Sharing the Nitrate Pie

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Objectives and Nutrient Limits

- **Water Quality**
  - Maintain or improve to meet drinking water standards for Nitrate
  - Maintain or improve aquatic ecosystems in the coastal springs
  - Maintain or improve aquatic ecosystems in the Waimea Inlet

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What that means for Nitrate concentrations

- **Drinking water standard is 11.3mg/m^3**
- **Nitrate toxicity for aquatic species**
  - NPS - Bottom line is 6.9mg/m^3
    - Between 2.4 and 6.9mg/m^3 – up to 20% of species growth affected.
  - **Site specific analysis accounting for hardness**
    - "A" Band (99%) <7mg/m^3 (annual median)

    <10mg/m^3 (annual 95% percentile)

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What nitrate means for ….

- **Periphyton growth**
  - Influenced by a range of factors;
    - Phosphorus
    - Phosphorus and Nitrate ratio
    - Shade
    - Runoff
    - Flow
    - Invertebrate grazing
- **Can’t just manage nitrate on its own to manage periphyton**

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What the Nitrate concentration means…

- **Coastal ecosystems**
  - Toxicity not a concern
    - localised algae growth where it seeps out into the estuary
    - Nitrogen load currently below range for macroalgal growth
      - *Limit recommended 610 tonnes/year = <50mgN/m^2/day*

What we have now…

- Groundwater levels

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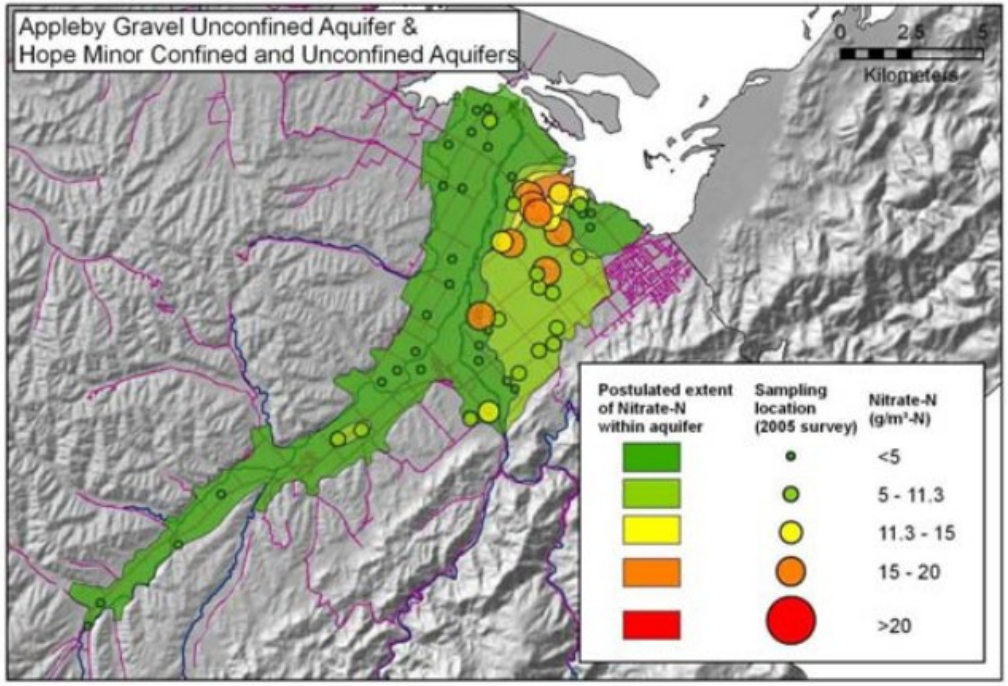

