Using cameras and artificial intelligence for monitoring invasive species

Manaaki Whenua
Landcare Research

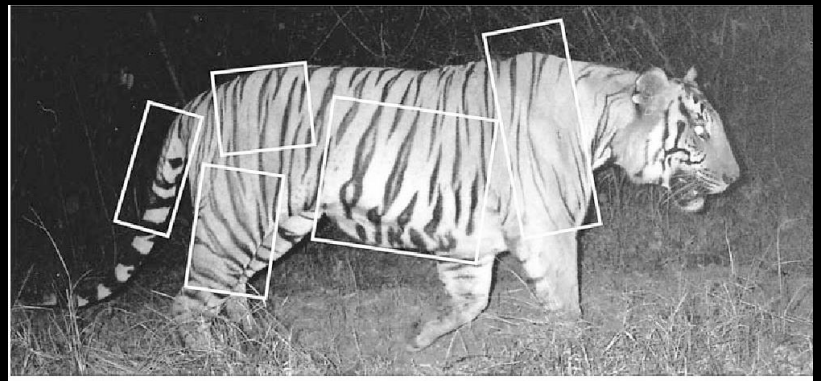
Al Glen
@AS_Glen

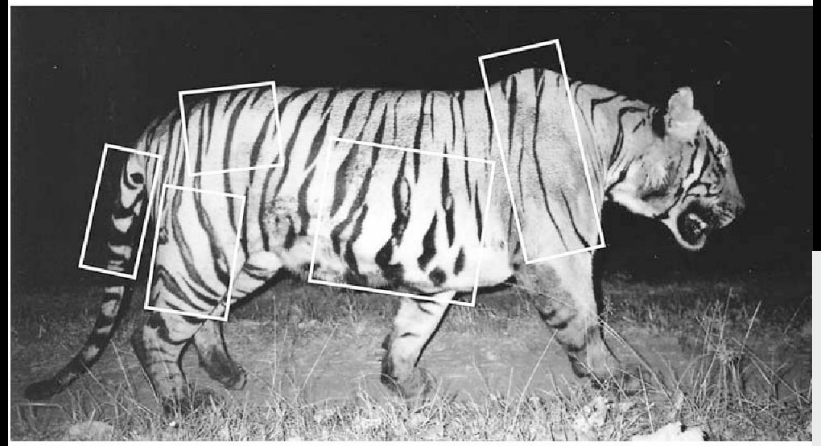
- Motion-triggered cameras
- Photos or videos
- Becoming widely used for wildlife monitoring and research
- Can detect many animal species

