

# Spatiotemporal Analysis and Dispersal Patterns of *Globodera pallida* in Idaho

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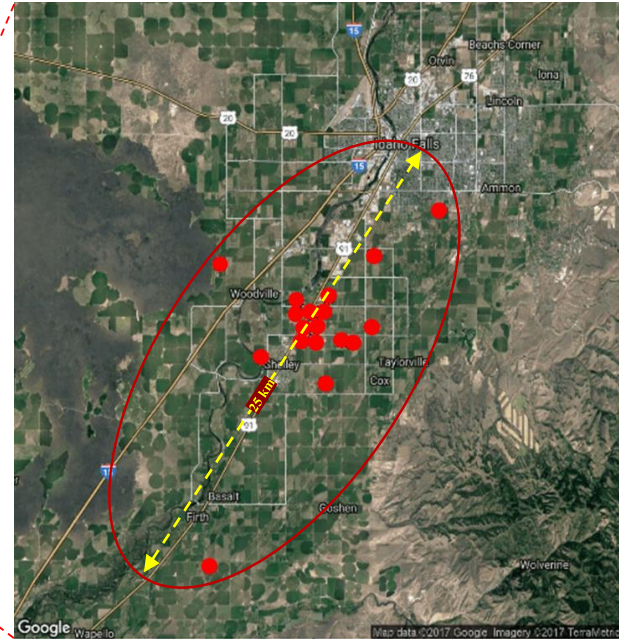
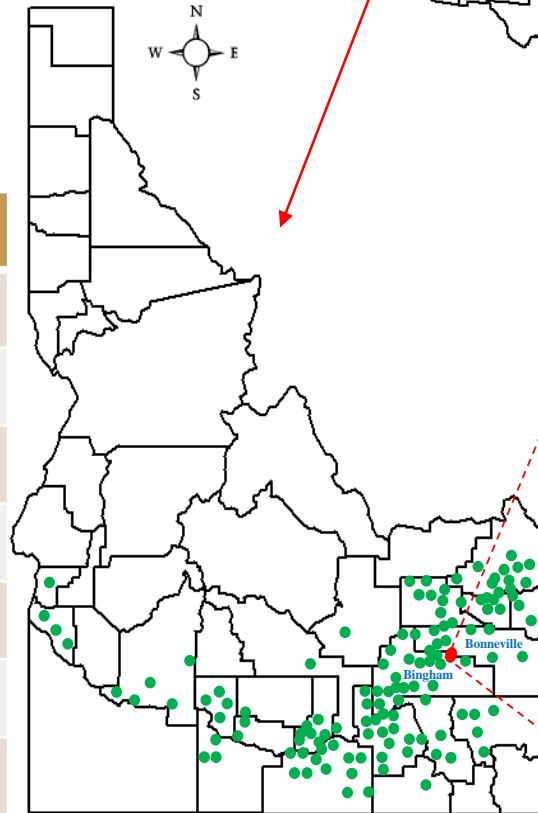
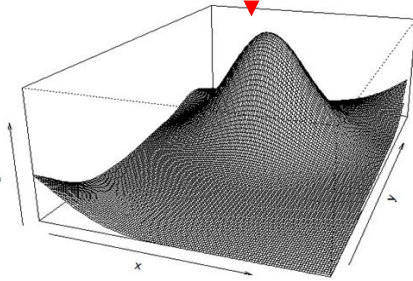
College of Agricultural  
and Life Sciences

