

## NOAA, California Scientists Use Phantom to Study Channel Islands Sanctuary Fish

—By Mary Patyten

Flying 70 feet below the sea surface off the coast of southern California in mid-May, the Phantom remotely operated vehicle was relaying live video back to biologists aboard the NOAA research vessel *Shearwater* when a ghostly image came into focus on the monitor. Jagged rocks thrust up toward the sea surface, draped in finely webbed fishing nets, like a graceful stage set for some underwater drama.

With the nudge of a joystick, the ROV pilot aboard *Shearwater* used thrusters to steer the Phantom away from the menacing webbing.

The lost and abandoned netting would continue to catch fish, which was not good news for struggling bottom fish populations. But on that particular day in May, the nets would not catch the little ROV, which had a big job to do—scan the depths of the new Channel Islands marine reserves, the largest system of reserves off the West Coast, to measure how fish populations were responding to their new sanctuaries.

Over time, monitoring fish populations there may provide evidence of whether bottom-dwelling species such as rockfish, lingcod and abalone can take advantage of the no-fishing zones to repopulate areas outside marine protected areas.

“Using the Phantom, we can identify where fish live, survey those areas and identify changes in the numbers of fish over time,” said Konstantin Karpov, the California Department of Fish and Game senior marine biologist heading up the survey. “This is really something that has not been possible before.”

The cruise specialized in innovation, from the use of a remotely operated vehicle to count fish to the remarkable collaboration between federal, private, academic and state agencies in search of better methods to collect the scientific data that are vital to fishery managers and biologists trying to preserve and enhance California’s marine resources.

It all began in September 2003, when Sarah Fangman, NOAA’s research program coordinator for the Channel Islands National Marine Sanctuary, was approached by Karpov’s ROV group about surveying the new marine protected areas from the NOAA research vessel *Shearwater*.

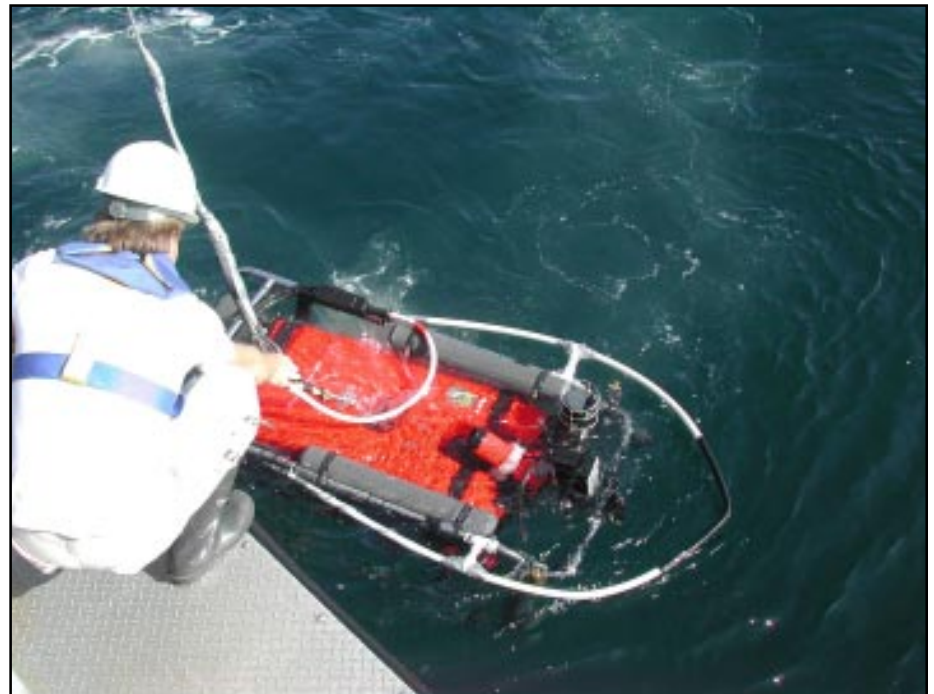
“We were happy to participate,” Fangman said. “This group proposed doing work we want to see done. By collaborating with people

who have the equipment and the expertise, we can all accomplish our goals.”

The survey sites lay off Santa Rosa Island, Santa Cruz Island and the smaller Anacapa Island in southern California. The team had also planned to visit San Miguel Island, the most northwesterly island in the chain. But rough weather precluded any surveying, with 50-mph winds buffeting them in the “protected” lee of the island.

