

Submission on PC7 – Protection of Christchurch's drinking water supply



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Threat to Christchurch's drinking water supply



- From farming on plains north of Waimakariri River (interzone transfer source area in NPA)
- Likely also from areas elsewhere in catchment
- Very large increase in nitrate concentrations in deep groundwater (and other) aquifers supplying our drinking water
- Comprehensive groundwater modelling exposes the situation
- Increase will take years for 'load to come' and to reach full 'steady state' concentrations

Nitrate-N concentration (mg NO₃⁻-N/L) statistics for Christchurch groundwater



Depth range	Median	Mean	95 th percentile	Maximum
< 30 m	2.5	3.4	7.6	27
30 – 80 m	2.4	2.3	6.1	7.3
> 80 m	0.3	0.6	1.6	2.6

Comparison of modelled nitrate concentrations with current observed aquifer concentrations in different depth Christchurch aquifers for different farming scenarios



Aquifer/Scenario	Median (50 th percentile)		95 th percentile	
	Current concentrations	Modelled from farming in WZ [†]	Current concentrations	Modelled from farming in WZ
Shallow aquifer nitrate (mg NO₃⁻-N/L)				
A; Current practice (CMP)	2.5	3.4 ↑	7.6	7.5
C; current consented at GMP	2.5	3.7 ↑	7.6	7.9
Mid aquifer nitrate (mg NO₃⁻-N/L)				
A; Current practice (CMP)	2.4	3.8 ↑	6.1	7.1
C; current consented at GMP	2.4	4.1 ↑	6.1	7.4
Deep aquifer nitrate (mg NO₃⁻-N/L)				
A; Current practice (CMP)	0.3	4.5 ↑↑↑	1.6	7.0 ↑↑↑
C; current consented at GMP	0.3	4.7 ↑↑↑	1.6	7.3 ↑↑↑

† ↑/↓ increased/decreased up to 2.2 times; ↑↑/↓↓ increased/decreased up to 4.3 times; ↑↑↑/↓↓↓ increased/decreased up to 16 times

PC7 proposes?



- More intensive farming, but how much?
- Then successive multiple reductions in nutrient release in different areas in WZ across subsequent plan changes to meet 'zone outcomes'
- Falsely claims that Christchurch's current high quality drinking water will be retained with a future goal of 1.0 mg NO₃⁻-N/L
- PC7 would not achieve this goal
- PC7 possibly 3.8 mg NO₃⁻-N/L in deep aquifers? 0.3 mg NO₃⁻-N/L at present

Risks from nitrate in drinking water



- Possible poor birth and colorectal and other cancer outcomes due to nitrate from drinking water
- DW standards to prevent methemoglobinemia, not other risks; standards should be lowered?
- Little or no risk from current nitrate levels
- Increased risks even for nitrate concentrations $> 0.87 \text{ mg NO}_3^- \text{-N/L}$
- Significant hazard and human health risk and cost from nitrate concentrations realised from PC7

Concerns over ECan groundwater modelling



- Not peer reviewed (but developed with peer input)
- Suggested poor agreement with current bore concentrations, and no 'load to come', not valid
- Lack of well data to confirm deep gw transfer under Waimakariri River, but supported by shallow gw flow data
- Fit for purpose and comprehensive, credible results
- Even if predictions out by 100 %, median and 95th percentiles of 2.3 and 3.6 mg NO₃⁻-N/L, respectively, much higher than 0.3 and 1.6 mg NO₃⁻-N/L currently, and an increased hazard to health

