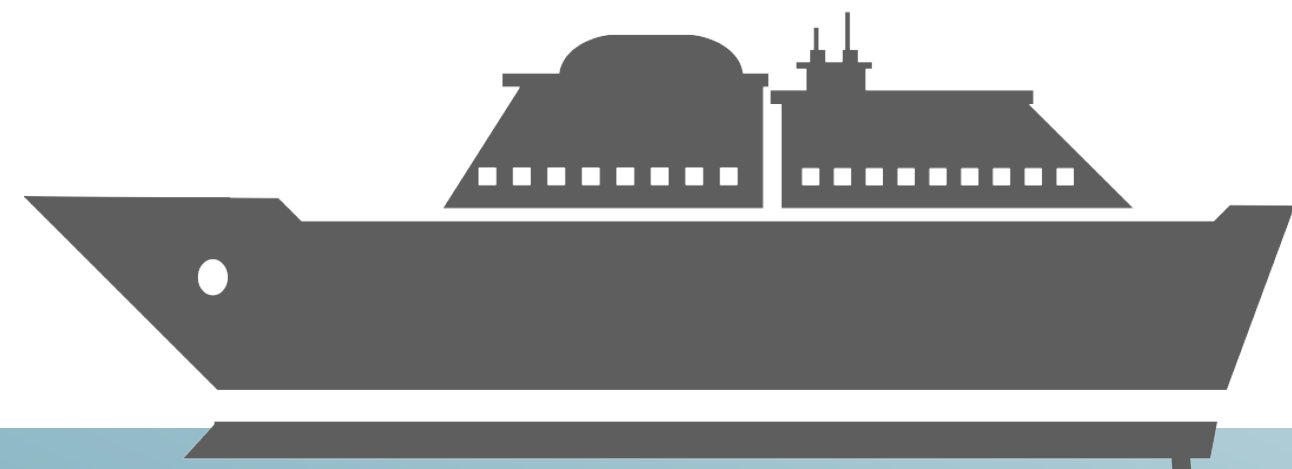
Acoustic waves from a sound source travel into layers of rock.





# MARINE GEOPHYSICAL SURVEY

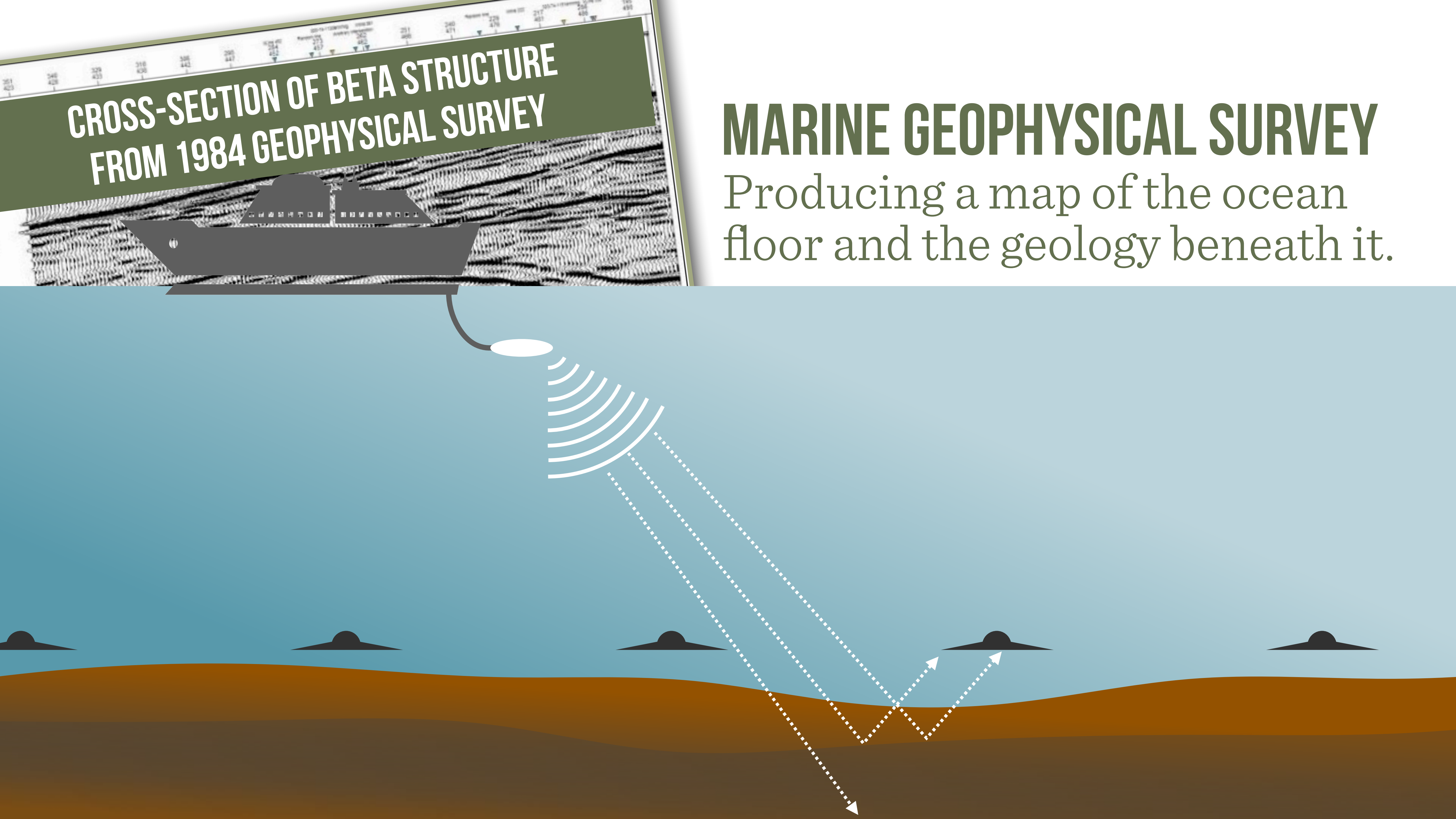
Length of time & characteristics are measured as they return.



**CROSS-SECTION OF BETA STRUCTURE  
FROM 1984 GEOPHYSICAL SURVEY**

# MARINE GEOPHYSICAL SURVEY

Producing a map of the ocean floor and the geology beneath it.





# BETA

BETA Geophysical Survey over existing producing leases of the BETA oil field will not open up new territory for drilling.

