TRIMmaps: creating maps from monitoring data and casual observations

Henk Sierdsema
Christian Kampichler
Caspar Hallmann

EBCC
European Bird Census Council
every bird counts

Sovon

EBCC Spatial Modelling Group (SMOG): *knowledge network on spatial modelling*

Facilitate creation of maps

TRIM*maps*

TRIM*maps*

- Facilitate production of maps from monitoring data and casual observations
- R-programme
- Open source / freeware

Statistics TRIM*maps*

- Combination of
  - Regression type statistics
  - Spatial interpolation of residuals
- Uses TRIM-input (data-files) or -output (F1-files) and a number of other formats

What do you need to run TRIM*maps* ?

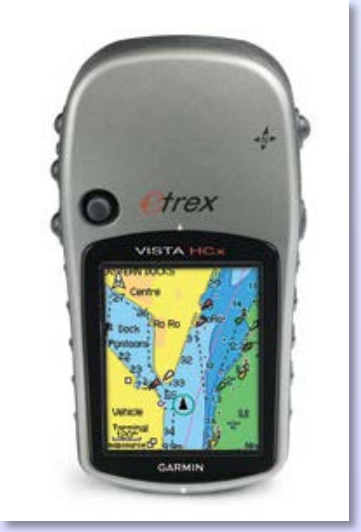
Observations

- Counts
- Presence-absence
- Presence-only
- Local trend data

- CSV-file
- TRIM F1- or dat-files

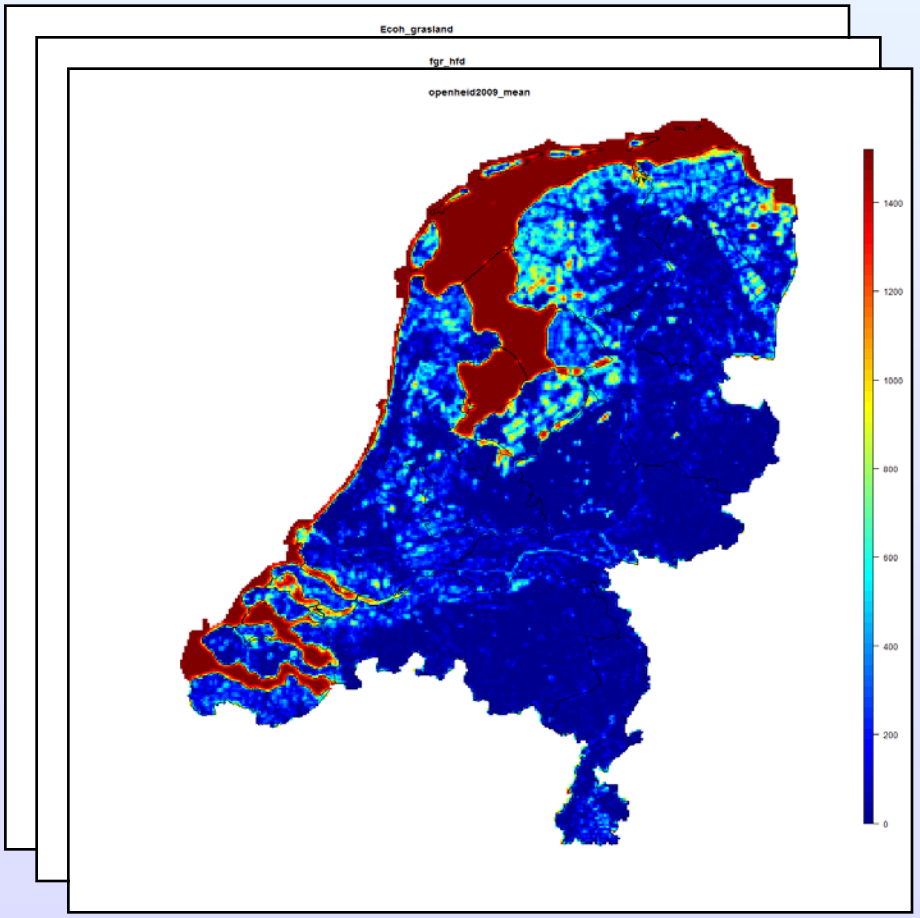
Site/location info

- X- and Y-coordinates
- Optional: environmental covariates



Environmental maps

- Raster maps



And some basic R-knowlegde

We even made a small course for you ☺

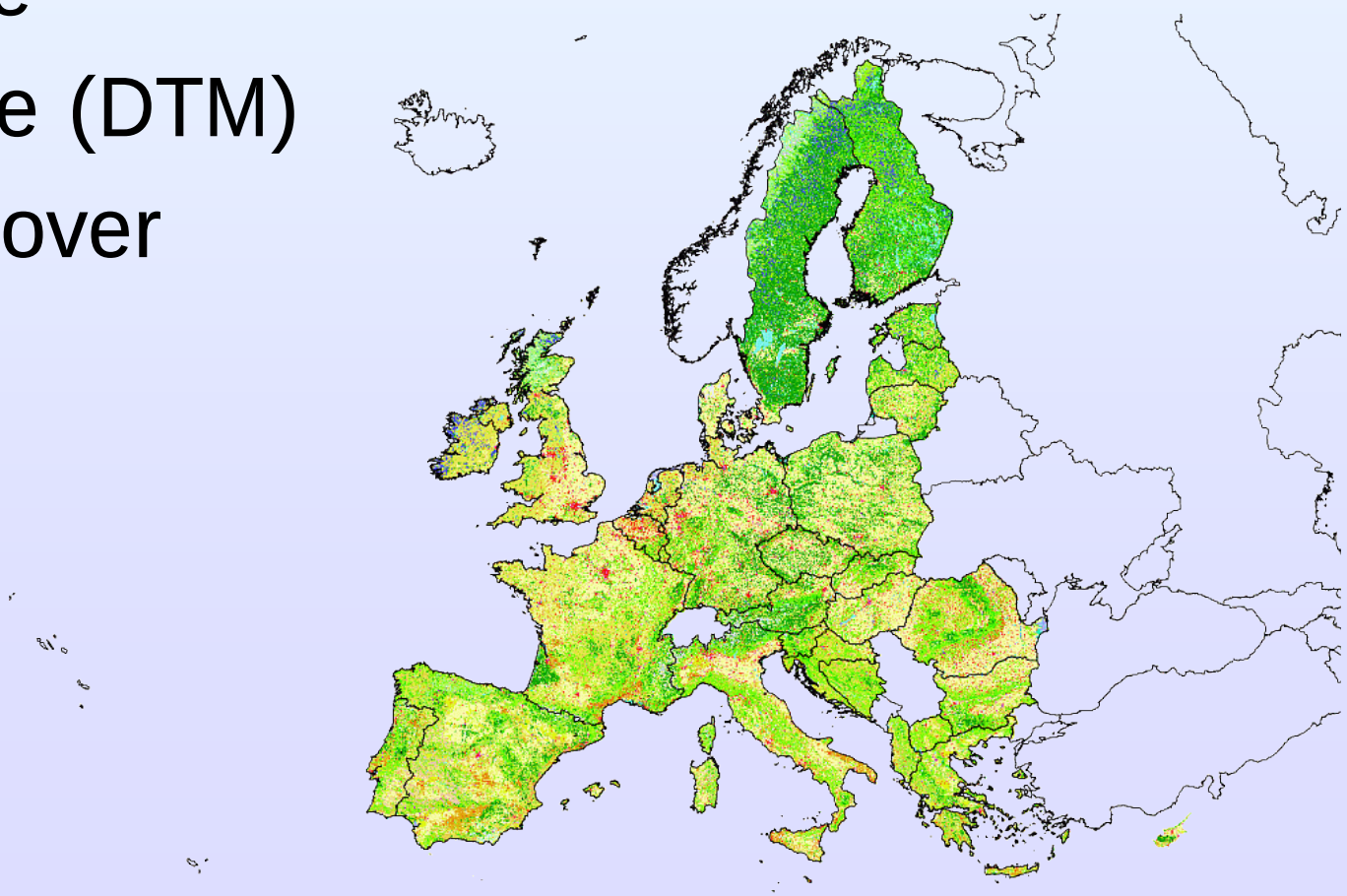
Running TRIM*maps*

Zeroes

- Add zeroes for TRIM F1- or dat-files
- Generate zeroes with Maxent

Overlay with environmental data sets

- Climate
- Altitude (DTM)
- Land cover
- ...



Regression models

- GLM
- GAM
- MARS
- Mixed models
- **Boosted Regression Trees**
- **Random Forests**
- ..

