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WHEN MEASUREMENTS MATTER

Australia River Water Quality

Campbell data loggers used in monitoring network to measure water quality in Queensland

The Water Quality Investigations team within the (Queensland, Australia) Department of Environment and Science (DES) is responsible for monitoring water quality in all Queensland rivers. The team's analytics and reports generate insights for the Queensland state government into the sources of pollution, and trends in quality over time, which informs state policy development to maximize environmental returns from investment.

To gather the data, DES installed and maintains a network of 50 monitoring stations across the state, including a mix of automatic samplers and physio-chemical sensors (e.g., nitrate trace, turbidity, electrical conductivity, and dissolved oxygen) and undertakes water sampling and laboratory analysis using automated samplers and grab sample programs.

Before Eagle.io was involved, the data generated from sensors and analytical results was stored on an on-site PC, which was not accessible to stakeholders, and which experienced reliability issues.

Case Study Summary

Application: Monitor water quality across the state, provide data for decision makers

Location: Queensland, Australia

Participating Integrator: Eagle.io

Sponsoring Organization: Queensland DES

Products Used: CR1000, MD485, AM16/32

Measured Parameters: Nitrate trace, turbidity, electrical conductivity, dissolved oxygen

Before Eagle.io's upgrade, data input required manual parsing of data to a standardized format. This process was time-consuming and introduced data quality risks. Identification of water-quality issues required manual interrogation of data, which often meant that issues were only identified after the fact.

Management of the network of loggers and the programs that ran on them required individual connection

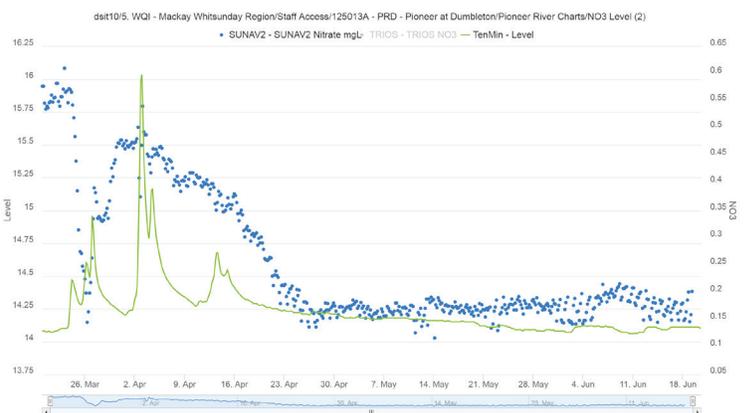*More info:* **435.227.9120**

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to devices in the field. The inability to manage devices on a batch basis meant that management of the hardware was a full-time job.

It was difficult to keep track of device health data like battery level, sample temperature, and when automatic samplers had triggered (and needed collection). This resulted in the department being unaware of hardware issues coming up to important flow events, and lost data.

The Solution

DES subscribed to Eagle.io management software, and now uses the platform for remote device configuration, data history, visualization and sharing, and server-side processing of data from sensors, laboratory and third party (BOM) data published to the web. The department has over 200 data sources configured on the platform and is rapidly expanding its network further.

Real-Time Insights—Laboratory data is now automatically ingested to Eagle.io for visualization and alerting as soon as it is released from the department. The parser deals with data-format issues, like the treatment of values below the limit of reading, which are identified with a "<" prefix to any value. The real-time insights can be securely shared with hundreds of stakeholders, both inside and outside of DES.

Calibration of Sensor Data—Eagle.io carries out a rolling calibration of turbidity sensor data against laboratory total suspended solid (TSS) data. This calibration allows DES to accurately estimate TSS in real time from turbidity

sensor data, and to use this calculated value to calculate daily loads in real time. This same calibration method is also used to train other sensors (e.g., nitrate trace) to more accurately estimate loads of other contaminants discharging from the state's waterways to the reef.

Remote Management of Loggers—The fleet of Campbell Scientific data loggers used by DES are now managed through the Eagle.io device management function. This allows operational staff to manage remote automatic samplers securely via the Eagle.io web portal, including the ability to update software and change sample rates during unusual flow events.

Break Data Silos—The quality data gathered by DES can be easily shared with other government departments (such as the regulatory arm). By so doing, this real-time quality data can be used by the state regulator to detect pollution events in real time and trigger site inspections to potential polluters in the catchment. DES can also use flow data stored in Eagle.io by another state government Eagle.io client (the Department of Natural Resources, Mines and Energy) to calculate nutrient loads as a function of DNRME flow data and DES quality data.

What the Queensland DES Has To Say

Ryan Turner, principal scientist and lead of the Water Quality Investigation team, said, "We use Campbell Scientific instruments and dataloggers. We've previously relied on LoggerNet to individually connect to loggers in the field. Eagle.io's ability to remotely connect to Campbell loggers has reduced the device management load, resulting in a time saving of one full-time equivalent person. The Eagle.io-to-CSI interface is so robust, technicians will choose to use the web interface to interact with the logger, even when they are standing beside the device in the field."