Landcare Research
Manaaki Whenua

Motu

Non-point Source Trading in New Zealand

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WQ Trading in NZ

- Water quality trading is becoming a reality
- Implemented in Lake Taupo
  - Taupo N Trading Programme
- Actively being explored for Rotorua Lakes
- Underpinning regulation being discussed in Horizons Regions & Canterbury
  - Key issue is around allocation mechanism

Background: Lake Taupo

- Lake clarity had decreased from 16 to 14 m
- Estimated that 20% reduction in manageable N lake inputs to lake was needed to maintain quality at 2001 levels
- Achieved by
  - Controlling current leaching N to 2001 levels (with N trading programme)
  - Permanently reduce N input by 20% (established a public Trust with $81million funding to reduce N)

Policy development process

- Legal framework
  - Regional Plan under NZ's Resource Mgt Act

- Policy timeline
  - 2005: Proposed Variation to plan notified
  - 2006/2007: Council hearing to hear appeals, decisions released
  - May 2008: Environment Court hearings
  - Nov 2008: Interim Court Decision
  - Mar/April 2011: Expected final variation

Contested policy/design issues

- Regulation of pastoral agriculture
  - controlled vs permitted activity
- Allocation mechanism
  - grandfathering chosen
  - year chosen for benchmarking
- Credibility of bio-physical modelling
- Maori concerns
  - Allowed to develop their undeveloped land for housing
- Size of cap too small

Status of Trading programme

- ~94% of farms benchmarked (ie. have NDA)
- ~12-15 trades have occurred
  - 6 to 8 with the Lakes Protection Trust (require permanent reductions)
- Trading prices
  - Permanent reductions ($350 - $400 kgN)
  - Leased temporary reductions ($250 - $300 kgN)
- Transaction costs: $1000-$1500 to modify consent/party + cost of implementing change



