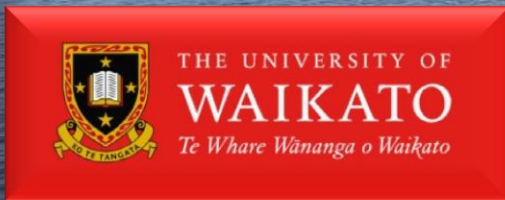


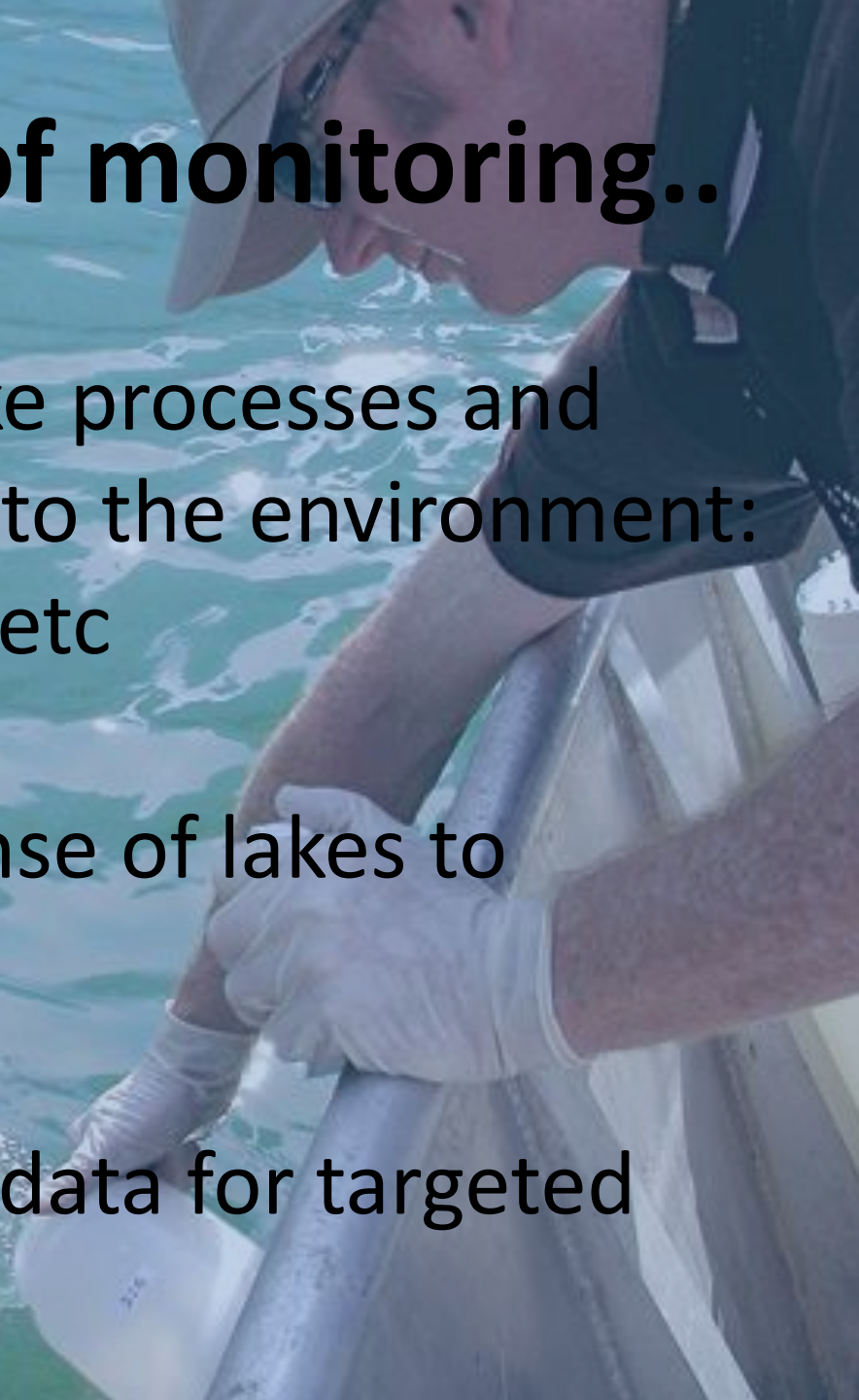
# Monitoring buoys: Rotorua Te Arawa Lakes



