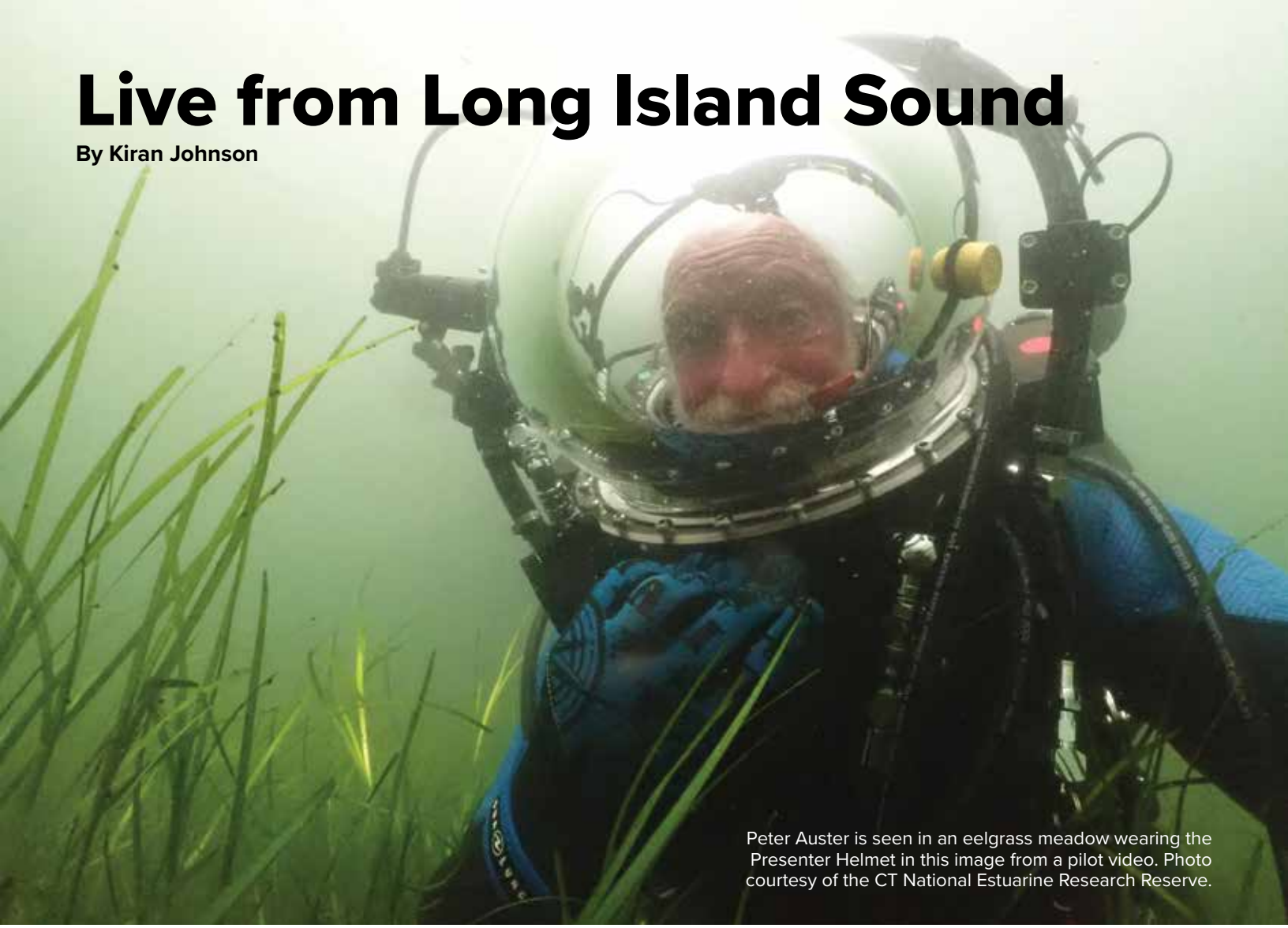
Live from Long Island Sound

By Kiran Johnson



Peter Auster is seen in an eelgrass meadow wearing the Presenter Helmet in this image from a pilot video. Photo courtesy of the CT National Estuarine Research Reserve.

