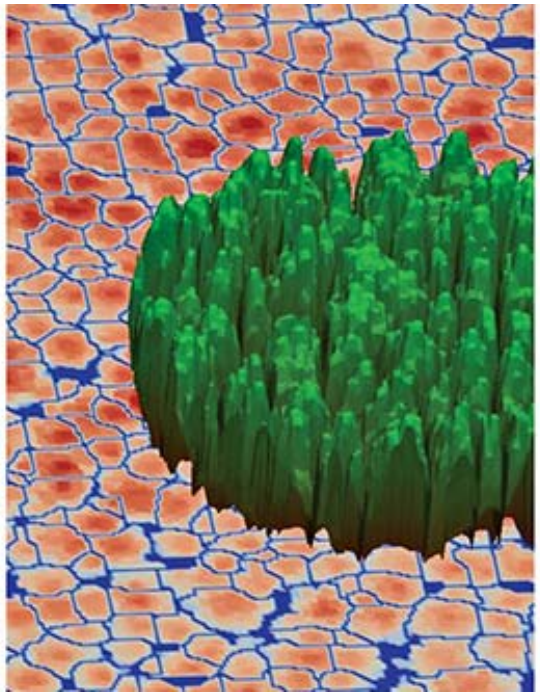
Growing confidence in forestry's future Research Programme

SCION forests · products · innovation

Nutrient management: How is the GCFF programme contributing to forestry's case for sustainable nutrient use in NZ forestry?

Tim Payn



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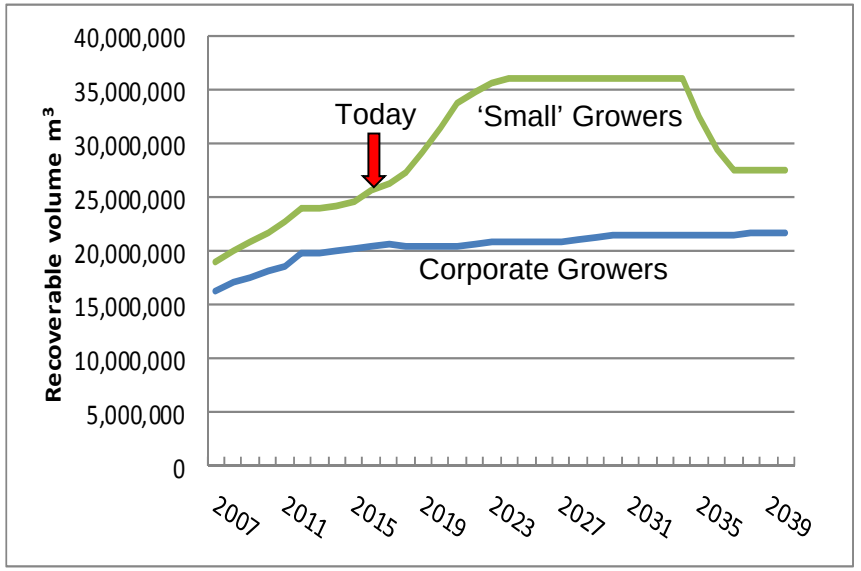
FOREST OWNERS ASSOCIATION

OUTLINE

- NZ forestry environment
- Key questions around nutrients
  - Leaching
  - Exports
- GCFF contribution

Forestry Growth strategy

Wood flow



NPS Fresh Water

The New Zealand Herald

New national standards for lakes and rivers

National water quality standards will be introduced for New Zealand's lakes and rivers, the Government has announced today.

The new policy means, for the first time, rivers and lakes will have minimum requirements that must be achieved so the water quality is suitable for ecosystem and human health.

