

GOVERNMENT TECHNOLOGY

Government Technology

Eyes in the Forest

By Chandler Harris
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During the height of the 2003 fire season, Bill Holmes, chief of the California Department of Forestry and Fire Protection (CDF) Amador-El Dorado unit, walked with retired CDF Director Bill Teie through the tinder-dry grasses at the unit's Northern California headquarters.



They passed an old, 100-foot-tall lookout tower, empty and unmanned -- a relic of an era when paid CDF staff manned the towers watching for smoke in the surrounding hills. Holmes and his staff only occasionally used the tower to confirm a fire.

Holmes gazed at the lookout tower and the taller communications tower nearby and thought out loud, "It sure would be nice if we had a camera and fire detection system to spot and locate new fires." There is, in fact, a fire detection system in South Africa with cameras connected to a dispatch center, Teie replied.

The proverbial light bulb went on in Holmes' head, and he soon contacted the fire chief in Zululand, South Africa, to learn more about the fire detection system. Holmes found that the Firehawk fire detection system had been used in South Africa for 10 years, and was also being used in Chile, Greece and Canada with successful results.

Through Holmes' diligence in requesting and garnering scarce grant money for the equipment, two fire seasons later, on Aug. 23, 2005, the Firehawk system was installed at the CDF base in Camino, Calif., east of Sacramento.

Technologically Speaking ...

The Firehawk fire detection system consists of a camera mounted on top of the same 160-foot communications tower that Holmes eyed at the Amador-El Dorado Unit headquarters. The distance the camera can see varies with air quality, and whether the camera is looking into the sun. "It's not unusual to see 20 to 30 miles," Holmes said. "The camera spotted a fire in Lincoln one day, which is probably 50 to 60 miles away."

The system also includes a video monitor at the CDF headquarters, and software that detects potential fires. It is the first and only Firehawk system operating in the United States, and the maker, Alasia Marketing, has allowed the CDF to use the Firehawk Forest Watch software free for a year.

One camera, one video monitor, two computer screens, keyboard, joystick and hundreds of feet of cable amounted to \$10,000.

The Firehawk camera rotates 360 degrees every three minutes and analyzes 21 vectors, or windows, per rotation, day and night. If the software analyzing the camera data detects changes related to what a fire -- or smoke from a fire -- looks like, it activates an alarm at the CDF dispatch center.

The dispatcher then looks at the Firehawk video monitor's live camera feed and uses a joystick to manually tilt or zoom in the camera to visually check the smoke trail. When the trail is found, the software's computer mapping function uses the camera's images to provide an exact location of the smoke source, down to the street name.

"The dispatcher can move the camera, and zoom in and see if it's a controlled burn on a property or a larger fire," Holmes said. "In the past we had to have somebody come out and look."

Eye of the Hawk

After nearly a year, the Firehawk fire detection system has proved useful, and this fire season, it has detected more than 20 fires, Holmes said.

In July 2005, a 911 call reported a fire at the south fork of the American River, but the U.S. Forest Service could not locate the fire. With the Firehawk camera, however, the Amador-El Dorado CDF dispatcher pinpointed the location.

Firehawk also reduced expenses by helping the CDF station appropriately dispatch resources, especially air tankers loaded with fire retardant, which cost about \$7,000 per mission. Many times when an air tanker is dispatched, the plane has to jettison its load regardless of the fire's size, because the plane usually does not have enough fuel to carry the fire retardant load back to base.

"If we can keep them on the ground before we get a confirmed fire, it amounts to a lot of saved money," said Amador-El Dorado CDF Captain Dale McGill. "A lot of people call in about fires, but sometimes it's dust, or there is a small fire, and it's not necessarily going to become big fire. Now we analyze the situation and decide if we can keep the aircraft on the ground."

The Firehawk system spots fires at night through an infrared sensor. In one instance during the 2005 fire season, a late-night 911 call reported a fire in the Georgetown area. The caller could not give an exact location so McGill maneuvered the Firehawk camera and found the fire's coordinates.

"Ordinarily we would have to send people in the dark looking around for the fire, and they may not have found it until morning," Holmes said. "It only takes one or two of those situations to pay for itself and prove its usefulness."

Firehawk also lets CDF officials save any data recorded by the system, which can be useful in conducting fire investigations and creating time-lapse photo histories of a fire for critiques, Holmes said.

Furthermore, the Firehawk system can download detection information to observe areas struck by lightning. There are 200 available presets that let the Firehawk camera capture a picture every rotation, allowing CDF officials to target particular danger areas, such as where an arsonist may be working.

Other regional and geographic CDF command centers can link to the Firehawk system through intranet or Internet connections, although they cannot control the camera.

Improving Accuracy

Since budget cuts in the late 1990s forced the CDF to eliminate paid workers from its lookout towers, the CDF has relied on volunteers to staff the towers and people calling to report fires or smoke in

forests.

But volunteers often are unreliable, as are citizens calling from cell phones who usually don't know the exact location of a fire. In addition, cell phone service in the mountainous Amador-El Dorado county area is spotty, and some reports of fire have been from controlled burns or dust.

"The lookouts were a tremendous tool for us and I hate to see them go," Holmes said. "We were hoping [Firehawk] is some sort of replacement for us."

For all its initial benefits, however, the Firehawk camera is not as good as a human fire lookout, Holmes said. Experienced live lookouts can better assess a fire than the camera. In addition, the camera has been sensitive to a variety of movement that unnecessarily sets off the alarm, such as trees moving in strong winds and high-powered sprinkler systems.

Because of this, technicians from the South African company have traveled to the CDF headquarters to adjust the camera's sensitivity. Another problem CDF officials have found is that the amount of terrain scanned by one Firehawk camera is very limited.

"There's a lot of river drainages that the camera can't see, so the accuracy is not very good right now," said McGill. "We don't see a lot of terrain, so the more cameras we add, the more we can look into drainages."

Yet having the Firehawk camera watching for fires 24 hours a day, 365 days a year is a great replacement to the unmanned towers, Holmes admitted, especially since human fire lookouts leave their post at 6 p.m.

The yearlong trial period for the Firehawk system expired Aug. 23, but Holmes is requesting an extension from Alasia Marketing until he can secure grant money. He is also seeking grant funding to purchase three additional cameras linked to the Firehawk network.

These cameras would be installed at Heavenly Valley in South Lake Tahoe, Mount Zion in Amador County and Pine Hill in western El Dorado County.

"In the future I think this will be the standard for all lookouts," McGill said. "A lot of people are thinking about getting them now. In the long run you'll see cameras installed at the closed fire lookouts."

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