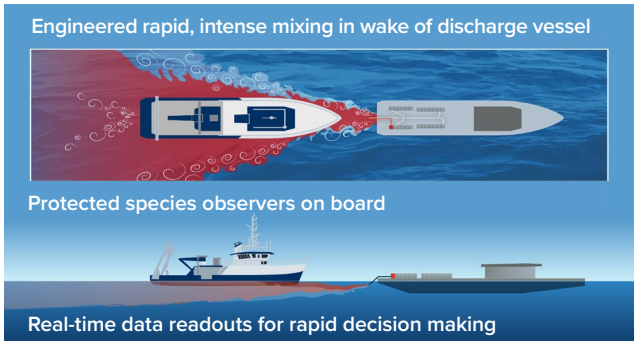
Field trial design and implementation

The location of the proposed LOC-NESS field trial has been carefully selected to maximize the likelihood of achieving the scientific goals of the project while minimizing impacts on marine life and human activity. The site selection is not an endorsement of this location for potential future commercial deployment of ocean alkalinity enhancement (OAE).

The Wilkinson Basin was chosen because of abundant baseline data about the physics, chemistry and biology of the region; the favorable currents, biological activity, and other environmental conditions during the proposed study period; and limited competing ocean uses at the sea surface. In the map below (Figure 2), the pink circle represents the size and location of the proposed dispersal, while the larger white circle is the potential monitoring area where the research vessel may operate over the proposed 7-day monitoring period.

Pending permitting from the EPA, the proposed field trial will take place in August 2025, with the sodium hydroxide dispersal occurring in the wake of a transport vessel and data collection occurring on a research vessel following close behind. Due to rapid, intense mixing in the wake of the transportation vessel, we expect that the pH of the sea surface behind the transport vessel will fall to 9 within 12 seconds. The dispersal will last approximately 4 hours, be limited to the upper 30 feet of the water column, and a perimeter will be established to ensure that the experiment can be conducted safely (pink circle in the map above). At the end of the dispersal, the resulting patch of water will have a alkalinity elevated by about 11% above typical values for the area, and the pH will be around 8.4, lower than the EPA's recommended water quality criteria for aquatic life for pH. Trained protected species observers will maintain watch



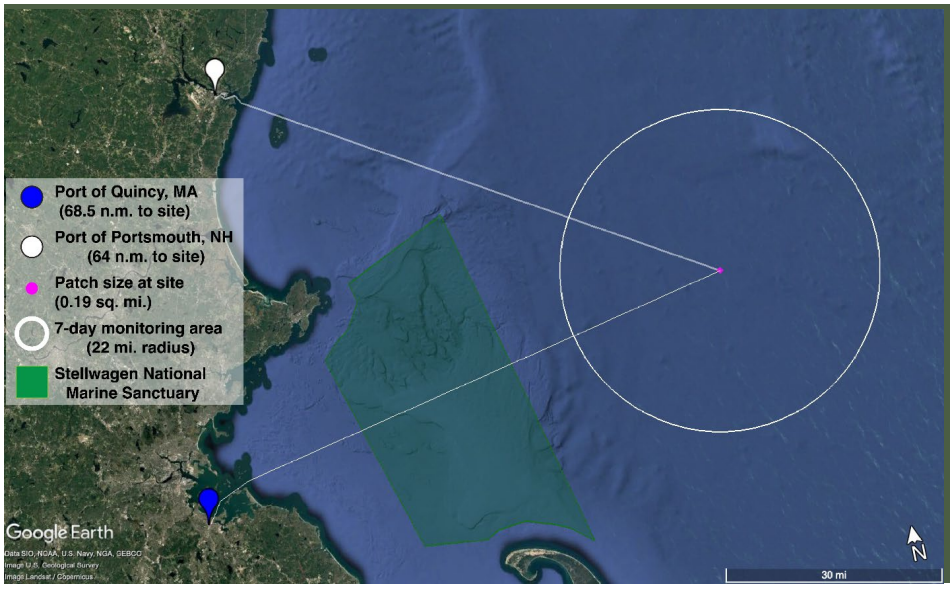


Figure 1 (above) shows the approximate (not to scale) configuration of the transport/dispersal vessel and research ship during dispersal. Figure 2 (left) shows the proposed dispersal location (pink circle) and potential routes (white lines) from the port of Quincy (primary port of departure) and the port of Portsmouth, NH, (secondary port) to the dispersal site. The potential monitoring area is shown as the larger white circle. Stellwagen Bank National Marine Sanctuary is shown in green.

throughout the dispersal period, will document the presence, abundance, and behavior of any marine animals observed, and will have authority to halt dispersal if protected species are spotted nearby. Data collection on the research vessel will permit real-time decision-making to fine-tune the dispersal as it is happening.

