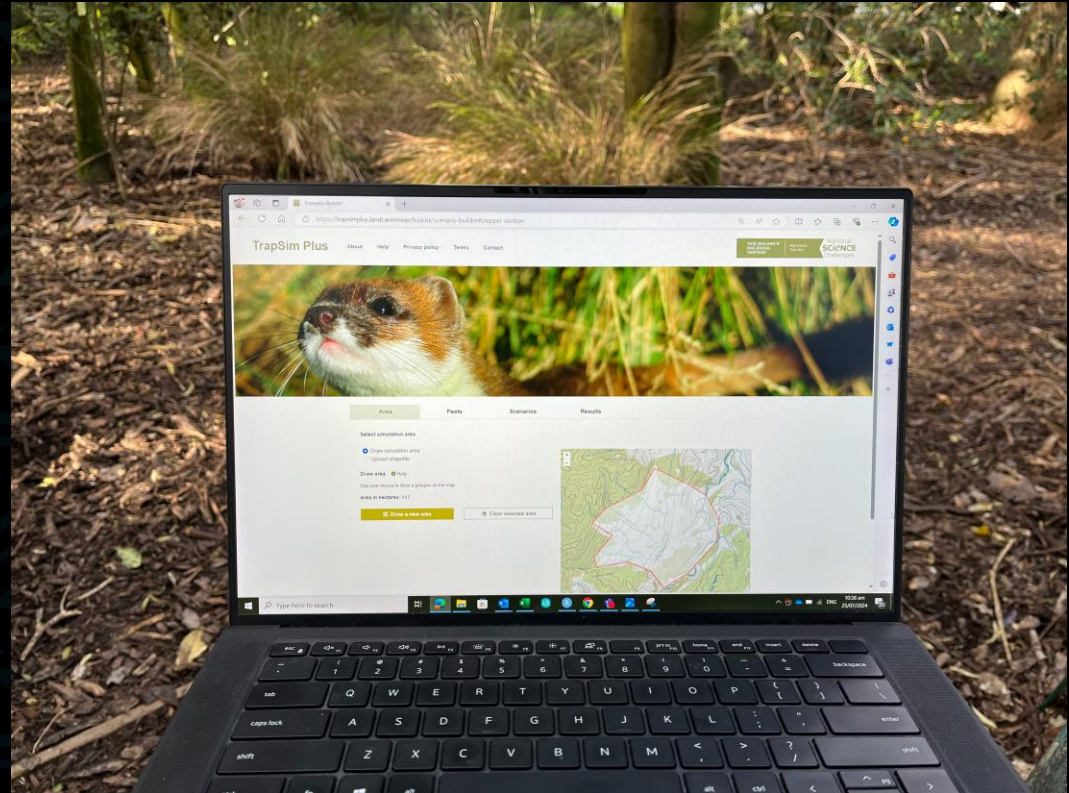


# TrapSim Plus:

A simple to use  
planning tool for  
control of invasive  
mammals

Wildlife Ecology and Management  
+  
Digital Solutions



# Pest Management



## The Big 'Three'

- Brushtail possum
- Norway and ship rats
- Stoats, Ferrets, Weasels



## Also:

- Goats, Hedgehogs,  
Mice, Feral Cats...



# Landscape Scale Control

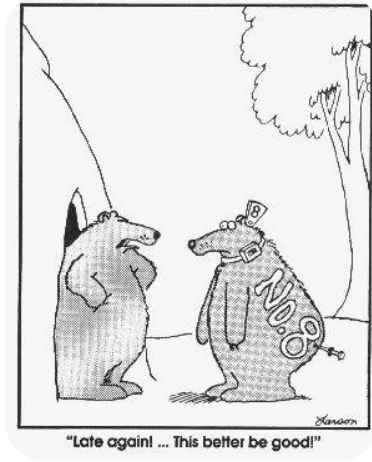


- What type of devices?
- How many devices?
- How long to set them?
- How often should they be checked?