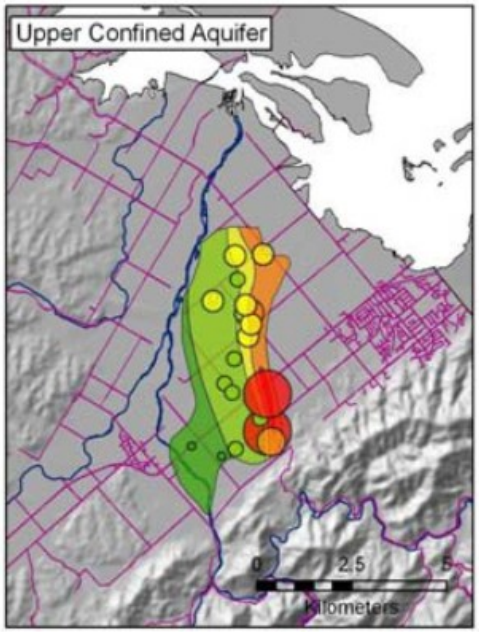

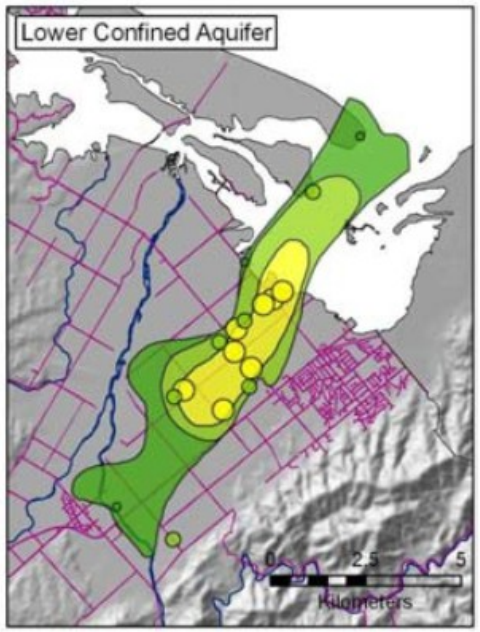

Figure 5 Nitrate-N concentrations in the aquifers of the Waimea Plains – winter 2005.

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What we have now

- **Coastal springs**
  - Hardness adjusted nitrate limits
  - Low Phosphorus levels
  - Runoff ?
  - Shading?
  - Consistent flows
  - Local community interest – planting/fencing/pest control

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Table 1: Derived site-specific guidelines for nitrate-N concentrations in Motupipi River, Borck Creek, Pearl Creek, Neimann Creek an

	NOF Nitrate Standards [a]					Hardness-specific guidelines [b]		Measured concentrations	
Attribute State (ANZECC protection threshold)	Annual median Nitrate concentration ($mg\ NO_3$-N /L)	Annual 95th percentile Nitrate concentration ($mg\ NO_3$-N /L)	Description of Management Class	River	Median hardness ($mg\ CaCO_3$/L	Annual median Nitrate concentration ($mg\ NO_3$-N /L)	Annual 95th percentile Nitrate concentration ($mg\ NO_3$-N /L)	Median ($mg\ NO_3$-N /L)	Maximum ($mg\ NO_3$-N /L)
A (99%)	1	1.5	Pristine environment with high biodiversity and conservation values.	Motupipi	89	6.3	9.5	1.3	2.7
				Borck & Pearl Ck	100	7	10	5.6, 2.9	7.0, 3.9
				Neimann Ck	130	9	13	3.3	8.5
				Waikoropupu Springs	190	13	19	0.37	0.51
B (95%)	2.4	3.5	Environments which are subject to a range of disturbances from human activities, but with minor effects.	Motupipi	89	15	22		
				Borck & Pearl Ck	100	16	24		
				Neimann Ck	130	21	31		

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What we have now - coastal ecosystems

- **Current nutrient loads into the estuary**
  - N:P ratios less than 5 (algal growth likely Nitrogen limited)
  - Regular tidal flushing – no current phytoplankton blooms
  - Annual average estimate 245 tonnes/year
  -

What are the attribute states?

- **Groundwater**
  - Drinking water standard is 11.3mg/m^3
- **Nitrate to protect aquatic species**
  - "A" Band (99%) <7mg/m^3 (annual median)
    <10mg/m^3 (annual 95% percentile)
- **Nitrate to protect periphyton**
  - Not applicable?
- **Nitrate to protect estuary and coast**
  - 610 t/year?

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Presentation by Andrew

- How the water bodies are connected
- What happens if land use changes?

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Nitrogen management options – no dam

- **Increasing water use restrictions, less irrigation;**
  - Unknown impact on land use;
    - *Not much change, more dry land, more grapes or?*
  - nitrate concentrations ?
- **Status quo approach**
  - Good agricultural practice assumed/required/promoted
  - Monitoring
  - Riparian land management for springs
- **Other options?**
  - Leaching limits at property scale?

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Nitrogen Management Options – with dam

- **Increasing water supply – more irrigated land**
  - Dairy not that likely?
  - More horticulture -
    - current pattern of land uses or
    - change to more market garden?

Policy Framework

- **Need to consider**
  - least cost - maximising the benefits and
  - equity – value judgements may be required

- **The decisions that we need to make;**
  - Clawing back?
  - Allowing additional N sources?
  - Capping Nitrate leaching at current levels
    - Catchment loads?
    - Or setting limits at the property scale ?

