Biolinks Alliance
Connecting Central Victoria

Heathcote ‘Local 2 Landscape’ Plan

Local 2 Landscape Action Plan and Prospectus: A Plan for community-lead landscape-scale ecological restoration

April 2020

‘Spring Plains watershed repair – phase 1’

Members of the Heathcote community, with Biolinks Alliance (Biolinks) and with the support of the City of Greater Bendigo (CoGB), embarked on a Local2Landscape (L2L) Action Plan process to develop a community vision for restoring the ecological health of the Heathcote environment.

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Local to Landscape Action Plan and Prospectus: A Plan for community-lead landscape-scale ecological restoration

April 2020

Draft

CITY OF GREATER BENDIGO

The '**Springs Plains watershed repair'** project is a landscape–scale restoration pilot project that targets a local hotspot for Threatened Woodland Birds (esp. Swift Parrot) and aims to repair landscape health and build resilience to Climate Change by scaling–up measures like ecological thinning that help make watersheds more absorbent and productive again.

funding – Phase 2 will be implementation across all public land within White's Gully (supported by

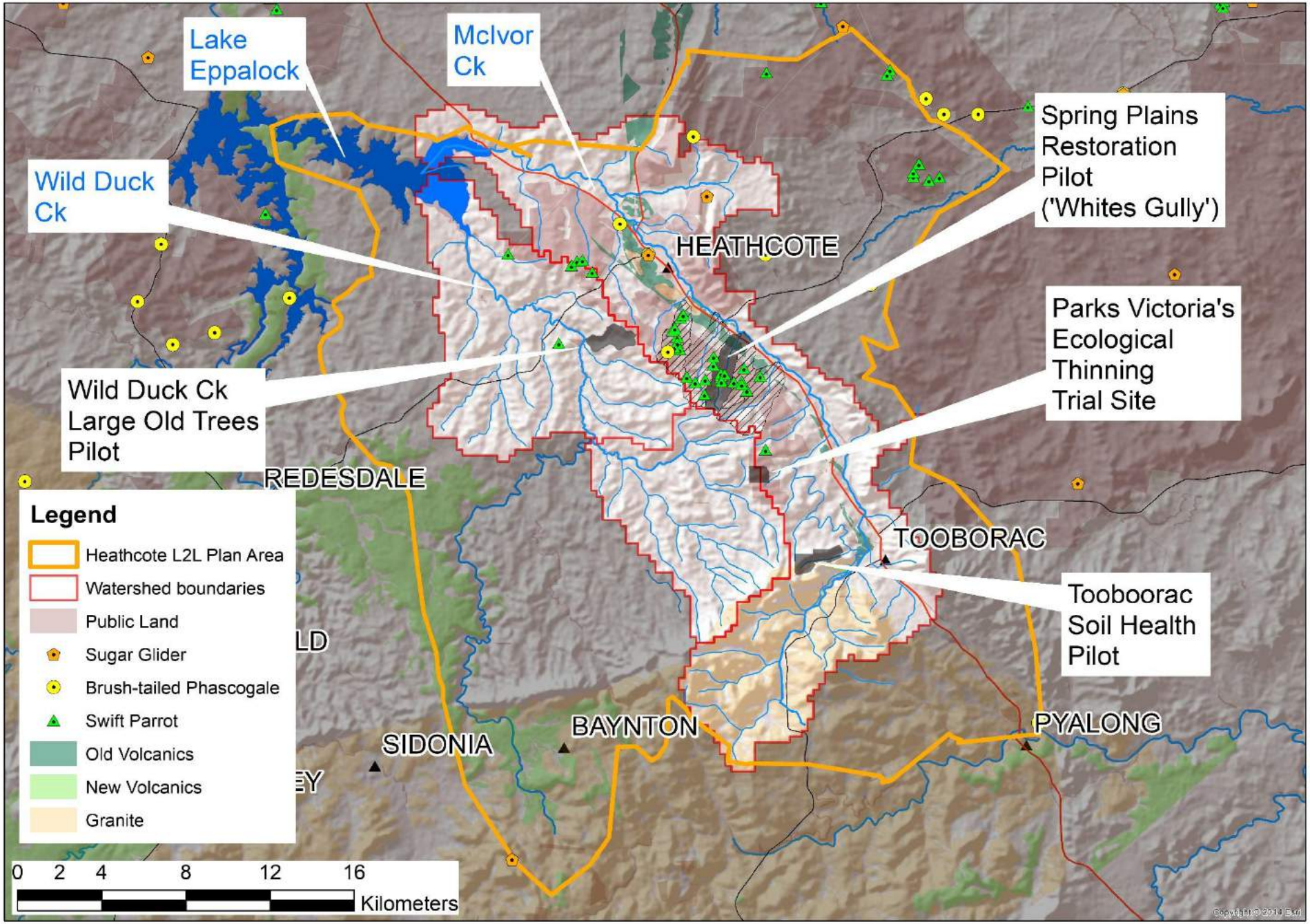
Recent trials conducted nearby by Parks Victoria has demonstrated the efficacy of **ecological thinning** (felling 50% of the canopy basal area and retaining *in situ* as 'coarse woody debris') for promoting tree and understorey growth, as well as boosting fauna habitat.

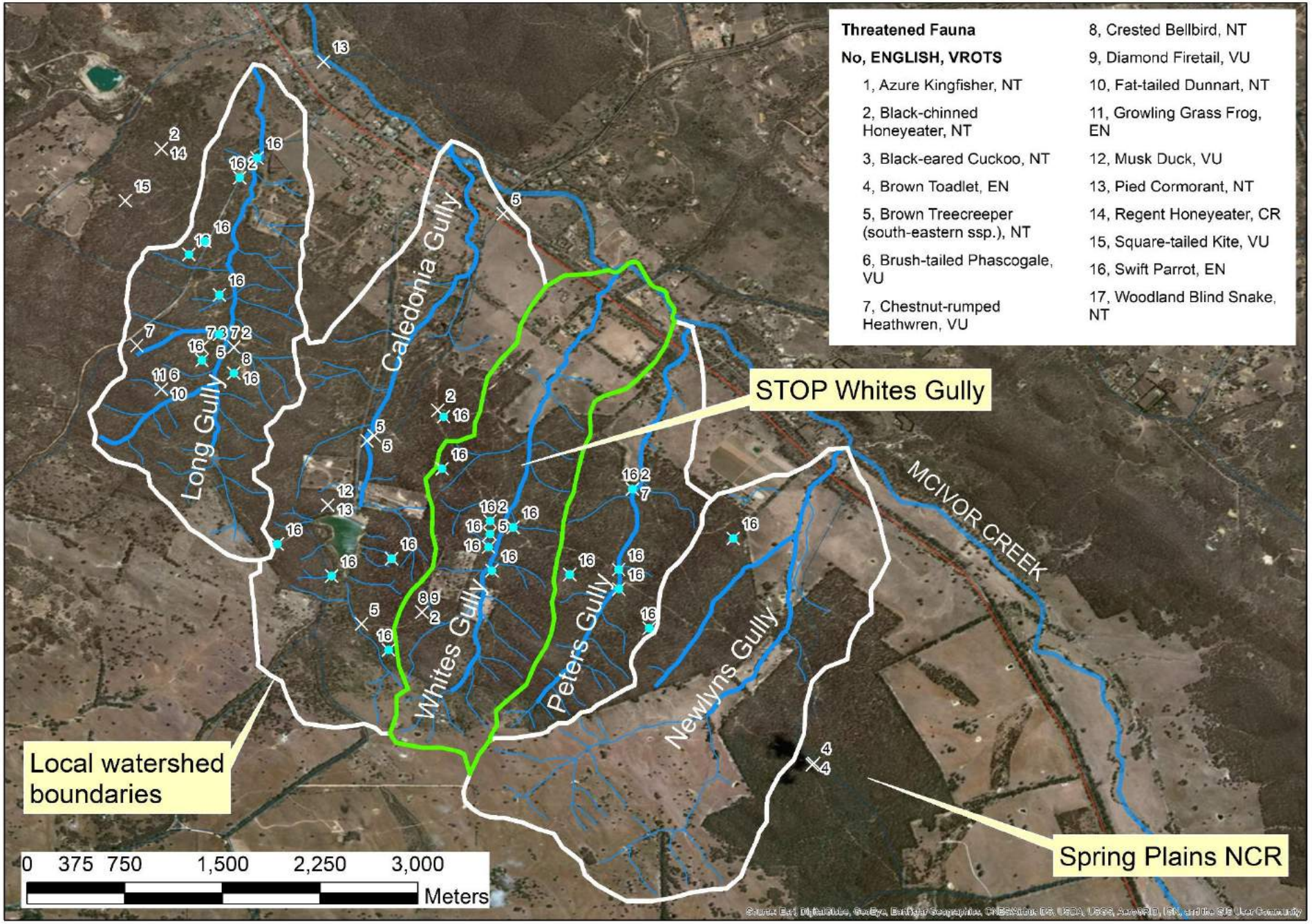
for nutrients, seeds and moisture. Other measures include: targeted contour ripping and

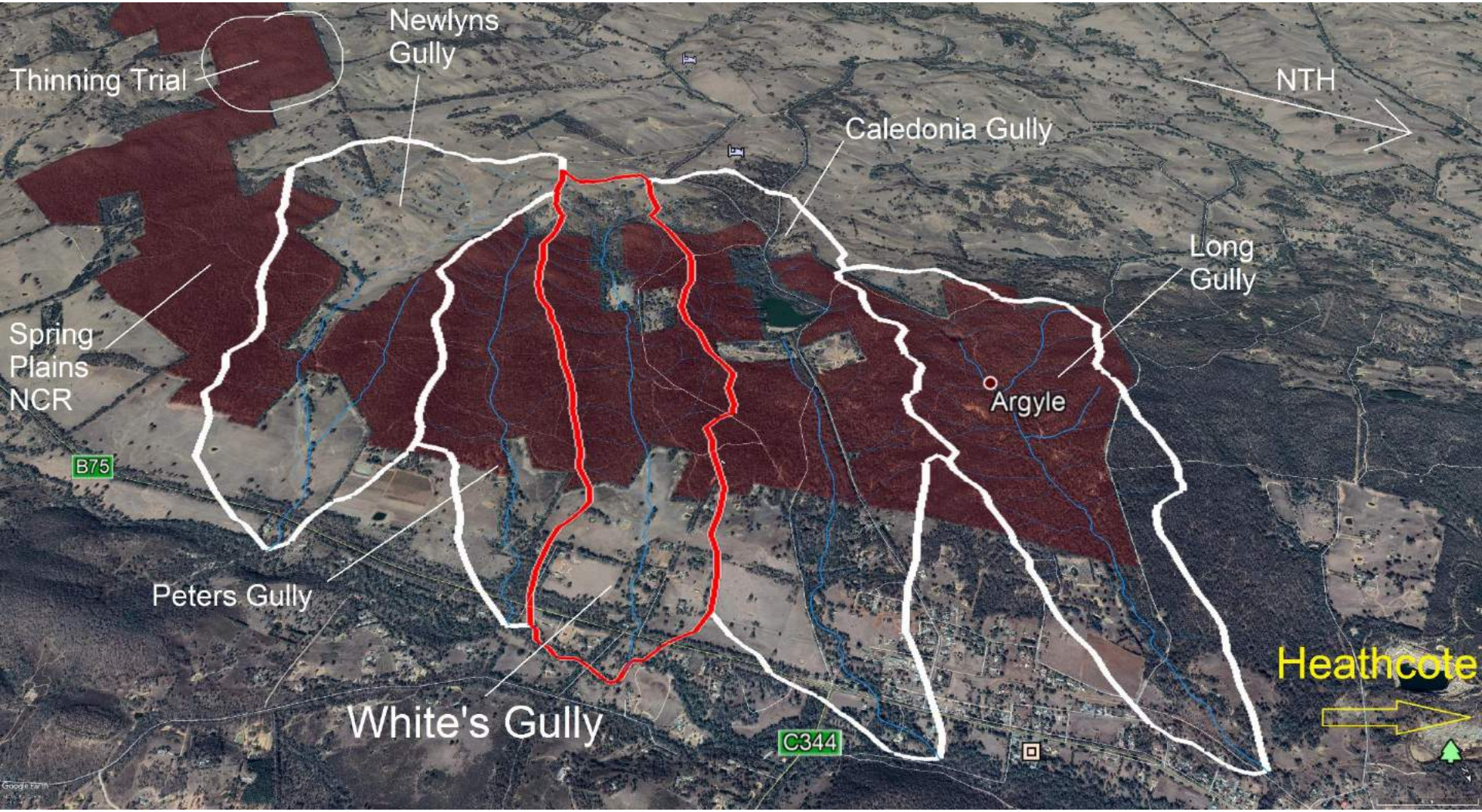
Landscape Ecology research elsewhere has show how ecological thinning can also greatly improve landscape hydrological function when rolled out at sufficient scale along with other measures.

