CAWTHRON INSTITUTE

ECOSYSTEM HEALTH OF TE WAIKOROPUPU SPRINGS

INTERIM SUMMARY OF WORKSHOP DISCUSSIONS

ROGER YOUNG

WORKSHOP OBJECTIVES

- Summarise existing physicochemical and biological data for Te Waikoropupu Springs and connected water bodies to improve understanding of the current state of the springs and changes over the last few decades

- Based on the above, and expert knowledge, describe ecosystem health of the springs and highlight the major anthropogenic risks to spring health

- Provide recommendations on relevant attributes (and bands) that can be used in objective setting processes

- More than just about nitrate!!

PARTICIPANTS

- Roger Young, Cawthron – workshop convenor
- Joseph Thomas, TDC – Takaka water resources
- John Stark, Stark Environmental – invertebrate monitoring
- Magali Moreau, GNS – national groundwater network
- Graham Fenwick, NIWA – groundwater biodiversity/ecology
- Andrew Fenemor, Landcare Research – N modelling
- Graham McBride, NIWA – trend analyses, water quality
- Chris Hickey, NIWA – toxicology, water quality

- Justin Kitto, Dairy NZ - observer
- Dairy NZ provided funding to convene the workshop

KEY DISCUSSIONS

- Long-term data and trends
  - Invertebrates
  - Nitrate nitrogen
  - Dissolved reactive phosphorus
  - Dissolved oxygen
  - Water temperature
  - Chloride

Data availability
Data quality issues
Trend analyses

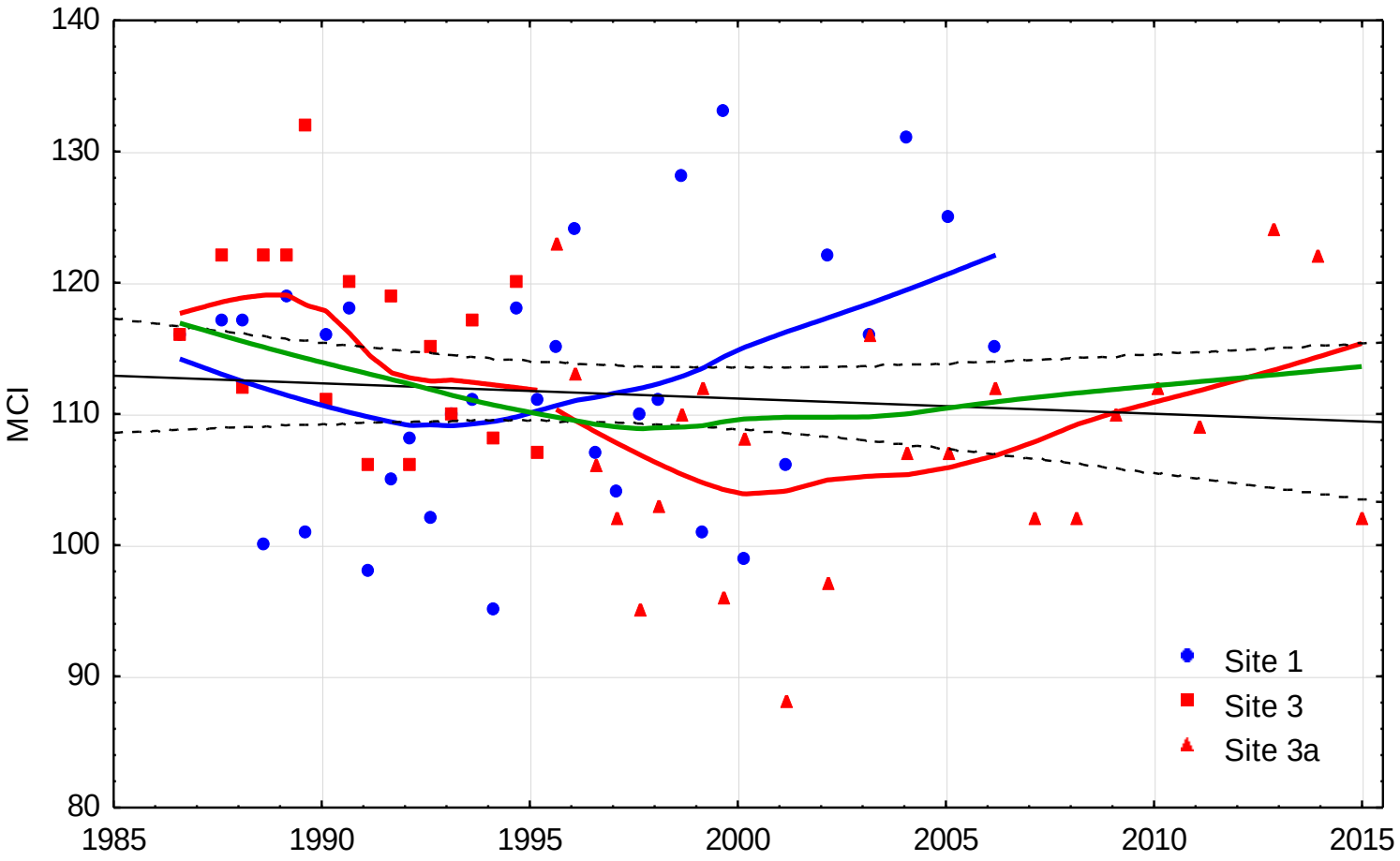
- Current health
  - Comparisons with relevant guidelines
- Risks
- Relevant attributes and bands