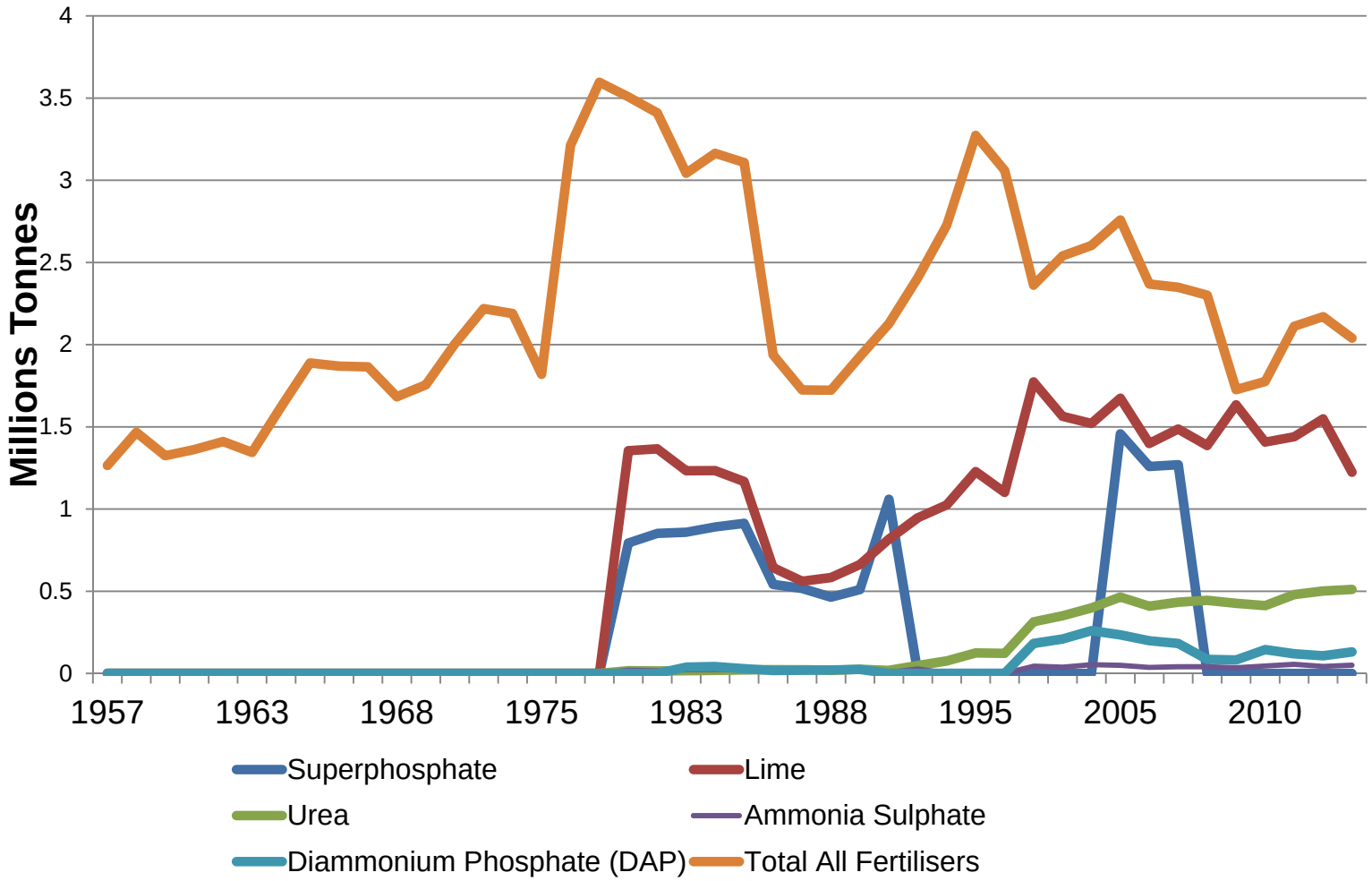
Freshwater reform 2013 and beyond

Message from the Ministers

most comprehensive and positive reform of our freshwater management system for a generation.

