

# Te Waihora/Lake Ellesmere

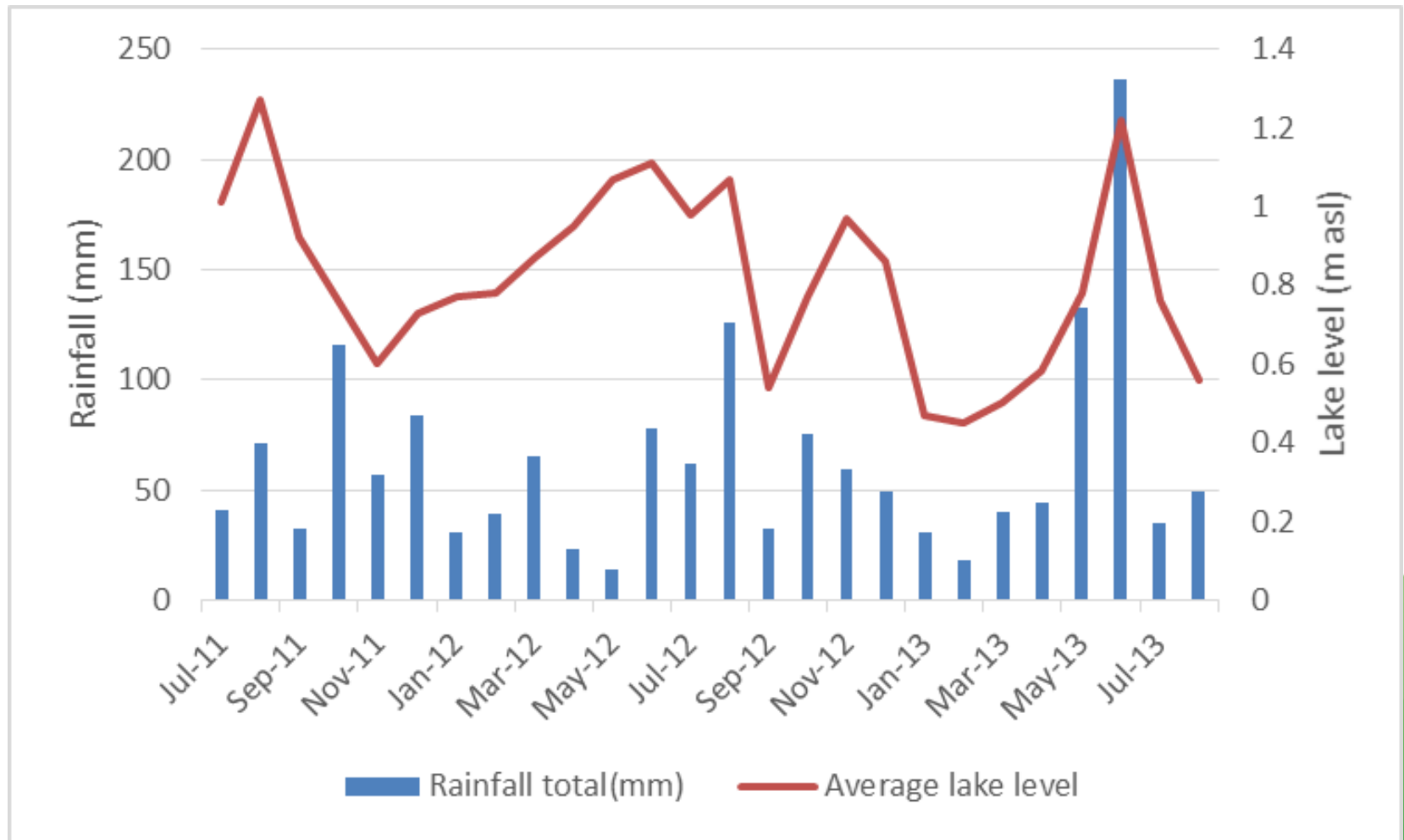
## State of the lake & catchment

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# Outline

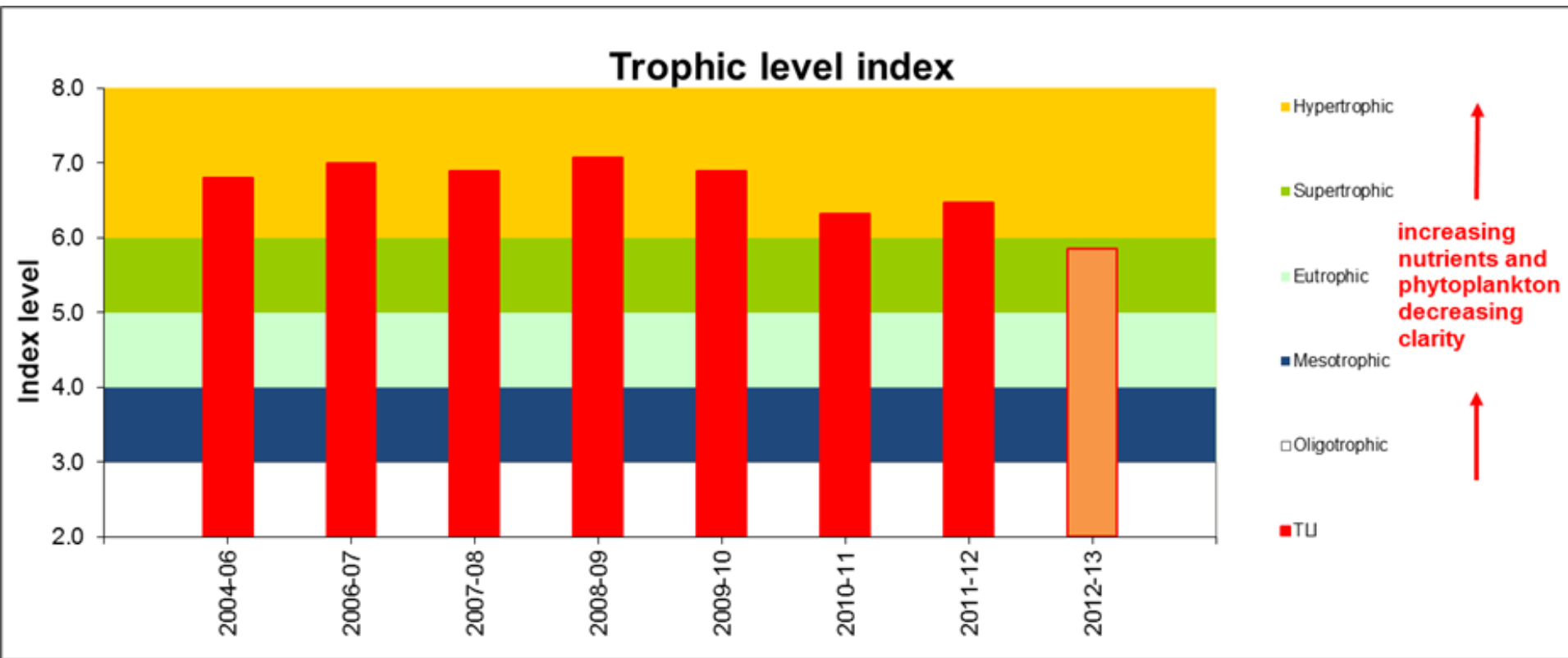
- Rainfall and lake level
- Lake trophic status
- Water quality of tributaries
- Aquatic ecosystem health of tributaries
- Contact recreation water quality
- Groundwater quality
- Response to monitoring results