MACROINVERTEBRATES

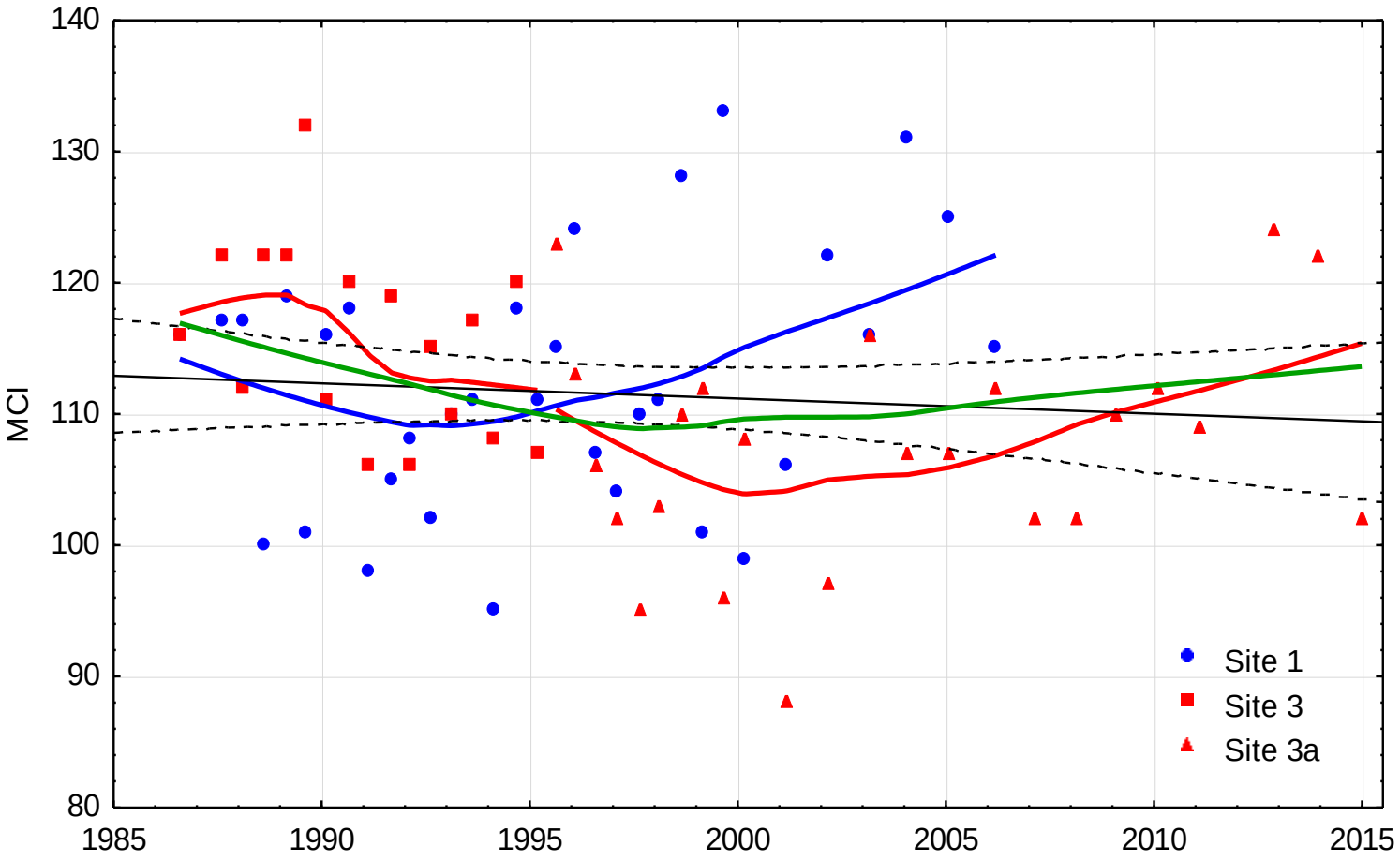
- MCI
- General measure of river health
- Sensitive species get high scores
- Tolerant species get low scores