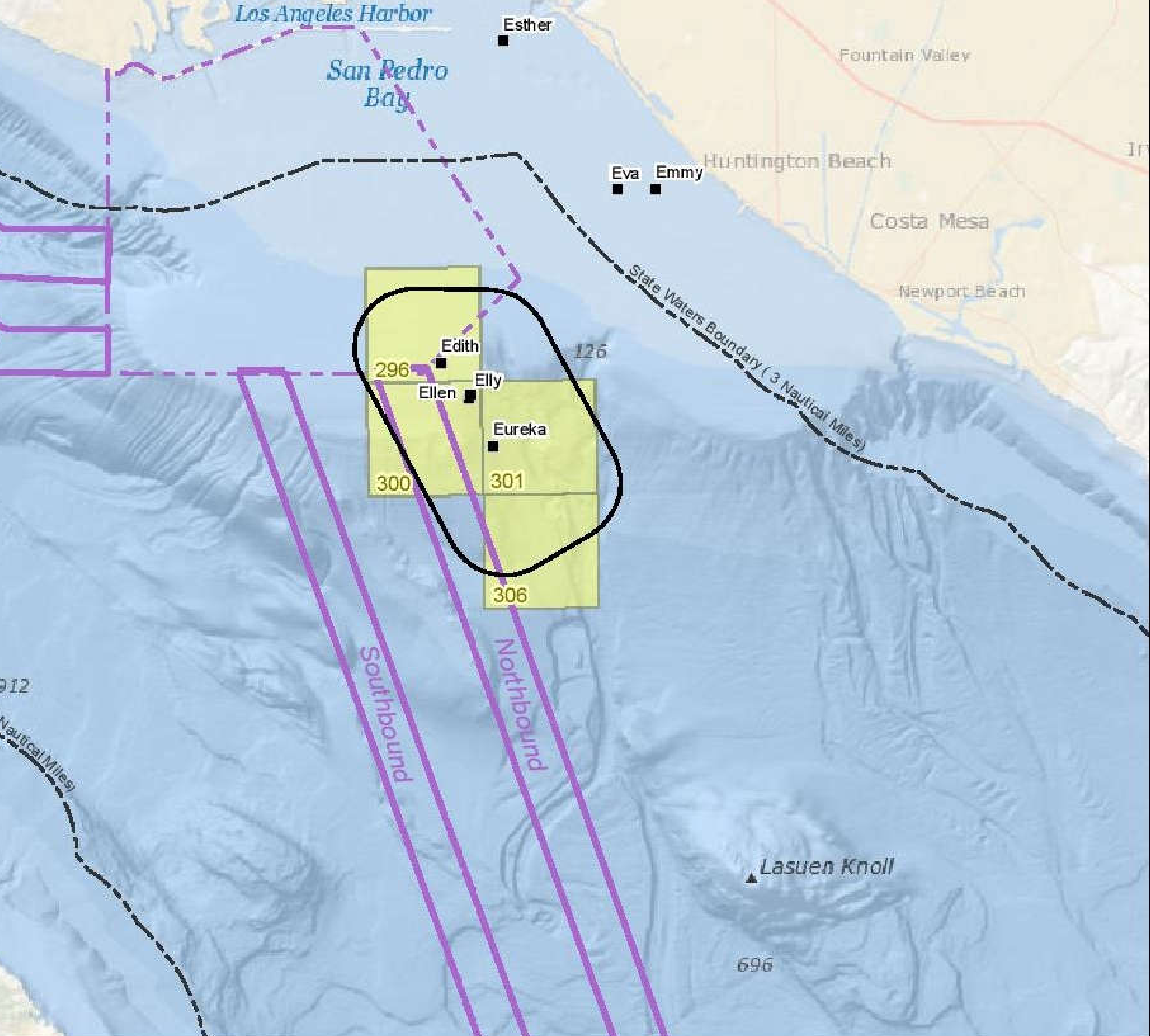


A large offshore oil platform, identified as Beta, is shown in the ocean under a clear blue sky. The platform consists of two main structures connected by a long, narrow walkway. The left structure is taller and features a prominent derrick with a crane. The right structure is shorter and more complex, with various pipes and equipment. The platform is supported by a steel jacket structure. The water is a deep blue, and the sky is a clear, bright blue.

# BETA

OPERATED SAFELY IN  
SOUTHERN CALIFORNIA  
FOR MORE THAN **40 YEARS**





As we gradually recover this known reserve, data from the geophysical survey will allow for maximum precision and the smallest possible operating footprint.

**MAP EXTENT:** 

Federal Lease (as of 6/05/2014)
  Shipping Lane

Survey Area
  Port of Los Angeles / Port of Long Beach Precautionary Area

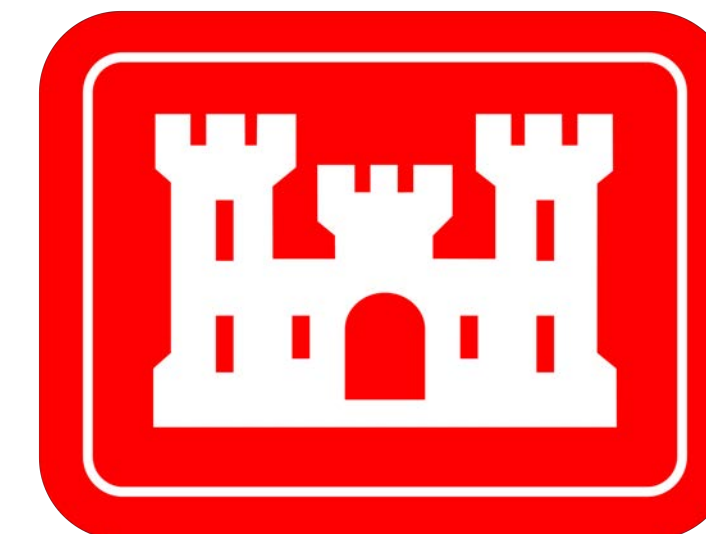
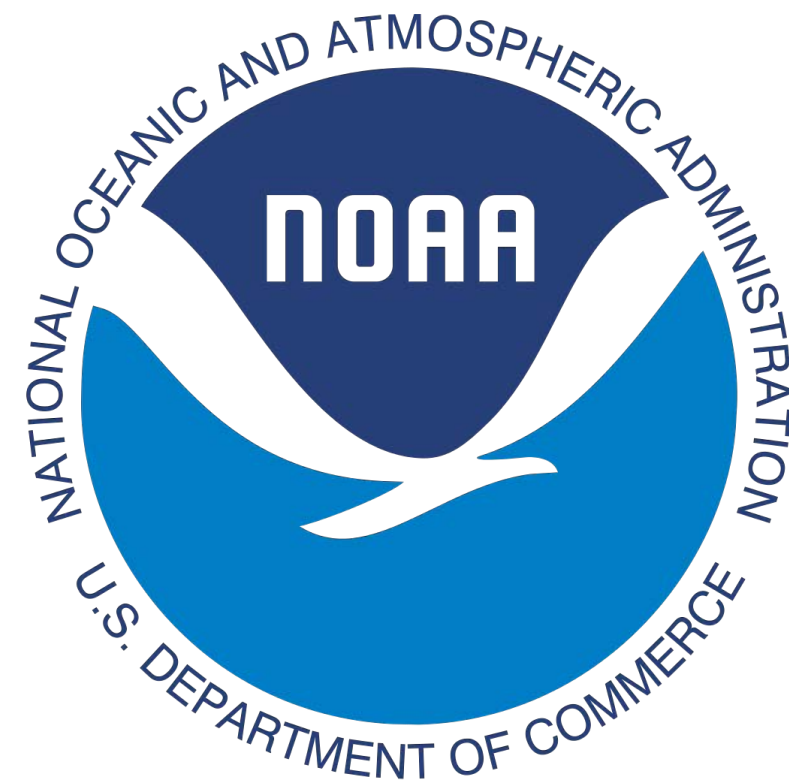
Offshore California V FIPS 0-405 Feet and display purposes only.  
PROJECT NAME: OFFSHORE GEOPHYSICAL SURVEY

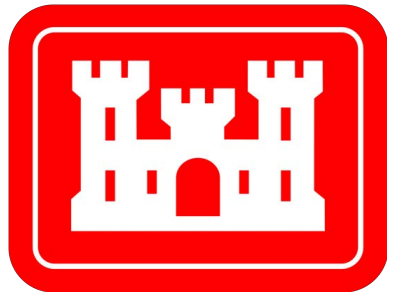
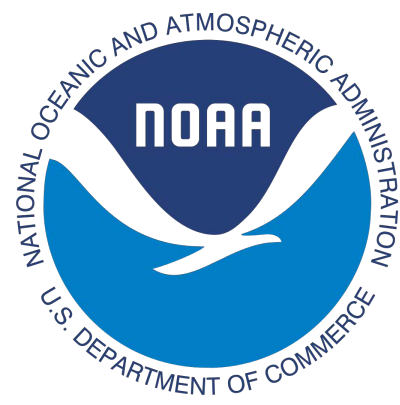
# ENVIRONMENTAL

Modern Best Practices & Regulations  
Minimize Marine Impacts



# In depth state and federal permit review





# Environmental Assessment



Geology



Water Quality



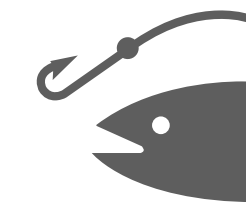
Air Emissions



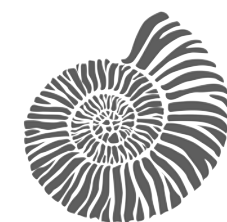
Transportation



Marine Biological Resources



Commercial and Recreational Fishing



Archaeological Resources



Hazardous Materials and Risk of Upset



Recreational Resources



Strong regulatory  
marine life protections  
are already in place.