***Globodera pallida*** infested fields in Idaho (red) (1,267 ha) (USDA-APHIS, 2018).

**Potato growing area** (green).



**Spatial aggregation**

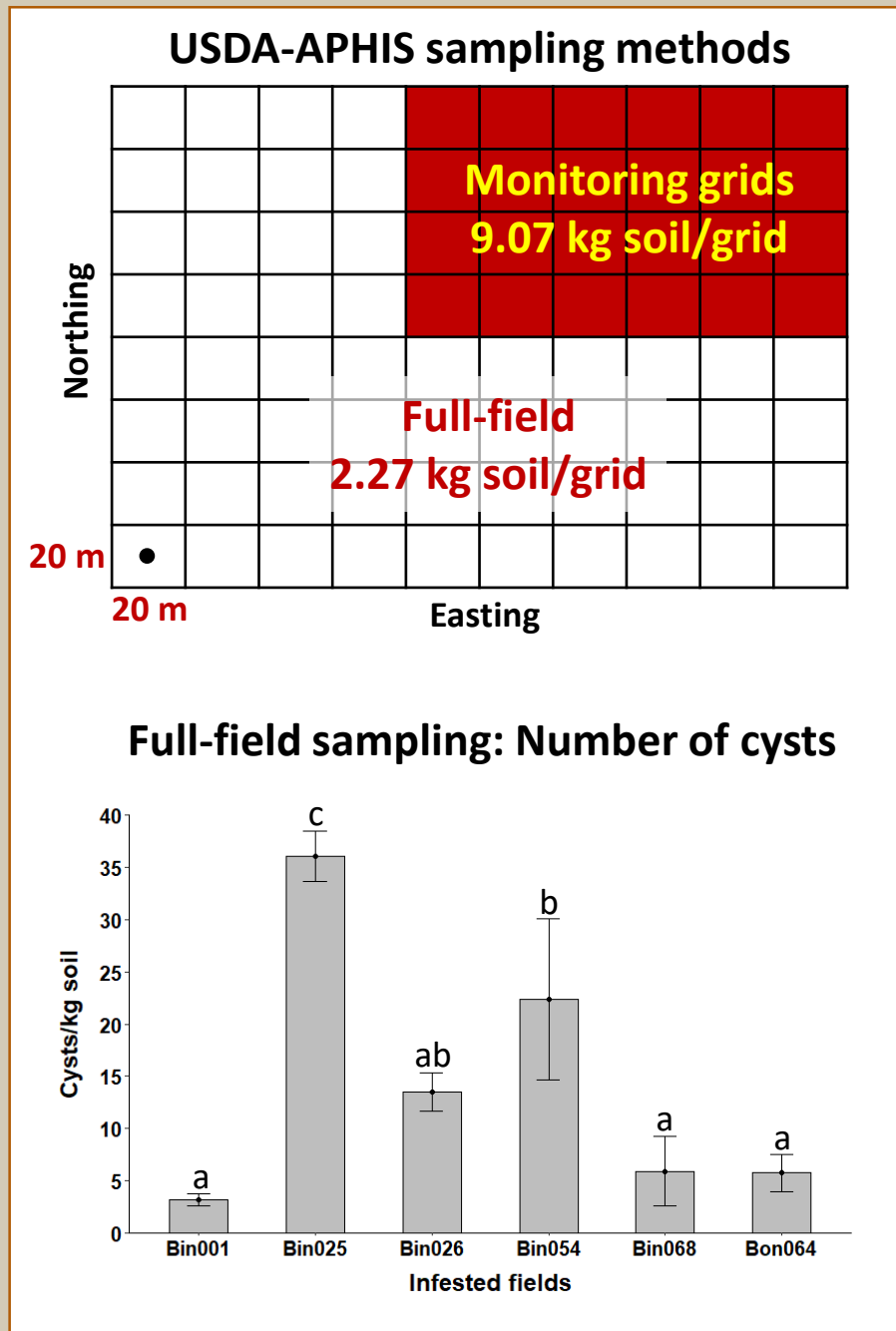


**Level of infestations in fields**

Field	Eggs/g soil	Viability
Bin01	0.60	12%
Bin25	22.02	20%
Bin26	0.26	18%
Bin54	0.12	33%
Bin68	0.01	9%
Bon64	0.06	36%

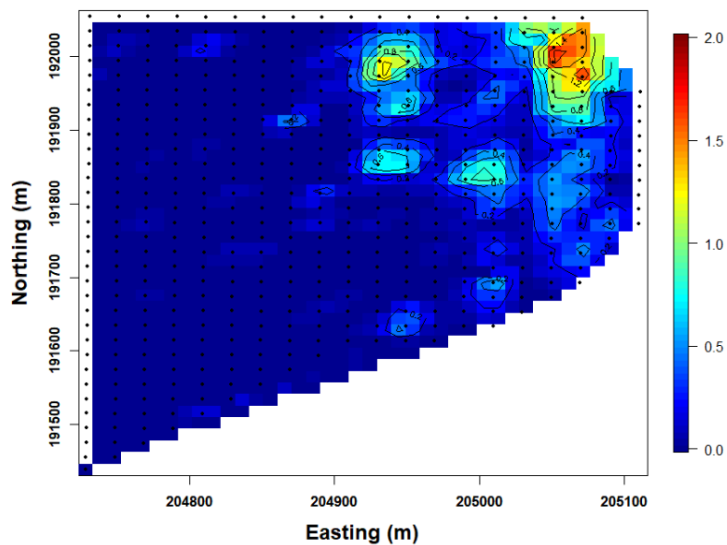
# Objectives & Methodologies:

- Modeling the spatiotemporal distribution of *G. pallida* in infested fields
- Data collection: USDA-APHIS
- Deterministic spatial modeling
  - Akima
- Stochastic spatial modeling
  - Kriging
  - Variograms
  - Moran's I
- Invasive species distribution
  - Force of invasion
- Dispersal gradients
  - Power-law model
  - Traveling wave