The project will develop parallel community engagement and communication campaigns using local champions to leverage funding, boost awareness and promote take up elsewhere. Ideally, the

Other measures include: targeted **contour ripping** and revegetation of native grasses and other understorey plants (via direct seeding) to allow greater soil water infiltration, and begin the process of rebuilding soil health; and **in stream 'leaky weirs'** to promote cascades of semi–permanent ponds to encourage wetland flora and fauna.


Lake Eppalock
McIvor Ck
Wild Duck Ck
Spring Plains Restoration Pilot ('Whites Gully')
HEATHCOTE
Parks Victoria's Ecological Thinning Trial Site
Wild Duck Ck Large Old Trees Pilot
REDESDALE
TOOBORAC
Tooboorac Soil Health Pilot
SIDONIA
BAYNTON
PYALONG
Legend
Heathcote L2L Plan Area
Watershed boundaries
Public Land
Sugar Glider
Brush-tailed Phascogale
Swift Parrot
Old Volcanics
New Volcanics
Granite
0 2 4 8 12 16
Kilometers


Threatened Fauna
No, ENGLISH, VROTS
1, Azure Kingfisher, NT
2, Black-chinned Honeyeater, NT
3, Black-eared Cuckoo, NT
4, Brown Toadlet, EN
5, Brown Treecreeper (south-eastern ssp.), NT
6, Brush-tailed Phascogale, VU
7, Chestnut-rumped Heathwren, VU
8, Crested Bellbird, NT
9, Diamond Firetail, VU
10, Fat-tailed Dunnart, NT
11, Growling Grass Frog, EN
12, Musk Duck, VU
13, Pied Cormorant, NT
14, Regent Honeyeater, CR
15, Square-tailed Kite, VU
16, Swift Parrot, EN
17, Woodland Blind Snake, NT
STOP Whites Gully
Local watershed boundaries
Spring Plains NCR
MCIVOR CREEK
Long Gully
Caledonia Gully
Whites Gully
Peters Gully
Newlyns Gully
0 375 750 1,500 2,250 3,000
Meters


Thinning Trial
Newlyns Gully
NTH
Caledonia Gully
Long Gully
Spring Plains NCR
Argyle
B75
Peters Gully
White's Gully
C344
Heathcote

Policy and conceptual framework

- “The self-generating nature of degradation processes often means that restoration cannot be achieved by removing the stress that started the degradation [desertification] process.”
- “Consequently degraded landscapes are often abandoned” because the cost of restoration likely > boost to on-site production (rangeland context).
- “The watershed is a logical, natural management unit for restoration activities”

Arnalds and Archer (Eds) (2000). Rangeland Desertification. (Kluwer Academic Publishers, The Netherlands)

- In Box ironbark Forests, the (local) production imperative is less important than the conservation and moral imperatives to affect restoration;
- Critical to intervene to reverse desertification to simultaneously address multiple sustainability challenges – biodiversity, Climate Change - public investment to affect short and long term public benefits;
- Also has the potential to address fire hazard reduction and community perception that parks aren’t being managed;
- Still important to minimise costs so all proposed interventions will be assessed for cost-effectiveness

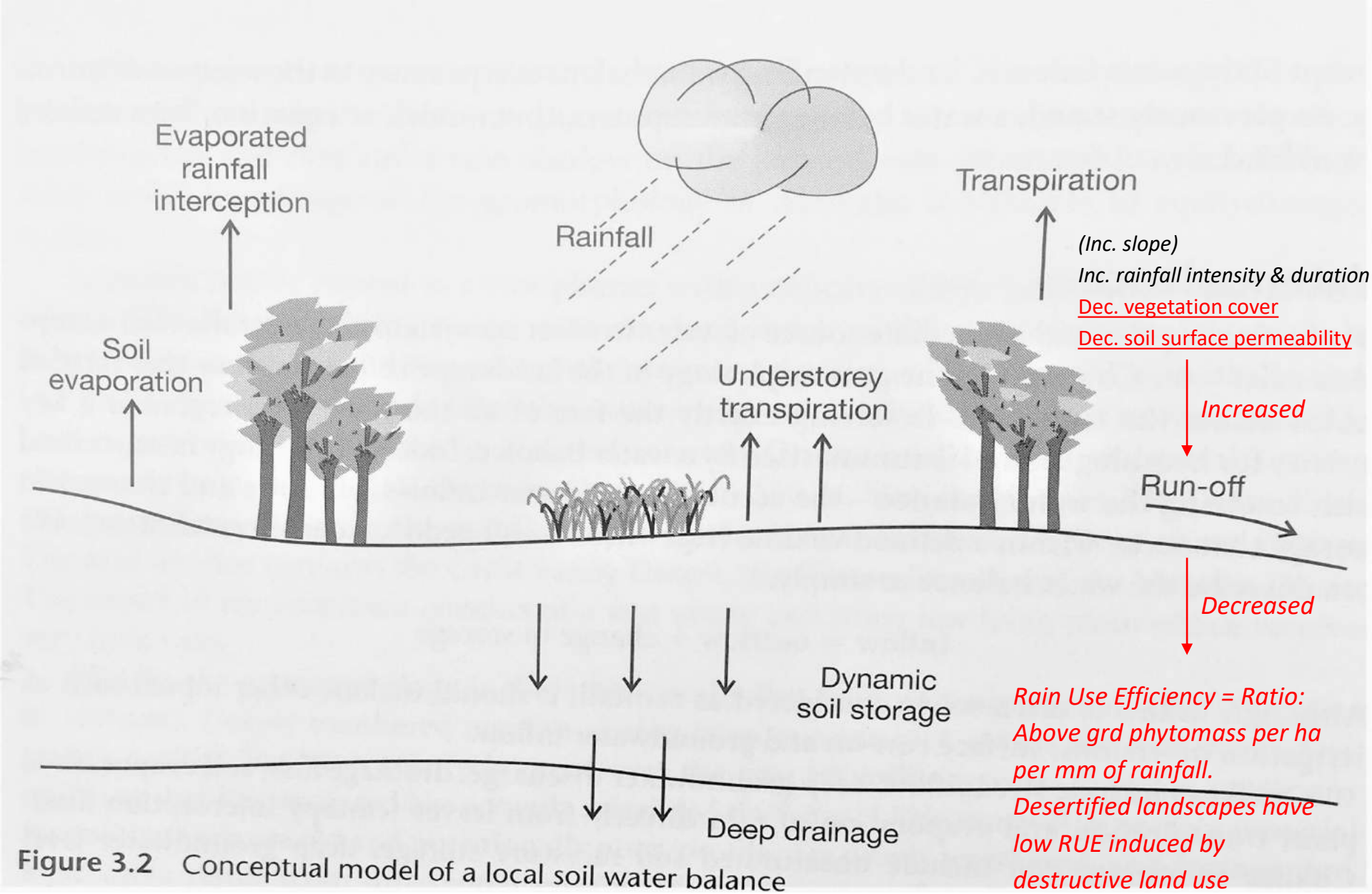
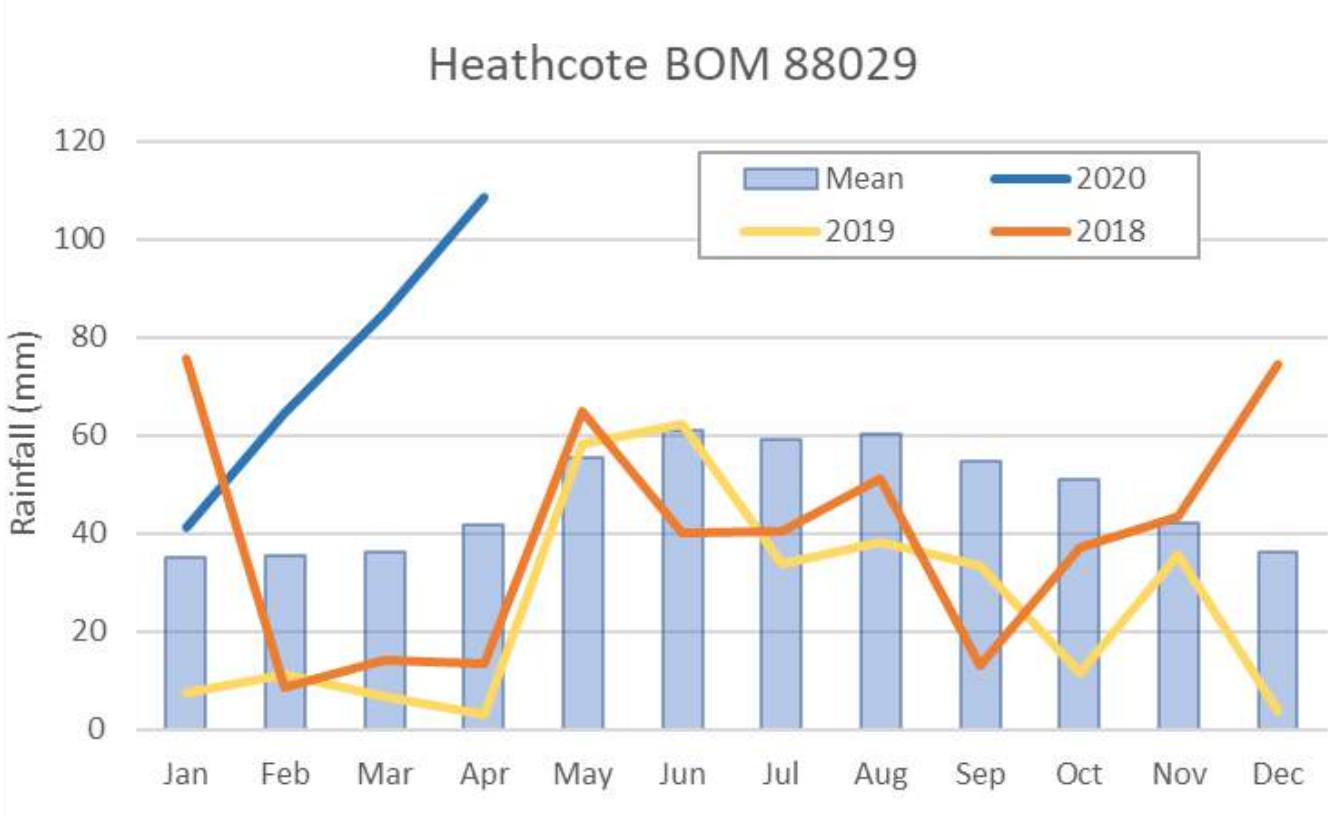


