## WP3 Birds



**Ainars Aunins** 











### Tasks and outputs of the WP3 (birds)

- Collection and analysis of existing data
  - Output: Report on bird densities and distributions 2001 2010
- Planning of surveys
  - Output: survey design, data collection protocols, etc.
- Manual on field survey methods
  - Output: Printed manual



## Tasks and outputs of the WP3 (birds)

- Bird surveys
  - Transect aerial counts (ca 4000km, 5 times)
    - Spring (2 surveys)
    - Summer
    - Autumn
    - Winter
  - Breeding birds (ca 50 islands)
    - EE only
- Spatial modelling of bird distribution
  - Output: bird distribution and density maps



# Old data report







Linking Estonia and Latvia Part-financed by the European Regional Development Fund

Gulf of Riga as a resource for wind energy -GORWIND

Deliverable WP 3.2

Historical overview: Distribution and numbers of birds during non-breeding period in Gulf of Riga 2001-2010

Ainars Aunins, Latvian Fund for Nature
Andres Kuresoo & Leho Luigujõe,
Estonian University of Life Sciences
Antra Stipniece, Latvian Ornithological Society







Riga-Tartu 2011

# Manual for fieldwork



#### Manual on field survey methods

Methods and procedures to be used for aerial bird surveys in GORWIND Project

#### Authors:

Ainars Aunins Andres Kuresoo Leho Luigujõe



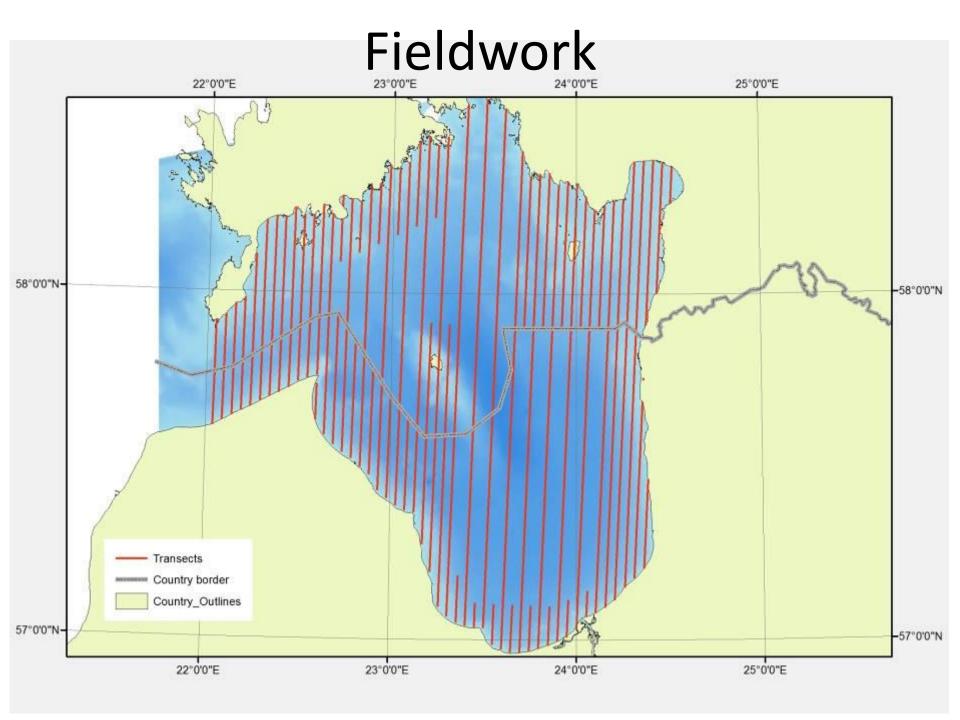


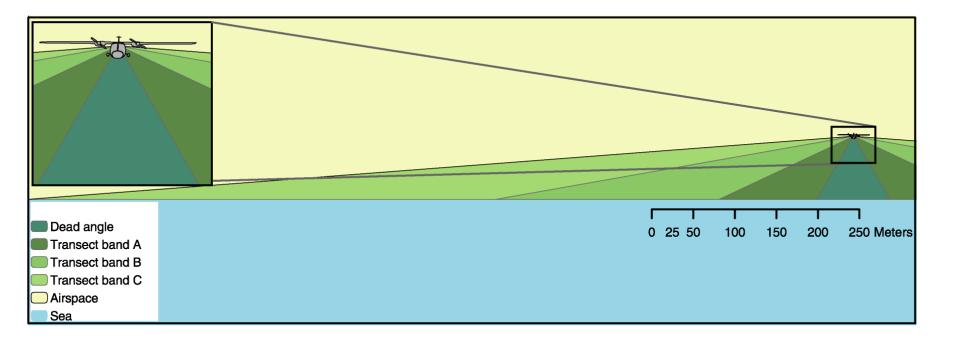
Latvian Fund for Nature

University of Life Sciences

Riga and Tartu

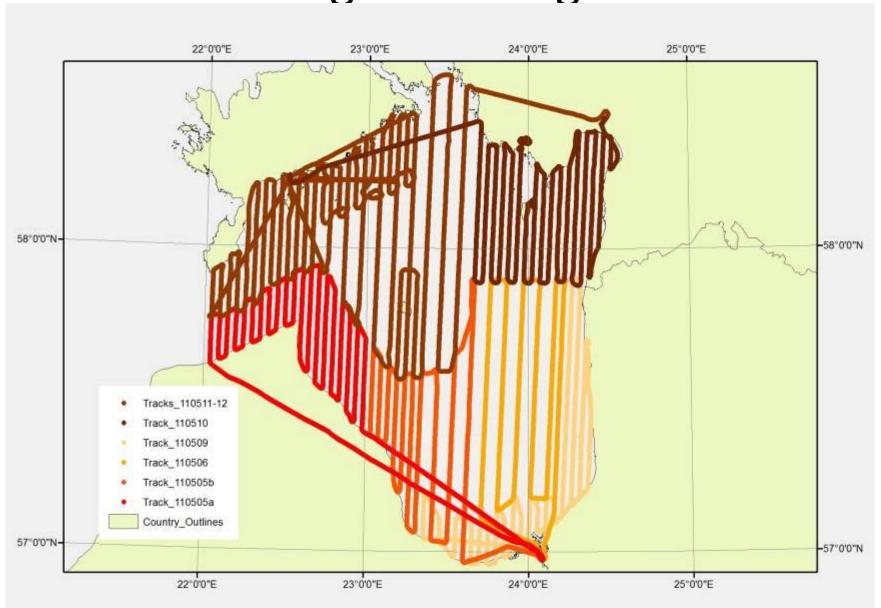
2011





Band	Boundary distances (m) from trackline	Declination in degrees from the horizon
A	44-163	60-25
В	164-432	25-10
С	433-1000	10-4
D	>1000	<4

# Flight coverage



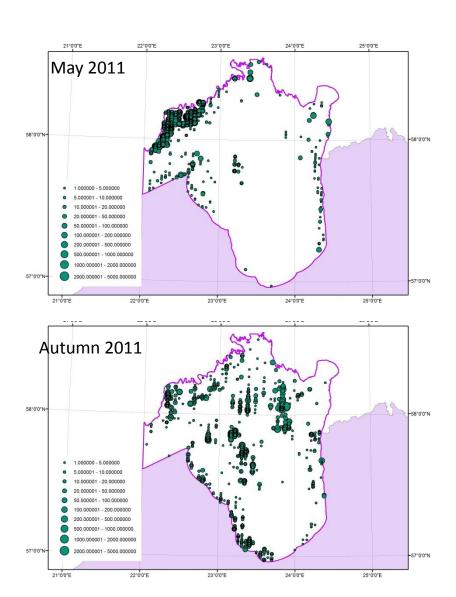
### Fieldwork

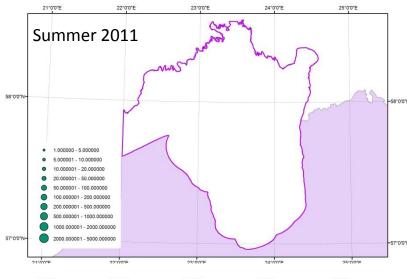
- Completed flight sessions
  - Spring 1 (April 2011 LV only)
  - Spring 2 (May 2011)
  - Summer (July August 2011)
  - Autumn (October 2011)
  - Winter (January February 2012)
  - Spring 1 (April 2012 EE only)

