Scoping the tools and technologies for a predator free New Zealand

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Variable home ranges (1 – 50 ha)

Variable densities (0.5 – >10 ha^{-1})

Can live for >10 years in the wild

Generally 0 – 2 offspring per year

Larger home ranges (50 – 500 ha)

Lower densities (0.01 – 0.1 ha^{-1})

Shorter lifespans (4 – 6 years)

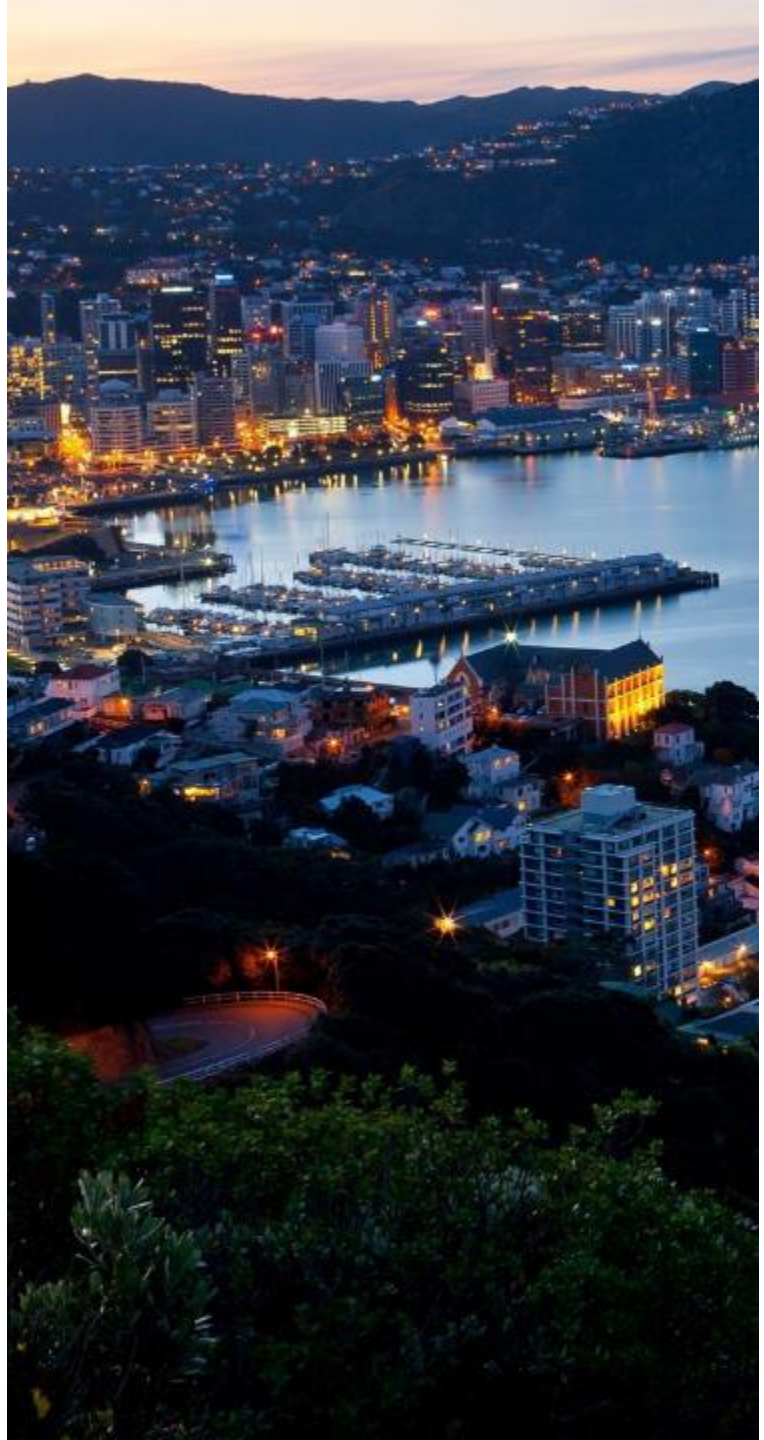
Faster reproduction (6 – 12 kits per year)

Smaller home ranges (0.02 – >2 ha)

Higher densities (1 – 50 ha^{-1})

Very short lifespans (up to 2 years)

Very fast reproduction (up to 5 litters per year)




Maintaining eradication at scale
Achieving eradication at scale
Cultural support
Social licence

- Current tools sufficient

- Current tools may be sufficient

- Current tools may be sufficient

- Current tools may be sufficient

- Current approaches may be sufficient

- Current approaches may be insufficient

- Current approaches may be sufficient

- Current approaches may be insufficient

- Current approaches likely insufficient

Achieving Eradication at Scale

Trapping

Traps (& lures) for possums, rats and stoats available with a range of efficacies