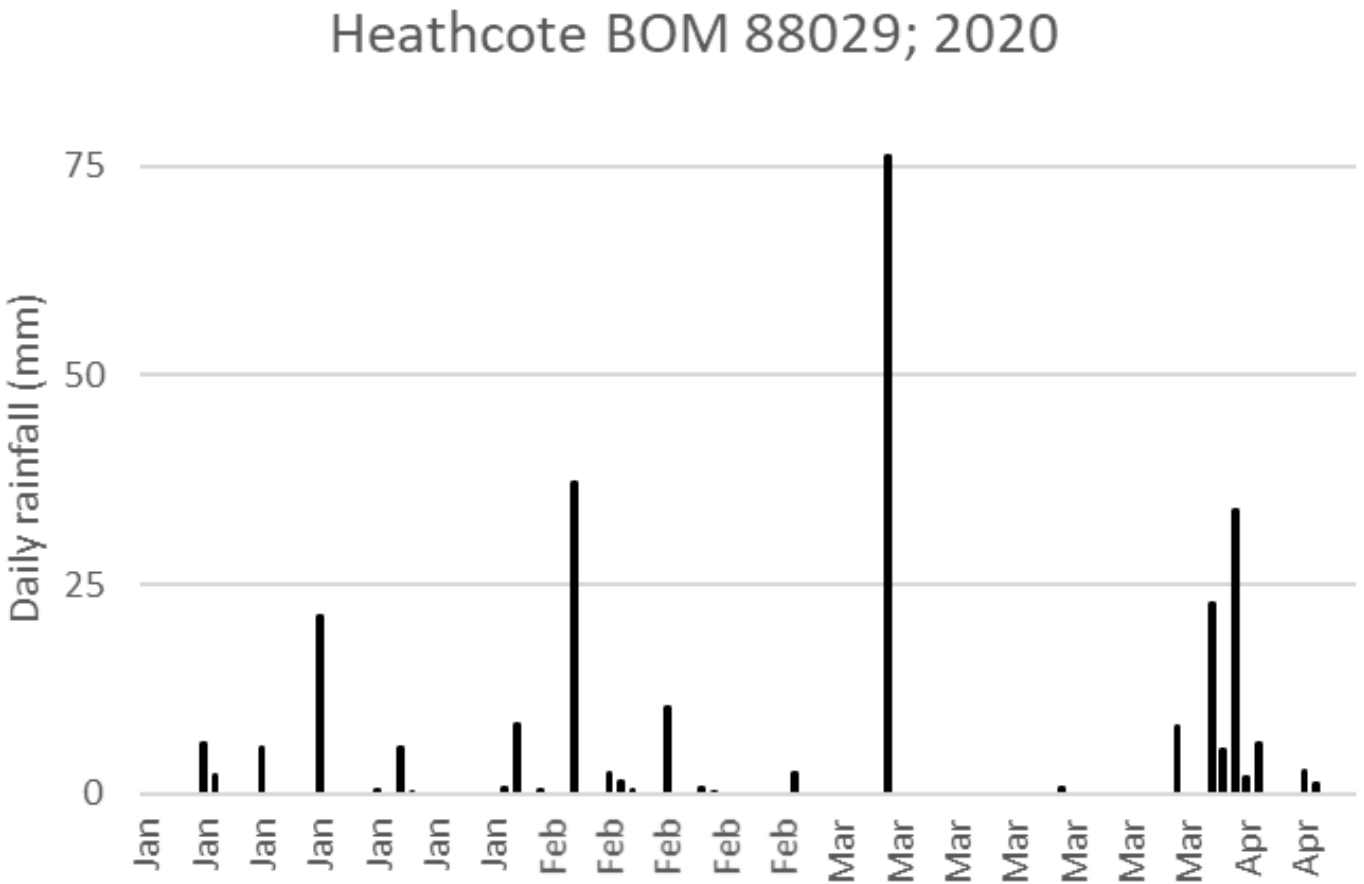
Figure 3.2 Conceptual model of a local soil water balance

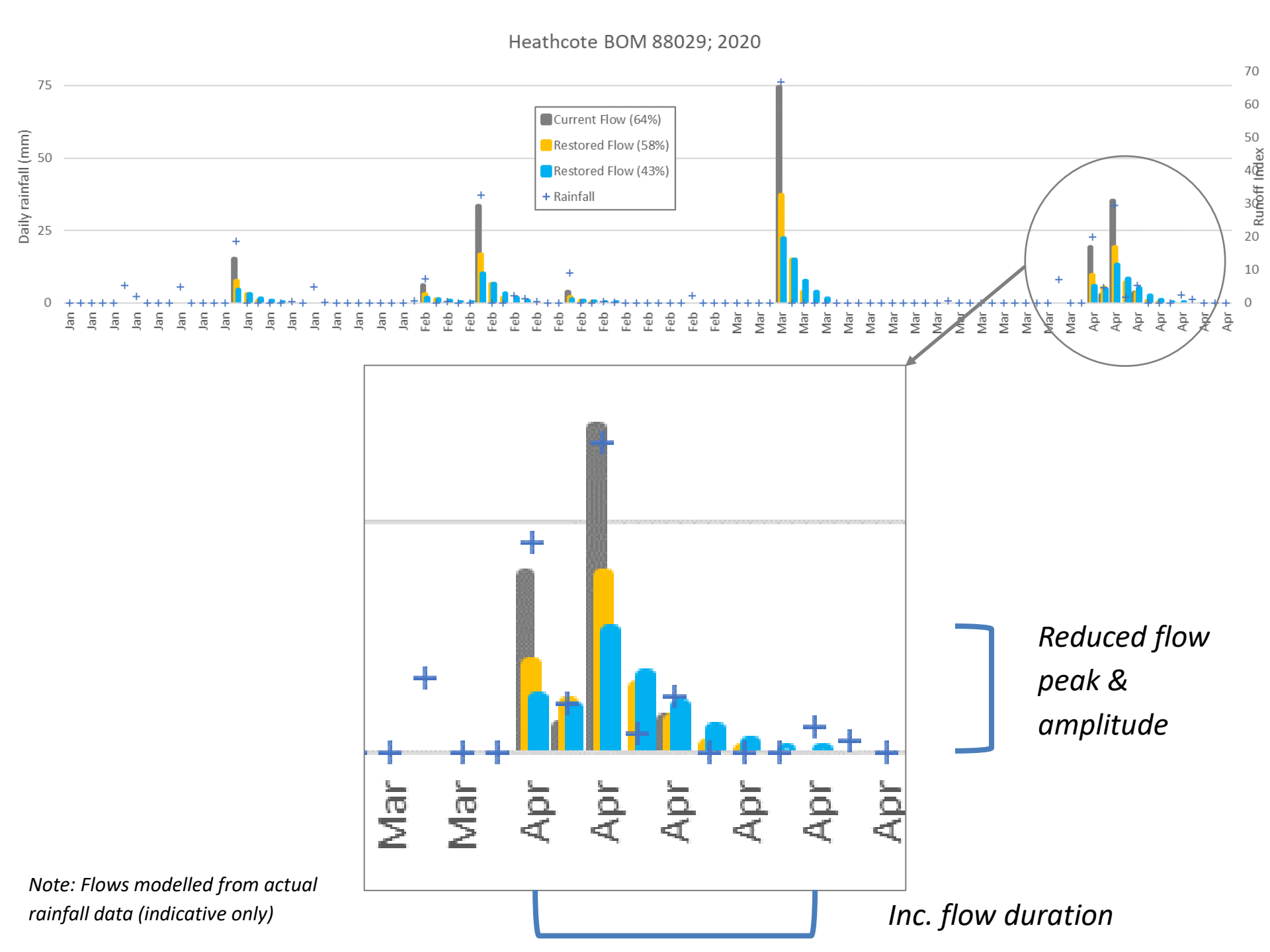
Eamus et al. (2006). 'Ecohydrology – vegetation function, water and resource management.' (CSIRO Publishing, Melbourne).



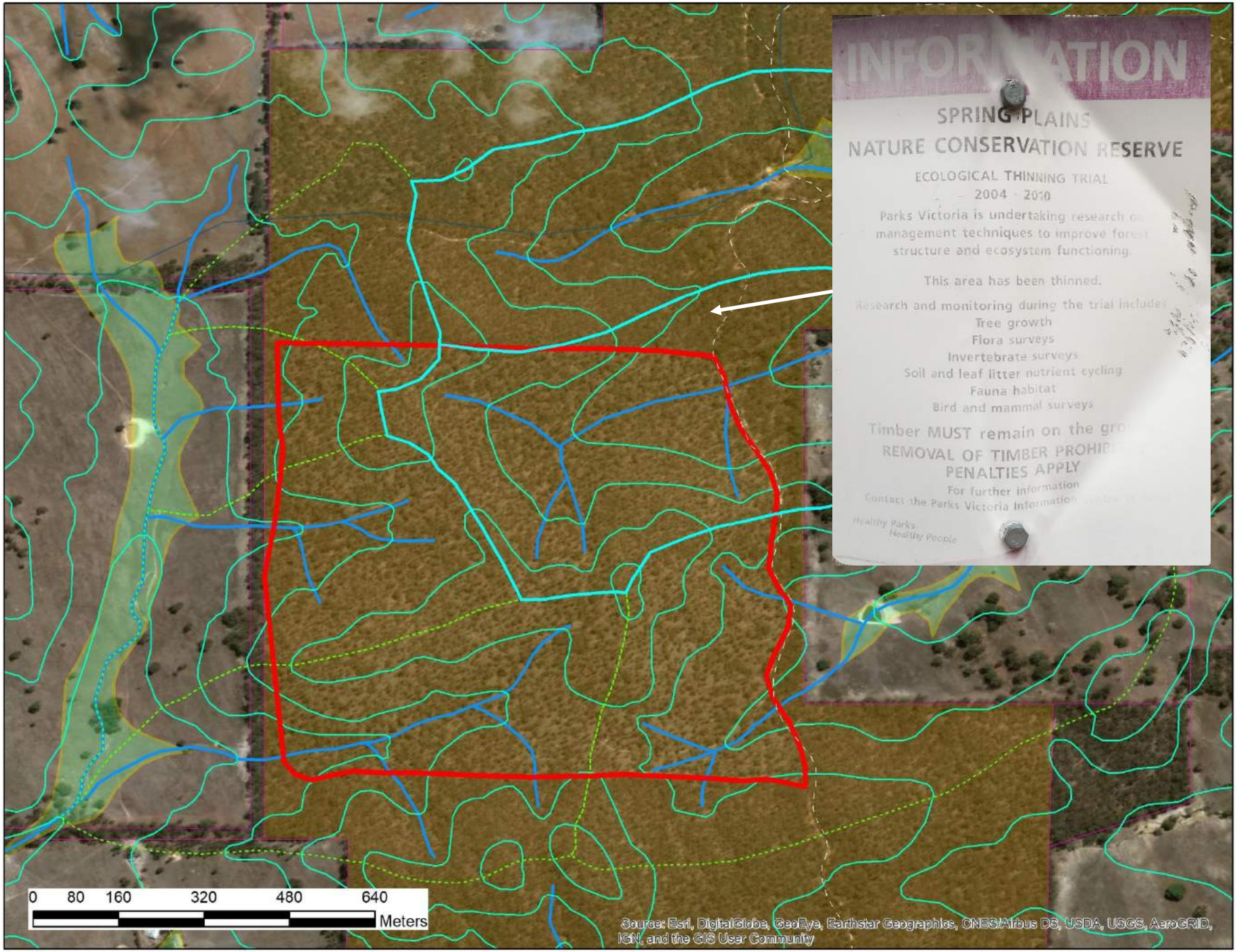
Very wet start to 2020:

Daily Max: Jan = 21.2; Feb = 37.2; Mar = 76.2; April = 108+ (13 days)


Heathcote BOM 88029; 2020
Daily rainfall (mm)
75
50
25
0
Jan
Jan
Jan
Jan
Jan
Jan
Jan
Feb
Feb
Feb
Feb
Feb
Mar
Mar
Mar
Mar
Mar
Mar
Apr
Apr



Note: Flows modelled from actual rainfall data (indicative only)