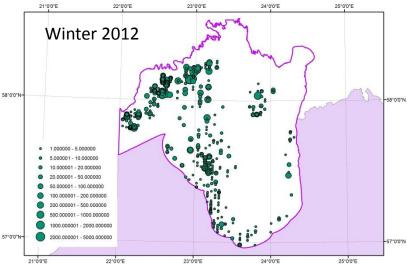


#### Long-tailed Duck Clangula hyemalis



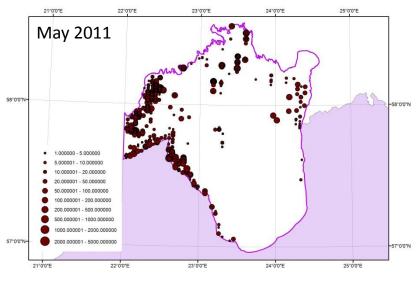


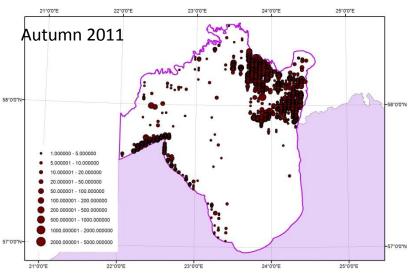


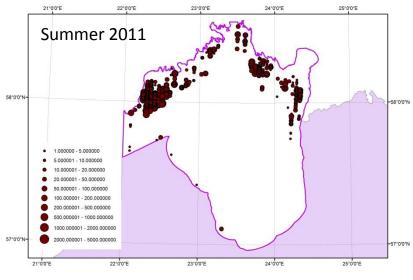


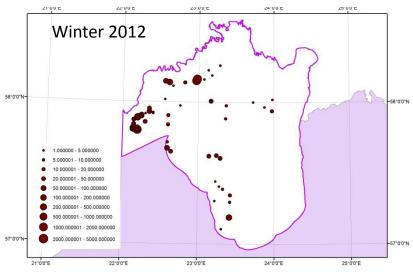
#### Scoters Melanitta sp.