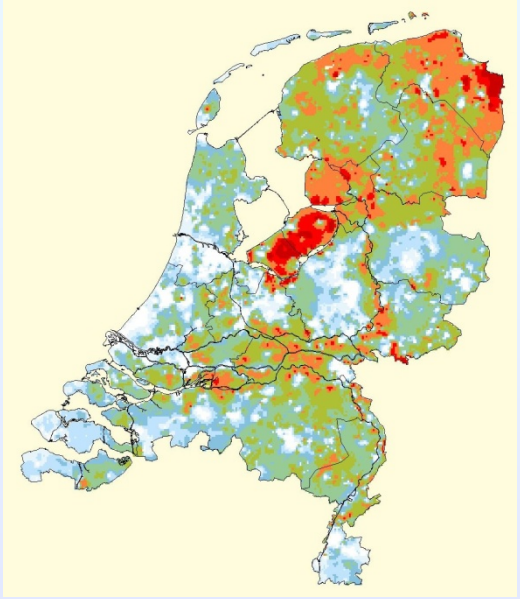
Interpolation of residuals

Include observed local deviations from regression model

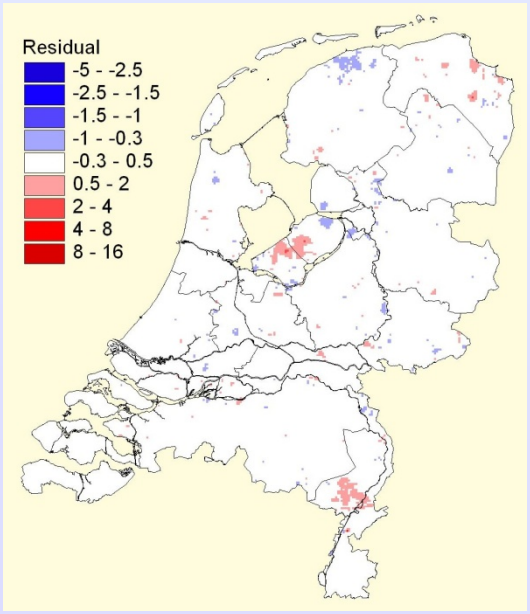
Better maps

- Inversed Distance Weighting (IDW)
- Kriging

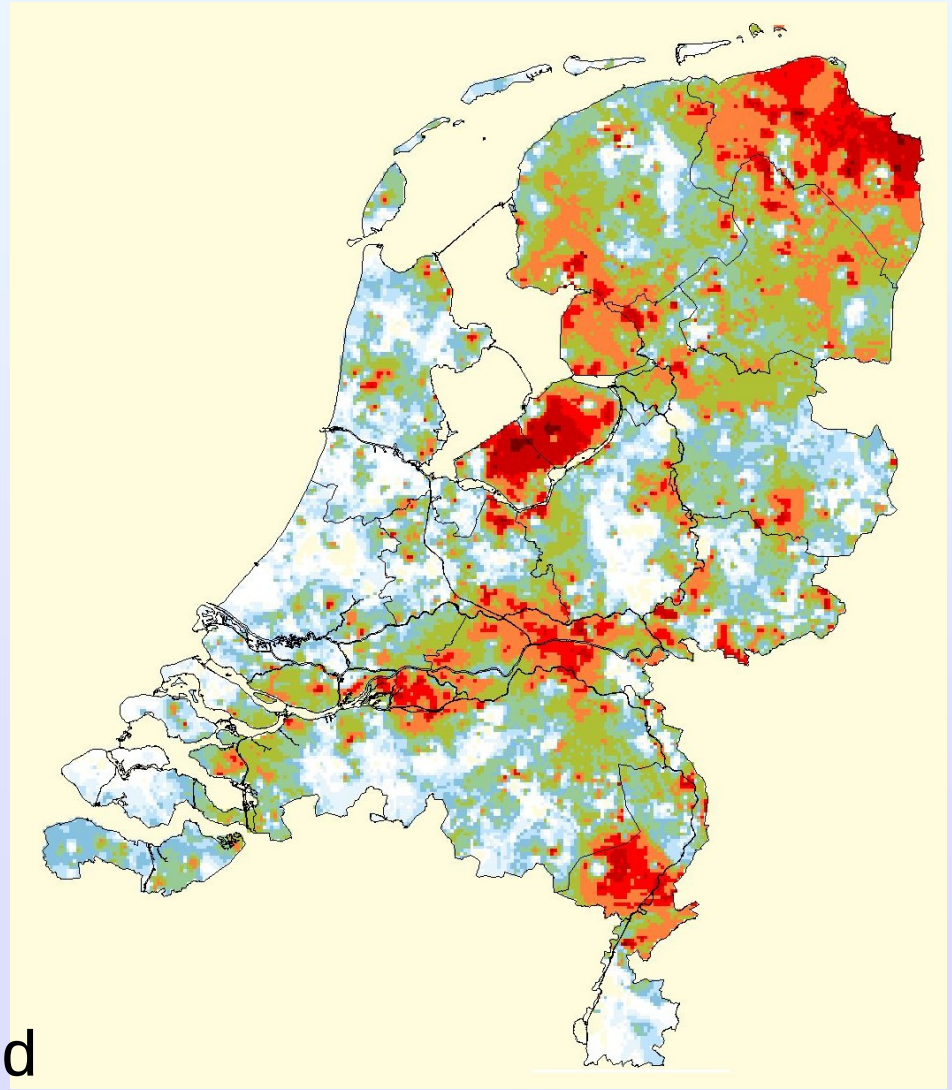
Combined map



regression model



interpolated residuals

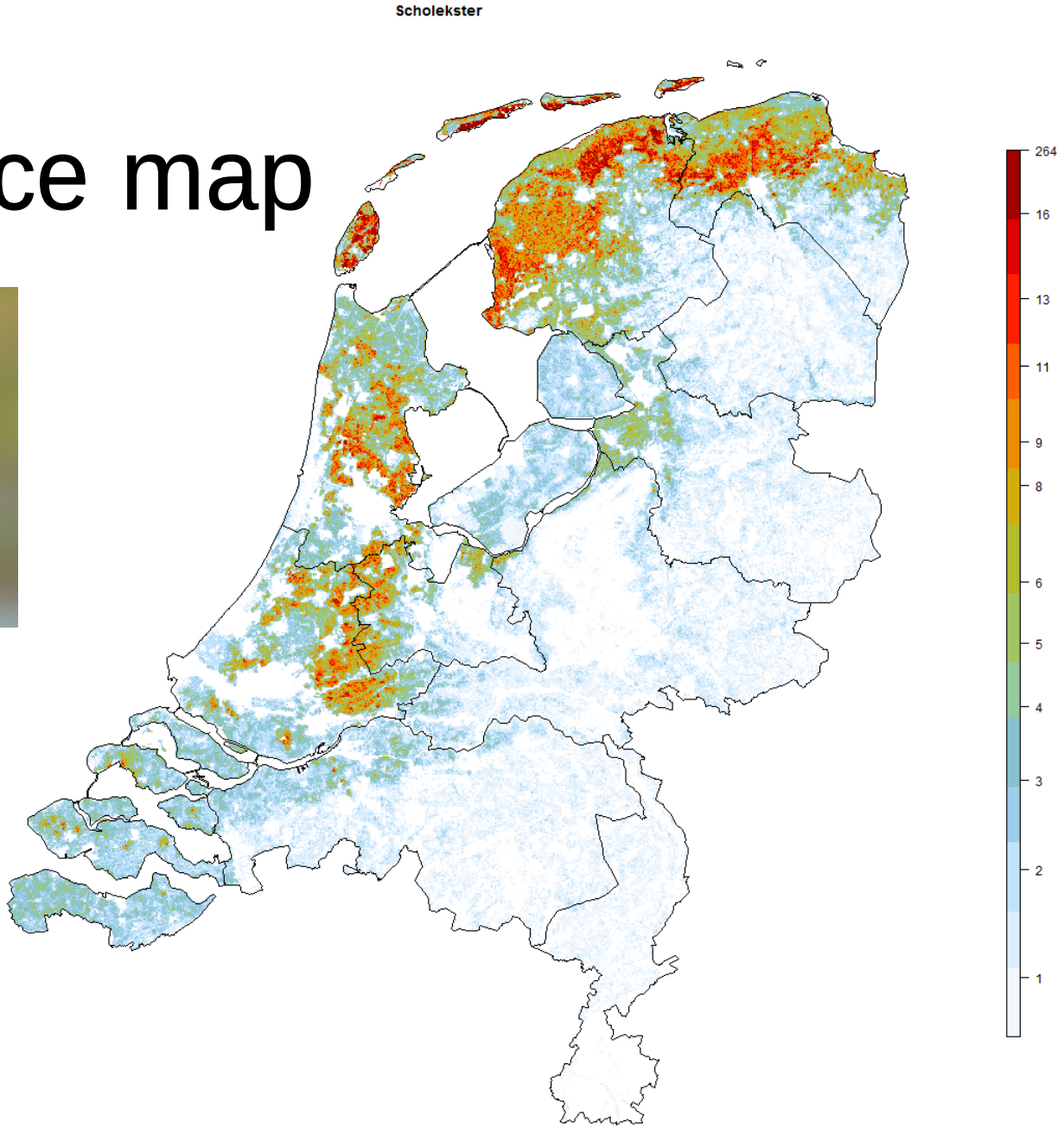


Output

- Maps
  - Observations
  - Predictions regression
  - Residuals
  - Combined map
- Regression models
- Model validations
- Shape-files, ASCII-grids and geoTIFF with predictions

