



Advanced IoT Pest Monitoring for a Truly Pest-Free Sanctuary

15 Kilometres of sanctuary fence with hotwire and gate sensors, reporting voltage and status 24/7 via LoRaWAN

Market:

- Conservation & Wildlife Management
- Infrastructure / Remote Monitoring
- Agriculture / Agri-tech

Problem:

The sanctuary's old 3G fence system was unreliable and only provided approximate fault locations. Rangers often had to respond without clear information, risking delays, unnecessary field visits, and potential breaches.

Solution:

Battery-powered LoRaWAN sensors were installed on gates, hatches, water points, and fence sections. Three strategically placed gateways collect data and feed it to the Scopious platform, sending near real-time alerts for any issues.

Requirements:

Sensors transmit small data packets at regular intervals, with 3-5 year battery life. The system provides clear monitoring, historical logs, and configurable alarms for fast, informed action.

Results:

Staff can now pinpoint problems quickly, reducing unnecessary site visits. Monitoring is more reliable, risk to the sanctuary is lower, and the system is easily scalable for future sensors or applications.



“We can now see the status of every fence section in near real time, meaning we respond faster and make better decisions before sending rangers into the field.”

— Sanctuary Ranger

Introduction

The Brook Waimārama Sanctuary is a 690-hectare predator-free sanctuary protected by approximately 15 kilometres of specialised perimeter fencing. Located in rugged terrain near Nelson, the sanctuary protects native species including kiwi, tuatara, kākāriki, and giant land snails from introduced predators.

With an estimated 25 million native birds killed each year in New Zealand by introduced pests and predators, maintaining fence integrity is critical. Any breach caused by fallen trees, slips, stormwater, rocks, or human error poses a direct threat to the sanctuary's predator-free status.

To improve reliability and prepare for the national 3G shutdown, the sanctuary upgraded to a LoRaWAN-based IoT monitoring system, a long-range, low-power wireless communication protocol designed for reliable connectivity across remote environments. The project was delivered with support from Teltrac, Scopious IoT, and Go Wireless NZ.

Problem - Business Impact

The sanctuary previously relied on a legacy EDAC monitoring system operating over 3G connectivity. Coverage limitations across remote sections of the valley reduced reliability, while alerts only provided approximate fault locations. Rangers often had to investigate issues manually, sometimes in severe weather, without knowing whether the alarm was genuine.

The sanctuary's geography also created deployment challenges. The 15 kilometre perimeter wraps through steep terrain and around sections of the valley with limited line-of-sight and inconsistent cellular coverage.

With New Zealand's 3G network approaching end-of-life, the replacement system needed to provide:

- Reliable long-range connectivity across the entire sanctuary
- Near real-time monitoring of gates, hatches, and fence voltage
- Low-power operation in remote areas without mains power
- Faster and more accurate alerting
- A scalable platform capable of supporting future sensors and monitoring applications

The Solution - Technical Dive

Teltrac designed a LoRaWAN-based IoT architecture to provide long-range, low-power connectivity across the sanctuary perimeter.

Network setup

Three LoRaWAN gateways were strategically installed around the sanctuary to maximise coverage and redundancy.

The deployment included:

- 1x gateway at the main entry using PoE power and Ethernet backhaul
- 2x field gateways powered by 12V battery and solar infrastructure with 4G backhaul
- Multi-gateway reception for improved resilience across difficult terrain

The sanctuary's bowl-shaped geography made LoRaWAN ideal for long-range, low-power communications across remote field devices.

Sensors and monitoring

A mix of wireless and wired sensors were deployed throughout the perimeter infrastructure, including:

- 11x wireless reed switches monitoring remote gates and hatches
- 11x wired reed switches across key access points
- 7x Fencyboy fence voltage monitors across separate fence sections
- Monitoring across pedestrian gates, vehicle gates, water gates, and stormwater entry points



Battery-powered devices transmit telemetry at regular intervals to any available gateway within range, improving redundancy and reliability. Most wireless devices are expected to achieve battery life of approximately 3–5 years.