# Rainfall and lake level



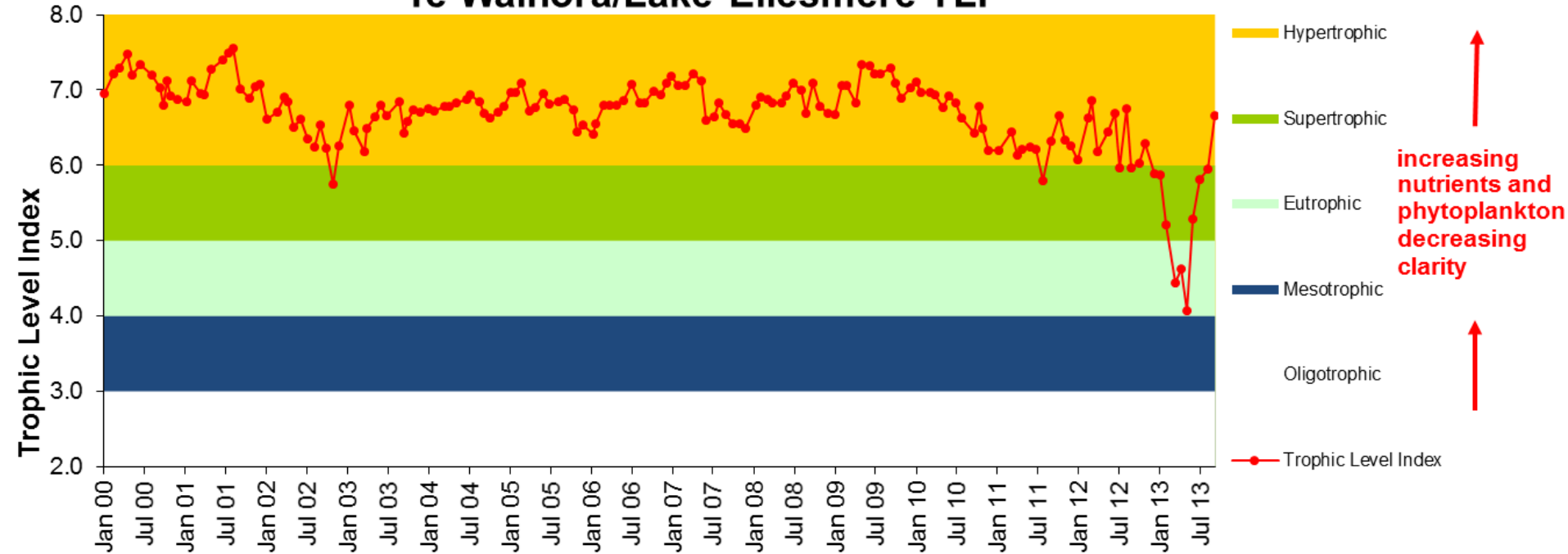
- Monthly lake level
- Two high levels events and one prolonged opening

# Trophic status

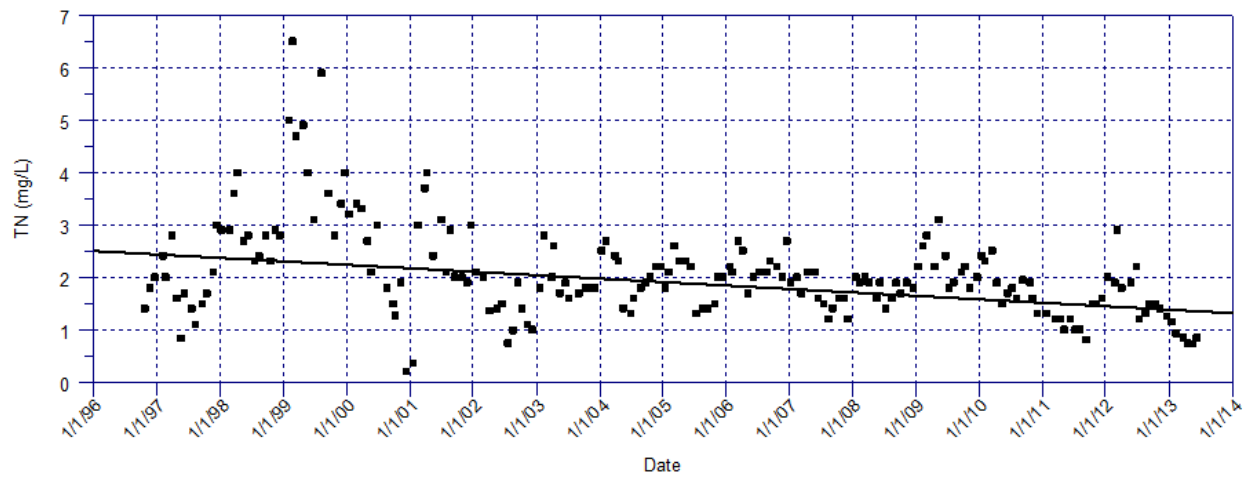
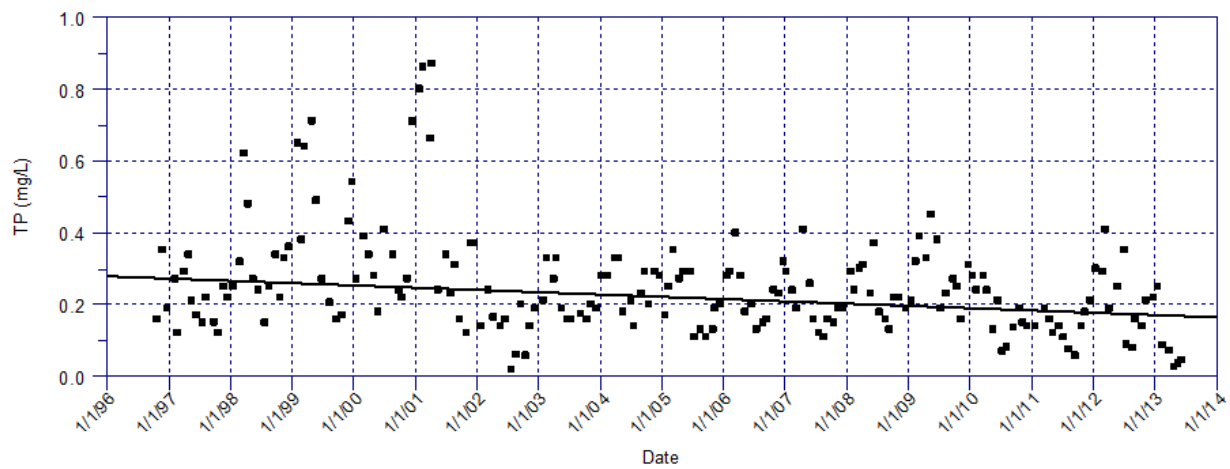
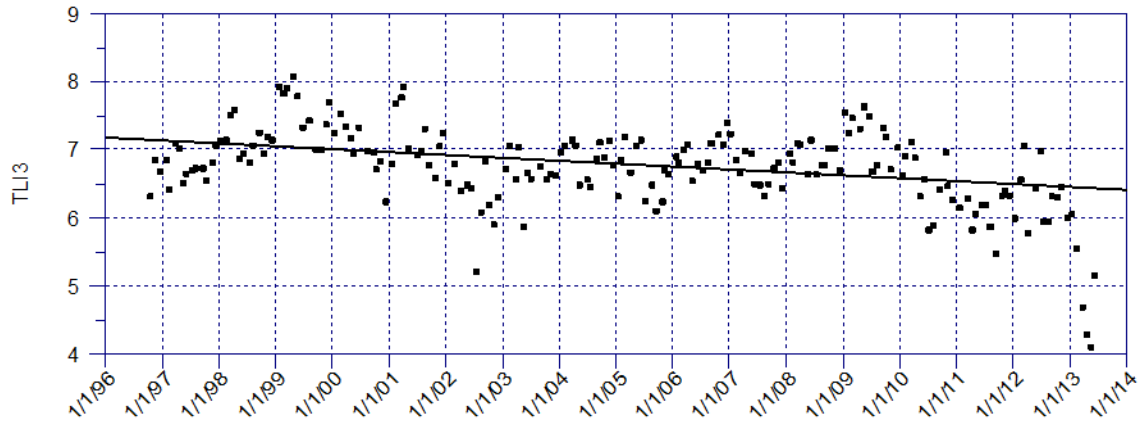