Abundance map

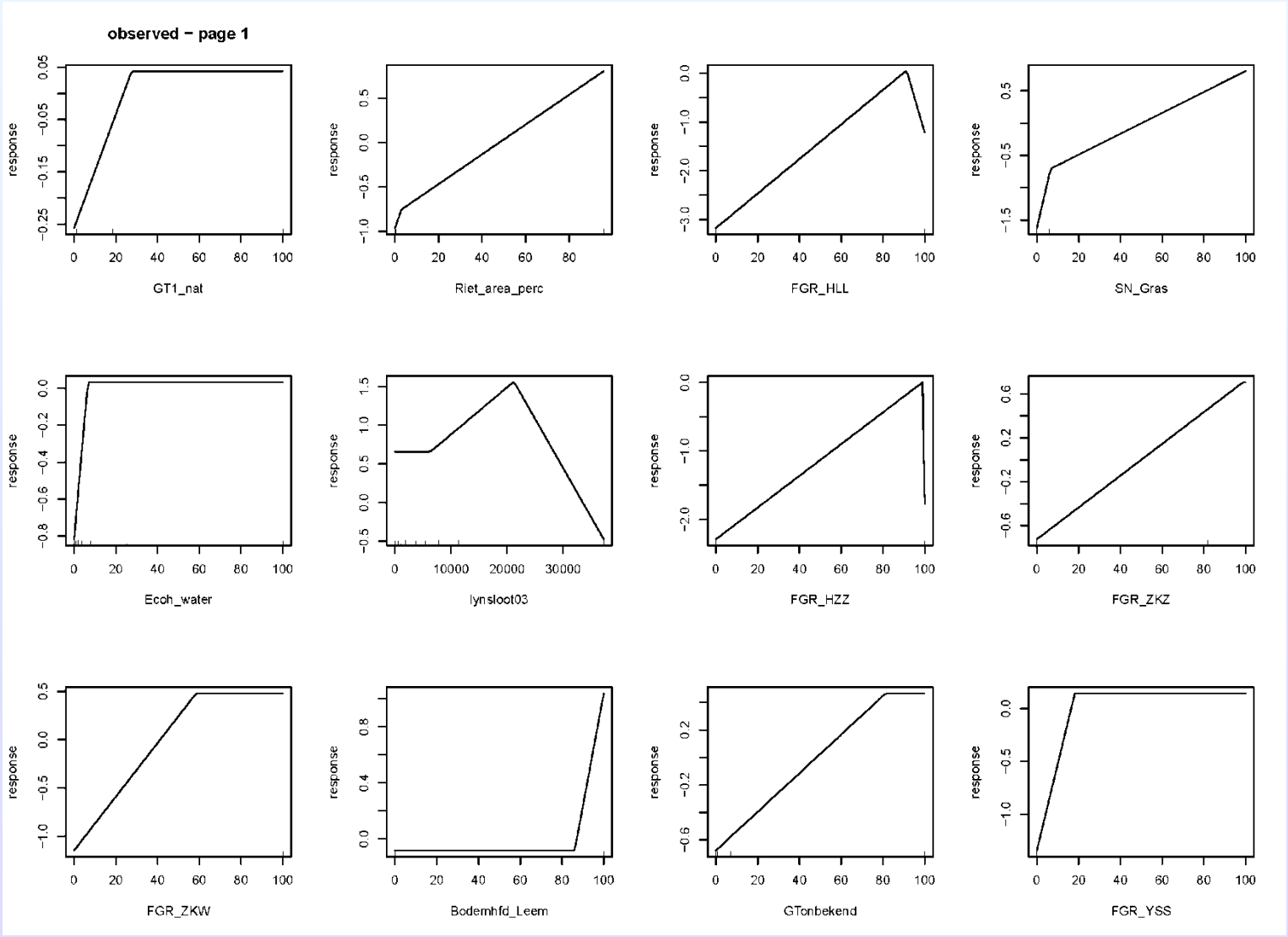
Oystercatcher



Variable contributions

Covariate	Relative importance %
Grassland	35.4
Water	11.7
Built-up areas	11.1
Heathland	9.3
Openness	7.8
Clay soil	6.4
Roads	4.3
Sandy soil	3.8
Arable land	2.8

Response curves



Model quality

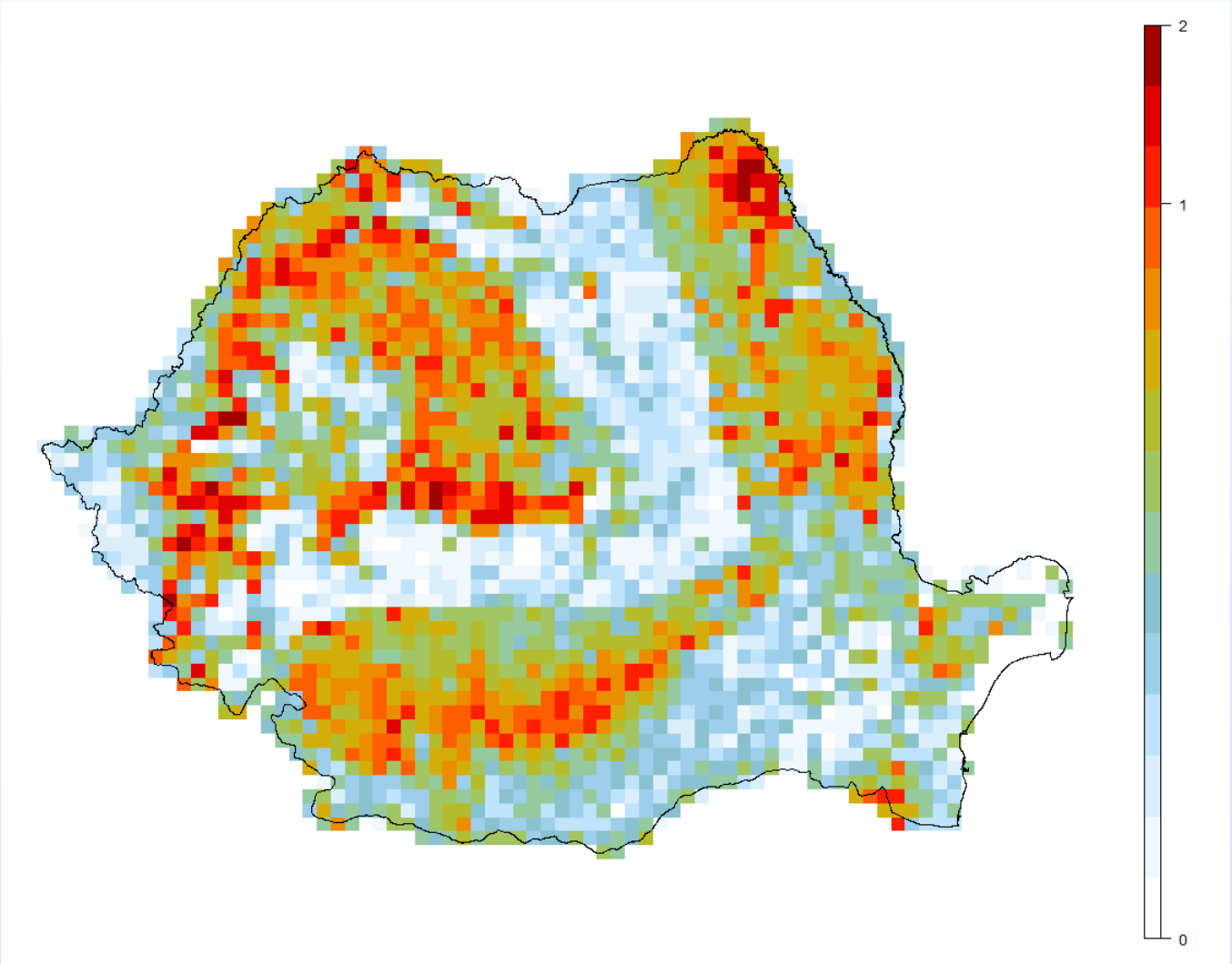
- Cross-validation
- QQ-plots, etc

Important remarks

- Bird observed ≠ Birds present !
- Assumes minor influence of differences in detection probabilities between habitats
- Next steps: account for imperfect detection