Mostly used for large animals

Can also be used for small species

Can identify animals with unique markings



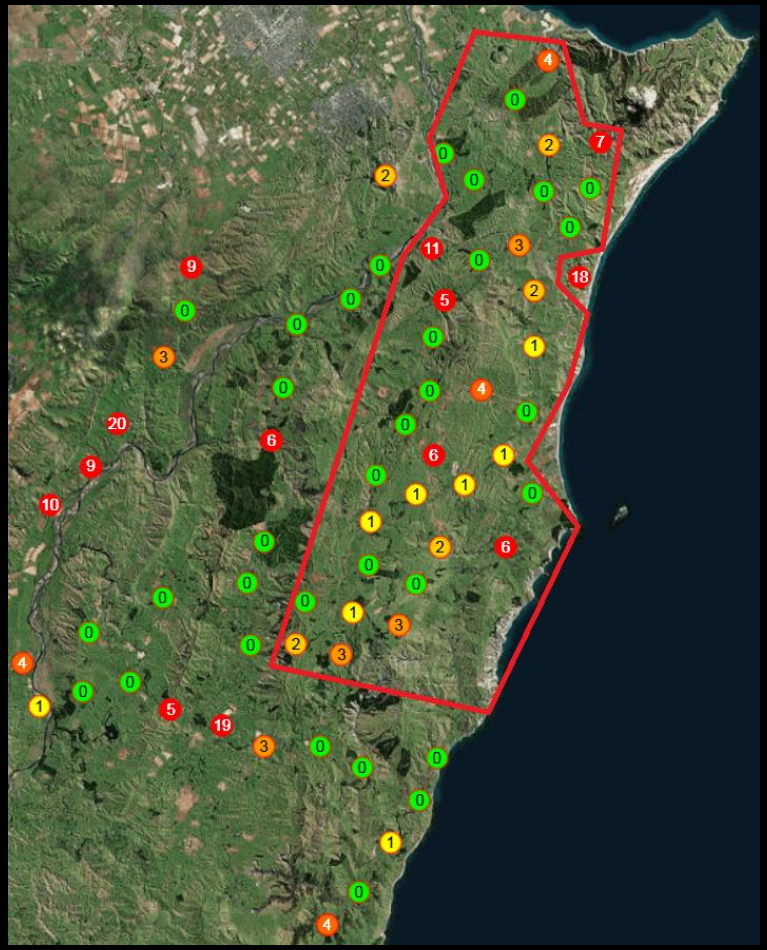


Assessing tiger population dynamics using photographic capture-recapture sampling.

K Ullas Karanth, James D Nichols, +1 author James E Hines • Published in Ecology 2006 •

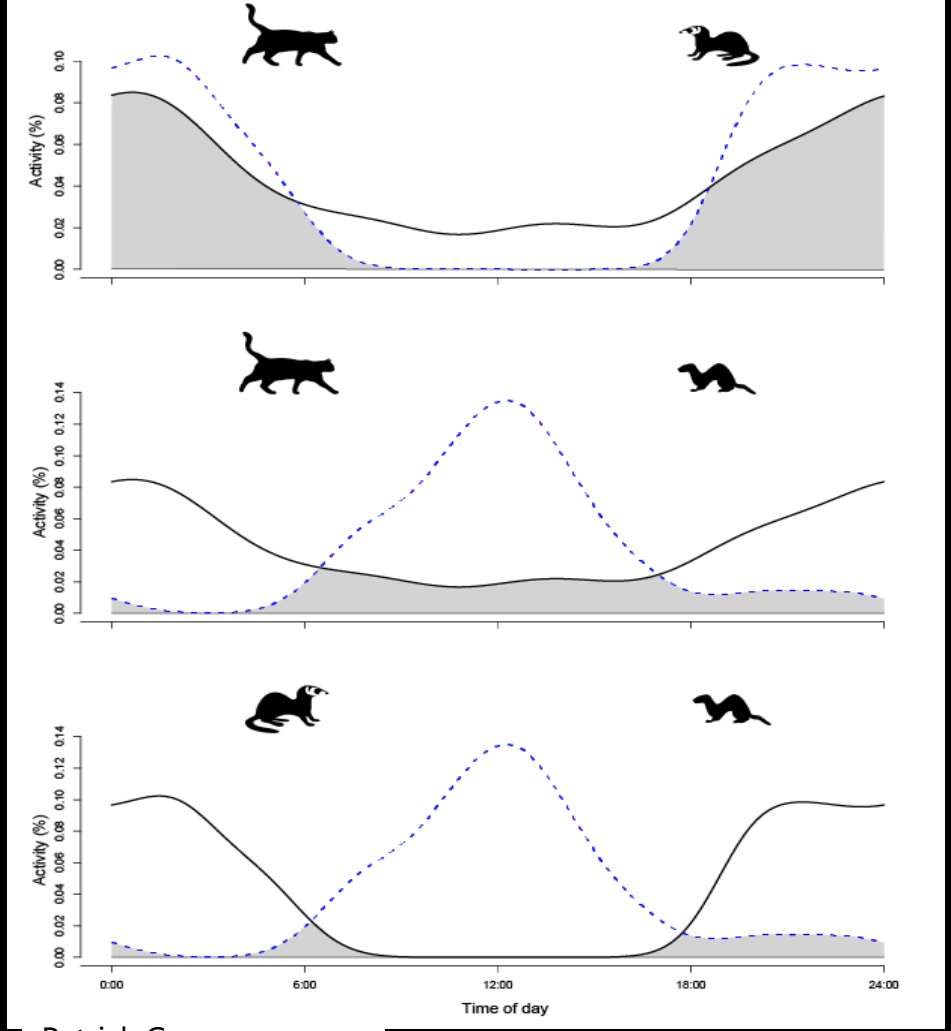
Useful for:

- Estimating population numbers
- Species distribution



Useful for:

- Animal behaviour (e.g. activity times)
- Species interactions (e.g. temporal / spatial avoidance)



Patrick Garvey

Useful for:

- Identifying nest predators

Photos: Grant Norbury

The problem

- Cameras readily detect target animals, but…
- Also triggered by moving branches, grass, livestock, etc.
- A monitoring session can produce many thousands of photos
- >90% of these are livestock or ‘false triggers’ due to moving branches etc.
- Manual processing takes about 1 hr for every 1000 photos = lots of time and $$

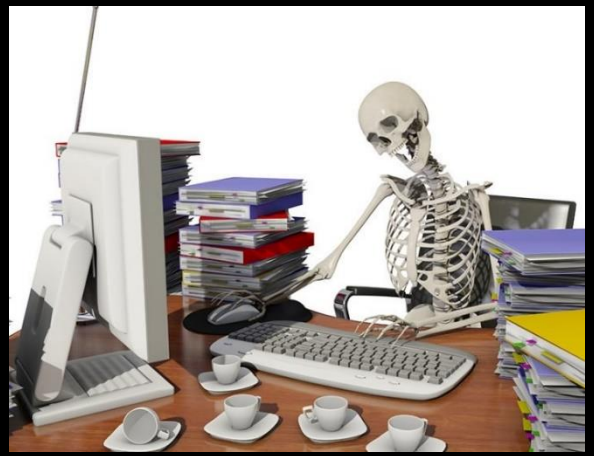
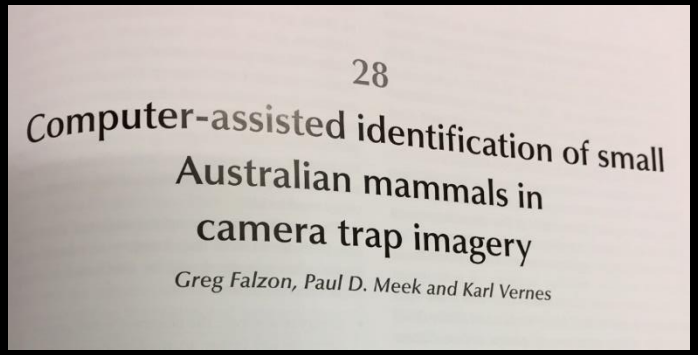


Image processing software

- Software originally developed for Australian species
- Greg Falzon (University of New England) has worked with us to adapt the software for NZ species
- Step 1: Filter out pictures with animals (e.g. kiwi, stoat) from ‘junk’ (false triggers)
- Step 2: Automatically identify species
  - 82 – 91% accurate in early testing
  - Accuracy will continue to improve



- ‘Beta version’ currently being tested
- Will run on a standard PC
- Can process 1000s of images / hour

Current version recognises:

- Cat
- Stoat / weasel
- Hedgehog
- Kiwi
- Other birds
- Livestock (sheep / cattle)
- False triggers

ClassifyMe

File Edit Help

ClassifyMe

New Zealand

Image number 5/6 loaded.
28IMG_1309.JPG classification: cat
Image number 6/6 loaded.
IMG_0006.JPG classification: No classification
Image00005.jpg classification: stoat
Classification of 6 image(s) with model New Zealand complete!
Results have been exported to: C:\Users\Glena\ClassifyMe\export\YOLOV2-2019-05-06_15-41.csv

Load | Classify | Cancel | Clear | Models

	A	B
1	2016 c2c TC6 (288).JPG	bird: 90%
2	1IMG_0020.JPG	hedgehog: 90%
3	Aotearoa (31).JPG	kiwi: 90%
4	28IMG_1309.JPG	cat: 90%
5	IMG_0006.JPG	No classification
6	Image00005.jpg	stoat: 85%
7		
8		

What next?