Monitoring and Data Platform

The Scopious IoT platform provides centralised monitoring, alerting, and historical data visibility.

The platform enables:

- Near real-time fence voltage monitoring
- Gate and hatch status visibility
- Historical event logging and trend analysis
- Device health monitoring including signal and battery status
- Customisable alerts and threshold-based notifications



Staff can now identify likely fault severity and location before dispatching rangers, reducing unnecessary callouts and improving response times.



The Results

Since deployment, the sanctuary has achieved significant operational improvements.

Improved Reliability

The LoRaWAN network has delivered more consistent coverage across remote areas where cellular connectivity was previously unreliable.

Faster Fault Identification

Near real-time voltage visibility across individual fence sections allows staff to isolate issues quickly and identify false alarms without immediate physical inspection.

Reduced Operational Risk

Continuous monitoring helps ensure potential breaches are identified quickly, protecting the sanctuary's predator-free status and native wildlife.

Lower Maintenance Overhead

Low-power wireless infrastructure and multi-year battery life have reduced servicing requirements across remote areas.

Future Expansion Capability

With the LoRaWAN backbone now established, the sanctuary can easily expand into additional applications including:

- Weather monitoring
- Water flow and level sensing
- Environmental monitoring

- Asset tracking and accelerometers
- Temperature and humidity monitoring

Recommendations for others considering the product:

Based on this deployment, several key insights may assist organisations evaluating similar solutions:

Design Around Terrain and Coverage

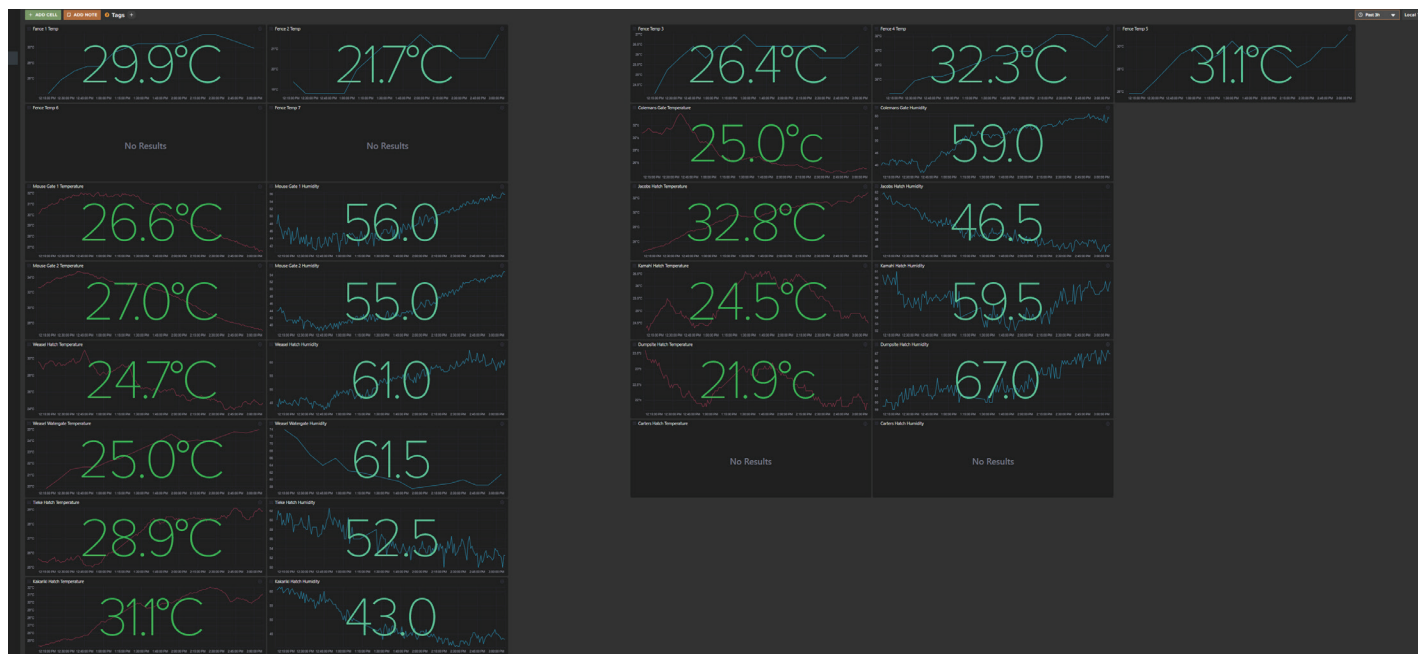
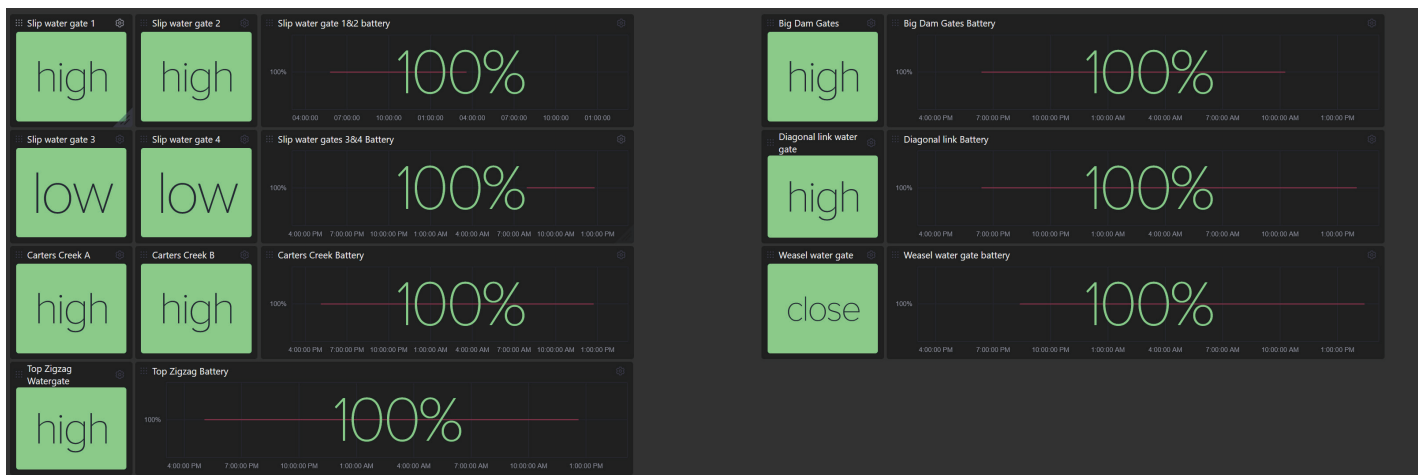
Environmental conditions and line-of-sight significantly influence network performance. Gateway placement and redundancy planning are critical for reliable operation.

Prioritise Long-Term Connectivity

Legacy cellular technologies can introduce future operational risk. LoRaWAN provides a scalable alternative for remote low-power deployments.

Focus on Actionable Data

Providing contextual information alongside alerts improves operational decision-making and reduces unnecessary field dispatches.



Build for Scalability

A modular IoT architecture allows organisations to add new sensors and applications over time without major infrastructure changes.



Solution Partners

Scopious IoT

Provided the IoT platform for device management, near real-time monitoring, alerting, and data visualisation.

Go Wireless NZ

Supplied IoT hardware and technical guidance for deployment across the sanctuary environment.

Reliable hardware. Real support.

Teltrac Communications

Provided consultation, network design, installation, and deployment support.

Fencyboy (Switzerland)

Supplied LoRaWAN-enabled fence voltage monitoring devices used across the sanctuary perimeter.