Being trialled for eradication of all three species in a range of projects

Current application up to 1000s ha

Scale increases through self-resetting and remote-reporting capabilities

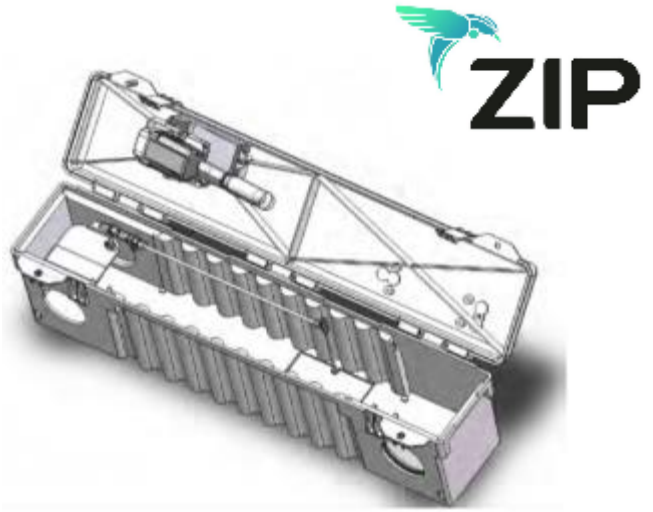
Achieving Eradication at Scale

New devices and drones

New control device approaches and materials

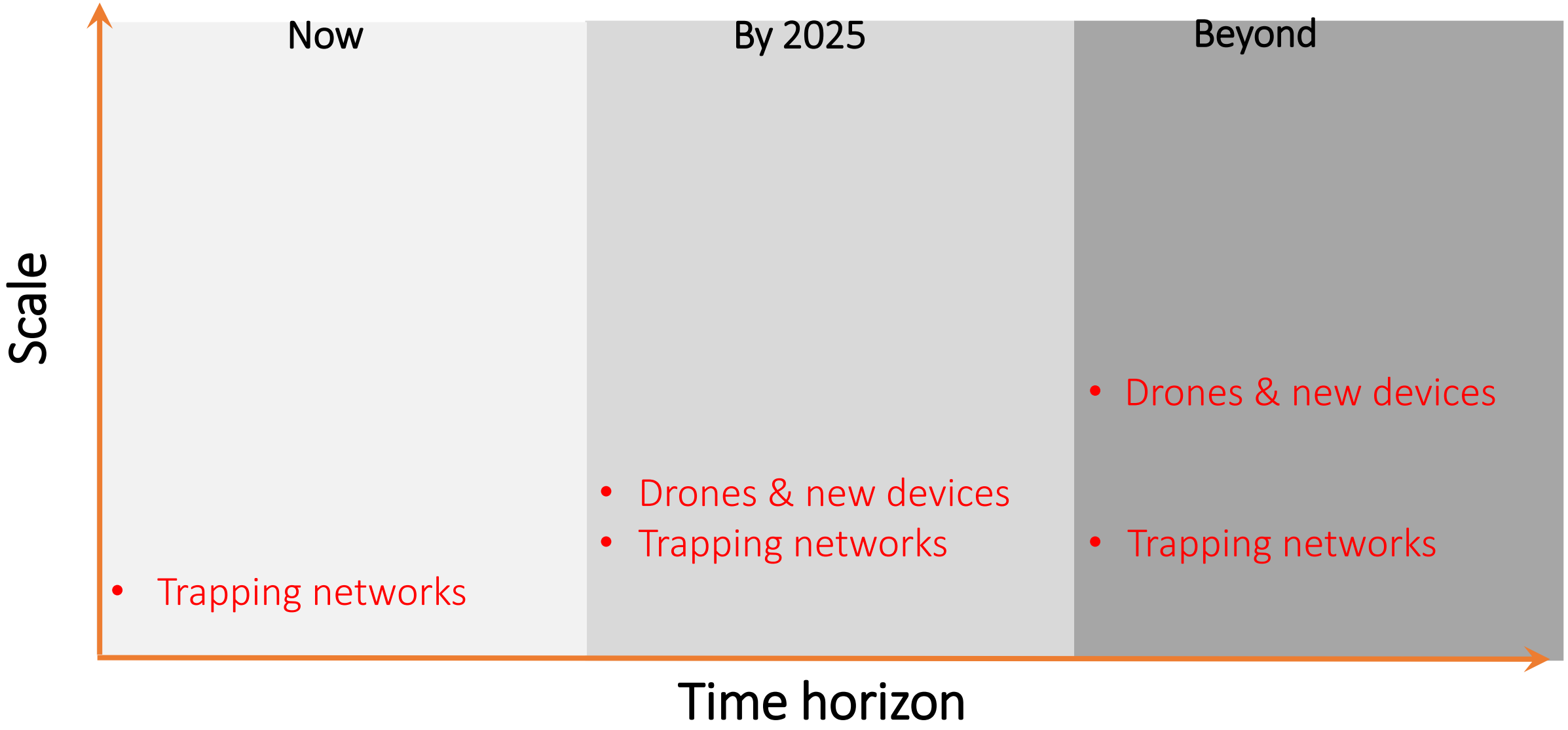
Use of drones for exclusion zones and other sensitive areas

