Havelock and Beyond

water NEW ZEALAND CONFERENCE & EXPO
20–22 September 2017, Hamilton

Should'a – could'a – would'a – didn't – damn!

What choices does New Zealand have to make its drinking water safe in the wake of the Havelock North enquiry – and will the changes we make lead to safer drinking water?

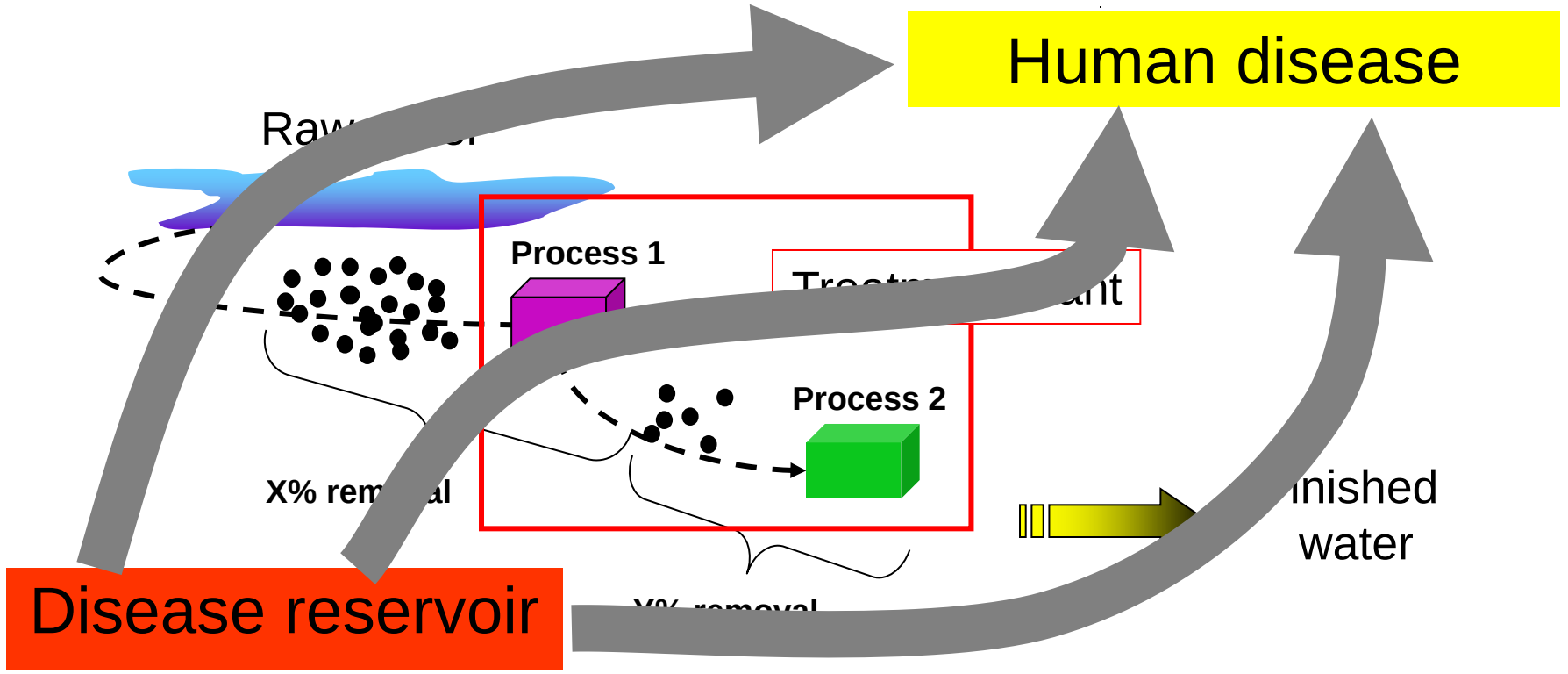
Dr. Alistair Humphrey
Canterbury Medical Officer of Health

19th September 2017

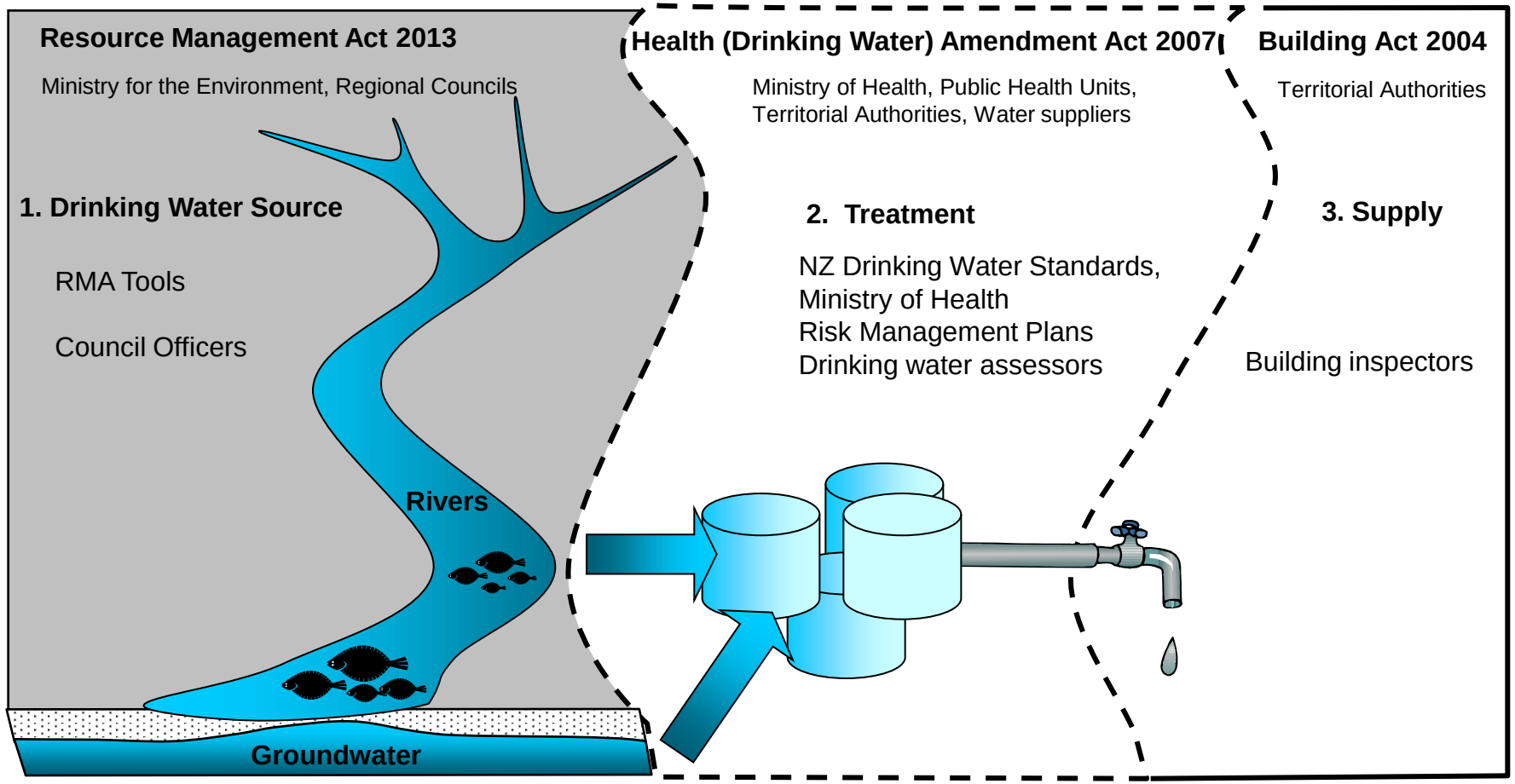
Scope of Presentation

- The Reality of the Science
- The Reality of the Bureaucracy
- The Reality of the Politics

Infection Pathway



Monitoring, compliance and the law



Collaboration

- Communicable disease
- General Practice
- DHBs and secondary care
- ESR (Science)
- Laboratories
- National Drinking-water Advice and Coordination Service (NDWACS)
- Engineers
- Ministry of Health
- Health Legal
- Regional Councils
- Territorial Authorities
- Iwi
- Primary Industry
- NGOs
- Designated Officers (enforcement)

Canterbury Water Management Strategy (CWMS)

water NEW ZEALAND CONFERENCE & EXPO
20–22 September 2017, Hamilton

MAKING BETTER USE OF CANTERBURY'S FRESH WATER

Canterbury's water resources are under pressure. Water quality is declining, particularly in lowland areas, and water supply is becoming less reliable for agriculture, cultural and recreational use.

There is a collaborative way to manage water so we can better balance environmental and economic goals - it's called the Canterbury Water Management Strategy. It's not about taking more water from our big rivers, it's about making better use of what we have.

Making better use of water has two main parts: storage and efficiency.

Storage
capturing water for economic and environmental use

- Using lakes or large storage ponds to keep water for when it is needed.
- A distribution system of existing and potential networks to move water to where it is needed, when it is needed.
- Small and mid-sized ponds to provide a reliable water supply that enables good water application practices.

Canterbury Water

Efficiency
doing more with what we have frees up water for the environment

A variety of approaches:

- Irrigation schemes are installing underground pipes to replace open water races. This reduces seepage losses and pumping costs as water can be delivered under pressure.
- The irrigation industry, through Irrigation New Zealand, is working to improve irrigation practices.

This means that water is used precisely when and where needed, and less water is lost by evaporation or leaks.

Why are storage and efficiency IMPORTANT?

Efficient use of water means that more water will be available in our rivers, streams, lakes and lagoons, as well as in our groundwater supplies.

Storage also means a reduced need to rely on groundwater and reduced demand for water from rivers when flows are low.