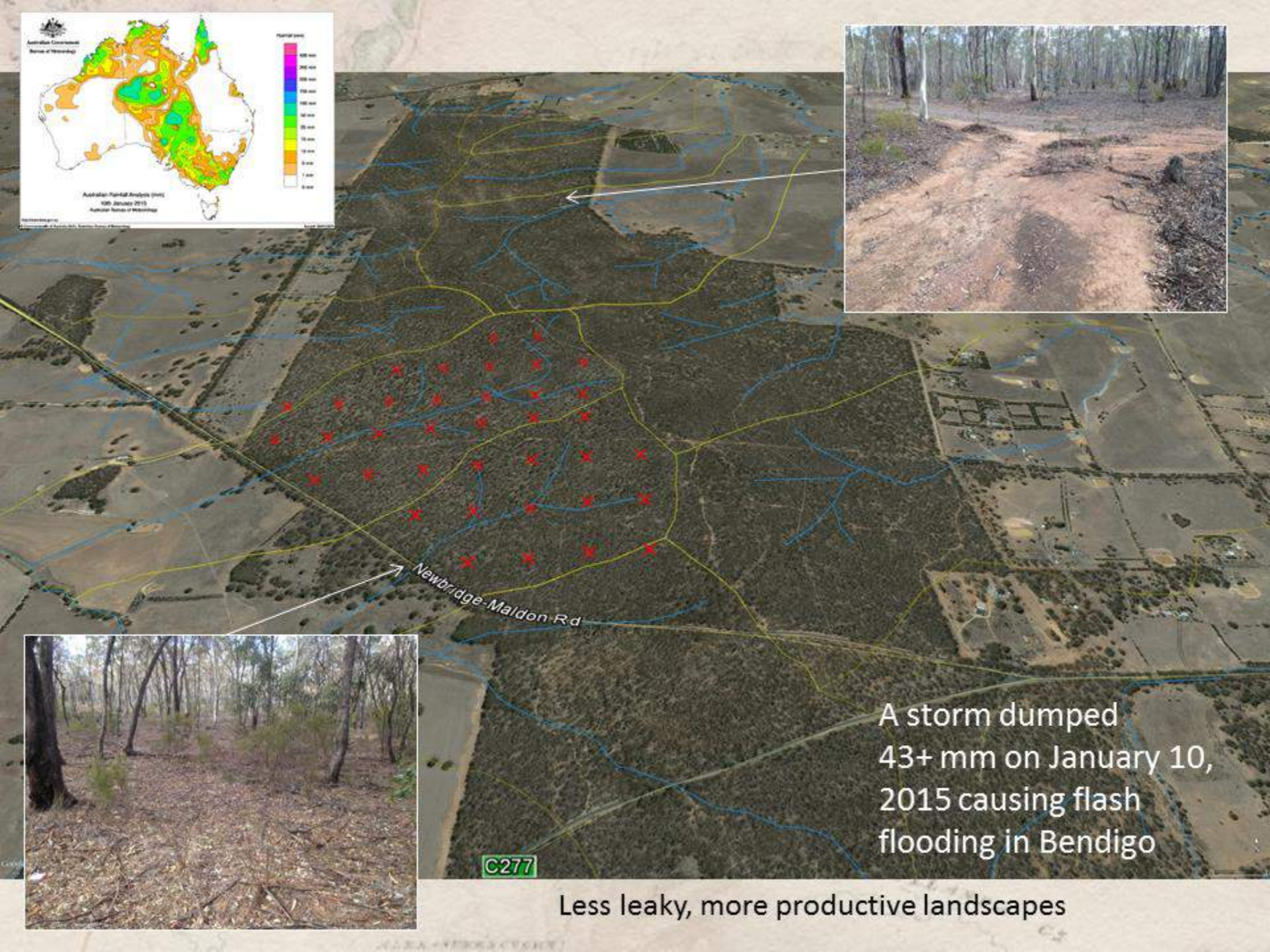

INFORMATION
SPRING PLAINS
NATURE CONSERVATION RESERVE
ECOLOGICAL THINNING TRIAL
2004 - 2010
Parks Victoria is undertaking research on management techniques to improve forest structure and ecosystem functioning.
This area has been thinned.
Research and monitoring during the trial includes
Tree growth
Flora surveys
Invertebrate surveys
Soil and leaf litter nutrient cycling
Fauna habitat
Bird and mammal surveys
Timber MUST remain on the gro
REMOVAL OF TIMBER PROHIB
PENALTIES APPLY
For further information
Contact the Parks Victoria Information
Healthy Parks
Healthy People
0 80 160 320 480 640
Meters
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Box–Ironbark Ecological Thinning Trial: Executive summary

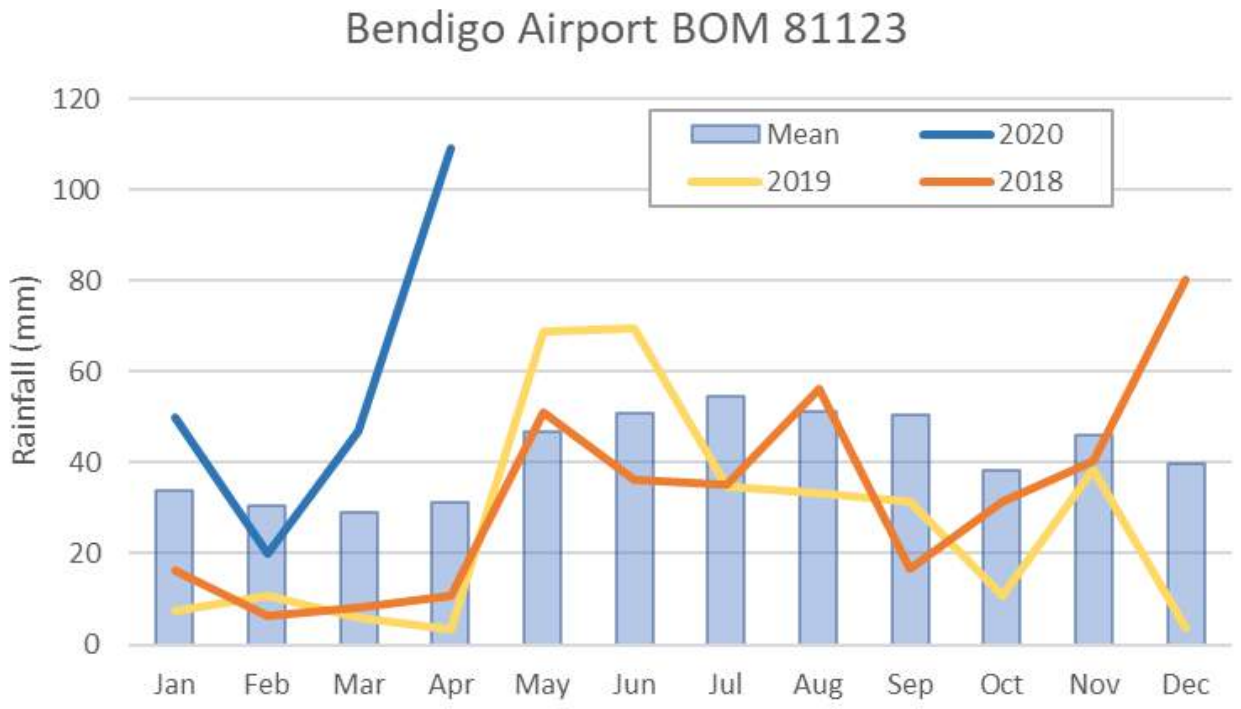
As a result of ecological thinning:

- **Stem density** was significantly reduced;
- **Mean stem diameter** increased;
- **Coarse woody debris** increased across all thinned Plots, including significant increases in large pieces of coarse woody debris;
- Changes to other habitat features post thinning, including **fine debris**, were measurably higher than pre-thinning values;
- Vegetation responses to thinning included **increased herb and tussock-grass cover**;
- **More profuse flowering of herbs and shrubs**;
- There was also a **decrease in perennial-shrub cover**;
- An initial, probably temporary, **increase in annual weed grasses;**
- Among vertebrate fauna, thinning affected the occurrence of **some diurnal birds** as well as **some other vertebrate groups**;
- **Species richness was greater among bird assemblages** (esp. understorey birds) after thinning, although this may have been influenced by the timing of surveys;
- **Bat activity was greater** in Plots after thinning;
- Other vertebrates, including **terrestrial and arboreal mammals, appeared to remain stable or displayed positive responses**; and
- Ground invertebrate assemblages were dominated by ants in species richness and total abundance, which in turn were dominated by a small number of **opportunistic ant species which responded positively** to disturbance associated with thinning.

Palmer GP., Brown GW., Gibson MS., Pigott JP., Tolsma AD., Wainer, J. & Yen AL. (2010). Box–Ironbark Ecological Thinning Trial: Integrated Analysis and Projected Changes. Parks Victoria Technical Series No. 58. Parks Victoria, Melbourne.



Less leaky, more productive landscapes



Wet start to 2020:

Daily Max: Jan = 29; Mar = 42.8; April = 109.2 (14 days)

Also ‘Landscape function’ benefits

Especially if integrated measures applied at landscape scale:

- Reduced water ‘leakiness’ (less ‘flashing’ after rainfall);
- Improved water retention, infiltration and productivity;
- Improved soil biological activity;
- Improved nutrient recycling (litter breakdown and OM retention);
- Less soil loss and gullying;
- Helps protect and improve refugia and source areas (i.e. valley bottom Grassy Woodland on alluvium and colluvium);
- Increased ecosystem productivity and resilience;
- Could buffer against climate change and species extinctions;

Tongway, D. J., and Ludwig, J. A. (2011). Restoring Disturbed Landscapes. Putting Principles into Practice, Island Press, Washington.

