“Historically, researchers try to get in a good relationship with fishermen,” said Timothy Rowell, a research biologist with the passive acoustic research group at the National Oceanic and Atmospheric Administration’s Northeast Fisheries Science Center in Woods Hole. “They have the best local knowledge of where (the fish) are aggregating and spawning.”

Although researchers still depend on fishermen, they also use ever more sophisticated technology to help them find and study fish in the immensity of the world’s oceans. That is true of a four-year $1.3 million study of spawning fish in the sprawling blocks of ocean southeast of Block Island that are zoned to build massive offshore wind farms.

NOAA, the state Division of Marine Fisheries, Woods Hole Oceanographic Institution and the University of Massachusetts Dartmouth School of Marine Science and Technology are all participating in the study, which is funded by the U.S. Bureau of Ocean Energy Management. The research is focused on what may be one of the last remaining major seasonal spawning gatherings in the Northwest Atlantic, according to the state Division of Marine Fisheries.

“It’s certainly been a persistent spawning aggregation and there are not many in New England,” said fisheries scientist Steve Cadrin, principal investigator on the project for the School of Marine Science and Technology.

Atlantic cod populations are at historic lows, hammered by chronic overfishing and climate change.

This past summer, the Department of the Interior halted the permitting process for the offshore wind farm proposed by Vineyard Wind, reportedly due in part to concerns expressed by NOAA Fisheries that the project had not adequately responded to concerns from fishermen. Rowell said the new study, which focuses on an area known as Cox’s Ledge, was not directly tied to the permitting process but would likely provide some good background environmental information as to the relative importance of the area to fish and whales whose vocalizations are also being recorded for analysis.

Conventional methods of catching and sampling fish at sea, tagging fish to study movements and examining fishermen landings are now routinely augmented by innovative ocean gliders. These sleek torpedoes carry instruments that can detect and record vocalizations made by mating cod. At the same time, they document signals emitted by fish tagged with an acoustic device that produces a unique identifying signal detectable for hundreds, maybe thousands, of feet in any direction.

By emptying and refilling ballast tanks, the glider sinks and rises like a submarine. Its sweptback wings allow it to glide forward like a plane, resulting in a saw tooth pattern that requires little energy to maintain. Gliders can travel through the ocean along a programmed route for anywhere from two weeks to a year-and-a half without having to recharge. They carry a suite of battery-powered instruments, can relay data to shore in real-time, and can have their paths and tasks altered remotely through a satellite connection.

The Bureau of Ocean Energy Management study glider is working within a 30-square-mile patch of ocean, half of which is in areas set aside for offshore wind farms. Known as Cox's Ledge, the study area is well-known to fishermen who have reported catching cod year after year during the late winter early spring.

Deployed in December, the glider runs continuously, listening for the grunts produced by male cod when trying to attract a female, or for the signal of the tagged fish, until it is picked up sometime later in the month.

Passive acoustic receivers anchored to the bottom, paired with similarly equipped gliders, have been used now for more than a decade in Massachusetts Bay and were instrumental in discovering an important cod spawning ground on the northwest corner of Stellwagen Bank.

Cadrin said he has been surprised by the amount of data they already have gleaned from the glider and the acoustic buoys.

"We were surprised to get so many detections ... and that they are staying in the spawning area after they've been tagged," Cadrin said.

The real payoff, Cardin believes, will be next year when they see if the tagged fish return to the same area and how long they remain.

"I'd say it adds precision," Cadrin said of the study.

It is believed that cod may return to the same spot every year to spawn, and that these important areas are both small and almost indistinguishable from the surrounding topography.

Knowing with some precision where fish gather to reproduce and for how long would make spawning closures less burdensome on fishermen and for developers trying to install wind turbines while minimizing harm to ocean dwellers, Cadrin said.