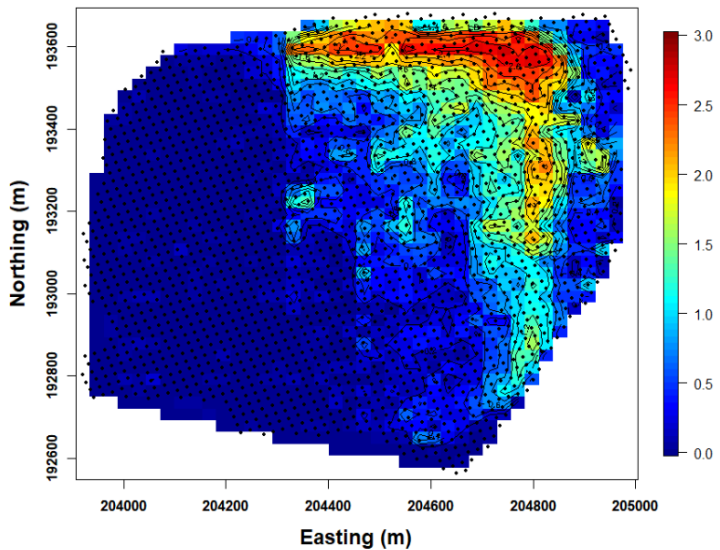


# Akima maps: Prevalence of *G. pallida* cysts

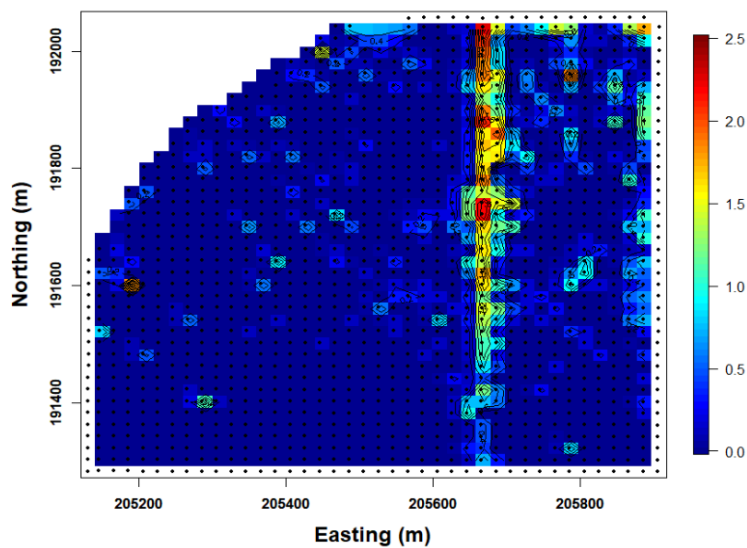
## Bin001



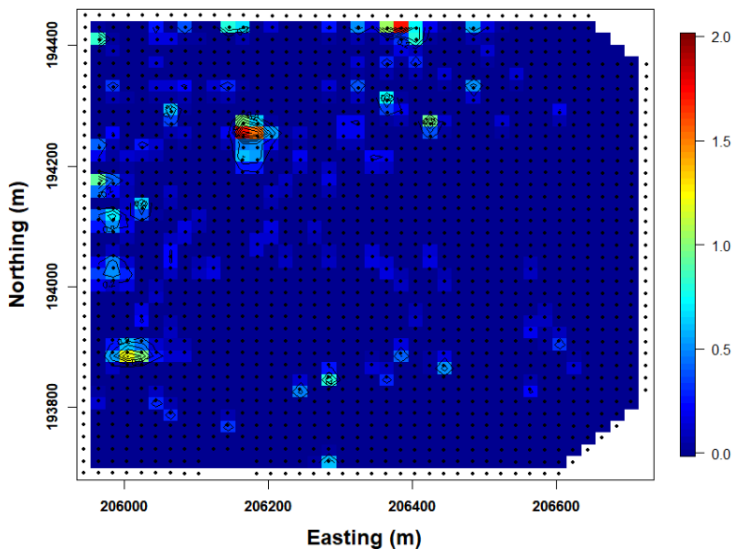
## Bin025



## Bin026

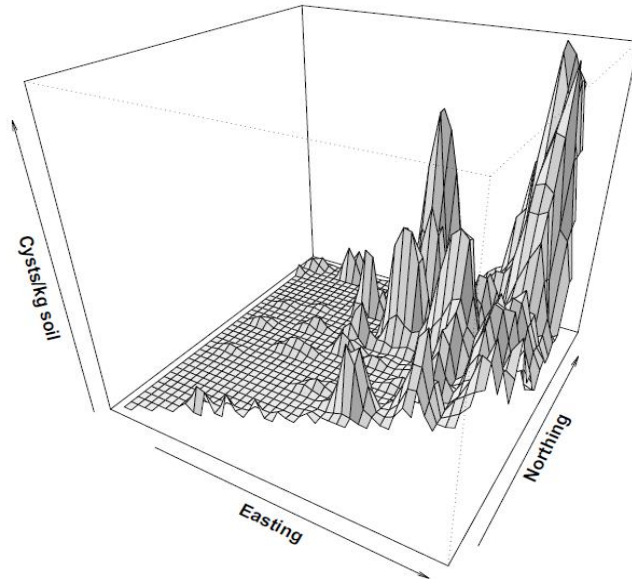


## Bon064

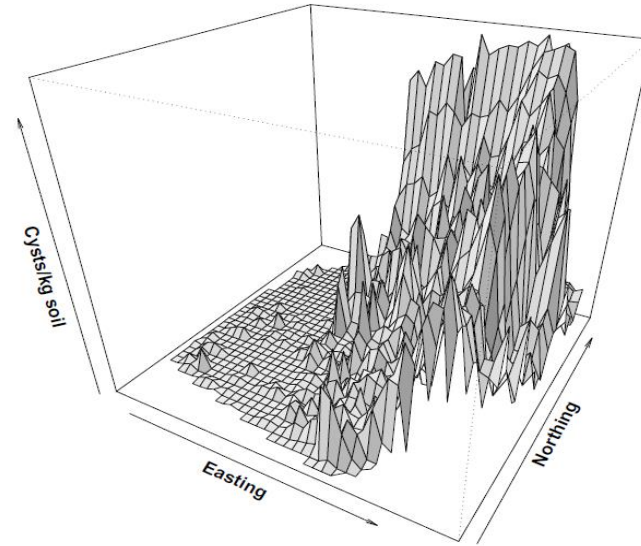


# 3D Akima: Prevalence of *G. pallida* cysts

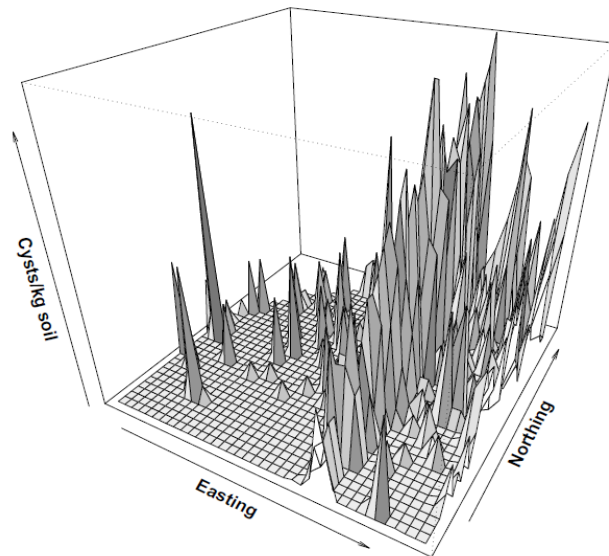