Other concerns



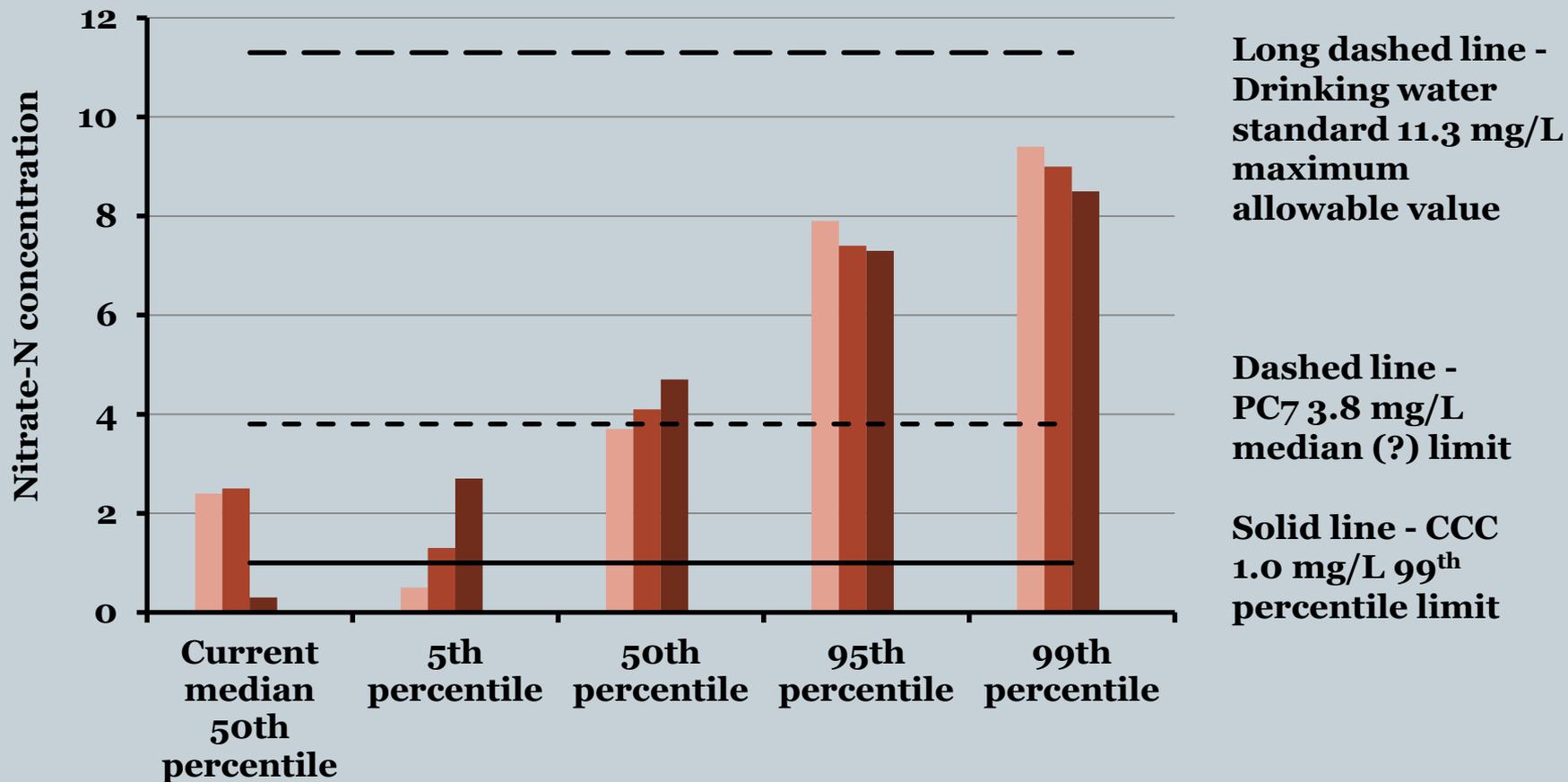
- Farmers – understandable
- WIL, no to suggested reductions after 1st stage, use MAR and TSA instead
- But will not address Christchurch gw problems, poor environmental health in WZ will persist
- CCC, set maximum of 1.0 mg NO₃⁻-N/L in Christchurch deep wells
- Will need greater than 80 % nitrogen reduction in interzone transfer source area than CCC request, but lead to median nitrate concentration increasing by 83 % to 0.55 mg NO₃⁻-N/L, acceptable?

