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Pine wood nematode: Towards a systematic trapping grid for the detection of infected insect vectors

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SCIENCE & IMPACT

Monochamus galloprovincialis
insect vector of the pine wood nematode

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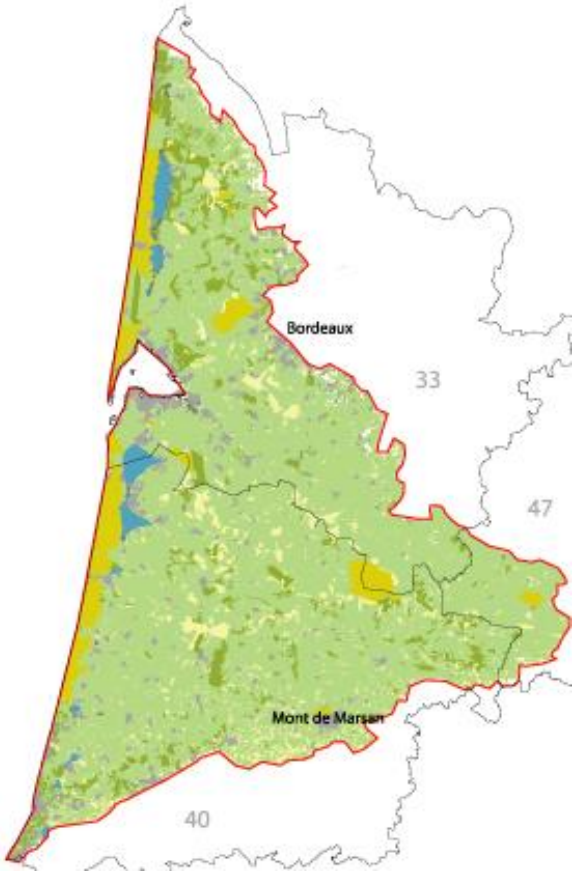
ORIGINAL CONTRIBUTION

Combining pheromone and kairomones for effective trapping of the pine sawyer beetle *Monochamus galloprovincialis*

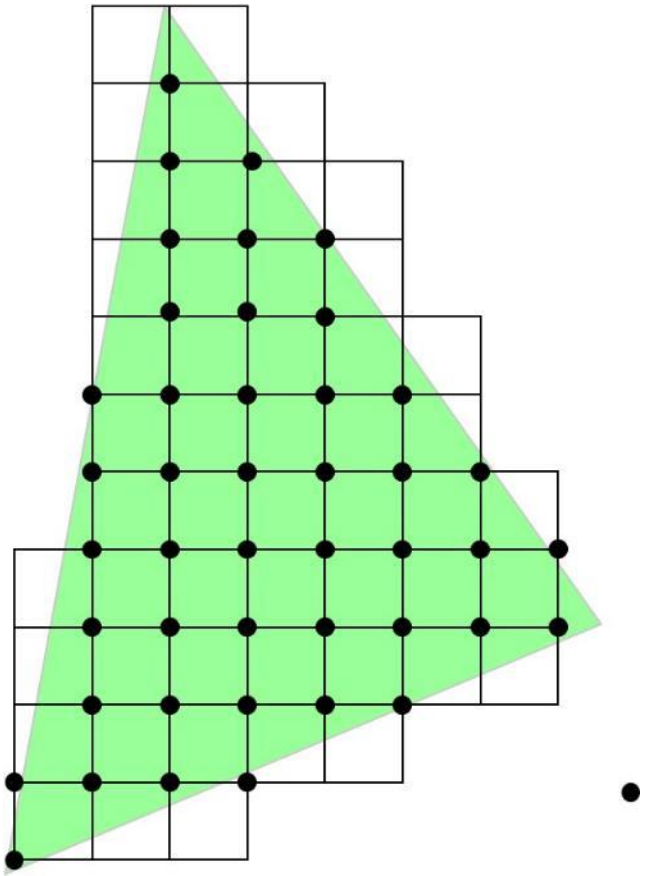
G. Álvarez[1], D. Gallego[2], D. R. Hall[3], H. Jactel[4,5] & J. A. Pajares[1]