If there is more water in the waterways, this is a starting point for **improving water quality,** not just for farmers but for everyone across Canterbury. Improving water quality underpins all of the targets in the Canterbury Water Management Strategy.

OUR TARGETS

REGIONAL & NATIONAL ECONOMIES
Achieve a demonstrable increase in economic wealth due to improved water management for all target outcomes, measured through economic growth and employment.

DRINKING WATER
Increase the percentage of people with safe drinking water. Ensure water quality remains high where it is currently. Prevent further decline where it must currently be treated.

ECOSYSTEM HEALTH & BIODIVERSITY
Protect, restore and prevent further loss of habitats and species in all natural aquatic environments – from the mountains to the sea – ki uta ki tai.

ENVIRONMENTAL LIMITS
Set and achieve flow, catchment and nutrient limits consistent with all the target areas mentioned here.

IRRIGATED LAND AREA
Achieve a substantial increase in the reliability of water supplied for irrigation, and in the area of irrigated land which has high standards of nutrient and water use management.

NATURAL CHARACTER OF BRAIDED RIVERS
Maintain, support, enhance and protect our braided rivers and the native species and habitat along their lengths. Actively maintain floodplains. No new dams on the main stems of major alpine braided rivers.

ENERGY SECURITY & EFFICIENCY
Maintain or increase existing electricity supply to NZ. Reduce power generation demand on waterways through efficiency gains and alternate smart-power generation solutions.

WATER-USE EFFICIENCY
Achieve high levels of best-practice water use for all irrigation, stockwater and industrial/commercial use. Improve water use efficiency in urban water use.

KAITIAKITANGA
Actively involve rūnanga in water management and decision-making. Increase the community understanding of customary values and uses. Protect wahi taonga and mahinga kai waterways.

RECREATIONAL & AMENITY OPPORTUNITIES
Maintain and improve existing diversity and quality of recreational sites, opportunities and experiences.

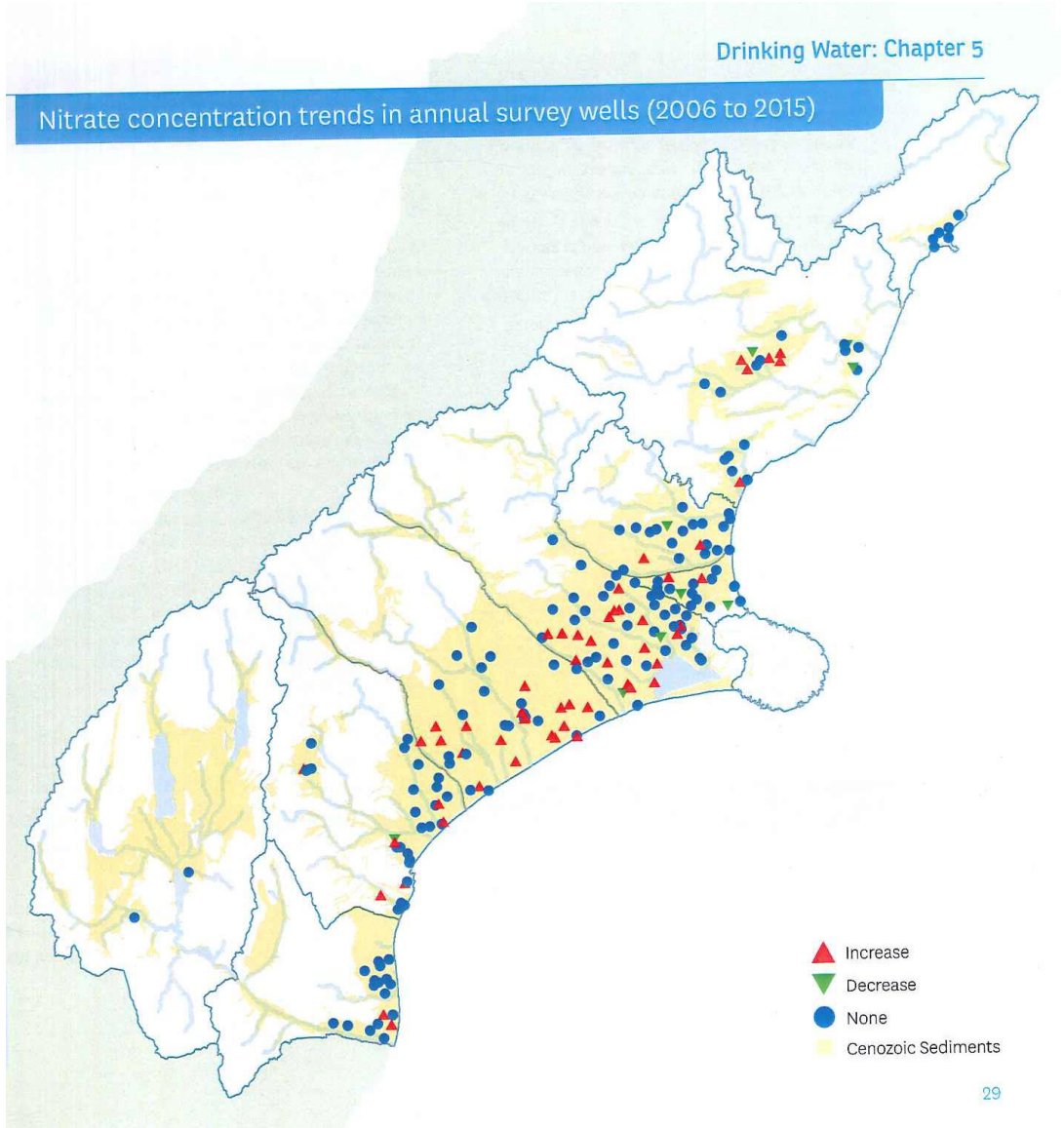
A demonstrable decrease in nitrate concentrations in shallow groundwater by 2020 (CWMS Target)

Nitrate in 2017:

9 wells (4%) showed a decrease

55 wells (25%) showed an increase

160 wells (71%) showed no decrease



CWMS: Drinking Water Targets
vs Irrigated Land Area Targets

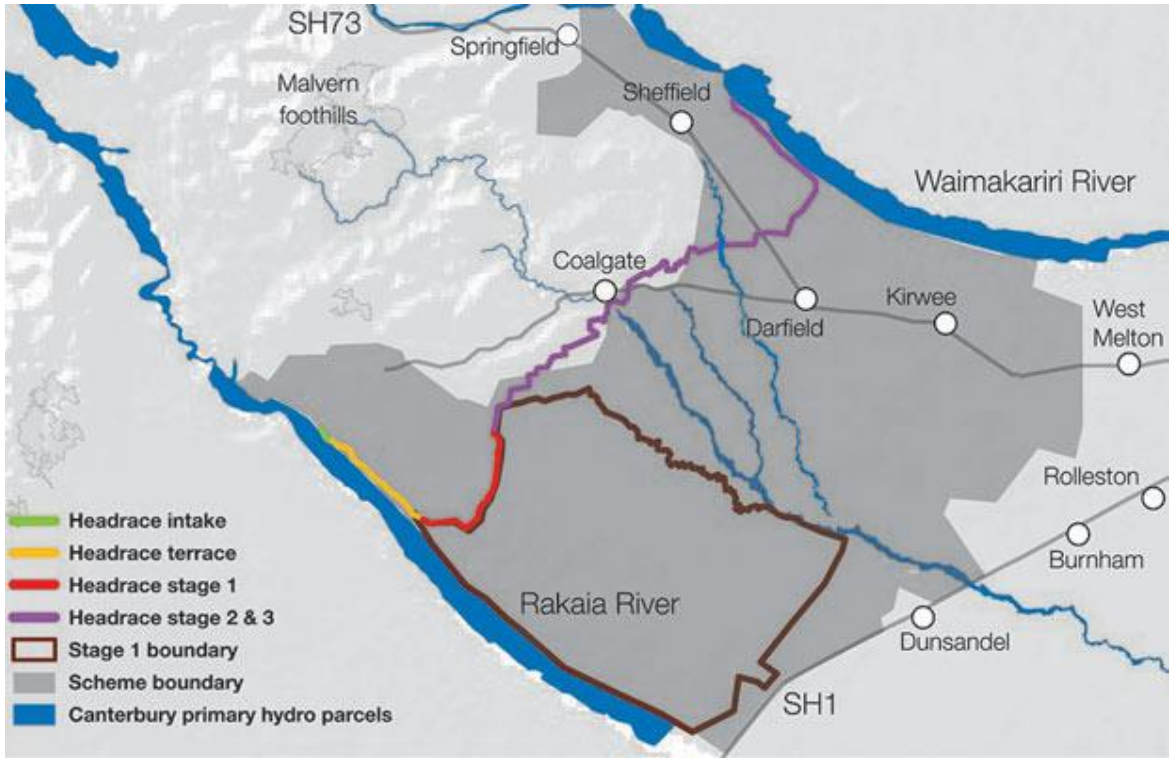
From 2015 Targets	Started	Some Progress	Good Progress	Achieved
Set catchment load limits for nitrate consistent with drinking water quality targets for each zone, identified priority areas where targets are not met and implemented actions to ensure there is no further enrichment **Comments:** Achieved for Hurunui River Catchment, scheduled for other zones. Work underway to identify priorities & implement actions to ensure no further enrichment*	✓			

From 2015 Targets	Started	Some Progress	Good Progress	Achieved
Increase the area of irrigated land and/or the reliability of irrigation. **Comments:** Information is available on consented irrigated area. Work is being progressed to increase both irrigated land area and reliability.			✓	