- Averaged across 4 lake sites and 12 monthly samples

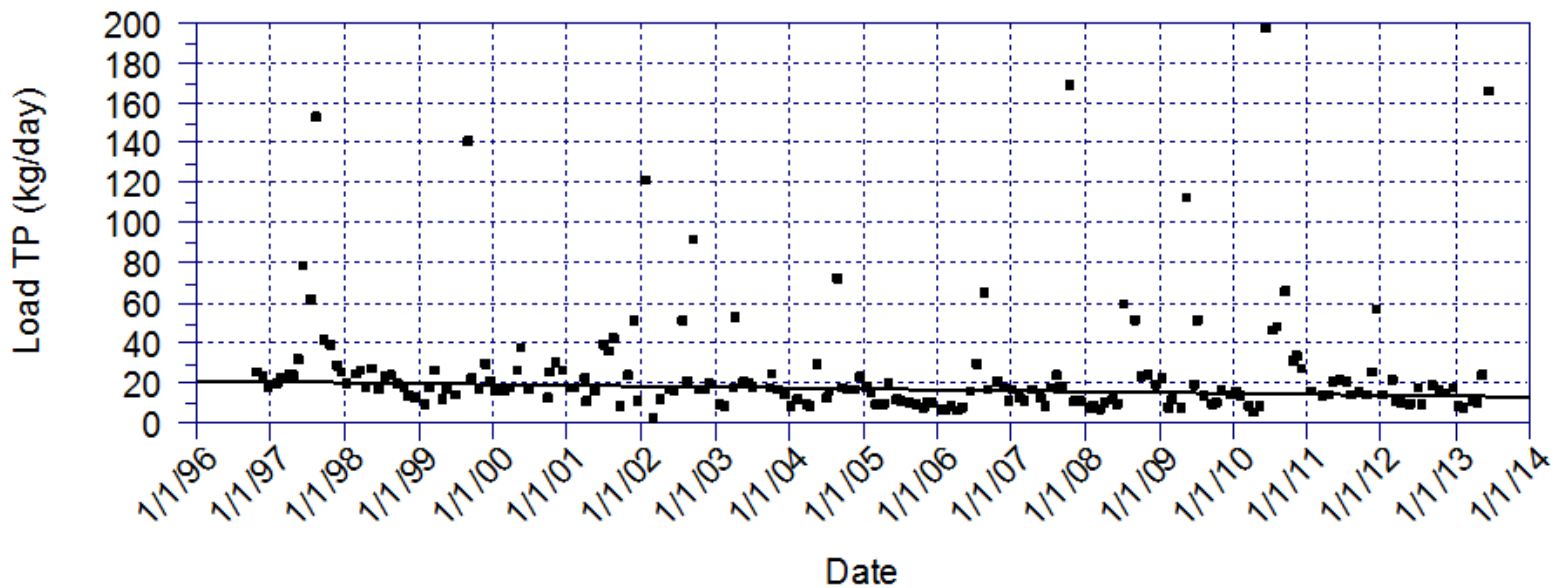
## Te Waihora/Lake Ellesmere TLI



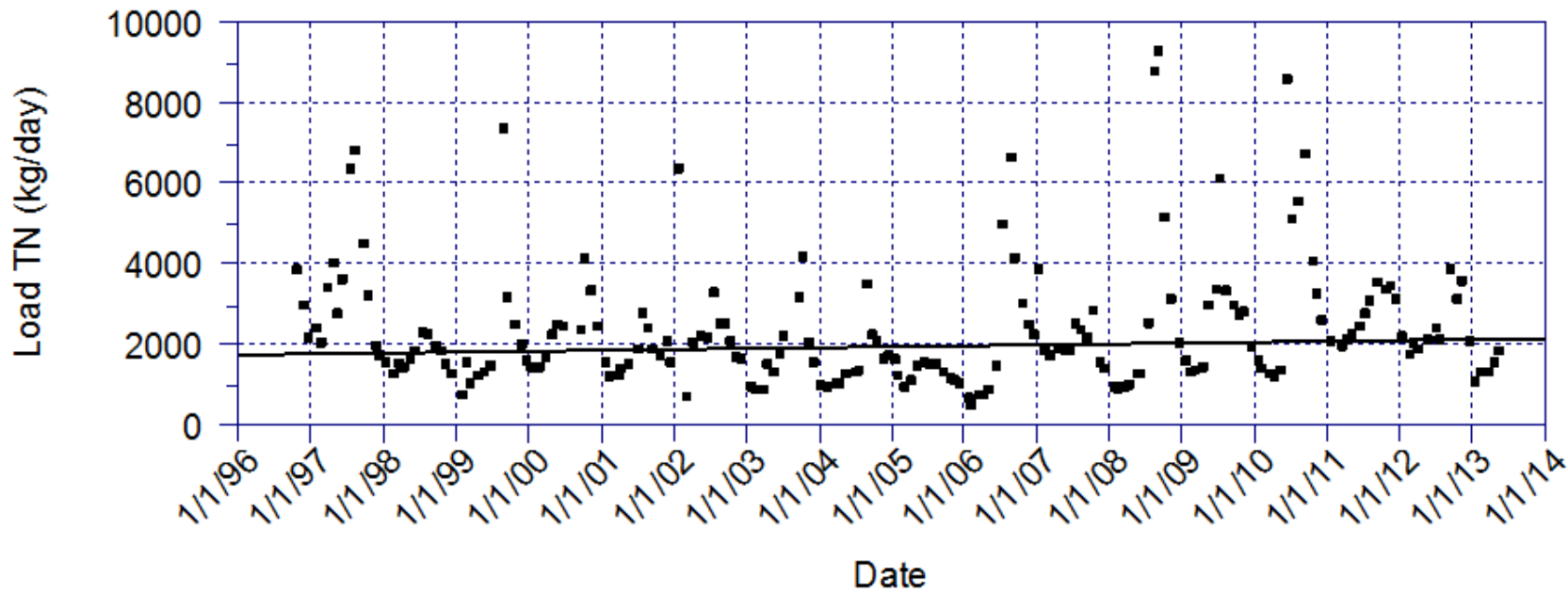
- Averaged across 4 lake sites
- Lake opening last summer caused dramatic drop
  - Chlorophyll-a lower and lake extremely saline
- Decline in TLI over length of record



Sen slope trend for Trib tot load TP (kg/day)



Sen slope trend for Trib tot load TN (kg/day)