Use of drones for full operations? Heavy-lift drones now up to 300kg payloads



ECT
Environment • Conservation • Technologies

Achieving Eradication at Scale



Achieving Eradication at Scale

Bait station toxins

Combined bait station and trapping approach to rat eradication on Miramar

Possum eradication on Mahia Peninsula being attempted using a ‘rolling front’ of high density (1 ha^{-1}) bait stations

Toxin being using is brodifacoum; not expected to eradicate either rats or stoats on Mahia

Achieving Eradication at Scale

“1080 to zero”

One operation to eradicate

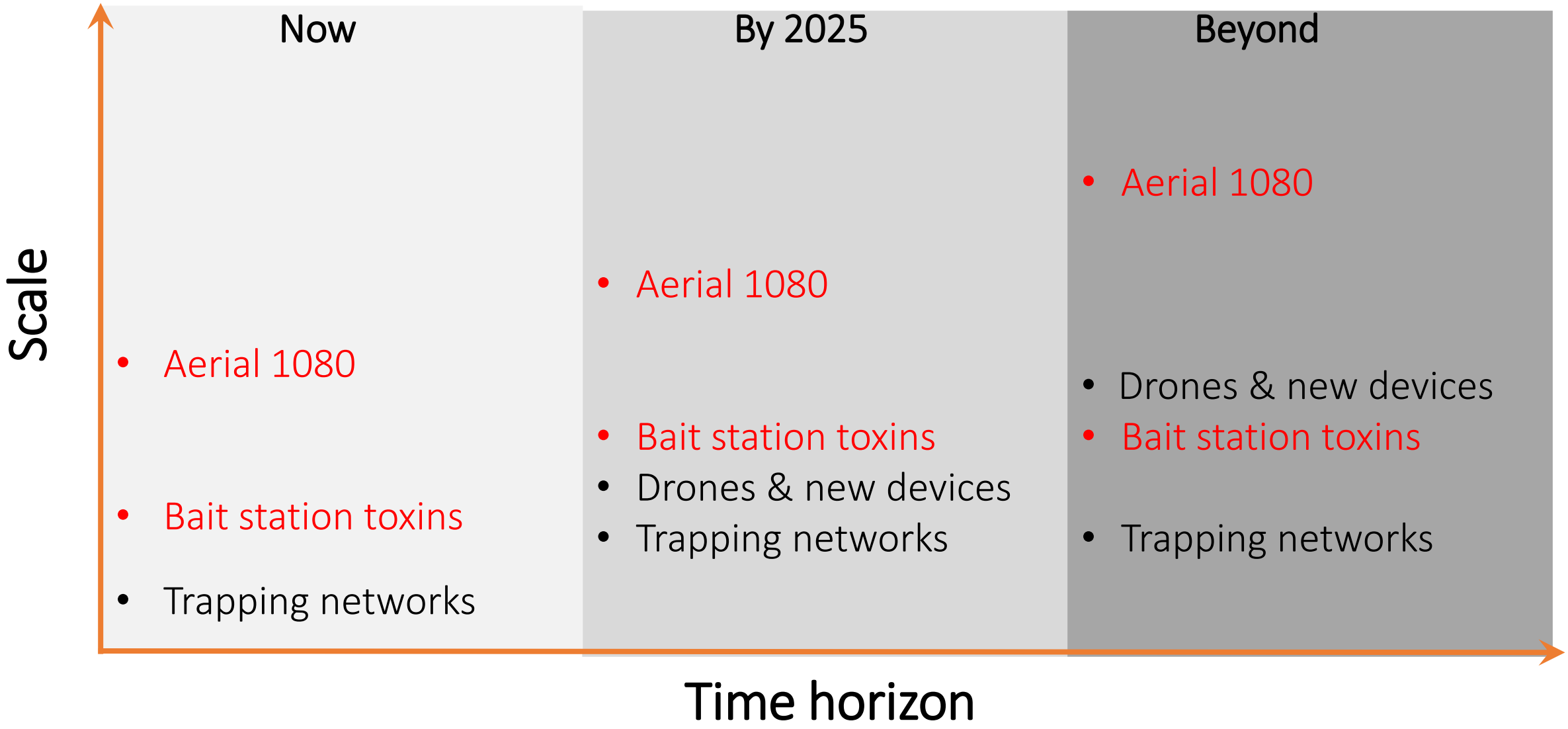
Good evidence to date that possum and rat eradication achievable over 1000’s hectares

ZIP

Operating at ~10,000 hectares this winter; first of two toxin drops:

- reduced possums by ~99.9%
- reduced rats by ~99.7%
- may have eradicated stoats

Achieving Eradication at Scale



Achieving Eradication at Scale

Selective toxins (& other compounds)