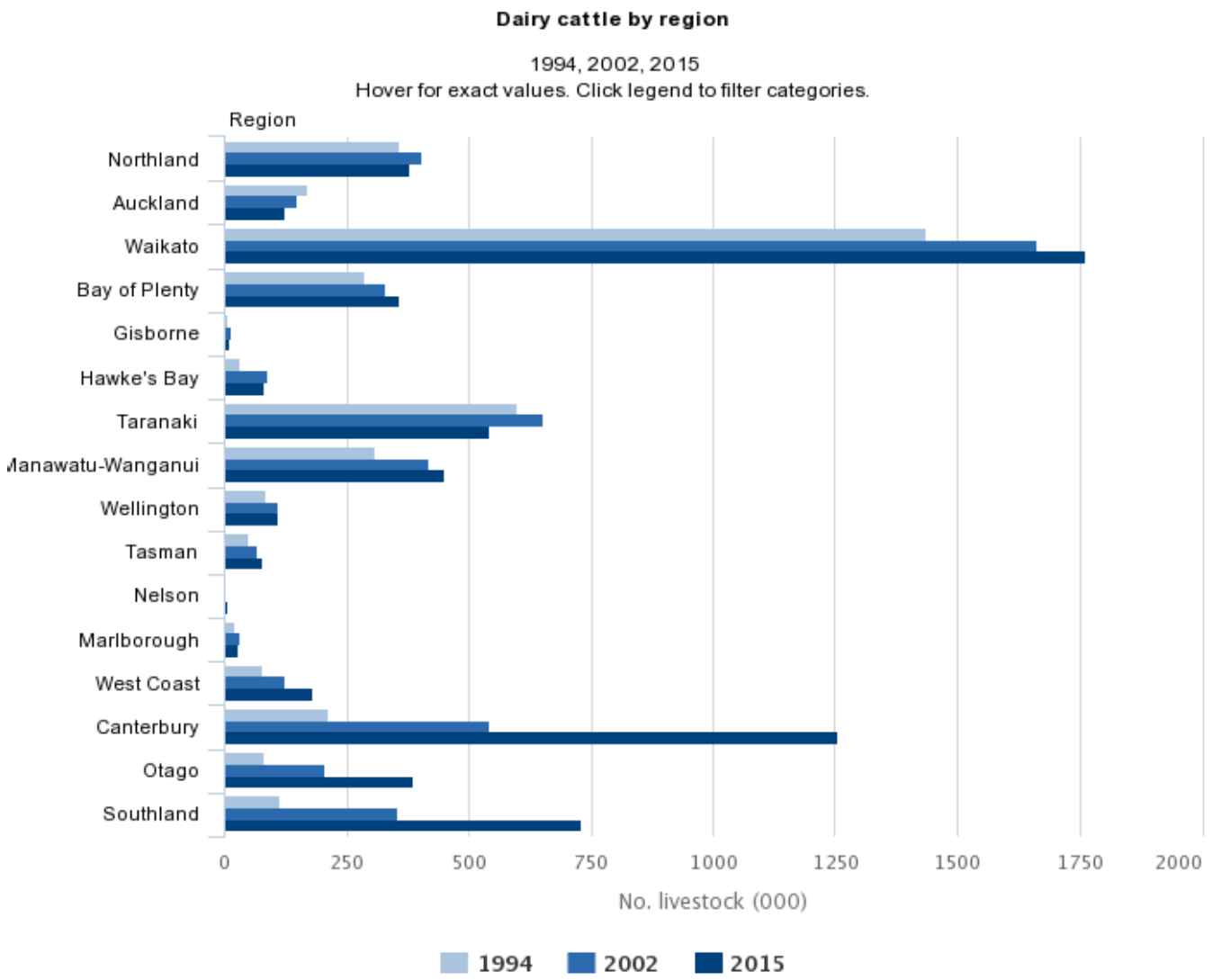
CWMS:
Irrigation Targets by 2040

- Average annual nitrate levels in all groundwater wells are below 50% of MAV for drinking water.

- 850,000 hectares of irrigated land



Growth of Dairy in NZ



Source: Statistics New Zealand

Nitrates

- Emerging issue throughout Canterbury in the 2000s
- Trend for increasing nitrate levels in ground water

Canterbury v Alberta

- 1.25m Dairy
- 505,461 Beef
- **45,346 km²**

- 76,000 Dairy
- 1.5m Beef
- **661,848 km²**

Parliamentary Commissioner for the Environment
Water quality in New Zealand (2013):
Land use change and nutrient pollution

Declining water quality is attributed to dairy farming:

1. Intensification:
   More cows per hectare

2. **Expansion:**
   More hectares for cows

Dr. Jan Wright – Parliamentary Commissioner for the Environment

http://www.parliament.nz/en-nz/parl-support/research-papers/00PLEcoC51261/freshwater-quality-in-new-zealand

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Freshwater quality in New Zealand

Freshwater quality in our lakes and rivers is a subject of high public concern and vigorous debate. There are three main water pollutants of greatest concern in New Zealand. These are pathogens, sediment, and nutrients (Parliamentary Commissioner for the Environment). Pathogens are invisible microbes that cause disease. Typical sources are raw and partially treated sewage entering lakes and rivers (usually at specific points); another source is the diffuse entry of faecal coliforms from farm animal excrement leaching into waterways. Soil erosion, particularly along river banks, causes sediment. Phosphorus and nitrogen, primarily from animal urine and fertilisers, are the main sources of nutrient pollution.

In 1991 the "sustainable management" of fresh water was assigned to the regional councils under the Resource Management Act 1991. End-of-pipe (or point) sources of water pollution, which require resource consents, became increasingly controlled and much has been invested in upgrading wastewater treatment. Today diffuse sources of water pollutants, principally from land-use practices, are a much greater challenge.

The biggest source of nitrogen in New Zealand's waterways is urine from farm animals

common forms of nitrogen—nitrate and ammonia— are highly soluble in water and easily leach into waterways. In contrast phosphorous in the form of phosphate usually clings to soil particles. The main way in which phosphorus gets into water is when soil is washed into lakes and rivers and becomes sediment.

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Contact details

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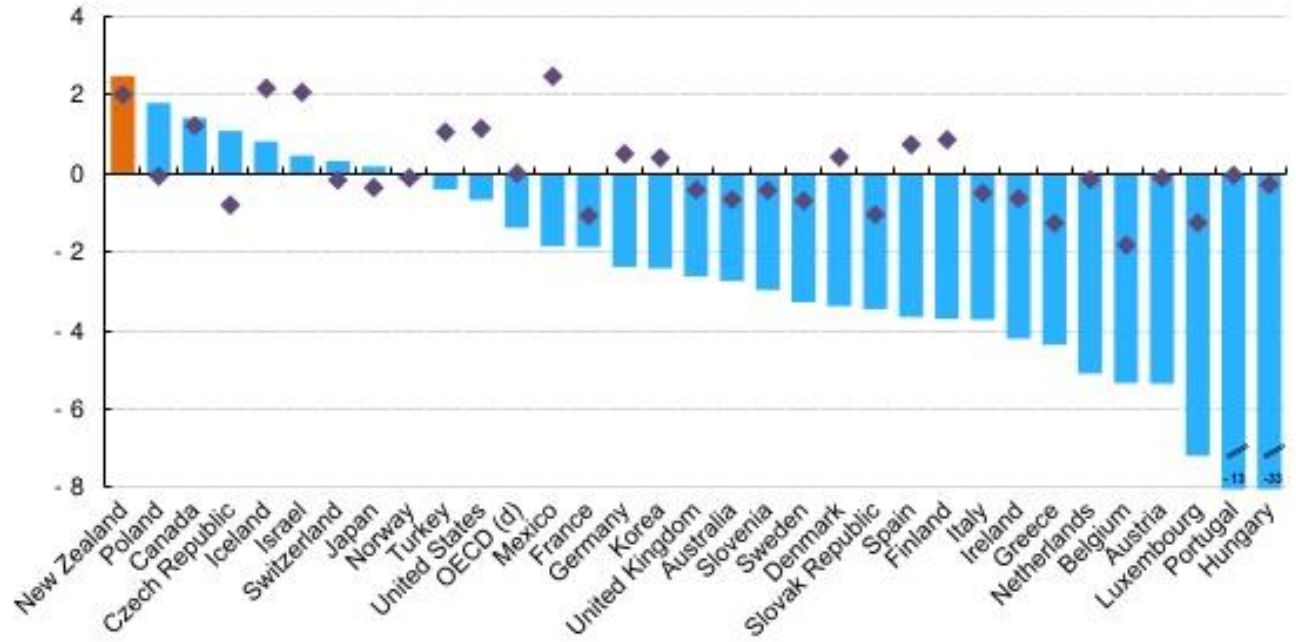
OECD Environmental Performance Reviews: New Zealand 2017

