APPLICATION NOTE

CAS DATALOGGERS

# Wireless Environmental Monitoring for a Tortoise Sanctuary

## Temperature and Humidity Data Logger Monitors Habitat

CAS DataLoggers is proud to have provided the wireless environmental monitoring solution to Dave Friend, owner of the Ojai Sulcata Project Inc (OSP) in Ojai, California, which rescues and researches the massive Sulcata tortoise.
These tough turtles are native to the southern Sahara Desert and are one of the largest species of tortoise on Earth, but their conservation status is currently listed as Threatened: Vulnerable. With a lifespan of 60 to 100 years in ideal conditions, Sulcatas are native to Africa's Sahara Desert and often enter the U.S. through the black market. Their pebbly skin and pointy shells make them look especially tough, and Friend and his wife Maree are easily able to tell them apart by their different carapaces and sizes.

## About the Sanctuary

The OSP is a nonprofit shelter which takes in these animals when they've been given up by former owners who buy baby Sulcatas as pets but then abandon them in the wild or entrust them to shelters after the turtles grow much larger. "Sulcatas are not meant to be domesticated," Friend comments, explaining that though born small, these tortoises can grow to over 200 lbs in just a few years, which often proves to be too much of a challenge for homeowners to keep. Friend hopes that people will adopt Sulcatas from shelters like his for free instead of buying them at pet stores.

Dave and his wife have been sheltering these turtles for almost 30 years. Currently, the Ojai shelter hosts about 70 turtles living in a 1-acre enclosure within the 12-acre property. The Friends receive donations which help to feed the animals and cover the large electric bills—they've installed heat lamps in both structures for their guests' comfort.

Most of the turtles live in the property's adjacent buildings and barns, so they have free reign to move about where they like. Sulcatas often dig burrows to sleep, which get dangerously cold and damp in the winter. As many as five turtles can share each burrow, which are about 8-12 ft in length and almost 4 ft underground. The shelter currently has 4 active burrows, spaced about 50 ft apart.


## Monitoring Conditions

Dave needed to monitor conditions in the burrows to see how the turtles live: "Over time I'm getting a good snapshot of what they need to thrive." Friend says that keepers and enthusiasts have guidelines for their Sulcatas, but it's not yet known precisely what climate ranges they require. Regardless, cold and damp conditions are very unhealthy for them and need to be addressed ASAP–specifically, any temperatures below 50°F are cause for alarm. High heat usually isn't a problem but conditions over 95°F could also pose health risks. Friend estimates ideal temperatures to be in the mid-80s-90s with humidity around 60% RH. If the humidity in the burrows gets too low, the turtles start dehydrating, while if it becomes too humid, they can get a cold or potentially fatal respiratory disease.

Constant care is especially important for these animals during the winter since they're cold-blooded and don't hibernate. On nights where the temperature drops too low, Dave must rush them out of their burrows and put them in the barn to warm up.

This environmental monitoring application was unique since the temperature and humidity data had to be captured from 4 ft. underground, necessitating a wireless solution due to the difficulty of getting a good signal. The high condensation in the burrows further complicated the setup, so this was not a data logging application that many sensitive electronic devices could handle.

Before looking for a high-tech solution, Friend inserted a tape measure with an attached sensor down a burrow and would return when it had taken a reading 20 minutes later. "That just took too much time. I knew there had to be a better way." He needed a wireless monitoring and alarming system which could remotely gather the environmental data and send email alarm messages to his mobile device whenever conditions went outside safe ranges.

## Installation

CAS DataLoggers provided the Ojai Sulcata Project with a T&D RTR-500NW Wireless Data Logger Network Base Station and 2 T&D RTR-503 Wireless Temperature and Humidity Data Loggers. A pair of Temperature & Humidity probes were also delivered with the loggers to simultaneously record these two parameters so the project could get started right away. Manufactured by T&D, these probes use a 1-meter-long cable length to connect to the loggers. The probes measure temperatures from 32° to 131°F (0° to 55°C) and humidity in a range of 10% to 95% RH. Transmitting the readings from these sensors to the base station, the logger each take a sample once an hour, so Friend stays appraised of current conditions in the burrows.

Friend's son used an augur to drill a hole into the ceiling of each burrow to insert the probes: using a vertical conduit, he then placed 1-inch diameter PVC pipe underground, connected to the wireless loggers placed aboveground in small plastic boxes glued to the conduit. To protect the probes from condensation, Friend wrapped the pipe in insulation and packed the inside with foam before sealing the probes into the burrows. The data loggers each monitor a different burrow, and when Friend wants to move them around, their compact portability allows easy repositioning.

Friend also brought his network drop into the family's barn, enabling the wireless base station placed just inside the window to communicate with the logger in the closest burrow in a direct line with the barn about 100 ft away.  This logger is about 150 ft away from its twin in another burrow, but these ranges are still well within each logger's 500 ft. line of sight communication range.

## Alarm Capabilities

Meanwhile, the alarm levels continually monitor this data for any temperature reading outside the safety limits of 50°-70°F while also checking for any humidity value outside 40%-70% RH. In the event of any value going out of specification, the base station will send warning emails directly to Friend's mobile phone so that he can contact his daughter and grandchildren who also volunteer at the shelter. Following the alarms, the Friends can take immediate measures: for example, when the data loggers indicate that humidity levels have become too dry, Friend pours some water in the burrows, and when it's too wet, he places plastic pipes into the burrow to help dry them out.

## Wireless System Benefits

Dave Friend was new to data logging when he called CAS DataLoggers with his unique application, so our Applications Specialists provided the shelter with the wireless base station, data loggers, probes, and also provided free tech support. Now the wireless logger automatically records and transmit their readings without Dave having to travel out to the burrows every time he wants to see the environment his Sulcatas are experiencing. Throughout the year, T&D's durable construction ensures that the data loggers survive long-term exposure in the burrows.

Our custom monitoring and alarming solution now saves the shelter a lot of work and worry. Friend is planning on expanding his T&D system to accommodate other burrows with more data loggers in the near future—just last month CAS DataLoggers supplied the shelter with additional probes. Dave Friend explained the convenience of his environmental monitoring setup: "I think the equipment's just what I need. I want to share this with people who have Sulcatas so they know if their environment is safe for the animals, and this'll work no matter where you're keeping them."

For more information on T&D Data Loggers, wireless environmental monitoring or to find the ideal solution for your application-specific needs, contact a CAS DataLogger Application Specialist at **(800) 956-4437** or www.DataLoggerInc.com.