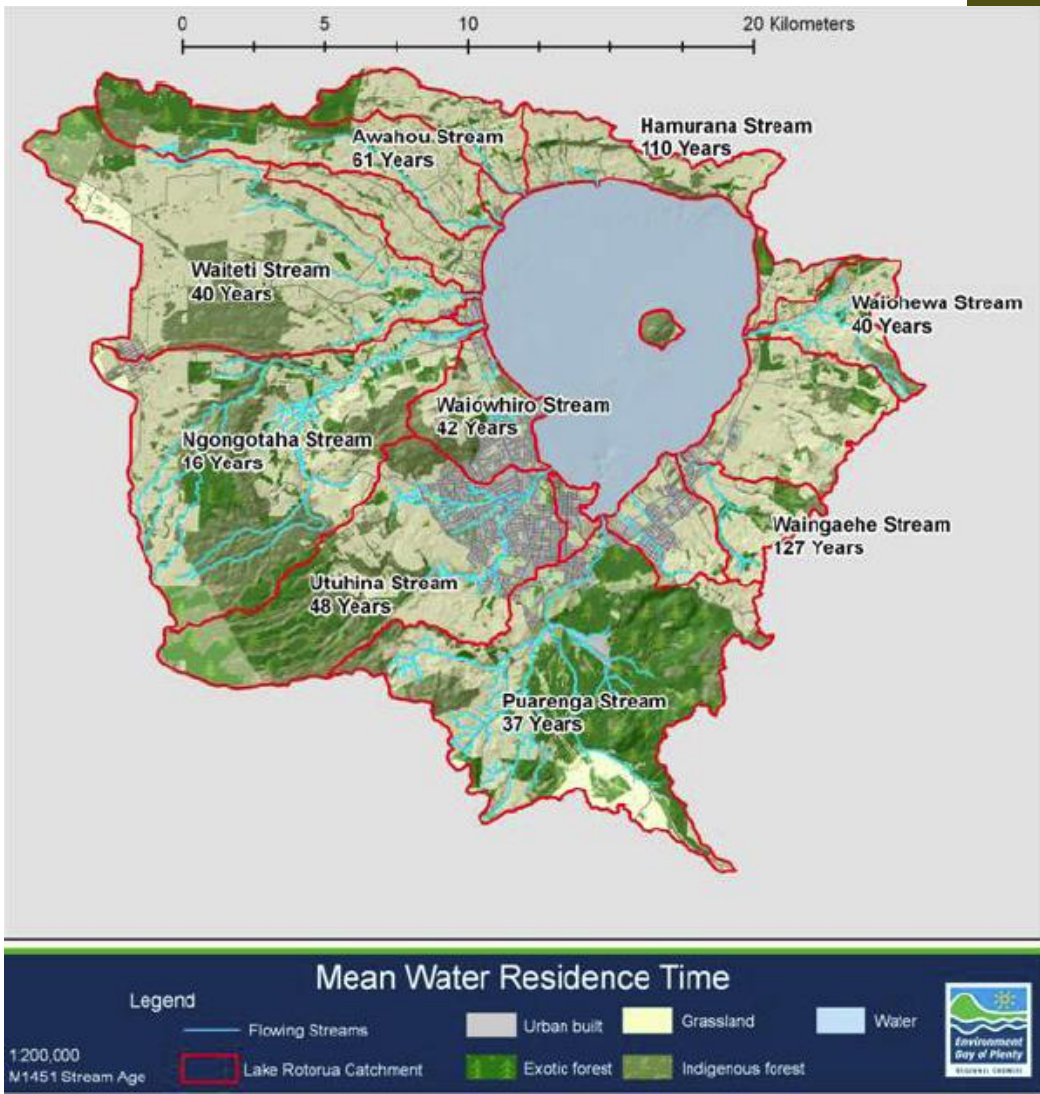
Key implementation observations

- Folks planting trees for N trades & then looking at selling C
- Lots of new local research being undertaken
- Farms became more efficient, e.g. retiring marginal land
- Exploration of alternative farming options for the catchment (e.g., native vegetation, blueberries)
- Windfall to farmers (NDA was highest leaching over between 2001 & 2004)
- People panicked, sold out early but meant Trust secured trades early
- Dislike of a more forested catchment from a visual amenity perspective (local comments)

Observations from Natasha Haywood, Taupo Implementation Manager

N Trading for Lake Rotorua

- Background
- Optimising in a complex world
- N-Manager – simulations of different options



What's different from Taupo?

- Much larger reduction desired: 60-70% of manageable nitrogen
- Most nitrogen flows through groundwater – only around 30% surface water.
  - Ground water lags are up to 200 years

How should we target mitigation effort to reflect biophysical conditions?

Cost effectiveness with lags

P_s = optimal price of allowance at time s

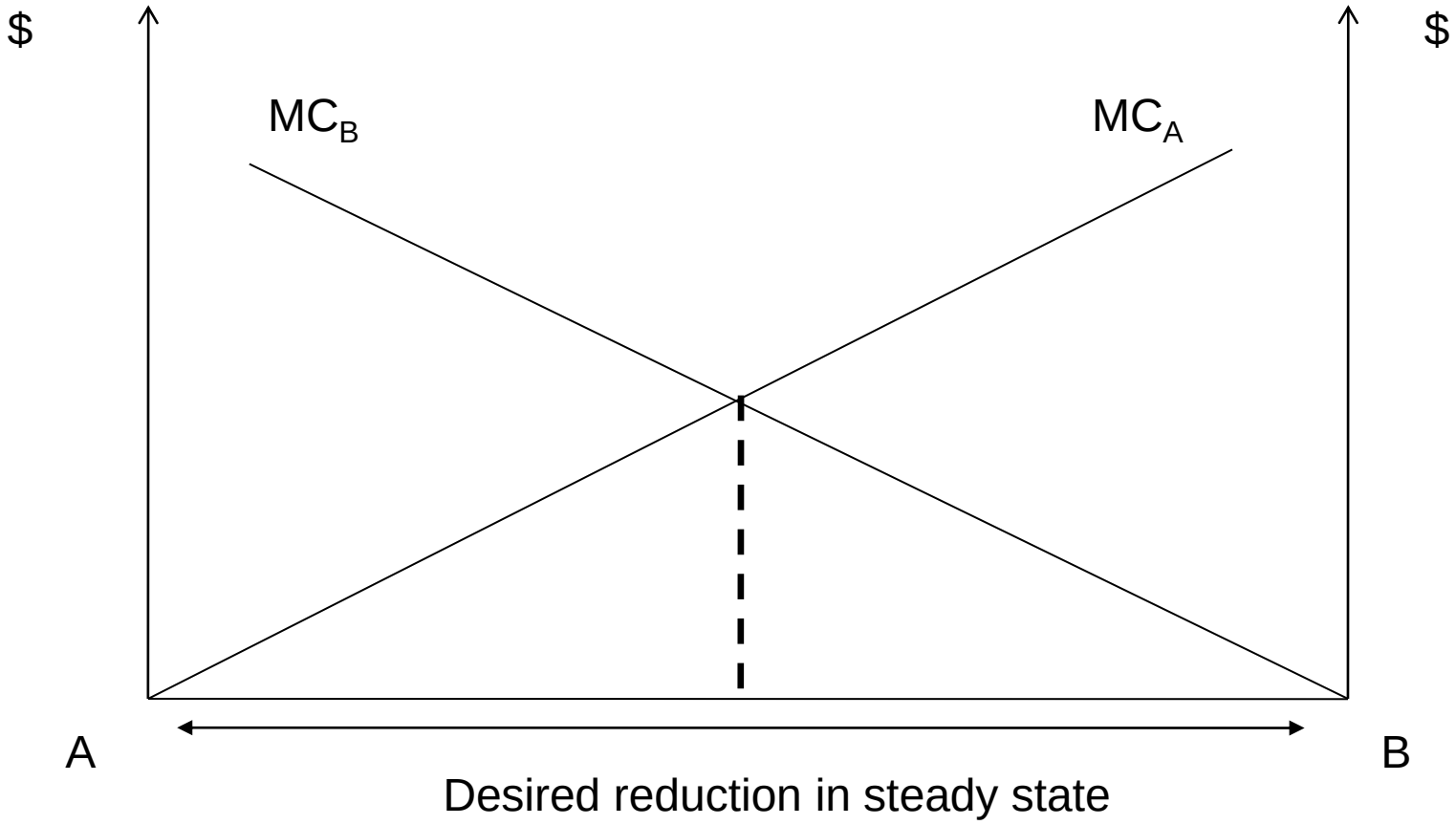
= MC of mitigation at time s on land with no lag