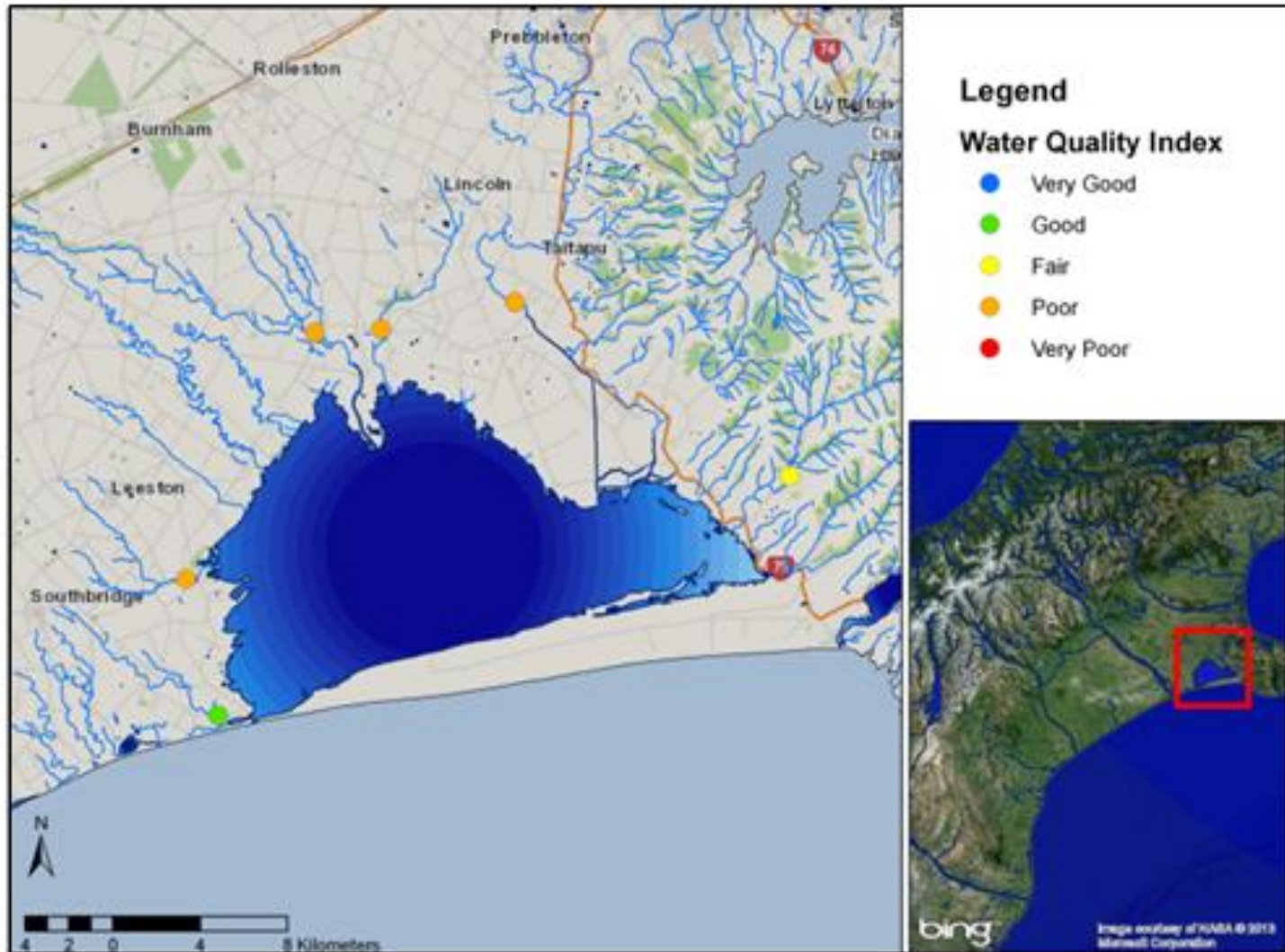


# Trophic level summary

- TLI showing decrease
  - TN, TP & Chl-a decrease
- Incoming nitrogen **increase** in load
- Incoming phosphorus **decrease** in load