36mill m^3 in 2024, 65% steeplands

Fertiliser usage, New Zealand



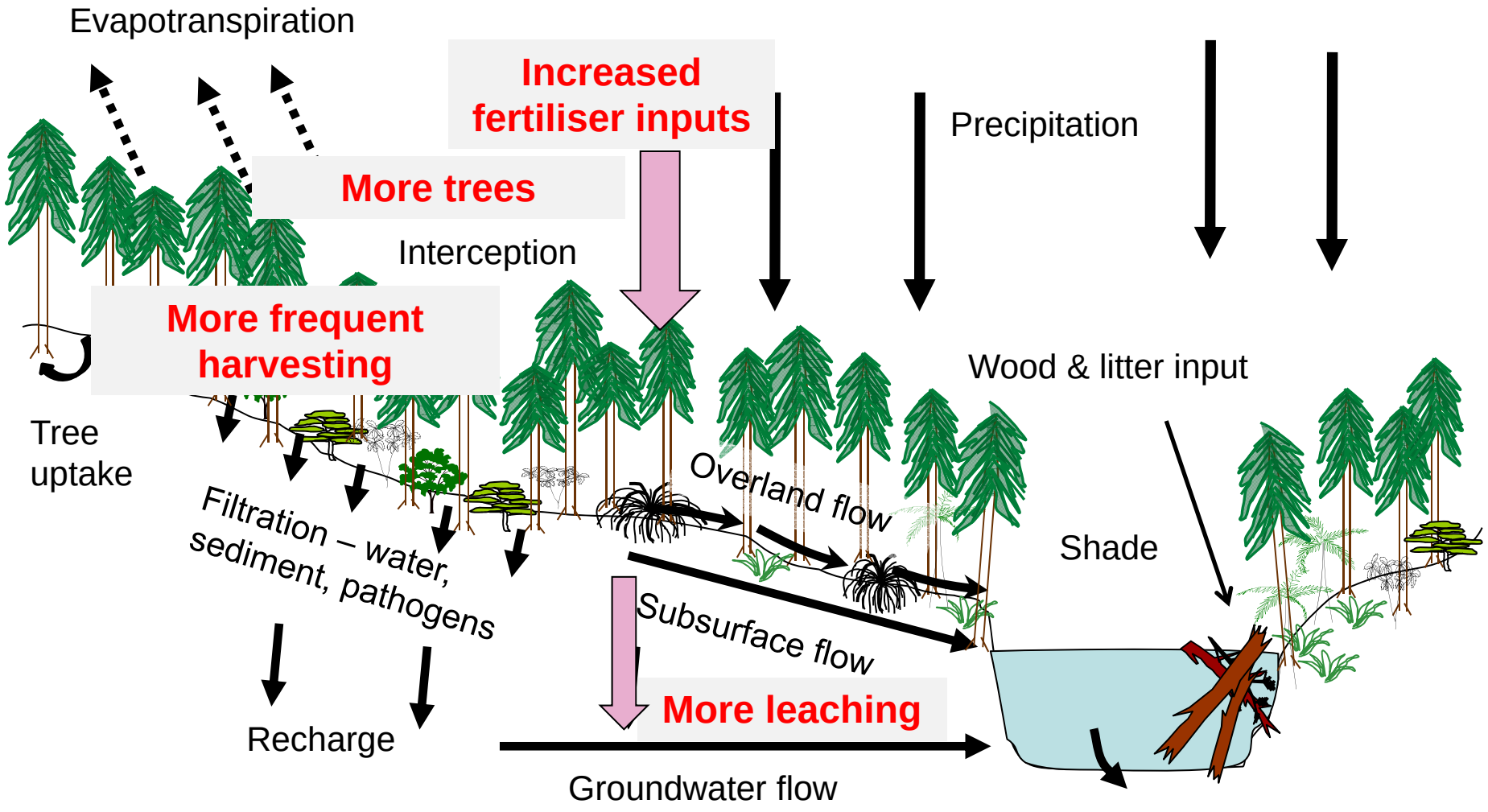
Current forestry fertilisation < 2000 Tonnes/annum

Key questions we must answer to maintain License to Operate as we intensify

- How much nutrient will leach from the stand
  - Soil type
  - Climate
  - Silviculture
  - Nutrient input type and rates
- How much nutrient is being exported, what impact will that have on productivity
  - Through crop removal
  - From environmental damage