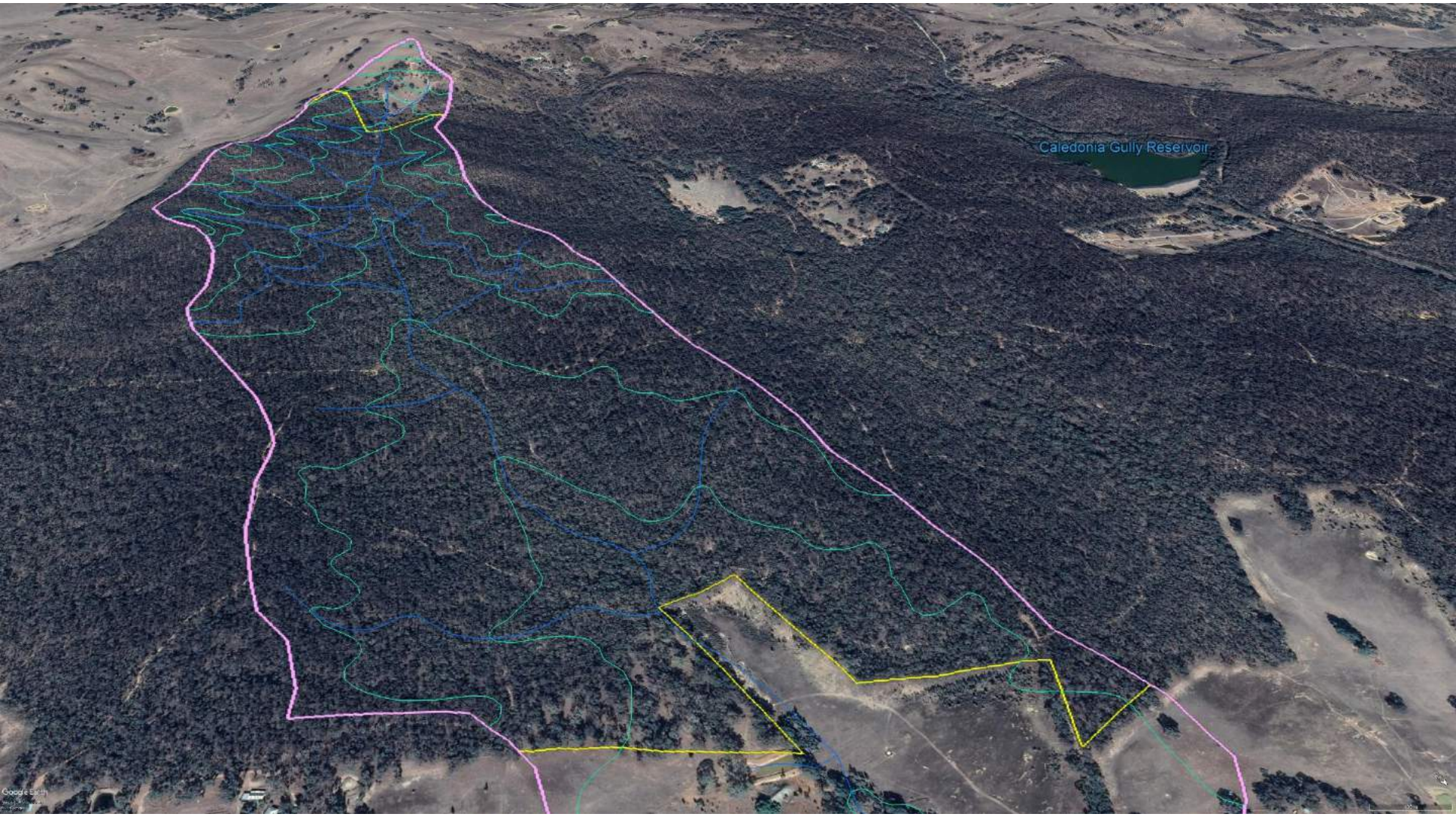
Feb 2016

Dec 2017

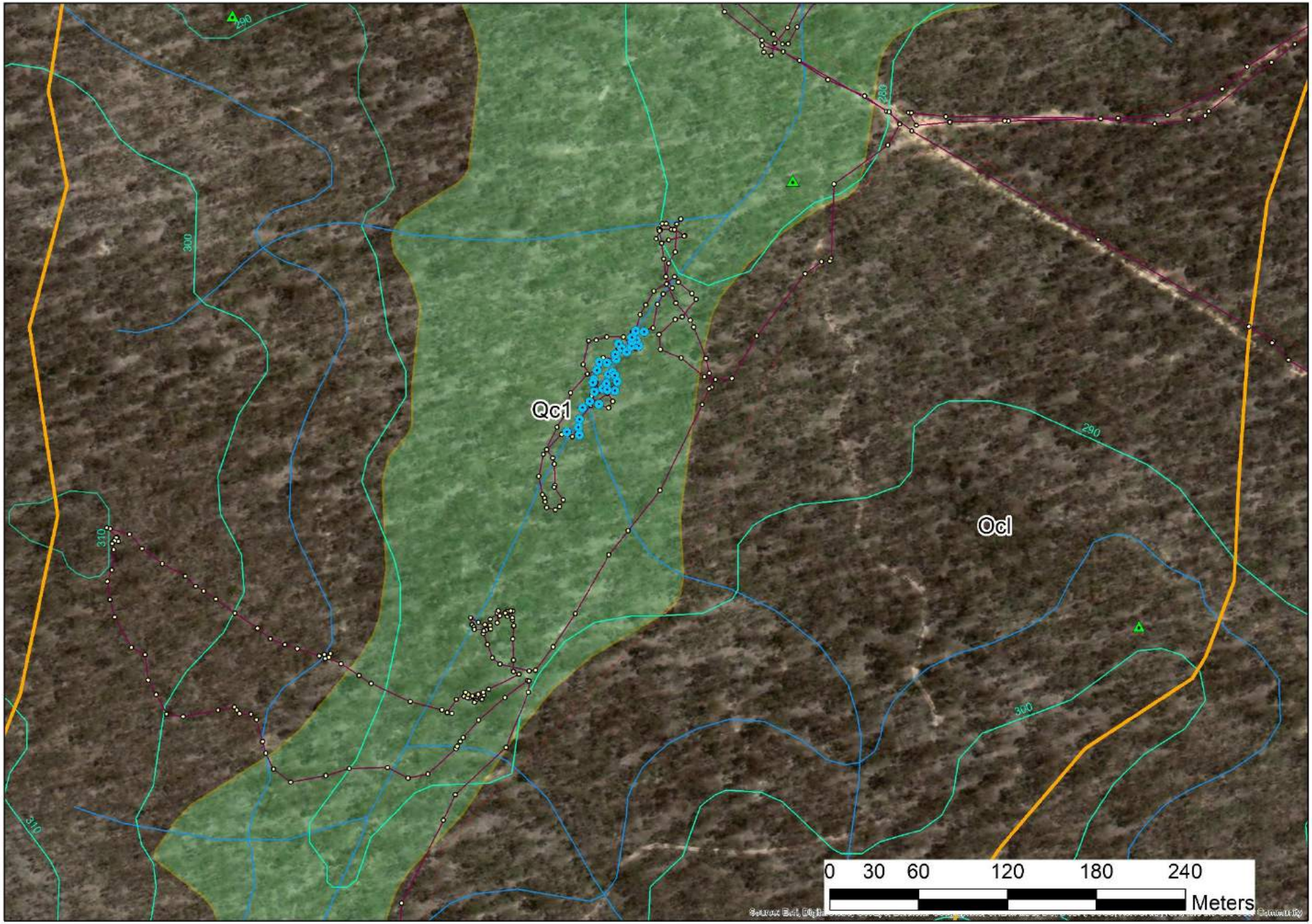
Feb 2016

Dec 2017

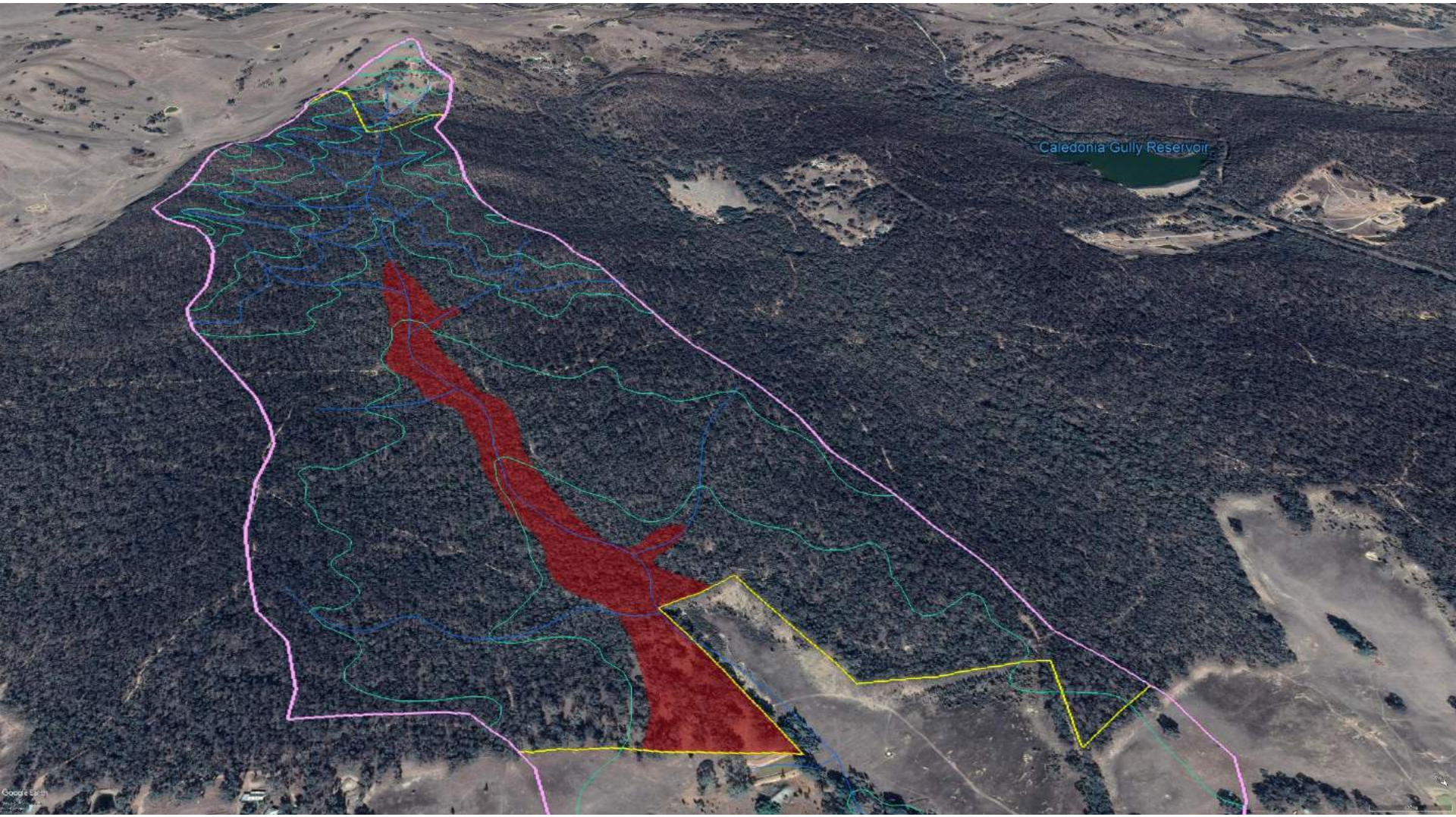
Peters Gully



Spring Plain NCR; 138 ha

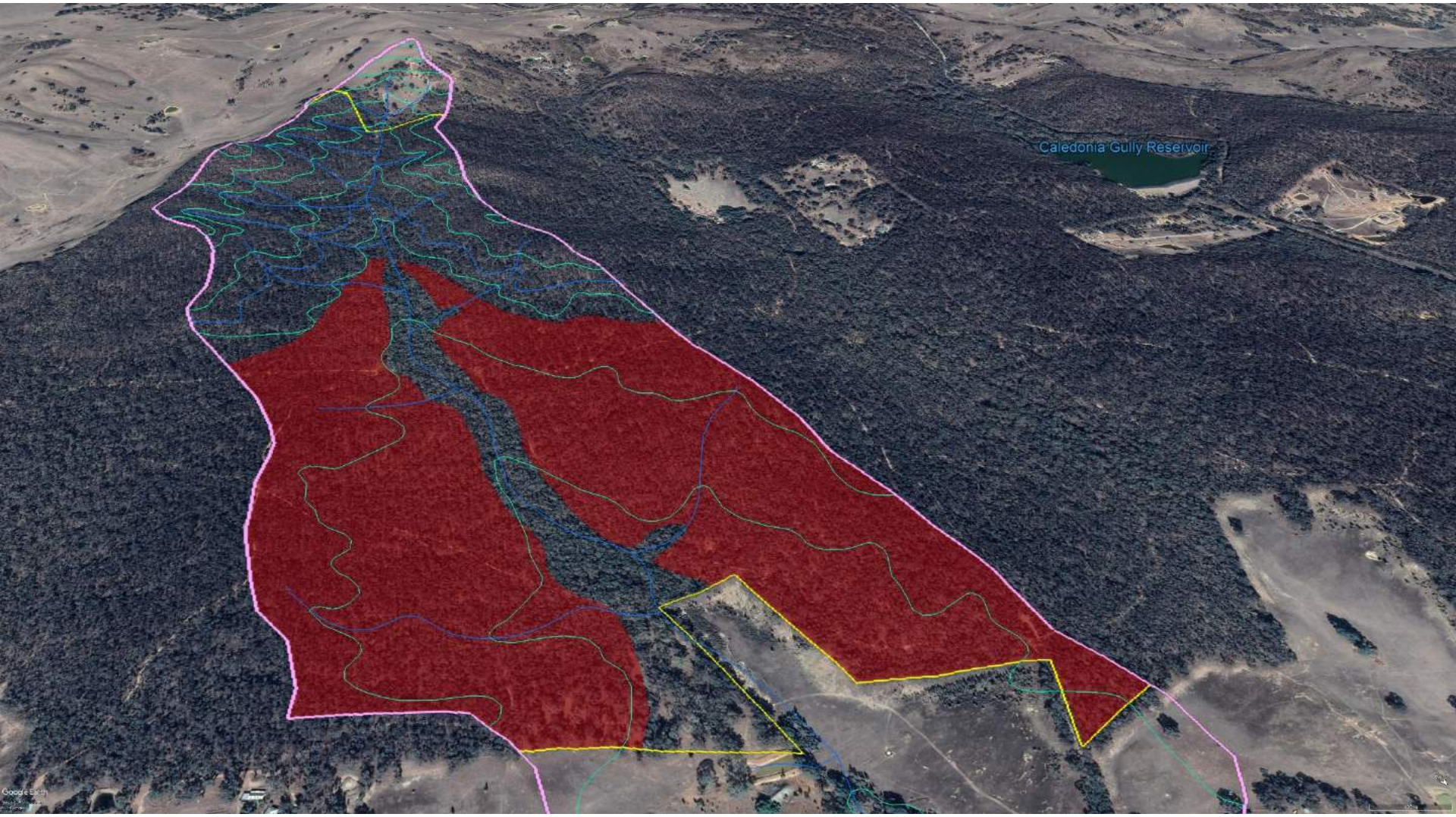

Qc1
Ocl
290
300
310
0 30 60 120 180 240
Meters

Peters Gully (Spring Plain NCR; 138 ha)