**NOAA  
FISHERIES**



**Public comments close:**  
January 27, 2014

**Public meeting:**  
January 14, 2014: 2-5pm

**Public comments opened:**  
December 27, 2013

For more information, visit:  
<http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm>

## NOAA Draft Guidance for Assessing Effects of Anthropogenic Sound on Marine Mammals

### Acoustic Threshold Levels for Onset of Permanent and Temporary Threshold Shifts

#### Guidance information

The Draft Guidance provides updated acoustic threshold levels for assessing the effects of underwater anthropogenic sound on marine mammal species under NOAA's jurisdiction. It identifies received levels or thresholds, above which individual marine mammals are predicted to experience changes in their hearing sensitivity (either temporary or permanent) for all underwater anthropogenic sources.

The updated acoustic threshold levels do not represent the entirety of an impact assessment but rather serve as one tool to help NOAA evaluate the effects of a proposed action on marine mammals and make findings required by our various statutes.

#### Who should use the Guidance?

This Draft Guidance is intended to be used by NOAA analysts and managers, other Federal agencies, and other relevant user groups and stakeholders to determine whether and how their activities might result in marine mammal hearing threshold shifts due to acoustic exposure.

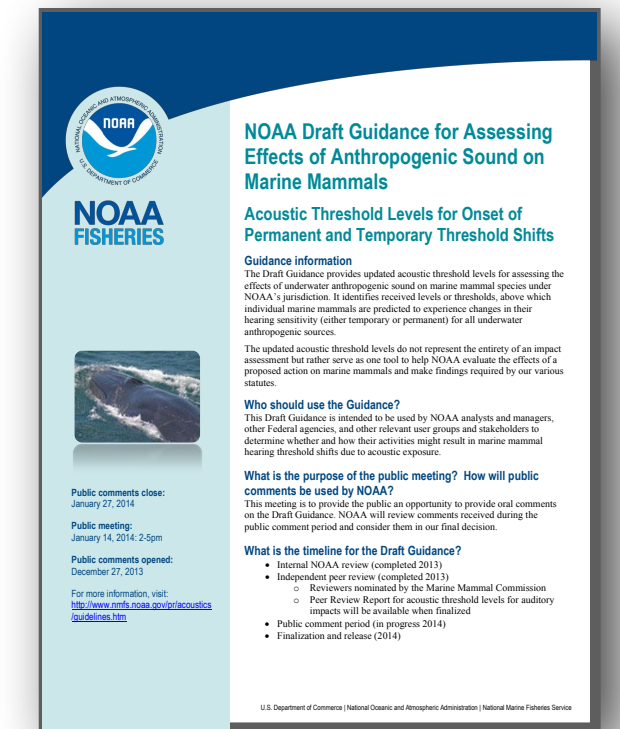
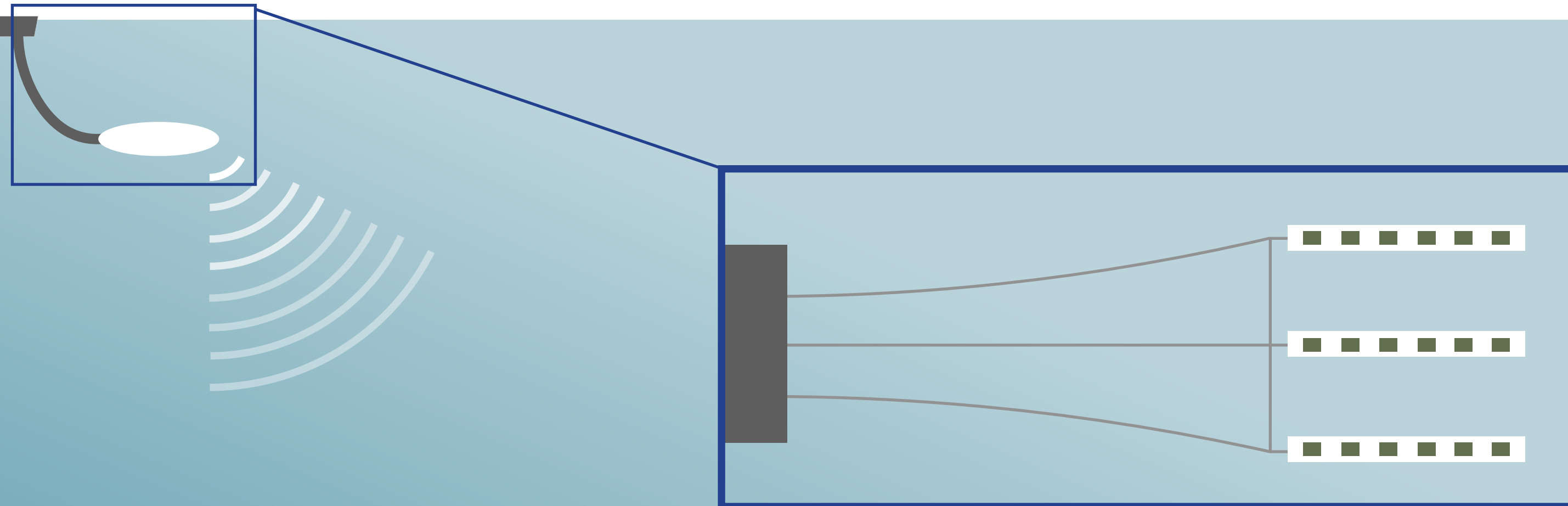
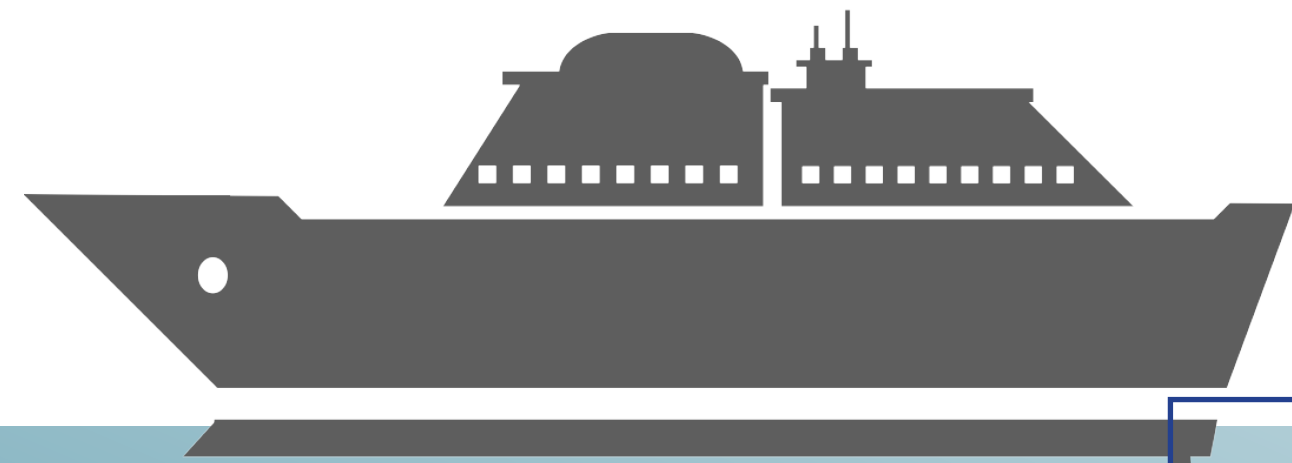
#### What is the purpose of the public meeting? How will public comments be used by NOAA?