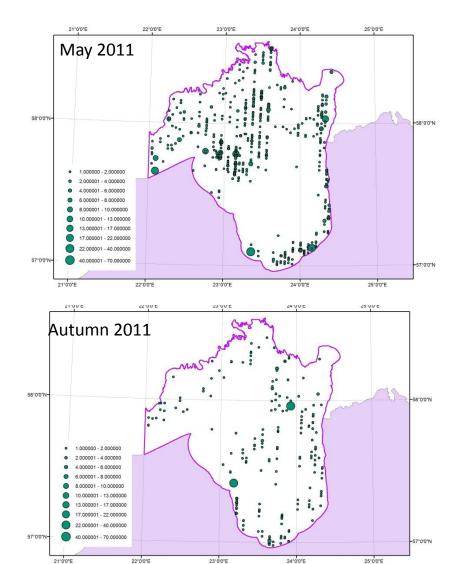


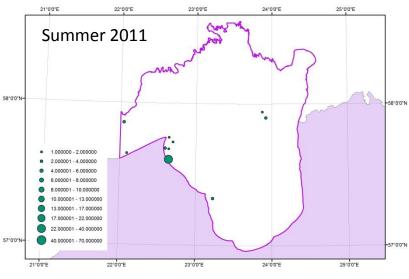


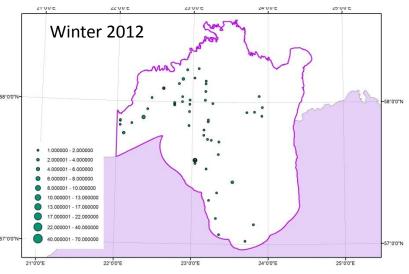


#### Divers Gavia sp.



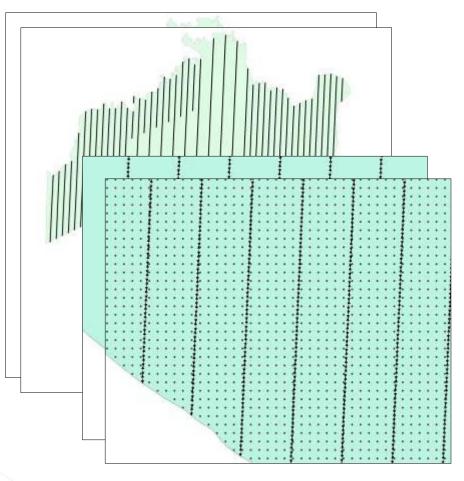






# Preparation of datasets

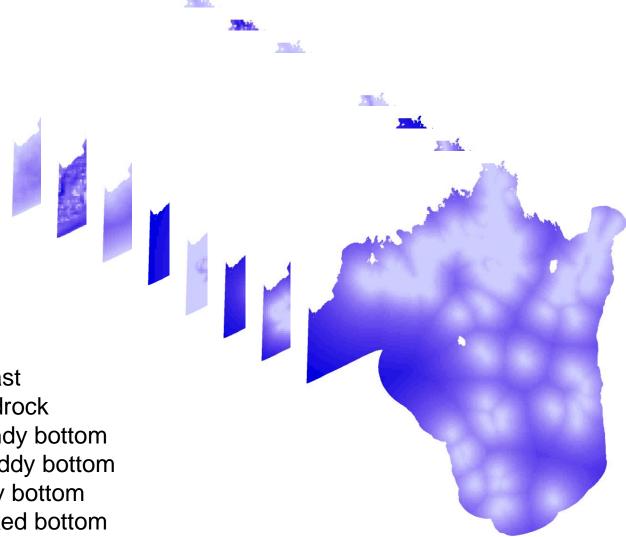
- Hierarhical structure
  - Study area
  - Transects
  - Sections
  - Observations
- Collection of external variables
- Preparation of prediction grid