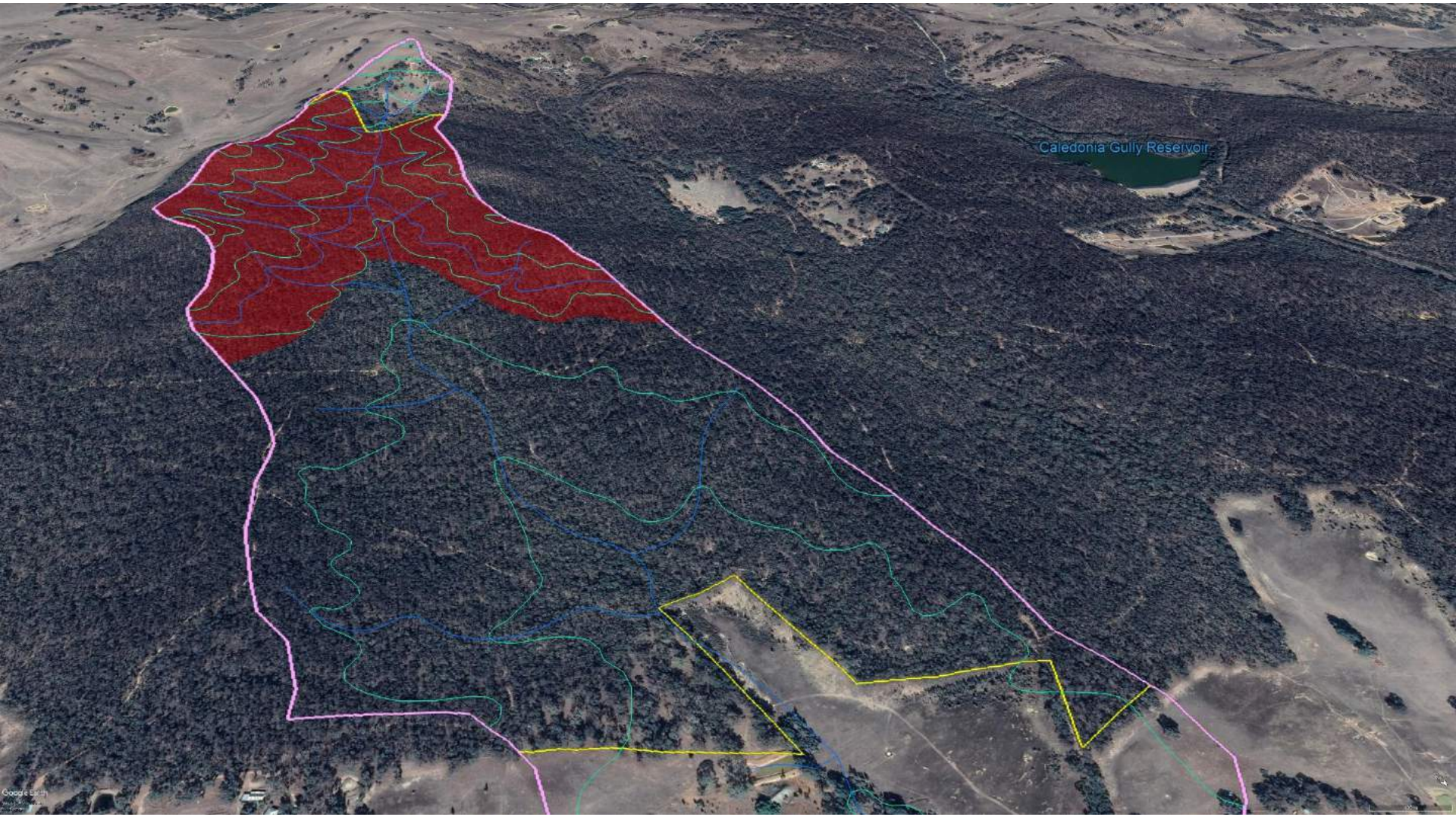
Valley Bottom (alluvium/colluvium)

Peters Gully (Spring Plain NCR; 138 ha)



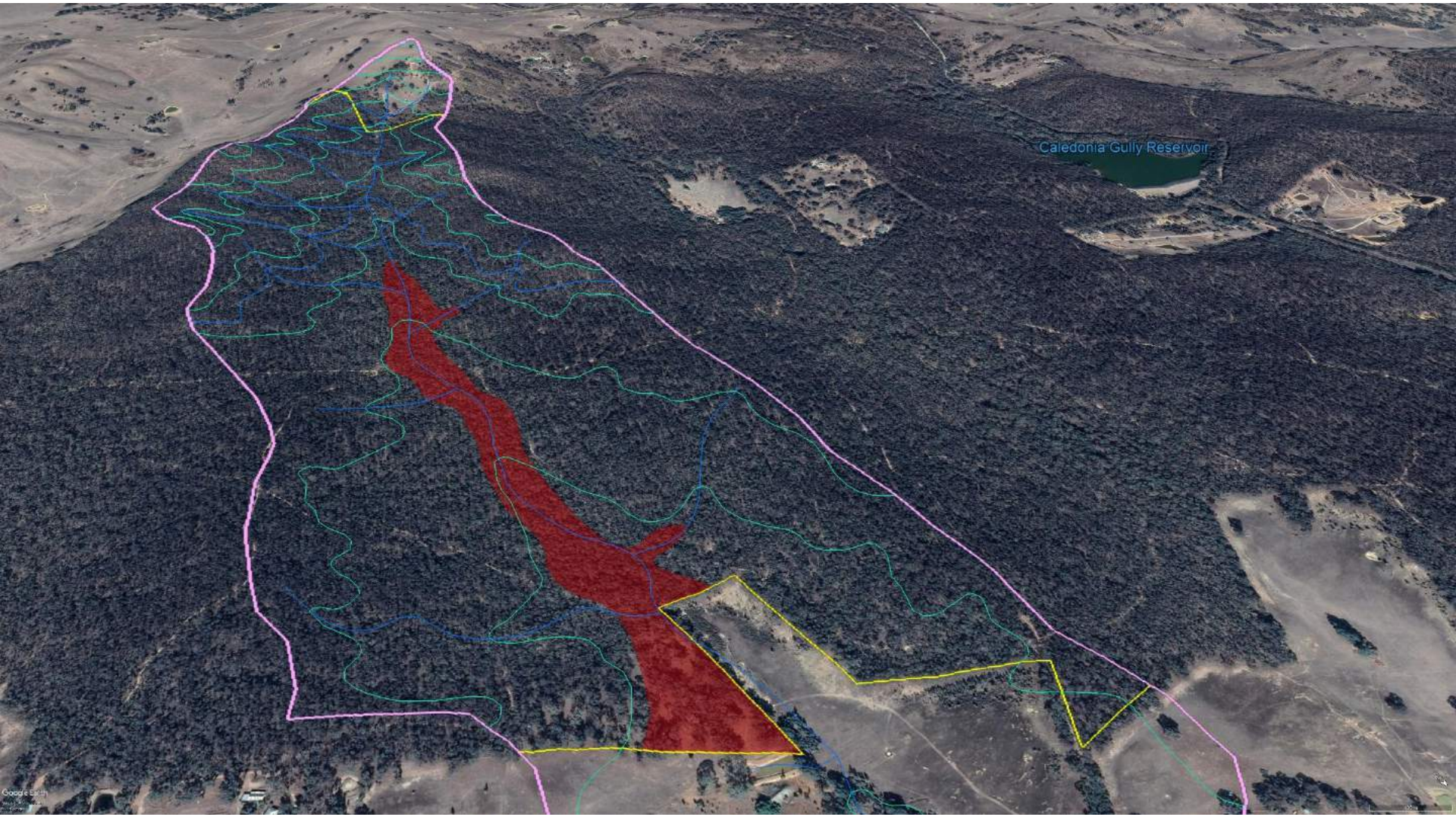
Lower Gentle Slopes

Peters Gully (Spring Plain NCR; 138 ha)



Steep Rocky Upper Slopes & Ridges

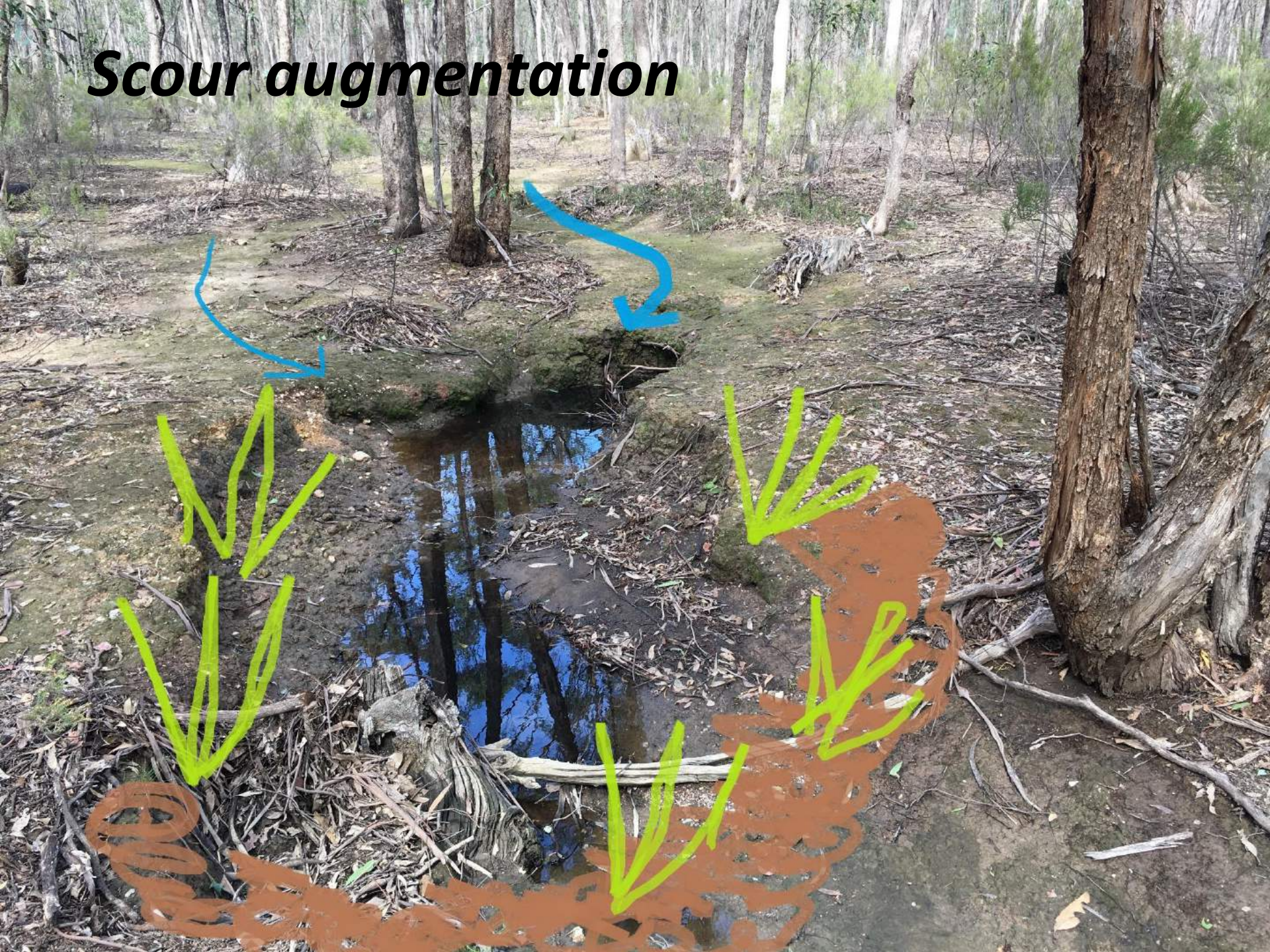
Peters Gully (Spring Plain NCR; 138 ha)