- Regular monitoring above and below the salmon hatchery since 1986

MACROINVERTEBRATE COMMUNITY INDEX (MCI) SCORES



MACROINVERTEBRATE COMMUNITY INDEX SCORES

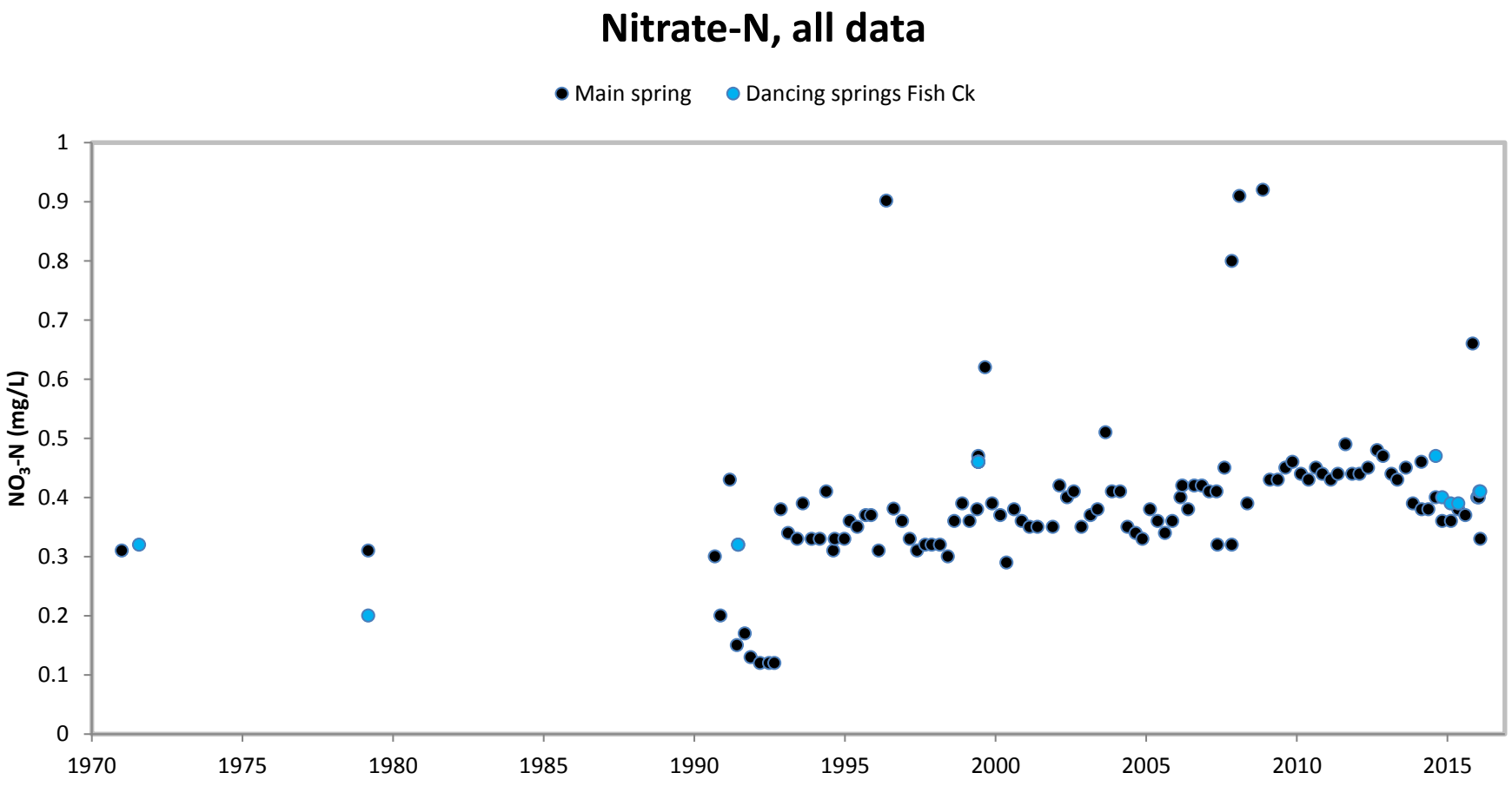


…the health of Te Waikoropupu Springs and the upper reaches of the Springs River has not changed noticeably from 1986 to 2014 (22 years).