## Covariates



X coordinate

Y coordinate

Depth

Variation of depth

Distance from coast

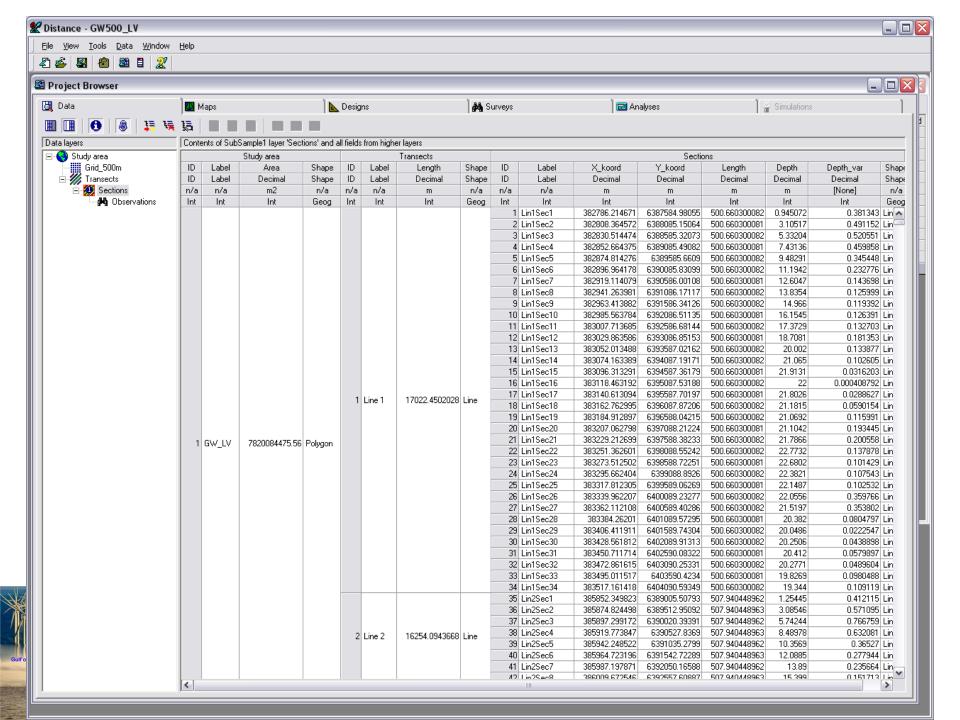
Distance from bedrock

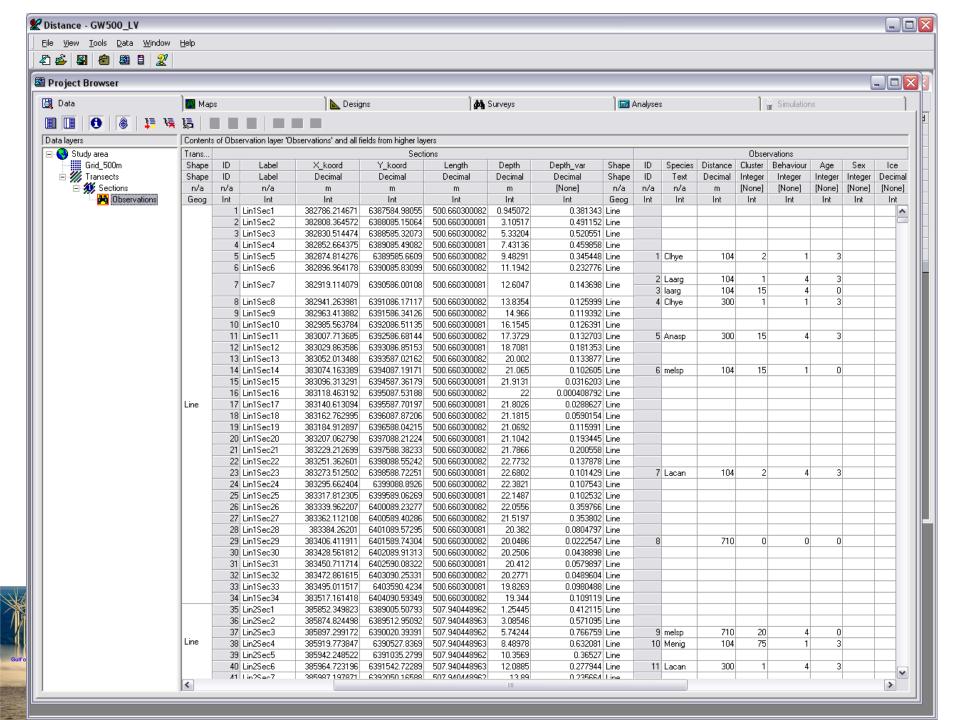
Distance from sandy bottom

Distance from muddy bottom

Distance from silty bottom

Distance from mixed bottom



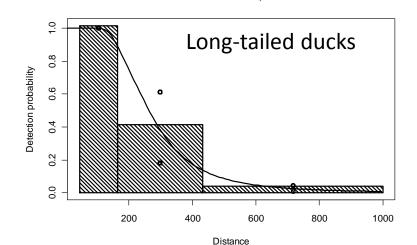


## Data analysis

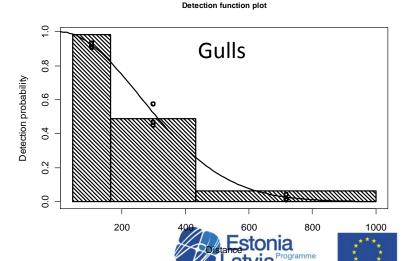
- Fitting detection probability curves
  - Species specific
  - Solutions for rare species
  - Dependence on observer, seat in plane, flock size, bird behaviour, sex and age, etc.







**Detection function plot** 



Part-financed by the European Regional Development Fund

## Data analysis

- Estimating spatially explicit abundance
- Fitting density surface models
  - GAM
  - X, Y, depth, depth variance, bottom substrate
- Predictions using fitted models

#### Long-tailed Duck Clangula hyemalis

Family: quasipoisson Link function: log

Formula:

N ~ depth + depth.var + x.koord + y.koord + offset(off.set)

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)
(Intercept) -6.155e+01 1.062e+01 -5.797 7.27e-09 \*\*\*
depth -8.281e-02 3.441e-03 -24.068 < 2e-16 \*\*\*
depth.var 5.174e-01 2.506e-02 20.647 < 2e-16 \*\*\*
x.koord -1.492e-05 1.058e-06 -14.095 < 2e-16 \*\*\*
y.koord 8.473e-06 1.628e-06 5.204 2.05e-07 \*\*\*