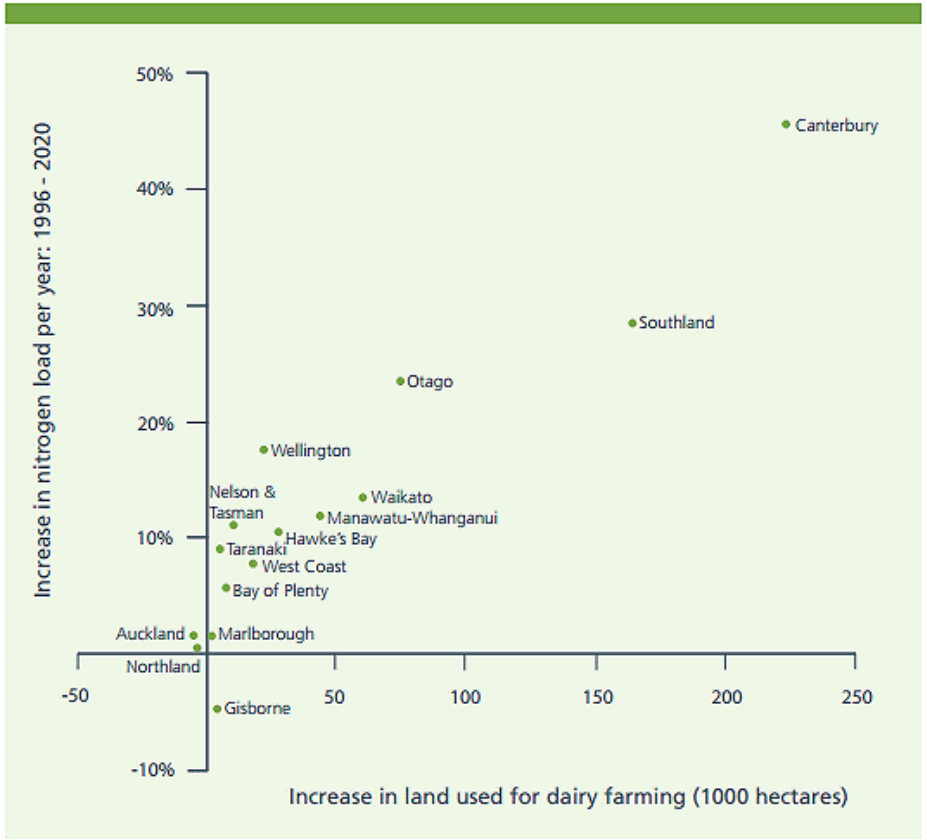
Nitrogen balance has worsened more than in any other OECD country

Changes in nitrogen balance (bars) and agricultural production (dots), 1998-2000 to 2007-09



Agricultural production: based on the sum of price-weighted quantities of different agricultural commodities produced after deductions of quantities used as seed and feed weighted in a similar manner. Index 2004-06=100. The OECD total excludes Chile, Estonia, Israel and Latvia.
Source: OECD (2013), *OECD Compendium of Agri-environmental Indicators*.

Dairy expansion 1996-2020

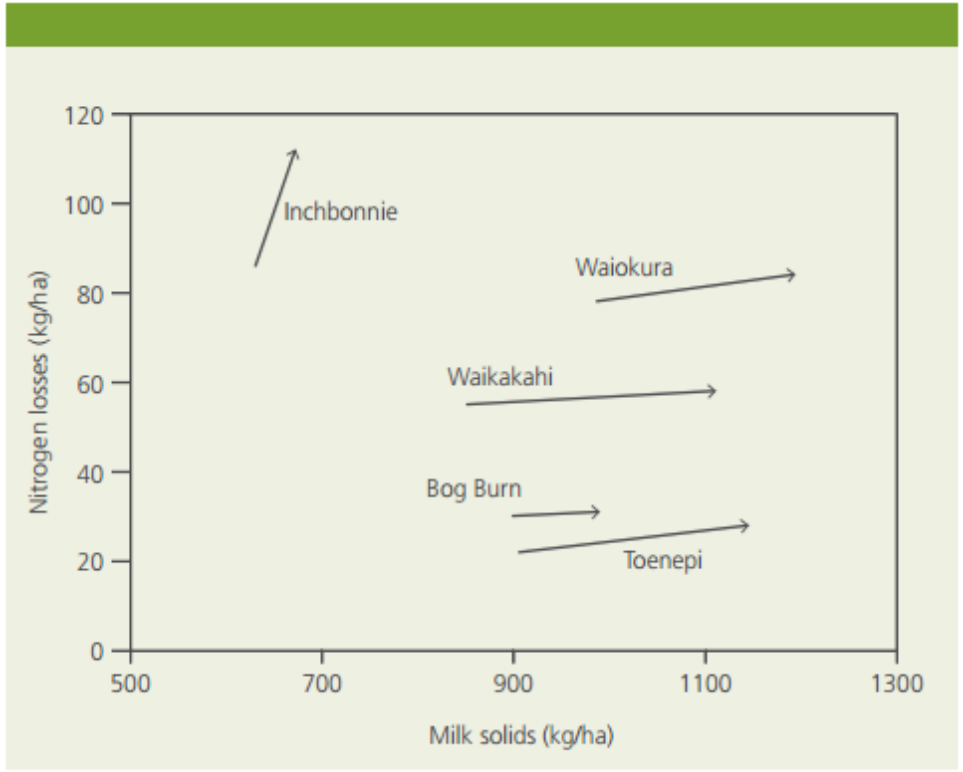


- The 2015 update report* contains new information on land use that was not available in 2013.
- It shows that the conversion of sheep/beef farms to dairy farms has continued.
- However, the predicted increase in forested land has not begun to occur.
- **This is not good news for water quality**.
- The modelling in the 2013 report is likely to have **underpredicted** the nutrients that will be lost from land into water.

* Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

Update Report
Water quality in New Zealand: Land use and nutrient pollution
June 2015

‘Standard’ mitigation was not enough to keep nitrogen losses constant, let alone reduce ther



Data source: Monaghan and De Klein, 2014

Figure 4.1. ‘Standard’ mitigation techniques on dairy farms struggle to keep nitrogen losses from rising as productivity rises.

