In January, ABC TV broadcast a special report during one of the expeditions that took biological oceanographer Joan Bernard to the chilly depths of the Gulf of Mexico. Bernard, a faculty member in USC's Norman J. Arnold School of Public Health, was part of a team of underwater pioneers who plumged to the gulf's bottom in the mini-submersible Alvin.

A purple squid triggering alarm across the screen during ABC's nightly newscast was taped during an Alvin dive in which Bernard and other members of an elite team of 28 scientists explored the biological and energy riches in the waters between Texas and Florida. That basin is destined for further energy exploration because of its vast oil and natural gas deposits tapped, and still untapped, in the ocean floor.

Secrets of the mysteries of global climate change and marine life. Though their science leads them in different directions, USC public health researchers and a group of USC biologists are among the nation's top scientists seeking to explore and protect the world's oceans.

Though not stranger to underwater exploration, Bernard is quick to admit that her three dives in Alvin were unlike any of her previous scientific missions.

"You are right there on the ocean floor. You can see how extensive the various environment are," said Bernard, who has been the chief scientist on seven oceanographic expeditions and who also has the distinction of being one of the few women researchers to dive under the ice of Antarctica.

"Unlike standing on the deck of a ship, you can see exactly where you want samples taken. You can see a coral reef or a whole area and then go back and take samples," Bernard said.

Research in the Alvin, the submarine that helped explore the Titanic, took for the deep-sea biologist. The cabin measures only about six feet in diameter. With three adults inside this space for nine hours or more, and the research experience becomes intense.

Even so, Bernard would not hesitate to go on another Alvin mission. The fragile environment that the vessel on whose dives will likely change the coming years as it taps more in to tap the energy supplies in the Gulf of Mexico.

"We want to know how different waves affect the environment and what this region is like before policy is set. The area is a tightly coupled ecosystem, and you have to be careful," she said.

"Disturbances that affect the oceans will affect our future generations."

Just as Bernard was wrapping up her work in the Gulf last fall, USC biologists Brian Holmstra, David Weisberg, and Dean Pennefather were off to the Florida Keys for the last Aquarius mission of 2008. Research on the Aquarius, an underwater laboratory that allows scientists to live and work on the ocean floor for extended periods of time, is helping researchers understand the delicate world of coral reefs—the ocean's rain forests.

Holmstra and Pennefather were among four scientists conducting ocean studies in the Aquarius. Weisberg, who built much of the underwater equipment used by the research team, worked on the surface with Kevin Gardner, a USC research coordinator, to provide the underwater scientists with supplies and research analysis.

The USC team was sent into the mission knowing their work is part of a race against time to save the world's coral reefs. Their research is aimed at preserving these important underwater communities that are home to much of the world's food supply and that likely contain important biomedical resources, including key agents for new medications.

"Coral reefs are just about the most productive ecosystem worldwide, more productive than rain forests," said Weisberg, whose research has spanned nearly three decades of discovery.

"But those reefs are dying, and no one knows why. Coral reefs are a bellwether of climate change," Holmstra said. Their death and determination are an indication of what can happen when pollution, tourism, and development go unchecked. But our work is to piece together the lessons. These are no single answers," Holmstra said.

Weisberg says that answers must come quickly. "What we are trying to do is look at the health of individual coral reefs and determine how they respond to factors like pollution and how they are affected by water motion, tides, and even climate changes," Weisberg said.

Now those biologists are taking their work beyond the sea and laboratory by sharing what they've learned with children in South Carolina schools.

"They will be our future scientists, teachers, and citizens," Holmstra said. "Coral reefs are important to their future. It's important that they know what we are doing."