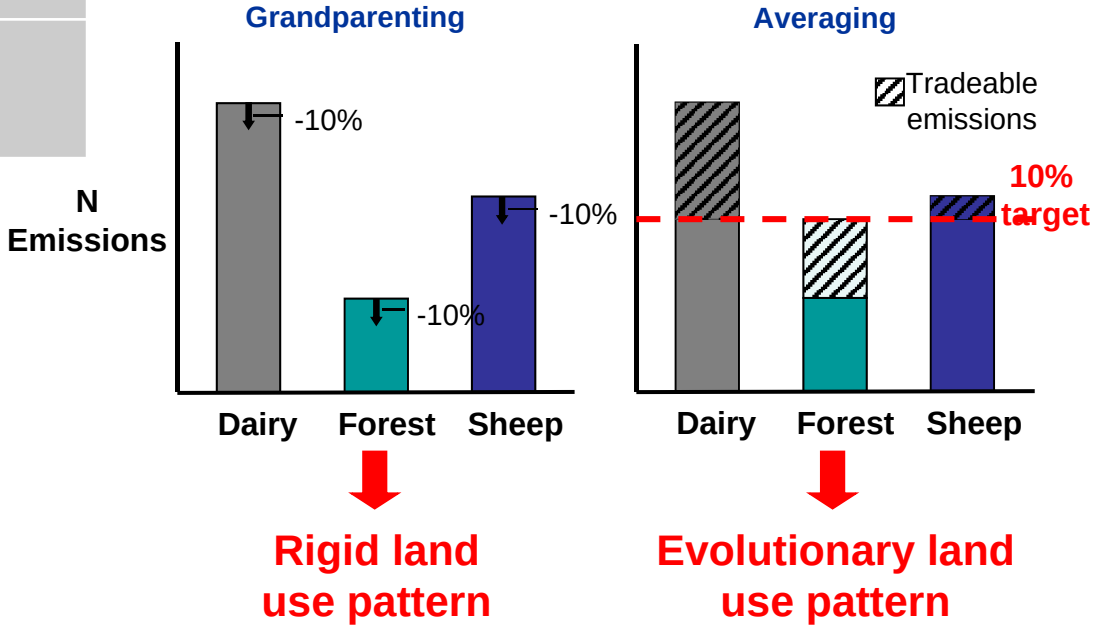
LEACHING

Intensification within existing forests



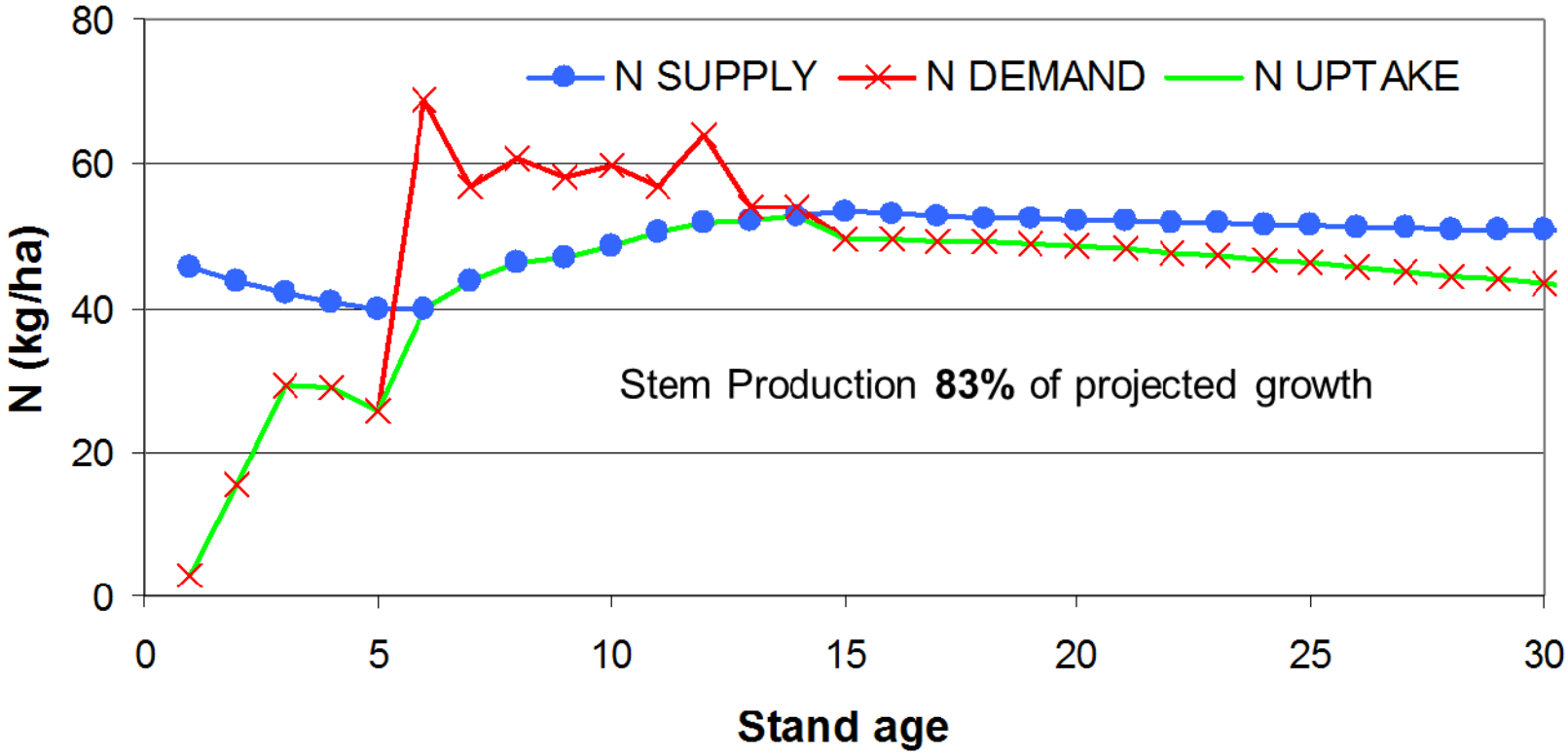
Challenges around nutrient limits and management