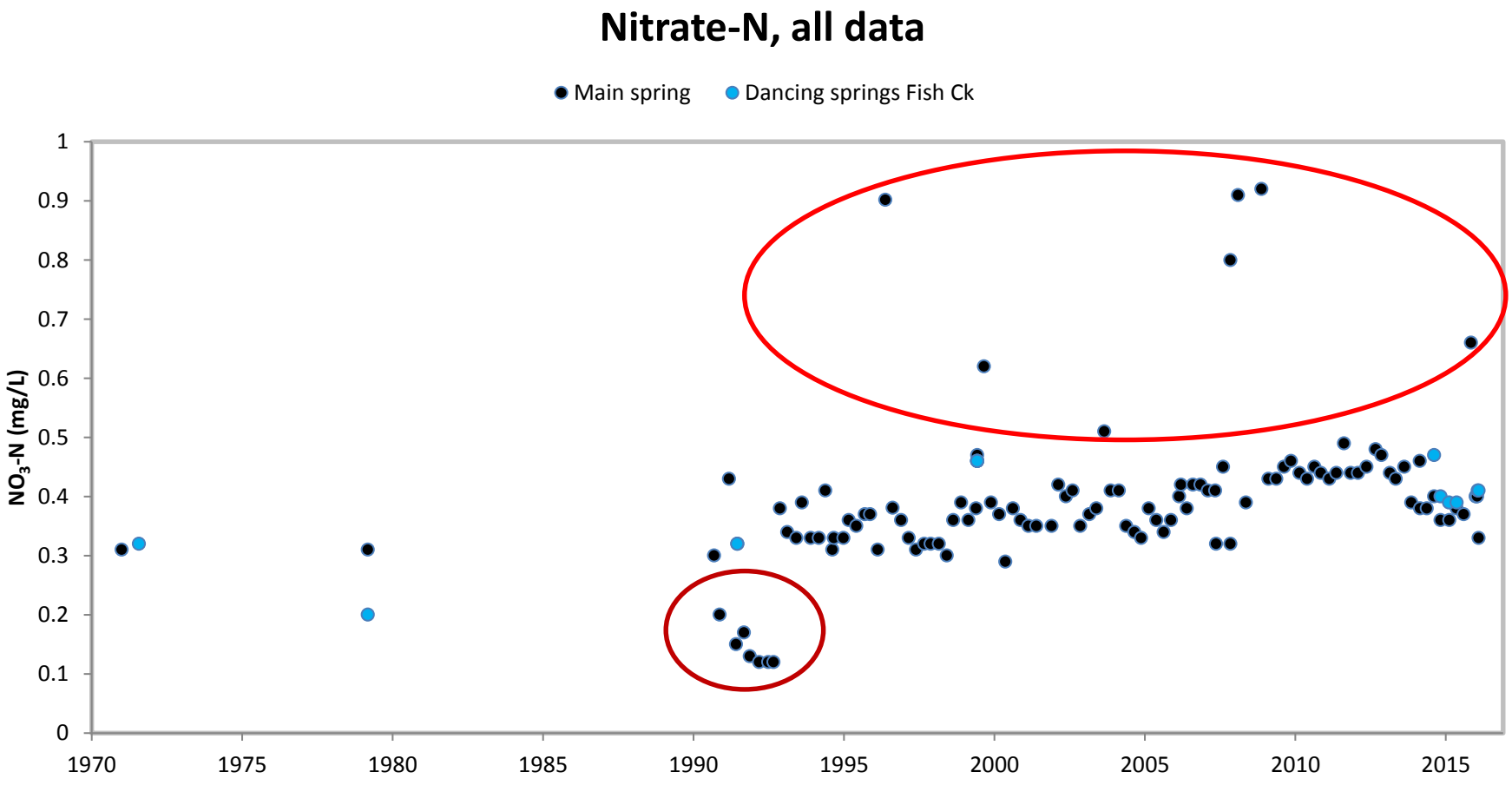
WATER QUALITY DATA

- Michaelis thesis 1970-71
  - Main spring and Dancing Sands
- Stewart & Downes 1979
- Other occasional one-off samples TDC
- National Groundwater Monitoring Programme 1990-present
  - Main Spring:
  - Quarterly samples
  - Temperature, conductivity, Ca, Na, Mg, K, Fe, Mn, Cl, Br, NO_3-N, SO_4, NH_4-N, SiO_2, F.
  - DRP analyses annually, quarterly since 2015.
- Friends of Golden Bay 2015-16
  - Temperature, conductivity, Cl, NO_3-N, DRP,

