



NOSB 2024-25

STEAM Leader Challenge

Science
Technology
Engineering
Art
Mathematics

Introduction to the NOSB

- The National Ocean Sciences Bowl (NOSB) is a nation-wide academic competition that fills a gap in environmental and earth sciences education. By engaging high school students in ocean sciences, it prepares them for STEM careers and fosters knowledgeable, environmentally conscious community members. The NOSB is providing ocean science resources through Scoutlier, a free lesson development tool for teachers that supports learning in the classroom and at home for all students, as part of a new pilot project supported by the Office of Naval Research (ONR) STEM.
- The NOSB also hosts annual STEAM Leader Challenges on Scoutlier. The challenges include video introductions to ocean science experts and the problems they are addressing through their work. Students answer questions to demonstrate comprehension of and critical thinking based on the content, and submit final product pitches for an opportunity to win a prize.

Introduction to the STEAM Leader Challenge & WAVES

WAVES: Weaving Art from Data, Sound, and the Sea

- Challenge Overview: This art challenge invites participants to explore the intersection of Data Science, Sound, and Marine Science through a creative lens, using the acronym WAVES as the guiding concept. The challenge encourages the integration of real-world marine data, ocean acoustics, and scientific insights to create artistic representations of oceanic phenomena, while also highlighting how important data is for understanding and protecting our global ocean.



Challenge Objective:

Create an artwork that combines data science, marine science, and sound. Choose your favorite art form, like digital art, sculpture, sound design, interactive installations, or mixed media. Your artwork should blend these elements in a way that looks good and makes sense together.

Bonus: Think about ways to make this artwork accessible for others with various disabilities. Explain how you accomplished accessibility in your final pitch to judges.



WAVES Explained:

As students explore and translate their experiences, we encourage them to think through the following steps:

1. W: Waveforms and Data Visualization
2. A: Acoustic Phenomena
3. V: Visualizing Marine Data
4. E: Ecosystem Interaction
5. S: Soundscapes of the Sea

W

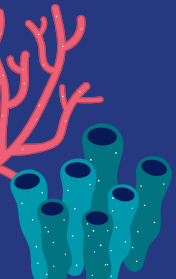
Waveforms and Data Visualization

- Gather information about the ocean, like water temperature, salinity, wave height and direction, or the biodiversity. You can also collect sounds from the ocean. A few suggestions will be provided, but you are free to find any data you think will be valuable in your project.
- Use computer programs to change this data into visuals like waveforms, charts, graphs, or other forms of digital art.
- The goal is to make pictures from this data that show what's happening in the ocean in an interesting way.

A

Acoustic Phenomena

- Investigate ocean sounds. What noises do marine ecosystems make? You can listen to recordings from underwater like whale songs, coral reef sounds, anthropogenic noise (noise from shipping, military exercises, or underwater construction) or deep ocean hums. You could also make your own ocean sounds.
- Think about ways to show these sounds through art. This could be drawing pictures of sound waves, making interactive sound exhibits, or creating sculptures that make noises when triggered by certain conditions.



V

Visualizing Marine Data

- Take the ocean data you have, like information on ocean currents, migration patterns, or coral reef health.
- Create art that shows these ocean facts. Your art could look abstract, which means it doesn't have to look exactly like what it represents but should give a sense of it.
- Use colors, shapes, and motion in your artwork to help show the complex and changing nature of the ocean.



E

Ecosystem Interaction

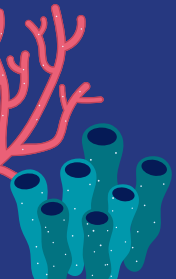
- Think about how different sea creatures and systems work together in the ocean. Look at how sounds affect the behavior of animals, how ocean data shows changes in the environment, or how humans impact the ocean.
- Use your art to explore these connections. For example, you could make a sculpture that changes based on different sounds, or an interactive display that changes visuals or sounds based on the data you input.



S

Soundscapes of the Sea

- Explore marine soundscapes, which include natural underwater sounds like those from fish, whales, and currents, as well as human-made sounds like shipping noises or sonar.
- Make sure your final art piece uses sound as a key part. This could be through a sound installation, a multimedia artwork, or a digital experience where viewers can interact with sounds from the ocean.





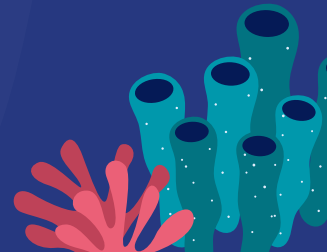
Curriculum Resources and Guides

- To explore topics in more depth, check out the NOSB ocean acoustics resource page at <https://nosb.org/portfolio-items/ocean-acoustics/> .
- Curriculum resources and guides are available through the [Scoutlier.com](https://scoutlier.com) website. Adult mentors/teachers can sign up for a free Scoutlier account to access the free materials.
- After signing into the platform, materials can be obtained through the following link:
 - [2025 NOSB STEAM Leader Challenge - Ocean Acoustics](#)
- Teachers can assign the Scoutlier lessons to students in order to lay the foundation for the process and provide resources to students.
- [This video](#) will explain how to copy the materials in the platform to use as your own.
- [This video](#) will explain how to create assignment codes for your students.
- Students can access the materials on the Scoutlier platform by typing the assignment code created by the teacher/mentor at <https://app.scoutlier.com/#/student/code> .



Judging Criteria:

- Innovation: How creatively have the themes of data science, sound, and marine science been integrated?
- Clarity: Does the artwork effectively communicate a message about marine ecosystems, sound, and the role of data in understanding them?
- Interactivity: Does the artwork invite audience engagement or exploration of the underlying concepts?
- Aesthetic Appeal: Is the artwork visually and/or aurally compelling?
- Pitch: How does the artwork creatively and effectively combine elements of data science, sound, and marine science to engage and educate viewers about marine ecosystems?
- Bonus: Is the artwork accessible for multiple audiences?



Submission Requirements:

- Participants: Students grades 9-12 and residing in the US are encouraged to participate in this design challenge. An adult mentor/teacher will be required for the submission contact.
- Students will submit documentation of art within a presentation of no more than 5 slides and an accompanying video of up to 3 minutes. The presentation should showcase the art piece while the video will explain the thinking behind the work.
- Art Format: Submissions can take any form, from digital art to physical sculptures, sound installations, video art, or interactive media. Multiple pictures of physical objects and installations will be required for your final submission. Digital art, videos, or interactive media links will be required for those submissions.
- A official submission form will be opened on February 1, 2025 and closed on February 28, 2025.
- Mentors/teachers/students can go through the full challenge without submitting anything for judging if they are not interested in competing.



Prizes

- 1st place – \$400
- 2nd place – \$300
- 3rd place – \$200
- Best Artwork Accessibility Description - \$100