You might know Long Island Sound by its sometimes green, opaque waters or enjoy its beaches. Fishermen might know it by the species they catch—black sea bass, bluefish and scup. Peter Auster and Jason Krumholz know it from a sub-aquatic perspective.

Waist-high but similar to a forest—that's how Auster describes standing in an eelgrass meadow. In the way that wind blows through a forest, waves ripple through the seagrass. Fish weave between blades while crustaceans scuttle around stalks.

Auster has been diving for 50 years. He is a research professor emeritus of marine sciences and a marine ecologist and conservation biologist at the UConn.

A primary location of his research is now the Connecticut National Estuarine Research Reserve (CTNERR), established in 2022. It is one of 30 coastal sites with the NERR designation and is located on the eastern end of the Sound. Here, shipwrecks being reclaimed by nature, intertidal marshes and shellfish beds share the waters with 78 different fish species. But there is nothing more quintessentially Long Island Sound than eelgrass meadows.

"A lot of people see eelgrass as a nuisance. It washes up on beaches, decomposes, smells bad, gets tangled in boat propellers," says Krumholz. "But it has a tremendous amount of ecological value."

A scientific diver since 2006, he is the stewardship coordinator at the CTNERR and is based at UConn's Avery Point Campus.

Krumholz and Auster want to bring their perspectives of the Sound out of the water and into classrooms, aquariums and, eventually, into interactive live streams conducted from the sea floor. For three days last May, they trialed a new diving helmet that enabled them to record video and audio from an eelgrass meadow 12 feet deep, near Avery Point.

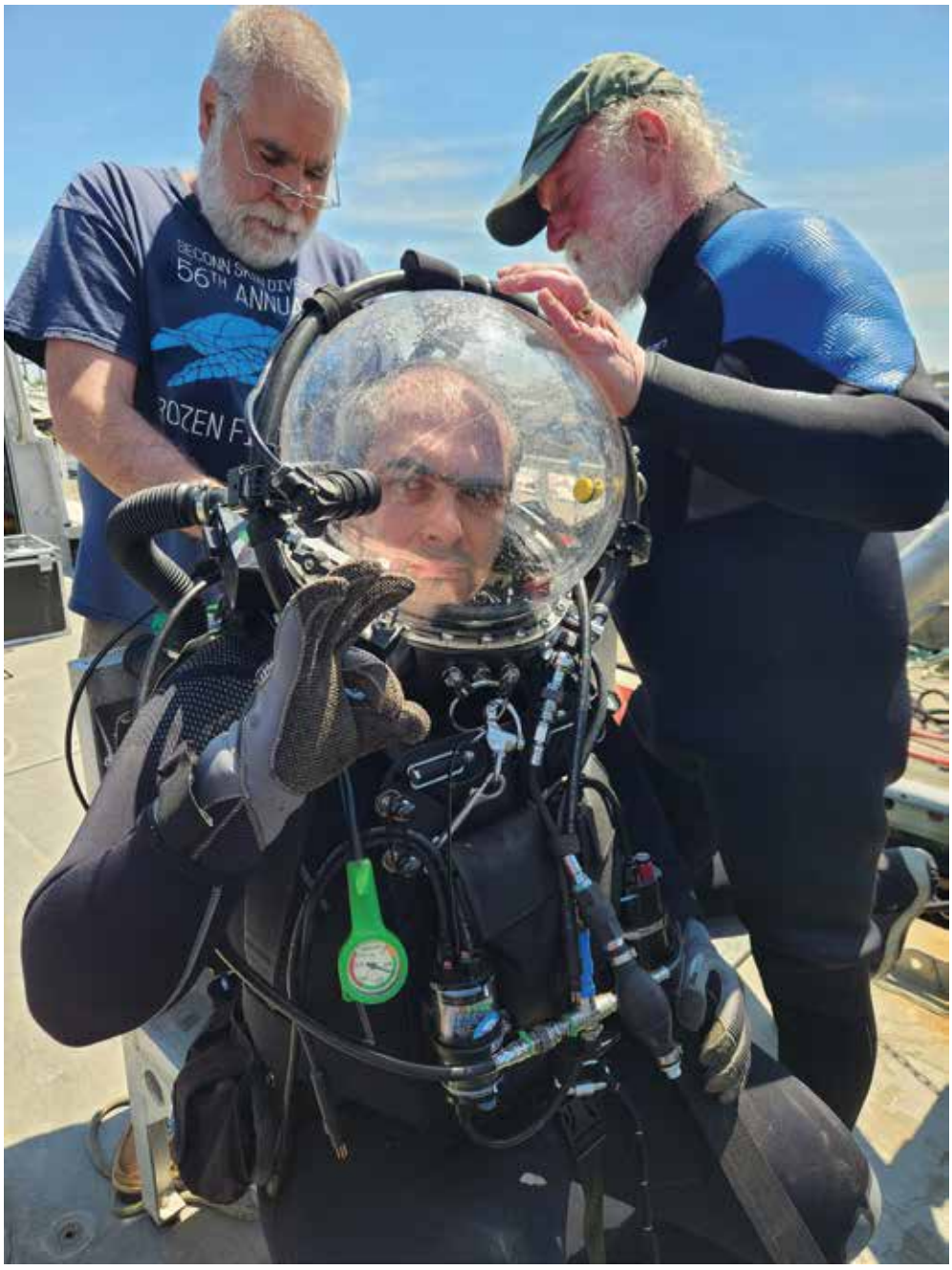
"It's an underwater storytelling tool," said Mike Lombardi. He is the creator of what he calls the "Presenter Helmet" and the company that owns it, Lombardi Undersea LLC. Lombardi spent much of the three-day period behind the camera, underwater, filming Auster and Krumholz speaking.