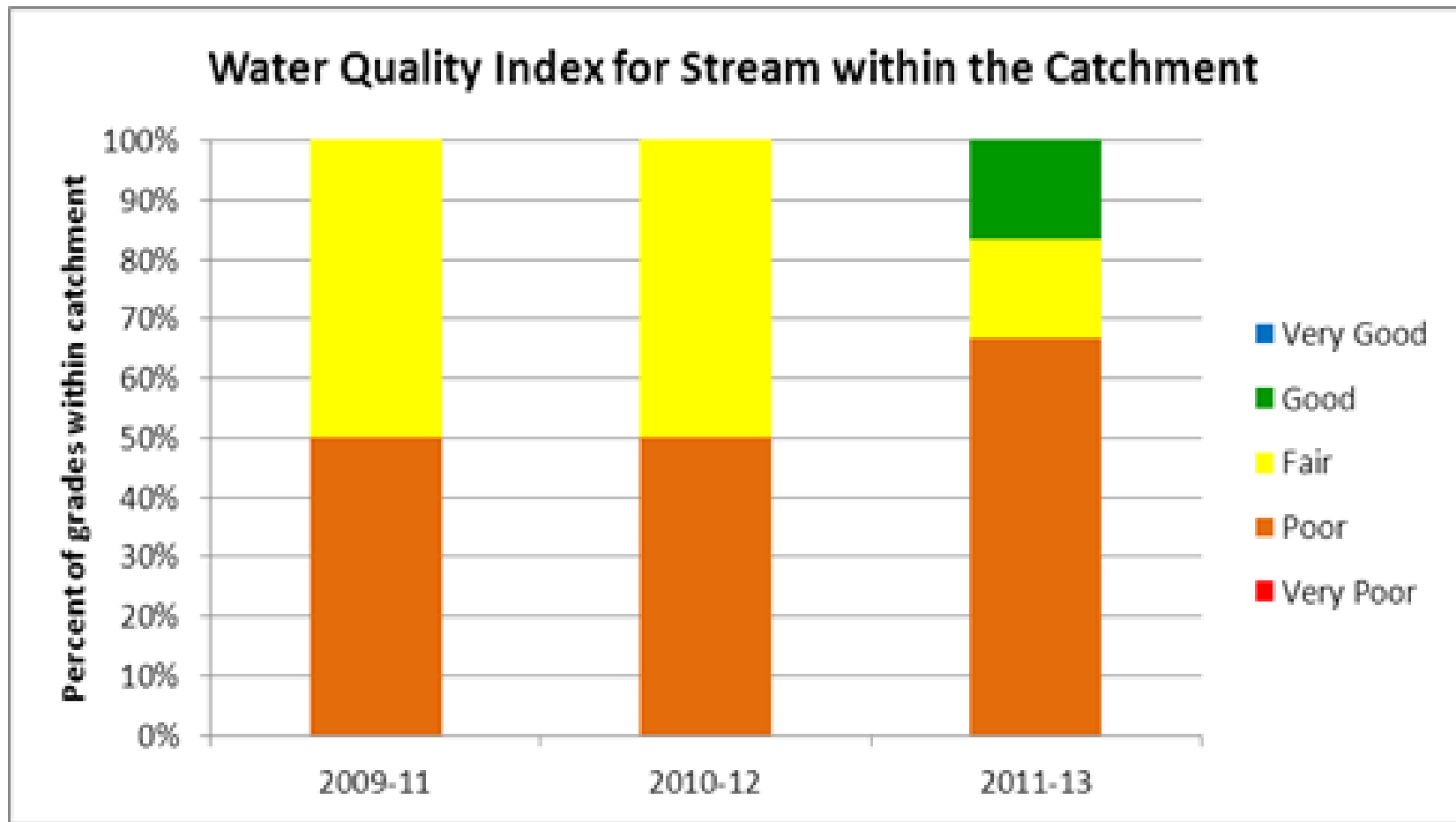


# Water quality of tributaries



- Latest water quality results presented as an index

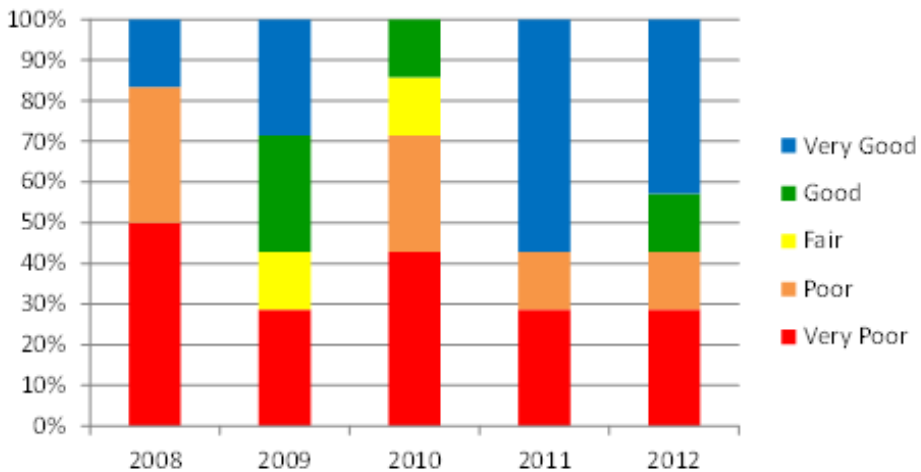
# Water quality of tributaries



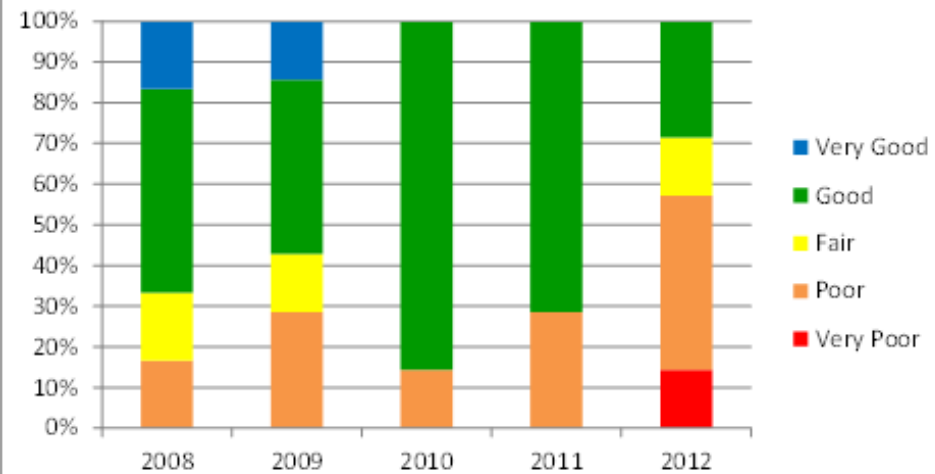
- Water quality index on 3 years of data

# Ecosystem health of tributaries

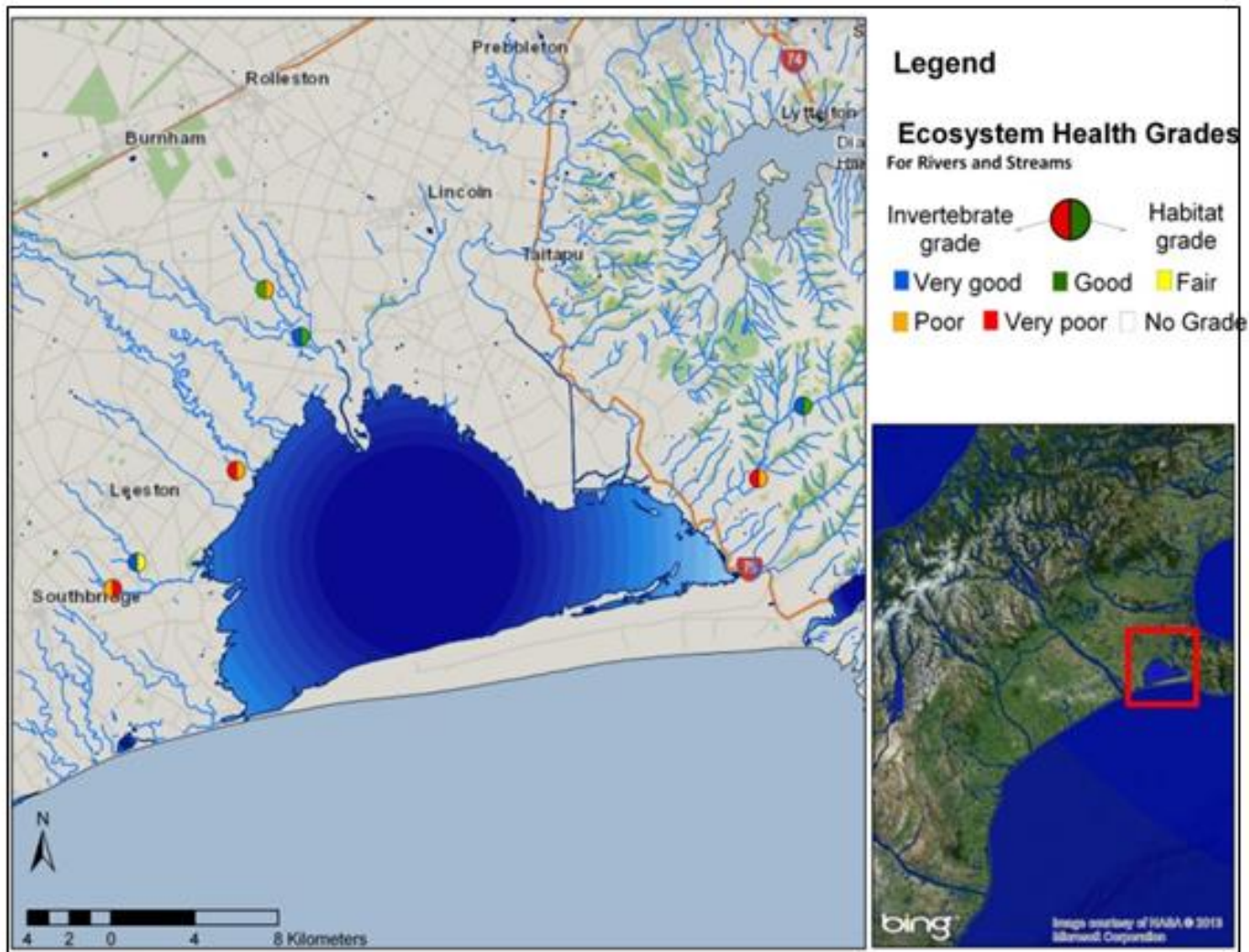
## Invertebrate Grades in the Catchment Streams