**Chris McBride, Joseph Butterworth & David Hamilton**  
The University of Waikato

# The importance of monitoring..

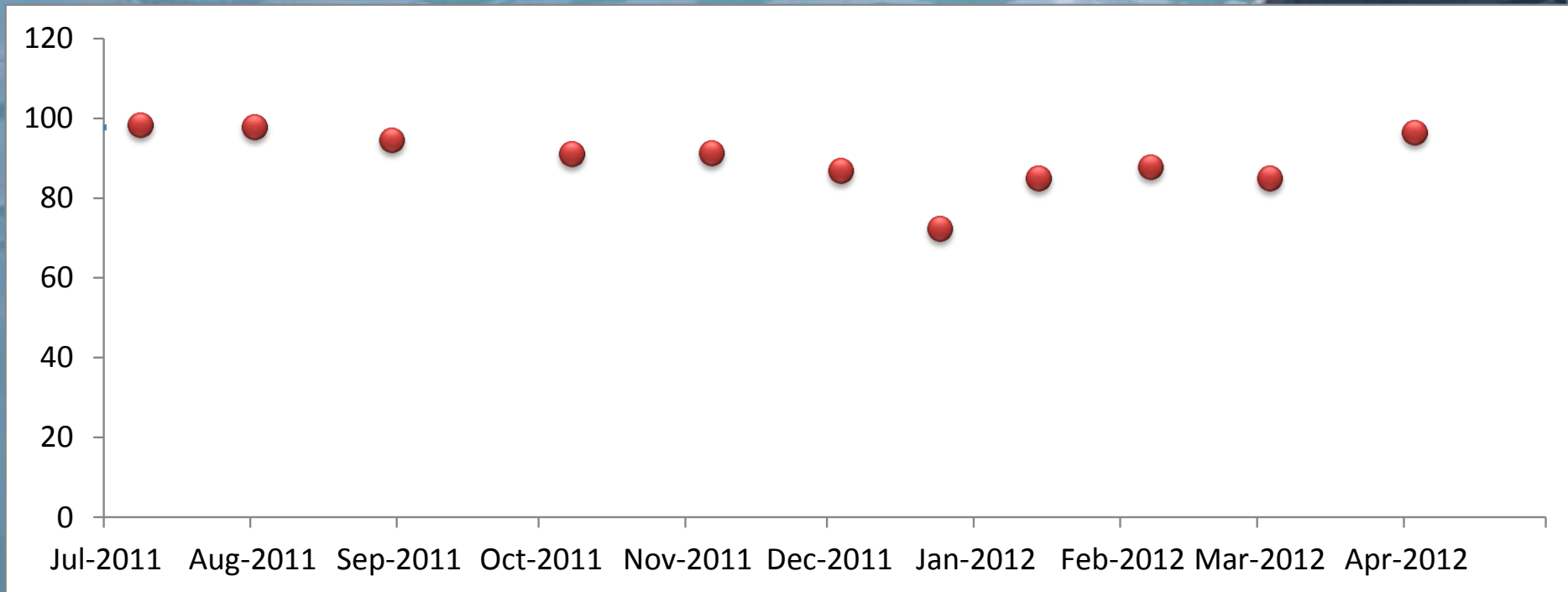
- To understand how lake processes and water quality respond to the environment:
  - climate, land use etc
- To measure the response of lakes to restoration initiatives
- To provide supporting data for targeted research endeavours





# 'Traditional' water sampling

Example: bottom water oxygen in Lake Rotorua



# Lake Rotorua Buoy

Deployed July 2007

*Sensors measure air and water quality every 15 mins and relay information to an online database and web interface in real-time*

**Meteorology:**

- wind speed and direction
- air temperature
- relative humidity
- barometric pressure
- precipitation

**Water quality:**

- surface and bottom dissolved oxygen
- chlorophyll fluorescence
- water temperature every 2 m

