Drone watches over Florida Keys marine sanctuary

September 26 2013, by Cammy Clark

Lt. j.g. Kyle Salling stood on the bow of a 24-foot boat in Florida Bay, holding what looked like a large model airplane. With the propellers gently whirling, and the small red and green aviation lights on, Sims launched the 13-pound aircraft like he was throwing a javelin.

The remote-controlled Puma AE banked upward into the sky and began heading toward its target, a mangrove island called Pigeon Key about a quarter-mile away in the vast Florida Keys National Marine Sanctuary.

A flock of frigatebirds hovering around the island scattered well before the arrival of the Puma, which also looks like a big bird with its nine-foot wingspan. While there is no way of knowing if it was the Puma that startled the seabirds, many of them did return. The Puma circled the island from about 200 feet above, capturing a bird's-eye view of the seabirds' activities on both video and in still pictures that were transmitted in real time back to a computer on the boat.

It was one of several tests that the National Oceanic and Atmospheric Administration has been conducting for 18 months in marine sanctuaries around the country to see if these unmanned aircraft can be transitioned from military roles into scientific ones.

"We're confident in this technology and what it can do," said Lt. j.g. Tanner Sims, who works for NOAA's Commissioned Officer Corps and is based at McDill Air Force Base in Tampa.

Last year, NOAA purchased three Pumas and a ground station that includes the remote controls and computers to receive the video and pictures for $400,000 from California-based AeroVironment, said Vernon Smith, media director for the National Marine Sanctuary Program. The miniature drones already have been tested at Channel Island in California, Grey's Reef in Georgia, Olympic Coast in Washington state and Humpback Whale National Marine Sanctuary in Hawaii.

This is the second test in the Keys sanctuary. Last year they tested the Puma in the remote Dry Tortugas, 70 miles west of Key West.

"It's amazing the view we can get from 200 feet above an island or reef," Sims said. "You can get a much better idea of how multiple things are interacting in that environment."

With federal budget cuts, the U.S. Navy tested a similar Puma AE (which stands for all environment) from the flight deck of the HSV 2 Swift. They demonstrated how it could be used to track a go-fast boat in a mock drug smuggling operation.

NOAA also is hoping the Pumas will work for science missions, too, because they are cheaper, greener and safer than manned flights. The Puma can operate for two hours on its lithium batteries. "All we do is plug it into a wall charger to fill up," Sims said.

And it doesn't require an aircraft carrier on which to land. It's almost like a seaplane. Sims landed it in the water. The boat captain drove over to it and Sims and Lt. j.g. Kyle Salling plucked it out of the water.

"It's all waterproof and very durable," Sims said.

Sims, a pilot, goes through a stringent safety and operational checklist

before every flight. While the Puma can fly about 12 miles from the remote-control operator, NOAA limits the distance to visual line of sight. "So we only go about one mile out and only as high as 500 feet," Sims said. "That way we can get away from other air traffic to make everybody safe. We look out for everything from little Cessnas to kiteboarders."

Stephen Werndli, the enforcement and emergency response coordinator for the Keys' national marine sanctuary, said the Pumas have many potential uses within the 2,900-nautical-square-mile protected site.

They include doing wildlife surveys, bird surveys out at remote islands in the back country and visitor usage surveys; documenting marine and shoreline debris; assessing prop scar damage; responding to boat groundings and monitoring of oil spills.

The eight-day test began in the Upper Keys on Sept. 14 and ended at the Western Dry Rocks off Key West on Sunday. It included videoing before-and-after pictures from a shoreline cleanup near big Pine Key on Saturday for International Coastal Cleanup Day.

The Puma also will be tested on Big Pine Key to survey endangered Key deer, by day and night. "At night, we'll use infrared cameras," Werndli said. "They might blend in during the day and be difficult to see, but you never know."

During the first day of the test, the crew used the Puma for several types of surveillance at Rodriguez Key, a wildlife managed area of shallow flats popular with fishermen and birders east of Key Largo.

The Puma was used to collect information about the number of vessels using the site and for what purposes. It also took video of prop scars, flew over islands to view birds and discovered a big blue sewer pipe in

about three feet of water.

"Somebody was probably using it there as a habitat to harvest lobster, which is illegal," Werndli said.

Scott Donahue, science coordinator for the sanctuary, said the Puma could be useful for marine mammal strandings, particularly dolphins and pilot whales that strand in mass.

"It could fly around and help us find the stragglers of the group," he said.

In the past, the sanctuary has had difficulty studying the magnificent frigate birds, whose skeletal structures are too fragile to have tracking tags. "They are built to be light and long and gangly to catch the air currents," Donahue said. "Using the unmanned aircrafts to fly where those birds are foraging might help us identify critical habitat."

In Kodiak, Alaska, the Pumas have been tested for the search of marine debris traveling the currents after the massive Japanese tsunami 2{ years ago.

"In the Keys, it's a great project to look for any nets that have gotten loose or drifted into the reef, so we can send a boat operator out there to remove it," Sims said.

Werndli, whose job is to respond to boat groundings, sees the Puma as a much cheaper way to survey the damage than hiring a contract pilot for $900 to $1,000 per hour.

The Puma also can help with developing a plan for the salvage operation of large boat groundings. "The charts might show it looks like it's better to tow to the west, but up in the air it might show the shorter distance is to tow to the east," Werndli said. "That could reduce the impact to the

resource."

And while NOAA is primarily looking at the Puma for science reasons, it could be used in law enforcement. During the test in the Dry Tortugas, the Puma was used to give officers information on what to expect when they board a boat.

"You will not always see an open deck on a center console," Werndli said. "But if you are coming in on the port side and someone on the starboard is dumping illegal catch over the side, it could have a niche for law enforcement."