

**Past/Current Uses**

- **Enhancing Public Safety**
  - [Fighting wildfires in California](#) – In 2008, NASA assisted the state of California in fighting wildfires with the use of Ilkhana, a UAS equipped with advanced technology. The information about the fires collected by Ilkhana was transmitted to command centers within minutes, and then distributed into the field giving firefighters crucial situational awareness. Throughout the operation, NASA pilots operating Ilkhana were in close communication with the FAA to ensure its safe separation from other aircraft.
  - [Finding missing persons in New Mexico](#) – On January 9, 2012, an Oklahoma couple became lost in the White Sands National Monument in New Mexico. UAS were brought in to assist with the search. Once the couple’s location was pinpointed, the UAS relayed specific coordinates of the couple and monitored their location and movement as rescue helicopters were en route.
  - [Patrolling the U.S.-Mexico border](#) – The U.S. Customs and Border Patrol use unmanned systems to patrol the U.S.-Mexico border, helping prevent drug smuggling and potential terrorist threats. The UAS monitor areas, which would take agents on the ground days to reach.
- **Enabling Scientific Research**
  - [NASA studying hurricanes](#) – NASA is launching a three-year project using UAS to monitor hurricanes and help scientists better understand why tropical storms become hurricanes, and what signs predict the metamorphosis. Scientists have been unable to determine why or how some storms strengthen so rapidly. UAS are able to fly straight through hurricane clouds to measure conditions, something manned flights and satellites cannot do.
  - [Nicholls State protecting the Gulf Coast](#) – Nicholls State University is using a six-foot UAS to map the Louisiana coast. Louisiana’s barrier islands are an important habitat for migratory birds, as well as the first line of defence against hurricanes. Erosion of the island has damaged the habitat, as well as the important protective function the islands serve. By flying more frequently and hover longer than satellites or manned aircraft, the UAS save money and provide a better picture of the situation on the coast.
- **Mitigating Disasters**
  - [Helping rescue efforts following Hurricane Katrina](#) – UAS were used to help search and rescue teams in the aftermath of Hurricane Katrina. Scientists from the University of South Florida worked with Florida rescuers in Mississippi, in what was the first known use of small UAS for an actual disaster. Brought in to survey Pearlington, MS, within two hours, the responders had the data from the UAVs showing that no survivors were trapped and that the flood waters from the cresting Pearl River were not posing an additional threat.
  - [Surveying damage caused by flooding of the Red River](#) – UAS aided the response to the severe flooding of the Red River in the upper Midwest in April 2011. According to the U.S. Customs and Border Protections Office, which leant the UAS to the effort, the UAS mapped more than 800 nautical miles along the flooded tributaries and basins in Minnesota and North Dakota, and provided streaming video and analysis of the areas affected by the flood such as levee integrity and ice damming. The information

provided by UAS gave forecasters more accurate predictions of when and where the flooding would be at its worst.

- [Assessing fallout from the damaged Fukushima nuclear plant](#) – After Japan was struck by a devastating, earthquake-induced tsunami on March 11, 2011, a nuclear facility in Fukushima began to leak dangerous levels of radiation, making it impossible for emergency responders to approach the facility's reactors. A UAS from America was used to fly over the damaged facility and use advanced sensors to help responders gain situational awareness they were prevented from otherwise obtaining due to the radiation.

## **Potential Future Uses**

- **Enhancing Public Safety**
  - [Enhancing search and rescue efforts](#) – In January 2012, the Mesa (CO) County Sheriff's office purchased small UAS to assist in search and rescue operations. The UAS can cover wide swaths of land and uses cameras and infrared imaging to send video to ground controllers. The use of UAS is also cheap, with the direct operational cost totaling \$3.36 per hour. In addition to aiding search and rescue missions, it could also help fight wildfires by determining hotspots and improving situational awareness.
- **Enabling Scientific Research**
  - [Safely tracking fish and wildlife](#) – After colleagues were killed in a helicopter crash, Idaho fish biologist Phil Groves has led an effort to develop small, maneuverable UAS for use tracking fish and wildlife. Currently in a multi-year test, Groves says the use of UAS could be a safer and more affordable way to count fish nests than the traditional way of using helicopters.
- **Mitigating Disasters**
  - [Enabling communications following a disaster](#) – The Federal Communications Commission is examining the use of UAS to help with communication relays in the event of a disaster to ensure emergency responders are able to communicate with each other. Following Hurricane Katrina, dozens of 911 call centers were knocked out of commission. UAS could help ensure connectivity until land-based communications are restored.
  - [Assisting in oil spill response](#) – The University of Alaska Fairbanks is testing UAS focused on improving oil spill response and clean up capabilities in difficult terrain and conditions. The technology gathers 3-D aerial data to produce a detailed image of the affected area, and allows oil spill responders to complete shoreline clean-up and assessment survey work with minimal impact on the shoreline or critical habitat.
- **Supporting Agriculture**
  - [Helping farmers fight disease in crops](#) – Researchers at the University of Florida are developing helicopter-style UAS to help farmers detect diseases and stress in their crops. Using GPS technology, the UAS take photographs and measurements and are proving particularly useful for citrus growers, allowing producers to easily detect tree health problems that aren't visible to the human eye.
- **Expanding Commercial Uses**
  - [Monitoring energy infrastructure](#) – Energy companies have been testing small UAS to potentially be used to monitor miles of pipeline and drilling rigs. Rather than using manned helicopters that cost an average of \$300 per hour to operate, UAS could provide a more cost-effective alternative. UAS ability to go into areas too hazardous for humans also holds potential for energy companies. The flames produced by crude processing operations can jump as high as 300 feet in seconds, making it too dangerous for manned aircraft to survey maintenance needs without shutting down the operation. Using small UAS, however, allows companies to take pictures of the equipment while the flares are burning.