t = length of groundwater lag

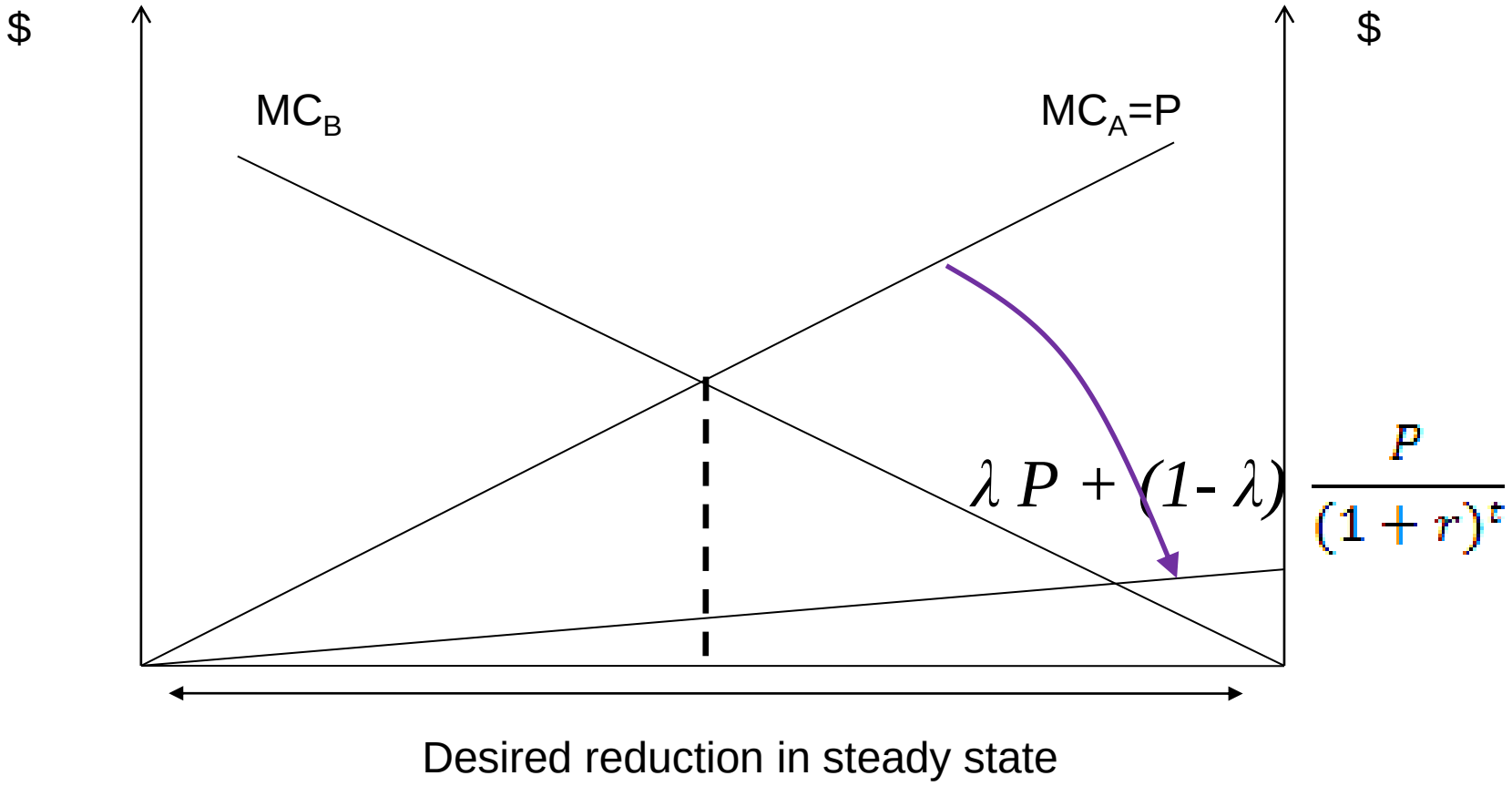
λ = share of nitrogen transported in surface water (no lag)

