

Rotoehu – Catchment Thinking

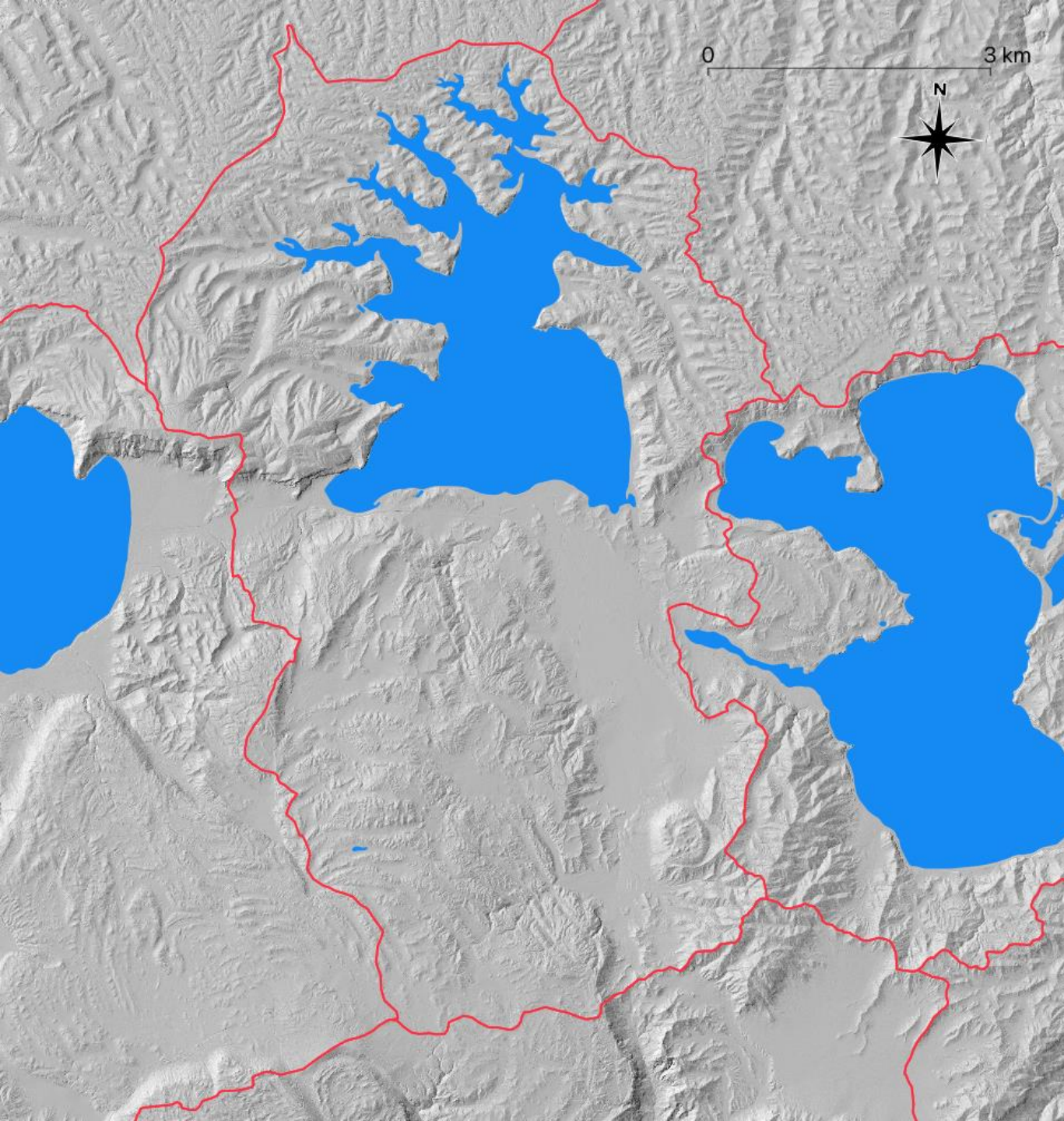
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Bay of Plenty Regional Council Chair in Lake and Freshwater Science



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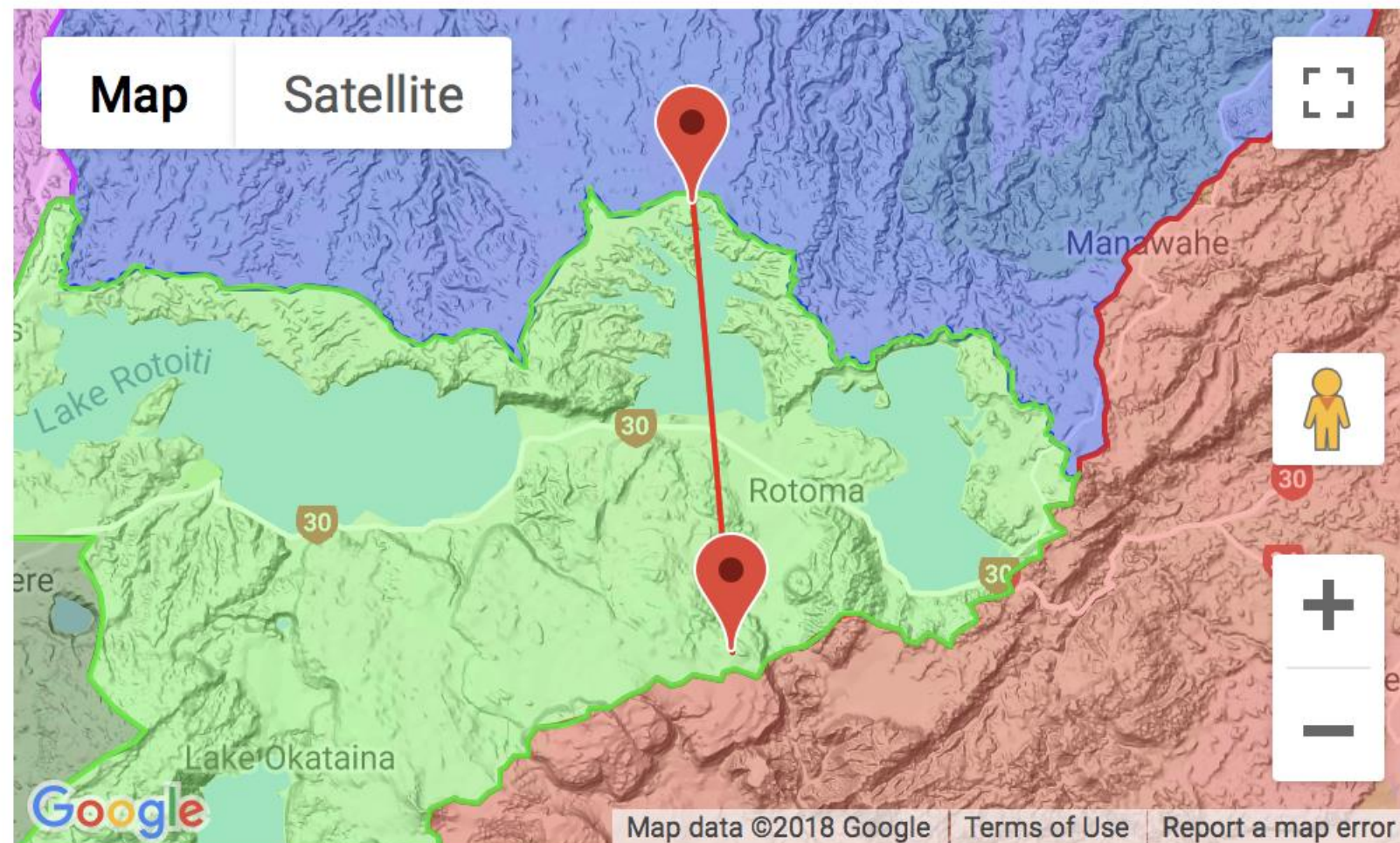
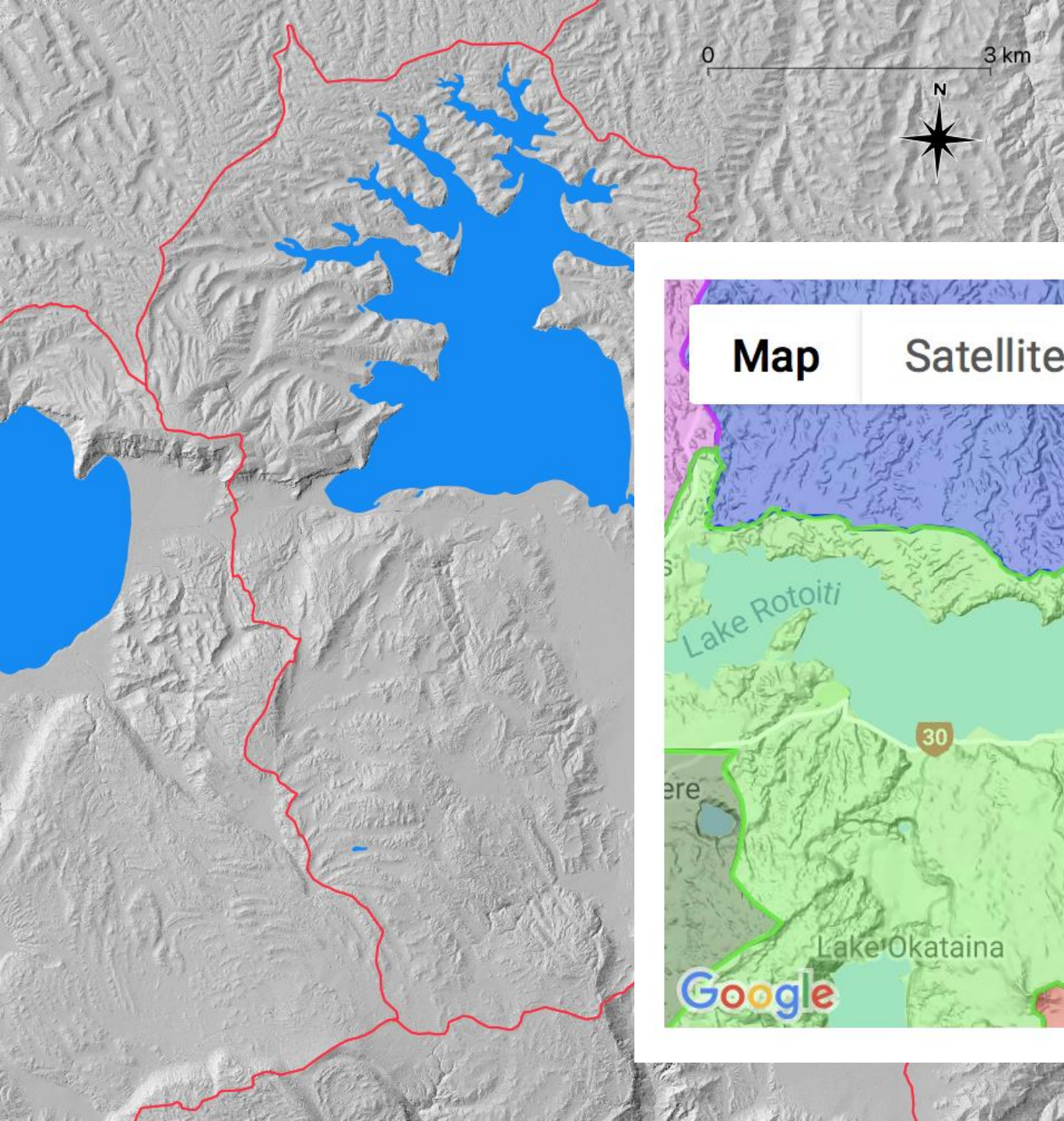
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TE MĀTAURANGA PŪTAIAO ME TE PŪKAHA