- Test and refine accuracy of species ID
  - Should reach >95% for all species
- Add more species
  - Possum
  - Rabbit / hare
  - Ferret
  - Rat / mouse
  - Pig
  - Dog

trap.nz

My projects | Find projects | Forums | Help | My account | Log out

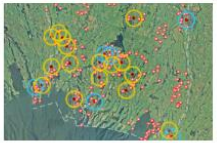
2,263 projects

1,930,943 records added

155,450 predators killed this year,

- **7,547** Mustelids
- **74,045** Rats
- **20,577** Possums
- **11,268** Hedgehogs

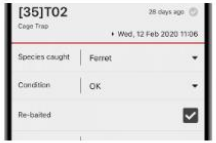
Get started



Set up or join an existing project

Joining a project is easy. Search for a project near you. When you find the right project, click the "Request to join project" button.

If there isn't a project near you, create your own! Mark out your trapping area using the online map, add your contact details and start trapping.

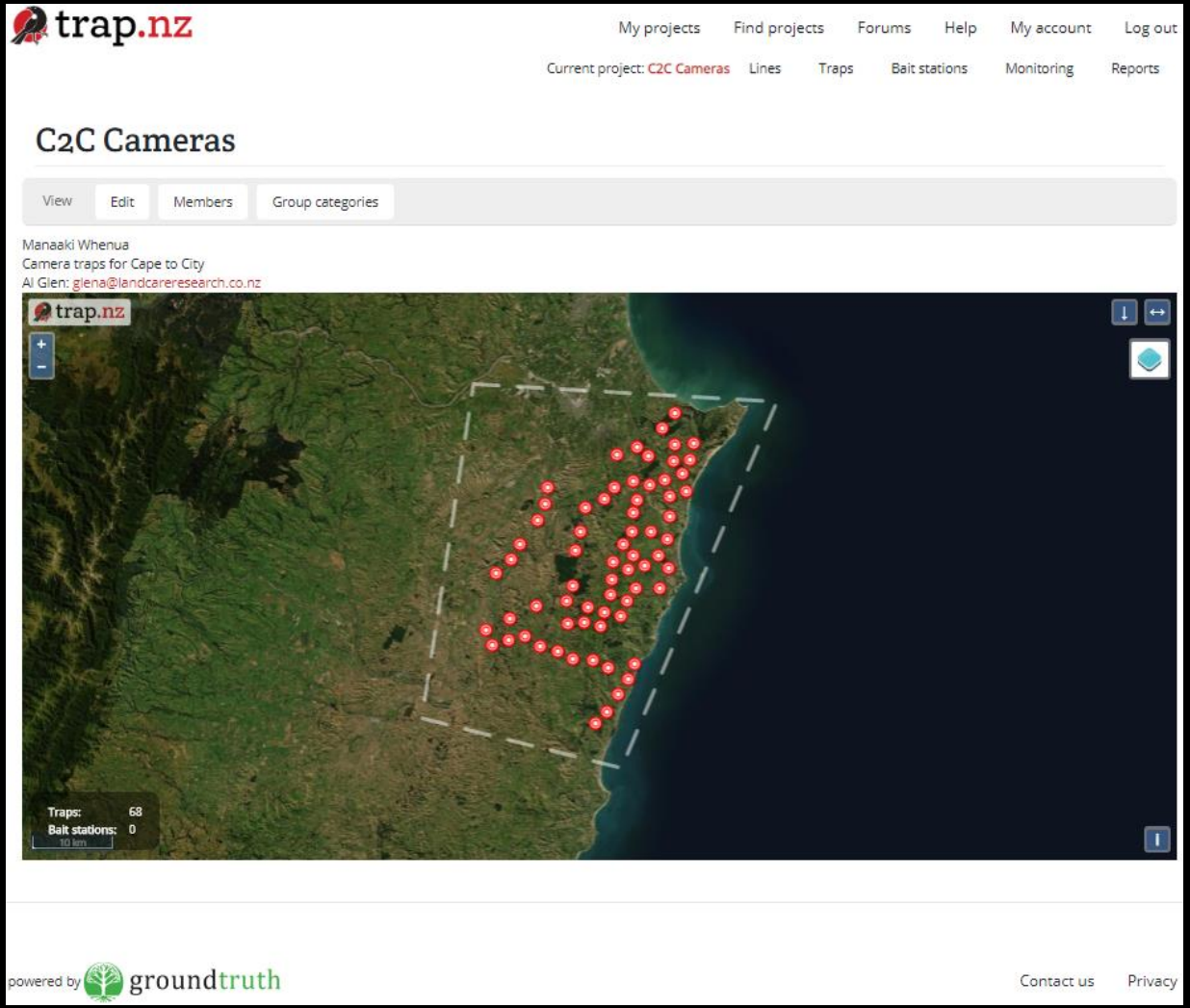


Enter trap and bait station data

Use the website at home or the app out in the field. Organise your traps in lines (a route along which a trapper sets traps) or keep it simple. Once your traps are set up, add catches at your convenience.