$$MC_t = \lambda P_0 + (1-\lambda)\frac{P_t}{(1+r)^t}$$

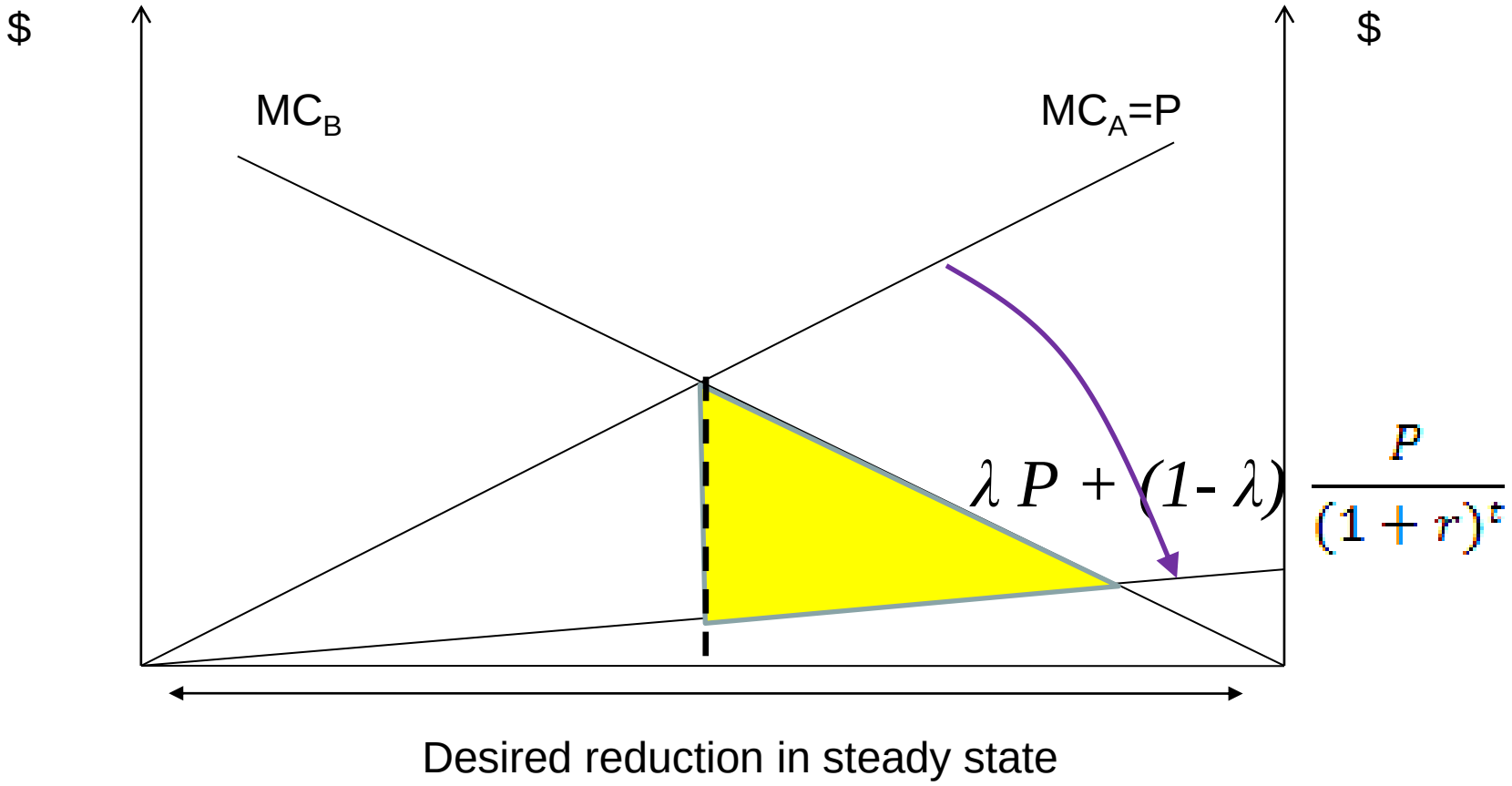
Intuition



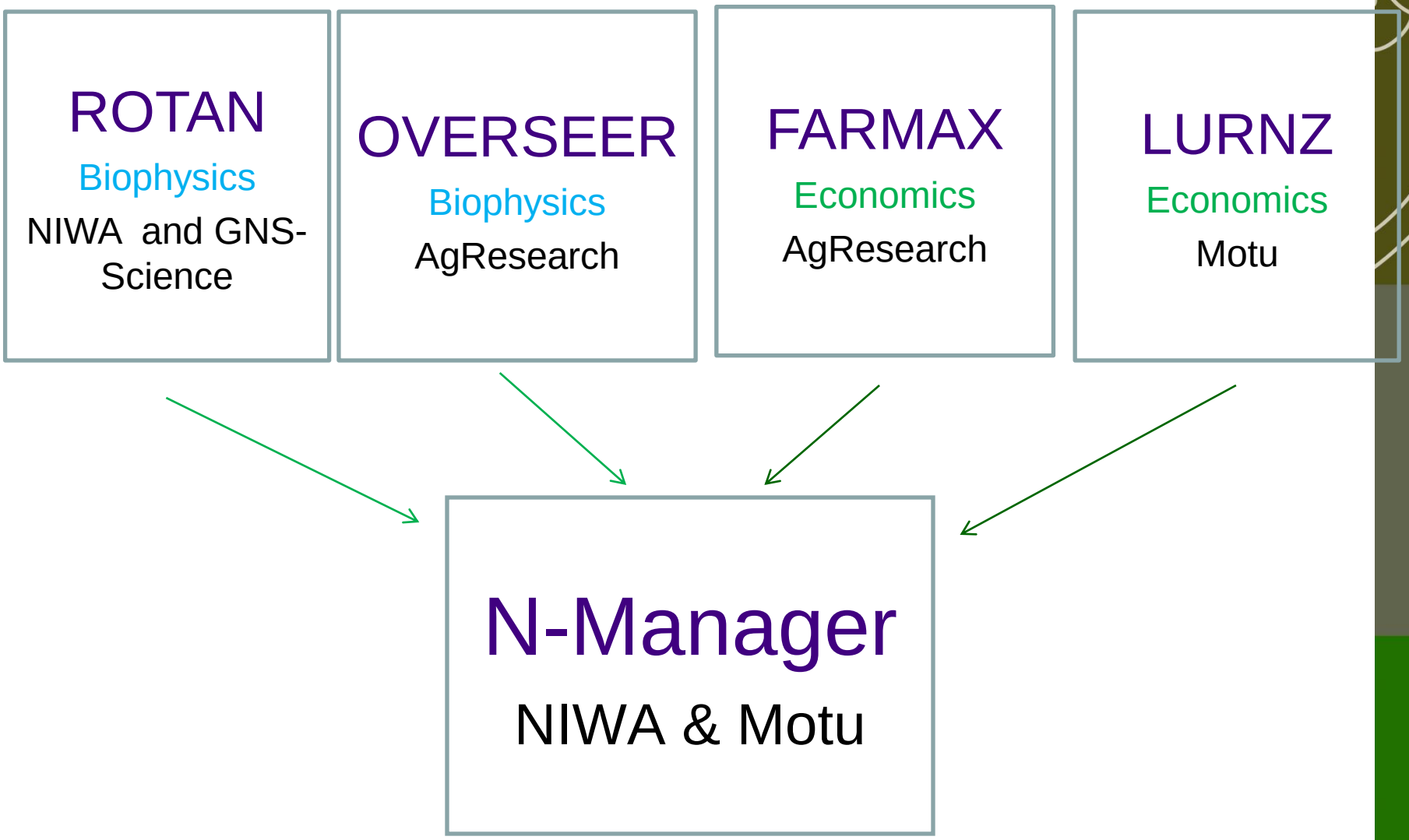
Intuition


$
$
MC_B
MC_A=P
$\lambda P + (1-\lambda)\frac{P}{(1+r)^t}$
Desired reduction in steady state

Potential gain from complexity



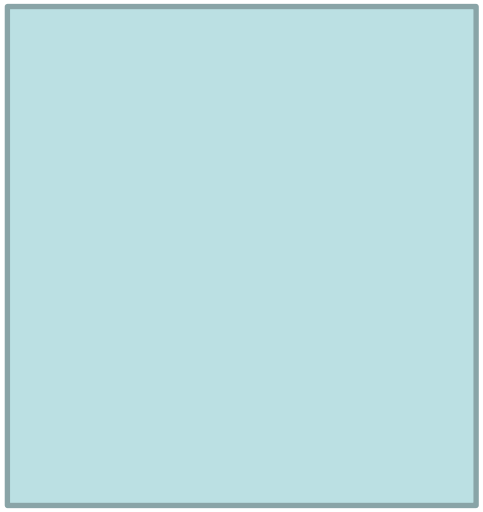
What is the gain in Rotorua?



N-Manager simulations

NPV of the Cost of Mitigation ($ millions)