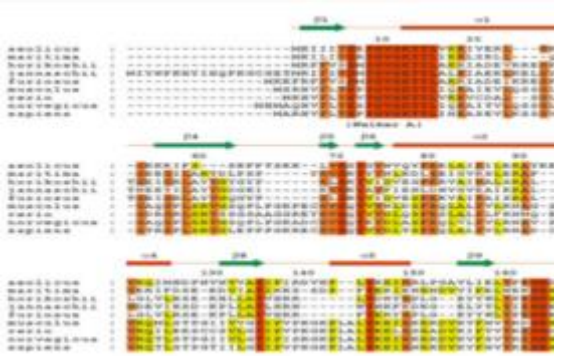
Norbormide and pro-drug formulations

Para-aminopropriophenone

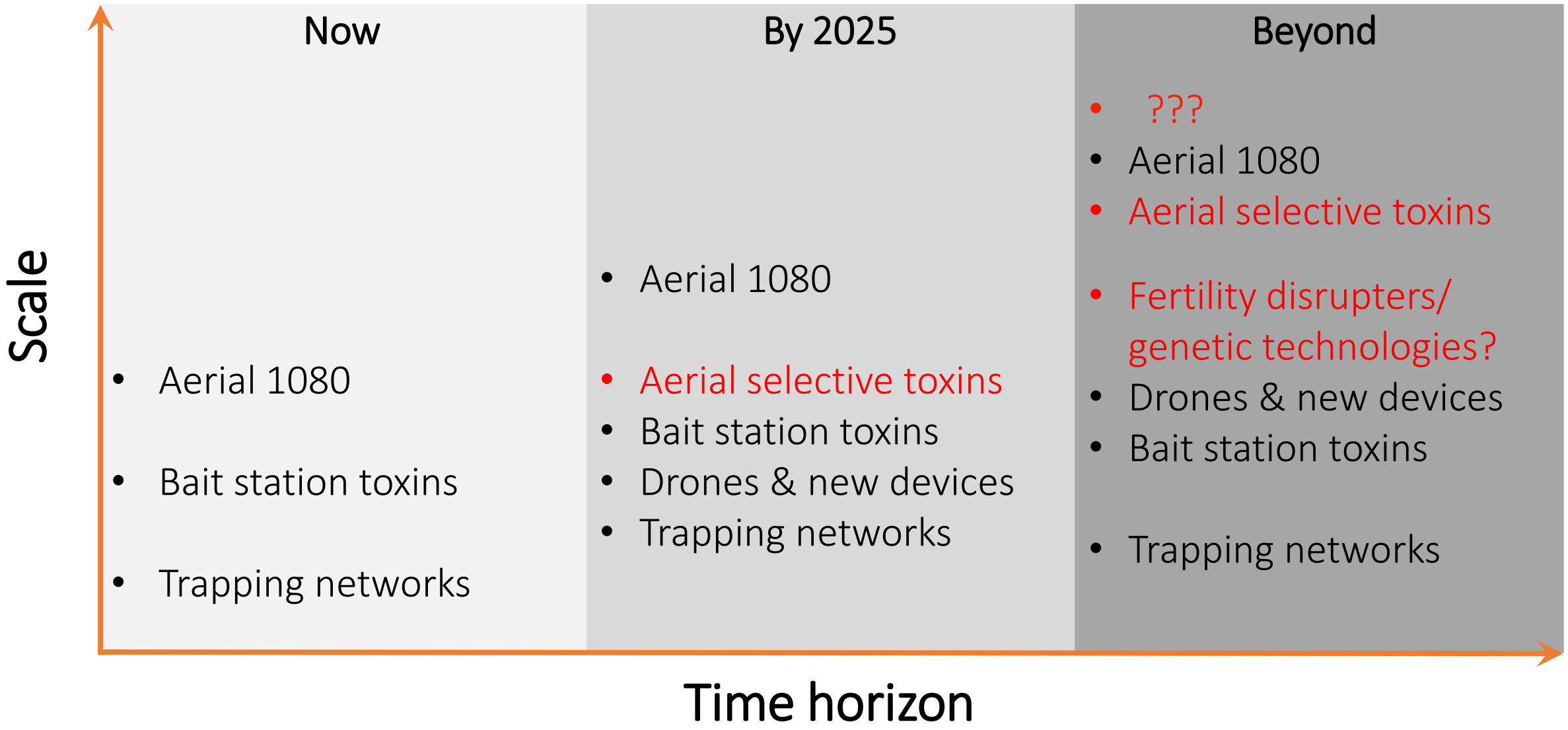
Genome mining for new toxins

RNA interference (RNAi)