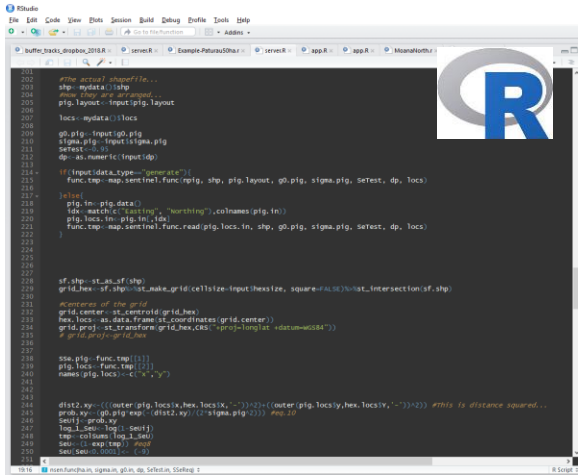


# Depends on many factors

- Animal home range size
- Trap interaction rates



# Computer simulation models to explore options



```
202 #the actual shapefile...
203 shp = readOAI(shp)
204 ptp_layout = rtpm::rtpm(shp)
205 locs = mydata[["locs"]]
206
207 #input data
208 gp = ptp -> input(gp, ptp)
209 sigma = ptp -> input(sigma, ptp)
210 setest = ptp -> input(setest, ptp)
211 dp = as.numeric(input(dp))
212
213 #input data type - generate
214 func_trap = map_sensitve(func_trap, shp, ptp_layout, gp, ptp, sigma, ptp, setest, dp, locs)
215
216 #input data
217 ptp_fm = ptp_fm_data
218 hex = match(c("east", "north", "west", "south"), colnames(ptp_fm))
219 ptp_fm[hex, ] = ptp_fm[hex, ]
220 func_trap = map_sensitve(func_trap, read(ptp_fm, locs_fm, shp, gp, ptp, sigma, ptp, setest, dp, locs))
221
222 #input data
223 if (shp == "shp") {
224   grid_hex = sf::st_as_sf(st::st_as_sf(shp))
225   #center of the grid
226   grid_center = st::st_centroid(grid_hex)
227   hex_locs = as.data.frame(st::st_coordinates(grid_center))
228   grid_proj = st::st_transform(grid_hex, crs = proj4string(st::st_crs(hex_locs)))
229   #input data
230   shp = ptp_fm_data
231   ptp_fm = func_trap[[""]]
232   ptp_fm = func_trap[[""]]
233   names(ptp_fm) = c("x", "y")
234
235   dist2_xy = (outer(ptp_fm[, "hex_locs", "x"], outer(ptp_fm[, "hex_locs", "y"], "y")) - "y") #this is distance squared...
236   prob_xy = gp_ptp_exp[["dist2_xy"]] * sigma_ptp[["prob_xy"]]
237   set1 = prob_xy
238   top1_set = top1_set
239   top_colsum = top1_set
240   set = [ exp(temp) * prob ]
241   set = set[["set"]]
242 }
```



**PLOS ONE**

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

### Refining kill-trap networks for the control of small mammalian predators in invaded ecosystems

Andrew M. Gormley  Bruce Warburton

Published: September 8, 2020 • <https://doi.org/10.1371/journal.pone.0238732>

## TrapSim

- Decision support tool
- For land managers
- Freely available online

# TrapSim

- Prototype
- Limited functionality
- No guidance for users
- Non-stable platform
- Costs not included