Theoretical grid of pheromone trapping for *Monochamus*

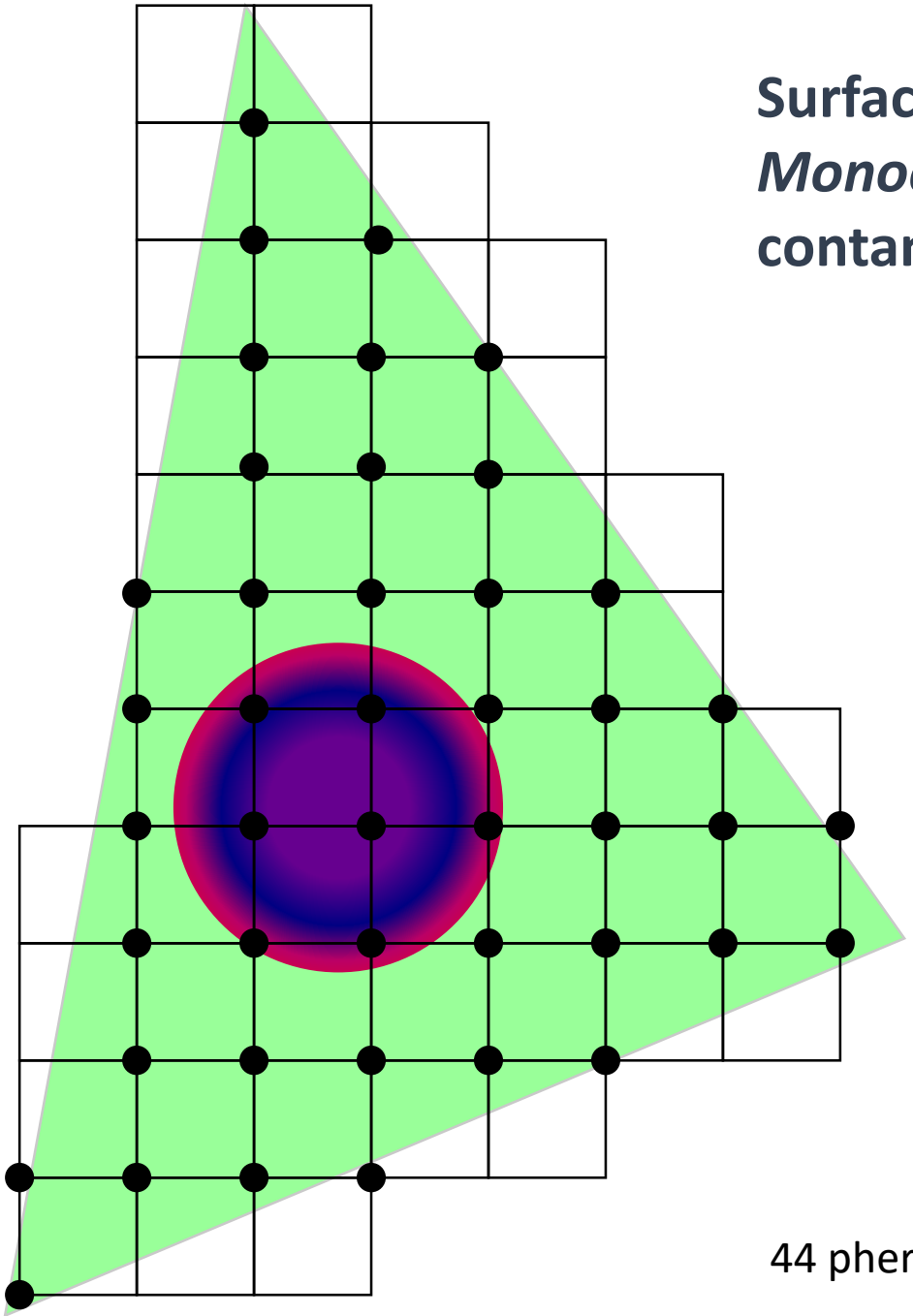
20 km × 20 km



Forêt des Landes de Gascogne

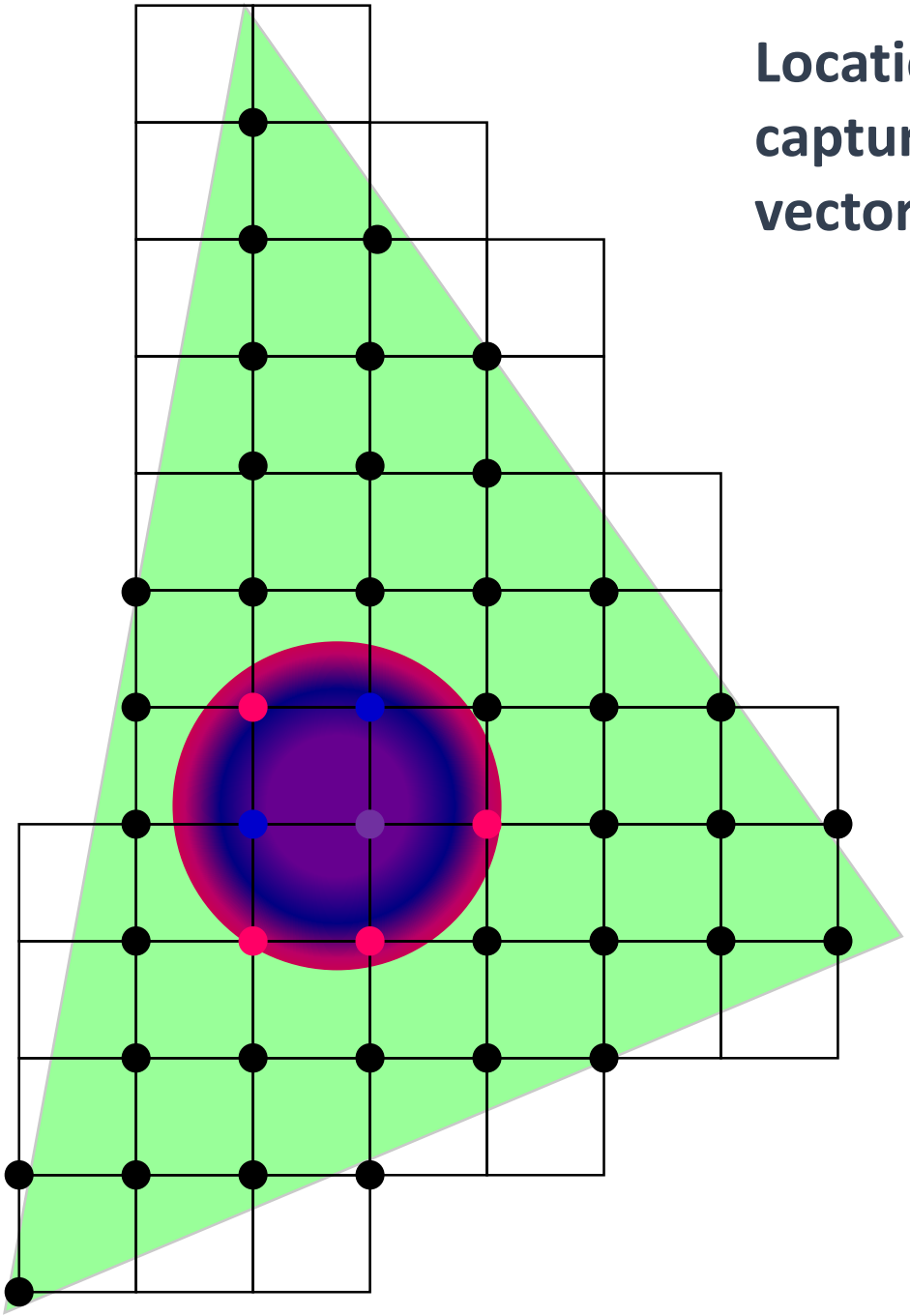


Pheromone trap

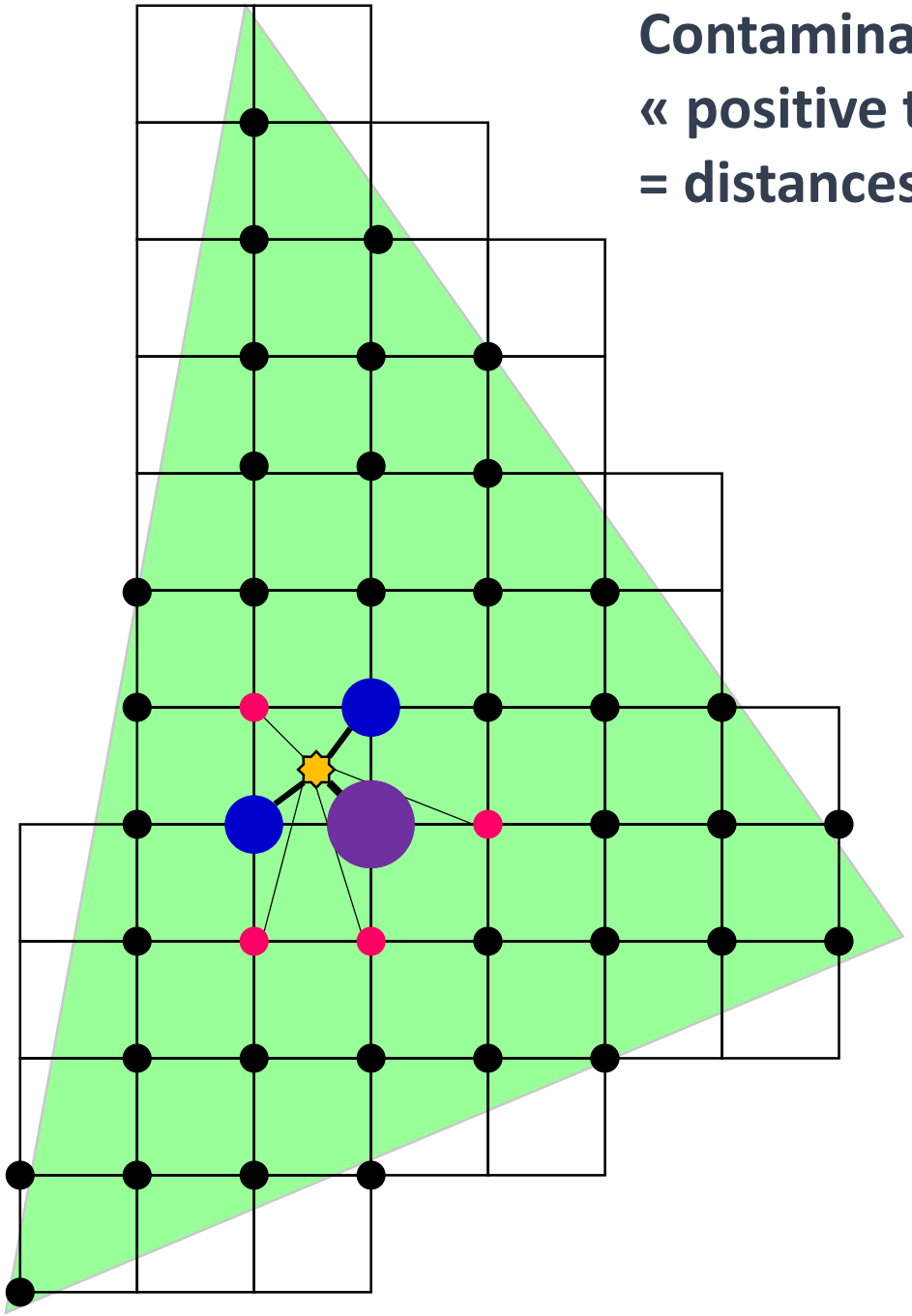