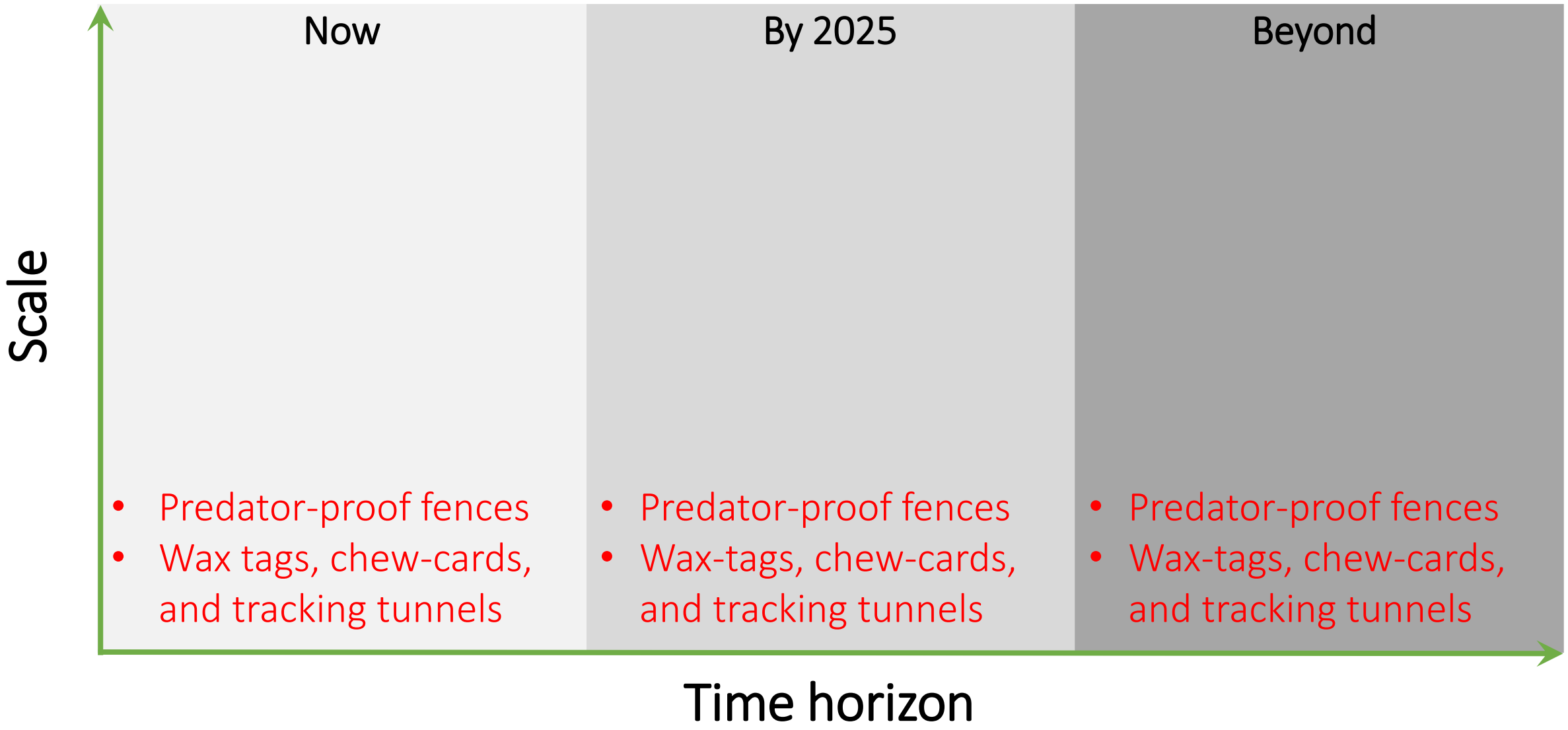
Chemical fertility disrupters?



