

WP3 Birds



Ainars Aunins



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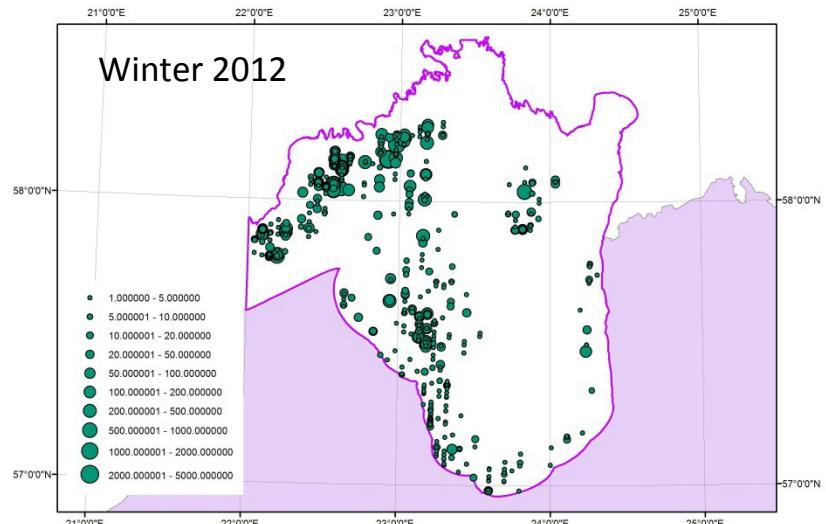
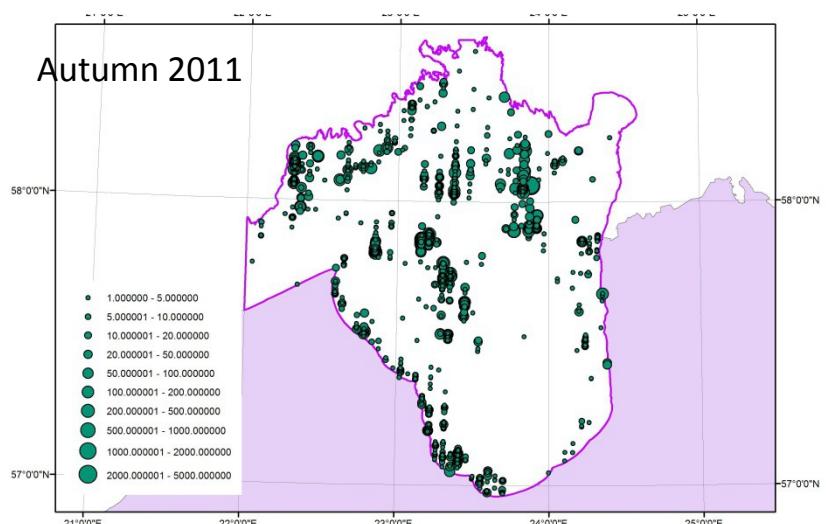
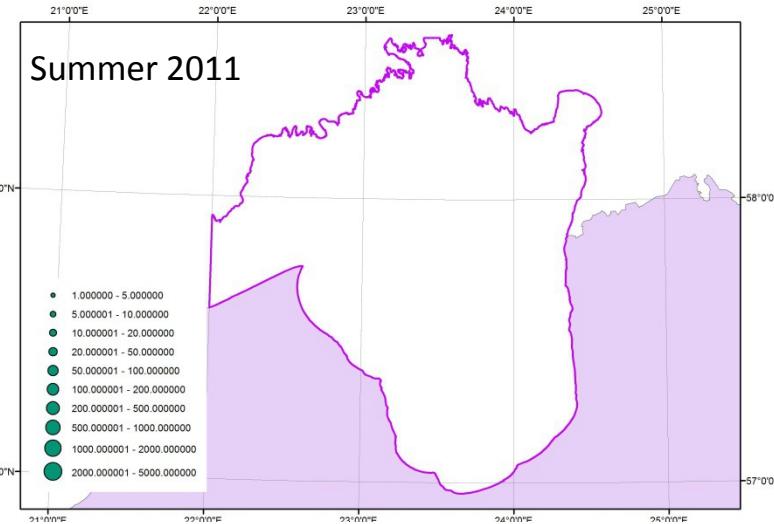
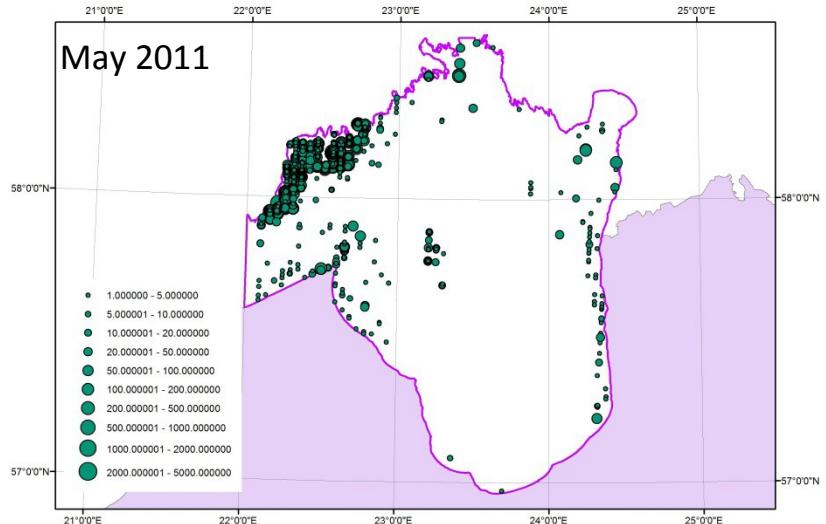
Linking Estonia and Latvia