**Live, web accessible data:**

<http://www.boprc.govt.nz/knowledge-centre/live-monitoring>





2011

2013

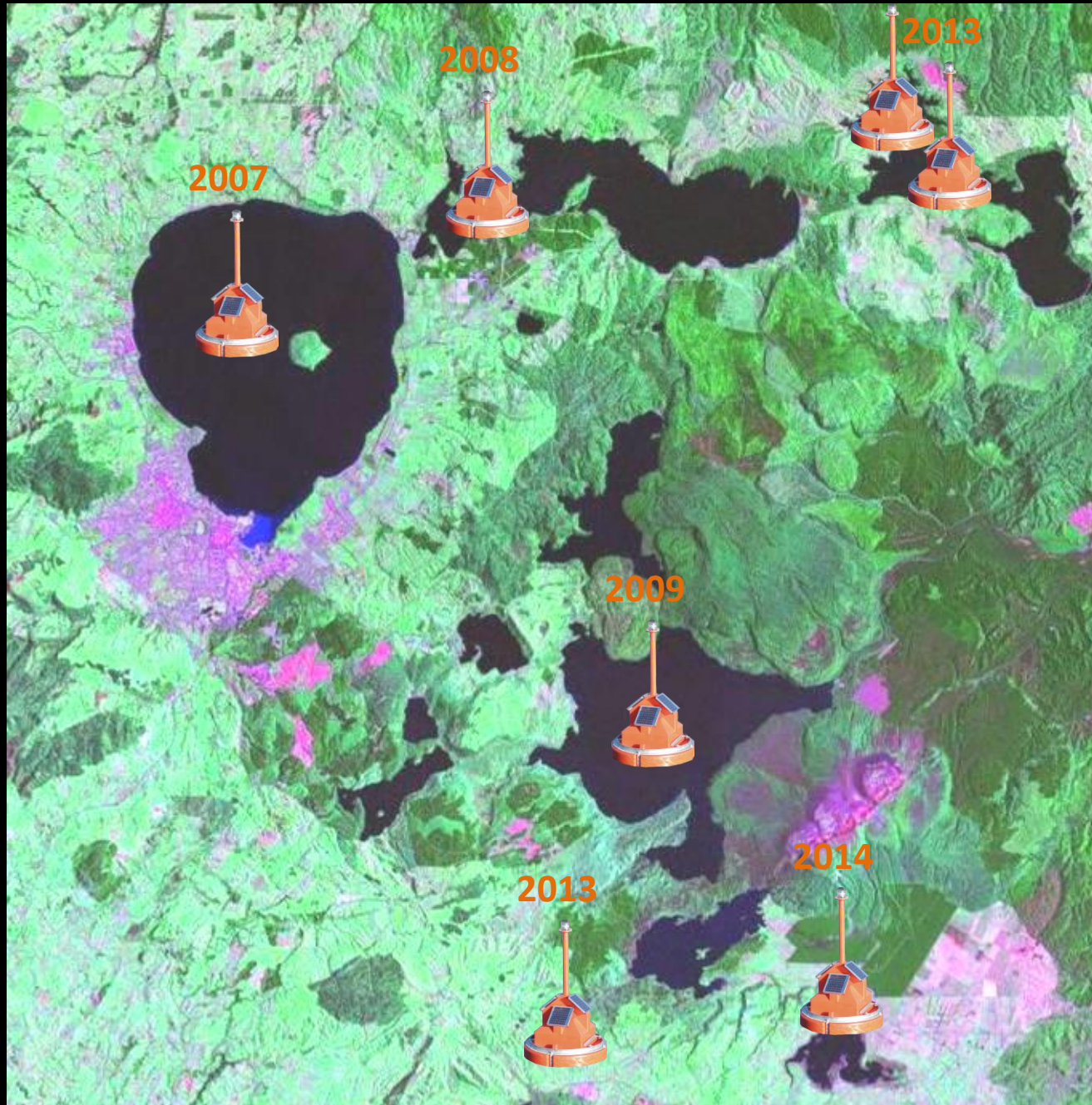