The helmet looks like an upside-down fishbowl on the diver's head. The dome is made of a custom polyacrylic plastic that is flexible and shatterproof. The diver has a 360° view of their environment, and the audience can see the diver's entire face as they interact with their underwater surroundings.

"The complaint was always, well, we go through all this effort and expense to try to capture diver audio, but we can't see the diver's reaction to things," said Lombardi. He has worked on various underwater film shoots, such as the Discovery Channel's "Shark Week," the PBS Nova show "Creatures of Light," and has had his own work featured in *National Geographic*.

"In the end, the audio usually wasn't very good," Lombardi said about past film shoots. The diver's voice would be dubbed in during post-production. "We're aiming to condense this entire operation," he added.

The Presenter Helmet doesn't require a breathing mouthpiece, and the diver speaks into a microphone located inside the helmet. A rebreather, secured to the diver's back, recirculates oxygen into the helmet while filtering



Jason Krumholz gets ready for a dive in the Presenter Helmet. Photo courtesy of the CT National Estuarine Research Reserve

out carbon dioxide that the diver exhales. Additional oxygen is circulated into the helmet, but the rebreather is a closed system and enables the diver to move freely without being tethered to the surface.

A $5,000 grant from Connecticut Sea Grant for the pilot project enabled the team to test the feasibility of this novel method of underwater content creation. The grant covered the cost of subcontracting to Lombardi Undersea for a dive technician's time to prepare the specialized equipment, supervise three days of field use and demobilize the gear.

"This was a proof-of-concept project," said Auster. The goal was to demonstrate that the Presenter Helmet approach, with an underwater host, could be an effective tool to create education and outreach content.

During the three-day trial period, the team worked to develop a protocol for training, including learning how to use the rebreather, and procedures for field use and helmet safety. Then, there was the actual content creation piece.

"Most people can picture a coral reef because they've seen it in magazines and they've seen it on television," said Auster. "People have an interest in Long Island Sound but they don't have a mental picture."

The camera is located outside of the helmet, connected to the microphone by a 15-foot wire. It has two screens: one facing the presenter and the second facing the person filming. This enables the presenter and cameraman to work together.