Achieving Eradication at Scale



Maintaining Eradication at Scale



Maintaining Eradication at Scale

Low-cost fencing

Maintain gains while eradication front moves forward

Predator Free Dunedin

Virtual barriers

Lines of detection and control devices

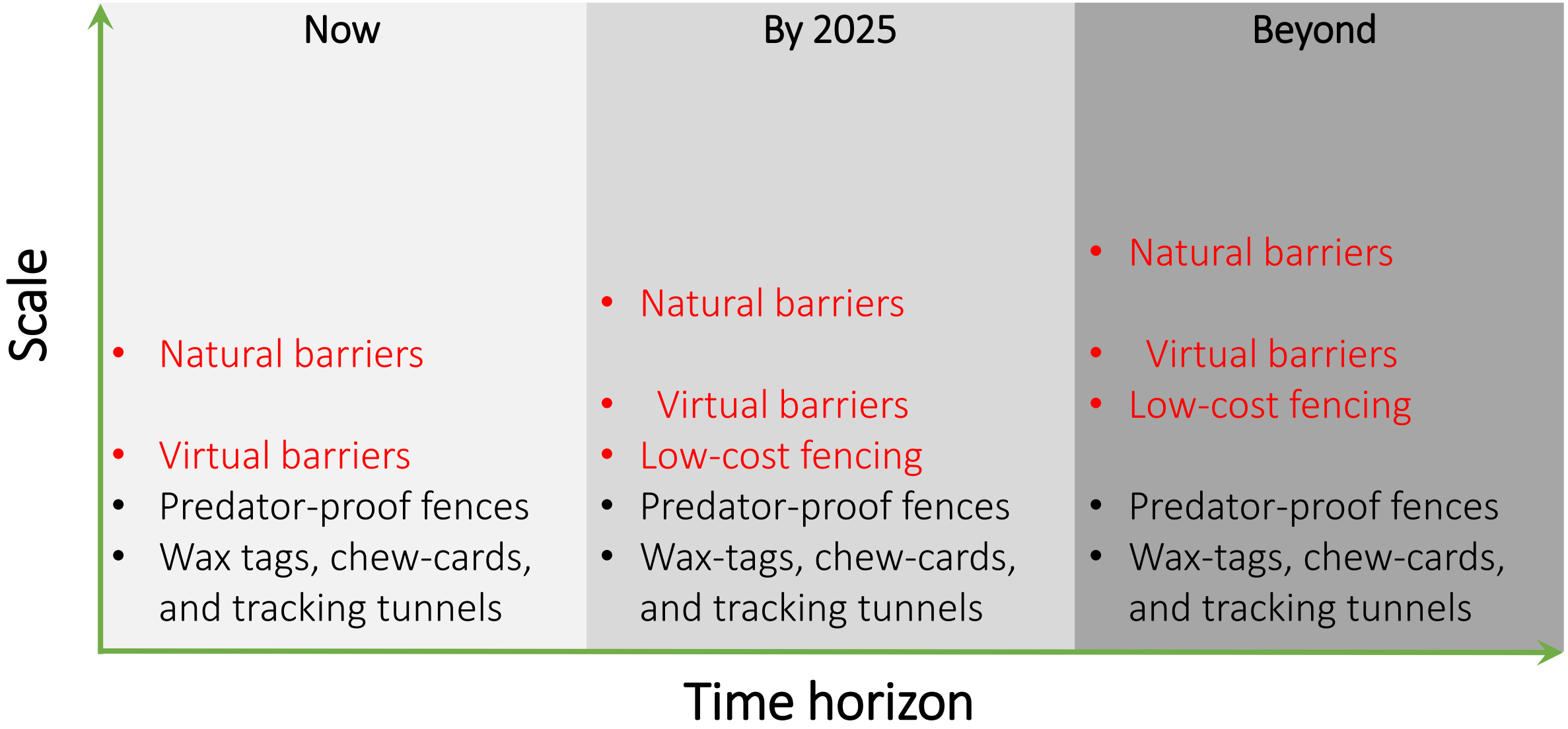
Towards Predator-Free Taranaki

‘Landscape’ barriers

Rivers, mountains, highways?