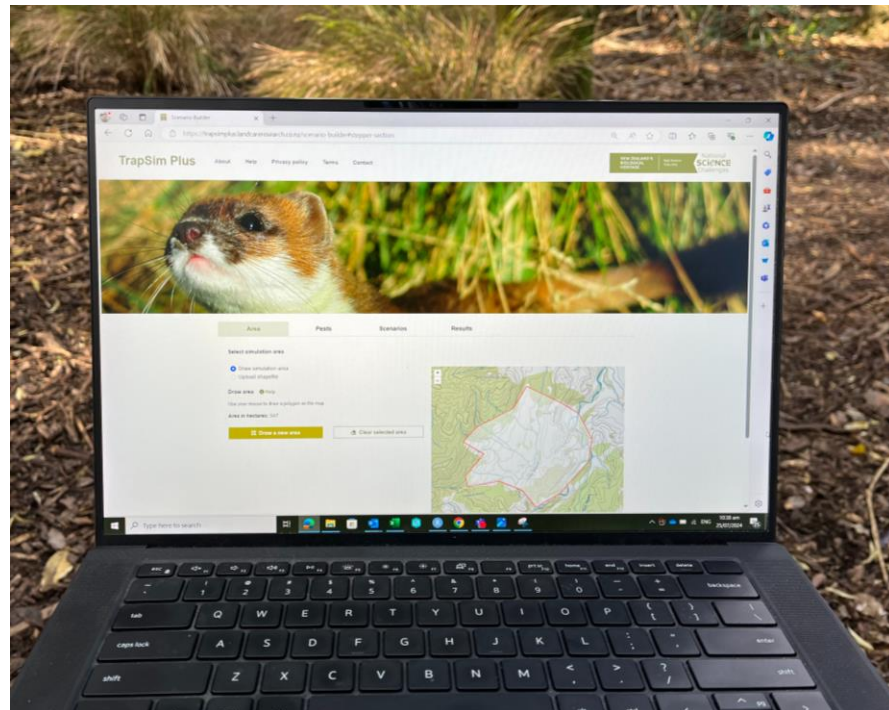
# TrapSim Plus



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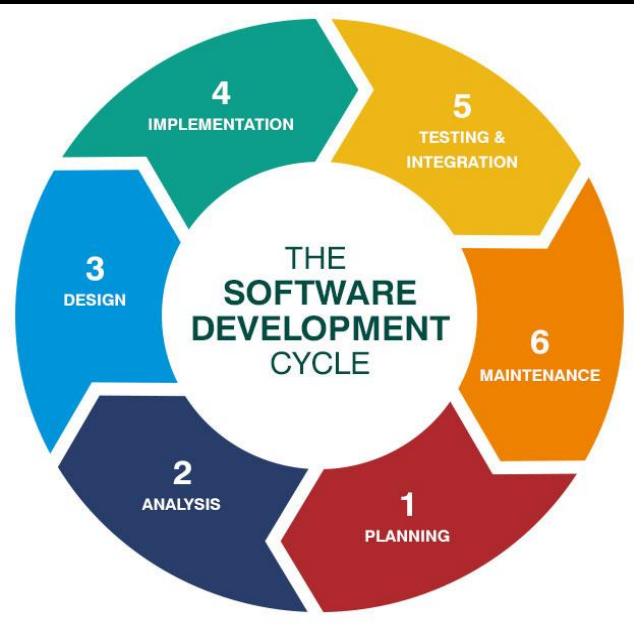
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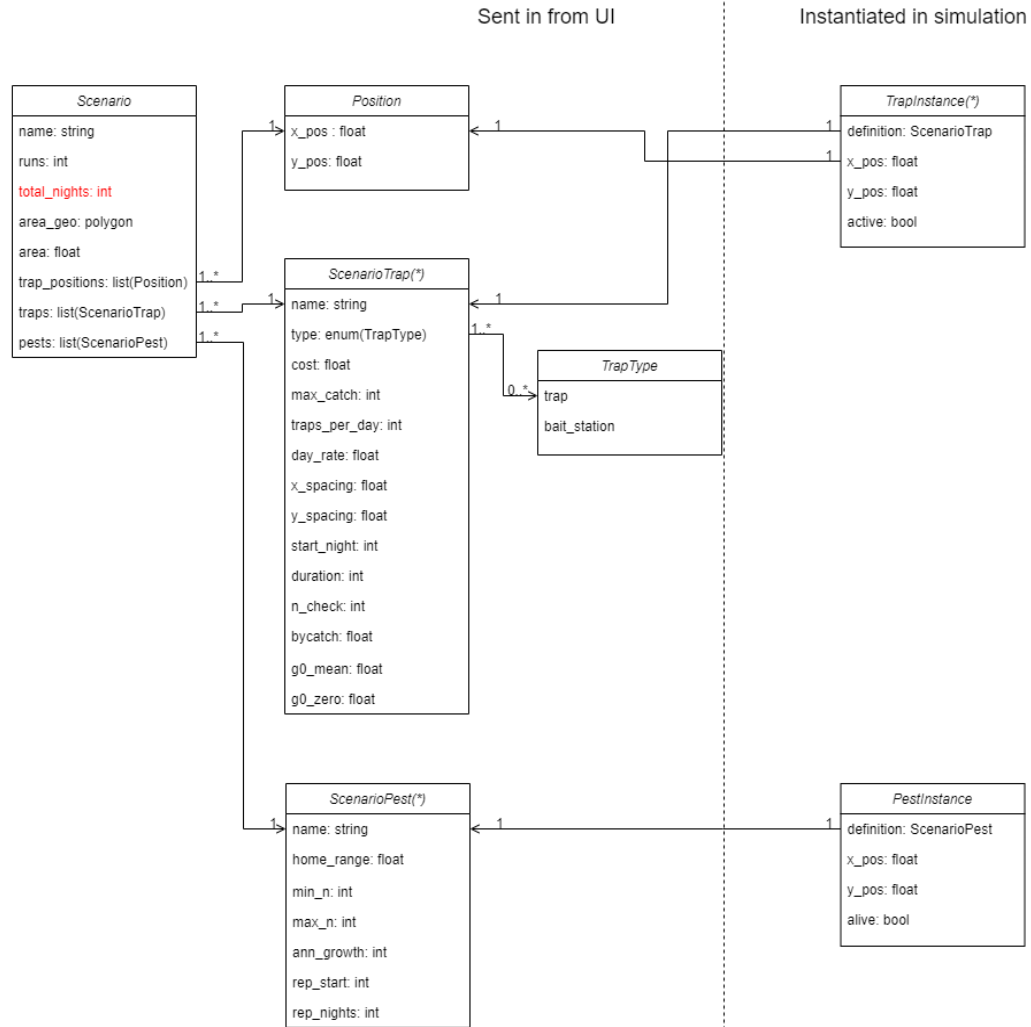


# Software Development Process

- Iterative approach
- Continuous cycle



# Reworking the Model



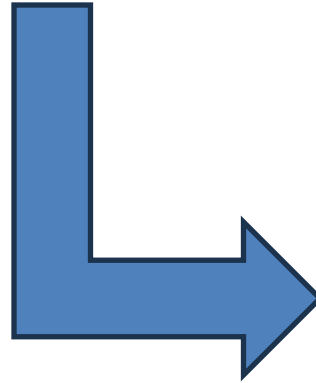


# Configurable

- Users might not always be aware of the information they need to provide
- Provide more data in the app to the users based on scientific evidence
- Enable scientists to provide updated data easily without code changes

Trapping

Trap Type	Maximum catch	Trap Probability (g0)	Fixed cost per trap (\$)	Daily bycatch	Proportion untrappable
Timms	1	0.1	60	0.01	0.05



Devices

Device information last updated on 13 Jun 2024

Add new device

Device type \*  
Choose device...