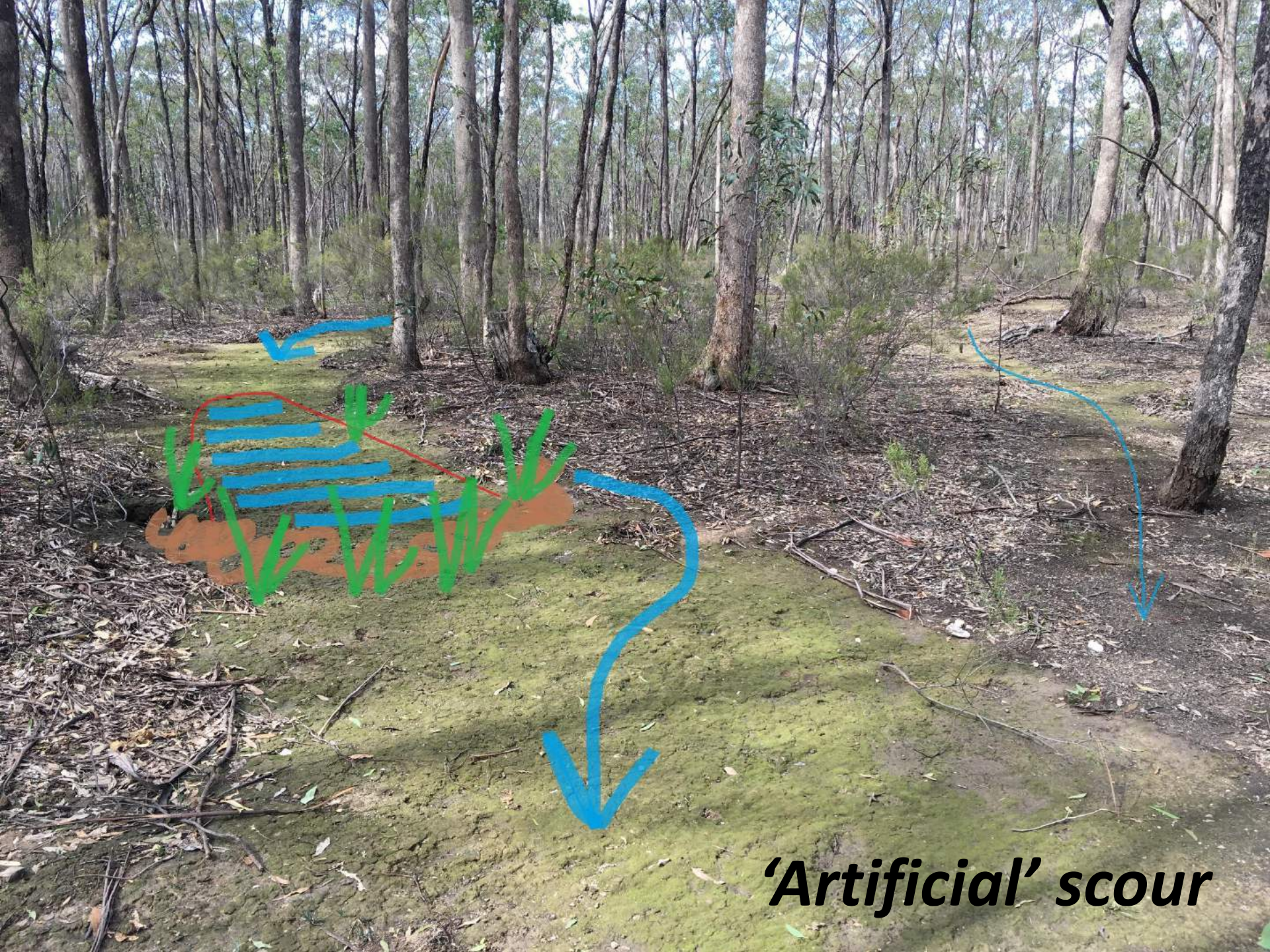
Valley Bottom (alluvium/colluvium)


