

# Drones are latest tool in conservation science

**Edward Ortiz, Sacramento Bee, 3-7-15**

When the rain finally came to Sacramento in early February, Nature Conservancy scientist Chris McColl needed to quickly assess whether water had overflowed the banks of the Cosumnes River and filled a floodplain the organization is trying to restore.

Planes are expensive, and it takes hours to hire one and get it in the air. So McColl deployed a drone instead.

Cheap, fast and flexible, drones are quickly becoming a favored tool for organizations conducting scientific research. The Nature Conservancy has four drones operating from San Diego to the northern Sierra. The remote aircraft count sandhill cranes, survey flood restoration projects and perform other tasks.

McColl said the conservancy would double its California drone arsenal within the next year.

At the Cosumnes River Preserve south of Sacramento, where a levee was recently removed to allow flooding to resume its natural, historic pattern, scientists use a drone to see if their efforts are paying off. They previously would have had to eyeball the flooding from the ground – not the most accurate way to measure it – or hire an airplane to fly over.

“If we had to hire a pilot, the time flexibility might not be there,” McColl said. “The drones allow us to be really responsive after storm events because we need to be there within hours to catch certain flood levels.”

At the Cosumnes River Preserve, the conservancy is using a Phantom Vision 2 drone that sports four propellers and a GoPro camera attached to a gimbal.

Total cost: \$1,400. The costs of repeat flights are minimal: manpower and battery juice. In contrast, hiring a pilot to fly over the site can run anywhere from \$1,500 to \$3,000 per trip.

The drone has the potential of paying for itself in just one trip. It also gives the conservancy complete control over the images captured. The only limitations are short battery times and noise levels.

Although small, the Phantom Vision 2 emits a high-pitch whirring sound that scares off sandhill cranes, McColl said. Quieter drones are available in the form of a fixed-wing model that is quiet and has not scared birds, but those drones cost \$10,000 to \$30,000 each.

Another scientist who has been using drones for research is Christopher Zappa, ocean and climate researcher at the Lamont-Doherty Earth Observatory at Columbia University.

Zappa has deployed drones since 2011 to test new instruments that measure ocean temperature and ocean waves. He also uses drones to drop off micro-buoys that can measure water temperature and salinity.

“We’re looking at the marginal ice zone, where the ocean meets the edge of the ice, seeing how fast and how slow the melting is occurring,” Zappa said. “Monitoring ice melt in the Arctic, drones will fly to places that icebreakers and manned aircraft don’t dare venture.”

Drones are not limited to the air. Recently, the Woods Hole Oceanographic Institution started monitoring polar ice with underwater drones. A similar drone is being used to observe the deep-water habits of great white sharks.

The technology is still in its infancy, as are the laws that regulate its use. Last month, the Federal Aviation Administration issued a ruling on allowing commercial use of drones, under strict guidelines.

The ruling, which needs final approval, allows drones to be flown for recreational purposes. For commercial use, a pilot's license is required.

The new FAA rules allow the operating of drones under 55 pounds. The drones must be flown below 500 feet, kept 5 miles from an airport, and are not to be flown directly overhead of people. The drone operator must also maintain a constant visual line of sight with the drone.

With the Cosumnes flyovers, no pilot's license was necessary since the conservancy was flying over its own land.

The river and adjacent fields are a living floodplain laboratory unusual in California, since the Cosumnes is one of the last rivers without a dam.

"The river is pretty dramatic because it's a seasonal river that goes from completely dry to flooded in winter," said Judah Grossman, project manager with the Nature Conservancy. "This is unique to the Cosumnes."

"We're hoping that allowing the river to overtop more frequently into a larger area will let floodwater percolate down and recharge the aquifer," Grossman said. "And, hopefully, this will bring groundwater levels up again."

Groundwater recharge is a big issue for a thirsty state in a multiyear drought. Last month, the U.S. Geological Survey reported that California is depleting its groundwater faster than any other state in the country.

The drones capture time-lapse photos and video that will help show whether the conservancy's efforts are succeeding.