"The shot we're working to engineer with the helmet helps to bring a viewer into the environment, benefitting from a stillness and interaction with a person who is already there," Lombardi said.

"You feel connected to the diver, you feel connected to the place, and you feel like you're part of it," Krumholz said.

He views his job as connecting people to nature. He hopes the helmet will make a difference for viewers vacillating between indecision and taking action for the marine environment.

Amid the forces of nature underwater

Filming underwater is similar to doing it on land, except that physics play a larger role.

"It's like you're trying to hold a 60-pound balloon over your head the whole time. It's pulling you up," Krumholz said about the helmet.

To counter the buoyancy, 32 pounds of weights were fixed to plates on the front and back of the helmet.

A key part of developing protocol and showing proof of concept was to work out how to make the dive presenter feel secure, physically and mentally. If the diver was worried about safety or not comfortable with their equipment, the conversation wouldn't feel natural and engaging to the audience.

"Day one," said Larissa Graham, "they just focused on making sure that everybody felt comfortable in the gear." Graham is the CTNERR's education coordinator, and she accompanied the divers on the three-day pilot test.

Alterations to the helmet had to be made to fit both Krumholz and Auster's facial structures. This was done with foam pads and adjustments to how the helmet straps to the chest piece.

"The underwater team is three people. It's the presenter, the videographer, and then the safety diver, who's one person who's just focusing on safety," Krumholz said.

Auster and Krumholz took turns in the presenter role. Jeff Godfrey, the diving safety officer in the UConn Department of Marine Sciences, served as the safety diver.

On day two, the divers began presenting underwater from a script.

"Weather conditions created some challenges with site selection and visibility, so the footage isn't as clear as we hoped, though they were comfortable in the helmet itself," Graham said. "On day three, we switched things up to ask more open-ended questions and that's where we got the best footage."

The team would film underwater for 30 minutes to one hour, structured around the length of their narrative, before surfacing. During that time, Graham stayed on the boat, cuing the divers relevant facts to highlight about the Sound between shots.

Prior to the three-day period, Graham posted a Google Form to the CTNERR's Facebook and Instagram pages asking for teachers to send questions from students to ask the divers.

"After reading the book, *A House for Hermit Crab* by Eric Carle, my kindergarten students would like to know if the Sound has any sea urchins," commented a teacher from Monroe Elementary School.
(Answer: Yes we do, but not as many as we used to.)

Eleventh and 12th grade oceanography classes from Newtown High School asked, "Does visibility increase below the photic zone due to a decrease in plankton (phyto) or does the current kick up detritus and sediment (due to increased turbidity currents) making water clarity/visibility still an issue?"
(Answer: It depends, but sometimes it can be very clear below the photic zone, even though it is often pitch black."

Krumholz responded to these questions during the pilot filming, and once the footage is edited it will be shared in classrooms.

By the third day, the team finished filming their scripted material and ended trial shooting.

Filming in the future

The imminent next step for testing the Presenter Helmet's outreach abilities is to try livestreaming.

"The hardest part underwater is microphones," Lombardi said. He is working to find or create a different microphone that's compatible with the technology used for livestreaming.

Are there others who could be presenters? Even those who aren't expert divers?

"As we keep practicing those systems and training those safety divers, and the safety divers get better and better, the skill of the diver in the helmet can get less and less," Krumholz said.

From scientists in different locations to senators, social media influencers or an NFL player—Krumholz let his imagination run wild with possible underwater speakers. Non-scientists could help bring in different audiences, widening the outreach about ocean conservation.

From other habitats in the CTNERR, such as oyster reefs, to Stellwagen Bank National Marine Sanctuary off the Maine coast, Gray's Reef National Marine Sanctuary off the Georgia coast, the Florida Keys, the Caribbean and places in the Pacific Ocean—there are many marine ecosystems that Auster wants to bring to the public.

"The water belongs to all of us," he said. "The idea isn't to tell people what to say, but it's to give them a different perspective on what it is that's in the public commons and that is part of their own natural heritage."

Watch video clips of the presenter helmet at:
https://seagrant.uconn.edu/?p=13653