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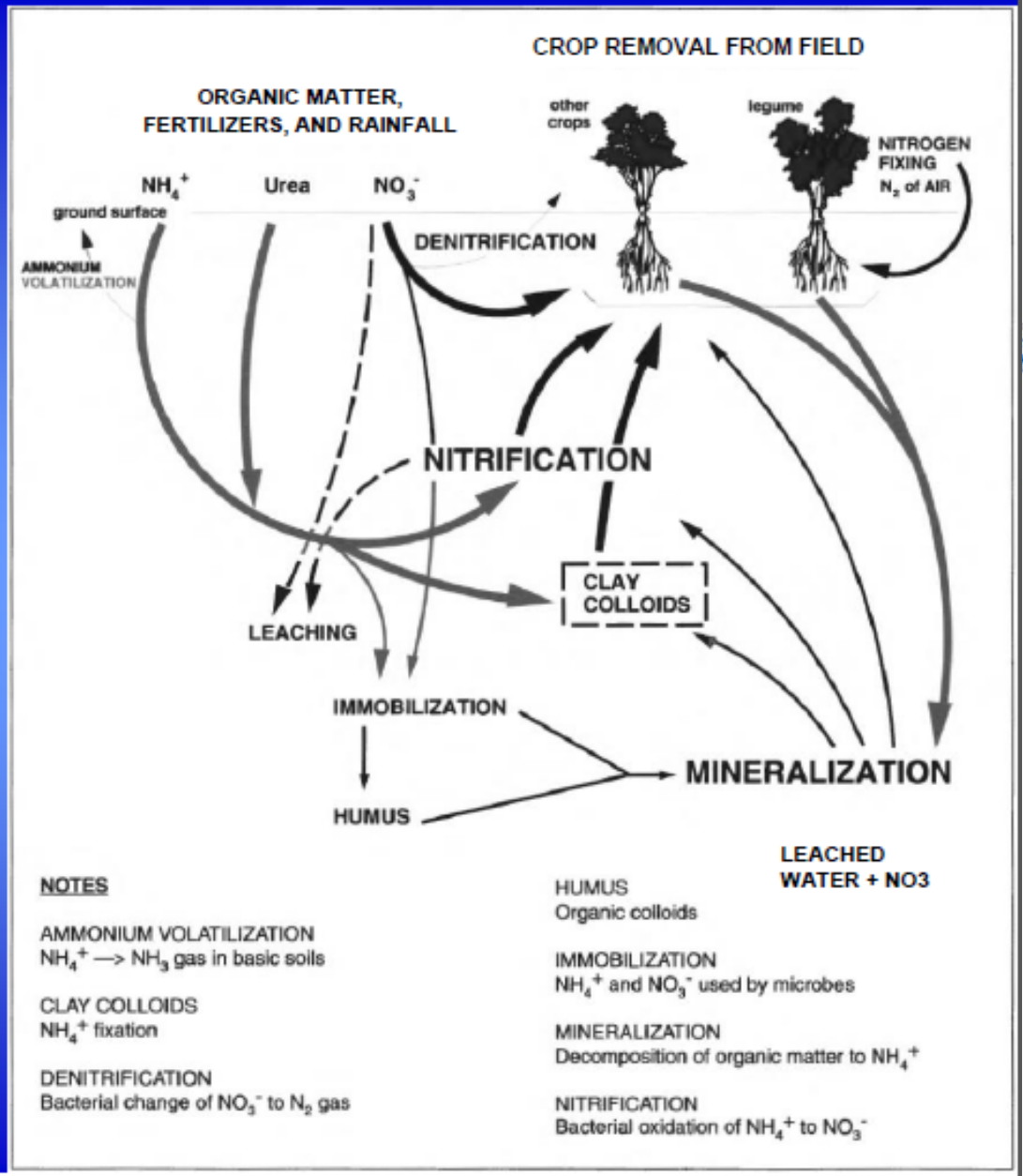
Nitrate Allocation Approaches

- **Grandparenting –** an allowance based on existing land use
- **Allowance based on natural capital** – LUC approach
- **Average catchment load distributed per ha**
- **Property allowance** based on
  - land cover or
  - sector average
- **Allowance based on nutrient vulnerability – soil based**

Second Conclusion:

Regulatory programs should not be based on understanding and reporting processes that have so many arrows.



Other Management Approaches

- **Status quo approach**
  - Good agricultural practice
    - *Regulatory/voluntary?*
  - Recording and measuring
  - Auditing performance
  - Water body monitoring
  - Riparian land management (for springs)

- **Provide for existing land use patterns**
  - Limits for land use changes within established %?

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Other Management Approaches

- **Higher performance standards or leaching limits specific to Ranzau soils**
  - Or according to different land use systems

Other Approaches

- Water reticulation
- Springs dilution
- Support industry to find other mitigation measures

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Tools available

- **Catchment modelling – SPASMO**
  - Not useful for land owners
- **Property scale modelling – Overseer**
  - Version control – can be managed
  - Lack of real data for some land uses – getting better
  - Limitations in water balance modelling
- **Industry GAP**
  - Needs training/support
  - Level of performance not clear for all land use systems
  - Existing systems for some sectors
  - Not always clear about N impact/outcomes

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Tools available

- **Water Monitoring –** related to objectives and limits.
  - Regular reporting against outcomes sought
- **Riparian land –** funding support

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- ?

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