**Bin001**



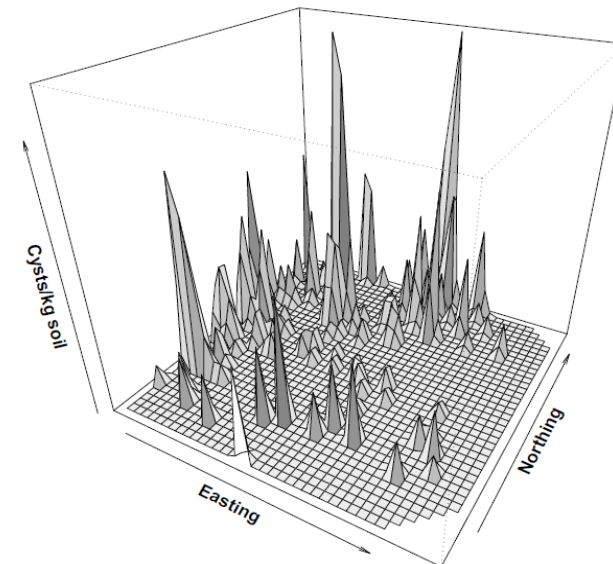
**Bin025**



**Bin026**

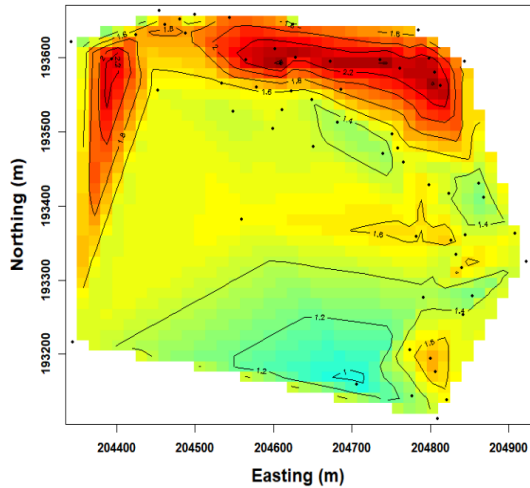


**Bon064**

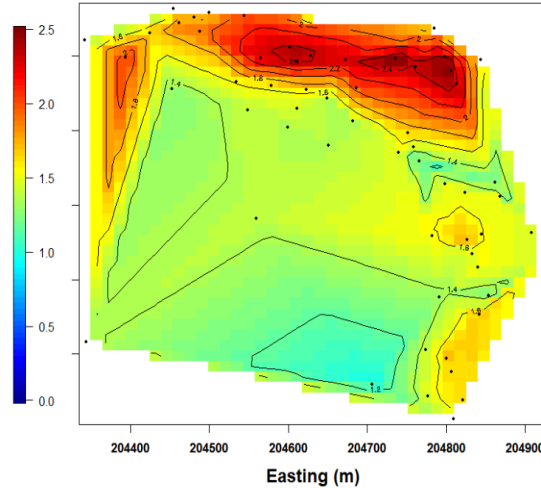


# Bin025 monitoring surveys for cysts

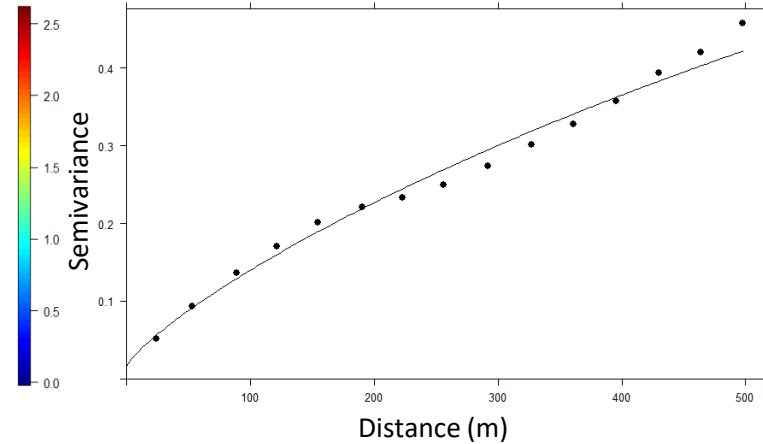
2009



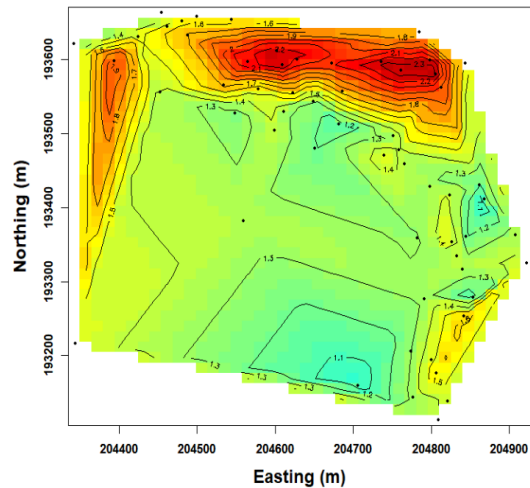
2010



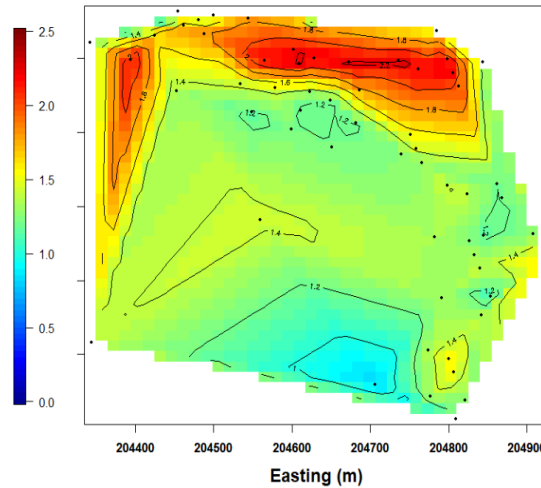