This meeting is to provide the public an opportunity to provide oral comments on the Draft Guidance. NOAA will review comments received during the public comment period and consider them in our final decision.

#### What is the timeline for the Draft Guidance?

- Internal NOAA review (completed 2013)
- Independent peer review (completed 2013)
  - Reviewers nominated by the Marine Mammal Commission
  - Peer Review Report for acoustic threshold levels for auditory impacts will be available when finalized
- Public comment period (in progress 2014)
- Finalization and release (2014)

# REDUCING SOUND using a distributed sound source on “popcorn” mode rather than a single source.

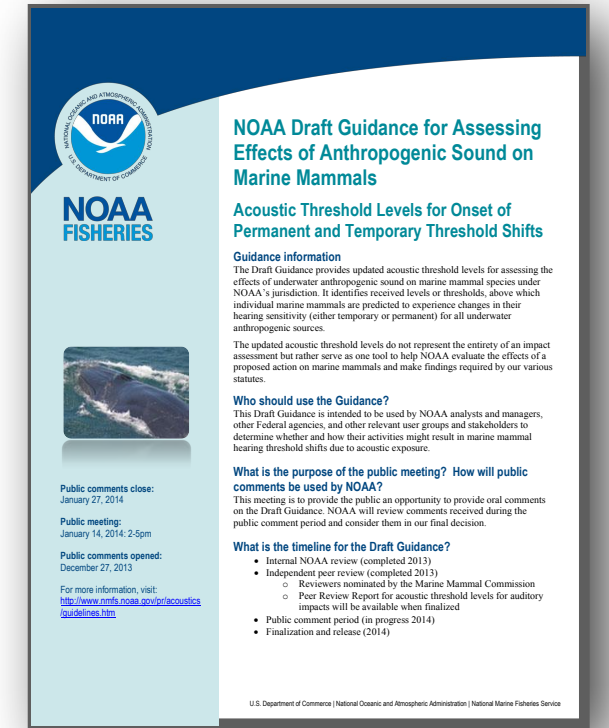
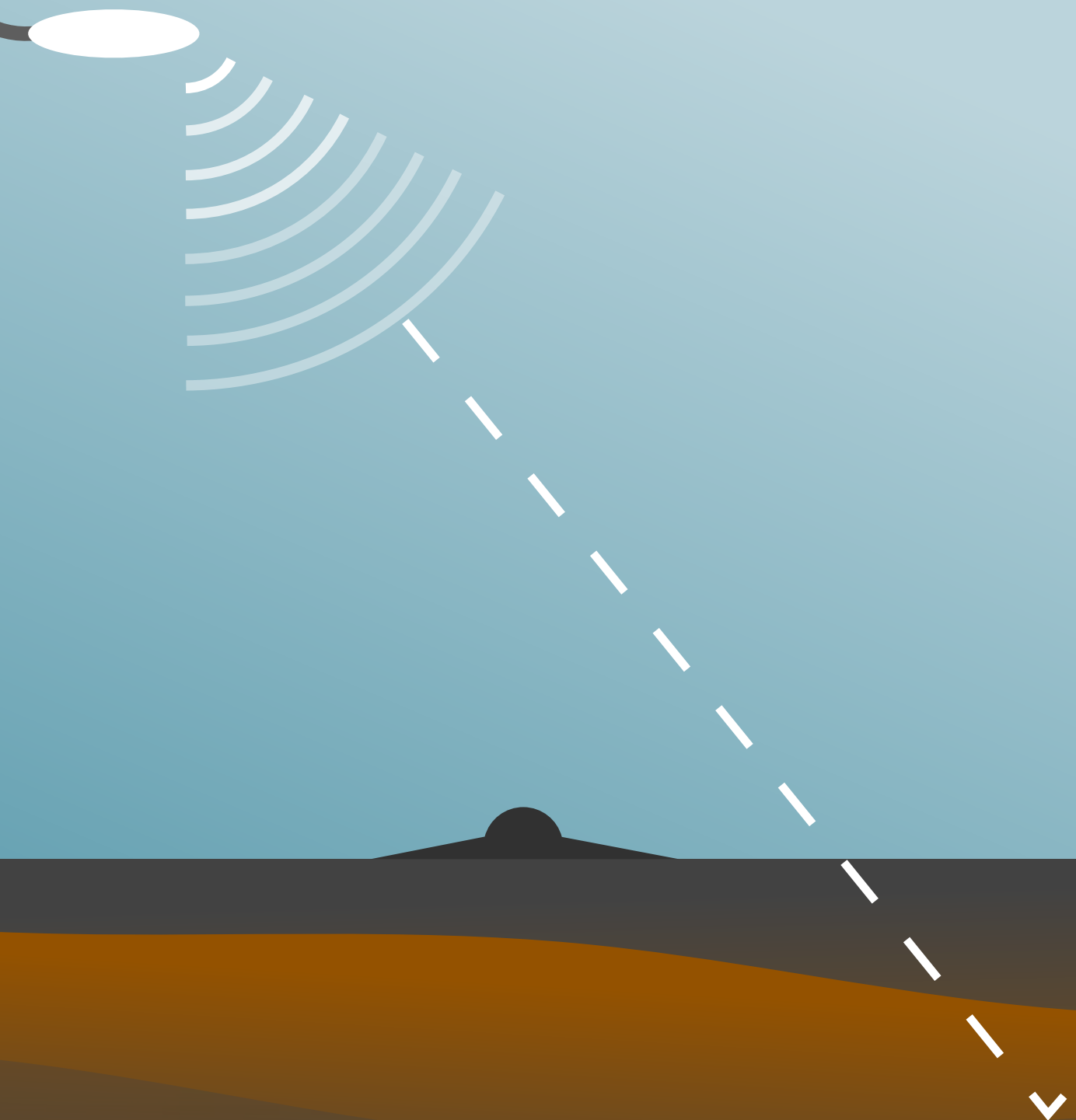
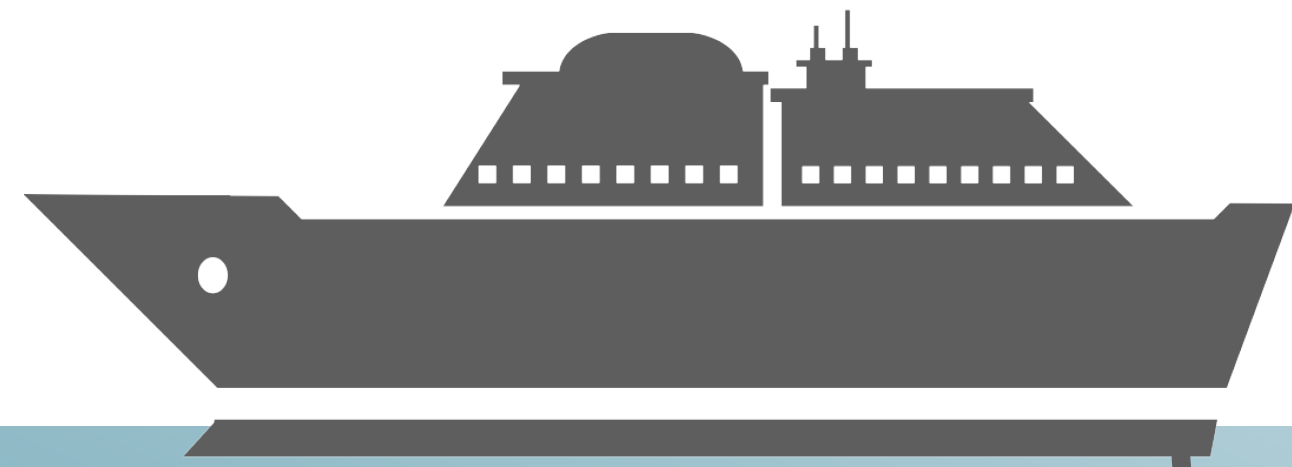