**Groundwater
catchment?**

Earth Beneath Our Feet

GNS/BOPRC



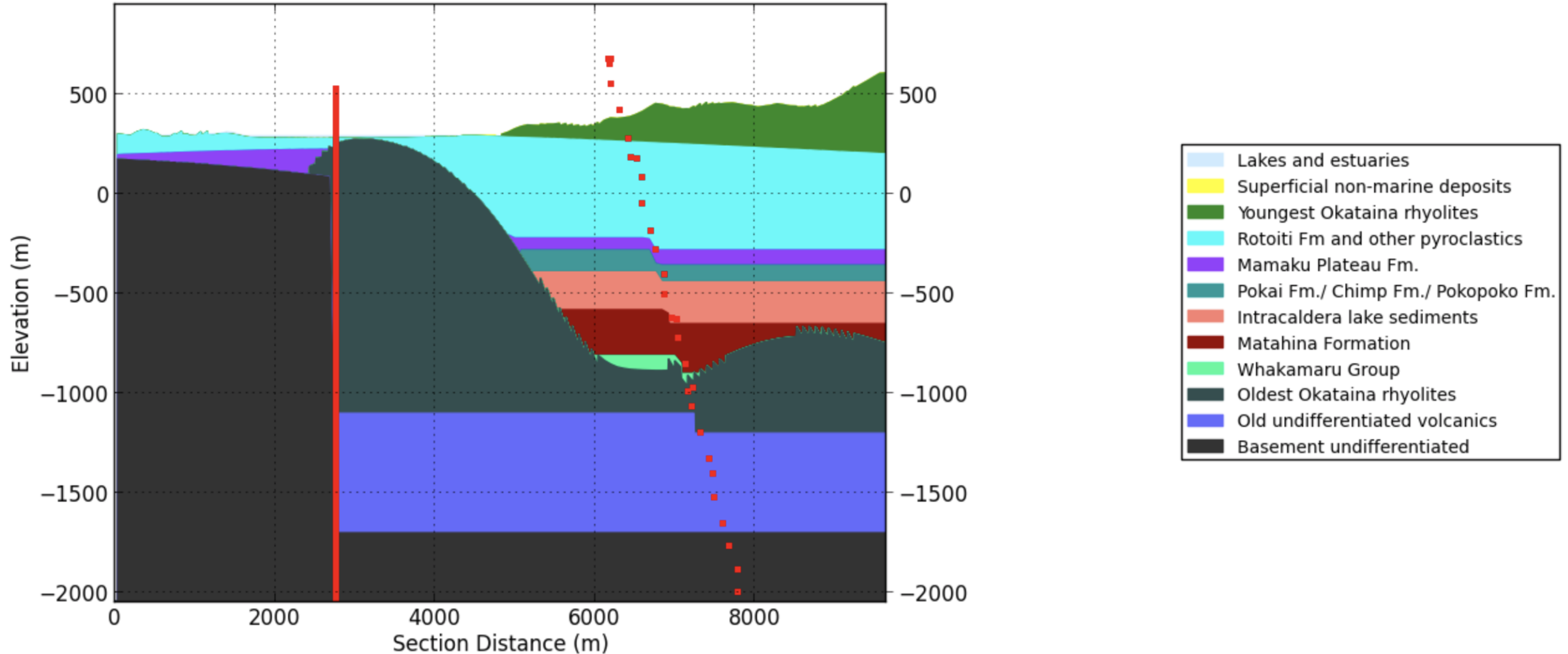
Earth Beneath Our Feet

GNS/BOPRC

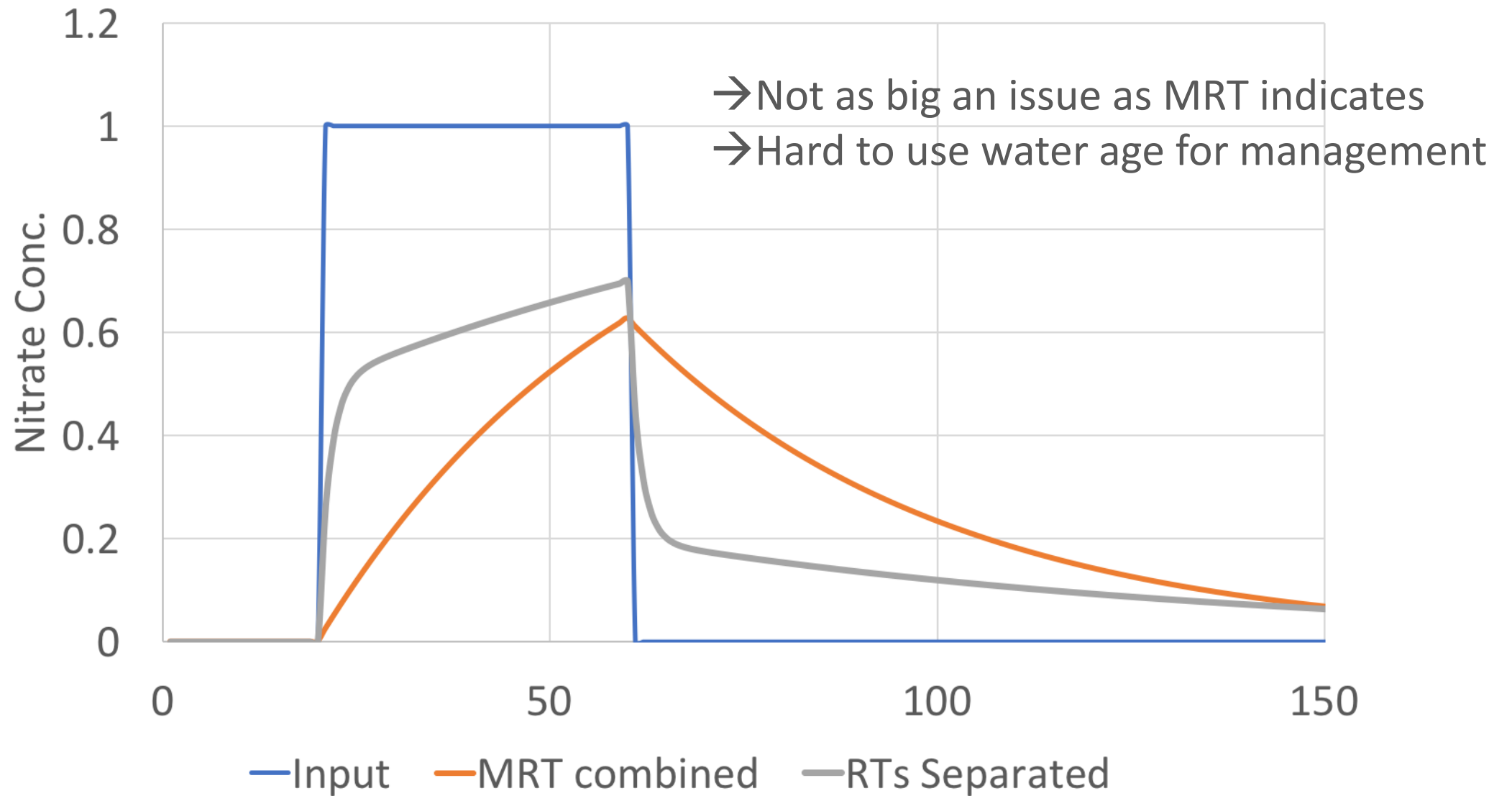
Geological Model Cross Section

Section Start (A): 2820102, 6350593

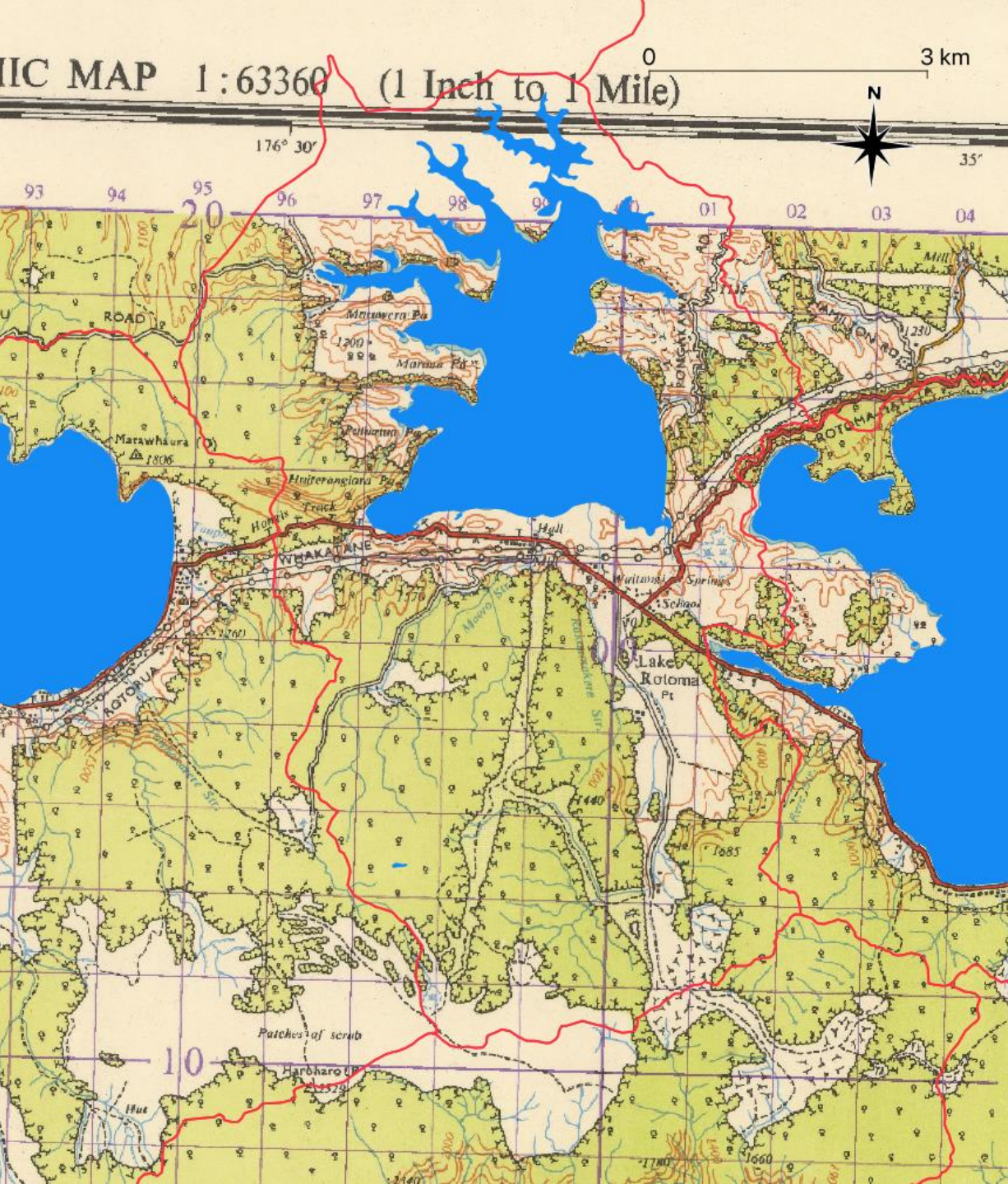