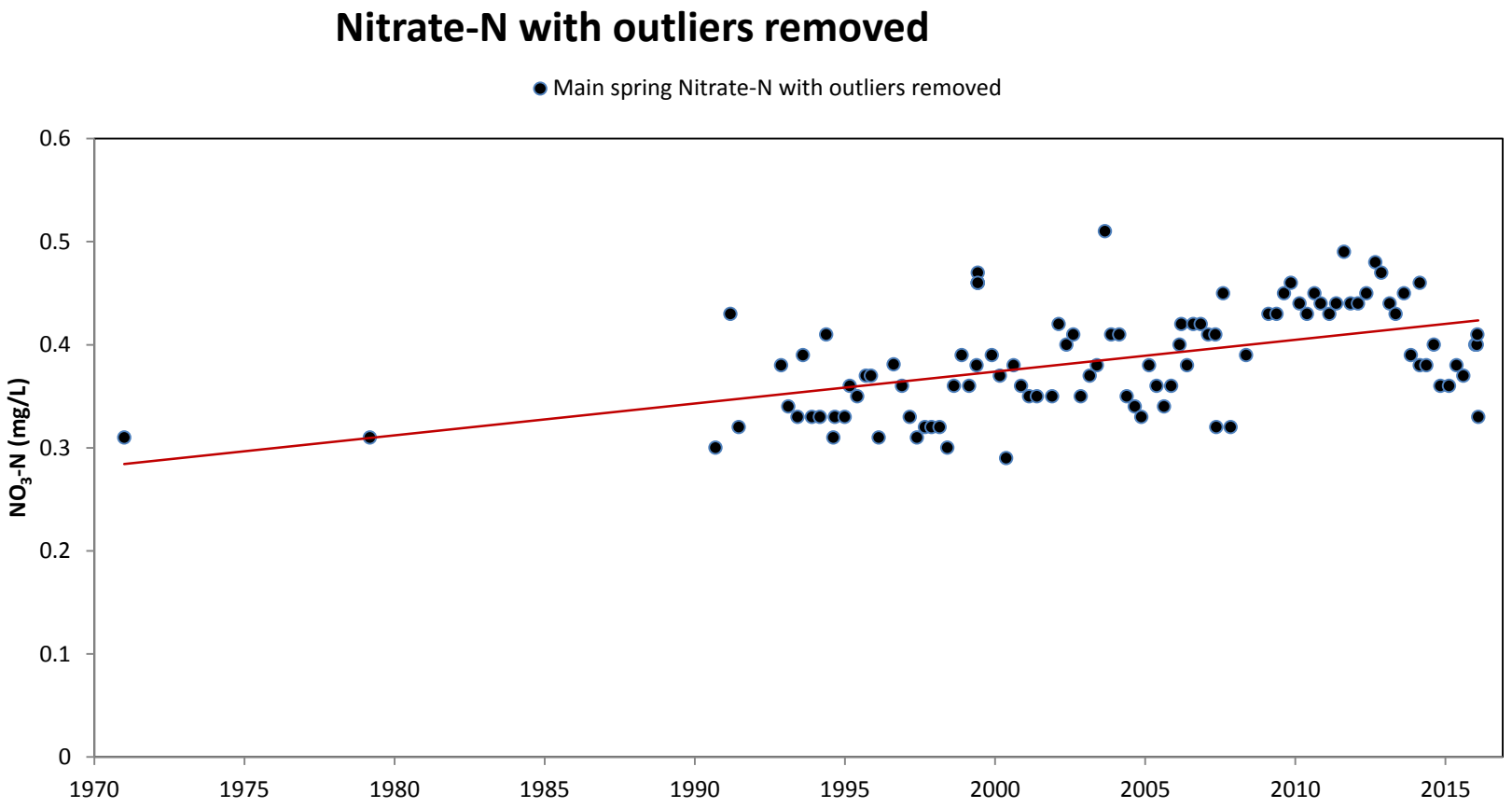
NITRATE NITROGEN



NITRATE NITROGEN



NITRATE NITROGEN TRENDS



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