- Choose device...
- AT220
- Flipping Timmy
- Possum Master
- SA2 Kat
- Sentinel
- Timms
- Trapinator
- Warrior
- Philproof Baitstation

# Adding UI improvements



- Draw your trapping area on a map
- Pulling through habitat information to make more accurate population estimates
- Generally making the app "user-friendly"

## Select simulation area

- Draw simulation area
- Upload shapefile

Draw area [Help](#)

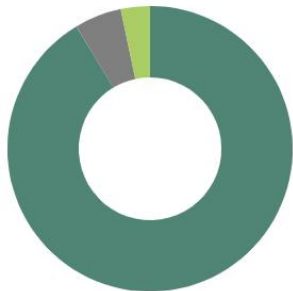
Use your mouse to draw a polygon on the map

Draw a new area

Clear selected area

Area in hectares: 241

Approximate habitation:

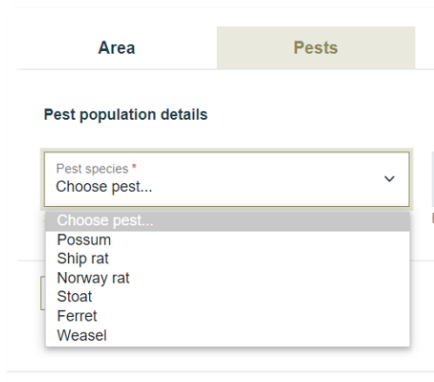
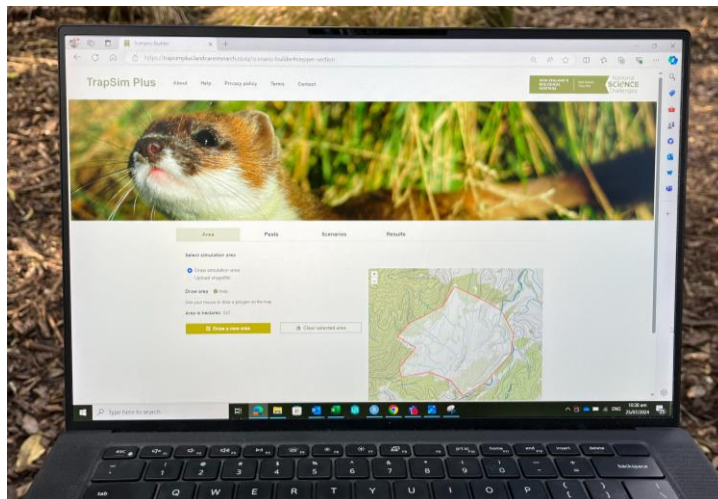


- Herbaceous (Wetlands)
- Other
- Exotic Grassland



# New Features

- Suitable for six species
- Automatic selection of default parameters: density, carrying-capacity, population growth rates, home range
- Can include immigration
- Device costs, & info on NAWAC status



## NAWAC guideline table

Y = tested and is humane for that type of pest

NAWAC guideline test status – updated 21 November 2023

Trap	Ship Rat	Norway Rat	Stoat	Ferret
DOC 150		Y	Y	
DOC 200	Y	Y	Y	
DOC 250	Y	Y	Y	Y
BT 200	Y		Y	
BT 250				Y
PodITRAP				Y
Rewild F-Bomb	Y	Y	Y	Y

New Zealand Journal of Ecology (2023) 47(1): 3552 © 2023 The Author(s), under a [CC BY 4.0 licence](https://creativecommons.org/licenses/by/4.0/)

1



NEW ZEALAND JOURNAL OF ECOLOGY

REVIEW

Detectability of ten invasive mammal pests in New Zealand: a synthesis of spatial detection parameters

Georgia Vattiato<sup>1,2,3\*</sup>, Rachele N. Binny<sup>1,3</sup>, Sam J. Davidson<sup>1,2</sup>, Andrea E. Byrom<sup>3,5</sup>, Dean P. Anderson<sup>4</sup>, Michael J. Plank<sup>2,3</sup>, Joanna K. Carpenter<sup>4</sup> and Alex James<sup>2,3</sup>

# Results

- Ballpark estimates of efficacy of control 'scenarios'
- Rank by cost-effectiveness

Name	Duration (days)	Total devices	Total cost	Population change	Efficiency index
Scenario 1	31	20	\$2700	↓ 83%	7.18

Hide details

## Scenario 1

### SCENARIO

Area (ha)	Total cost	Start population	End population	Efficiency
194	\$2700	35	6	7.18