Section End (A'): 2820566, 6340964



1 MRT vs 2 RTs governing N inflow & outflow



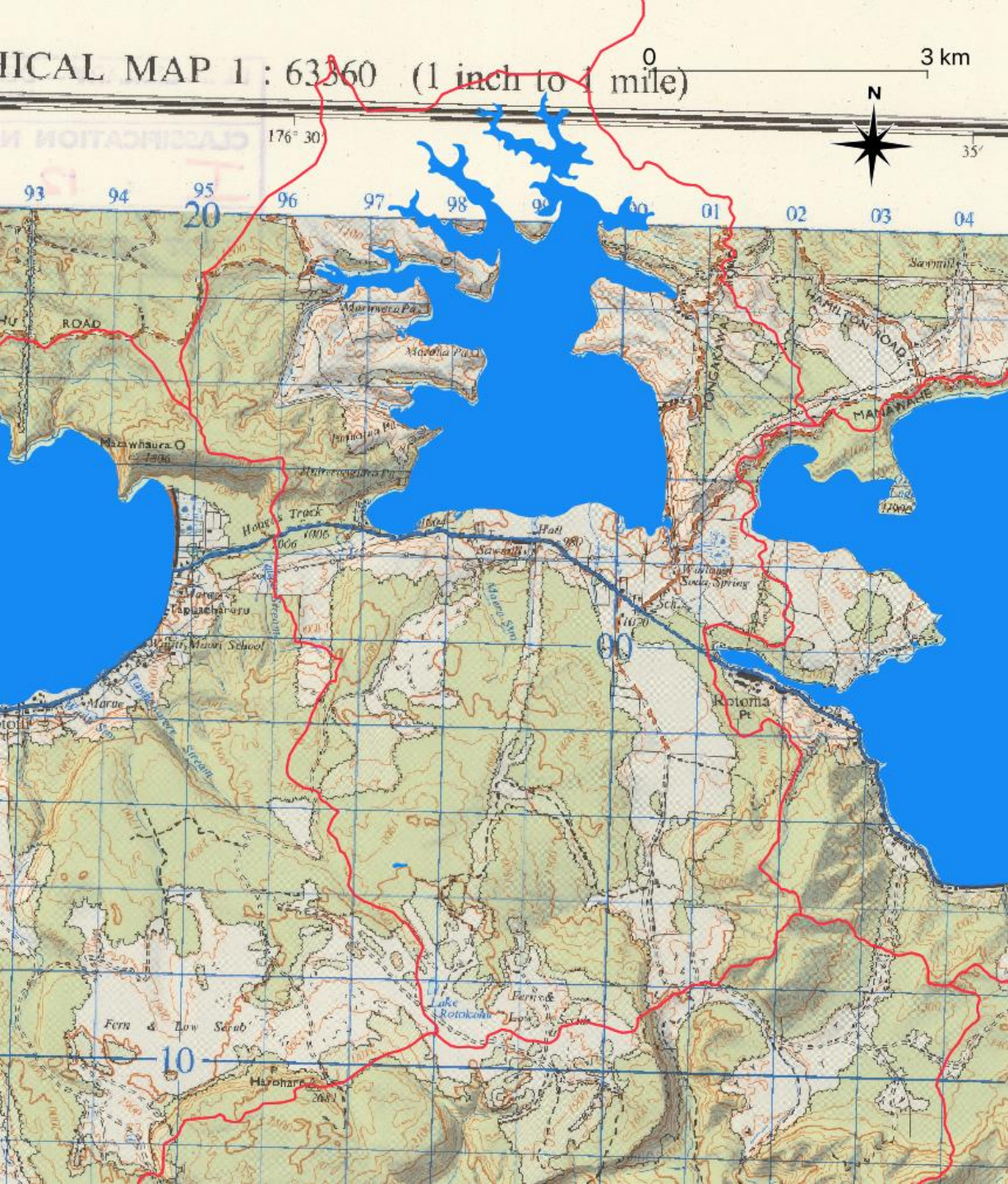
2 year RT + 80 year RT \neq 41 year MRT



1952 map

~1945 aerial photos

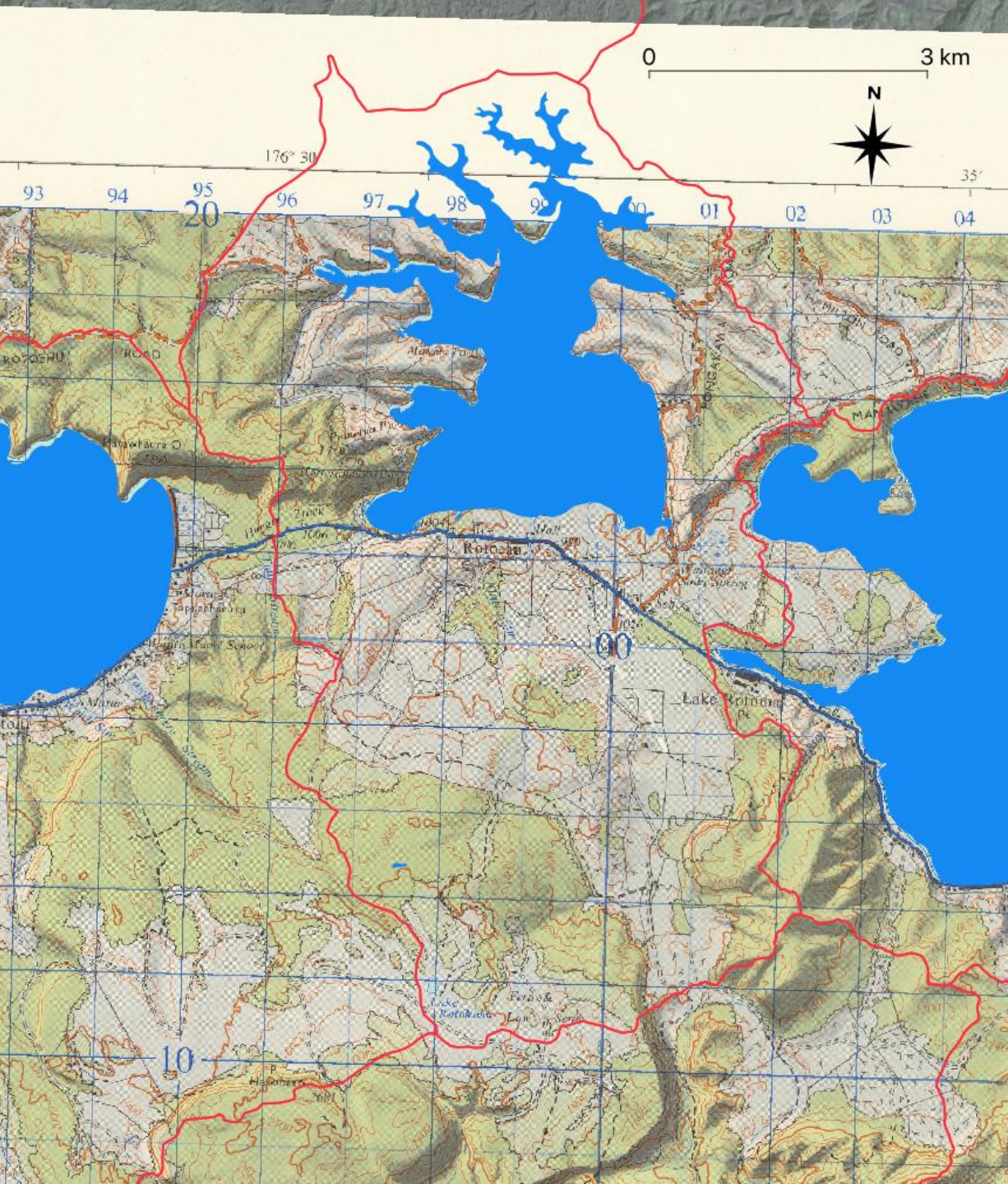
bush



1965 map