PROJECT INCORPORATED MEASURES TO REDUCE IMPACTS



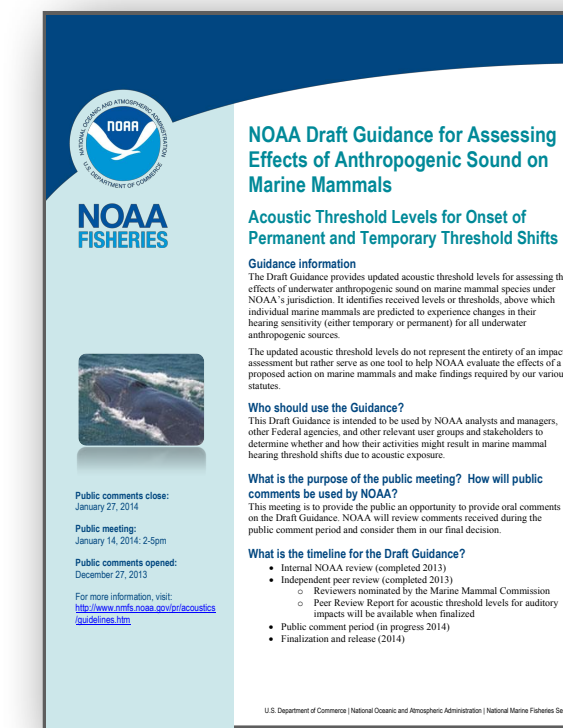
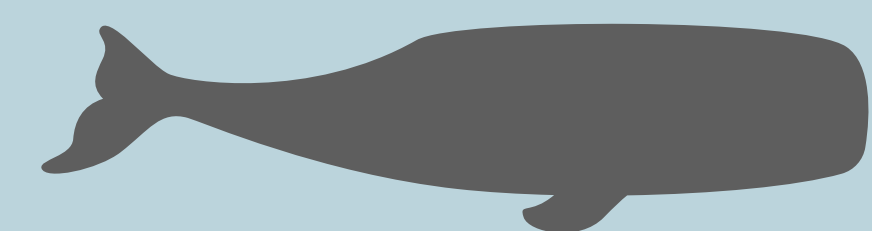
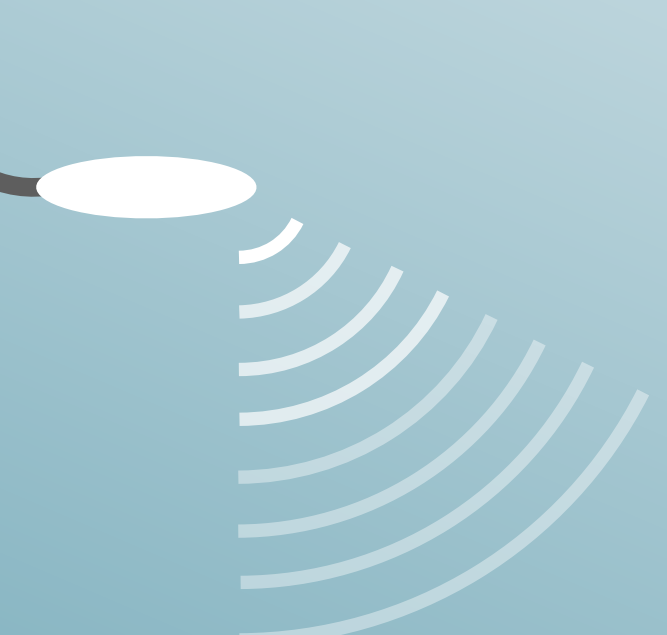
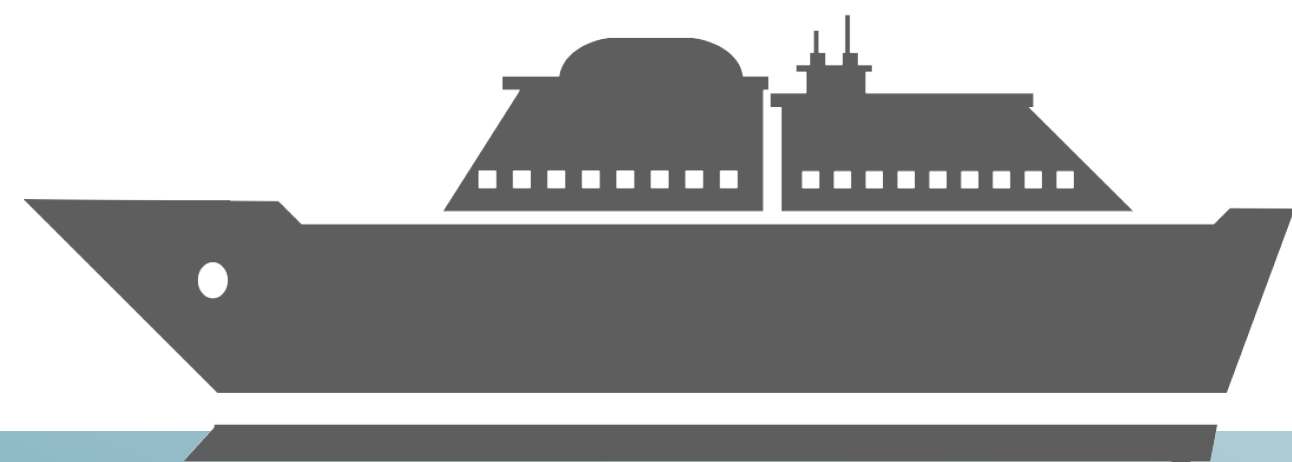
# SOUND SOURCE VERIFICATION

conducted to ensure actual acoustic energy levels are consistent with modeling.