Surface probability of presence of *Monochamus* dispersing from the contaminated stand

44 pheromone traps

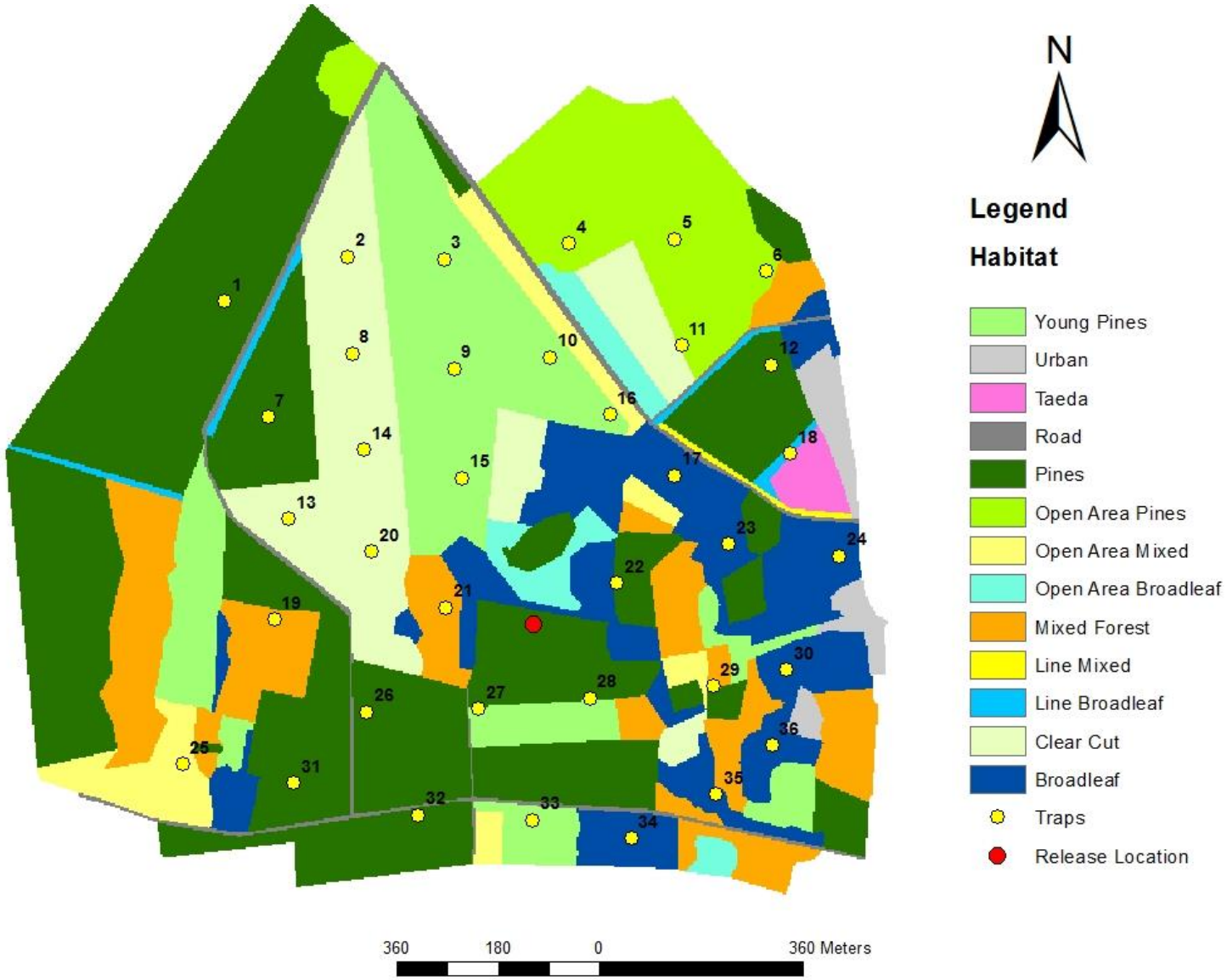


Location of “positive traps” = with capture of contaminated insect vectors, with levels of capture