Part-financed by the European Regional Development Fund

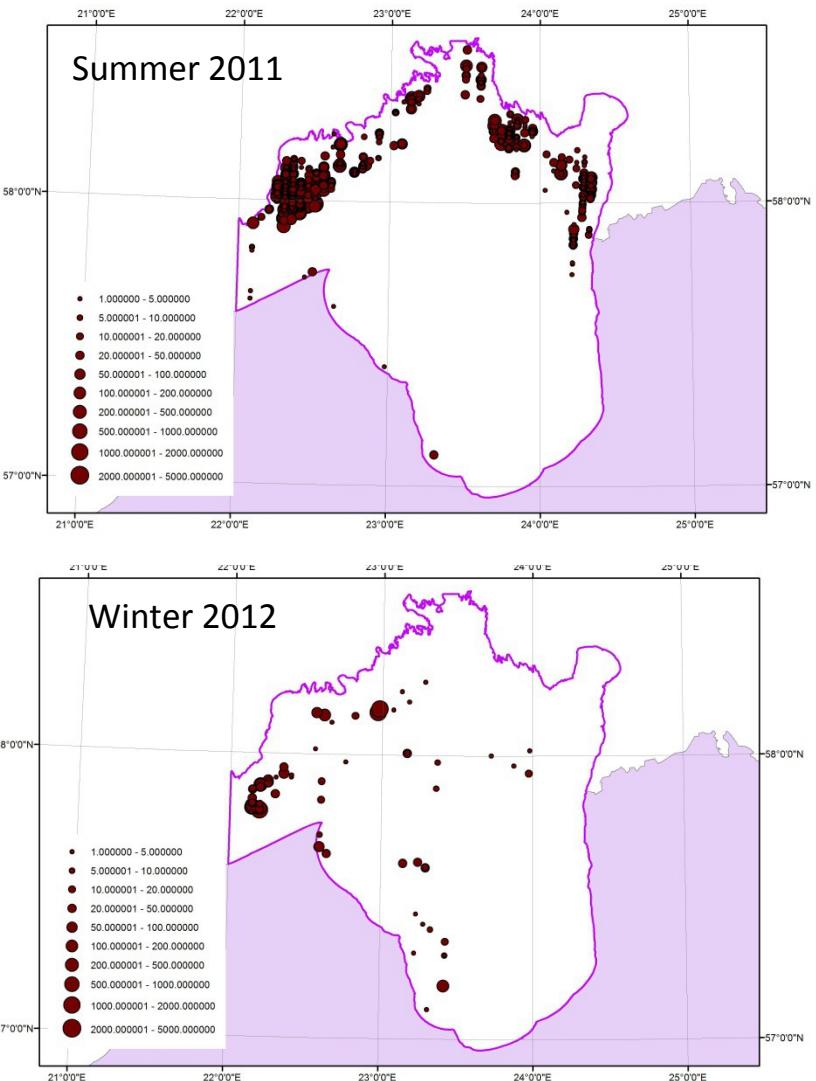
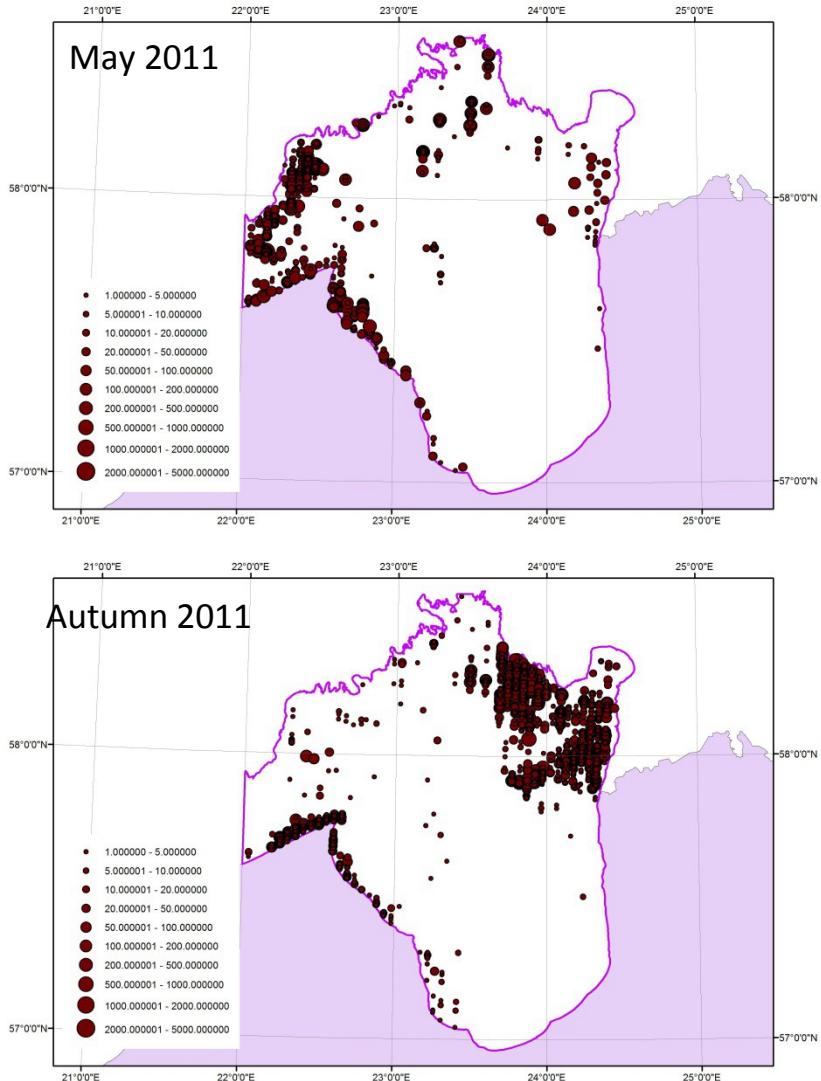