~1952, 1962-3 aerials

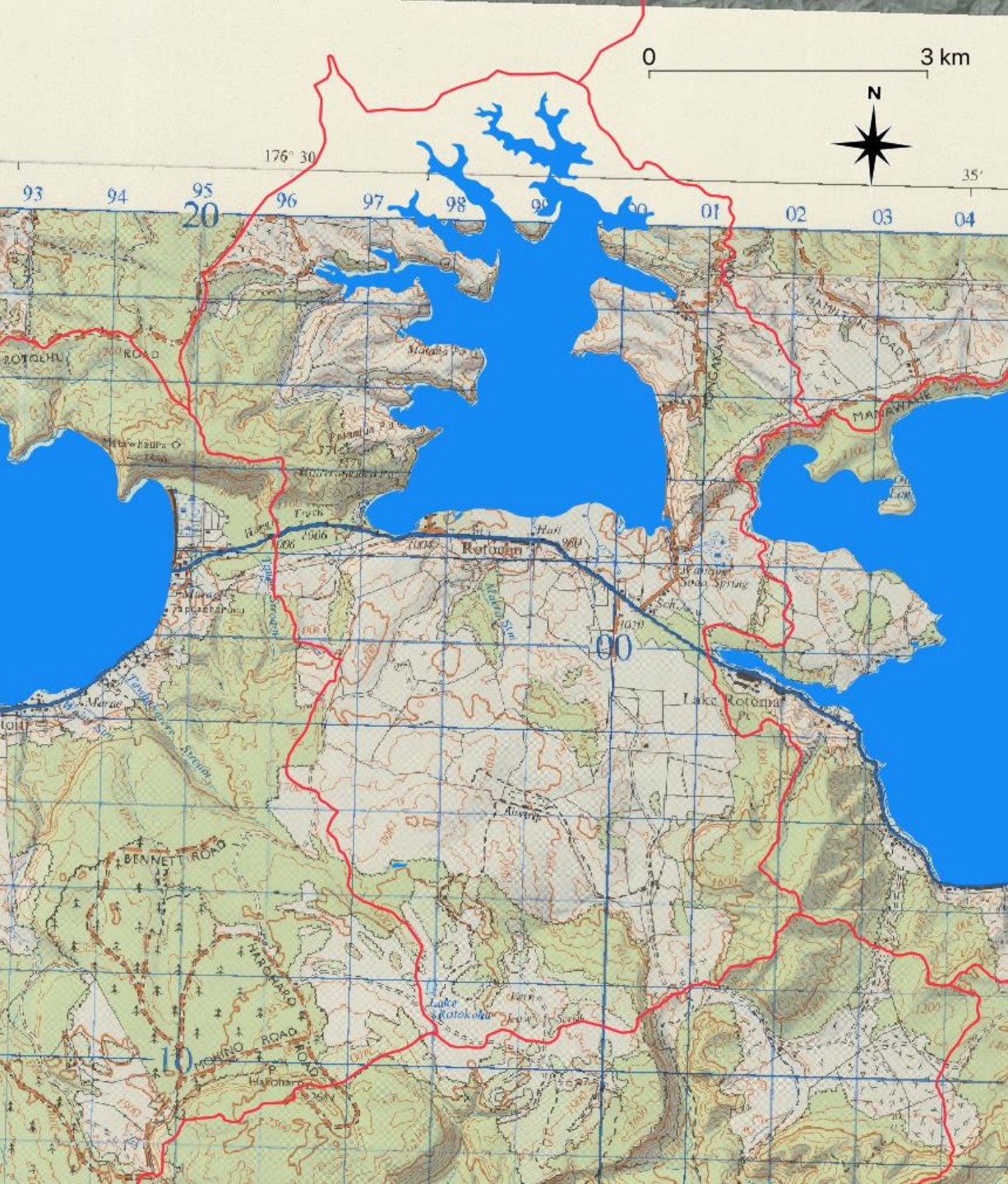
bush



1971 map

~1966 aerial

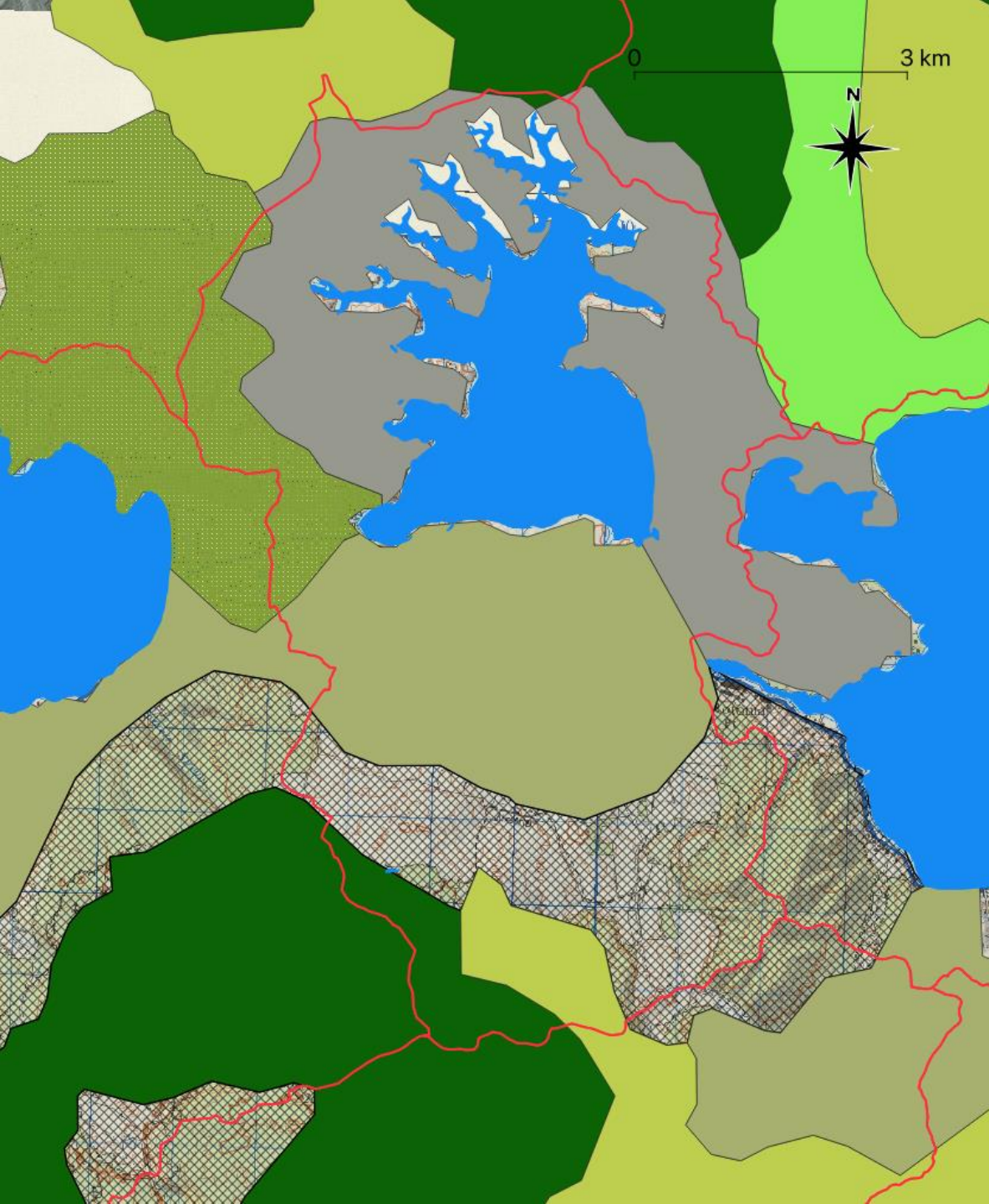
bush



1979 map








~1966 aerial

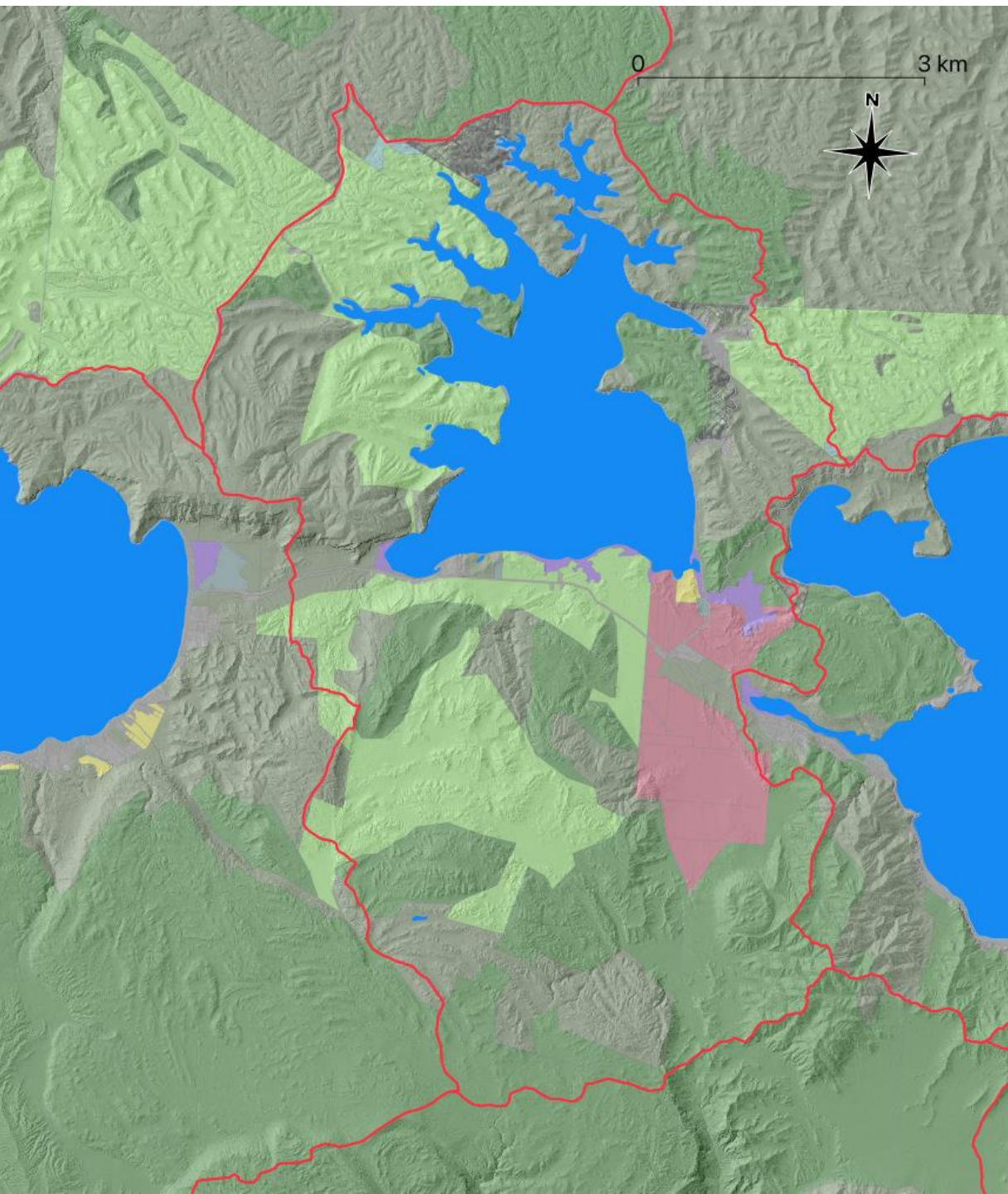
pasture



1986 VCM

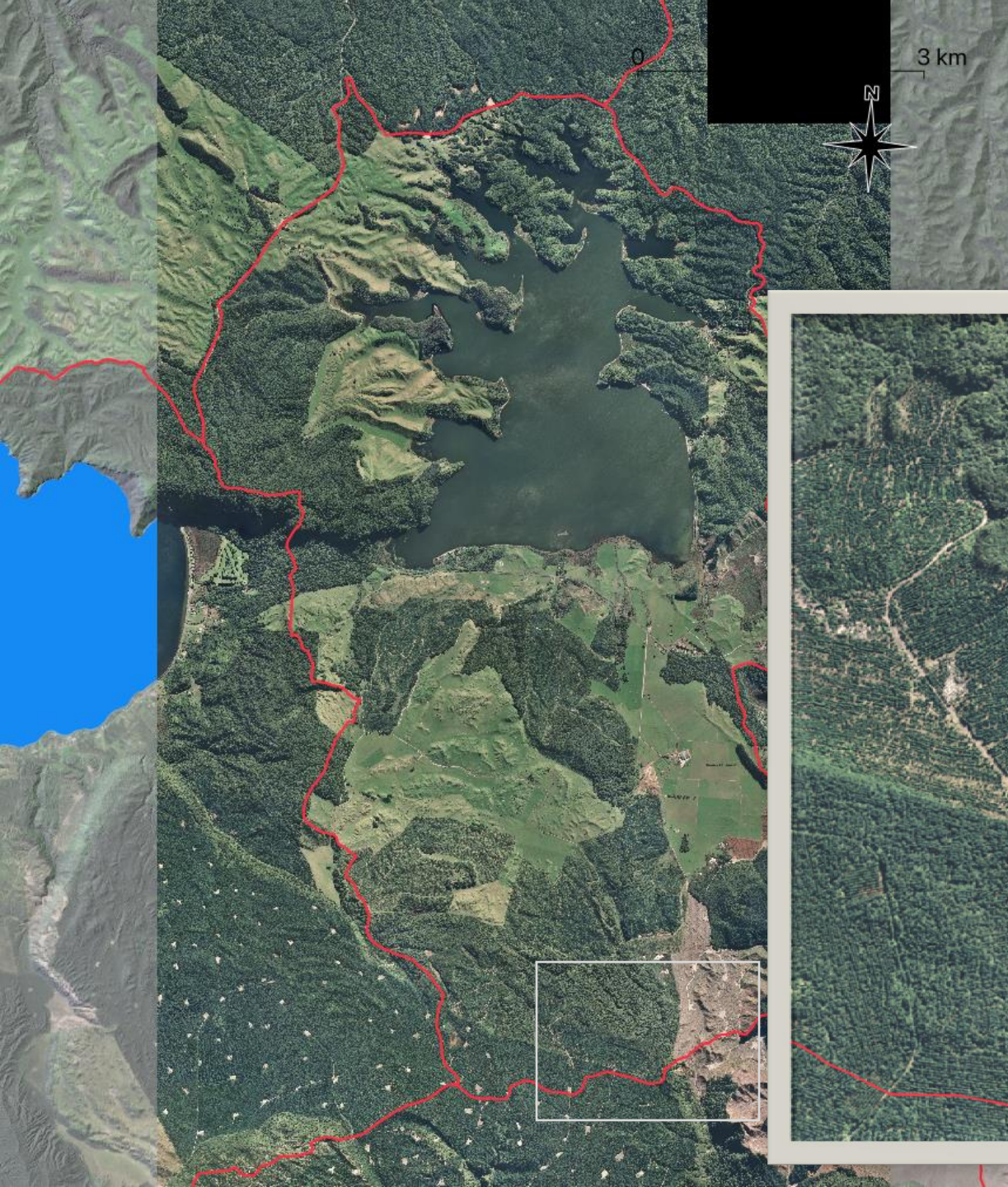
~mid-1980s 1:1M