## PROJECT INCORPORATED MEASURES TO REDUCE IMPACTS

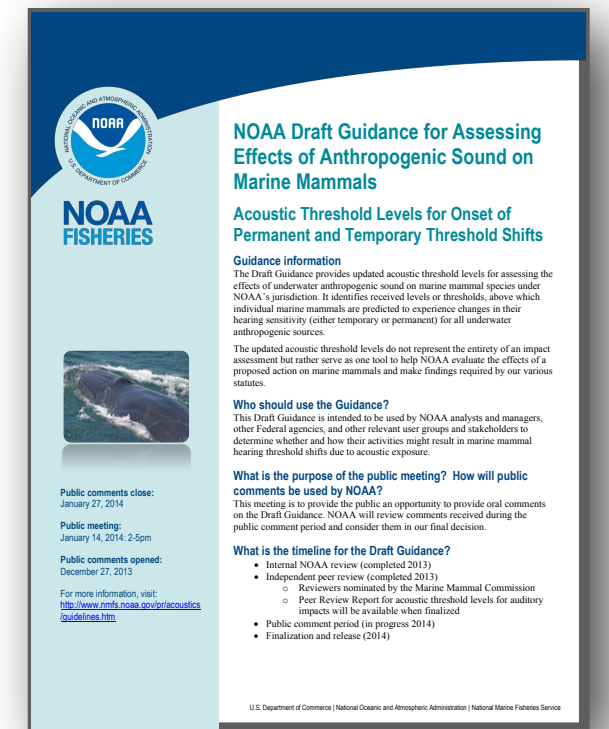
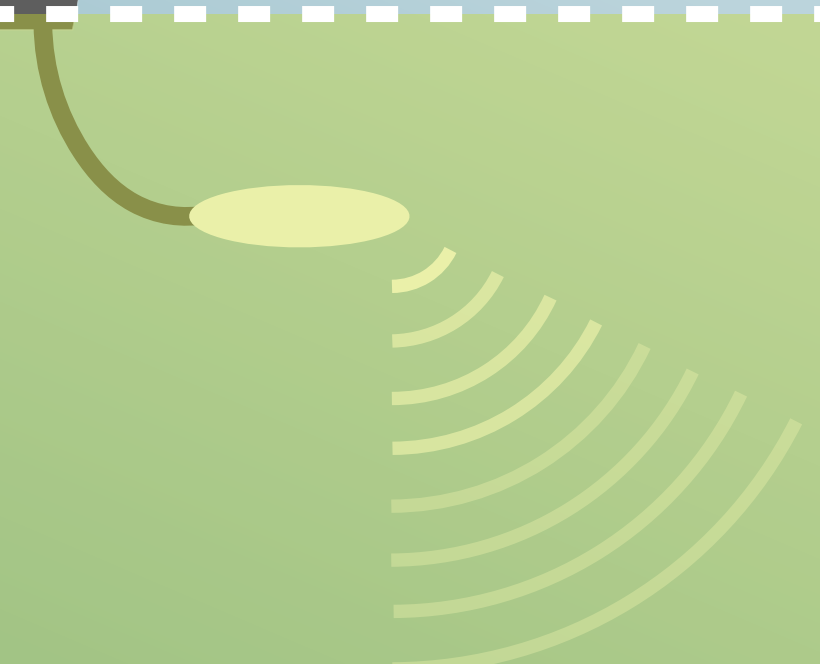
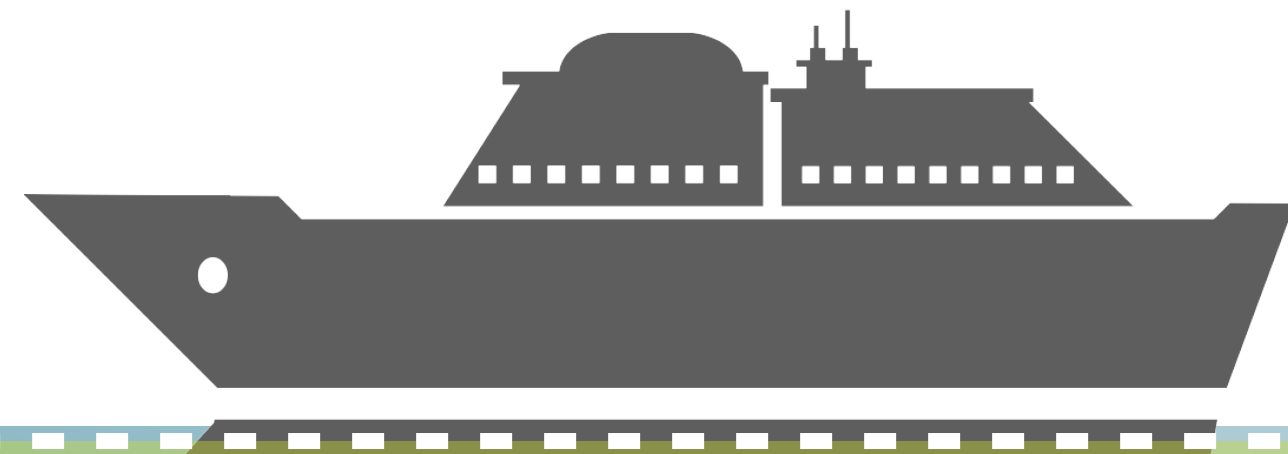
**SCHEDULING** to coincide with the reduced number of cetaceans in the area and outside the peak gray whale migration period.



**PROJECT INCORPORATED MEASURES TO REDUCE IMPACTS**



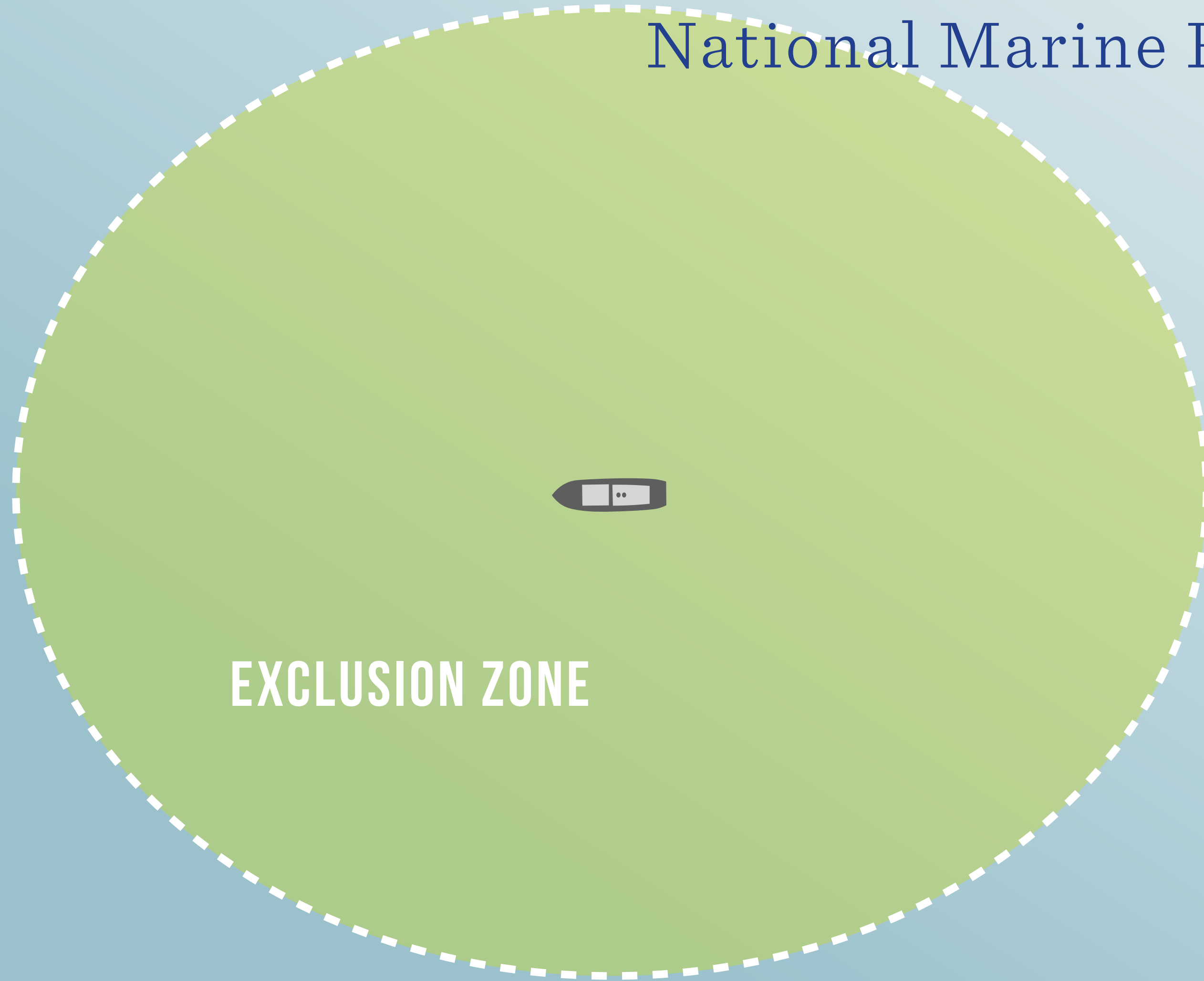
# EXCLUSION ZONE established to protect marine mammals from potential injury.