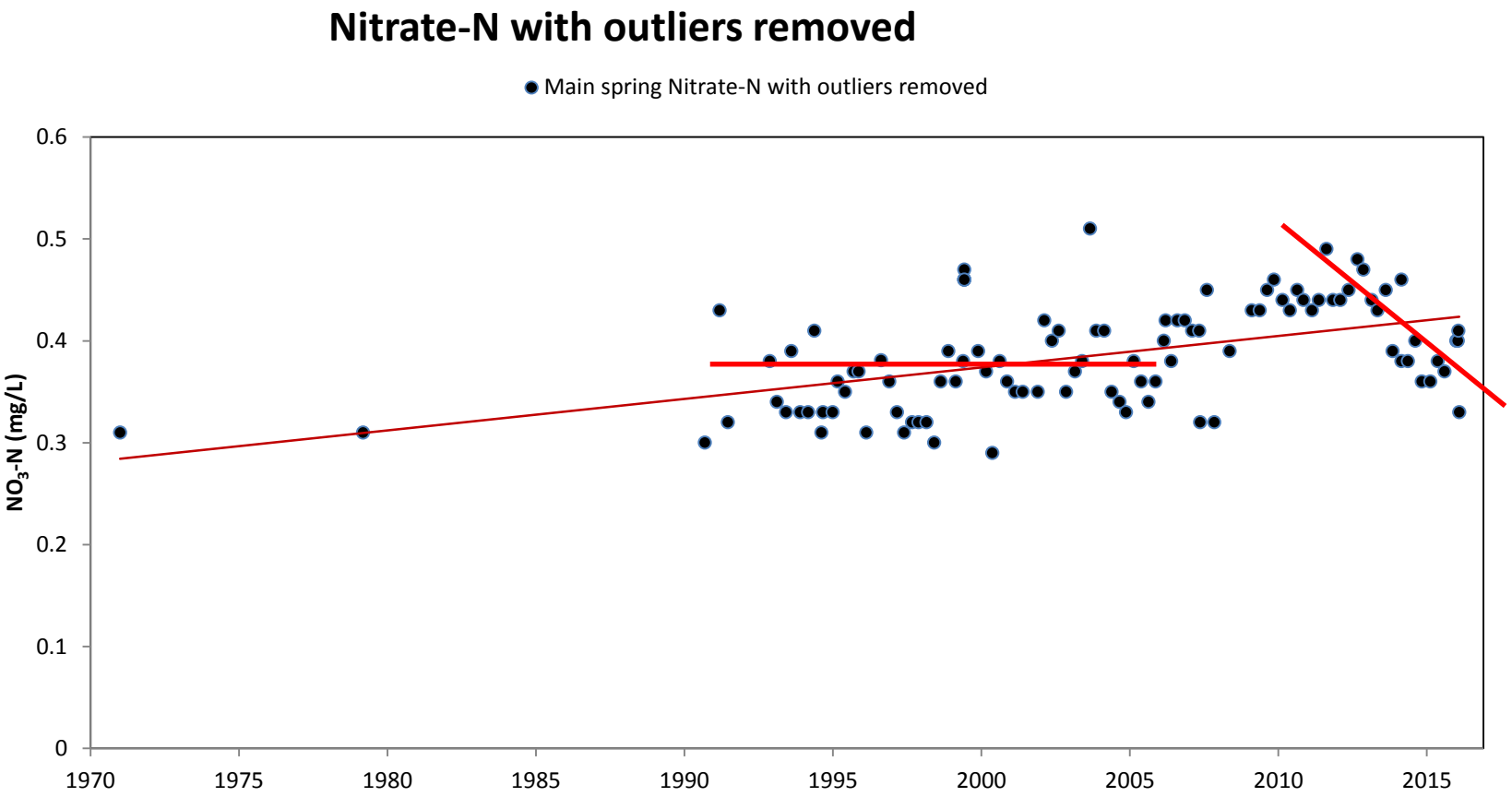
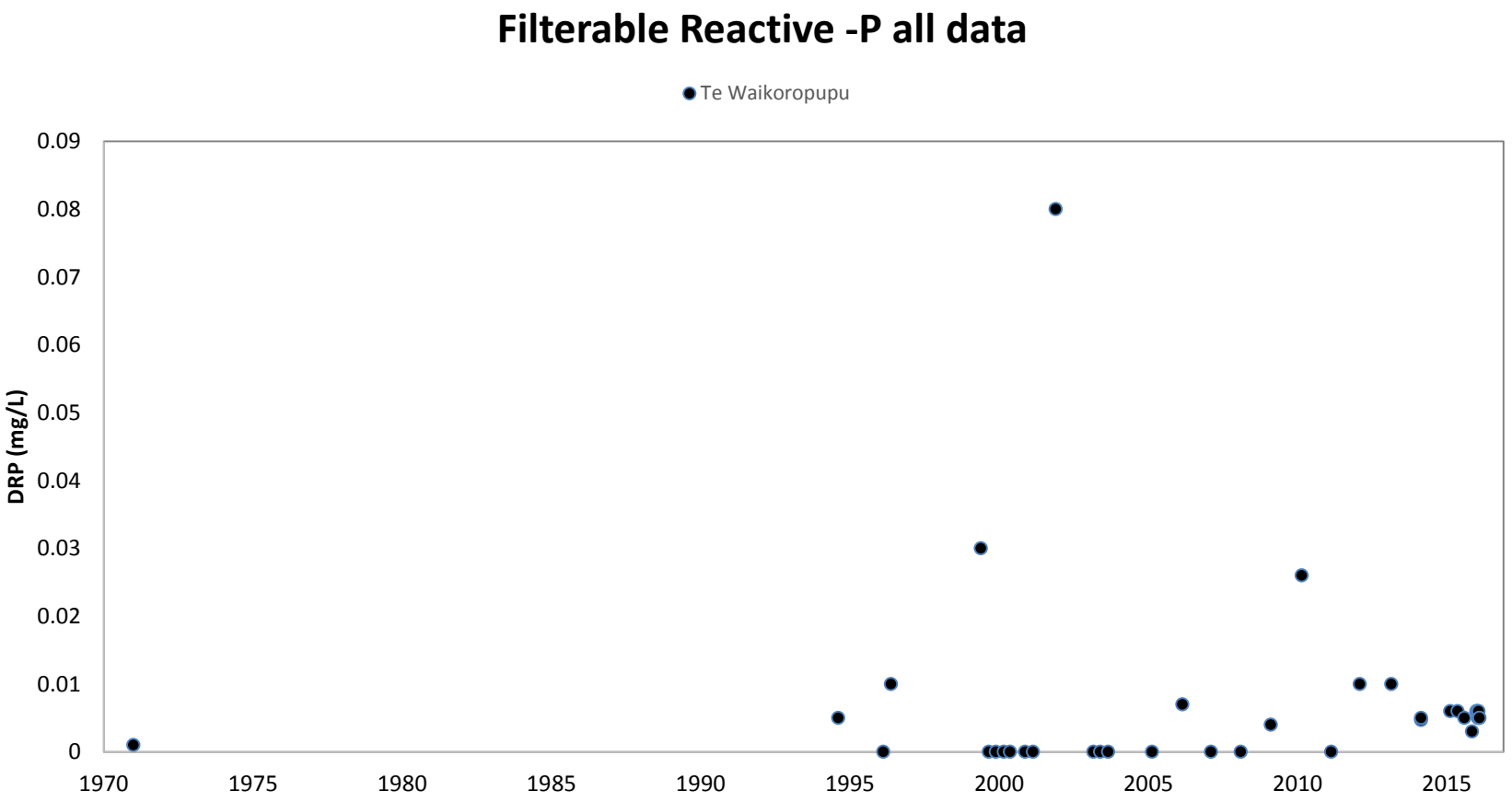
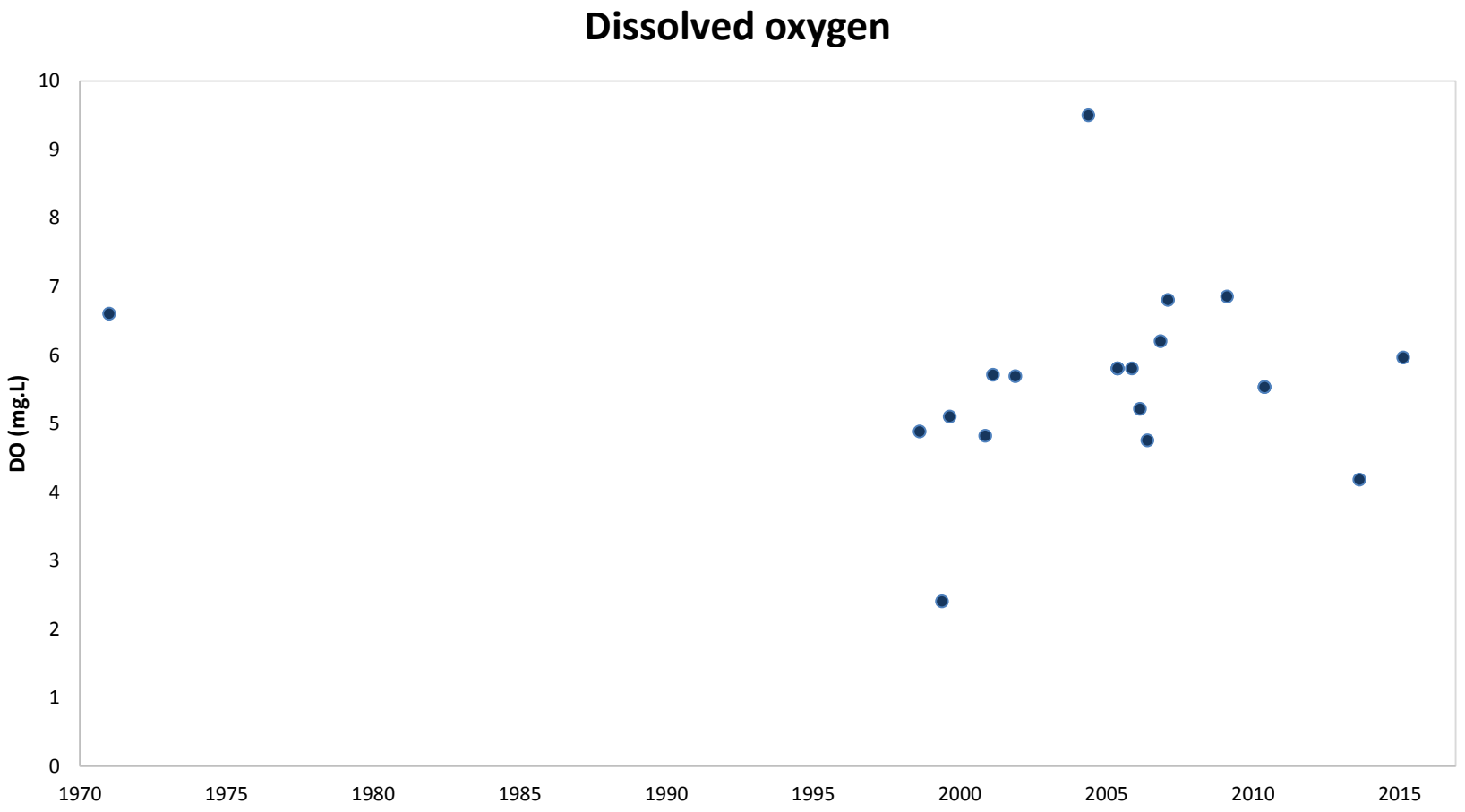