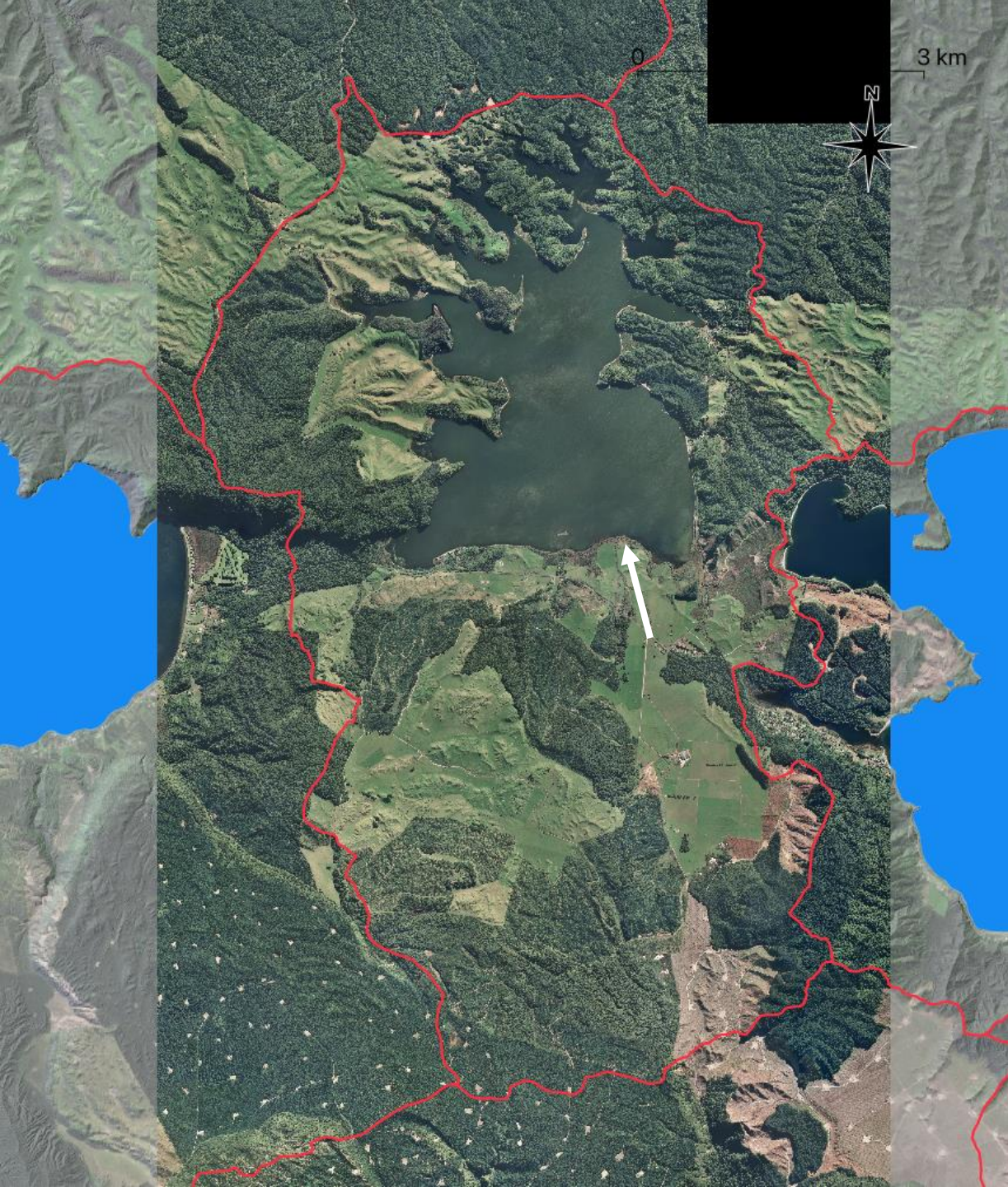
-  Broadleaved forest and scrub
-  Exotic forest
-  Grassland and Leptospermum scrub or fern
-  Grassland and mixed indigenous scrub
-  Improved pasture
-  Lowland podocarp-broadleaved forest
-  Podocarp-broadleaved forest and scrub