PREDATOR FREE WELLINGTON

Maintaining Eradication at Scale

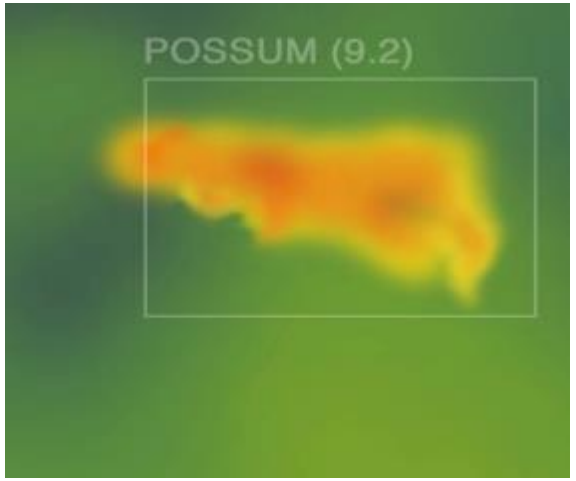


Maintaining Eradication at Scale

Camera traps

Automated species IDs

Manaaki Whenua



Thermal cameras

3-50x sensitivity

THE Cacophony PROJECT

Remote reporting

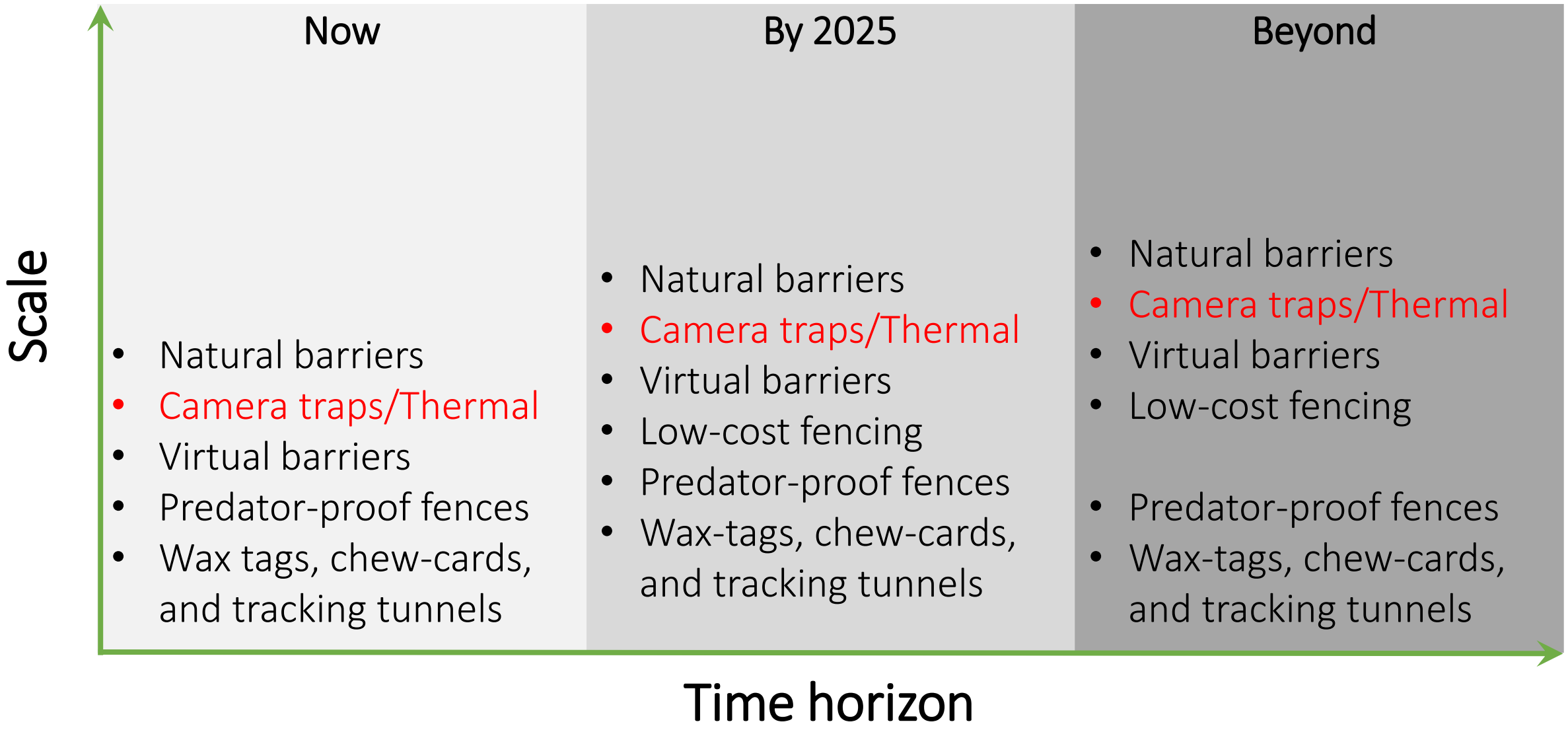
econode

‘Nodes’ on devices

Networks and communication

‘Moore’s Law’, machine learning, AI

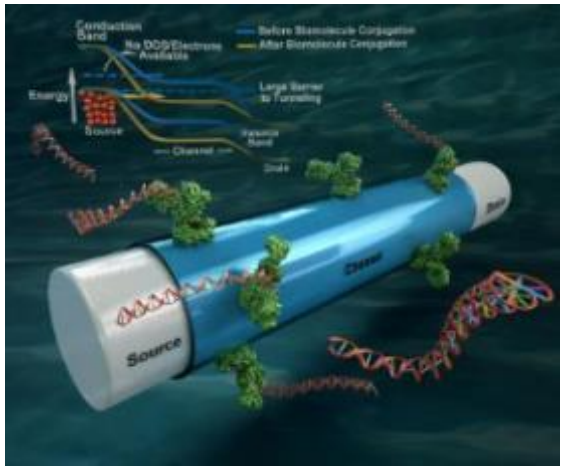
Maintaining Eradication at Scale



Maintaining Eradication at Scale

Drone-mounted sensors

Improved thermal sensing?
Molecular/pheromone sensing?

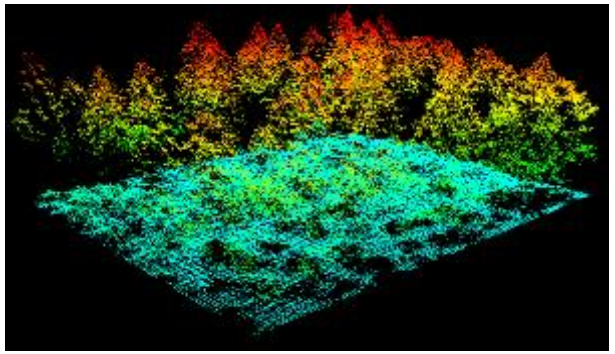


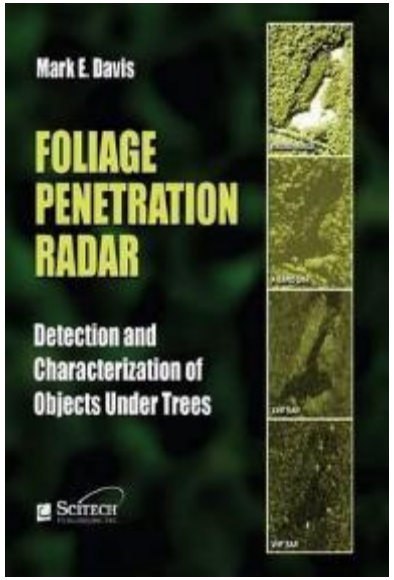
Lidar?