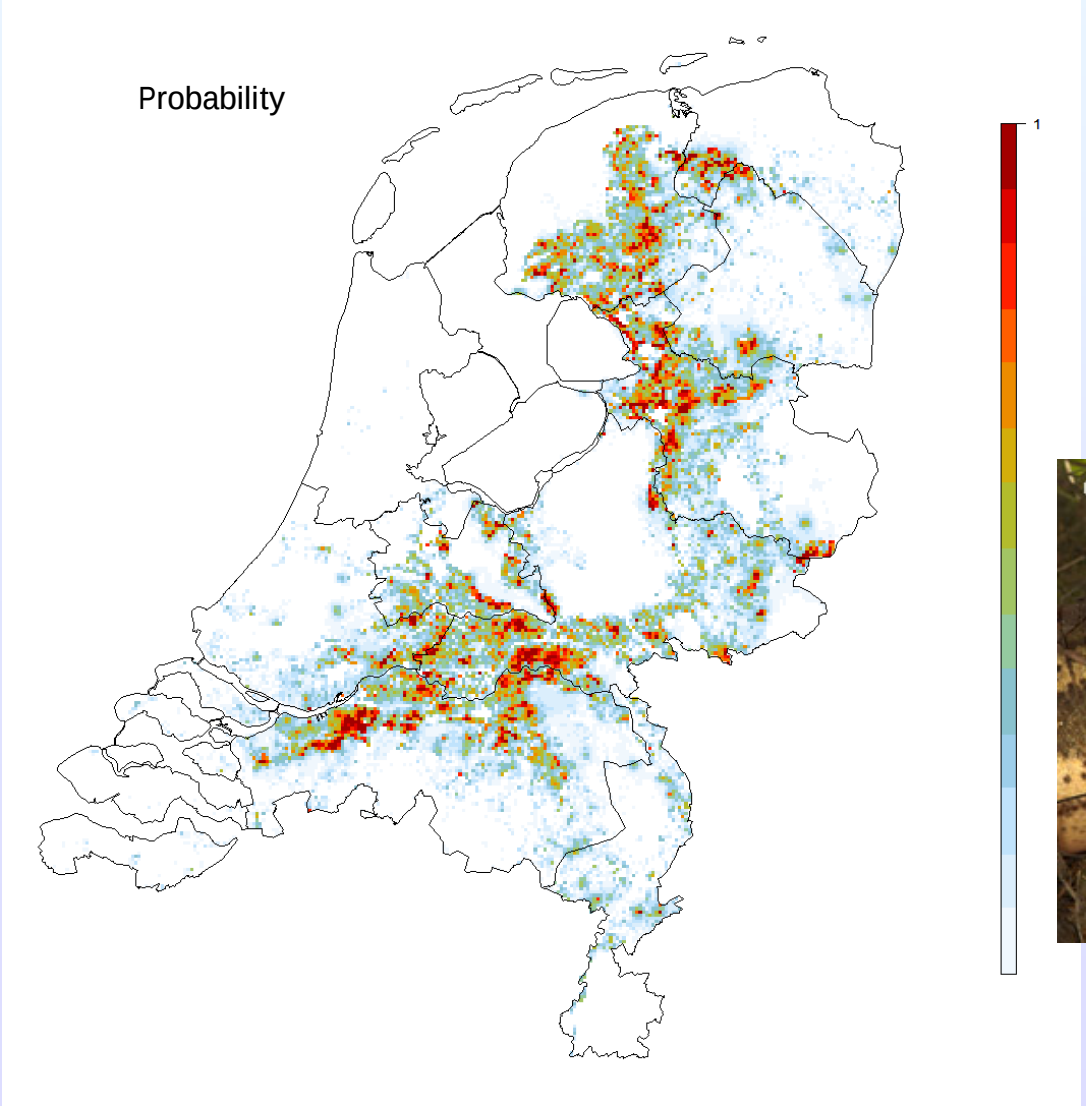
Applications of TRIMmaps

Red-backed Shrike (example 1)