Land Use	Average N leaching rate (kg N/ha/year)*
Dairy	65
Kiwi fruit	50
Dry stock	21
Indigenous forest	3
Planted forest (undisturbed)	3

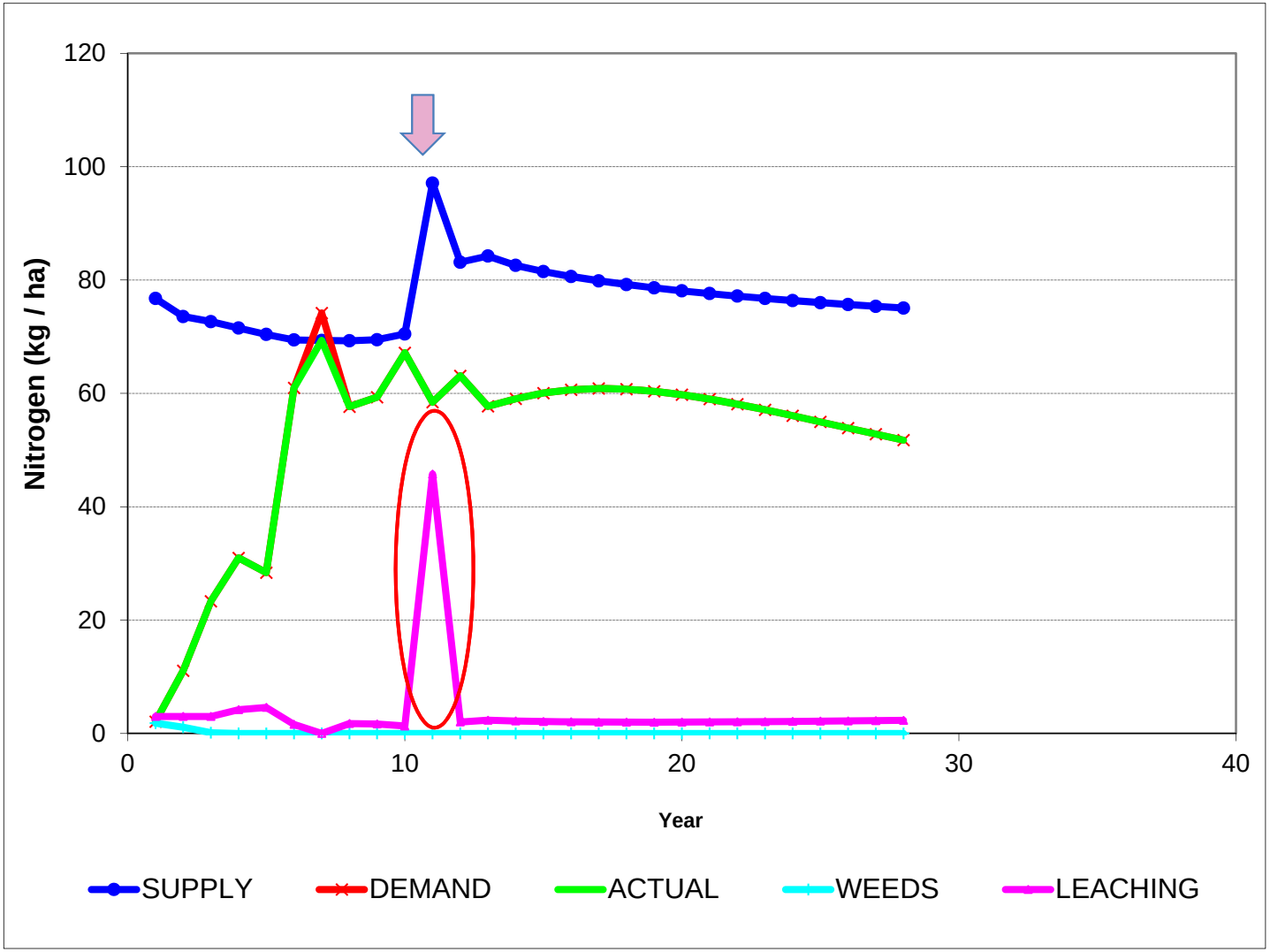


Nutrient **Bal**ance **M**odel (NuBalM)

Predicts productivity based on projections of nutrient supply and demand as a forest develops

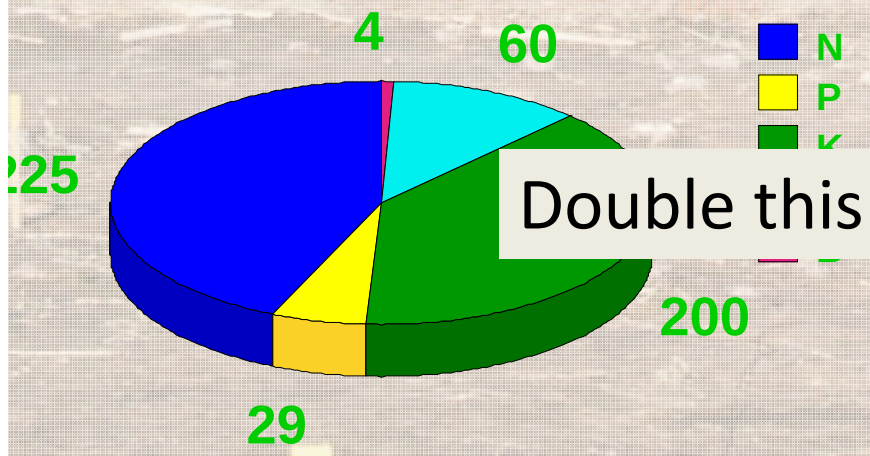


Fertilisation – implications for leaching



NUTRIENT EXPORTS

Why should we be worried?
- Loss of soil Natural Capital
Site Depletion



• In 2025, if all harvesting is stem only, every year we will need to replace:

Double this under intensification

– of N
–1,600 Tonnes of P
–11,000 Tonnes of K
–3,300 Tonnes of Mg
–220 Tonnes of B

Where is the 'tipping point?

Why should we be worried?
- Loss of soil Natural Capital
Environmental and Management Impacts

Erosion at Pakuratahi

Average soil loss per slip: 254 tonnes

Estimated soil loss for 14 measured slips – 0.25 ha:

- total loss: 3555 tonnes
- 0-10 cm: 300 tonnes

Pakuratahi recorded slips area estimated at 12 ha

Estimated soil loss for 0-10 cm of all slips: 14,400 tonnes

774 ha of forest,12 ha of mapped slips: potential loss of net value **NZ$1m**

Heaphy et al 2014 NZ Journal of Forestry Science

Why should we be worried?
- Loss of soil Natural Capital
Environmental and *Management* Impacts