	-10%
Surface water scheme	2.50
2 pulse scheme	2.46
Cost reduction	2.7%

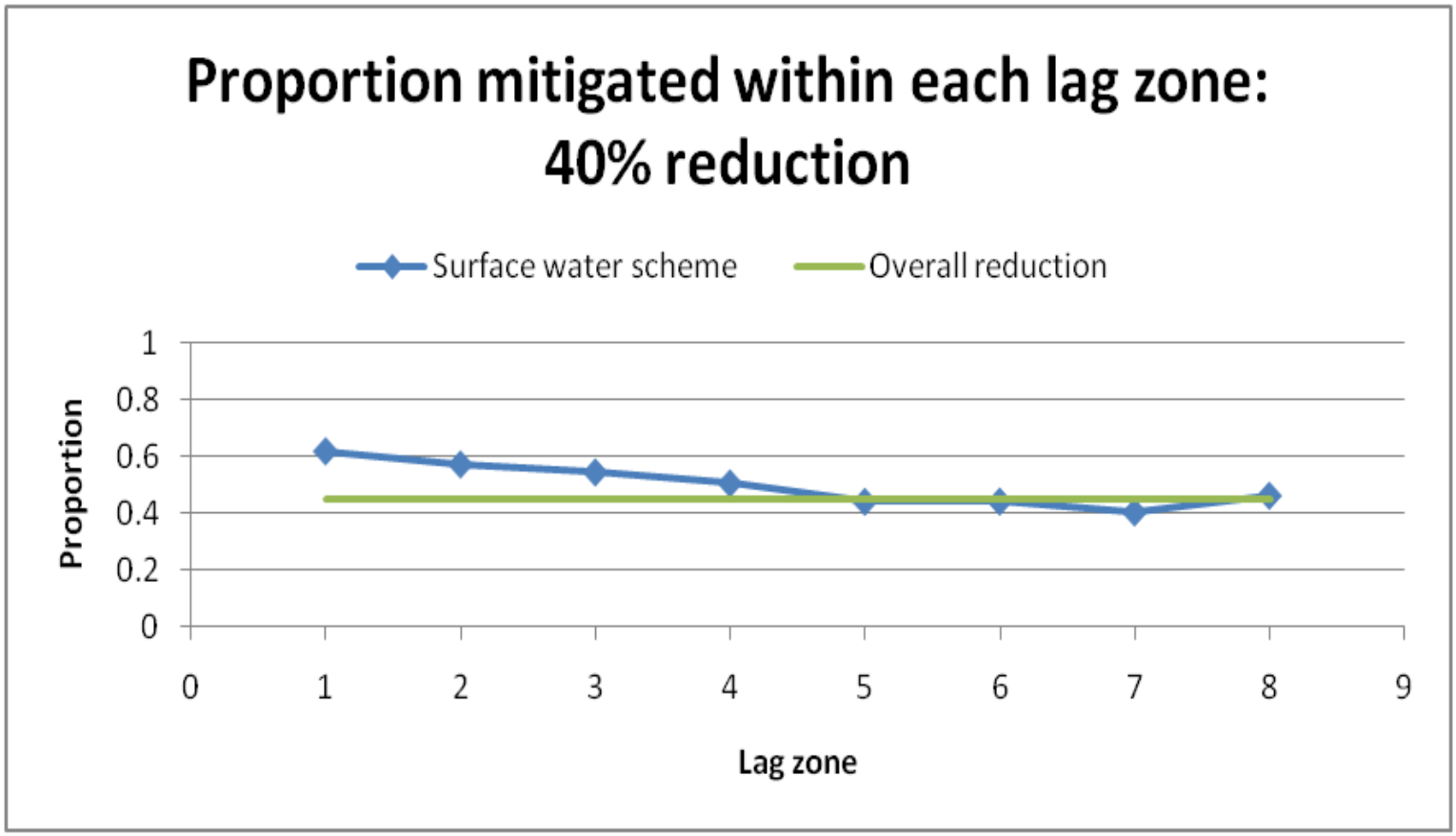


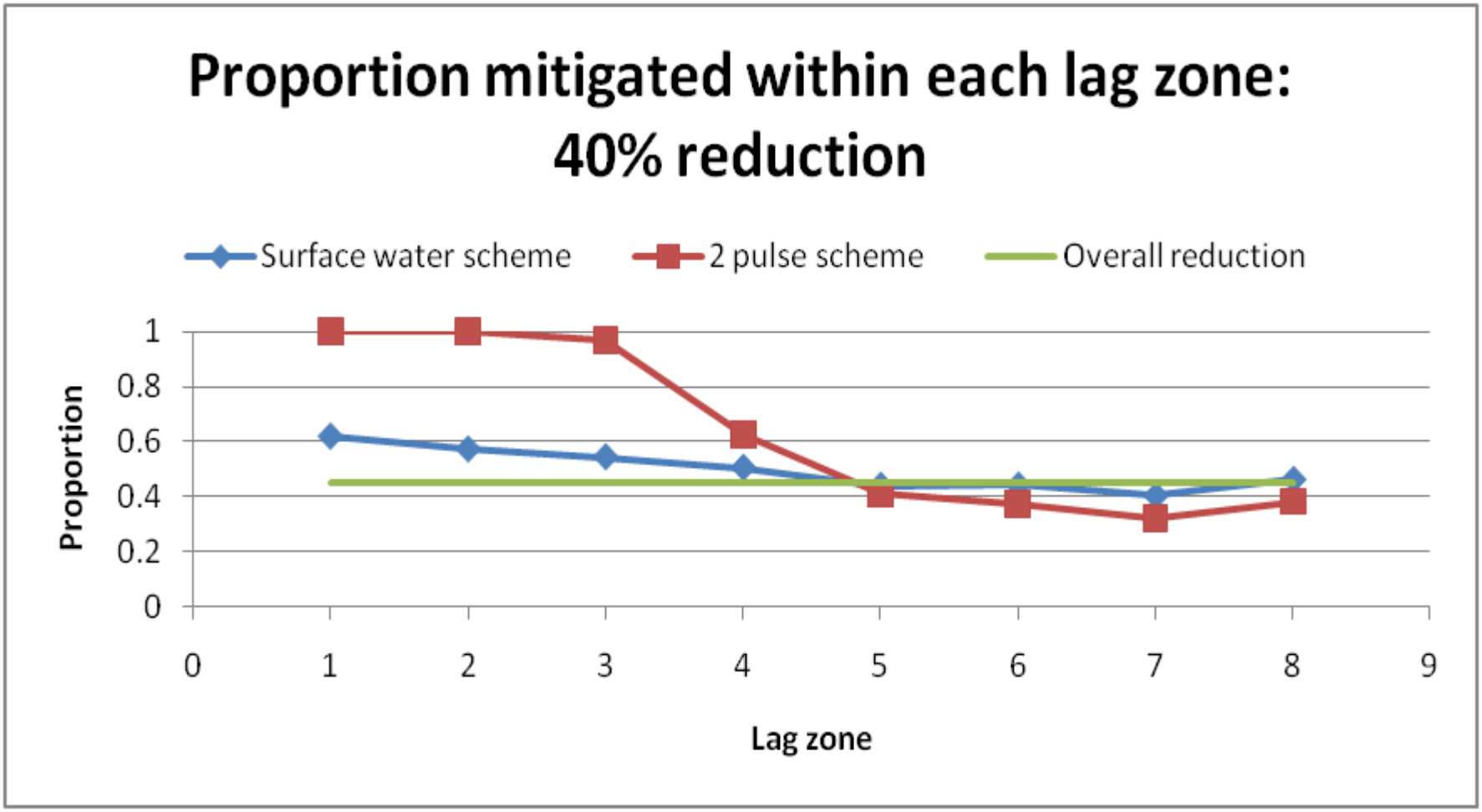
N-Manager simulations