## Habitat Grades in the Catchment Streams

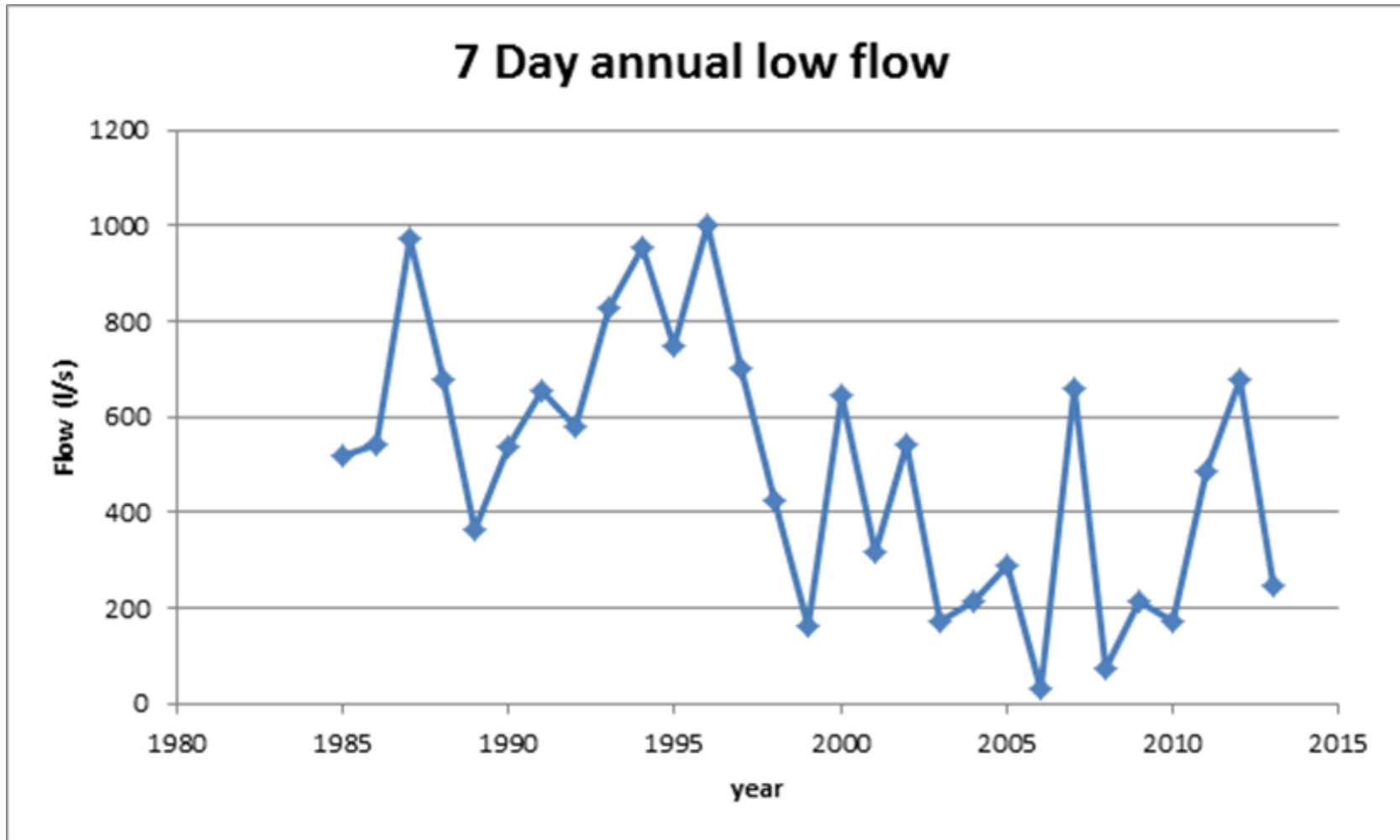


# Ecosystem health of tributaries



- LHS invertebrate score
- RHS habitat score

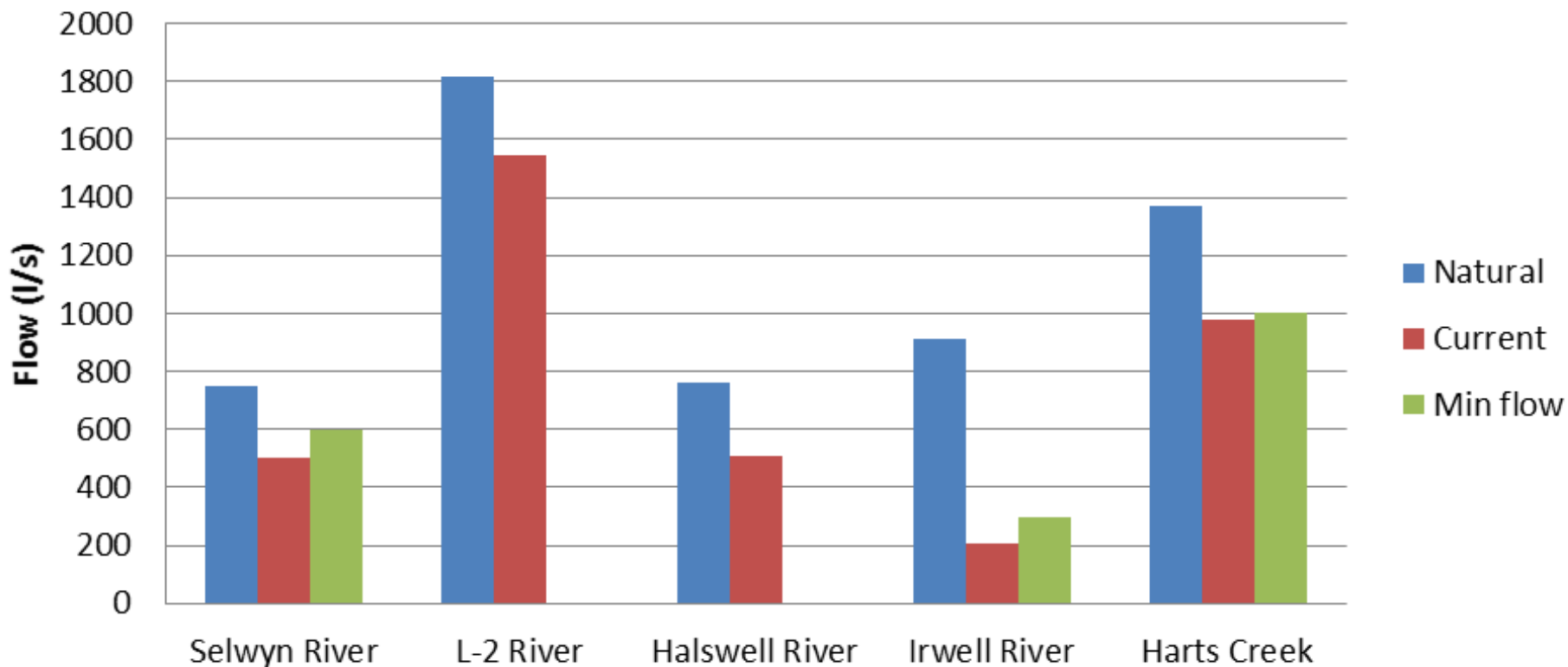
# Ecosystem health of tributaries



- Where habitat good but invertebrates poor then need to look at an outside influence (e.g. water quality, low flows)