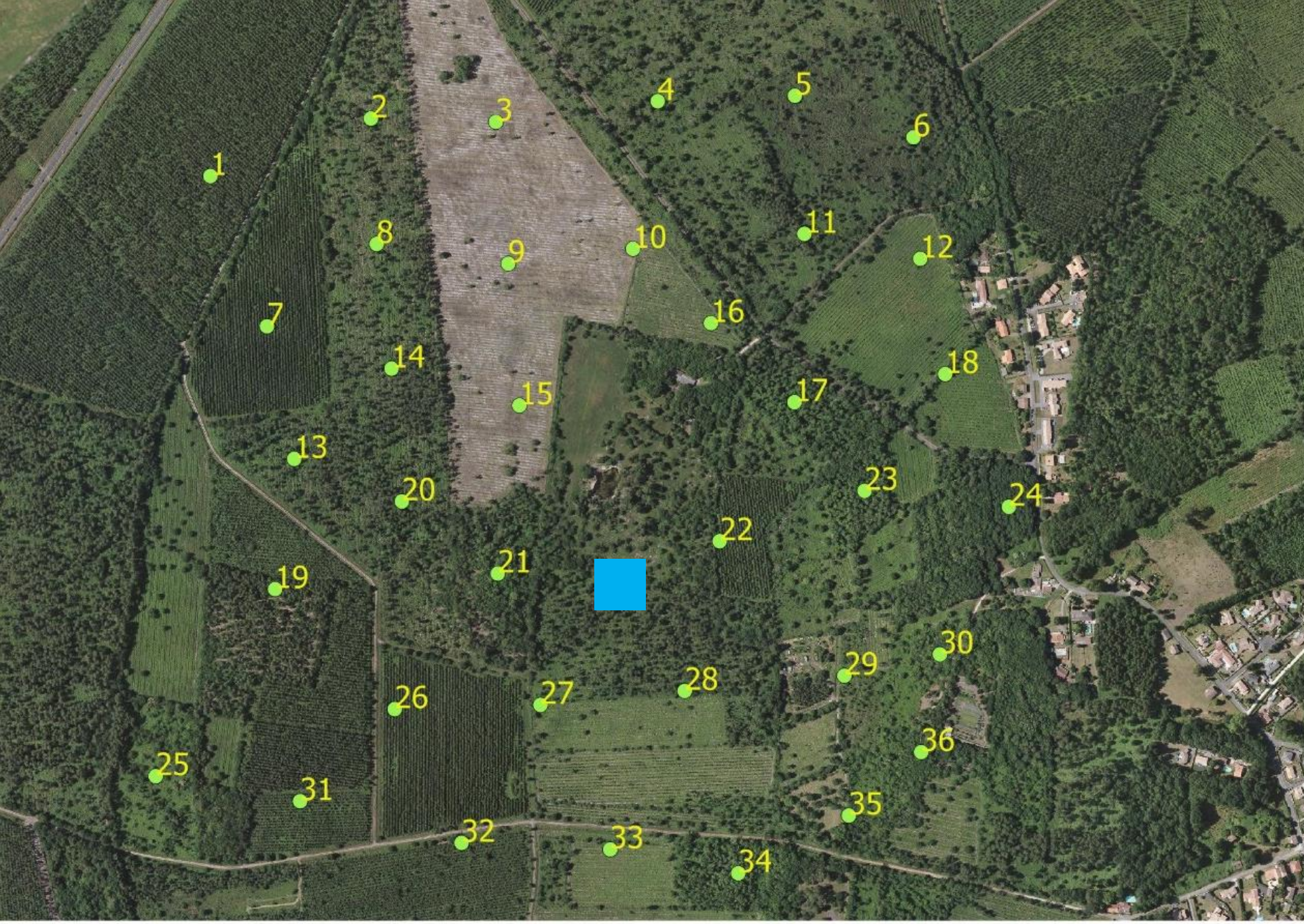


Contaminated area at the barycenter of
« positive traps »
= distances weighted by capture

Experimental test with a mark-release-recapture experiment in a heterogeneous forest landscape



Mark – Release – Recapture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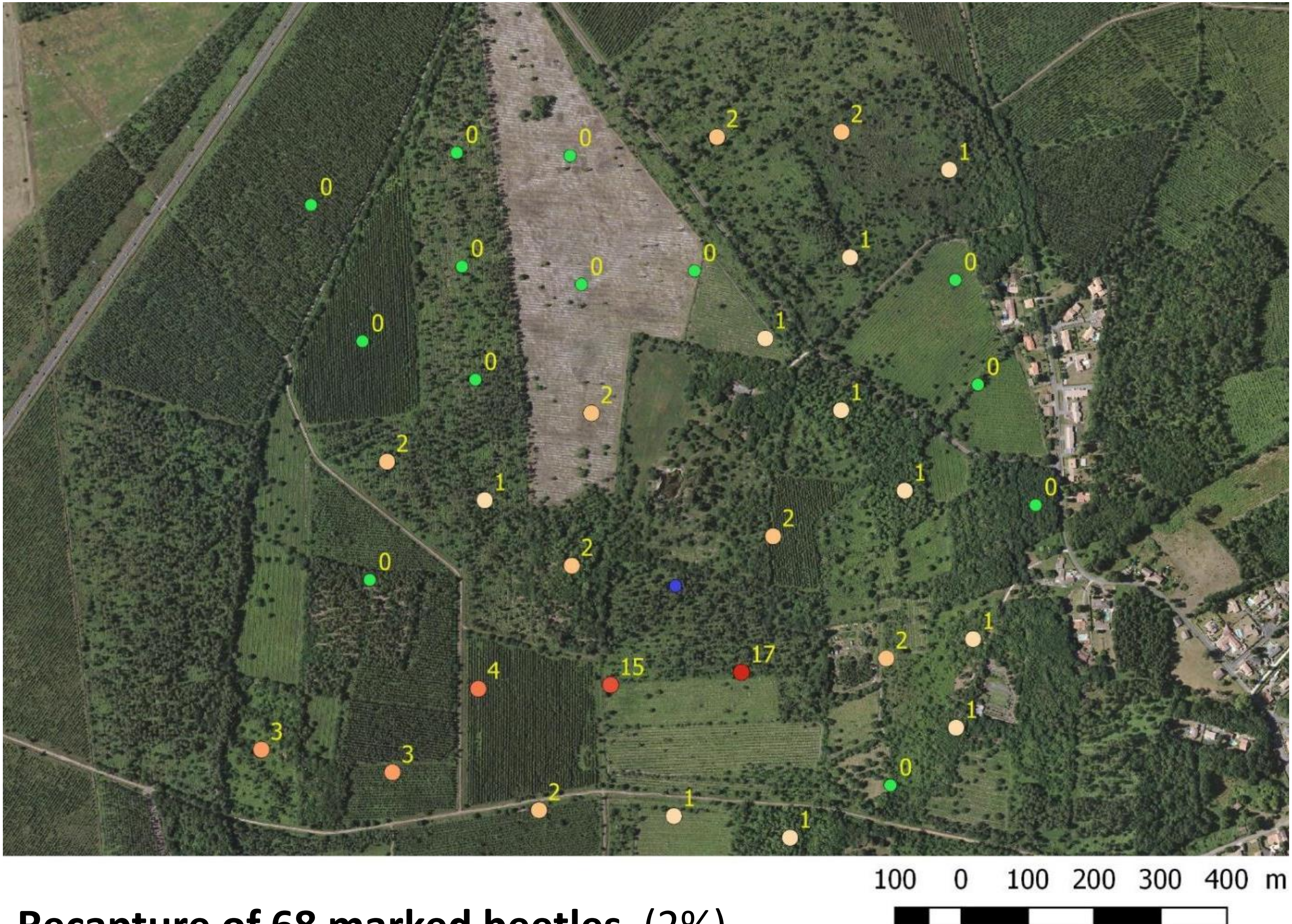
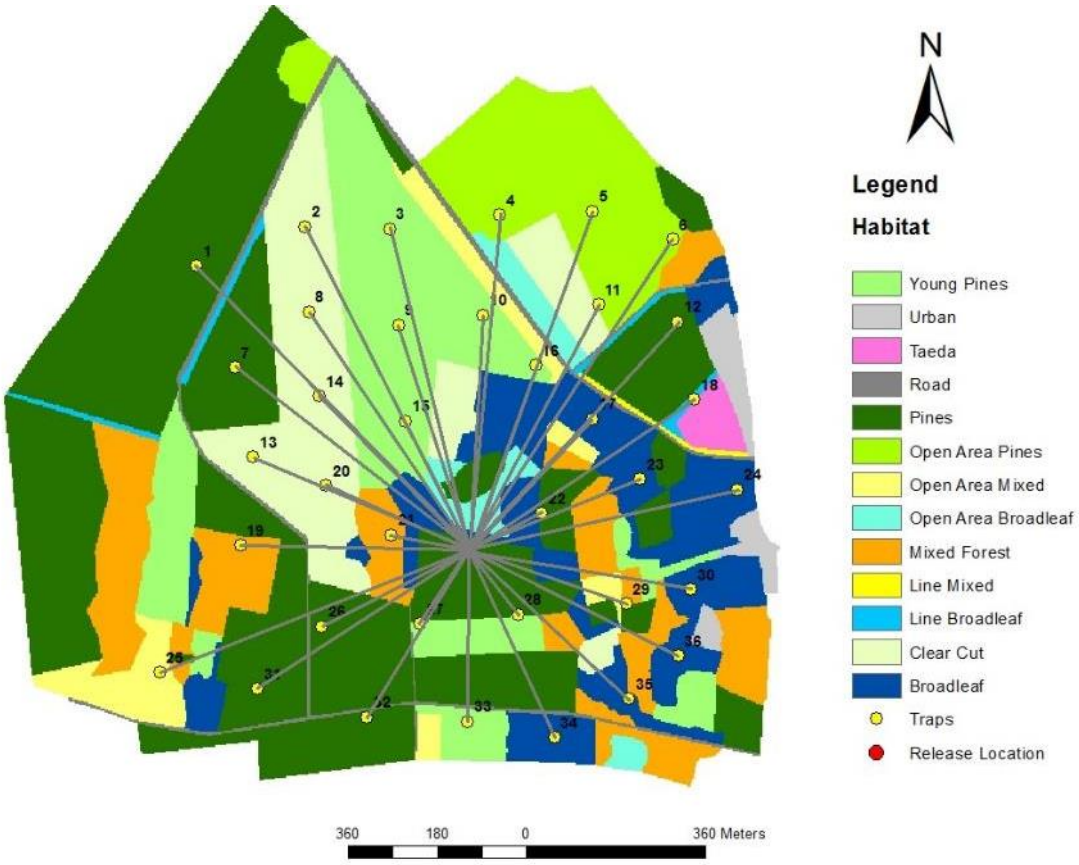
Release 3162 marked beetles
100 0 100 200 300 400 m