NPV of the Cost of Mitigation ($ millions)

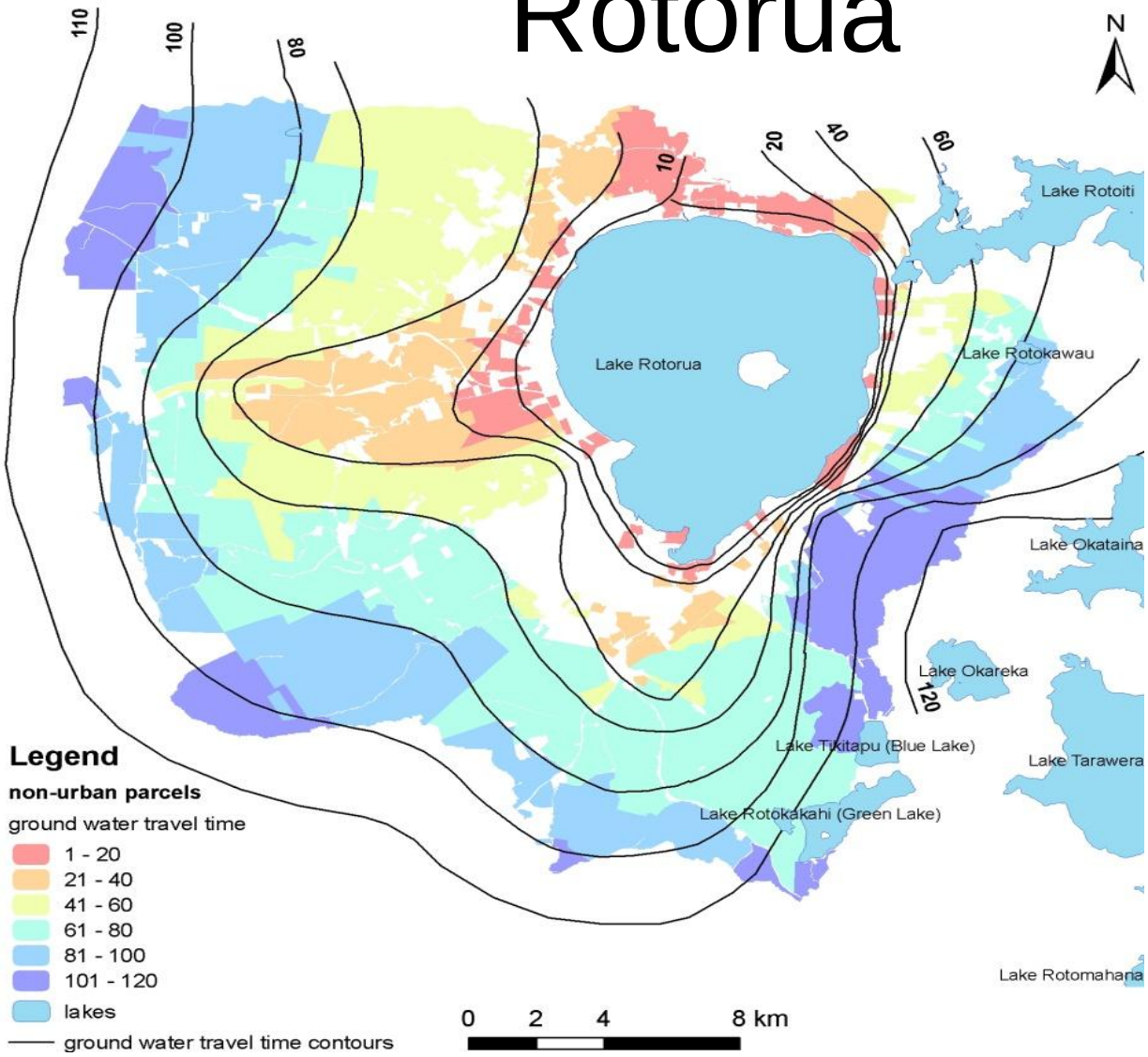
	-10%	-30%	-40%
Surface water scheme	2.50	24.5	39.4
2 pulse scheme	2.46	23.9	38.5
Cost reduction	2.7%	2.3%	2.2%