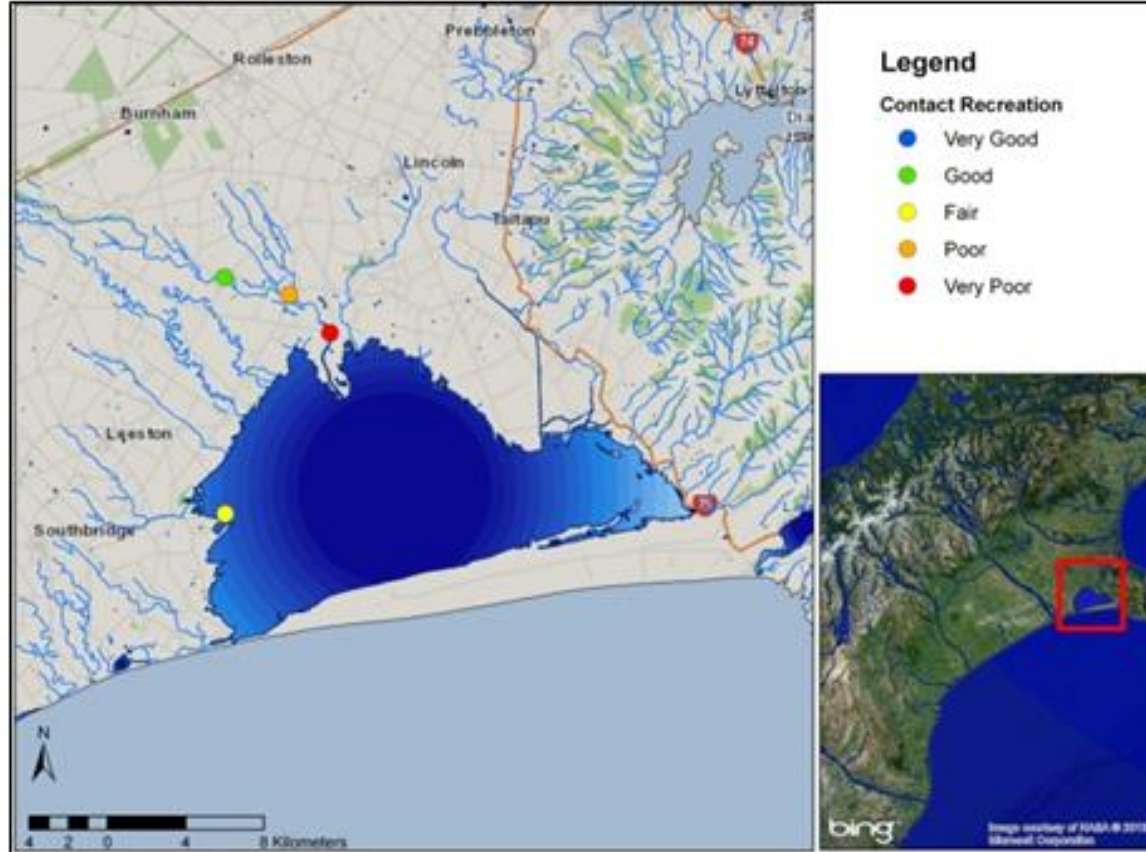
# Ecosystem health of tributaries

## 7 day mean annual low flow



- Work done for sub-regional plan highlights the cumulative impact of groundwater extraction in catchment

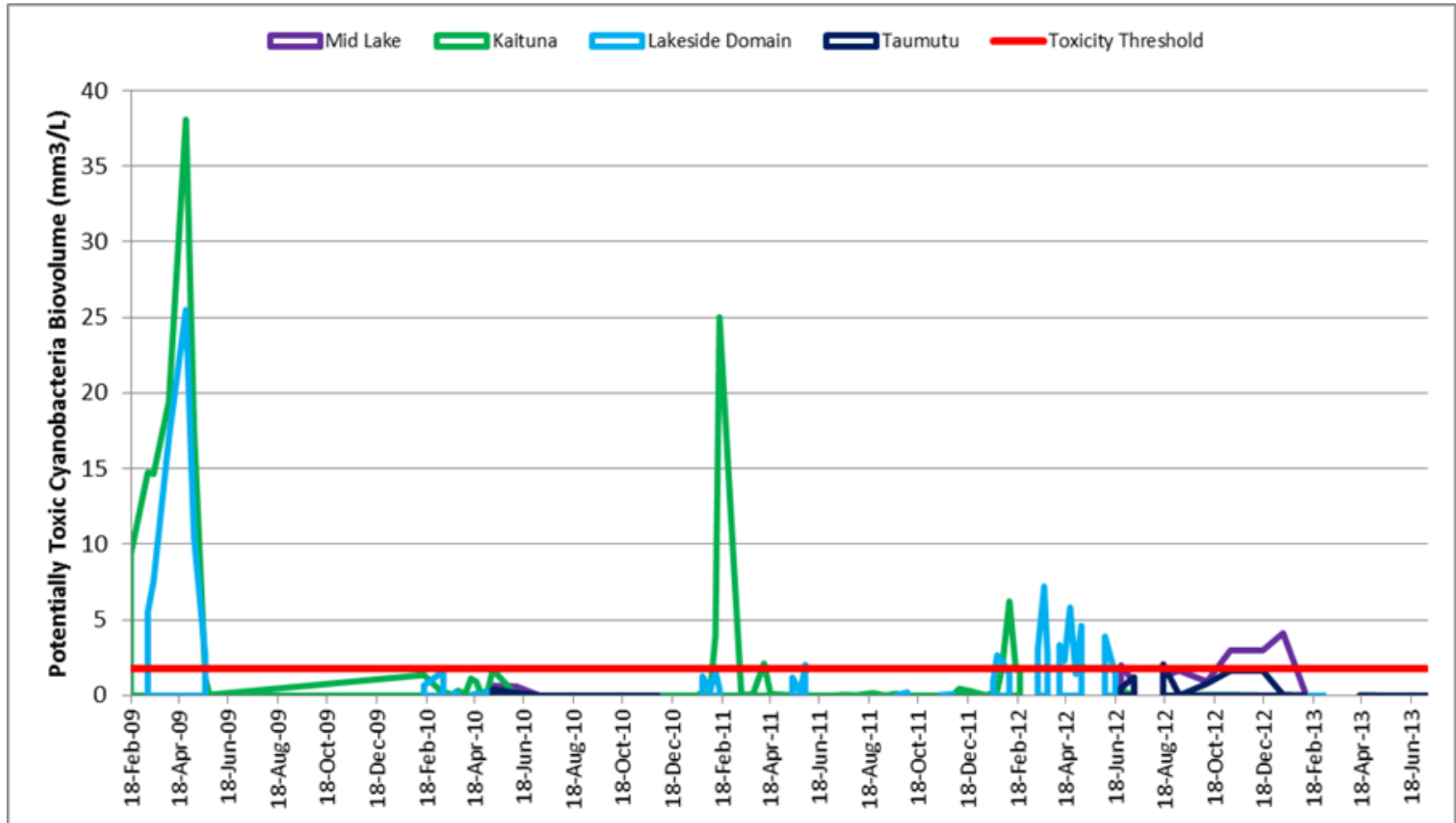
# Contact recreation monitoring



- Coes Ford
  - Main summer months OK
  - Investigation has highlighted Silverstream as major faecal source
  - Work being done on riparian improvement in Silverstream

	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Te Waihora/Lake Ellesmere	Poor	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Fair
Waikirikiri/Selwyn River - Chamberlains Ford	Good*	Good	Good	Good	Good	Fair	Good	Good	Good	Good
Waikirikiri/Selwyn River - Coes Ford	Poor*	Fair*	Poor	Very poor	Very Poor	Very Poor	Very Poor	Poor	Poor	Poor
Waikirikiri/Selwyn River - Upper Huts	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Very Poor	Very Poor	Very Poor