Recapture of 68 marked beetles (2%)

Computation of the weighted barycentre to locate the release point

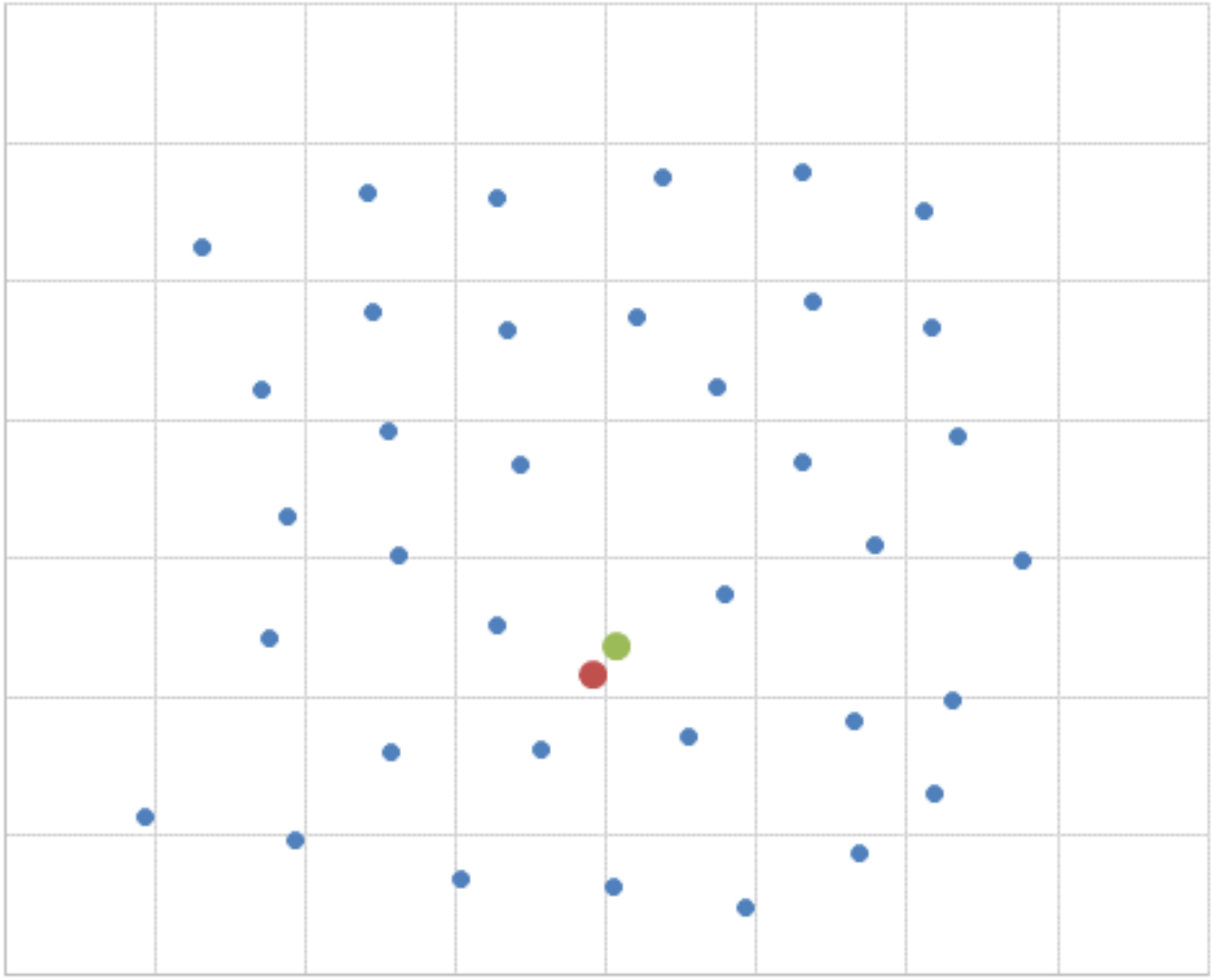
1. Based on straight line distance



$$Abscisse\ xb = \frac{\sum x.n}{\sum n}$$

$$Ordonnée\ yb = \frac{\sum y.n}{\sum n}$$