Scour augmentation

Scour augmentation

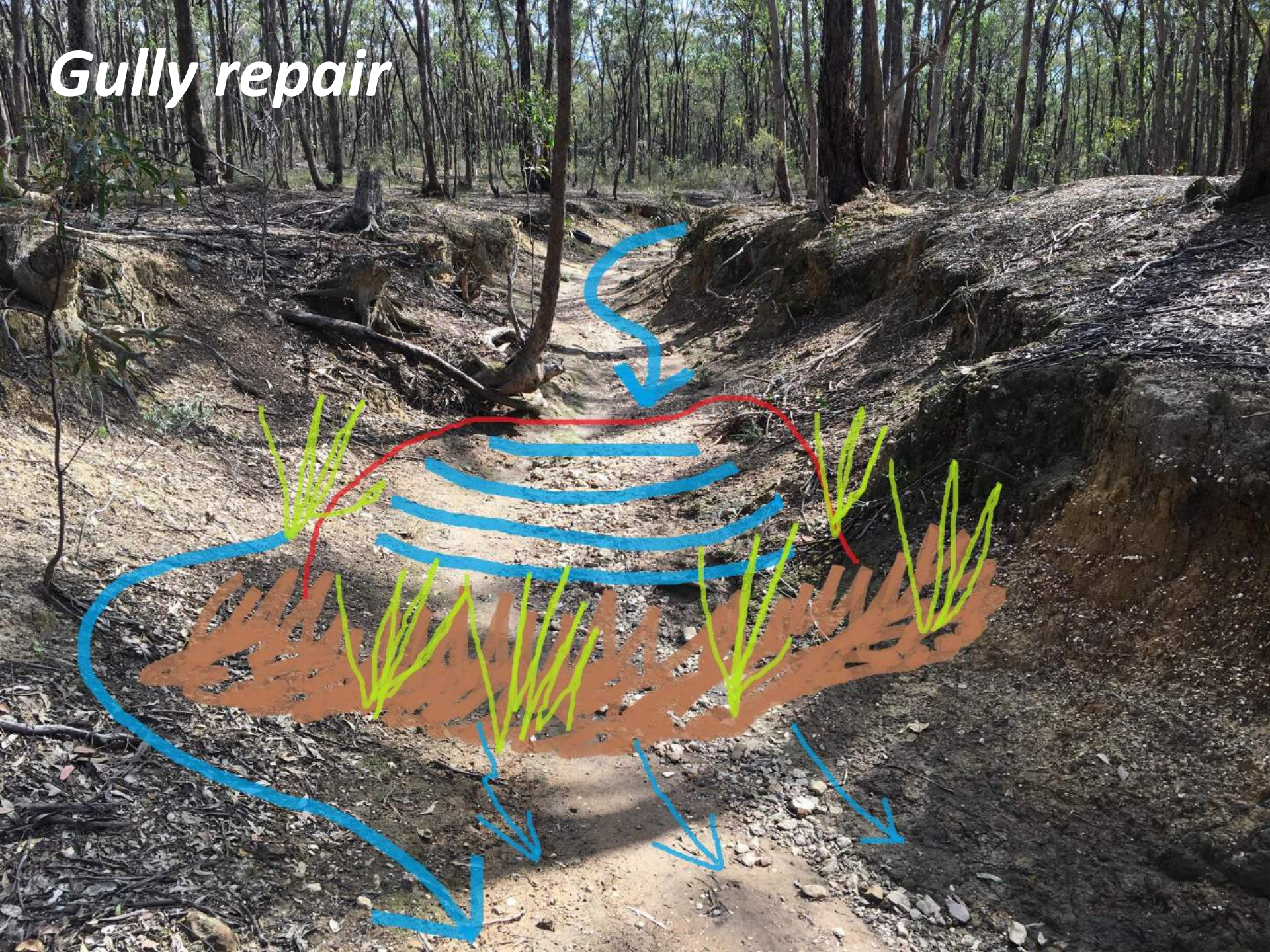



‘Artificial’ scour


'Artificial' scour

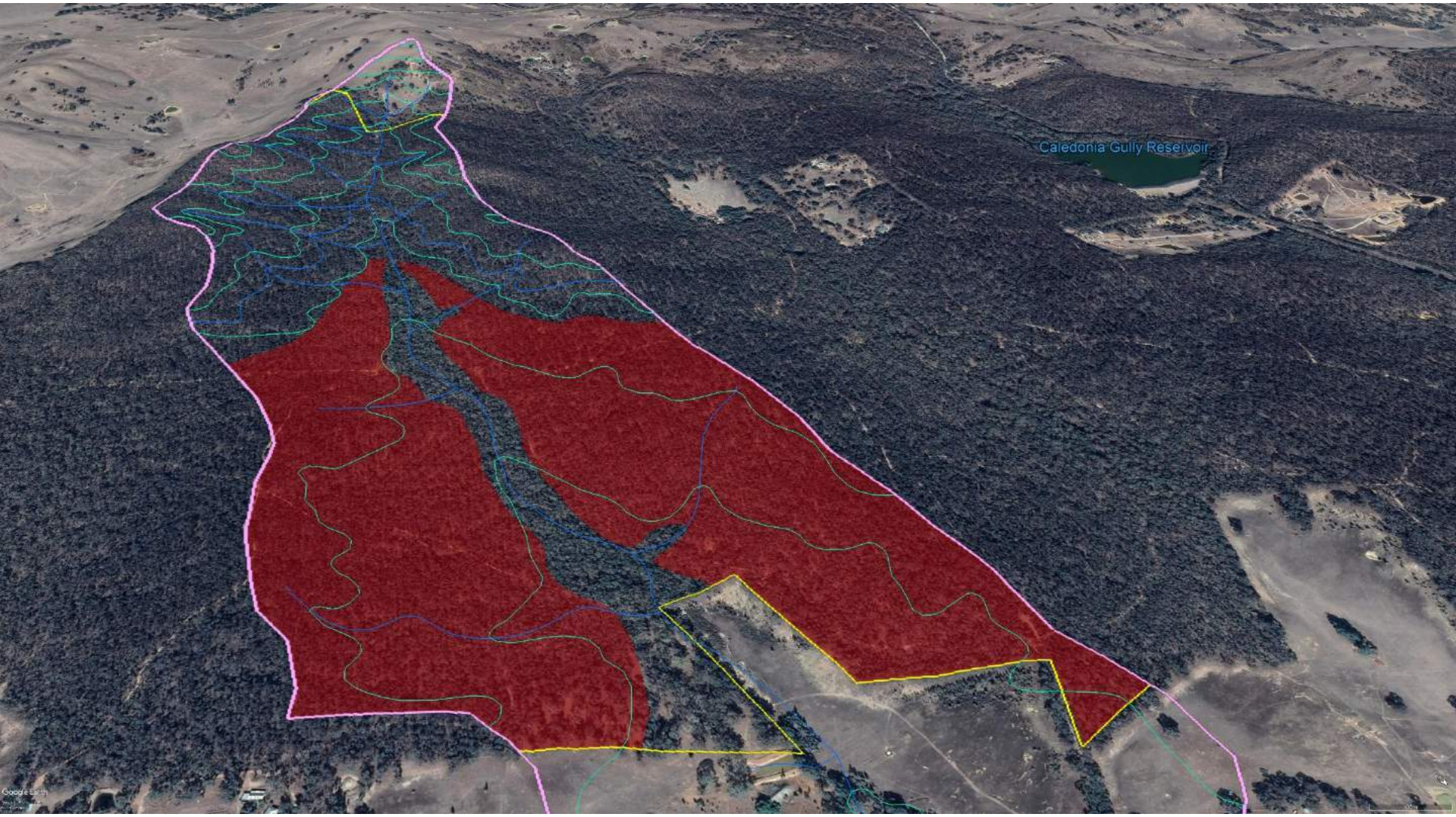

Gully repair

Gully repair




Natural intermittent pond

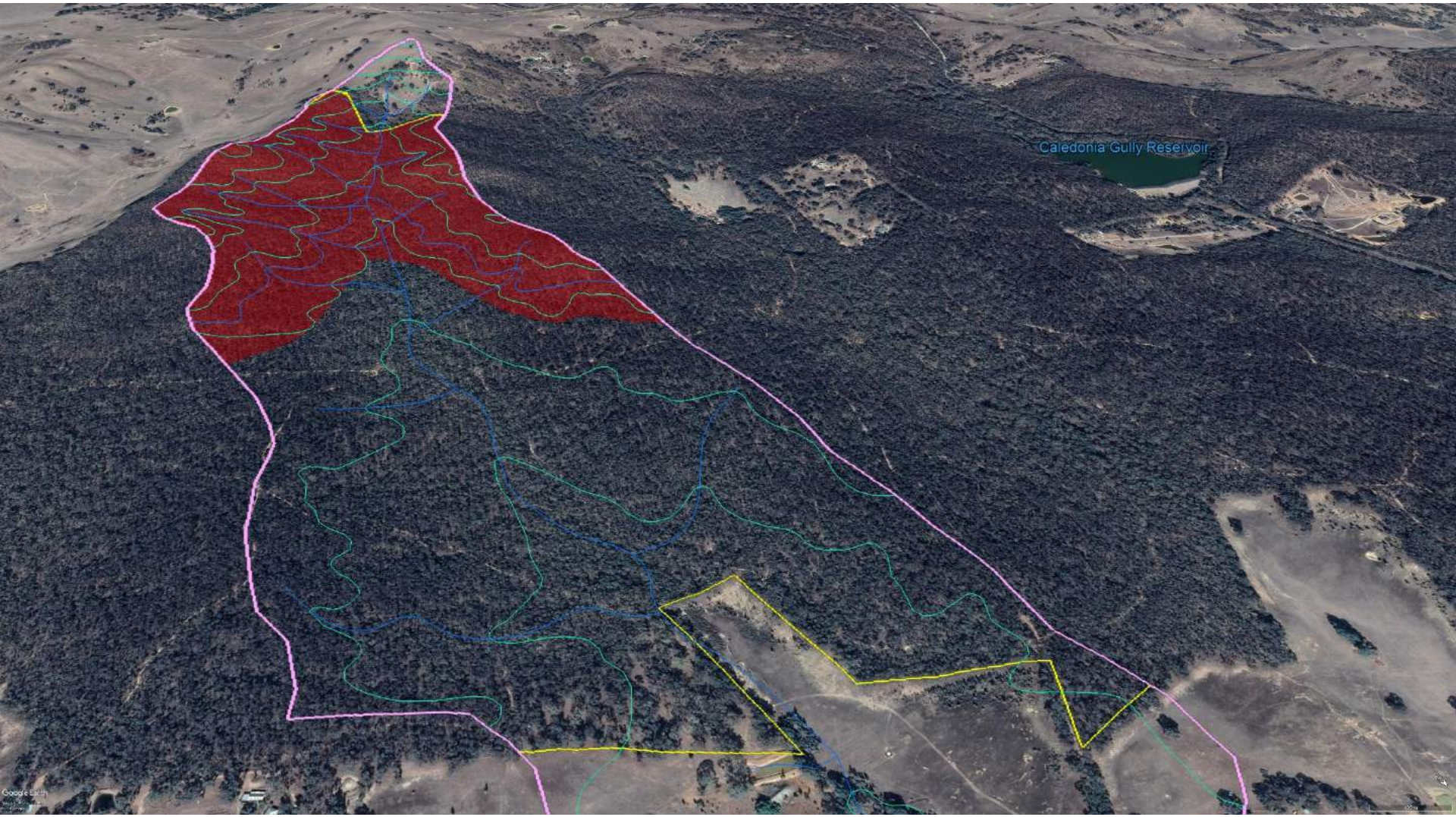
Peters Gully (Spring Plain NCR; 138 ha)



Lower Gentle Slopes


Contour ripping & grass seeding
Selective thinning & retain

Peters Gully (Spring Plain NCR; 138 ha)



Steep Rocky Upper Slopes & Ridges

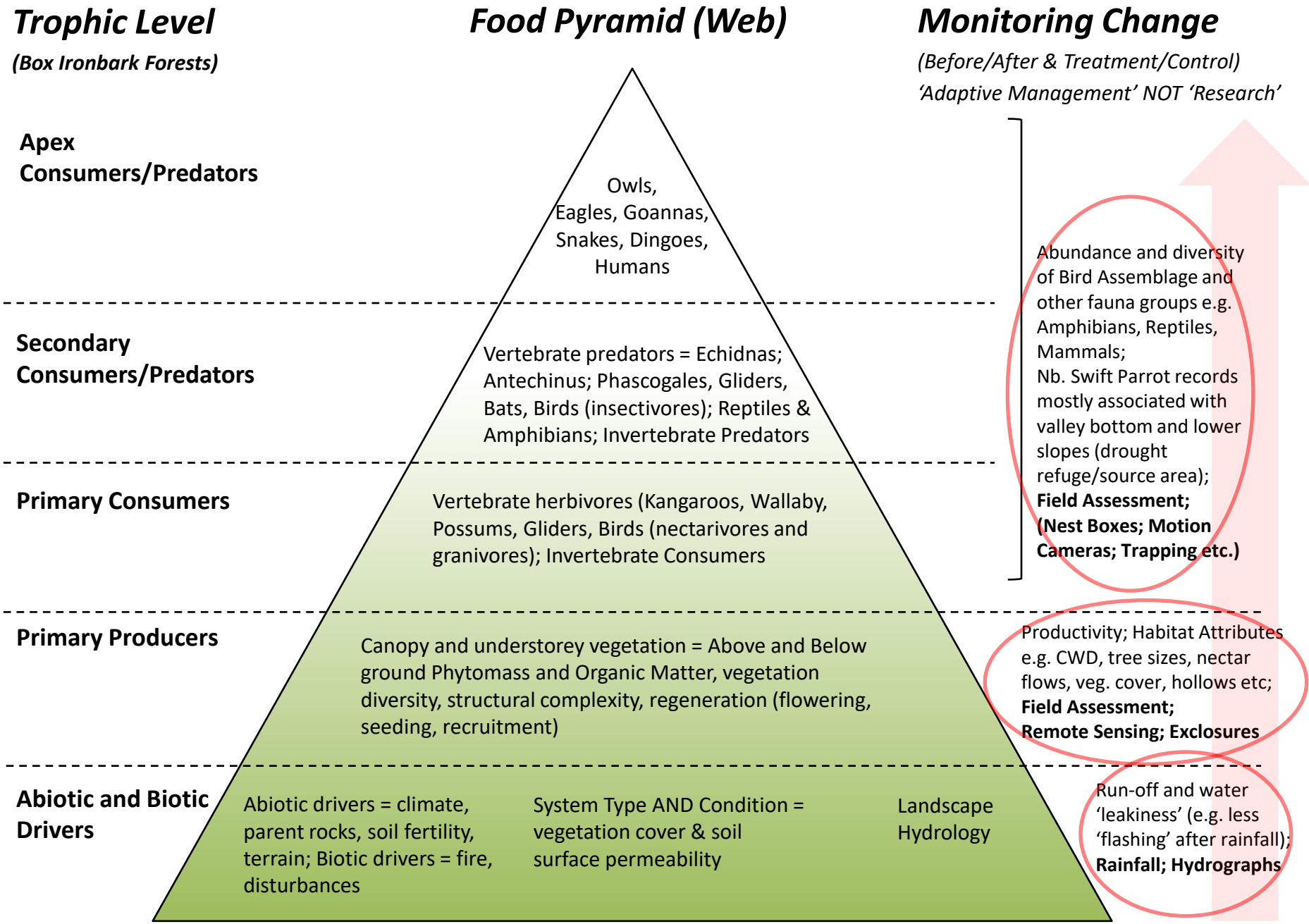

Selective thinning & retain
Kangaroo control;
Understorey regeneration nodes

Expected Outcomes and Monitoring

Strategy – not a ‘research’ project;
more like a ‘proof of concept’ trial

Monitoring of key landscape/trophic elements:

- Hydrology;
- Phytomass productivity (canopy and ground layer – especially valley bottom and lower slopes);
- Habitat values – structural heterogeneity, CWD, tree size distribution, nectar flows (flowering), ground layer cover, flowering and seed production;
- Bird assemblage diversity and abundance increases; Swift Parrot records mostly associated with valley bottom and lower slopes
- Improvements for other fauna – amphibians, reptiles, mammals.


Trophic Level
(Box Ironbark Forests)
Food Pyramid (Web)
Monitoring Change
(Before/After & Treatment/Control)
'Adaptive Management' NOT 'Research'
Apex Consumers/Predators
Owls, Eagles, Goannas, Snakes, Dingoes, Humans
Secondary Consumers/Predators
Vertebrate predators = Echidnas; Antechinus; Phascogales, Gliders, Bats, Birds (insectivores); Reptiles & Amphibians; Invertebrate Predators
Primary Consumers
Vertebrate herbivores (Kangaroos, Wallaby, Possums, Gliders, Birds (nectarivores and granivores); Invertebrate Consumers
Primary Producers
Canopy and understorey vegetation = Above and Below ground Phytomass and Organic Matter, vegetation diversity, structural complexity, regeneration (flowering, seeding, recruitment)
Abiotic and Biotic Drivers
Abiotic drivers = climate, parent rocks, soil fertility, terrain; Biotic drivers = fire, disturbances
System Type AND Condition = vegetation cover & soil surface permeability
Landscape Hydrology
Abundance and diversity of Bird Assemblage and other fauna groups e.g. Amphibians, Reptiles, Mammals;
Nb. Swift Parrot records mostly associated with valley bottom and lower slopes (drought refuge/source area);
Field Assessment;
(Nest Boxes; Motion Cameras; Trapping etc.)
Productivity; Habitat Attributes e.g. CWD, tree sizes, nectar flows, veg. cover, hollows etc;
Field Assessment;
Remote Sensing; Exclosures
Run-off and water 'leakiness' (e.g. less 'flashing' after rainfall);
Rainfall; Hydrographs

Next steps

- Phase 1 of the pilot will develop a detailed project plan or prospectus including technologies, costs and time frames for one watershed within Spring Plains Nature Conservation Reserve NCR (‘Peters Gully’);
- Biolinks has already received Phase 1 funding from a consortium of environmental philanthropists;
- Need ‘in principle support’ and feed back on formal approvals process;
- And subject to funding – Phase 2 will be implementation across all public land within Peter’s Gully (subject to supported by Parks Victoria) and likely also some adjoining private land;
- Hope to have planning completed by around the middle of 2020 and hope to begin implementation (subject to approvals and funding) in 2020/21.