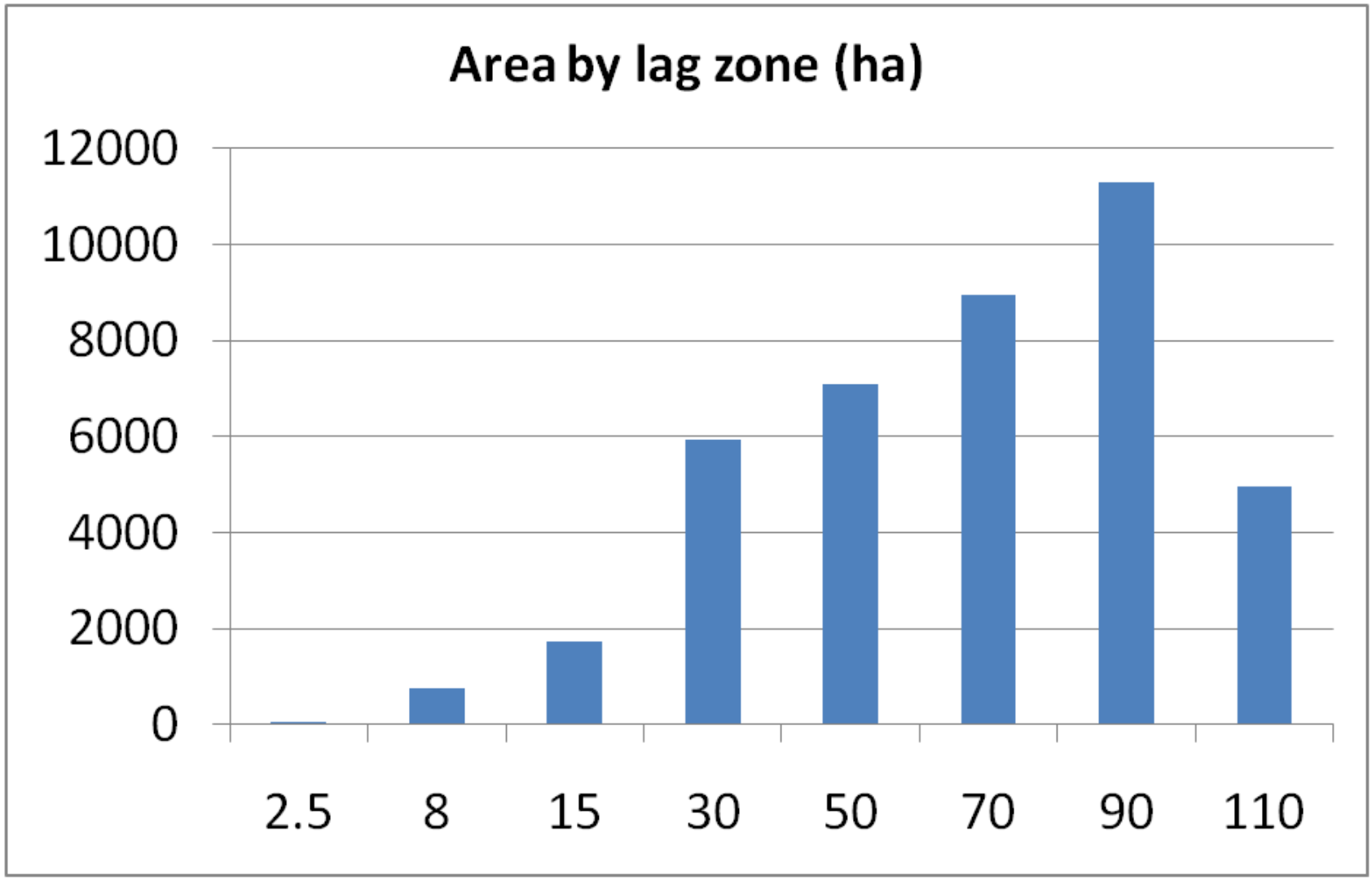
So, what's happening?




Proportion mitigated within each lag zone:
40% reduction
Surface water scheme
2 pulse scheme
Overall reduction
Proportion
1
0.8
0.6
0.4
0.2
0
0
1
2
3
4
5
6
7
8
9
Lag zone

Groundwater lag zones in Rotorua




Area by lag zone (ha)
12000
10000
8000
6000
4000
2000
0
2.5
8
15
30
50
70
90
110
Mean residence time

Value of complexity is location specific

- What fraction of nitrogen goes through groundwater?
- What fraction of land has a short lag zone?
- How evenly are mitigation options spread?
- How much mitigation is required?

For Rotorua the complexity does not seem justified – elsewhere it might.

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