The cruise exceeded everyone’s expectations. In just four days, the team surveyed for 16 linear kilometers within six sites despite the blustery weather, proof of the rapid synergy between NOAA vessel captains and the ROV crew and the refinement and improvement of ROV survey methods.

Likely survey sites were chosen by first consulting side-scan and multibeam sonar maps that showed the topography of the sea floor. Precise two- to three-kilometer paths, called transects, were *continued on page 7*



*David Jeffrey/Deep Ocean Engineering*  
Scientists from NOAA and the California Department of Fish and Game launch a Phantom remotely operated vehicle from the NOAA research vessel *Shearwater* to survey fish in marine protected areas off the Channel Islands.

## TELEX

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the Severe Storms Lab who is leading the team with David Rust, chief of the lab's Forecast Research and Development Division, and Terry Schuur, a research meteorologist with the Cooperative Institute for Mesoscale Meteorological Studies at the University of Oklahoma who works at the lab.

To determine a storm's electrical structure, TELEX researchers intercept thunderstorms and launch weather balloons with electric field meters and radiosondes attached. These instruments record data from inside the storm, including temperature, pressure, humidity, wind speed and direction and the total electric field as well as the balloon's location. All of these data are collected in the Severe Storms Lab's mobile laboratory. This electric field profile can provide scientists with information about how a storm becomes electrified and about the forces responsible for lightning.

The TELEX team is also taking advantage of new sensors now used routinely by the Severe Storms Lab. One is the KOUN radar in Norman, a NEXRAD Doppler weather radar modified with polarimetric technology to provide more information about the types of cloud and precipitation particles.

"We are collecting information on the microphysical structure of storms to help us better understand how storms become electrified," Schuur said. "This information has been lacking in most previous studies."

Another new sensor, the Oklahoma Lightning Mapping Array, or OK-LMA for short, is a network of ten stations in central Oklahoma that continuously maps the structure of all types of lightning in three dimensions out to a range of 75 kilometers and in two-dimen-

sions out to a range of 200 kilometers.

University of Oklahoma meteorologist Mike Biggerstaf is leading a team using two five-centimeter mobile radars to gather additional data near storms. Biggerstaf said the Shared Mobile Atmospheric Research and Teaching Radars, or SMART-Radars for short, provide detailed measurements of the three-dimensional winds in thunderstorms every two to three minutes.

The TELEX team also plans to map airflow patterns responsible for the generation and distribution of electrical charges within clouds in a way that may allow them to relate lightning activity to circulations within the clouds.

In 2003, the team launched fourteen balloons into nine storms on seven missions. Two of the storms were mesoscale convective systems, a specific target of TELEX. National Severe Storms Laboratory scientists spent the fall and winter analyzing the processed data.

Already this year, the project has been very productive. "It has been the most successful year ever for ballooning in severe storms," Rust said. He credits improvements in the instruments they're using, such as radiosondes with GPS tracking ability and high-resolution electric field meters that allow more accurate determinations of the electrical structure inside storms.

Mother Nature has helped as well, providing the necessary types of thunderstorm to sample. "We've gotten our instruments into supercell storms, which have not been internally sampled very much at all previously," Rust added.

TELEX is funded partly by the National Science Foundation. Other participants in the project include the New Mexico Institute of Mining and Technology, Texas A&M University and the University of Washington. ☺

## Channel Islands

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mapped for each ROV run, as the survey team prepared to launch the submersible.

NOAA ship captains Luman Moody and Terence Shinn were crucial components of the team, working in shifts to keep the ship positioned over the ROV as the submersible ran precise transects over the sea floor—not an easy job when contending with ocean currents, crab pots and shifting winds.

"The people really make the project," said Dirk Rosen, vice president of special projects with Deep Ocean Engineering. "These folks are so attuned to what they're doing. They're performing cutting edge science in this tight-knit team."

Rosen began working with Karpov's ROV team about 10 years ago. Inspired by the promise and challenges presented by California's new marine protected areas, he launched a non-profit organization called the Marine Applied Research and Exploration group, or MARE for short, to help fund and support efforts to obtain baseline data.

Watching the video monitors during the May cruise, Rosen said he felt the wonder of exploration, seeing animals at depths beyond the normal limits of safe scuba diving.

"It's fascinating that we're now able to quantify what we're seeing in a very useful manner," he said.

Future plans for the ROV team include expanding their sampling to all five of the Channel Islands.

"If the weather gods allow, we want to survey San Miguel Island on our next cruise," Karpov said.

*Shearwater* is scheduled to ferry the researchers to the islands again later this year, from Sept. 7-21, and for four yet-unscheduled weeks in 2005. ☺