Generate reports

Produce reports and maps to help understand your progress. Learn which traps are most effective and where extra work is required. Easily see which traps need to be checked. Track the number of catches of by species. Generate reports for funding applications. Create maps to share your progress on social media.

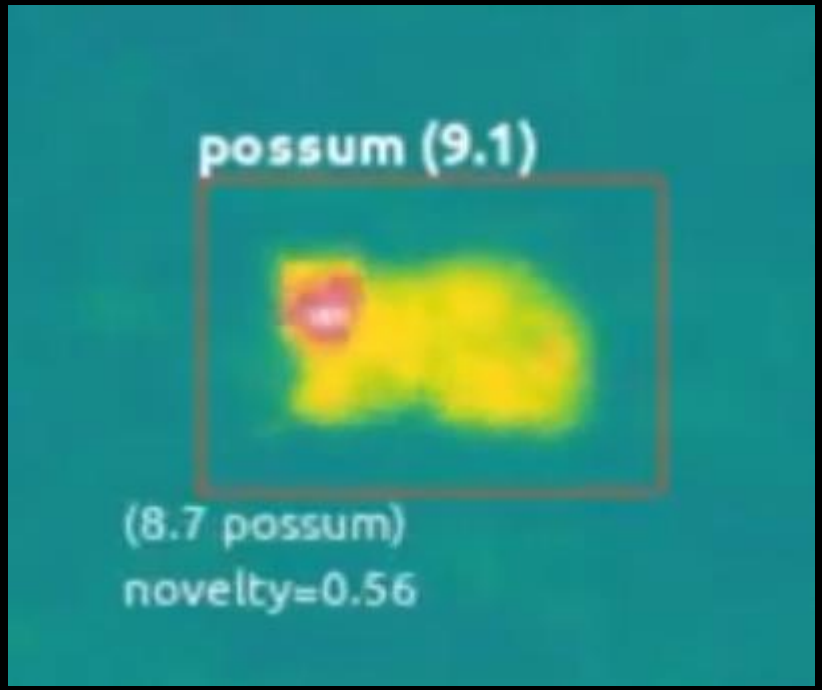


- Image identification currently done manually
- Opportunities for citizen science / public engagement
- A.I. coming soon!
- Potential to improve accuracy even further

THE Cacophony PROJECT

Thermal cameras

- 3 – 50 times more sensitive than normal cameras!



‘Smart’ traps

- Wild Dog Alert developed in Australia
- ‘Smart’ traps could
  - Identify non-target species and disarm
  - Identify target species and deploy appropriate lures
  - Activate without being touched by the target animal


Any questions?
28.06 inHg - 57°F 11/30/2016 03:00PM CAMERA32