**PROJECT INCORPORATED MEASURES TO REDUCE IMPACTS**

# EXCLUSION & BUFFER ZONES

determined in consultation with  
National Marine Fisheries Service

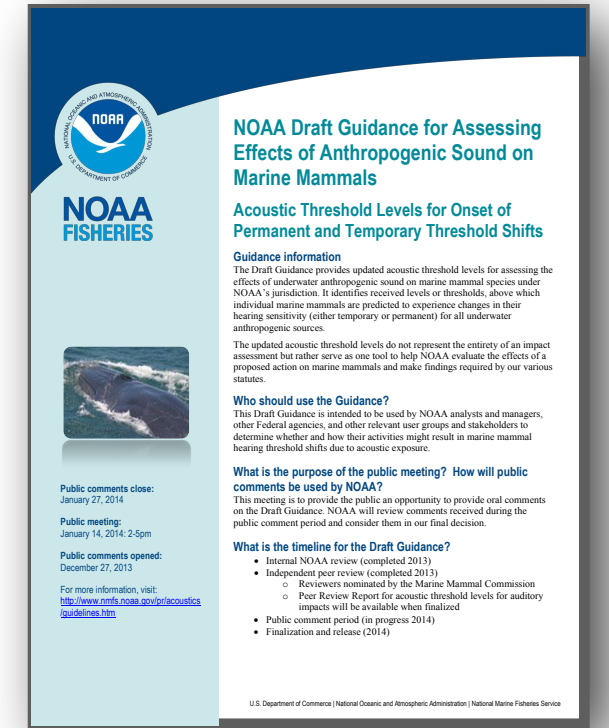
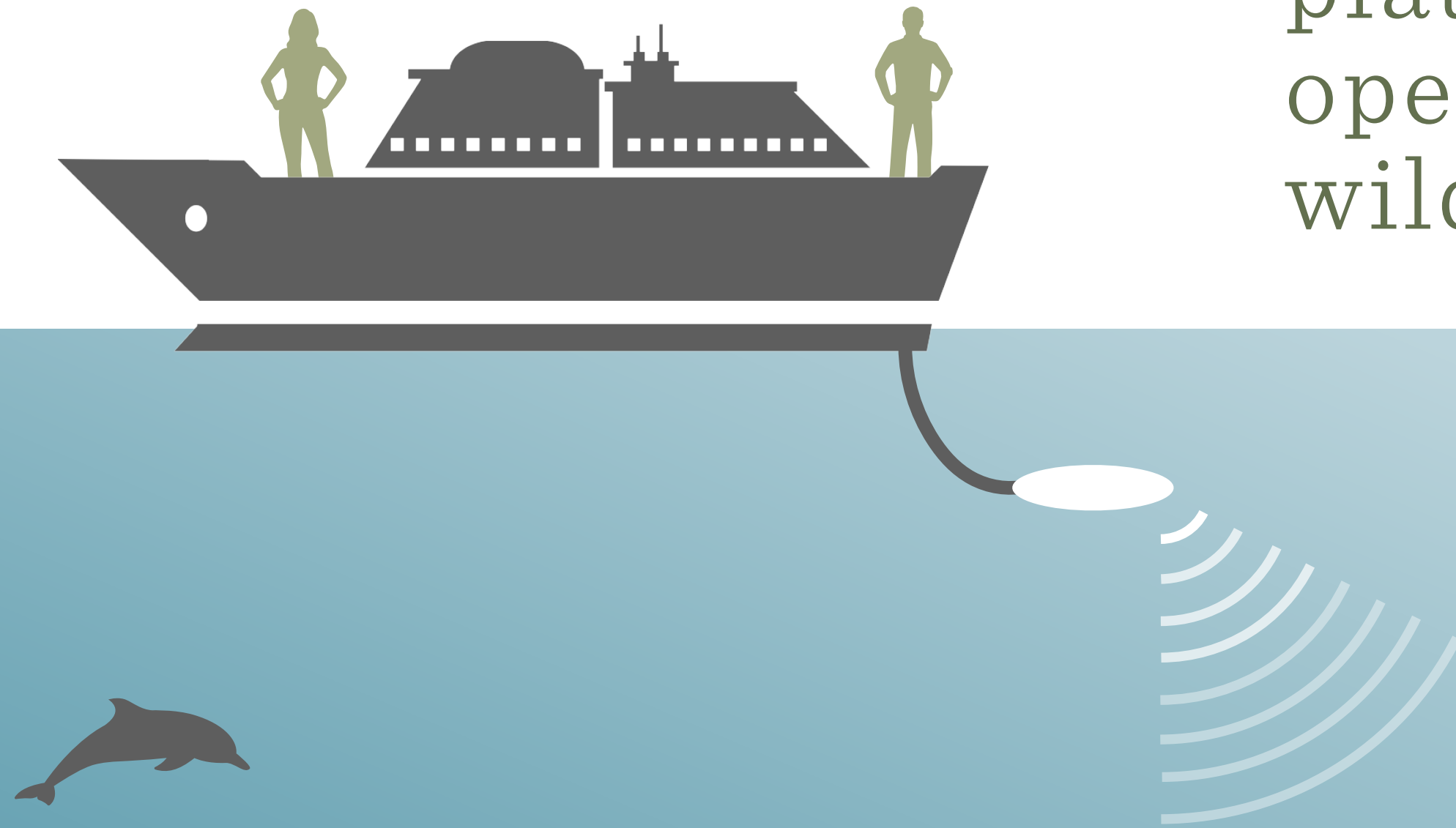


BUFFER ZONE

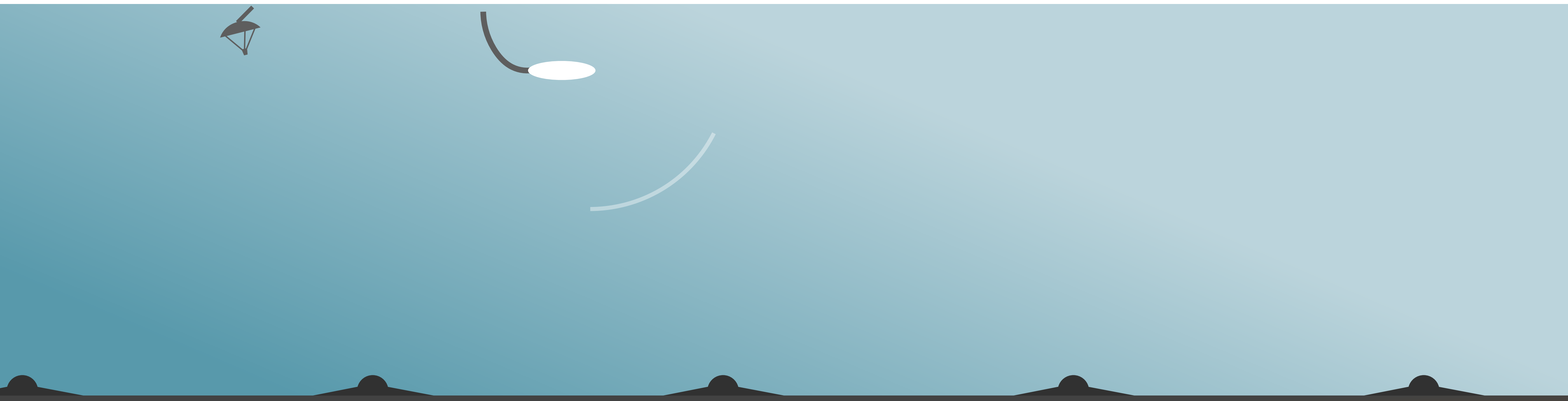
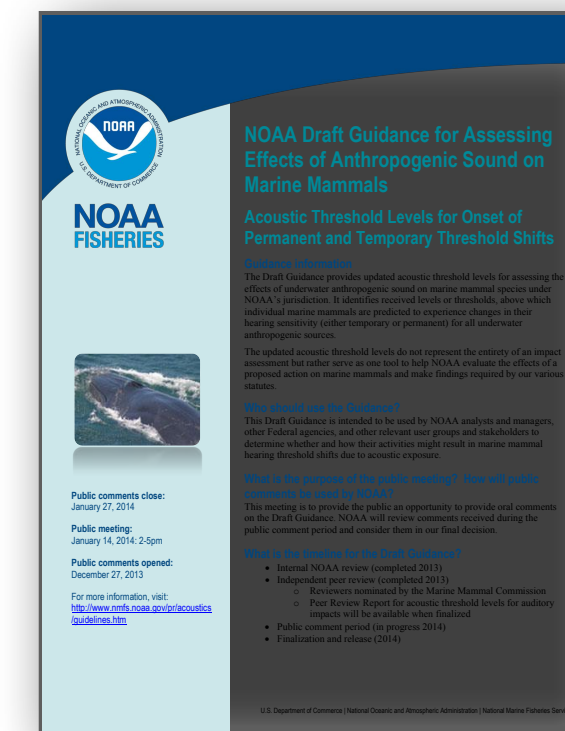


# PROTECTED SPECIES OBSERVERS

will watch from vessels and platforms to shut down operations if protected marine wildlife enter an exclusion zone.