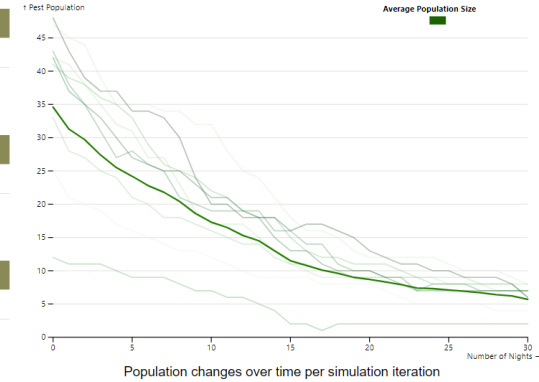
### PESTS

Pest type	Min pests	Max pests
Stoat	10	50

### DEVICES

Name	NAWAC	Quantity	Total cost
BT200 Double Set	✓	20	\$2700

### POPULATION OVER TIME



Scenario 2	61	10	\$1700	↓ 81%	9.1
------------	----	----	--------	-------	-----

## Scenario 2

### SCENARIO

Area (ha)	Total cost	Start population	End population	Efficiency
194	\$1700	26	5	9.1

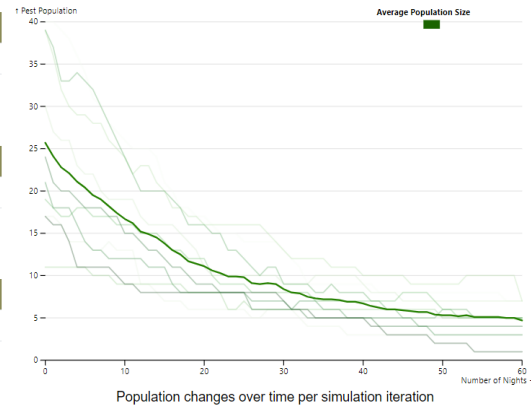
### PESTS

Pest type	Min pests	Max pests
Stoat	10	50

### DEVICES

Name	NAWAC	Quantity	Total cost
BT200 Double Set	✓	10	\$1700

### POPULATION OVER TIME



# DEMO



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[Build simulation ▶](#)

By using this website you agree to the terms and conditions of the TrapSim Plus website.

**Predator control planning made easy**

## Other team members:

- Mary O'Leary (Intern)
- Kate Davidson (Intern)
- Nicoletta De Maio
- Martin Herran
- Siamac Nikoo
- Tomas Burleigh-Behrens
- Margaret Watts

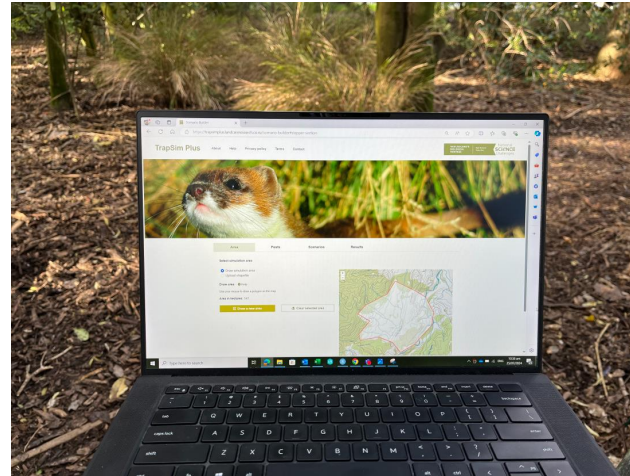
## SO5 Co-leads and project team

- Chris Jones, Nikki Harcourt
- Izzy Busby, Ally Palmer, Kevin Collins

## Acknowledgements

- Predator Free Wellington testers
- Bruce Warburton, Dean Anderson, Cecilia Latham, Simon Howard (MWLR)
- Campbell Leckie (HBRC), Dan Tompkins (PF2050), David Ramsey (DELWP)

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