1. Based on straight line distance



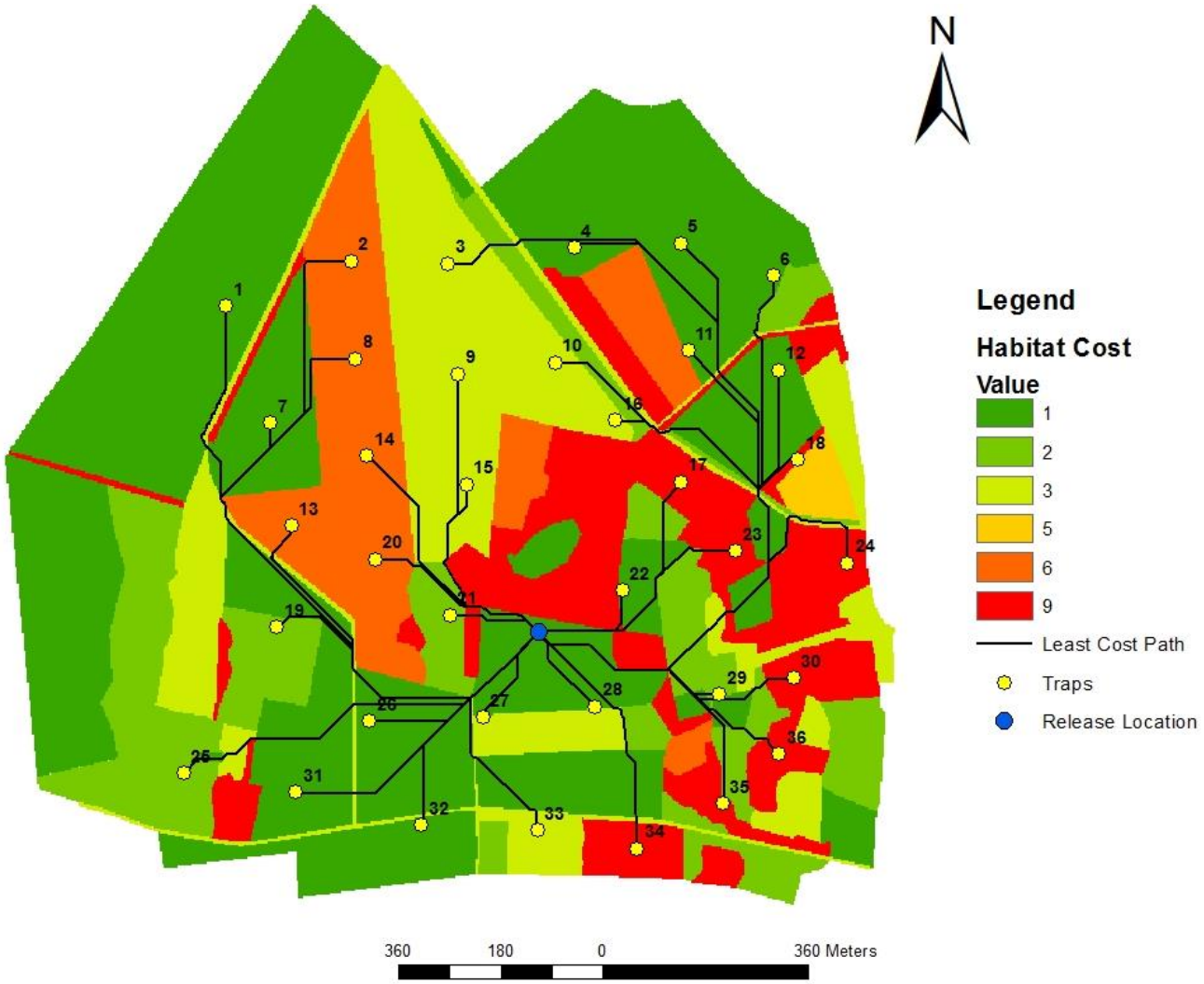
Release point

Estimated barycentre

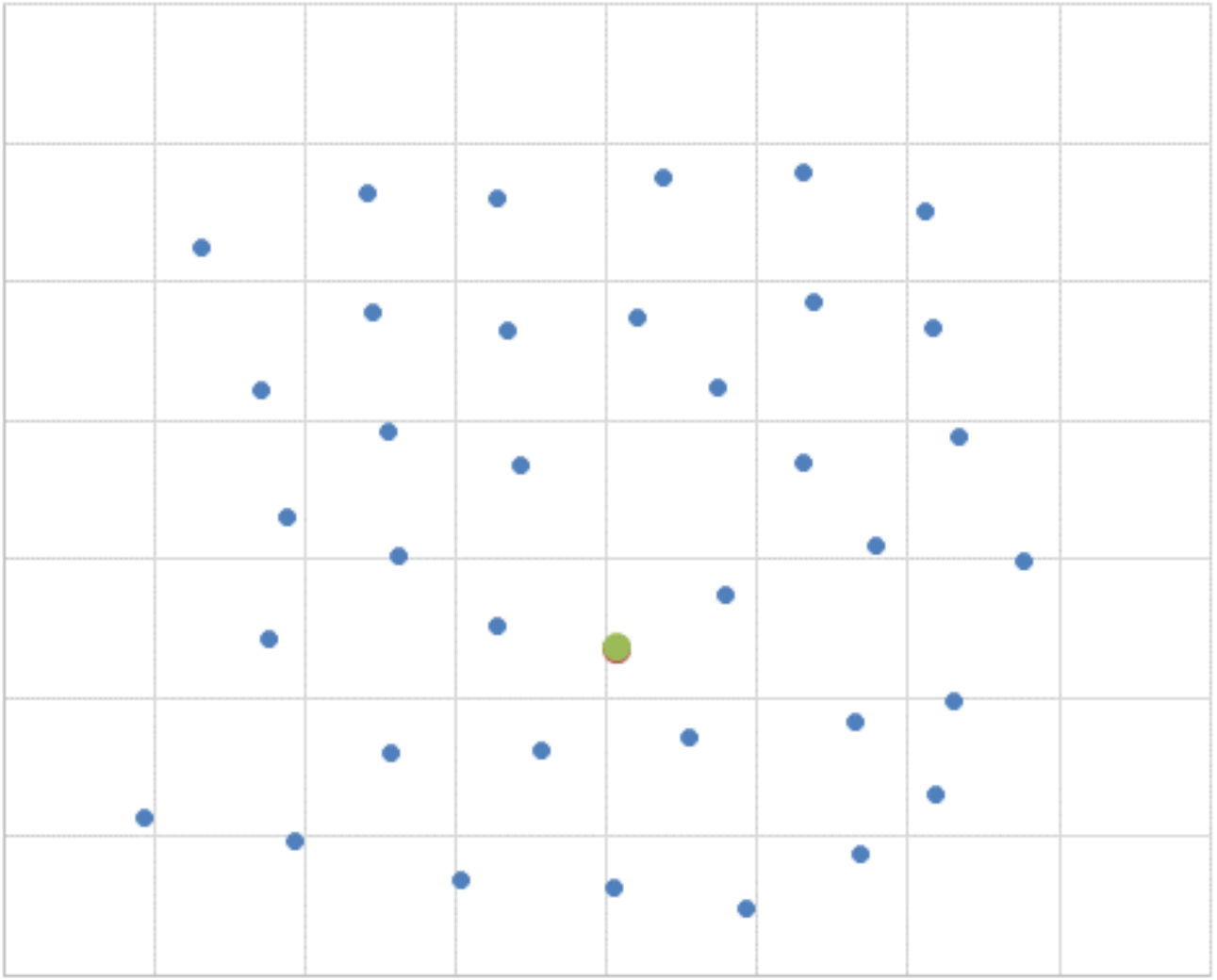
Distance: 52 m

Computation of the weighted barycentre to locate the release point