Variogram: Ste model



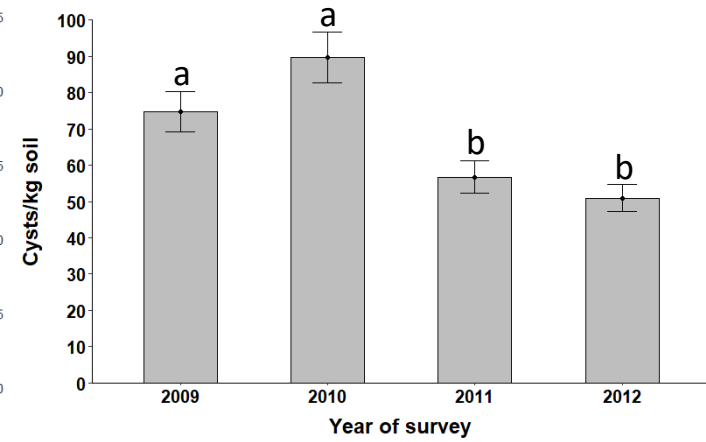
2011



2012

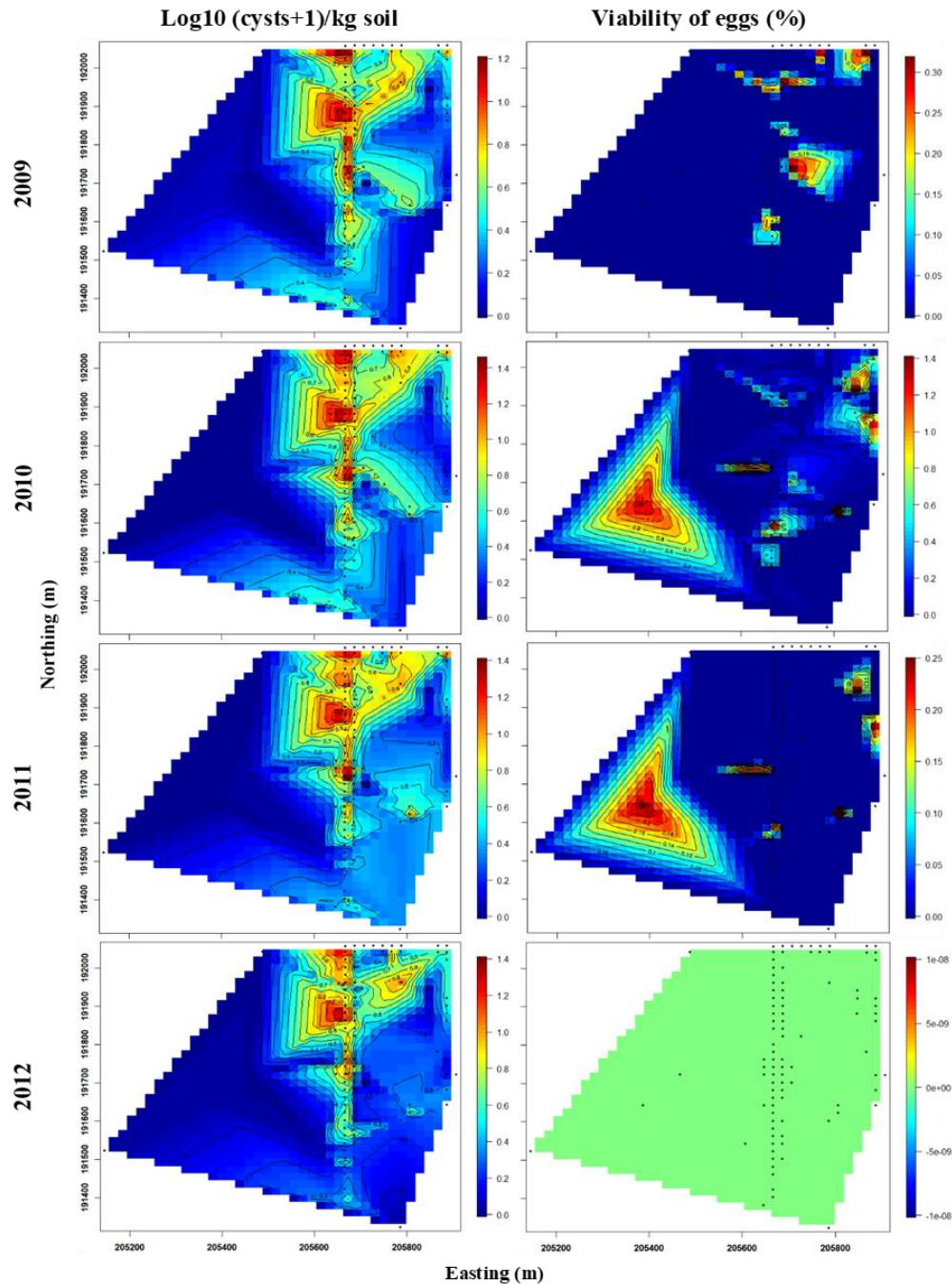


Number of cysts collected

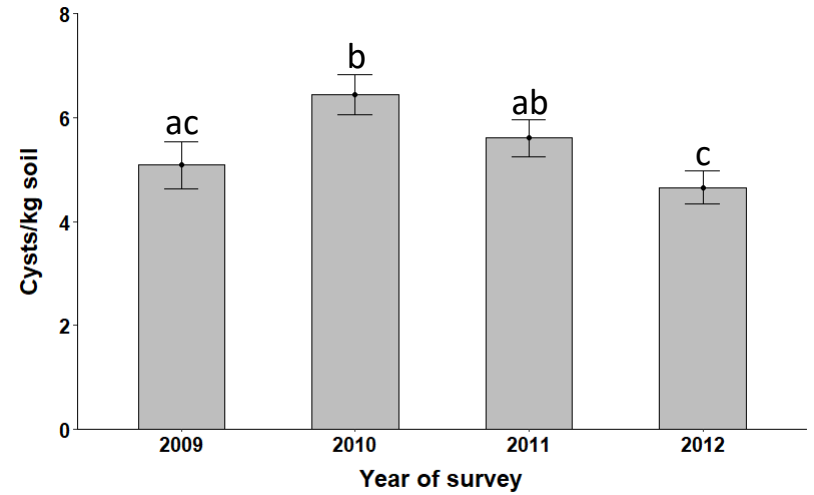




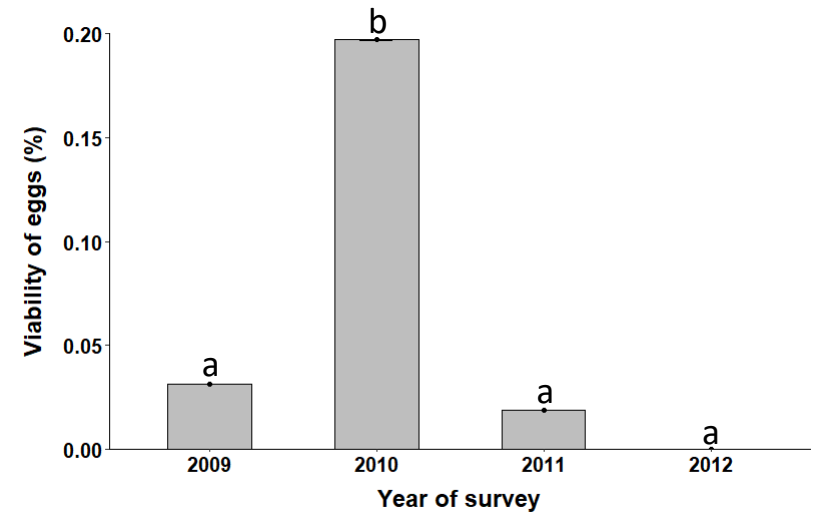
# Bin026 – Monitoring surveys



## Fluctuations of cysts number

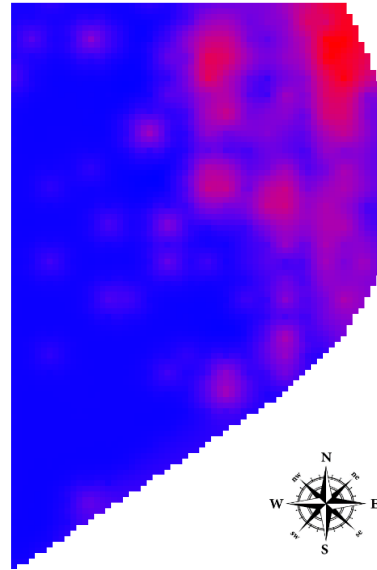