Courtesy of Cristi Domsa, SOR

Probability map based on casual observations

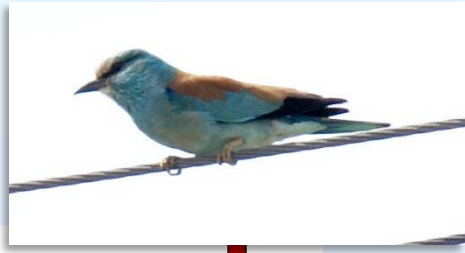


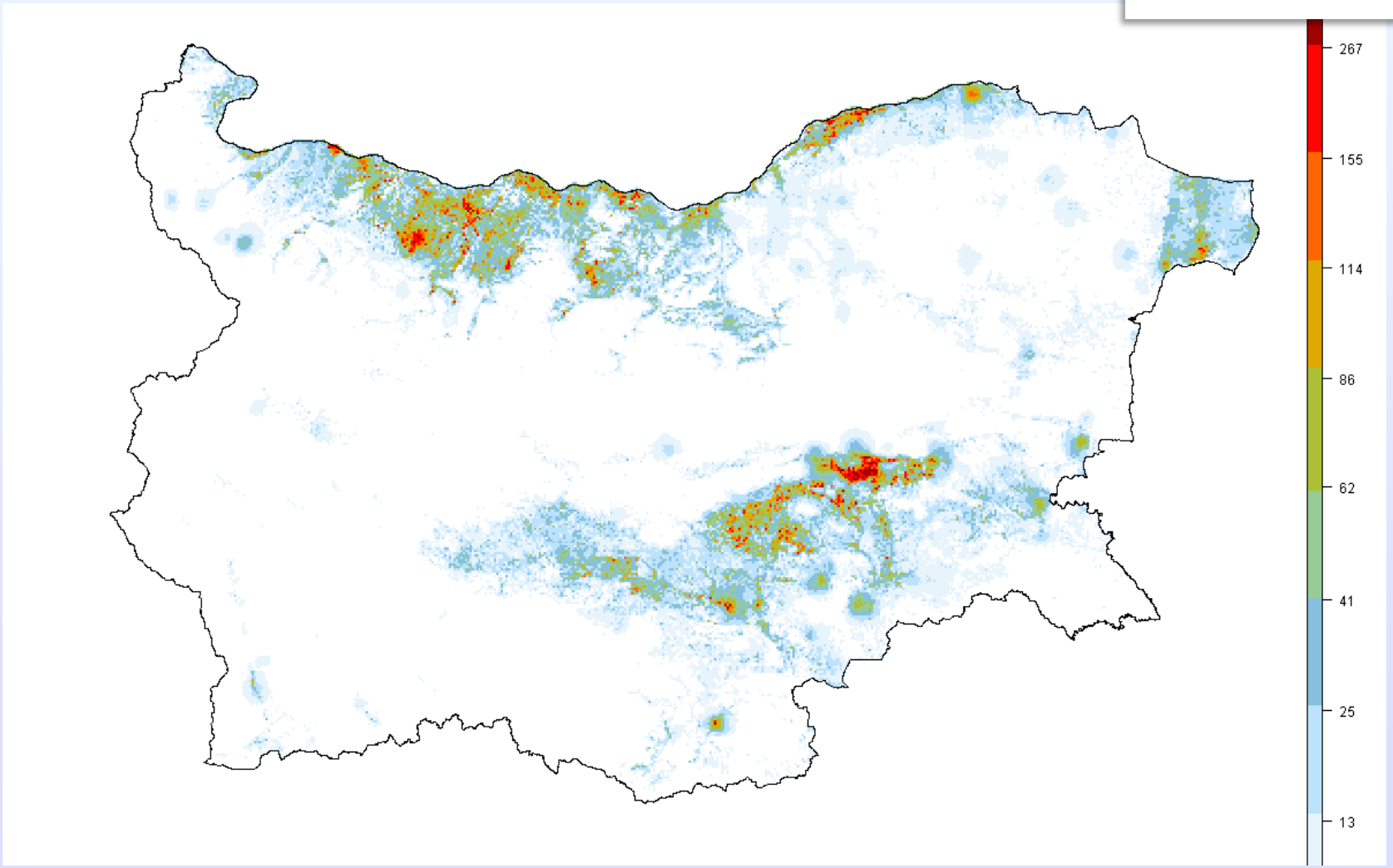
Weatherfish

Misgurnus fossilis

Combining monitoring data and casual observations

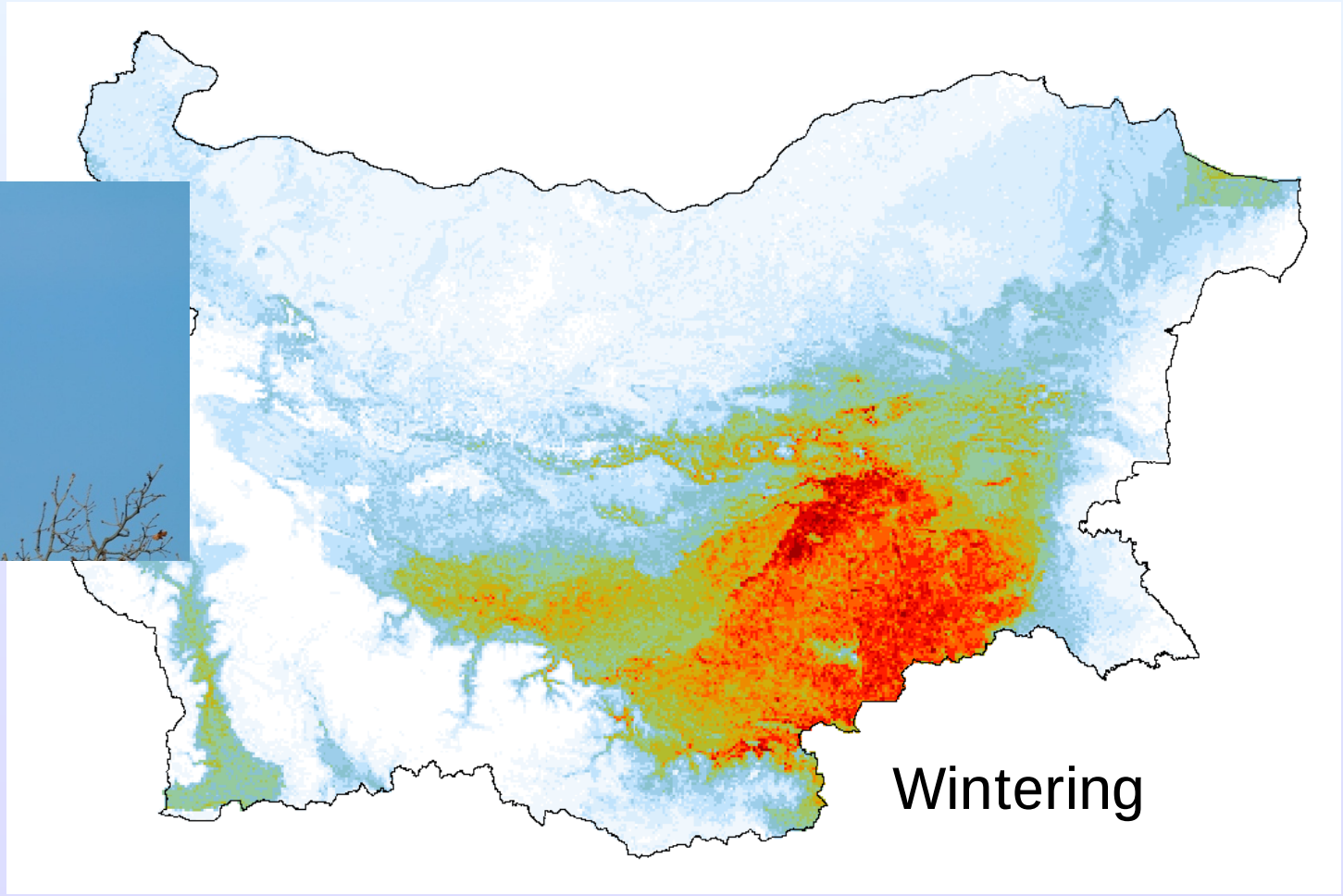