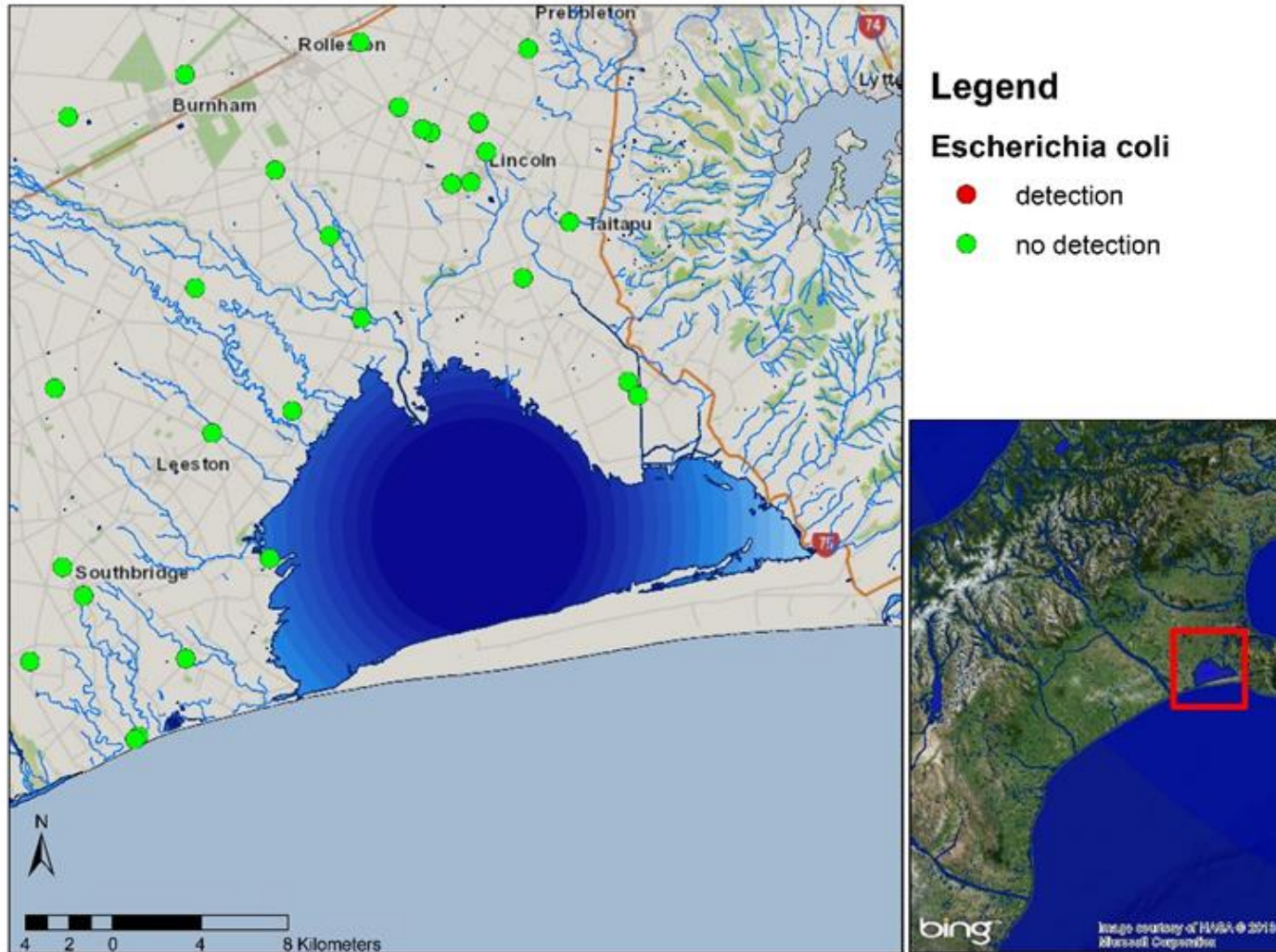
# Contact recreation monitoring



- Toxic cyanobacteria highly variable (spatially and temporally)

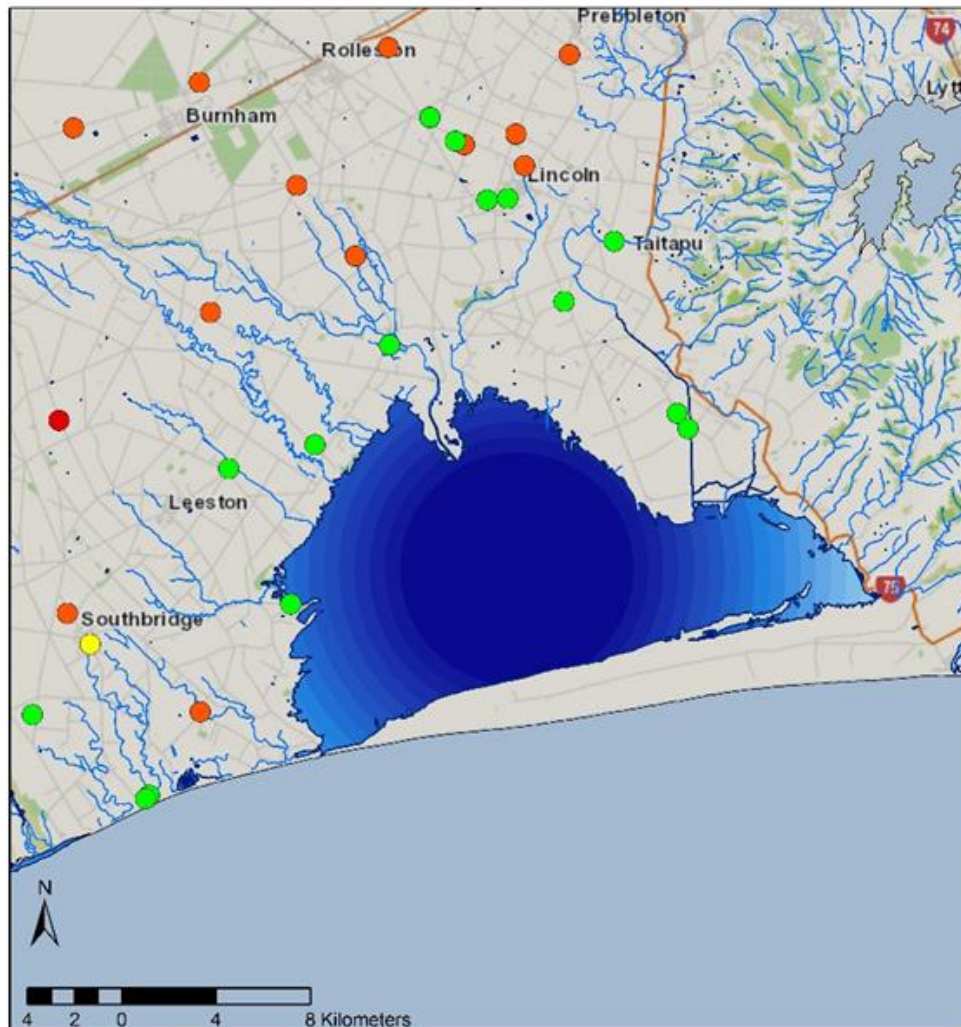


# Groundwater monitoring



- E. coli in groundwater 2012

# Groundwater monitoring



## Legend

### Nitrate Concentration

- <0.1 to 2.8 mg/L
- 2.9 to 5.6 mg/L
- 5.7 to 11.3 mg/L
- greater than 11.3 mg/L



- Nitrate concentrations lower closer to lake (deeper source of water)
- Most show no trend (apart from Tai Tapu & Leeston)

# Summary & response

- Some improvement in TLI but lake and tributaries continue to be under considerable pressure
  - Invertebrate health points to pressures of water extraction and water quality
- Responses:
  - Whakaora te Waihora
    - On the ground response
  - Land and water sub-regional plan for Selwyn-Waihora
    - Trying to address diffuse pollution and impacts of land use pressures
  - Change to WCO and new consent
    - Allow for opening regime for more values