Outcome and Benefits from Good Management of nutrients

- Maintain productivity over multiple rotations
  - ✓ Site specific nutrient balance model to improve precision of long-term nutrient management
  - ✓ Improved site management regimes that maintain or increase forest productivity
- Reducing environmental impacts
  - ✓ To inform policy and community relating to sustainability credentials of our planted forests
  - ✓ Maintain licence to operate as FSC/NZ4708/PEFC certified

Gaps

- Evidence base for actual leaching losses from spectrum of forest soils and regimes
  - Response to new regulations
- Links of model to other land uses and models – Overseer
  - e.g use of same hydrological model
- Within stand quantification of management and erosion impacts on productivity
  - Avoiding ‘2nd rotation decline’

Should foresters be worried?

- Not unduly – we know the pressure points, we are building evidence bases
- Yes, new water regulations could limit ability to operate
- Yes, public perception drives local license to operate, and can be negative
- Yes, we don’t know what impact disturbance has on steepland crop productivity

Acknowledgements

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- Trish Fordyce

- MBIE and FGLT investment

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http://research.nzfoa.org.nz/
www.scionresearch/gcff

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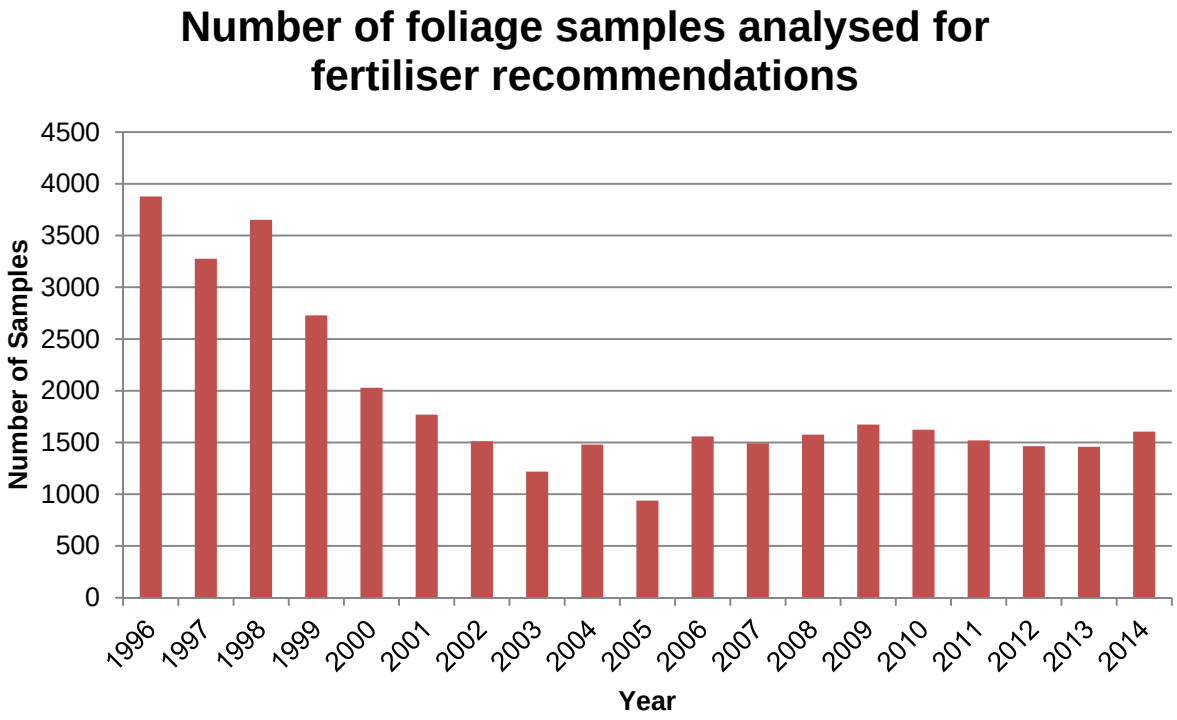
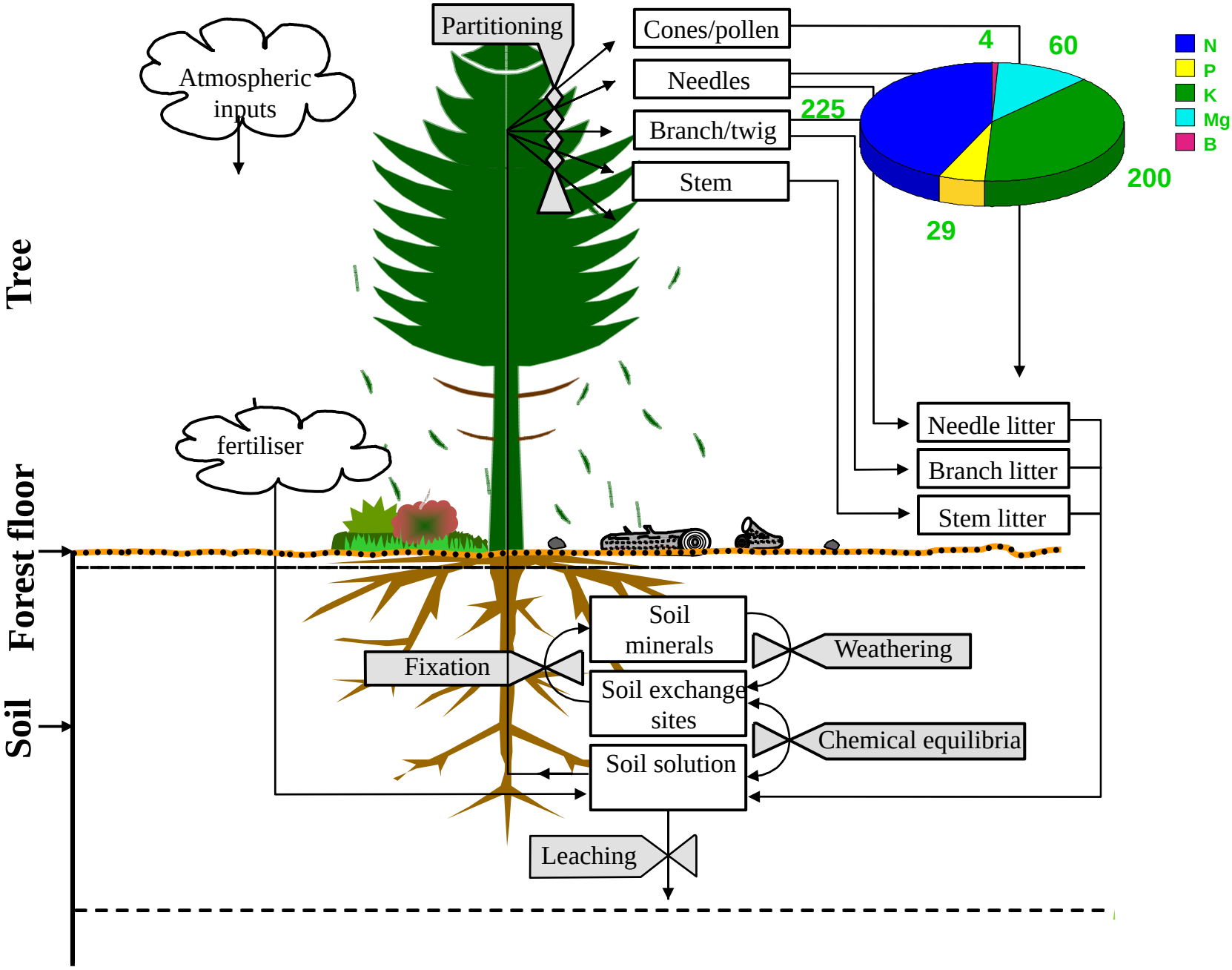

Number of foliage samples analysed for fertiliser recommendations
Number of Samples
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year


Tree
Forest floor
Soil
Atmospheric inputs
fertiliser
Partitioning
Cones/pollen
Needles
Branch/twig
Stem
4
60
225
200
29
N
P
K
Mg
B
Needle litter
Branch litter
Stem litter
Soil minerals
Weathering
Fixation
Soil exchange sites
Chemical equilibria
Soil solution
Leaching

Percentage of harvest exported as logs

56%