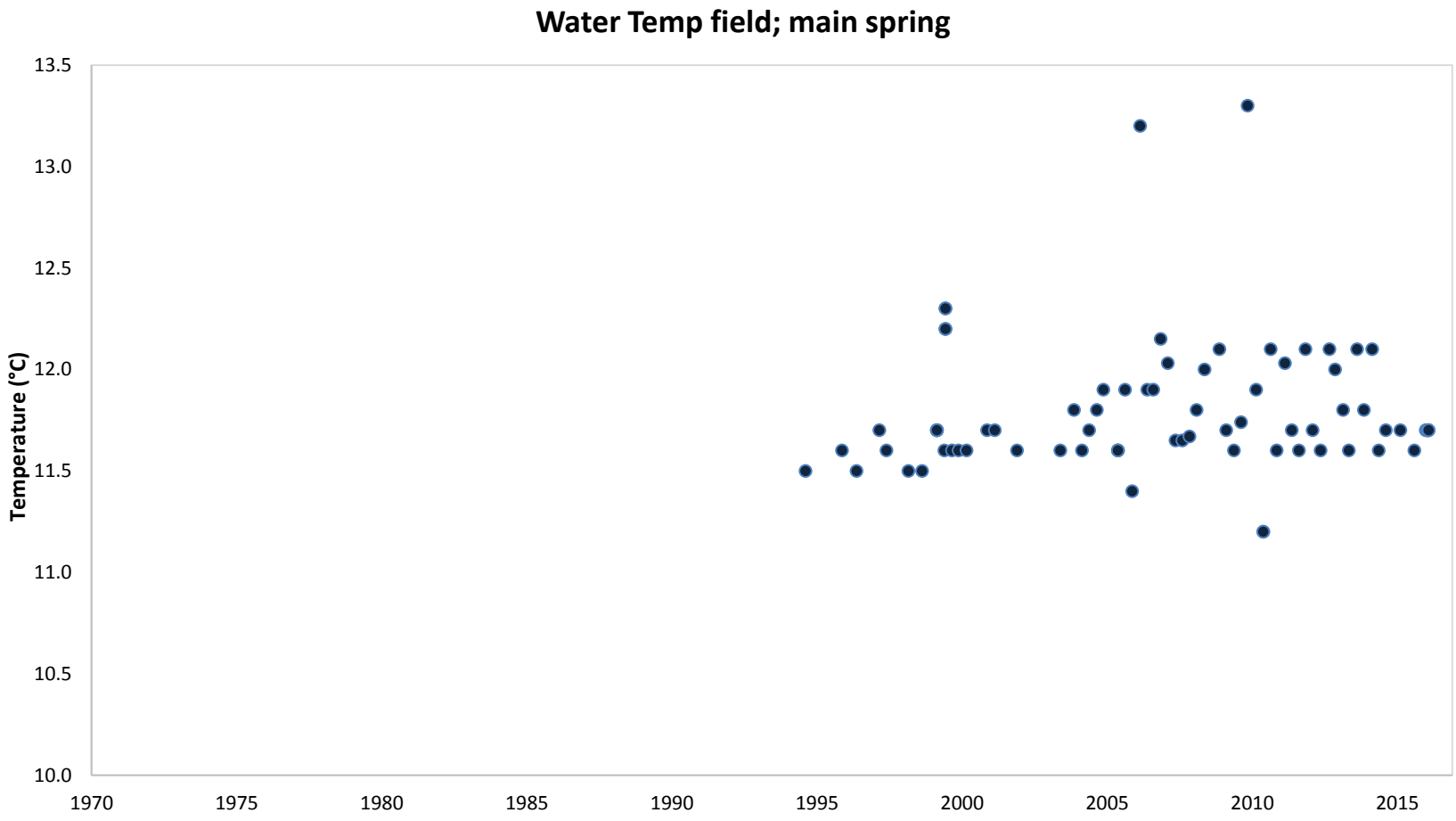
DISSOLVED REACTIVE PHOSPHORUS



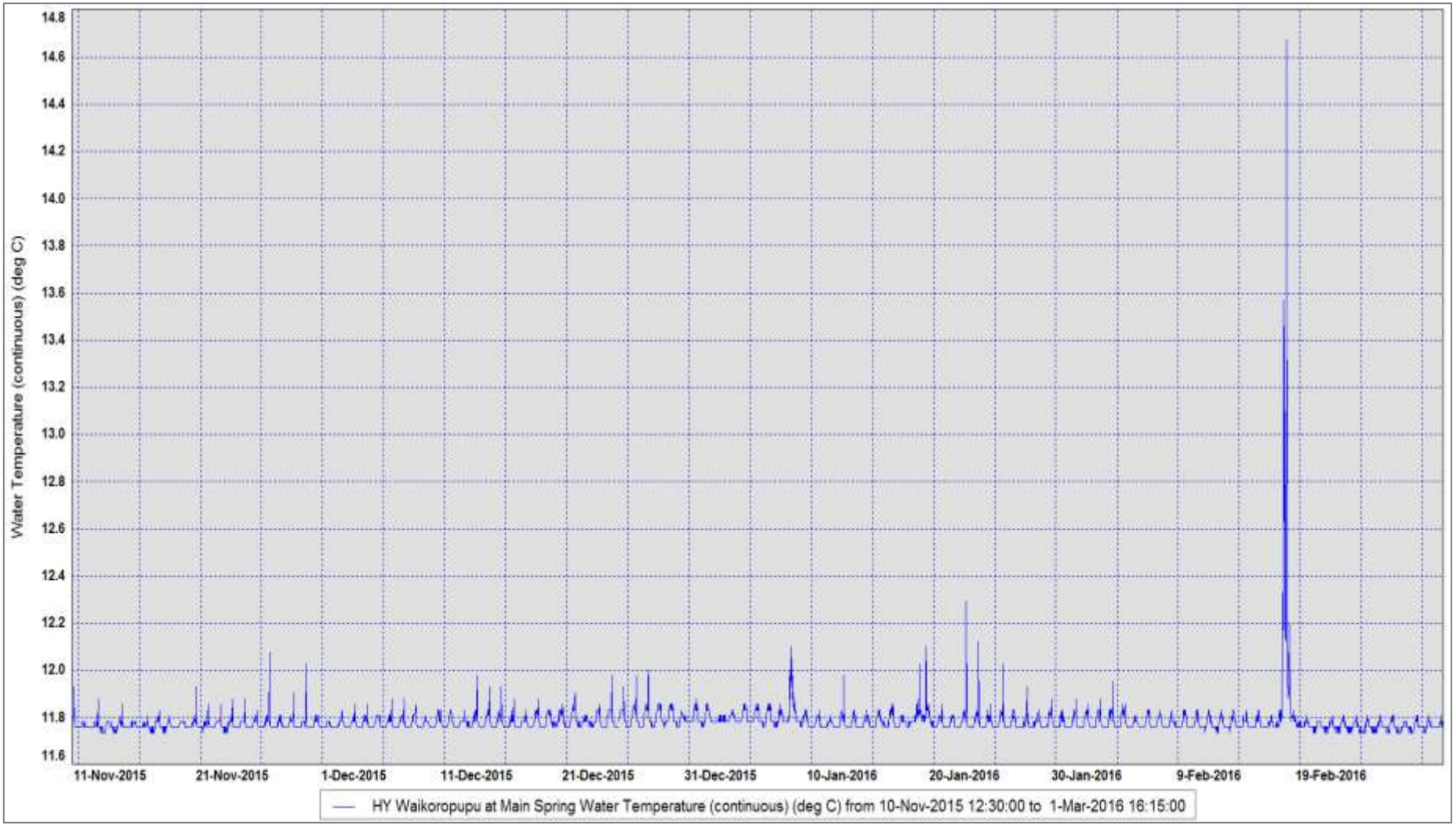
DISSOLVED OXYGEN



WATER TEMPERATURE

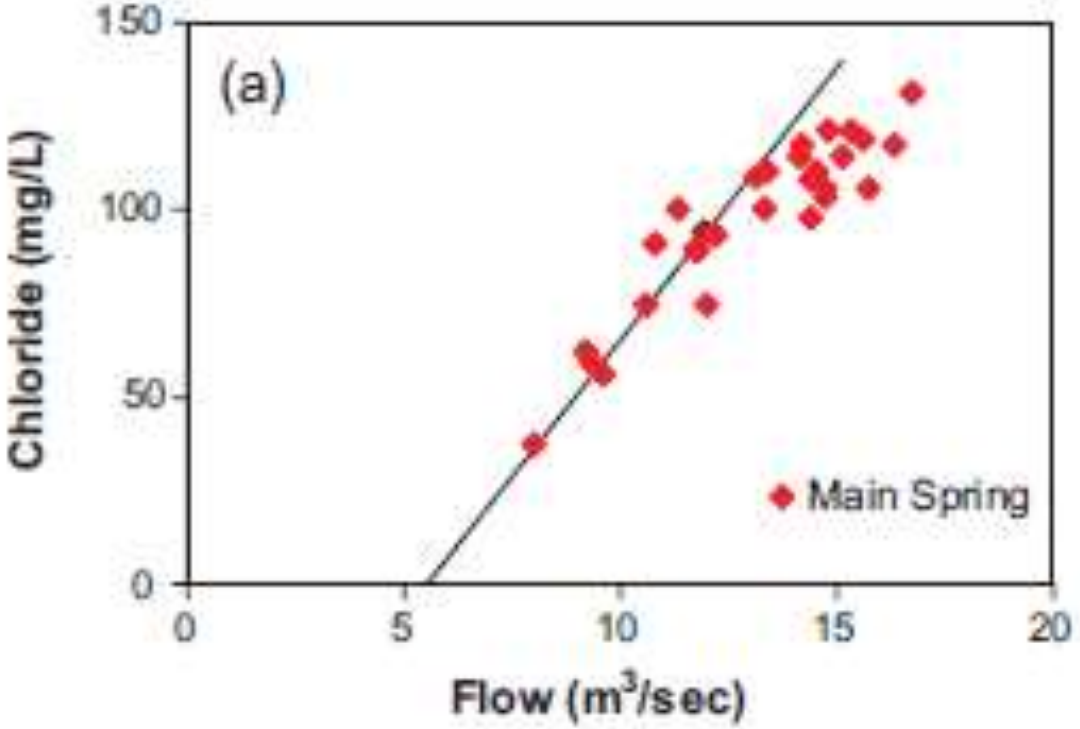


WATER TEMPERATURE



Michaelis 1971 – 11.7 °C

CHLORIDE



HEALTH STATUS

- ANZECC guidelines
  - Trigger values, not limits

  TP TN NH_4-N pH

  DRP NO_3-N DO Clarity

- NPSFM current NOF attributes for A-band

  Periphyton NO_3-N toxicity NH_4-N toxicity DO *E. coli*

- Drinking water standards

  NO_3-N Hardness Chloride *E. coli*

- Microbiological guidelines

  E. coli

POTENTIAL RISKS TO THE AQUIFER AND SPRINGS

- Sediment – water clarity
- Nutrients – periphyton growth
- Pathogens
- Organic waste – lower dissolved oxygen
- Climate change – temperature, flow fluctuations
- Invasive species – didymo, aquatic weeds
- Flow abstraction
- Cobb Hydro scheme – flow fluctuations

ATTRIBUTES AND BANDS

- Te Waikoropupu an A-band waterway?

  ….but doesn't meet A-band status for DO (and probably periphyton) because it's a spring not a rain-fed river.

- Potential attributes

DO	Clarity	Periphyton?
NO_3-N toxicity	NH_4-N toxicity	
MCI	Macrophyte cover	
Manganese	DRP?	

FURTHER WORK PLANNED

- DO measurements
- Summary report on workshop – June 2016

- Want feedback from FLAG

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