Roller Bulgaria





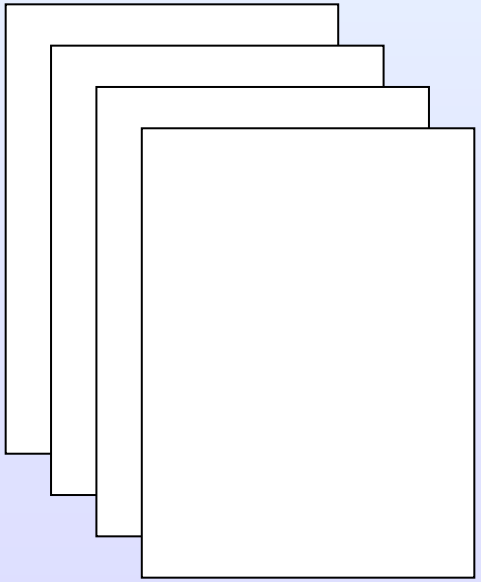
Example 2, courtesy of BSPB

Imperial eagle

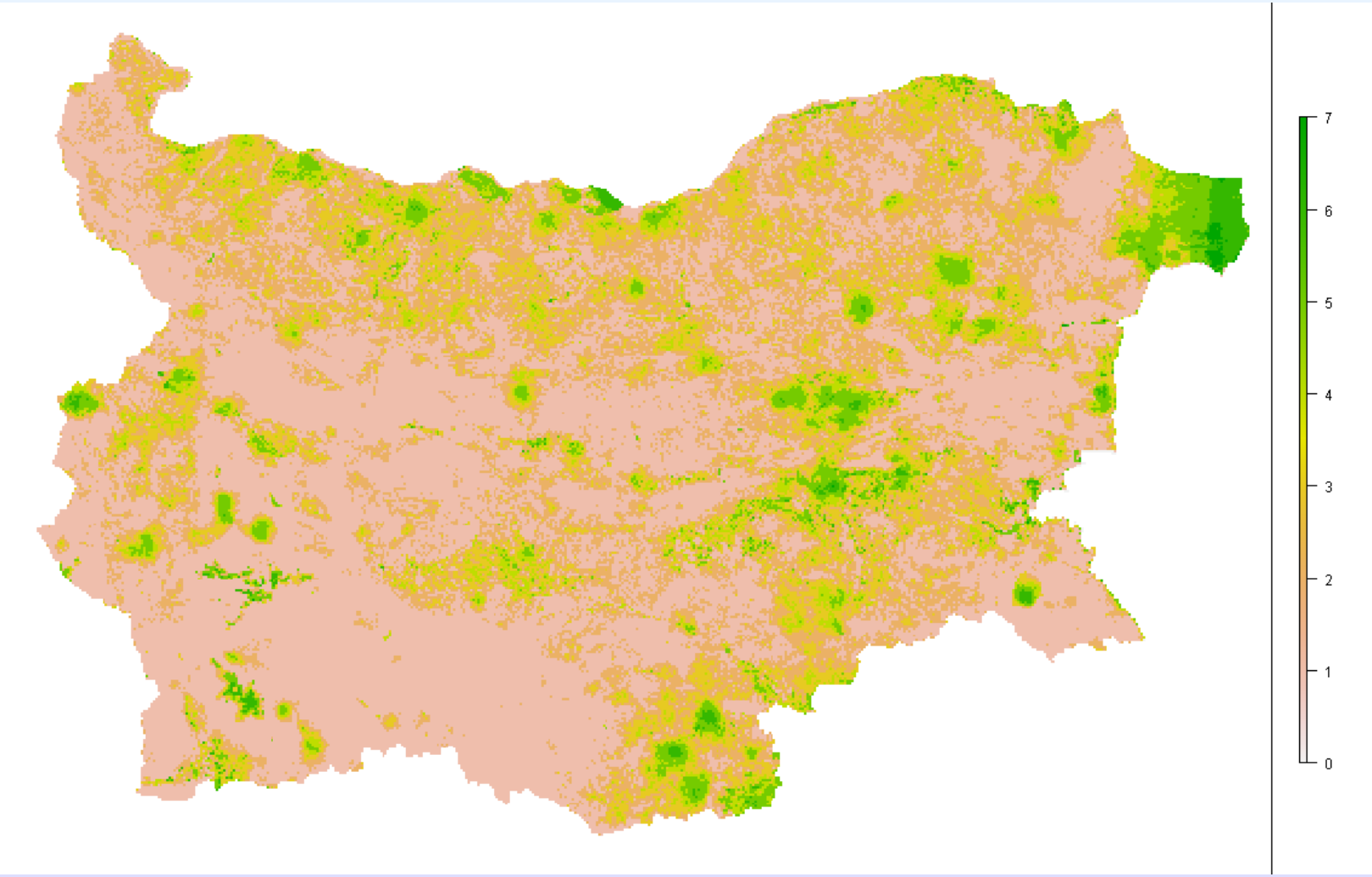


Wind farm riskmaps

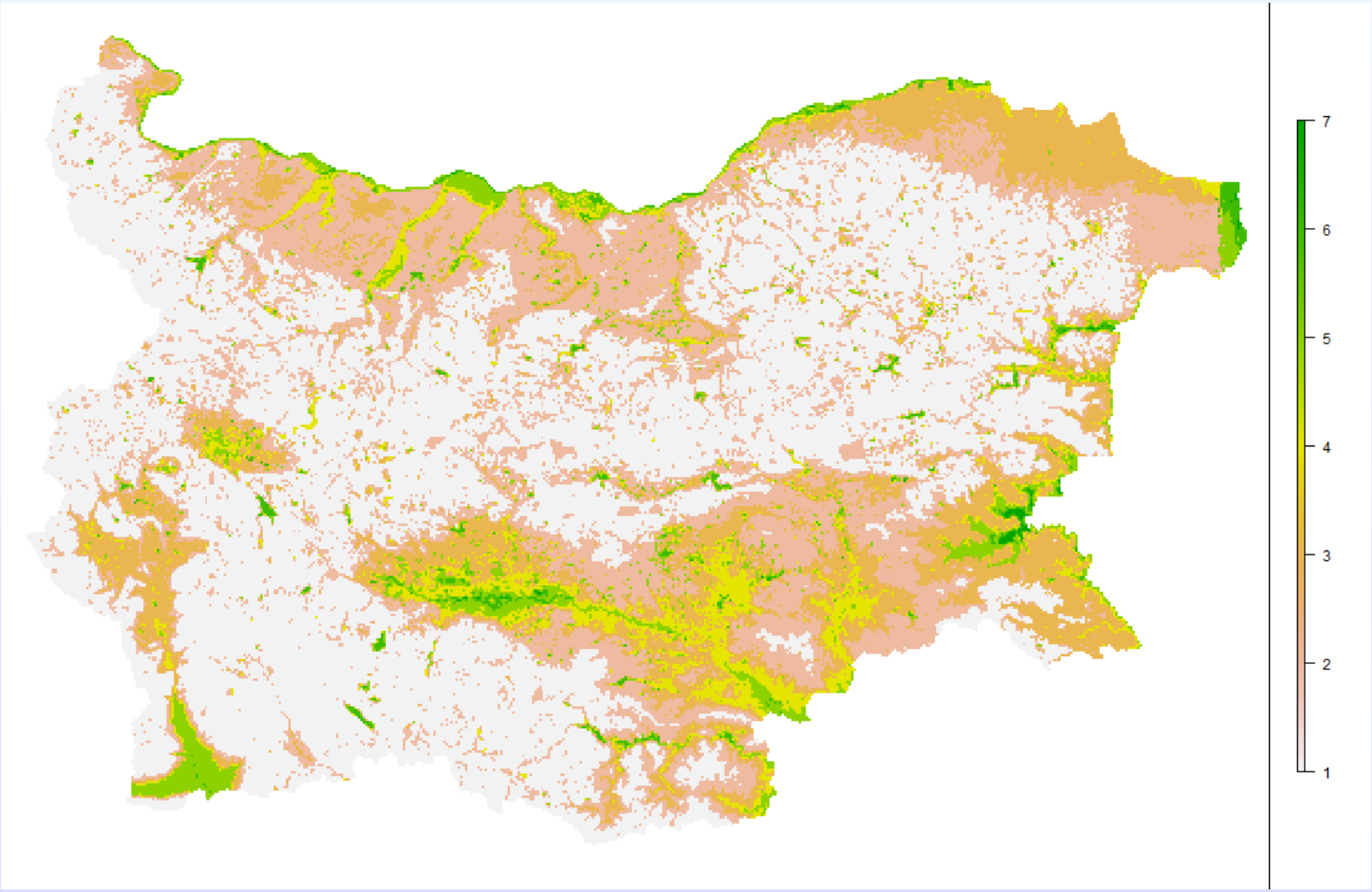
- Abundance maps for
  - Breeding birds
  - Wintering birds
  - Migrating birds