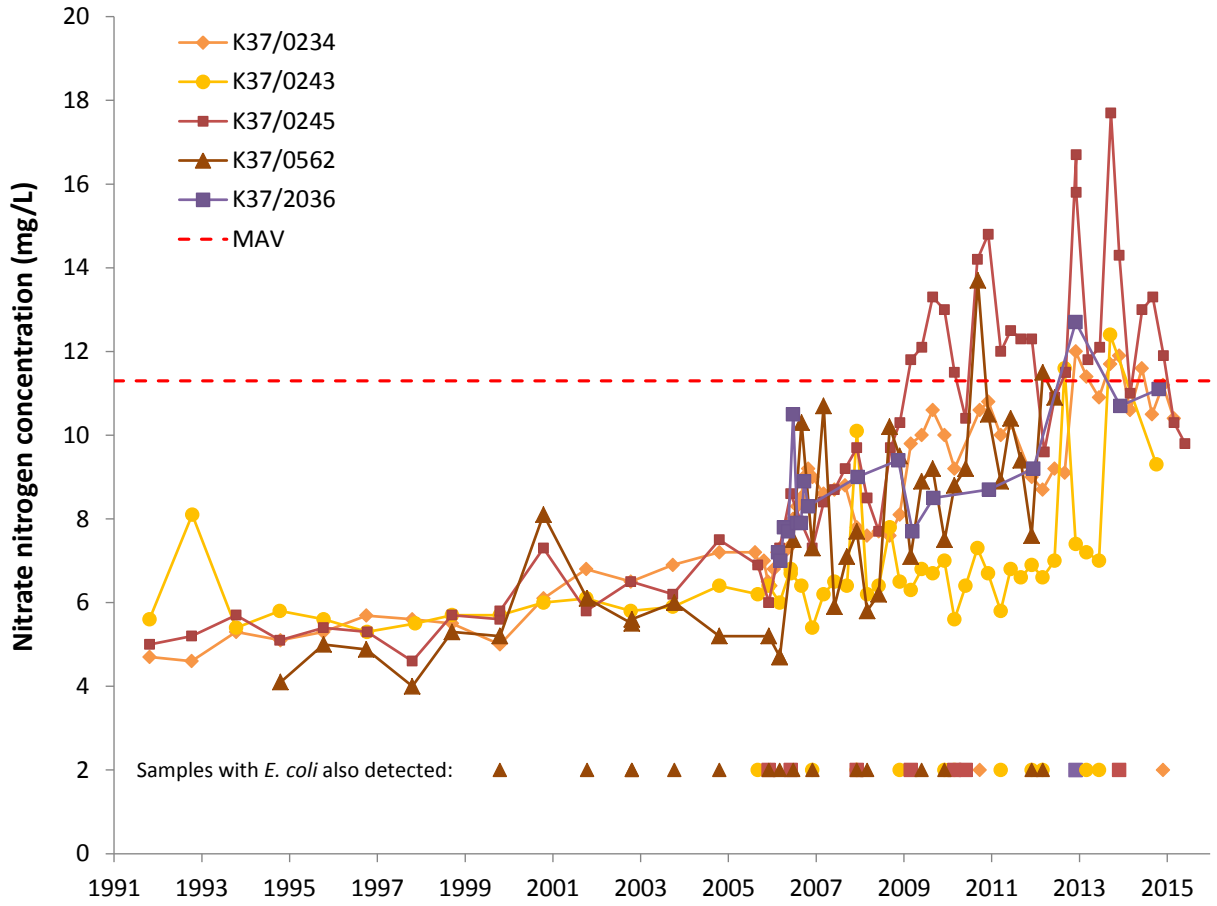
Update Report

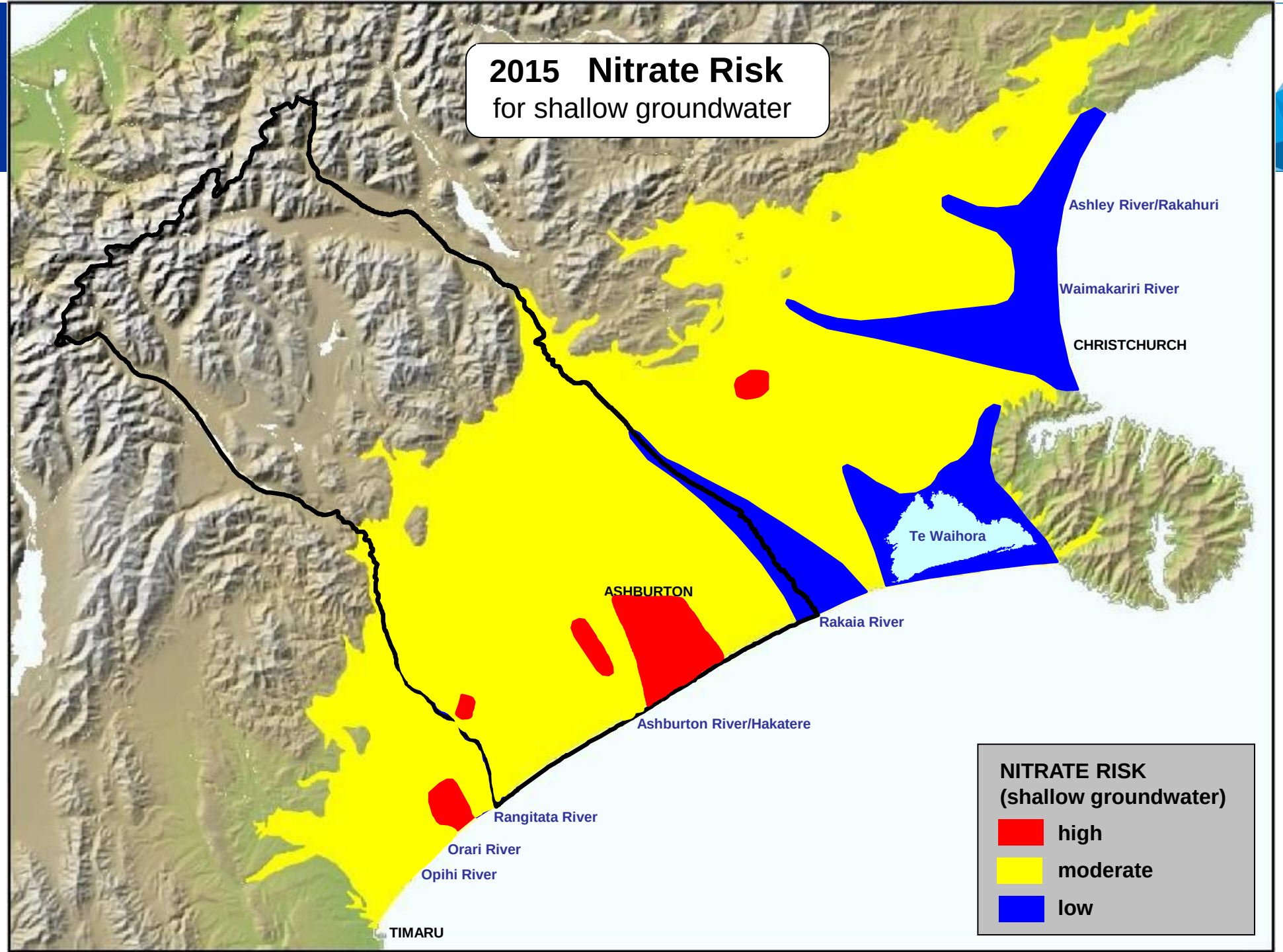
Water quality in New Zealand: Land use and nutrient pollution

June 2015

Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

Nitrate-Nitrogen in the Ealing Hinds area




2015 Nitrate Risk
for shallow groundwater
Ashley River/Rakahuri
Waimakariri River
CHRISTCHURCH
Te Waihora
ASHBURTON
Rakaia River
Ashburton River/Hakatere
Rangitata River
Orari River
Opihi River
TIMARU
NITRATE RISK
(shallow groundwater)
high
moderate
low

So what is the solution to pollution for rural Cantabrian babies?

Process for LMCs wrt drinking water and methaemoglobinaemia

- If your client is *not* on a town drinking water supply:

1. Check maps to see whether they live in a high or moderate risk zone

2. If **yes** – ensure that their drinking water supply is checked for nitrates and *e.coli (*about $50)
   - *Lists of accredited laboratories are available on the CPH website*

3. Provide leaflet for mother

Nitrate in Drinking Water: Pamphlet

water NEW ZEALAND CONFERENCE & EXPO
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Where can I get my water tested?

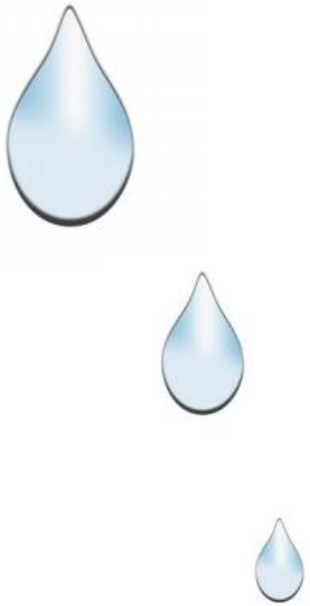
Testing for nitrate and bacterial contamination should be carried out at an approved laboratory. Community and Public Health and the Environment Canterbury website have a list of accredited laboratories that can be used for testing.

Further Information

Community and Public Health
03 364 1777
www.cph.co.nz

Environment Canterbury (ECAN)
03 353 9007
0800 324 636
(0800 EC INFO)
www.ecan.govt.nz

Nitrate maps are available from:
Community and Public Health
www.cph.co.nz



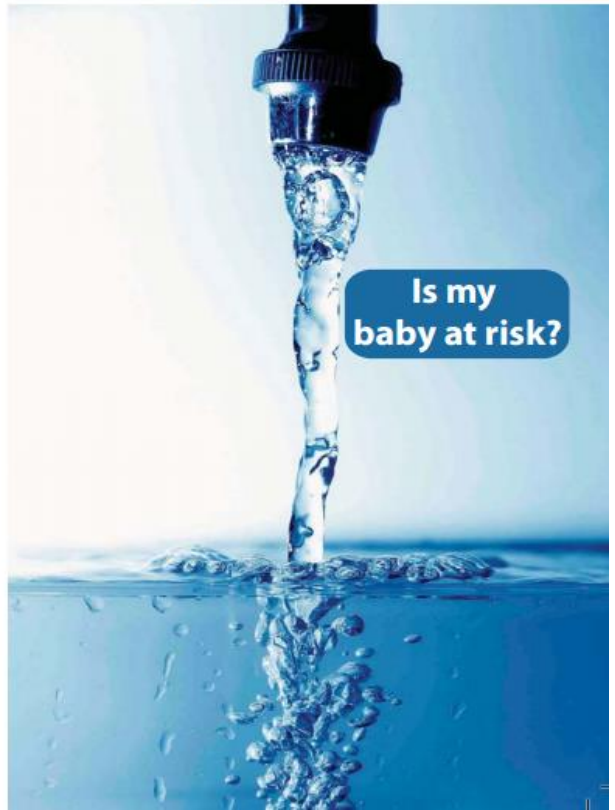
Canterbury
District Health Board
Te Poari Hauora ō Waitaha

Community and Public Health
310 Manchester Street
Christchurch
Phone: 03 364 1777
Fax: 03 3796125
www.cph.co.nz