European Union

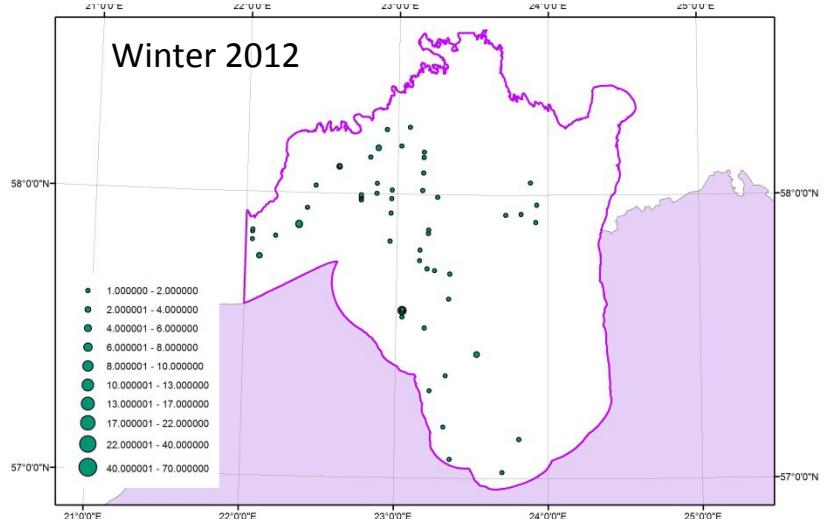
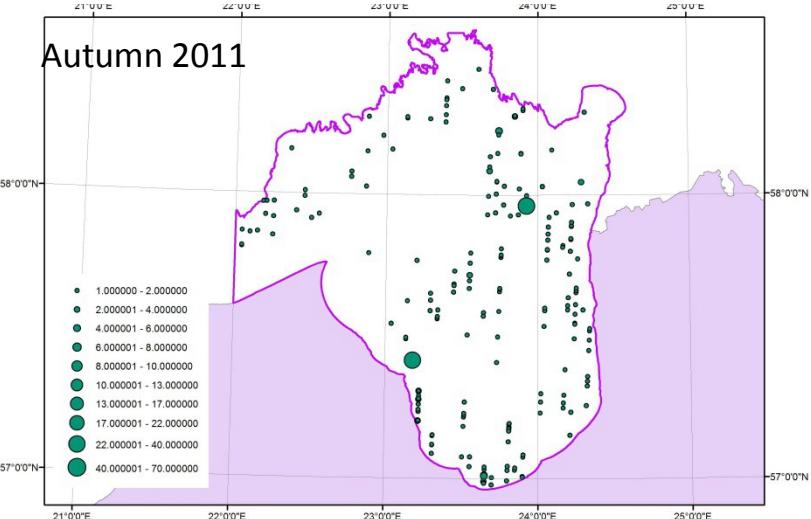
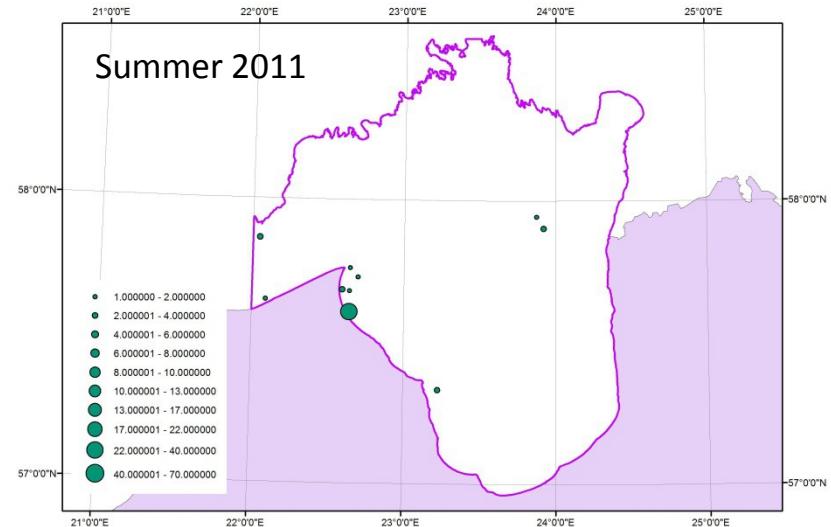
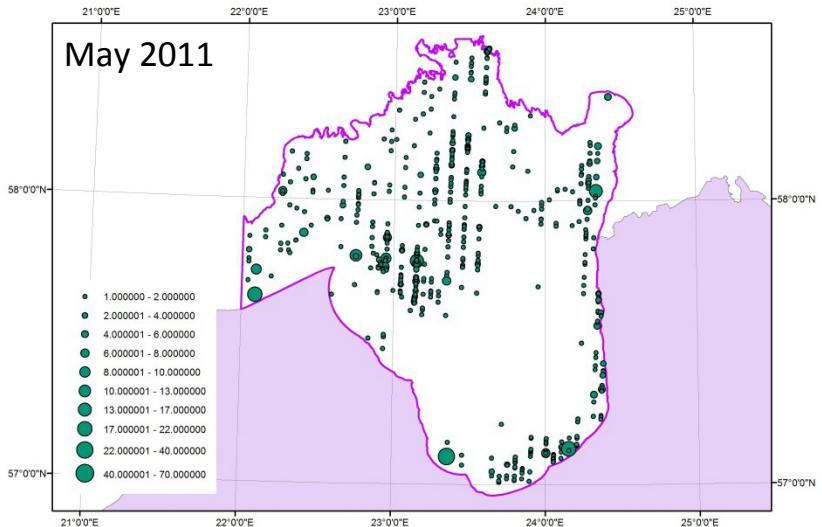
Long-tailed Duck *Clangula hyemalis*