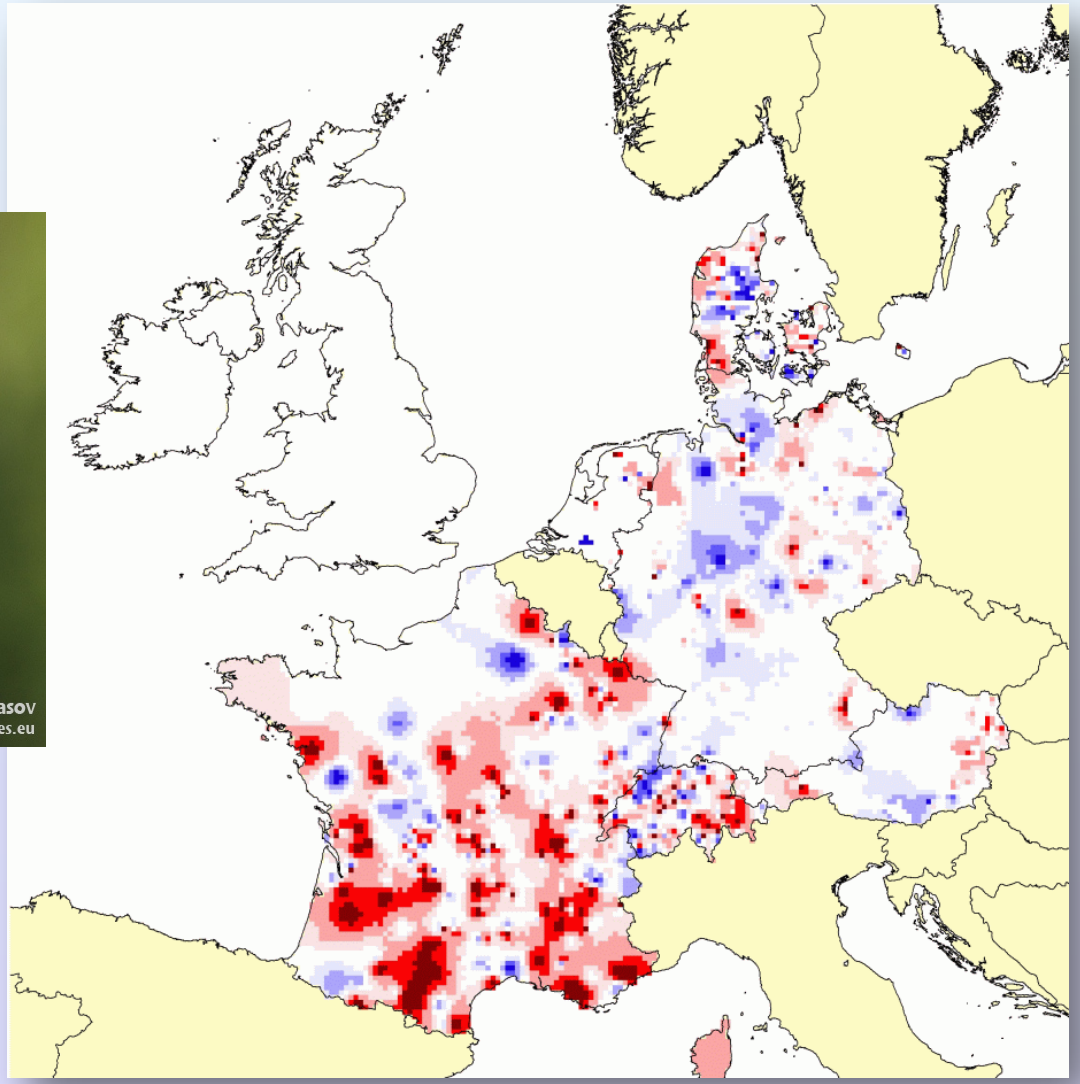
Riskmap breeding birds



Riskmap wintering birds

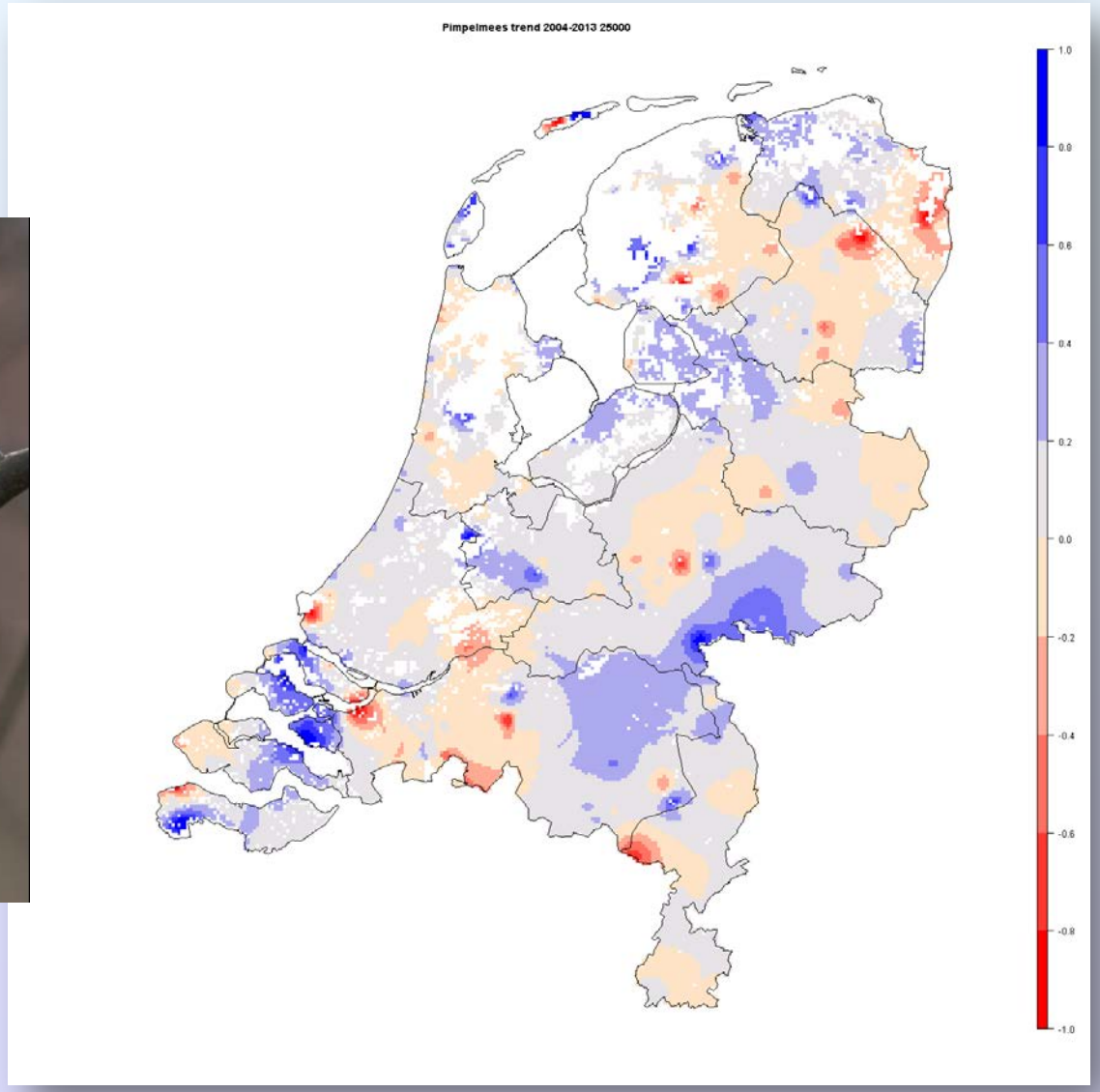


Spatial trends



Spatial trends

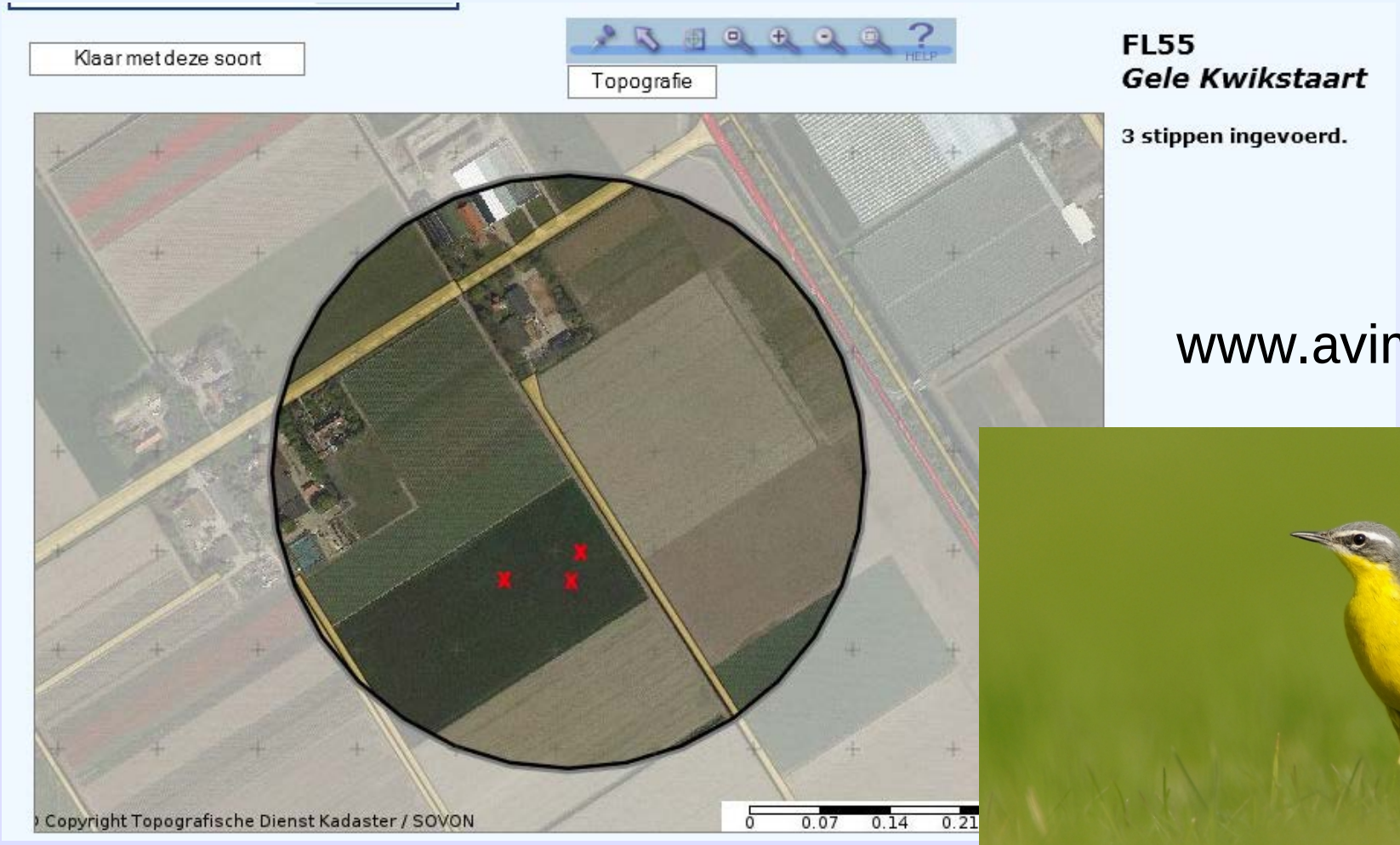
Saxifraga - Luc Hoogenstein
www.freenatureimages.eu



Inferring territory density maps from point counts: Dutch farmland birds

- 5 min point counts
- All observations mapped
- Automated clustering to territories
- Distance function per species
- Real density maps