2. Based on least cost path



2. Based on least cost path



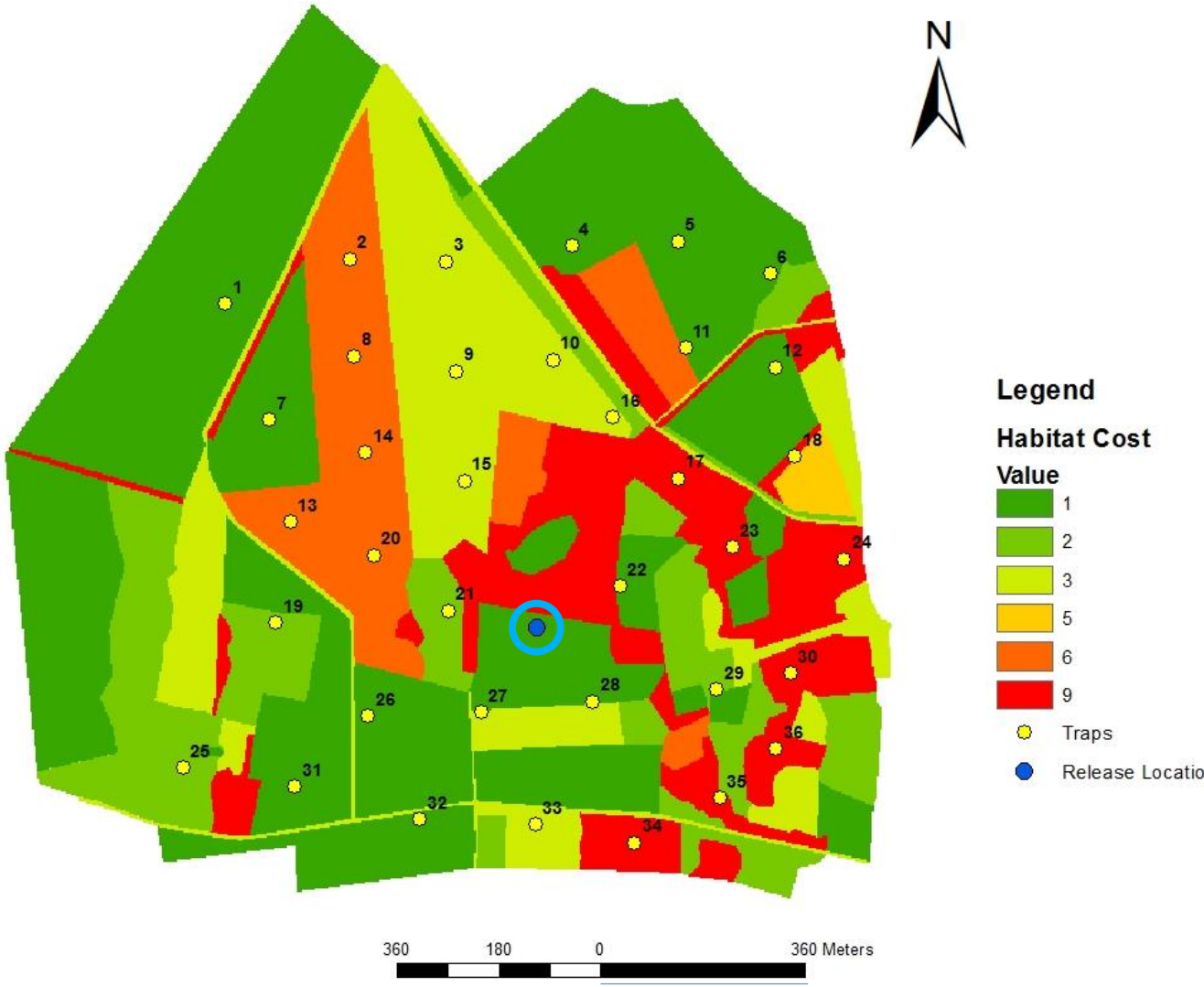
Release point

Estimated barycentre

Distance: 3 m !!!

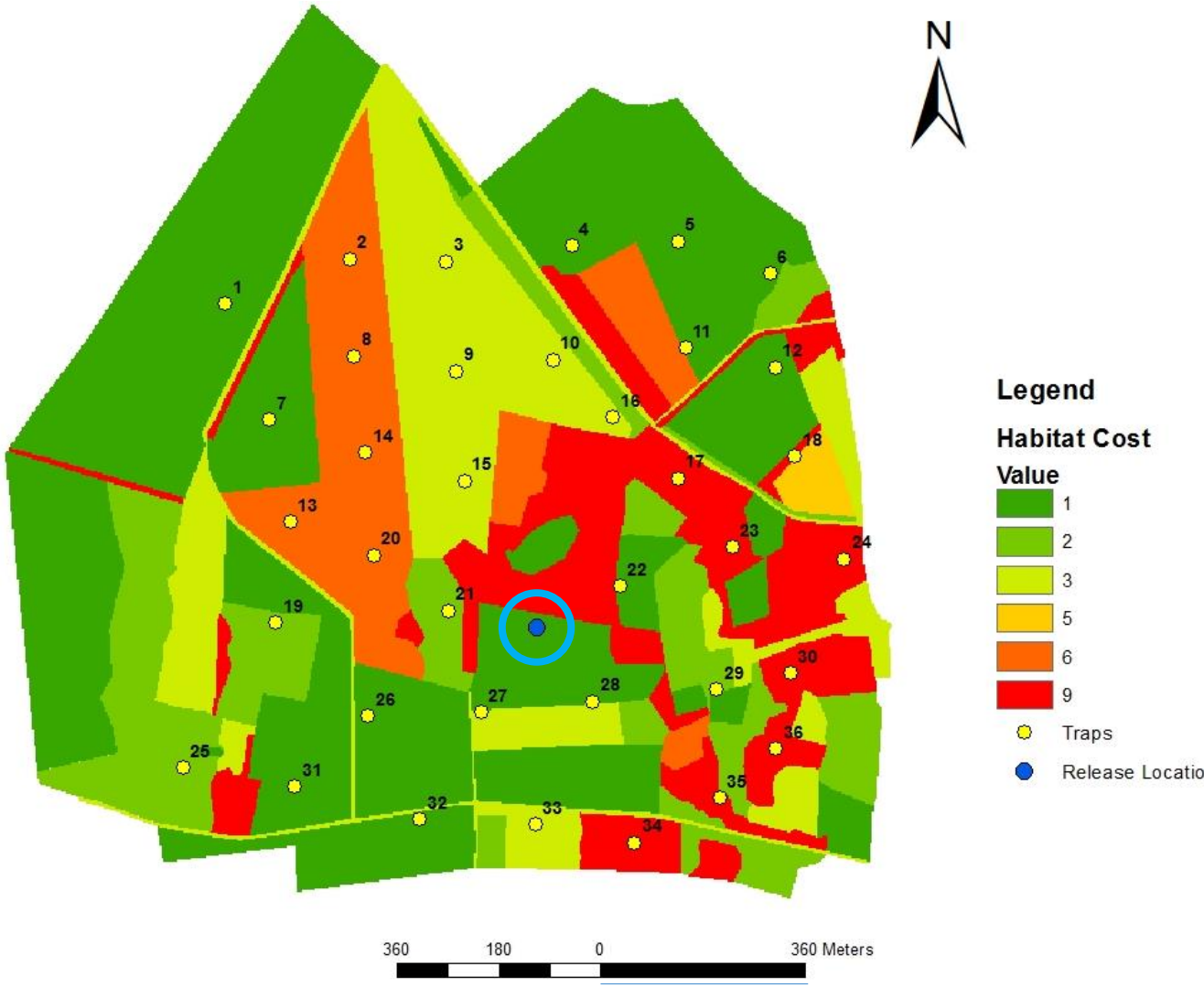
Reducing the density of traps in the systematic grid