## Fluctuations of eggs viability

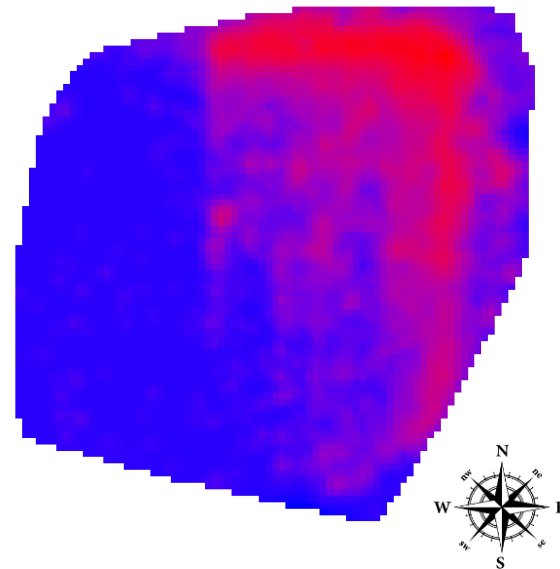


# Kriging maps: Prevalence of *G. pallida* cysts

**Bin001**



**Bin025**





# *Globodera pallida* central infestation area

## Kriging maps of cyst infestations

PCN-infested fields in southeastern Idaho

### Legend

● PCN infested fields

Bin108

Bon064

Bon058

Bin025

Bin086

Bin081

Bin068

Bin001

Bin054