Relief sought

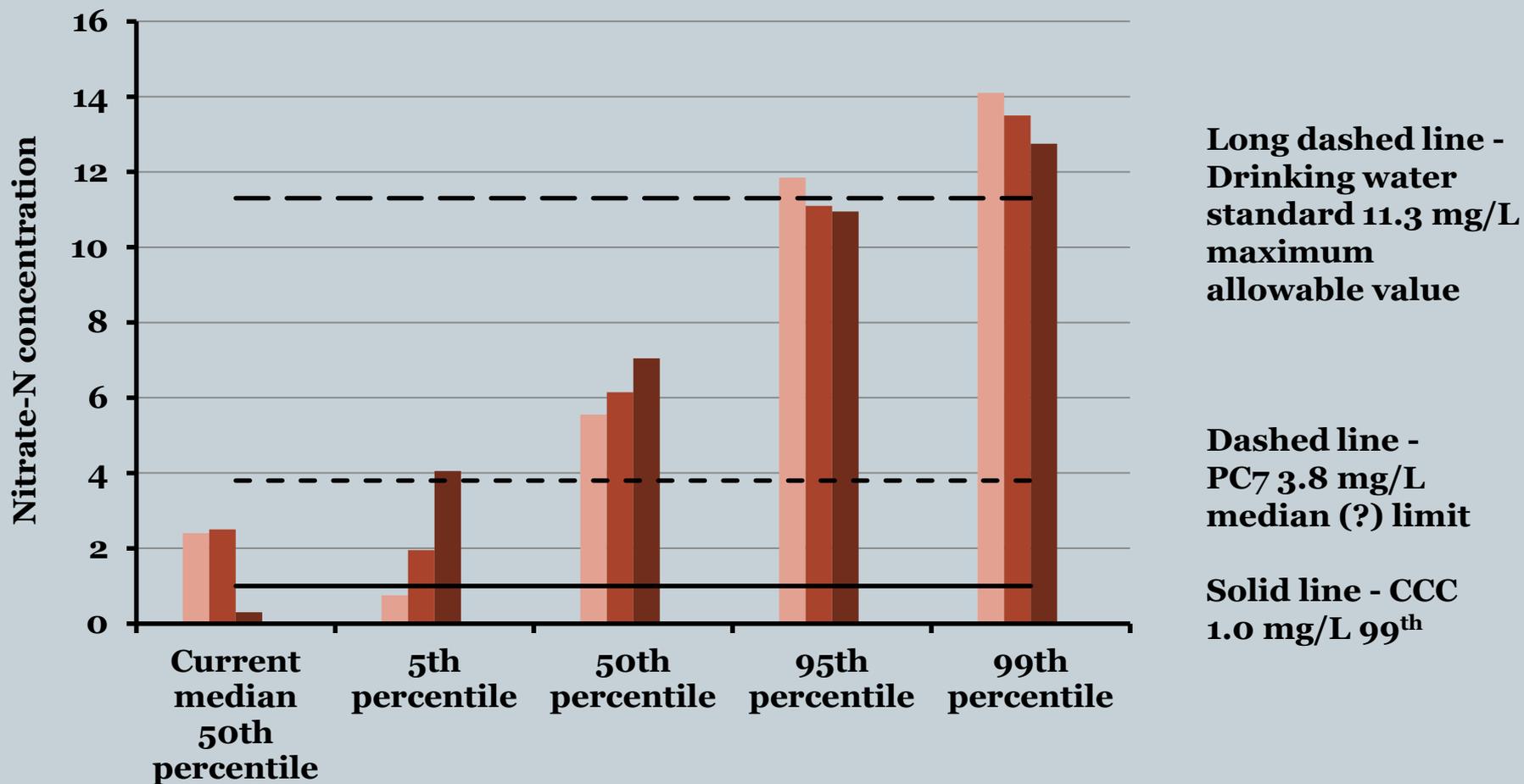


- Maintain current median nitrate concentration Christchurch deep groundwater 0.3 mg NO₃⁻-N/L
- Protect at all costs; too precious to gamble with; there can be no doubt whatsoever – there is doubt - don't allow
- Stipulate in PC7:
 - Amount of nitrogen that can be released from farming in the interzone transfer source area to retain this level (about 2.2 kg/Ha/yr)
 - Robust, unambiguous, enforceable and enforced rules
 - Fit for purpose monitoring programmes
- Further modelling and action to protect Christchurch aquifers from farming in other areas