2008

2007

2009

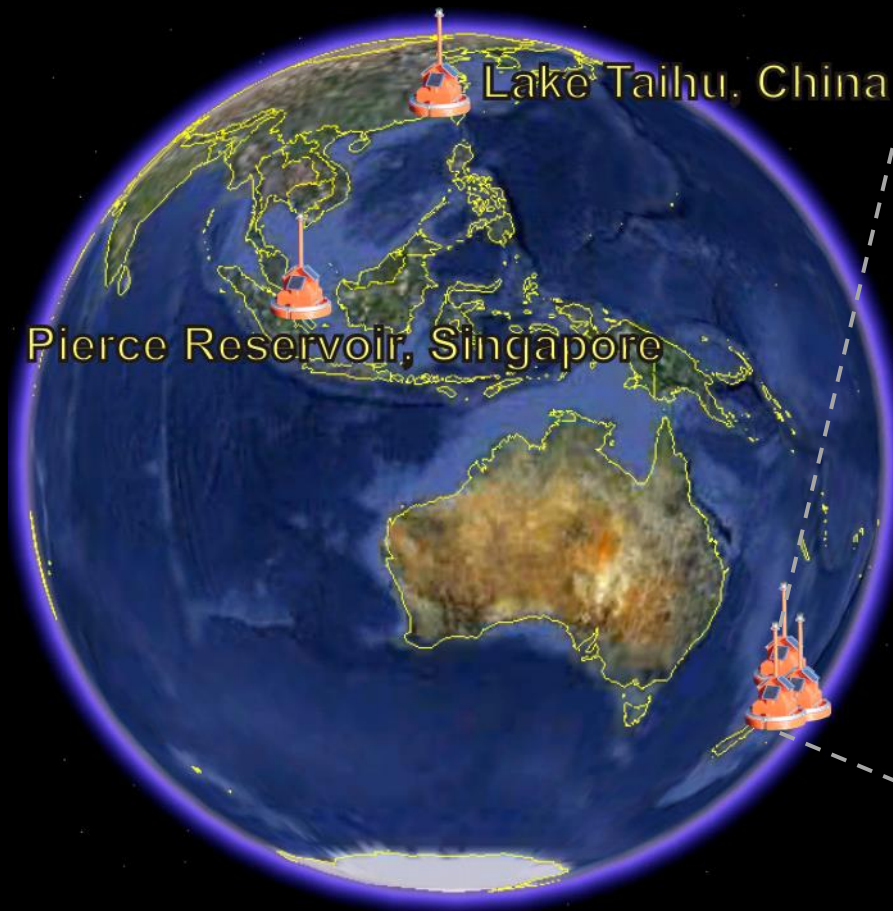
2014

2013

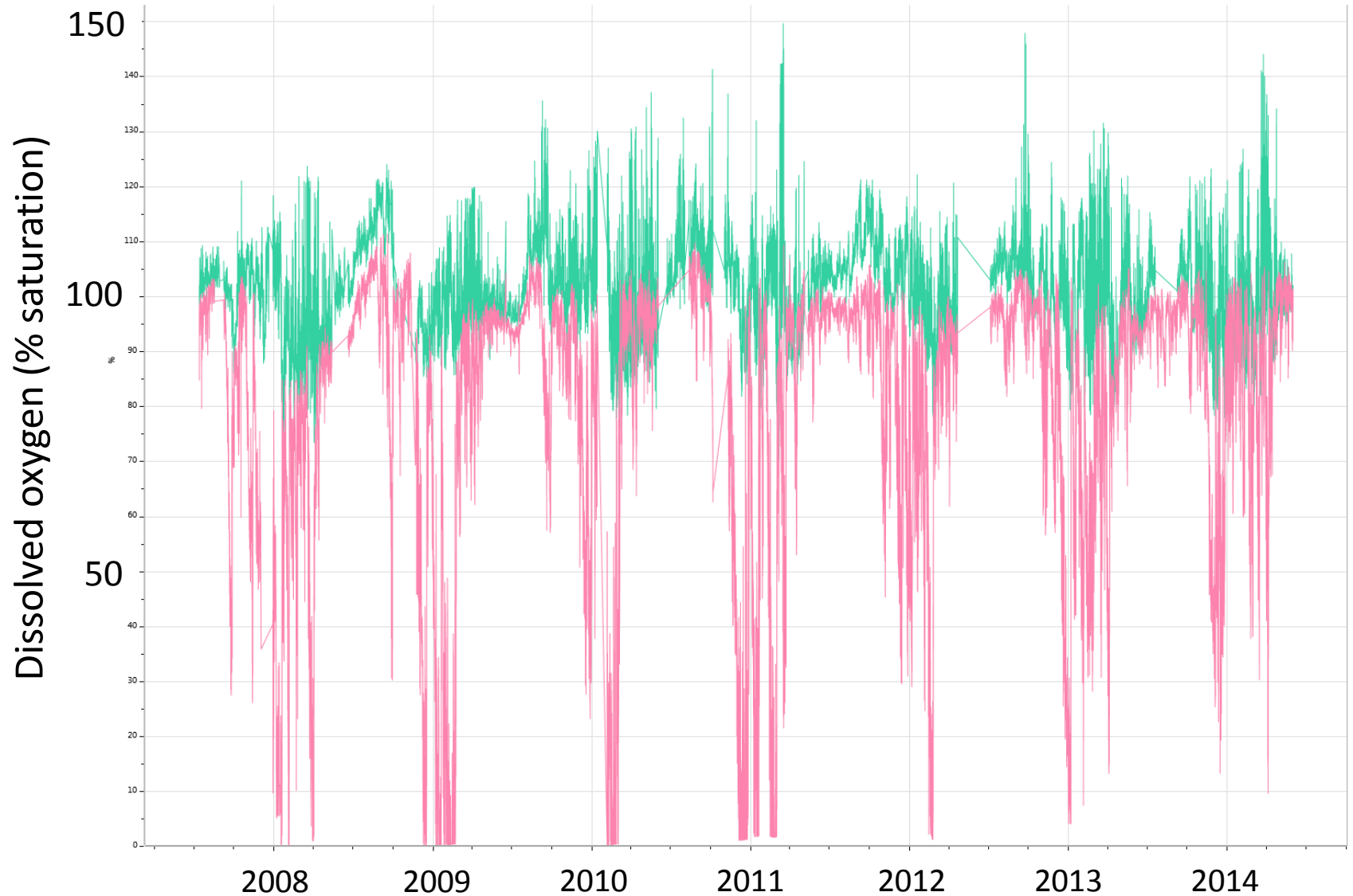




# Waikato University monitoring buoys



# Lake Rotorua dissolved oxygen: **surface** and **bottom** waters





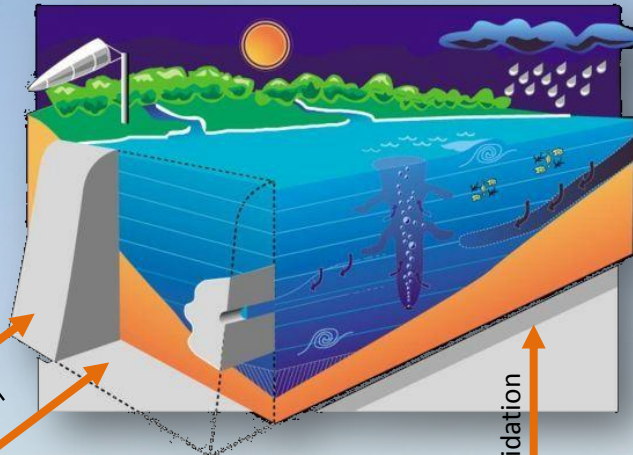
# Integrated technologies:

Comprehensive monitoring, modelling, and forecasting of water quality



Satellite/remote sensing of water quality

## Forecasting water quality models

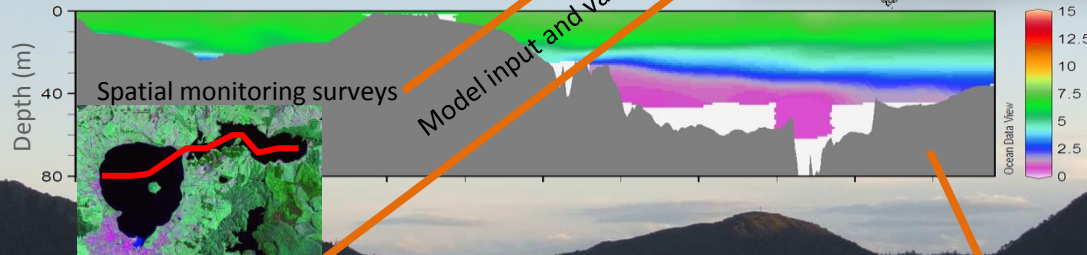


Water quality model input  
Future land-use scenarios

Model input and validation

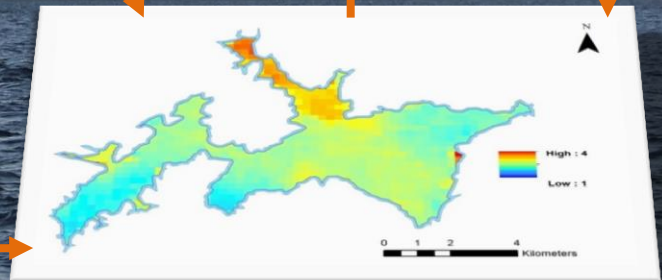
Model validation

Catchment modelling



High-frequency,  
automated monitoring

'Hindcasting' historical water quality & validating remote sensing



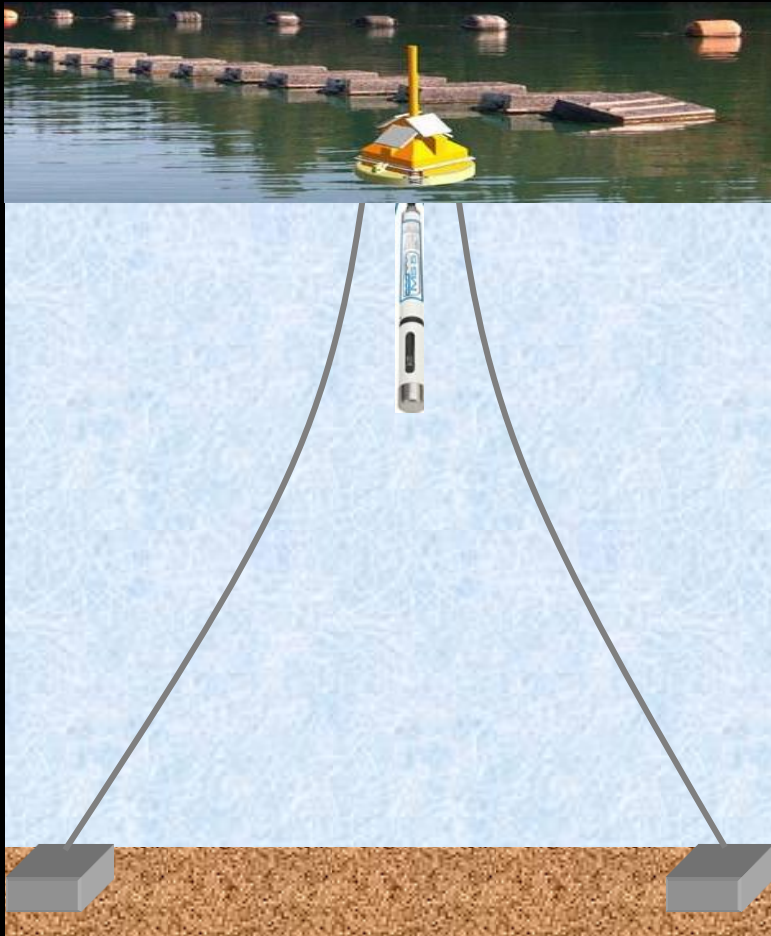


# New development:

## Autonomous water column profiling buoy system

### Features

- Automated winch for controlling sensor depth.
- Multi-parameter WQ probe, & met station
- Water level sensor, with adjustment of winch routine for safe operation in fluctuating water levels (e.g. reservoirs).



Thanks!



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**WAIKATO**  
*Te Whare Wānanga o Waikato*