After the dispersal, the science team will track the elevated-alkalinity patch of seawater for 7 days, which is longer than the time expected for the patch to return to background conditions and no longer be detectable. There are no anticipated restrictions on vessel activity in this monitoring area (white circle in the map above). Instead, the circle indicates where other mariners might encounter the monitoring research vessel. The patch itself will be much smaller than the 7-day monitoring area, and will move and dissipate with currents and tides away from the dispersal area.

During the dispersal and throughout the 7-day monitoring period, the team will continuously measure surface ocean pH, pCO_2, alkalinity, temperature, salinity, and dye concentration using the monitoring vessel's pumped underway system. Some of these parameters will also be measured with a vehicle towed behind the ship. Water and biological samples will also be collected to assess ocean chemistry and plankton community composition throughout the water column using the ship's rosette sampler and via regular plankton net tows. Satellite remote sensing and aerial drone imagery will also help document the evolution and extent of the experimental patch. Autonomous drifters outfitted with sensors will track conditions inside and outside the patch, and gliders will be deployed for several weeks before and after the experiment to document baseline and post-experiment conditions at the study site.

These data together will be used to differentiate changes in the ocean chemistry and carbon content due to mixing, biological activity, and enhanced CO_2 uptake from the atmosphere.

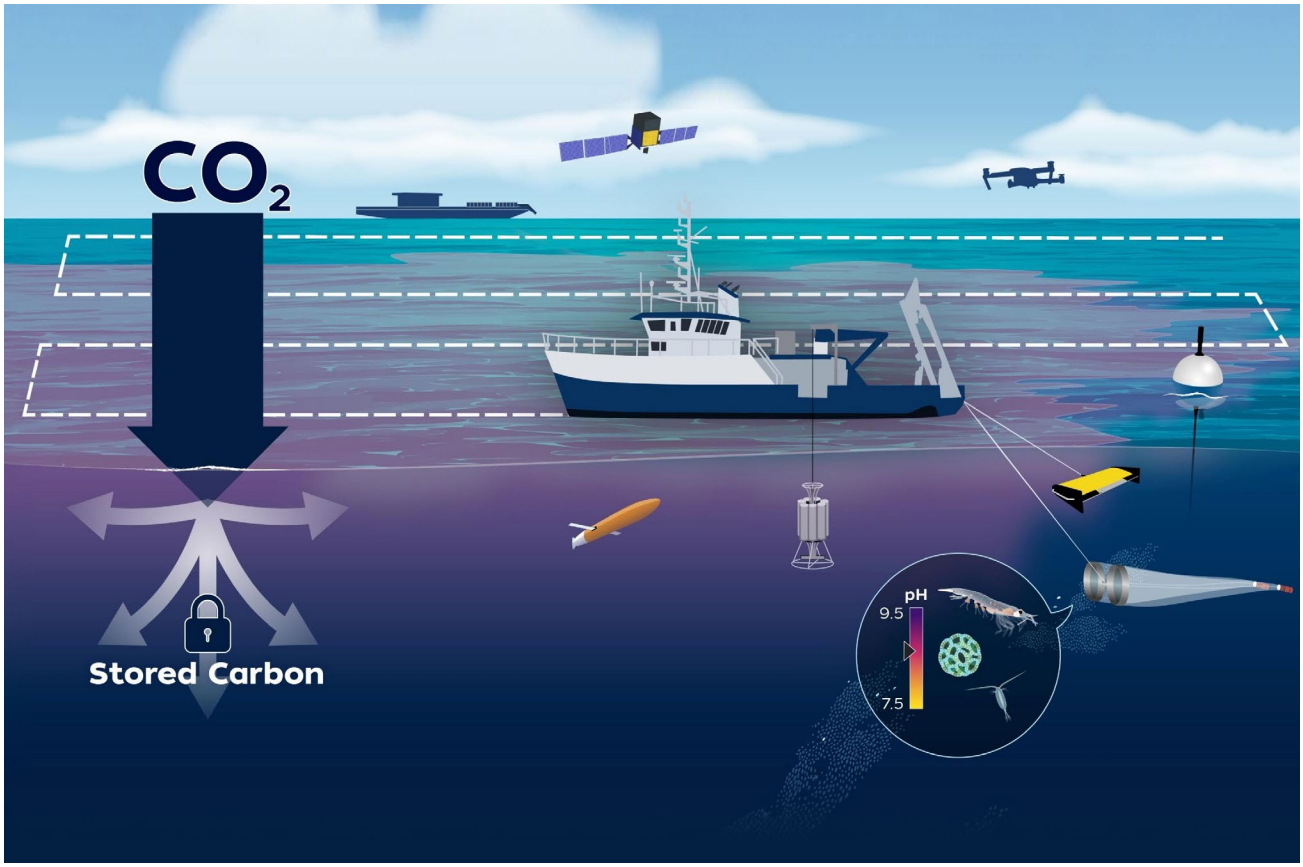


Figure 3: The LOC-NESS monitoring program includes a fully equipped research vessel, biological and water sample collection, towed and autonomous underwater vehicles, and aerial drone and satellite imaging.