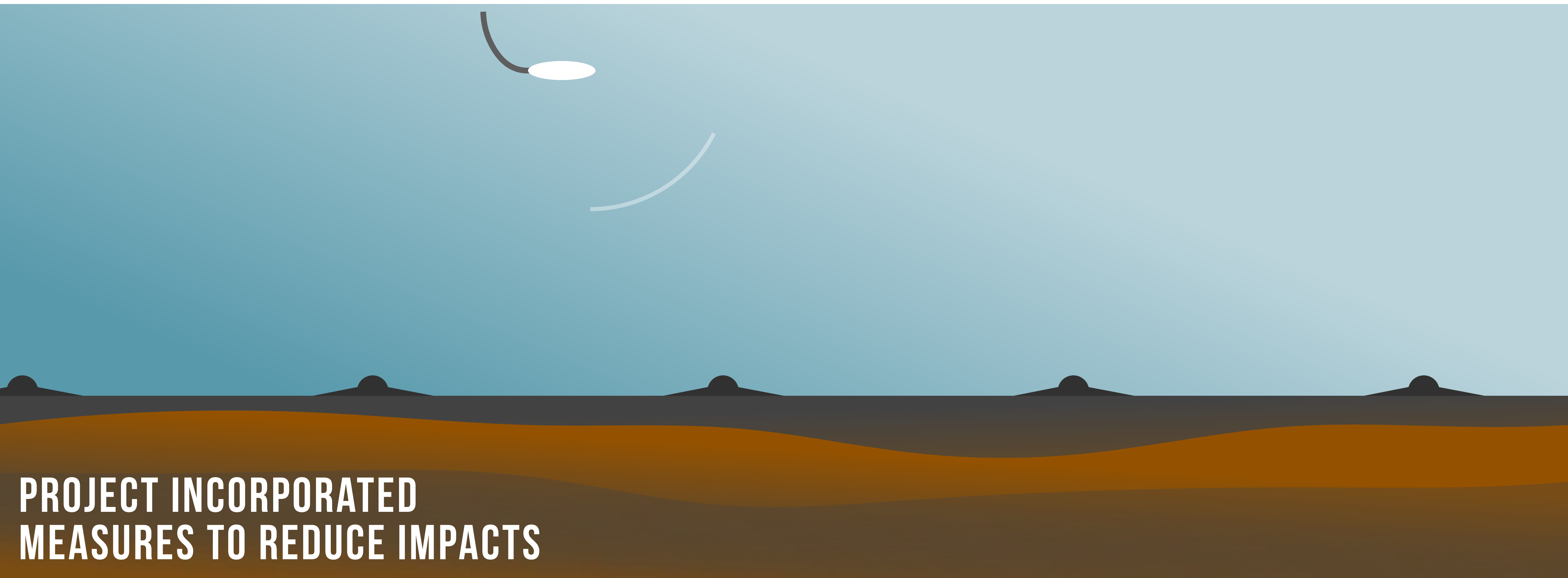
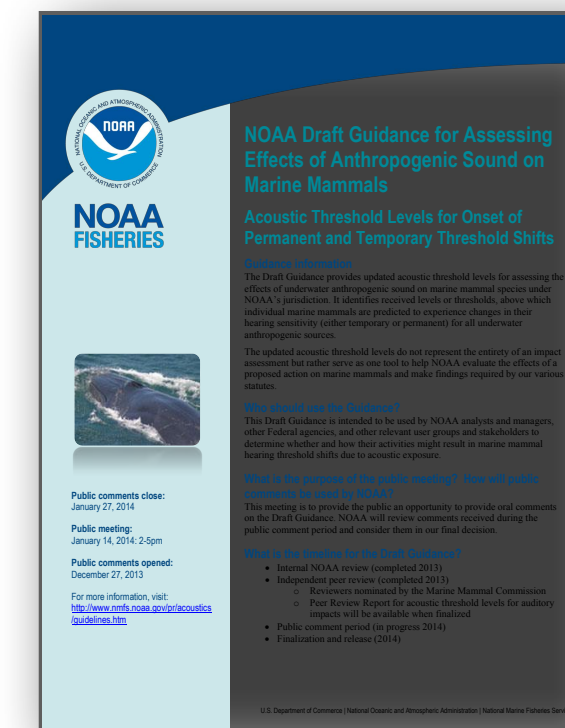


## PROJECT INCORPORATED MEASURES TO REDUCE IMPACTS



**PROJECT INCORPORATED  
MEASURES TO REDUCE IMPACTS**





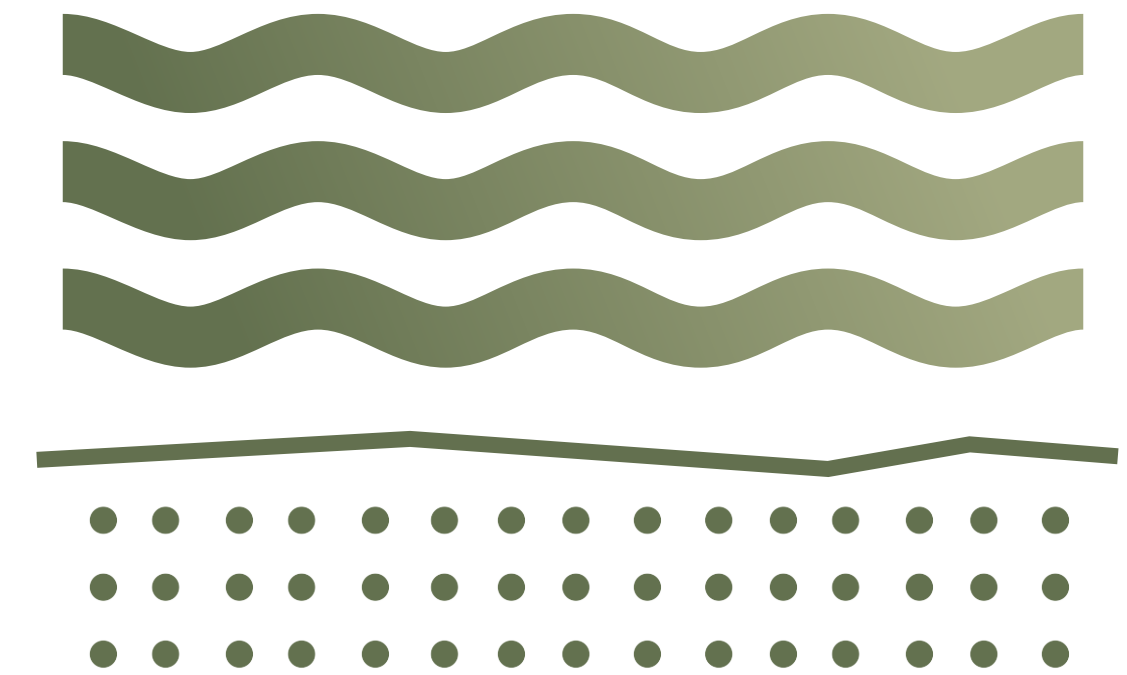
**PROJECT INCORPORATED  
MEASURES TO REDUCE IMPACTS**



A proven technology to map the geology of the ocean floor.



Modern best practices and regulations can minimize marine impacts.



Helps efficiently recover remaining resources with fewer wells.



# BETA OFFSHORE

[betaoffshore.com](http://betaoffshore.com)

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