Observations Yellow wagtail



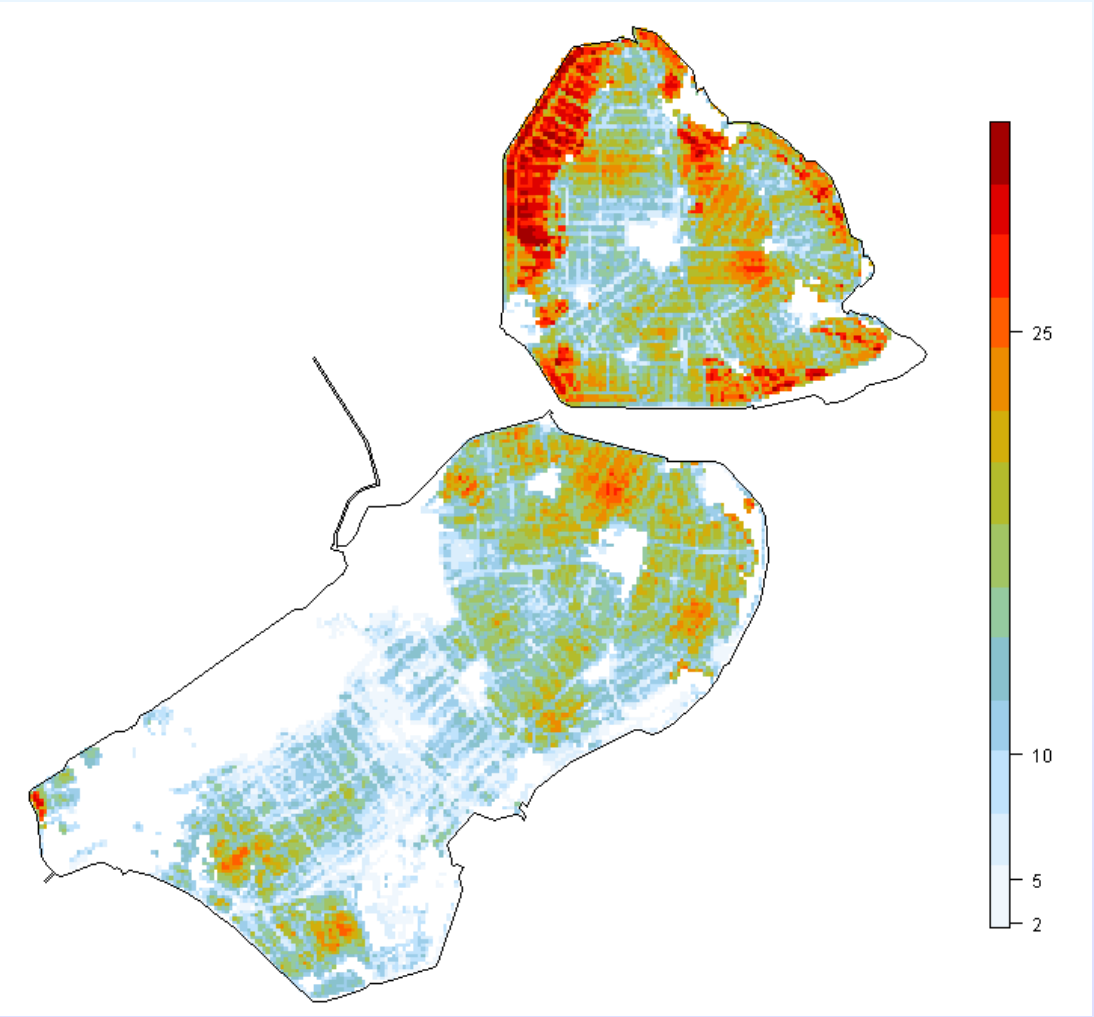
www.avimap.org

Territory map Yellow wagtail

created with automated clustering

www.avimap.org

Leo Snellink, www.birdpix.nl



Density map Yellow wagtail

Comparison with other R-packages

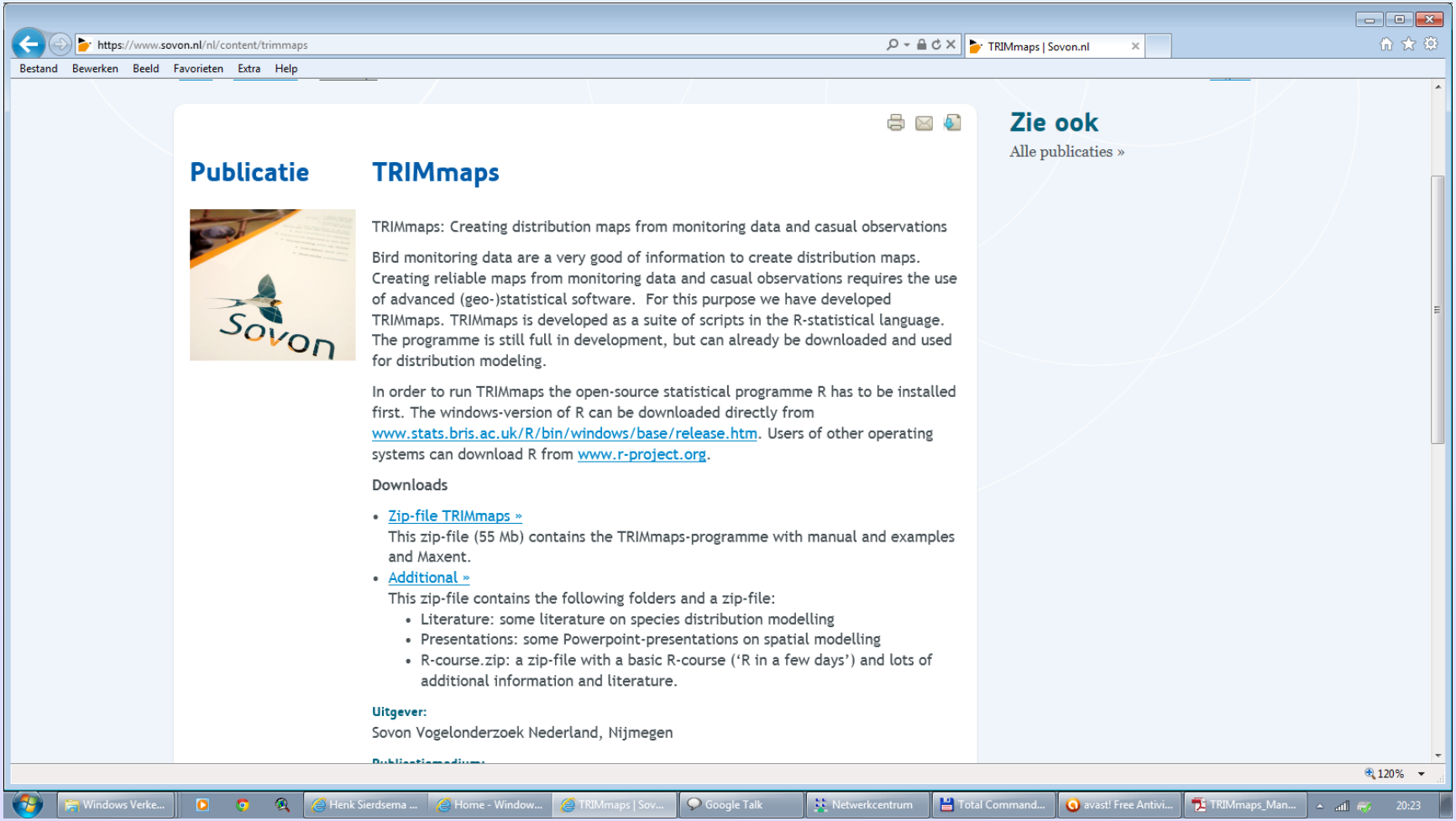
- BIOMOD: presence(-absence) modelling
- Dismo: also count data

Comparison with other R-packages

- Site-specific covariates
  - like buffer around point or transect
  - downscaling larger grids
- Account for spatial correlation in residuals
- Use TRIM-files for input

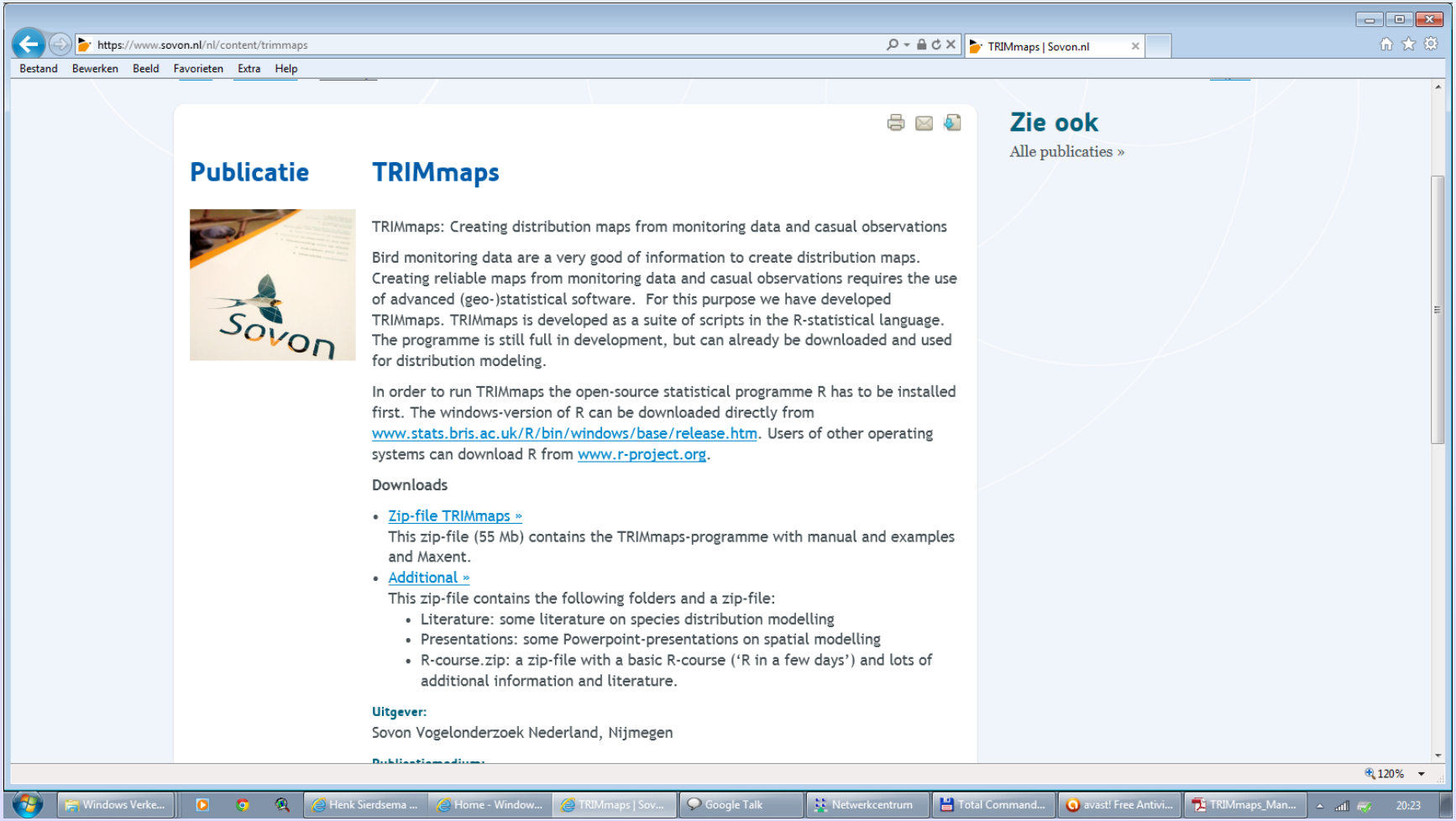
Download TRIMmaps

www.sovon.nl/nl/content/trimmaps



Download TRIMmaps

or simply google ‘trimmaps’



Installing TRIMmaps

- Install R
- Install 64-bits Java manually!
- Run ‘install_TRIMmaps.r’
- Check dependent packages with firstLibraryStart()
- That’s it!

Thank you for your attention...

And we are happy to help
you with the use of TRIMmaps!

henk.sierdsema@sovon.nl