High frequency direct laser pulses through canopy gaps

Foliage penetrating radar?

UHF radio-waves that resonate canopy gaps; currently capable of detecting personnel, vehicles and structures out to 30km in dense covered environments





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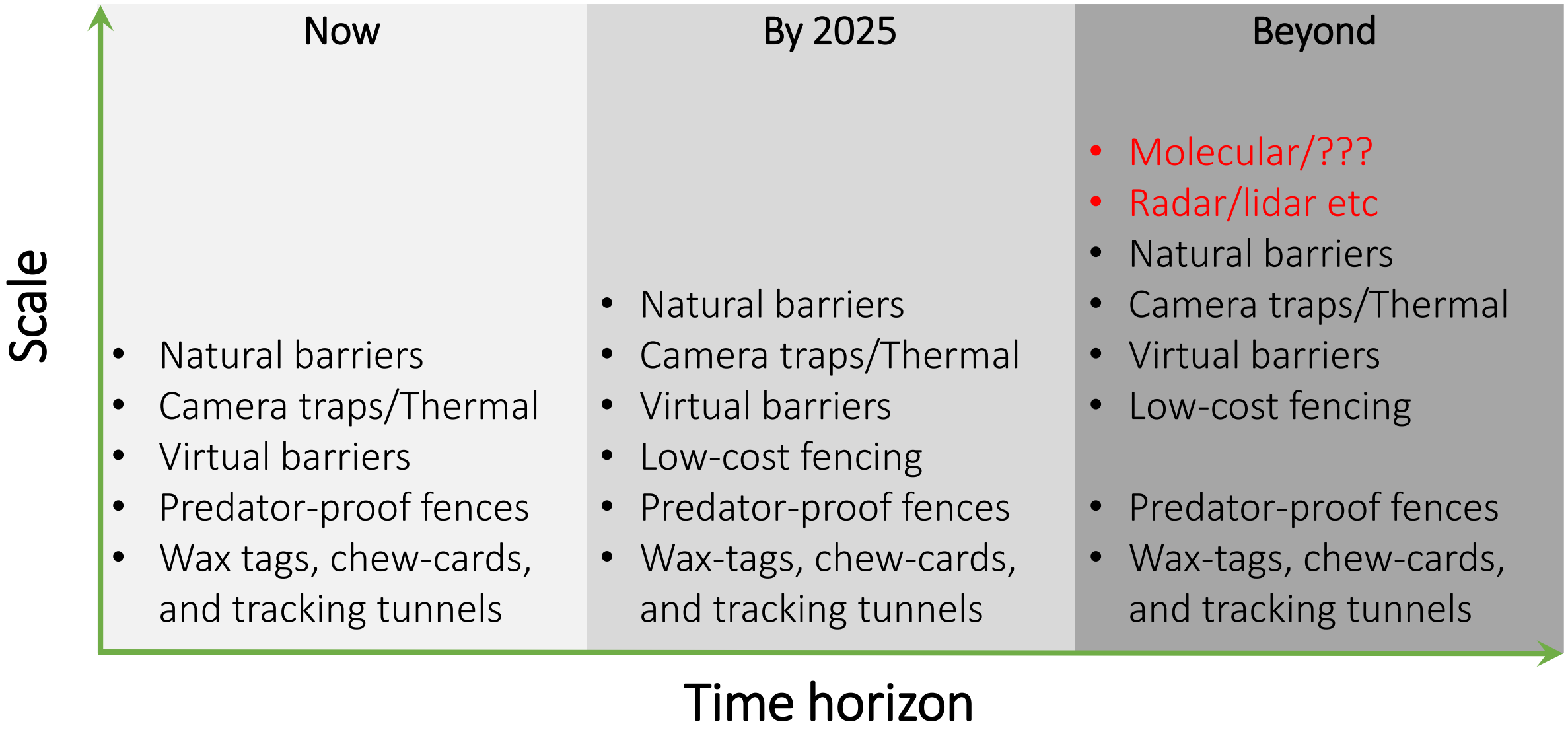

‘We can’t think of them right now, but solutions will be out there’

– Kim King

Photo by Rod Morris www.rodmorris.co.nz

PF2050.co.nz

Brushtail possums

- Small-medium mammal
- Variable home ranges (1 – 50 ha)
- Variable densities (0.5 – >10 ha^{-1})
- Can live for >10 years in the wild
- Generally 0 – 2 offspring per year

Photo by Rod Morris

Stoats (mustelids)

- Small mammals
- Large home ranges (50 – 500 ha)
- Low densities (0.01 – 0.1 ha^{-1})
- Lifespan 4 – 6 years in the wild
- Litters of 6 – 12 kits per year

Photo by David Hallett

Rats

- Very small mammals
- Small home ranges (0.02 – >2 ha)
- High densities (1 – 50 ha^{-1})
- Lifespan up to 2 years in the wild
- Up to 5 litters (of up to 6) per year

Photo by Rod Morris