2017 BOPRC LU

2015 Aerials







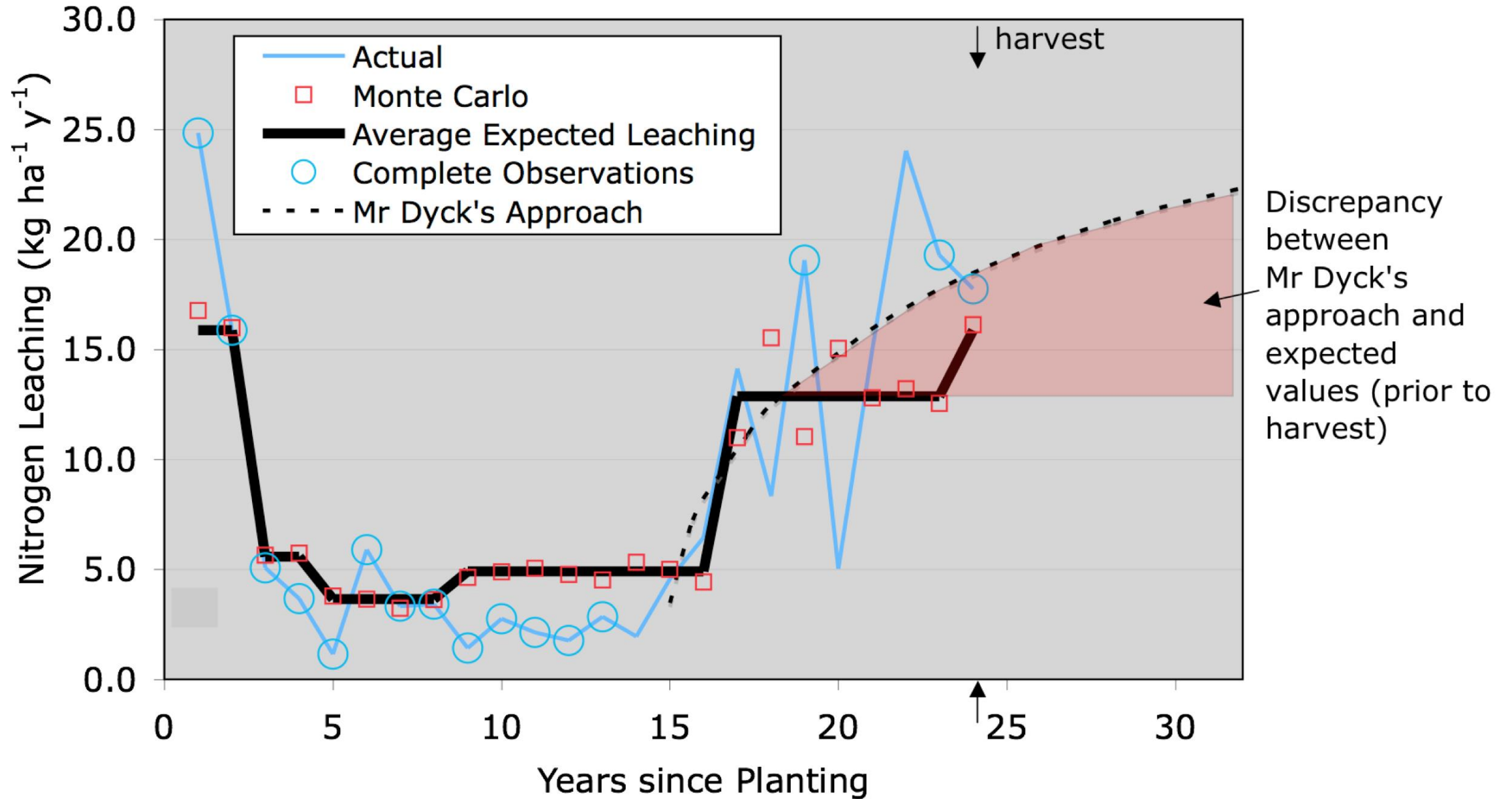
S2 true colour

~ 9 Sept 2018

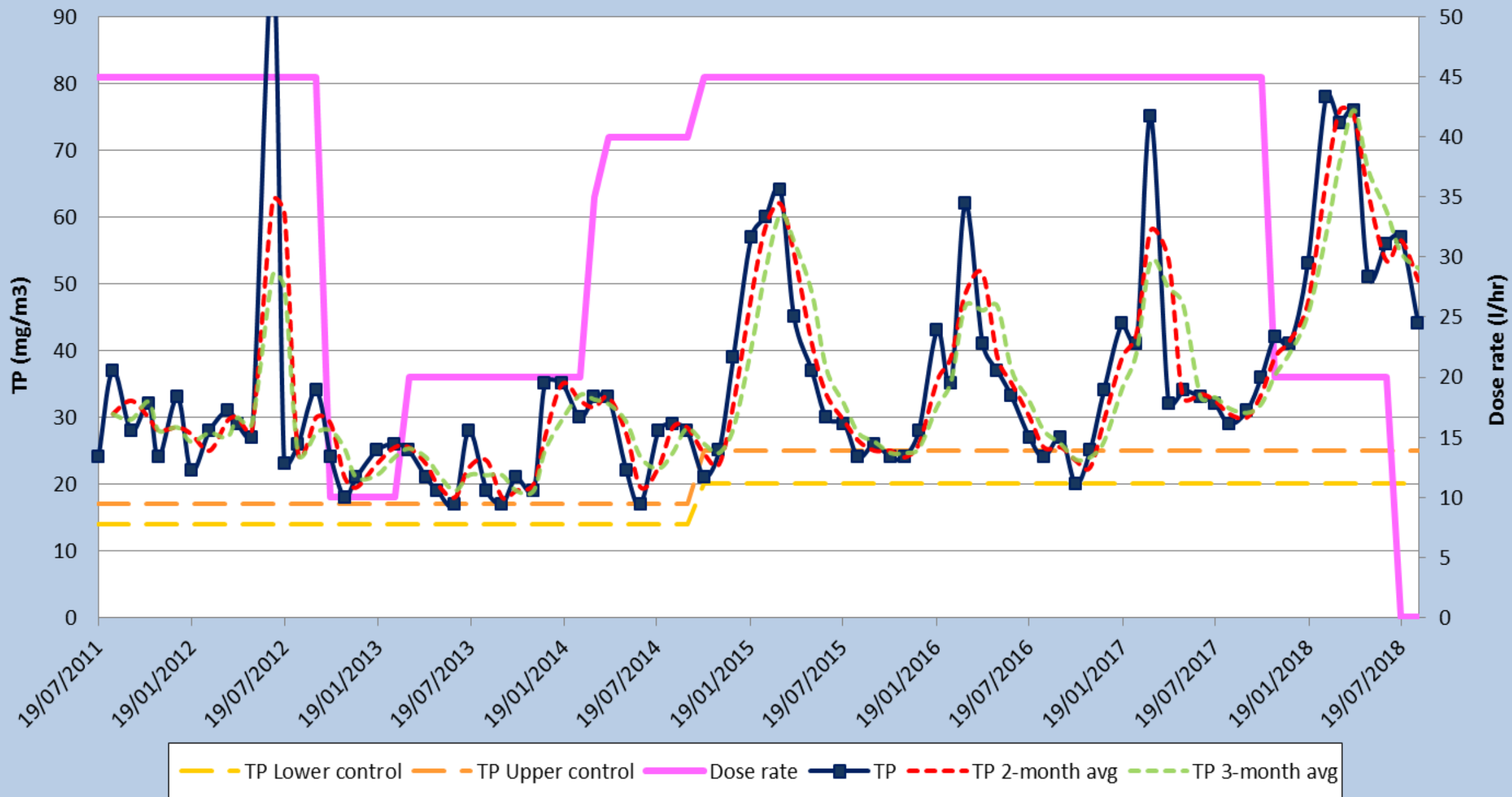
16 Feb 2018