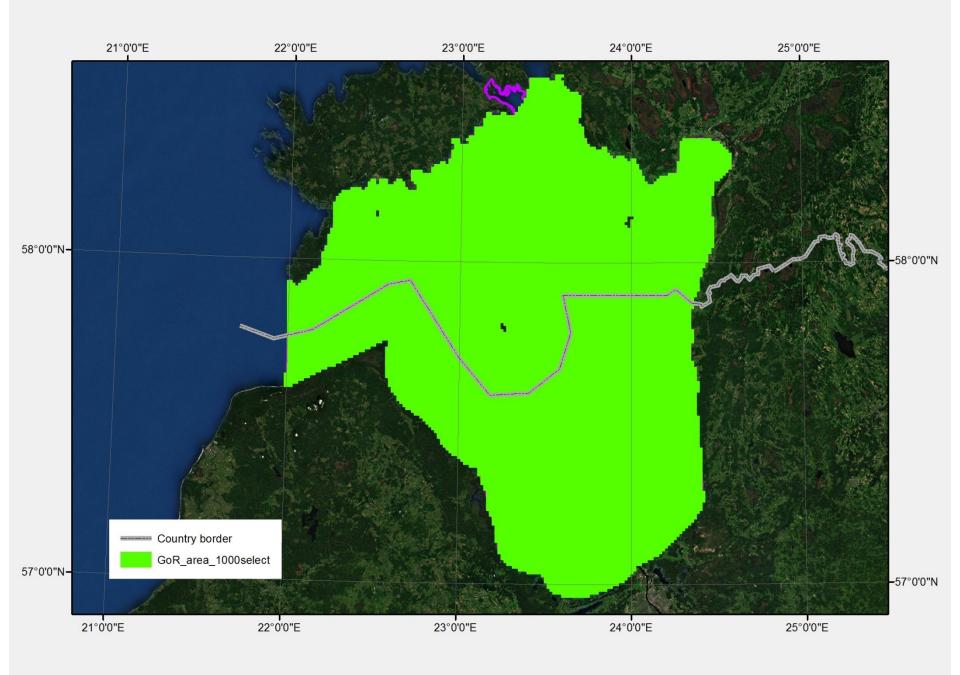
Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Deviance explained = 30.1%









## Outputs for WP4

- 1. Abundance (or density) for every species (or groups) in every season
- 2. Maximum abundance (or density) for every species (from all seasons combined)
- 3. Relative importance for every species (normalized values based on abundance/density to achieve comparability between the species and seasons; calculation: value for each cell is calculated relating actual abundance/density to average abundance/density calculated from non-zero cells) in every season
- 4. Relative maximum importance for every species from all seasons (the maximum value from seasonal (No.3) maps for the particular species)







## Outputs for WP4

- 5. Abundance (or density) of all waterbirds (all ducks, geese, swans, divers, grebes and auks + little gulls) in every season
  - 5a. Abundance (or density) of protected waterbirds (divers, little gulls, terns) in every season
  - 5b. Abundance (or density) of birds belonging to different functional groups (mussel eaters, other benthic, fish eaters, plant eaters) in every season
- 6. Maximum abundance (or density) of all waterbirds (all ducks, geese, swans, divers, grebes and auks + little gulls; from all seasons)
  - 6a. Maximum abundance (or density) of protected waterbirds (divers, little gulls, terns; from all seasons)
  - 6b. Maximum abundance (or density) of birds belonging to different functional groups (mussel eaters, other benthic, fish eaters, plant eaters; from all seasons)



## Outputs for WP4

- 7. Relative importance for all waterbirds (all ducks, geese, swans, divers, grebes and auks + little gulls) in every season (2 versions possible: calculated from relative importance maps of individual species (maps No. 3) using the weighting or calculated from the abundance of all qualifying species (maps No.5) using calculation procedure as described on point 3)
- 8. Distance based weighted importance for island breeding birds (a grid where importance values of cells are dependent on distance from the island groups that are weighted according to their importance to breeding seabirds)
- 9. Relative maximum importance for all waterbirds (all ducks, geese, swans, divers, grebes and auks + little gulls?) from all seasons (the maximum value from No.7 maps combined with No. 8 maps)







#### Further work

- Final distribution and density maps
- Preparation of datasets for WP4
- Contribution to the spatial plan for the GoR

