Innovative Research Tracks Mysteries of Marine Larvae
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Scientists gathered here have long puzzled over how baby marine animals survive in the complex swirl of ocean currents off the California and Oregon coastlines.

What portion of these tiny larvae, which are not strong swimmers, get swept away to unknown fates? How many manage to cling to coastal areas and grow up to become fat rockfish or large lobsters? These questions have taken on more urgency with the sharp decline in fish and shellfish, leaving fishermen and government officials wondering how to help bring them back.

A team of marine scientists announced on Saturday that its members have been surprised to learn that far more larvae stay close to home than was previously known.

Oceanographers and biologists for decades have just assumed that microscopic larvae get scattered widely by the cold, unyielding pull of the California Current, which sweeps 1,200 miles down the West Coast. Until recently, they hadn't tried, in any systematic way, to unravel the complexities of coastal currents and dispersal of larvae.

A multi-university team of scientists, presenting findings at the annual meeting of the American Assn. for the Advancement of Science, said it has cracked this "black box" of oceanic secrets. The scientists haven't done that by tracking currents, but by following larvae in some unusual ways.

Most fish and shellfish spend the first few weeks, and sometimes months, in the microscopic larval stage, swimming freely before settling down to the seafloor to continue their development.

Robert R. Warner and other scientists at UC Santa Barbara have discovered that they can chart an animal's wanderings since birth by scrutinizing its ear bones, which act like tiny flight recorders, logging its movements through the sea.

The bones have layers like an onion; each day a new layer incorporates the tell-tale chemical signatures of certain metals associated with various places in the ocean. Warner can tell which larvae were born around the Channel Islands and which were born closer to the coastline. And he can pinpoint where they have been swimming every day since birth.

Stephen R. Palumbi, a Stanford marine biologist, has been mapping neighborhoods of marine animals using their DNA. Palumbi, who has carved out a niche as a genetic detective of the ocean, was startled to discover that barnacles settle in specific areas, using circling currents, or gyres, to keep them close to their parents. Genetics show that they like to stick to their old neighborhoods and stay with their own kind.

"When you look at the sea, you think of everything being wafted away at the mercy off ocean currents," Palumbi said. "That's the conventional wisdom. But this shows it's not necessarily true."

Some larvae change directions by moving deeper to ride currents that go in directions opposite to those of surface currents.

A group from UC Santa Cruz, led by oceanographer Margaret McManus, has fashioned acoustic devices similar to echolocation pings of dolphins, to track thin, moving carpets of larvae as they twist and turn through the sea for weeks and sometimes months.

She discovered that rockfish larvae are not dispersed equally through ocean waters around Monterey Bay, but rather cluster in bands like thick carpets -- from a few inches to a few feet thick -- that can stretch for miles.

"It's important to understand where larvae are coming from and where they are going," McManus said. "It's all about identifying which areas of the coast should be protected for these species of rockfish."

These findings, researchers said, underscore the local benefits of no-fishing marine reserves, such as those established around the Channel Islands, which are designed to allow brood-stocks of fish to recover so they can begin "seeding" surrounding areas with larvae and spillover fish.

"This is a message of hope," said Warner, the UC Santa Barbara marine biologist. "If a fisherman gives up a local fishing spot, he may benefit by repopulating other areas he fishes. It won't just get swept down the coast to help somebody else."

California Department of Fish and Game officials are now working with scientists and fishermen to figure out where to establish a network of marine reserves along the state's 1,100-mile coastline. In addition, officials within the National Oceanic & Atmospheric Administration are trying to figure out how far the reserves around the Channel Islands should be extended into federal waters, which begin three miles from shore.

Many fishermen oppose such reserves and question claims by scientists that the zone would ultimately help the fishing industry. Commercial fishermen say the no-fish areas hurt their livelihoods, while recreational fishermen say they infringe on their way of life.

Conrad C. Lautenbacher, Oceanic & Atmospheric's administrator, said in an interview this week that he favors an "ecosystem approach" to managing fisheries and sees reserves as a valuable tool that can benefit fishermen, as well as those who want to conserve nature for its own sake.

Lautenbacher said he was intrigued by the new discoveries, which he wants to incorporate into his agency's coastal observing system. "It's an excellent development and something we are very interested in," Lautenbacher said. He said far too little research has been done on coastal waters because oceanographers tend to focus on the deep ocean.

The research unveiled Saturday was coordinated through the Partnership for Interdisciplinary Studies of Coastal Oceans, a collaboration of Stanford, UC Santa Barbara, UC Santa Cruz and Oregon State University that involves more than 100 scientists.

Many of these marine scientists have called for 20% of the world's ocean area to be designated off limits to keep many types of fish from becoming extinct. Only about 1% of the ocean area is closed to fishing. Some scientists blame the relatively small size of the closed areas for collapse of many fisheries.

"There is emerging concern about the ocean," said Jane Lubchenco, a marine ecologist at Oregon State University. "There will be increasing calls for doing a better job managing our oceans."

Credit: Times Staff Writer

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