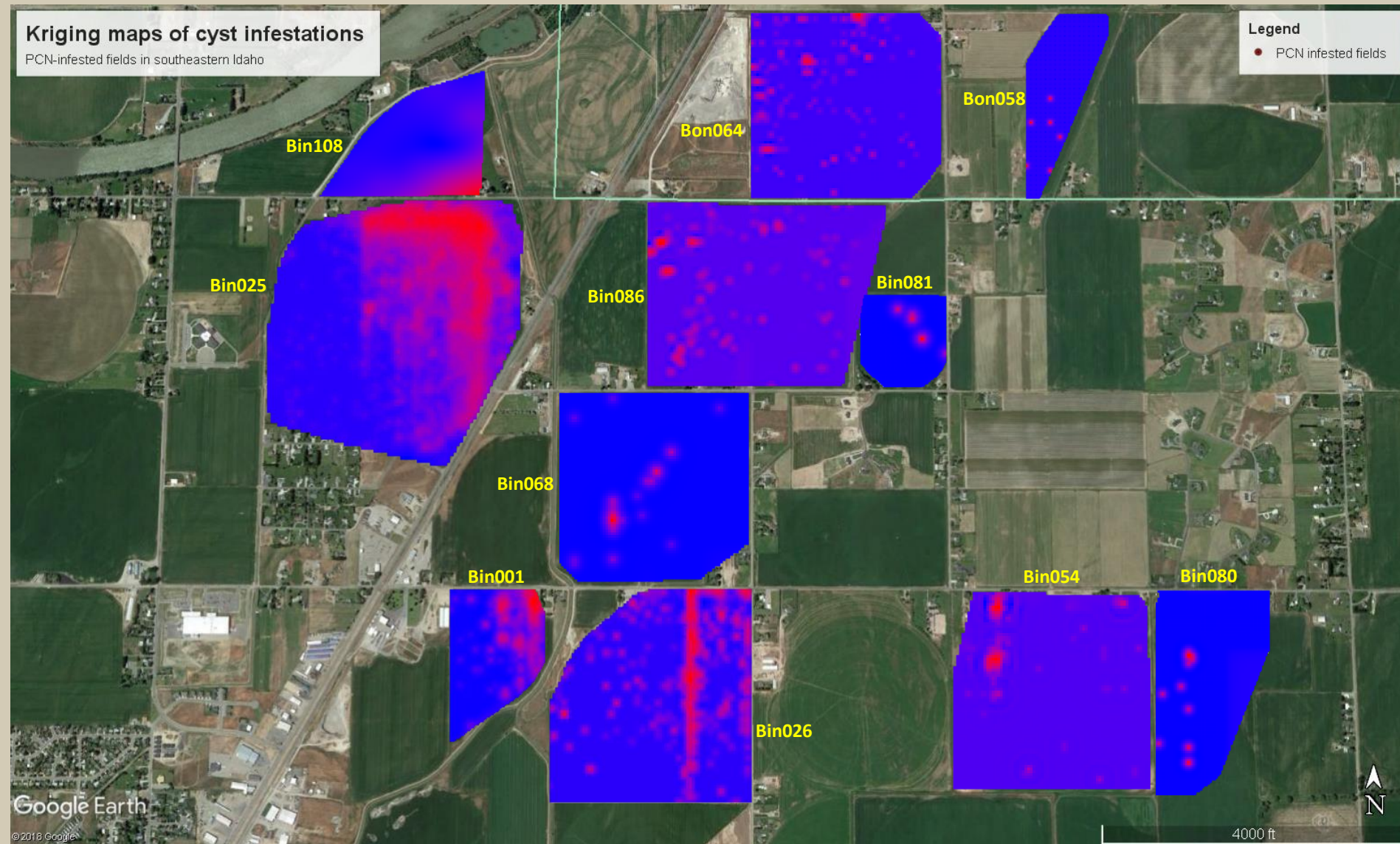
Bin080

Bin026

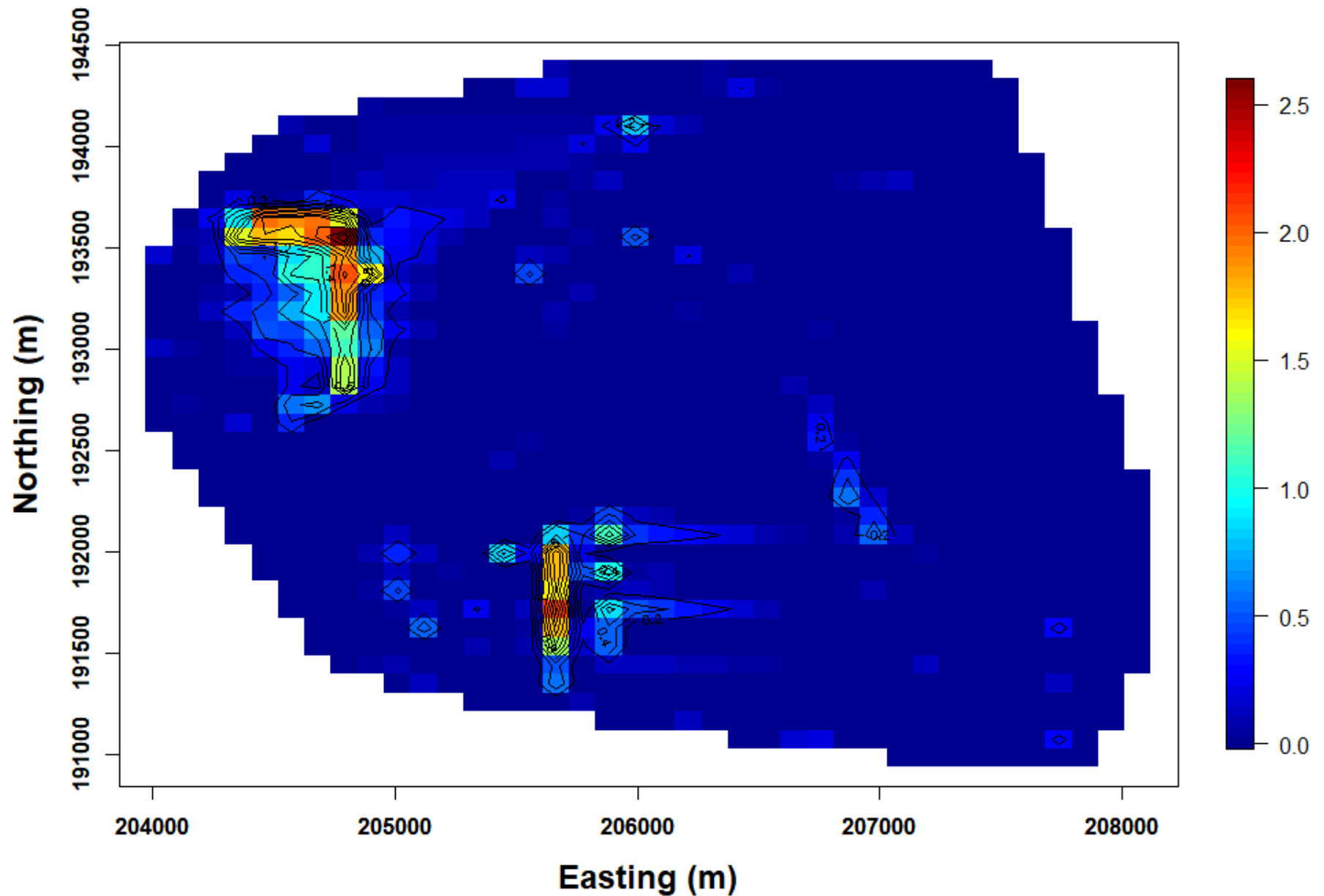
Google Earth

©2018 Google

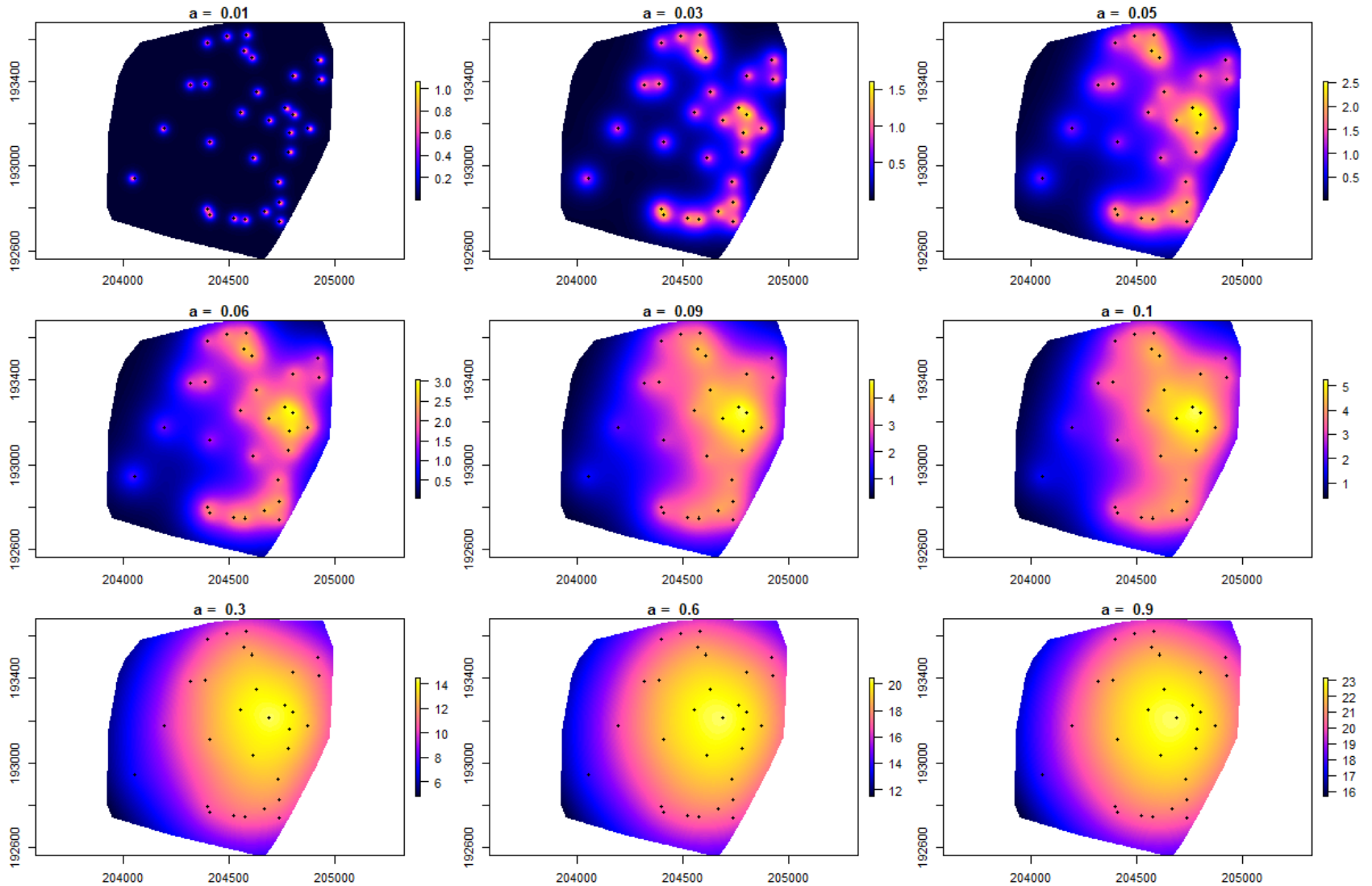
4000 ft



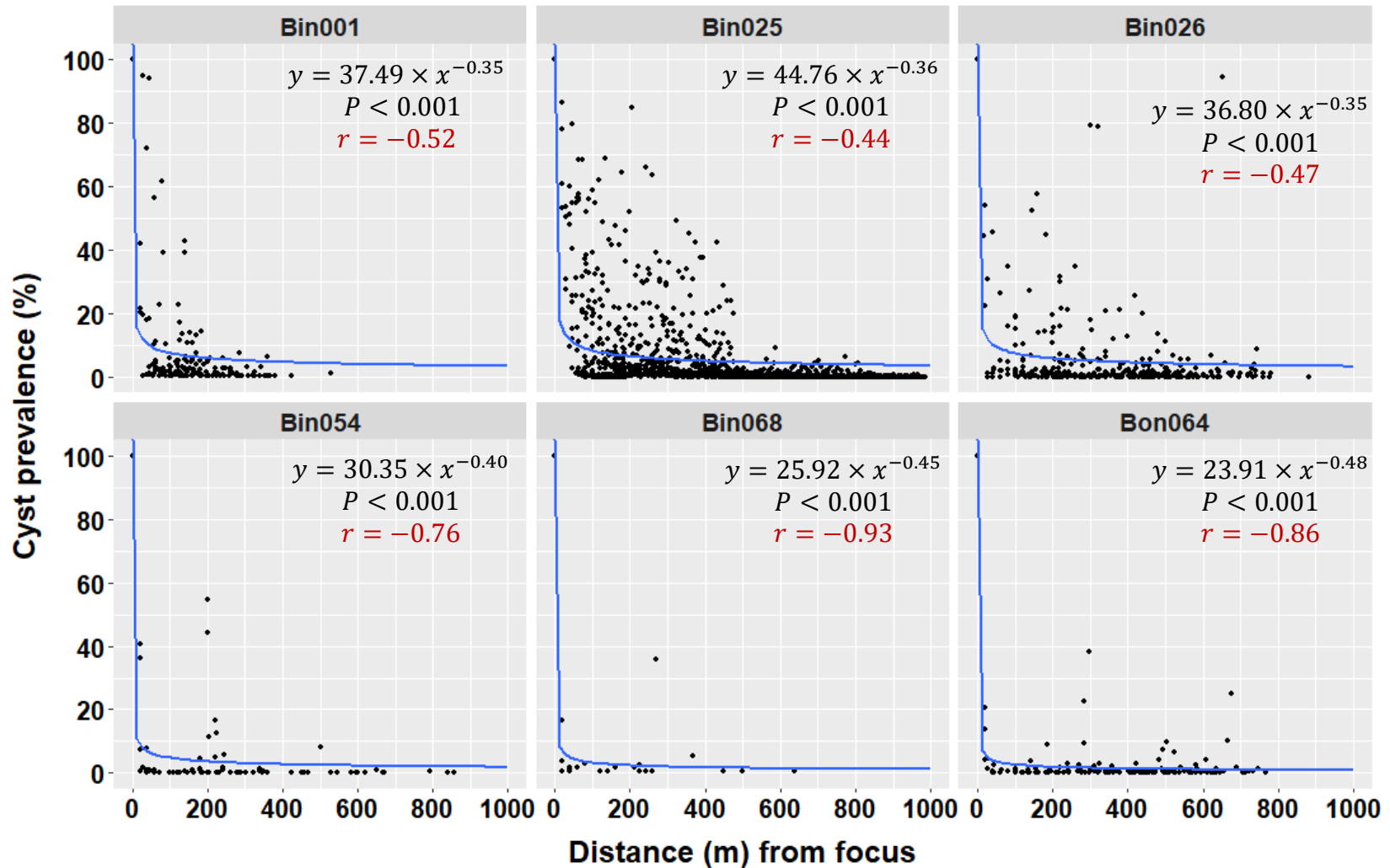
# *Globodera pallida* central infestation area



# ISDM: Force of invasion in Bin025



# Dispersal gradient – Power-law model



# Conclusions

- *Globodera pallida* infestations are **spatially-aggregated**.
- Significant reductions in the number of cysts collected during monitoring surveys.
- **Significant reductions in the viability of eggs.**
- Dispersal patterns follow a Power-law distribution
- Future directions: **Landscape genetics** and pedogenics

## Acknowledgement



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