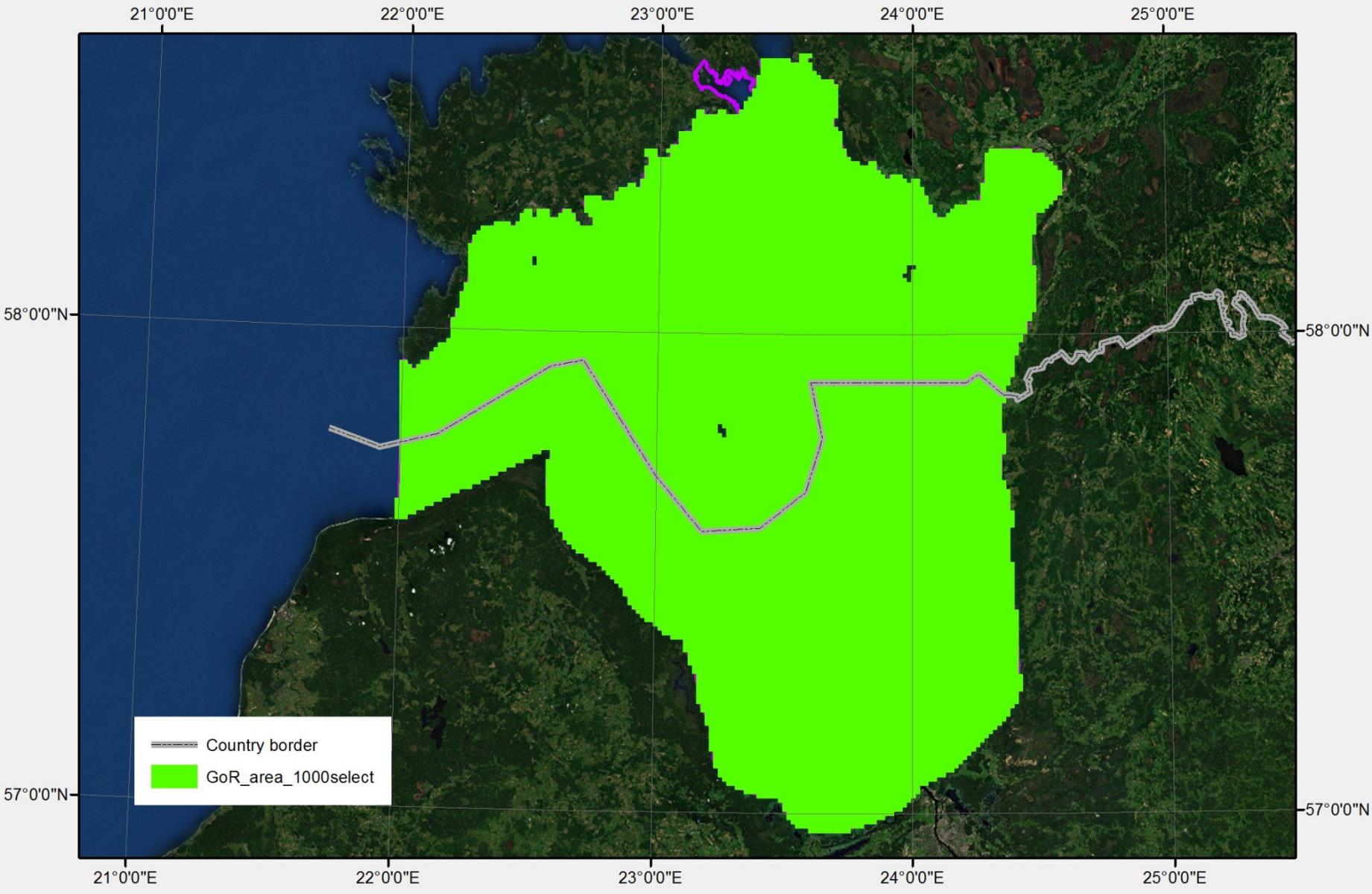


Scoters *Melanitta sp.*

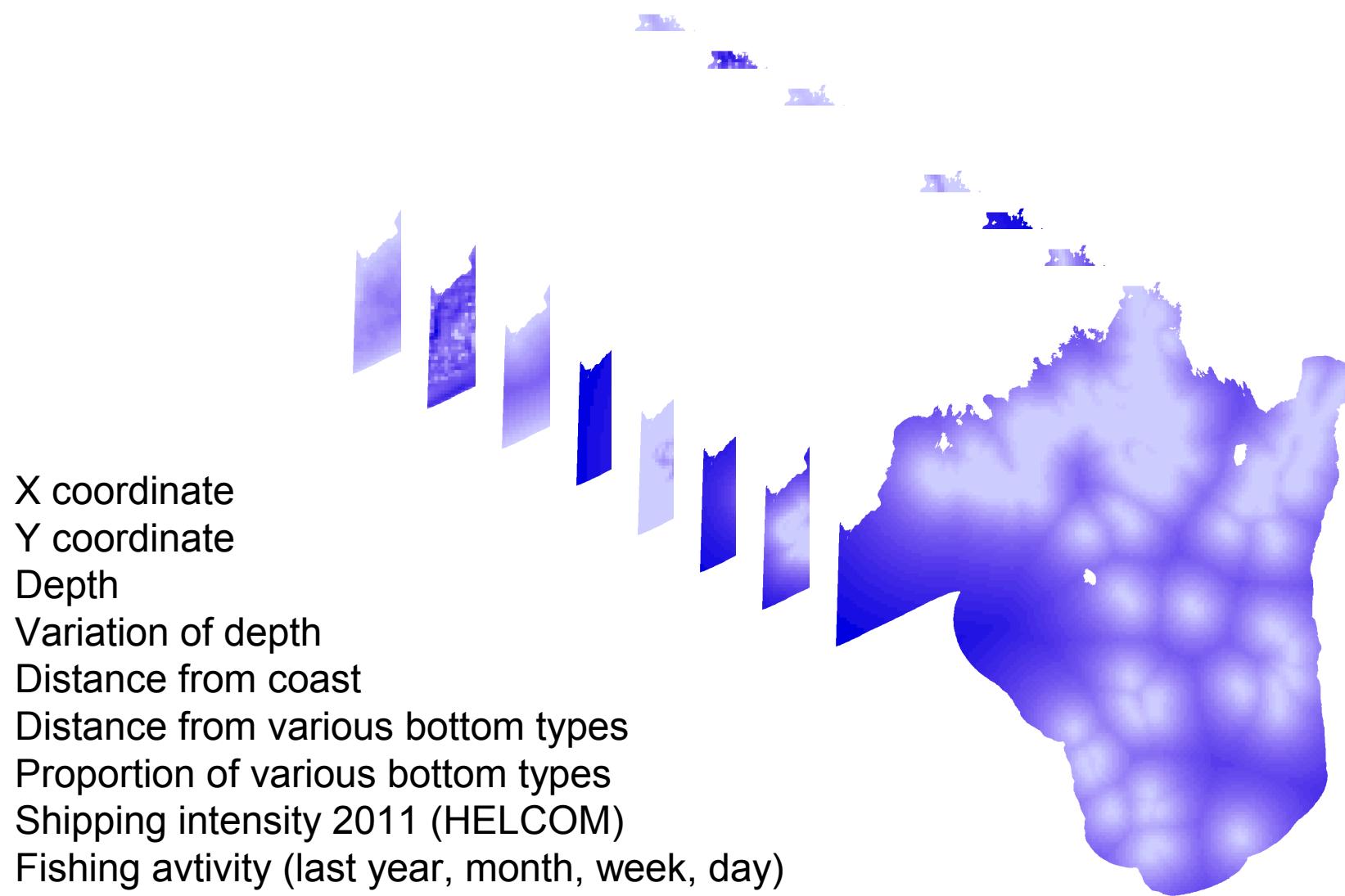


Divers *Gavia sp.*





Covariates

- 
- X coordinate
 - Y coordinate
 - Depth
 - Variation of depth
 - Distance from coast
 - Distance from various bottom types
 - Proportion of various bottom types
 - Shipping intensity 2011 (HELCOM)
 - Fishing avtivity (last year, month, week, day)
 - Ice cover (winter only)

Data analysis

Scoters Melanitta sp.

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



Family: quasipoisson

Link function: log

Formula:

$N \sim te(x.coord, y.coord) + s(depth, k = 4) + s(depth.var, k = 4) + s(di.coast, k = 4) + s(di.bedrock, k = 4) + s(di.mixed, k = 4) + s(di.muddy, k = 4) + s(di.silt, k = 