Published September 2013

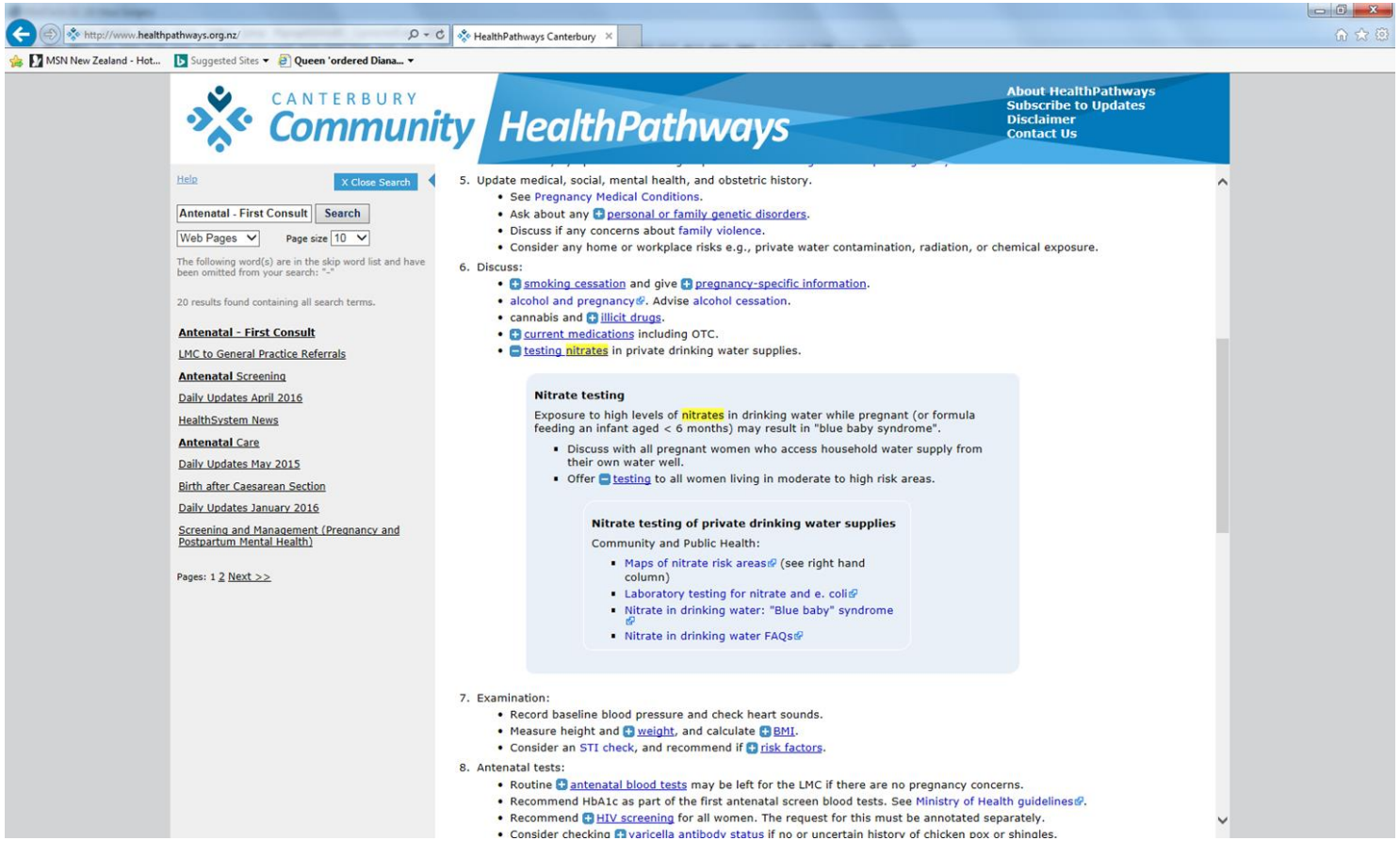
Nitrate in Drinking Water

"BLUE BABY" Syndrome



Health Pathways

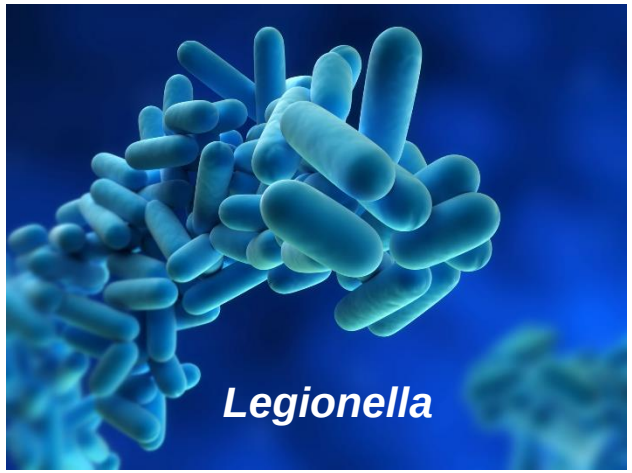
- Information now provided on health pathways for GPs and Midwives.
- Acts as a prompt for LMCs to ask questions about drinking water source.
- If on own bore, information available.

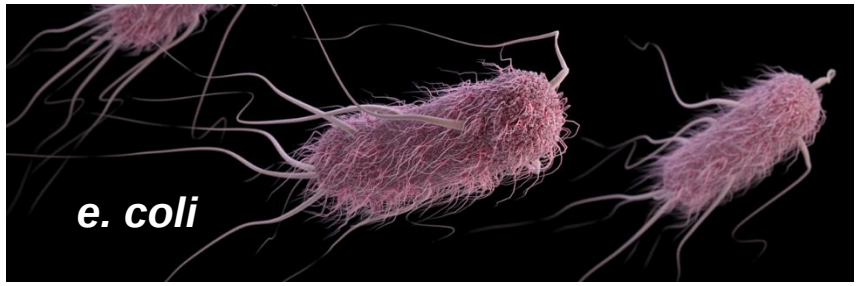


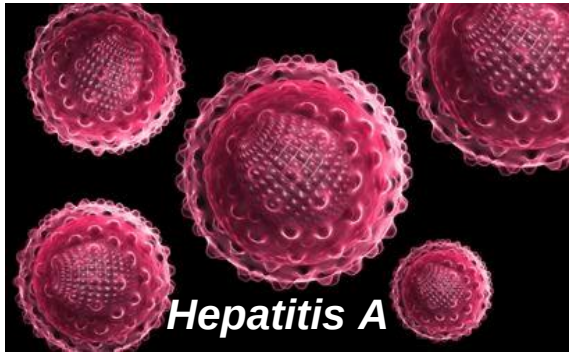
Water Testing results:

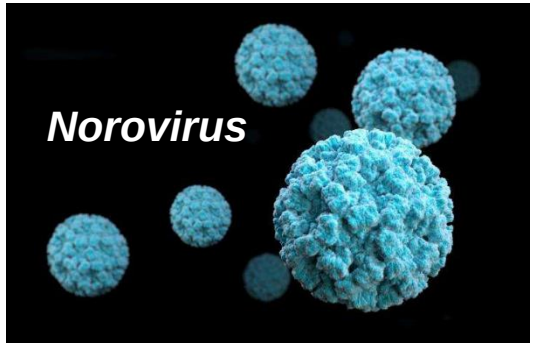
- If the level of Nitrate-Nitrogen exceeds the MAV (>11.3mg/l)…
- **Only use bottled water for making up infant formula**
- In any case – Breast is *always* Best:

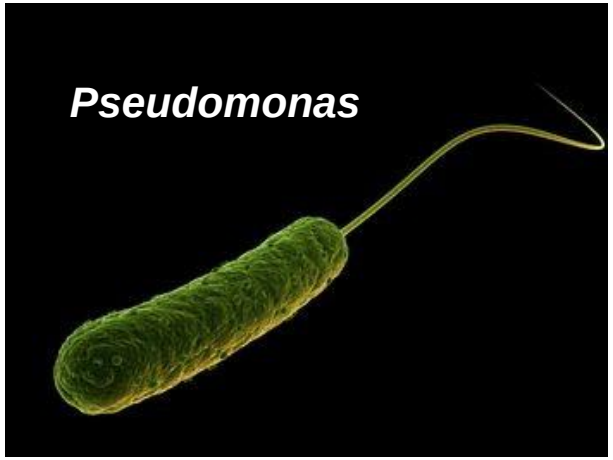
Microbial Contamination of Water

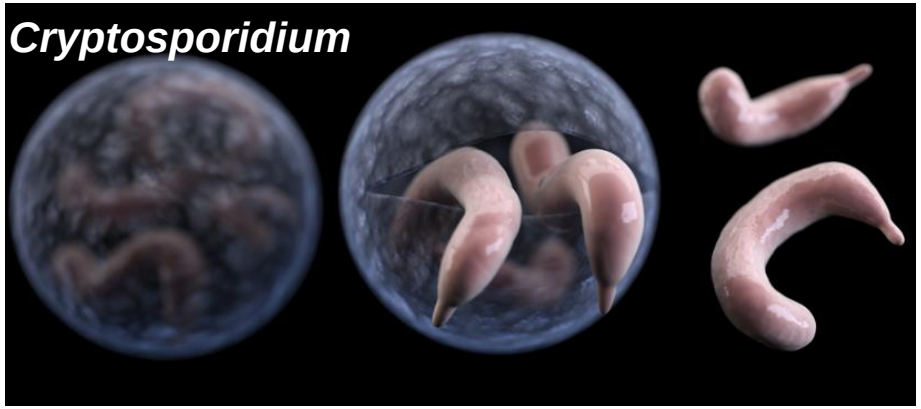


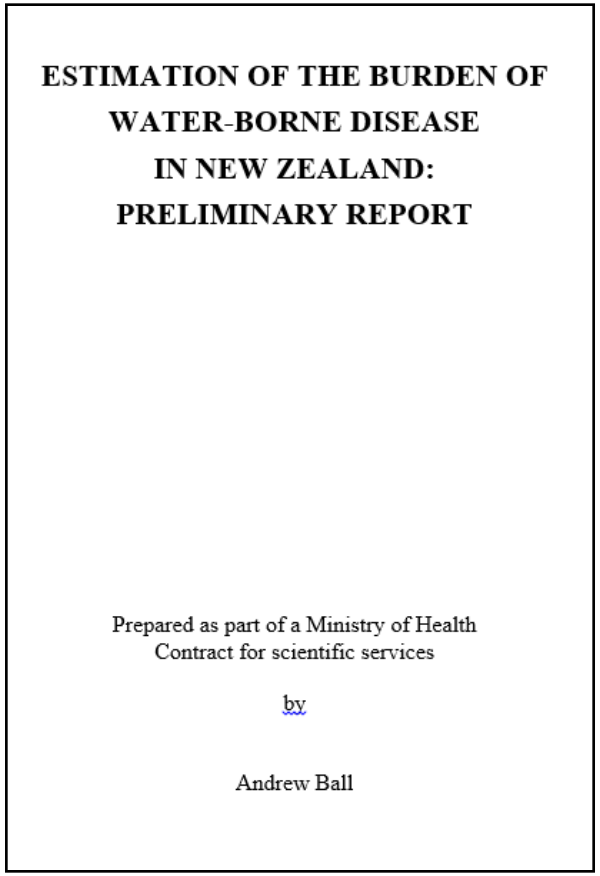












ESTIMATION OF THE BURDEN OF WATER-BORNE DISEASE IN NEW ZEALAND: PRELIMINARY REPORT

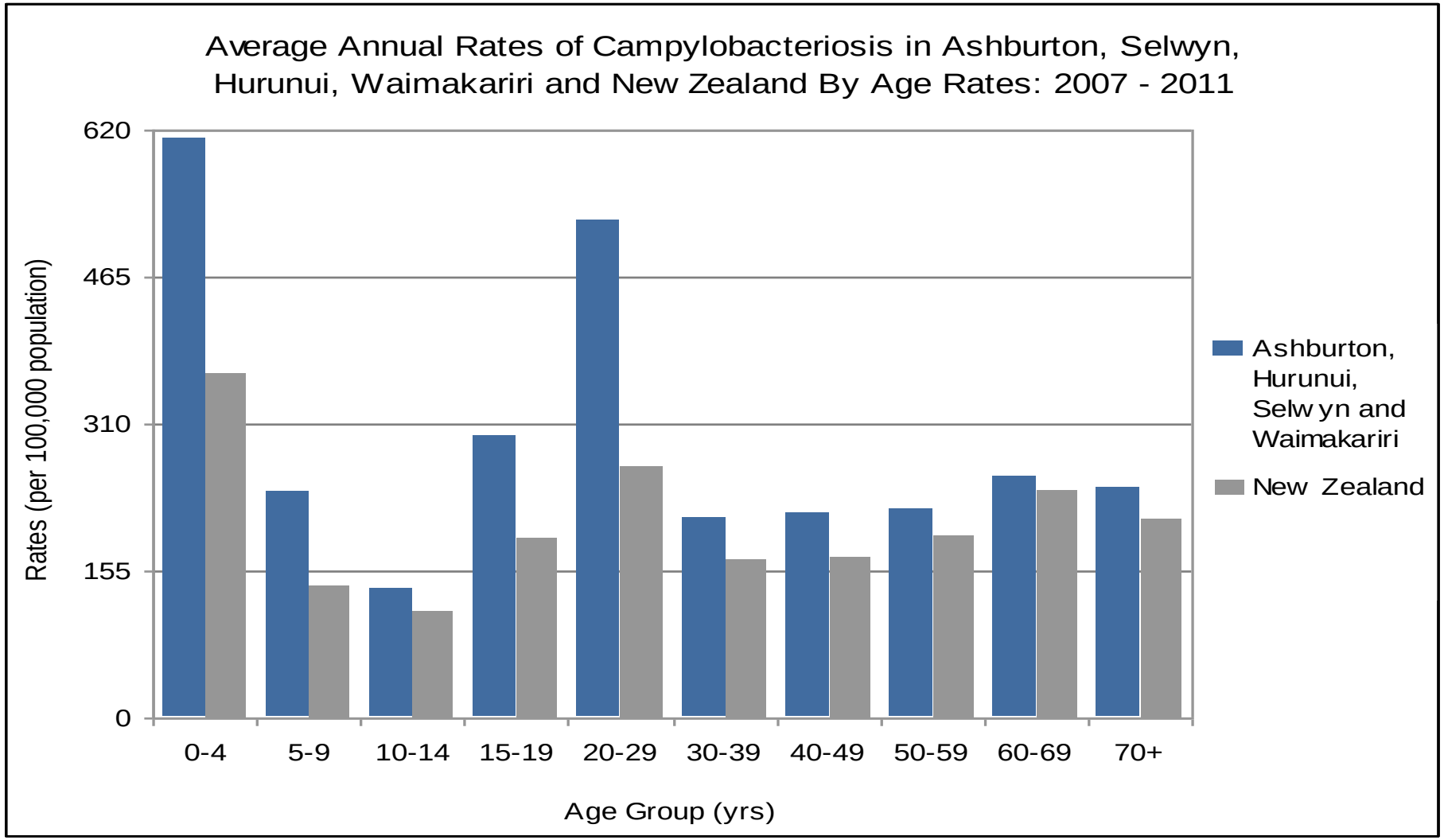
Prepared as part of a Ministry of Health Contract for scientific services

by

Andrew Ball

- 18,000 cases of *campylobacter* per year
- 34,000 cases of waterborne gastrointestinal disease per year
- Both likely to be underestimates in 2008
- Population has increased by 20% since 2000

Campylobacteriosis rates for four regions included in Regional Implementation Plan



Some Canterbury Waterborne outbreaks

- Darfield August 2012
  - 118 cases of gastro – 29 *Campylobacter*
  - Infiltration gallery water supply
  - Failure of chlorine analyser
  - Flooding

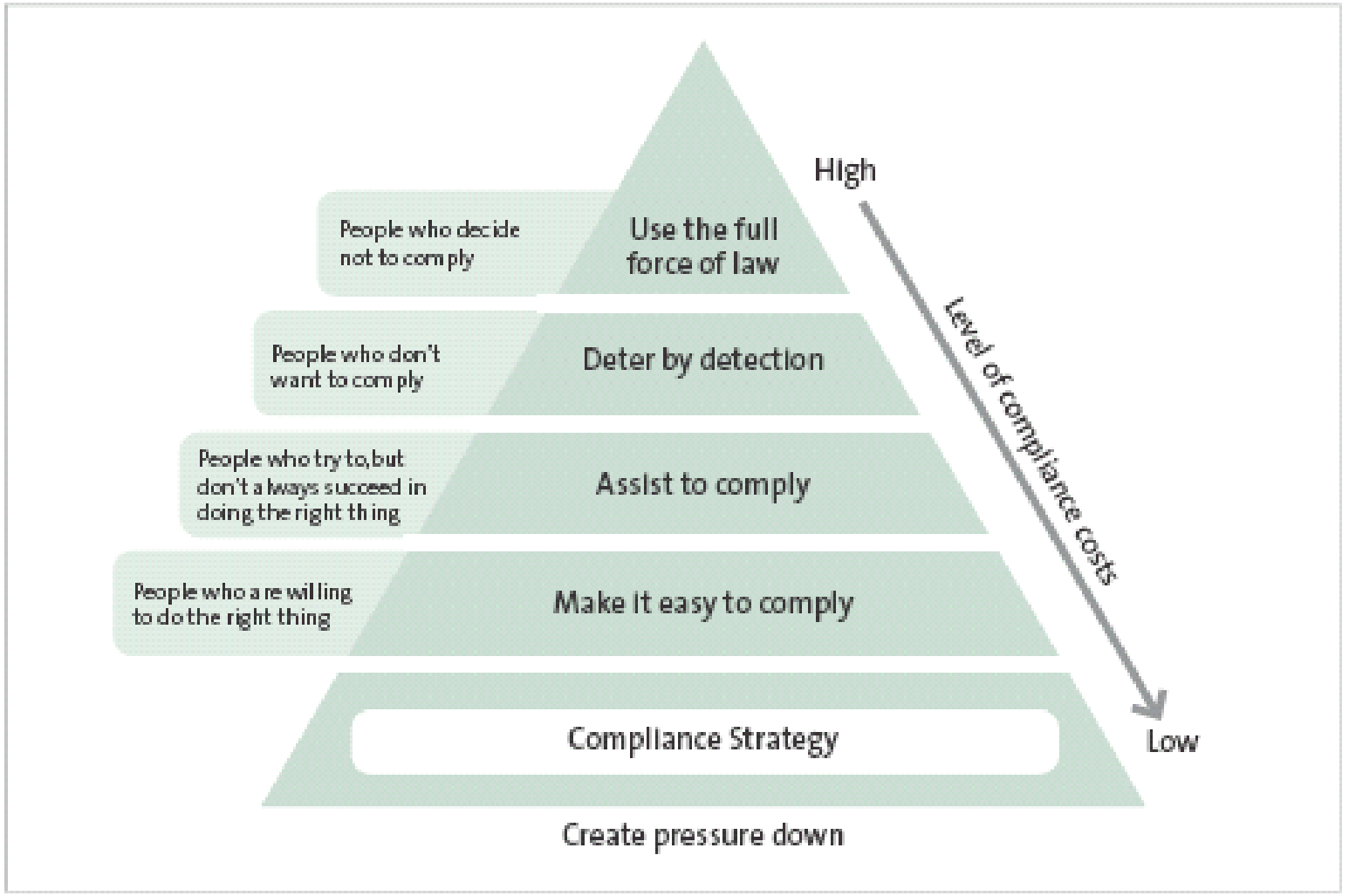
- Dunsandel November 2009
  - *E.coli* transgressions
  - Animal source
  - 70M well

- Springston February 2008
  - Nearly 50% of township affected
  - Most cases identified as *campylobacter*
  - At least one case *e.coli 0157*
  - Cracked bore with intensive farming

Health Effects of Land use intensification

- **Water quality**
- increased greenhouse gas
- loss of biodiversity and ecosystem services
- weaker rural communities
- increased risk of zoonotic disease
- increased antimicrobial resistance.

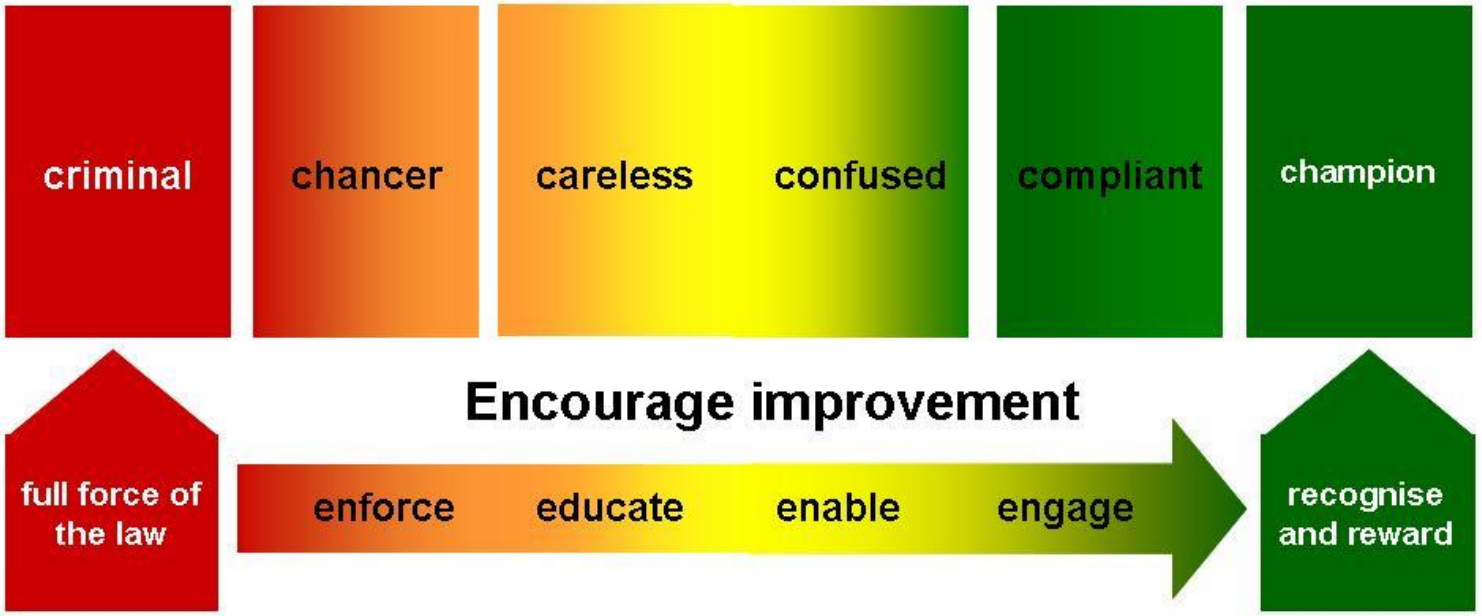
Achieving Compliance



Braithwaite Compliance Triangle - Office of the Auditor General 2007

Who does what?