25 traps → 47 m



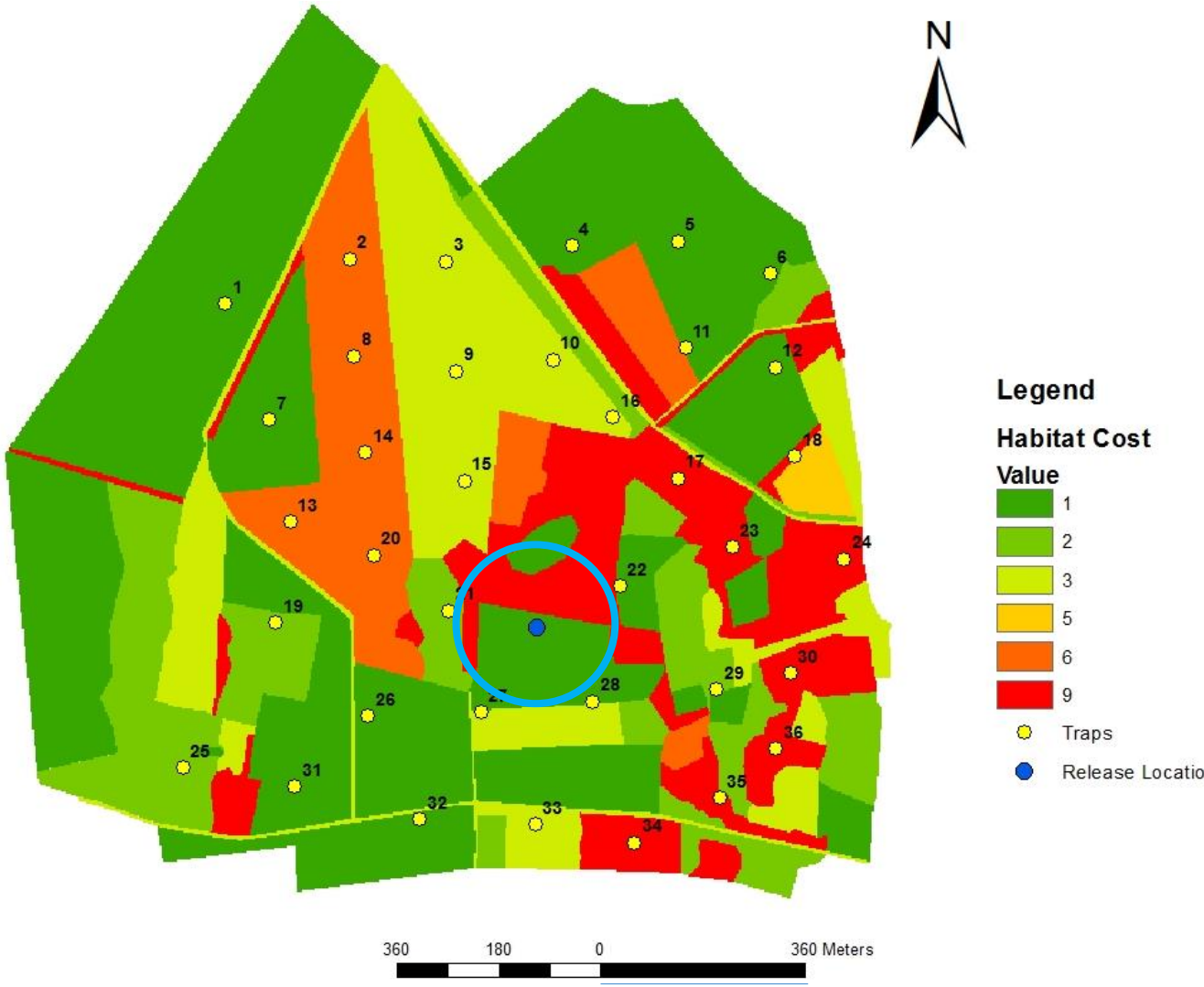
Reducing the density of traps in the systematic grid

16 traps → 52 m



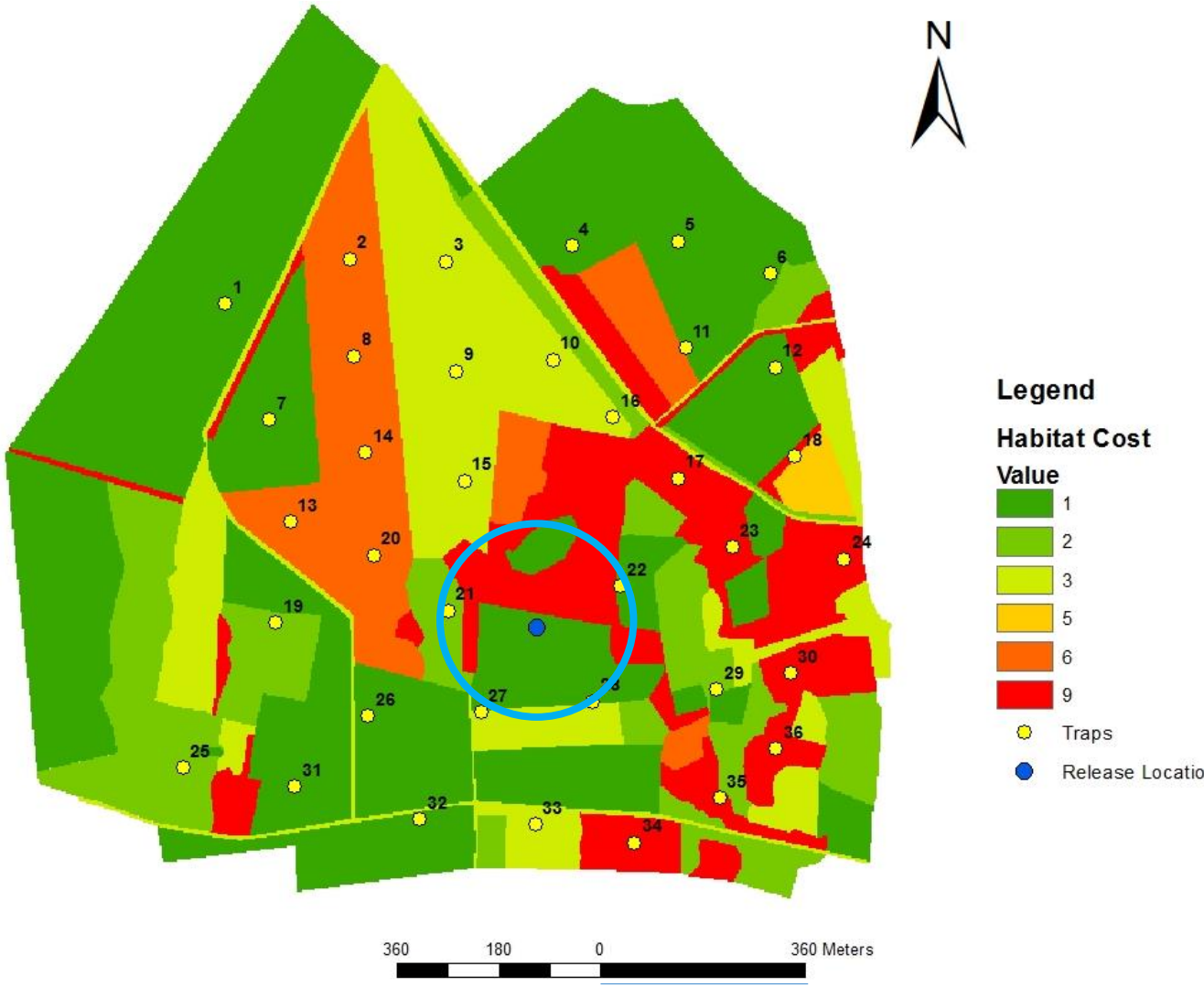
Reducing the density of traps in the systematic grid

9 traps → 135 m



Reducing the density of traps in the systematic grid

4 traps → 170 m



Conclusions

1. **A systematic grid of traps represents a promising method to define the area where to look for the source of PWN infection**

2. **Next step: use simulations to optimize the density of traps to set up at the regional scale**