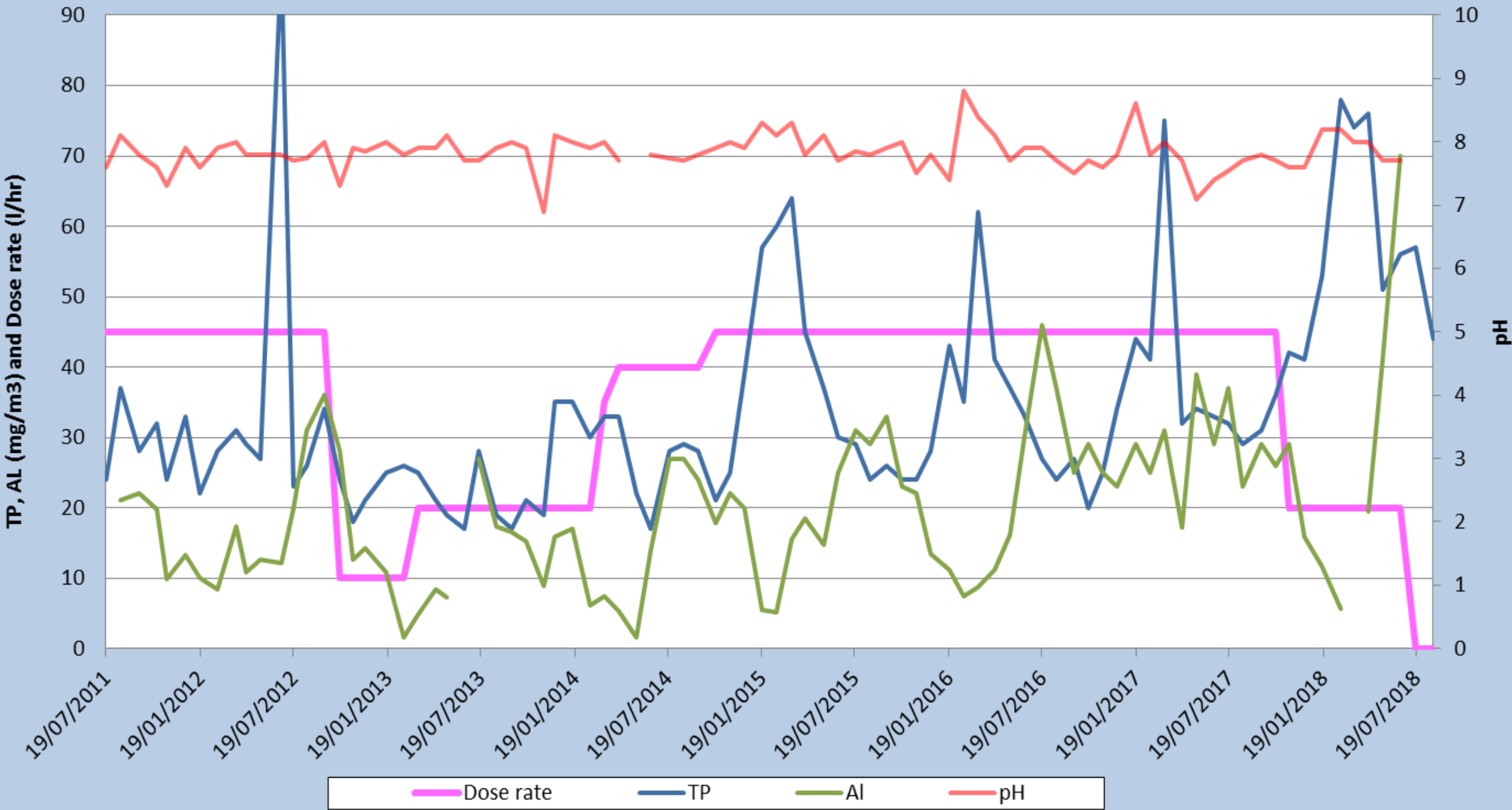
Nitrogen Leaching from the Root Zone of Forest in the Puruki Catchment



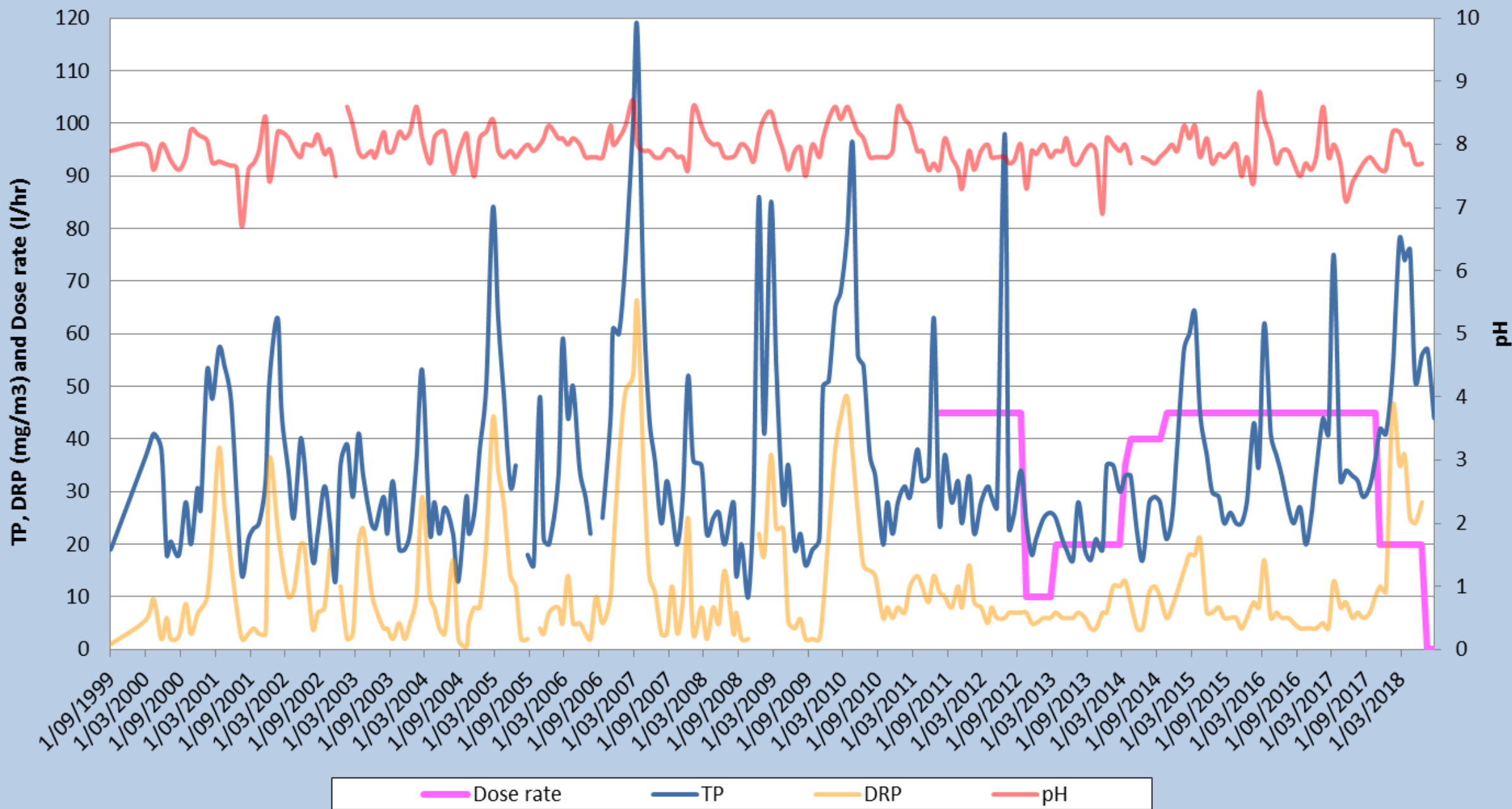
Rotoehu TP and Alum dose rates 2011 - 2018