Medical Officers of Health ⟸ Drinking Water Assessors



South Australian Government 2014

Speak softly and carry a big stick*

- Regulatory agencies will be able to speak more softly when they carry big sticks
- Failure to follow up low level warnings reduce the credibility of the regulator and make compliance less, not more, likely
- Pressure from industry can result in agencies taking softer measures for longer than is appropriate

*Theodore Roosevelt. In a letter to Henry L. Sprague; January 26th 1900

Regulatory Capture

- Enforcement is the first victim of pressure on regulatory agencies by powerful interests
- Regulators must retain independence
- Regulatory capture identified in:
  - Ministry for Primary Industries (Heron M 2016)
  - Regional Councils (McNeil JK 2008)

The reality of Bureaucracy

- Increasing pressure from population and farming intensification
- Aging infrastructure
- Under-resourced and under-prioritised
- A soft approach to compliance

  [eg The water safety plan does NOT have to provide a pathway to compliance]*

*Ministry of Health Environmental Health Protection Manual 8.7

Resource consent in the 21st Century

“Let them eat cake”

“Let them drink bottled water”

“[Irrigation] potentially puts bottle fed babies at greater risk,

but on the other hand

a very simple mitigation measure is available

– bottled water can be purchased or supplied.”*

*Rangitata South Irrigation Ltd Consent Decision

Moral Hazard

Multi-barrier (belt and braces) approach

↓

Treatment can mitigate poor source protection

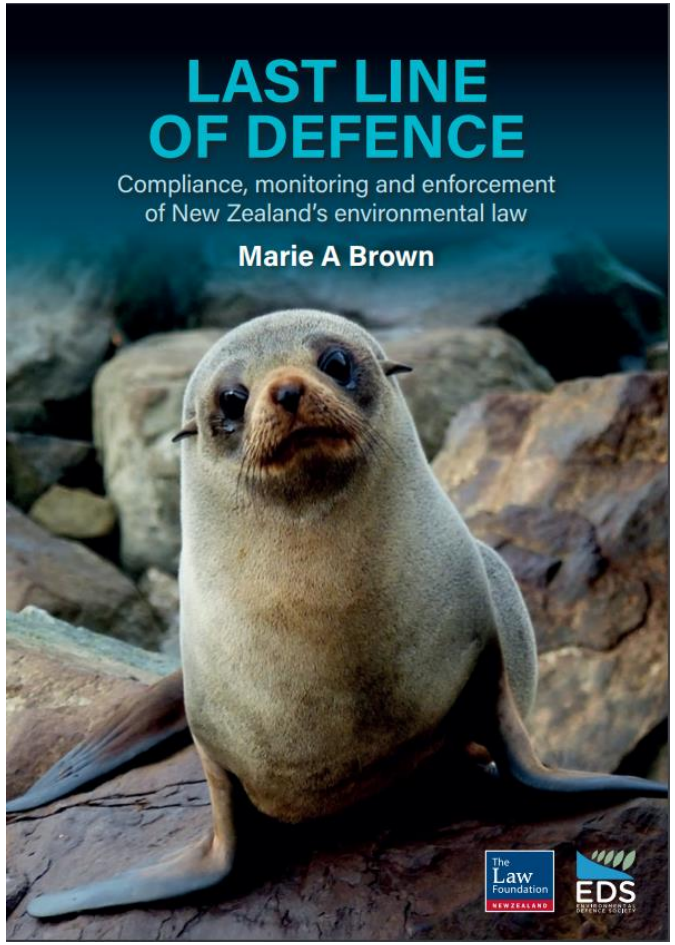
↓

Treatment is needed because of poor source protection

↓

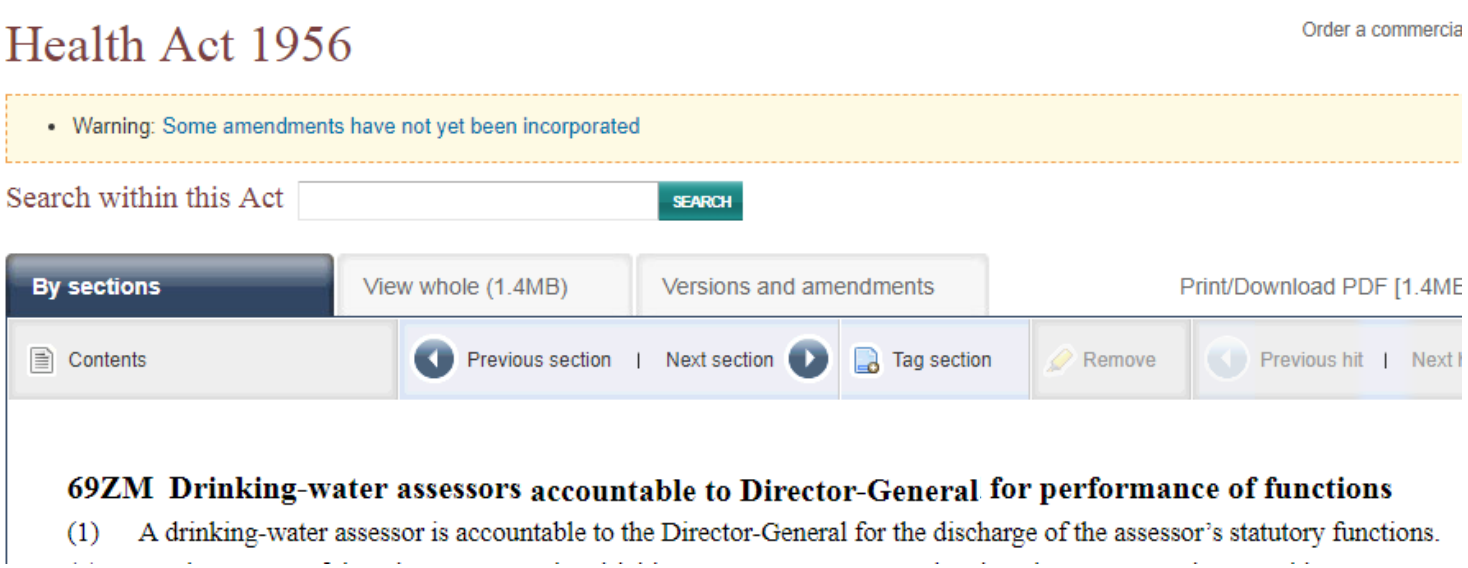
Treatment does the job

Barriers to Compliance, Monitoring and Enforcement



- Resourcing
  - There are not enough DWAs
- Politics
  - A credible regulator makes individual enforcement-related decisions based on facts
  - There is no room for politics. This is often not the case and this must urgently change
- Failure to separate governance and operations
  - Governance sets strategy and policy directions
  - Day-today decisions are not to be interfered with (see also Cabinet Manual s3.5)

Health Act 1956



Drinking Water Assessors
(wherever they are housed)

- There is a need for many more of them
- They need to be supported technically and legally by their Ministry
- Their Ministry (rather than the Minister) need a greater focus on operations (cf Cabinet Manual 3.5)
- Chief Executive's relationship with Minister is critical

A good relationship between Chief and Minister*

- The willingness to give and receive free and frank advice
- The capacity to foresee and manage risks in advance
- Trust in third party relationships formed
- The value of Parliamentary contacts of the Ministry recognised by the Minister
- The acceptance of independent professional contributions by senior staff
- Trust in appointments

*Len Cook. Framing the Debate – why the governance of the relationship between ministers and chief executives is important and what are the current issues and tensions. Presentation to the New Zealand Institution of Public Administration Wellington, March 12, 2013

Political reality

- Increasingly political appointments at a high level
- Operations subsumed by policy
  - (Departments subsumed by Ministries in the 90s)
- Ministerial involvement in operational issues
- Regulatory capture at the highest level
- Loss of independence of regulators
  - Softly-softly approach
  - Under resourcing

Conclusions

- The failure of CME exemplified by the Havelock North outbreak is widespread in NZ and not limited to drinking water, TLAs or the MoH
- The science tells us that the challenges are enormous and require a multi-agency approach
- Regulatory capture has affected CME in drinking water from the lowest levels of bureaucracy to the highest levels of government and needs to be addressed at all levels
- There is no room for politics.

With thanks

water NEW ZEALAND CONFERENCE & EXPO
20–22 September 2017, Hamilton

- Judy Williamson
- Kirsty MacLeod
- Denise Tully
- Prof. Mark Francis
- Marie Brown