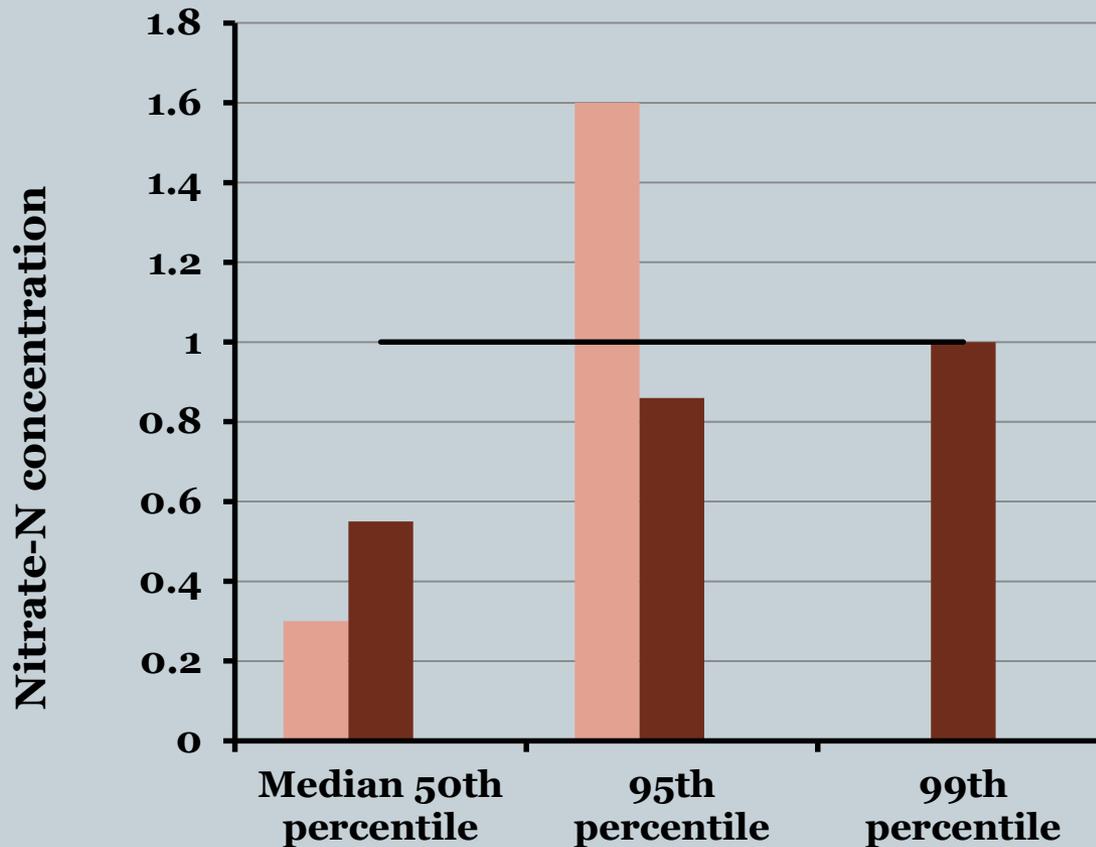
Modelled nitrate concentrations in shallow (light brown), mid (mid brown) and deep (dark brown) Christchurch aquifers from current consented at GMP farming in the interzone transfer source area in the Waimakariri Zone NPA



Modelled nitrate concentrations in shallow (light brown), mid (mid brown) and deep (dark brown) Christchurch aquifers from current consented at GMP farming in the interzone transfer source area in the Waimakariri Zone NPA plus hypothetical half as much more load from elsewhere in Waimakariri catchment



Current (light brown) and modelled (dark brown) nitrate concentrations in the deep Christchurch aquifers from current consented at GMP farming in the interzone transfer source area in the Waimakariri Zone NPA to meet the CCC nitrate limit



After an 88.24 % reduction in nitrate loss in order to meet the CCC maximum nitrate concentration limit of 1.0 mg/L

Solid line - CCC 1.0 mg/L 99th percentile limit