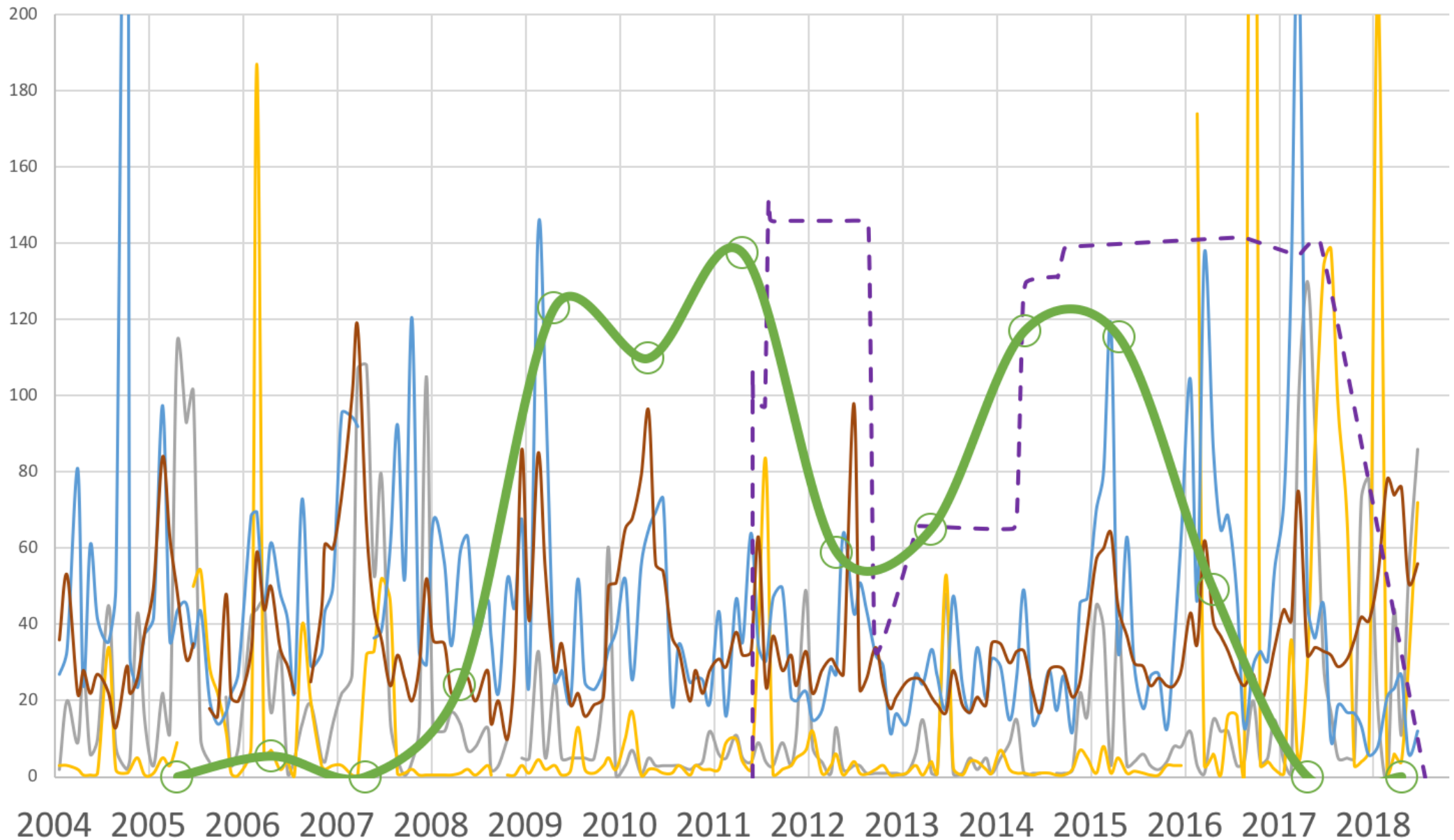
Rotoehu TP, Al, pH levels and Alum dose rates 2011 - 2018



Rotoehu TP, DRP, pH levels and Alum dose rates 1999 - 2018



Rotoehu



— NH4N — NO3N — CHLA x5 — TP - - Alum (T/d) x100 —○— Weed harvest DM

Trophic Level Index

0.00

1.00

2.00

3.00

4.00

5.00

Rotorua 2004-2006

Rotorua 2015-2017

Rotorua Target

Rotoehu 2004-2006

Rotoehu 2015-2017

Rotoehu 2018

Rotoehu Target

Tarawera 2004-2006

Tarawera 2015-2017

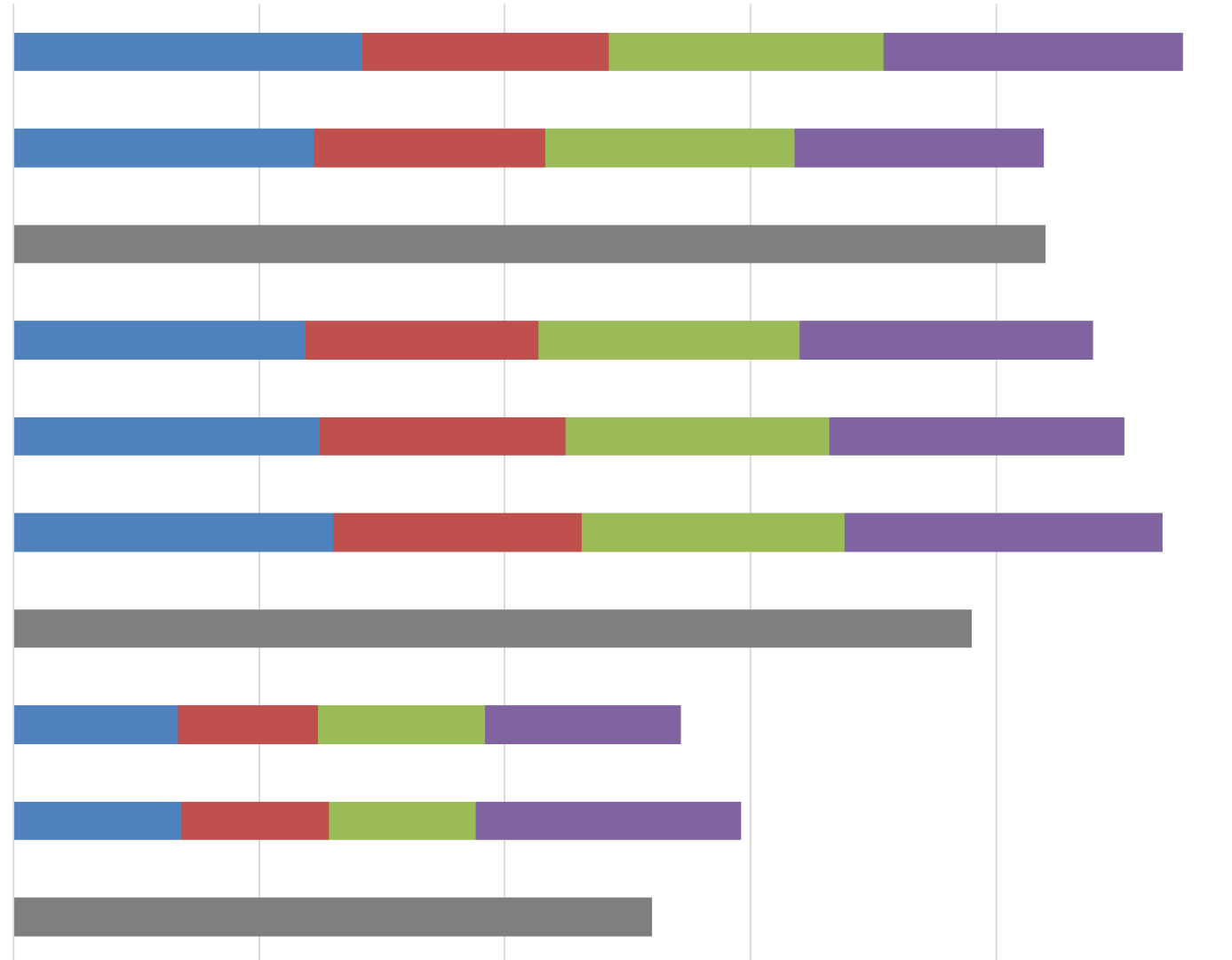
Tarawera Target

Chl-a

Secchi

TN

TP



Nutrient Budgets

- Useful budgets show dominance of pastoral inputs
 - Uncertainties poorly known?
 - Need action plan budget updated to Overseer 6.x
 - Mitigation opportunities on land not evaluated?
- No number for cyanobacterial N inputs
- Significant in-lake sources
- Geothermal variability?
- Need dynamics for land use inputs and legacy
 - Could be 5-10 year impacts in forest growth/harvest cycles
- Weed (hornwort harvest) exceeded expectations
 - Eg., in 2015: 2,882 tonnes harvested → 3,458 kg N and 461kg P
- If we could get back to this harvest, could balance legacies?
 - ~7-10% of N budget; 15-25% of P budget?

Useful hypotheses

- Null: It's all climate.
 - Geothermal variability matters
 - Relevant to setting TLI
 - Deposition zone and biogeochemistry of Fe-P matters
 - Localised de-oxygenation?
 - Old groundwater probably not large, but groundwater catchment unknown? → not an issue?
 - Land-use legacies in planted forest need evaluation
 - “Attenuation” in catchment may vary from NZ averages
 - N & P both matter
-
- Progress in Rotorua and Tarawera N & P budgets can also be applied to Rotoehu.
 - Failure to respond to alum useful warning for Rotorua?