4) + s(prop.gravel, k = 3) + s(prop.mixed, k = 3) + s(prop.mud, k = 3) + s(prop.sand, k = 3) + s(prop.silt, k = 3) + s(ship.2011, k = 4) + s(fish.w.sum, k = 4) + offset(off.set)$

Parametric coefficients:

| | Estimate | Std. Error | t value | Pr(> t) |
|-------------|----------|------------|---------|----------|
| (Intercept) | -1974 | 1014 | -1.948 | 0.0515 . |

Approximate significance of smooth terms:

| | edf | Ref.df | F | p-value |
|---------------------|--------|--------|--------|--------------|
| te(x.coord,y.coord) | 21.118 | 21.610 | 22.300 | < 2e-16 *** |
| s(depth) | 2.813 | 2.962 | 23.671 | 5.06e-15 *** |
| s(depth.var) | 1.690 | 1.983 | 19.954 | 2.72e-09 *** |
| s(di.coast) | 2.107 | 2.324 | 20.702 | 7.46e-11 *** |
| s(di.bedrock) | 2.942 | 2.992 | 10.401 | 8.39e-07 *** |
| s(di.mixed) | 2.277 | 2.635 | 8.080 | 5.95e-05 *** |
| s(di.muddy) | 3.000 | 3.000 | 47.774 | < 2e-16 *** |
| s(di.silt) | 2.875 | 2.985 | 5.459 | 0.000984 *** |
| s(prop.gravel) | 1.000 | 1.000 | 3.677 | 0.055234 . |
| s(prop.mixed) | 1.854 | 1.978 | 19.128 | 6.38e-09 *** |
| s(prop.mud) | 1.669 | 1.889 | 3.631 | 0.028944 * |
| s(prop.sand) | 1.760 | 1.932 | 8.018 | 0.000400 *** |
| s(prop.silt) | 1.567 | 1.802 | 6.455 | 0.002329 ** |
| s(ship.2011) | 1.000 | 1.001 | 8.384 | 0.003800 ** |
| s(fish.w.sum) | 1.000 | 1.000 | 2.907 | 0.088249 . |

R-sq. (adj) = 0.456 Deviance explained = 67%

GCV score = 42.445 Scale est. = 41.514 n = 4076

WP3 meeting

August 29-30, 2012 Tartu

Non-breeding distribution:

Long-tailed Duck *Clangula hyemalis*

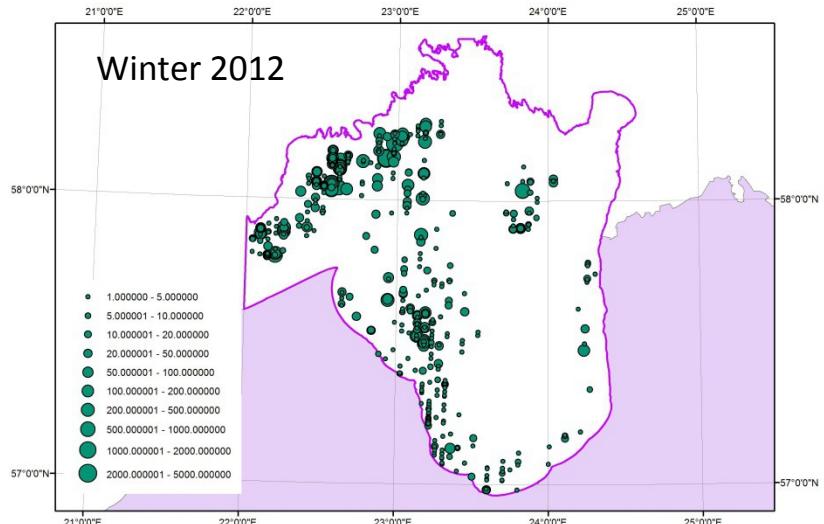
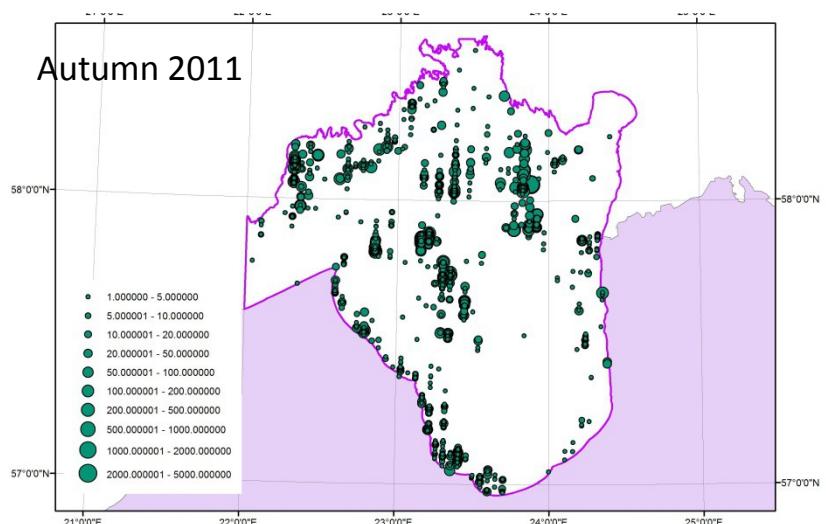
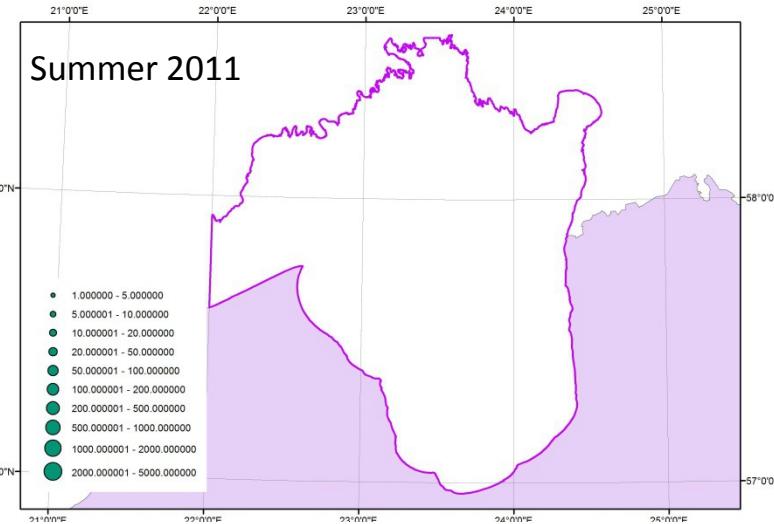
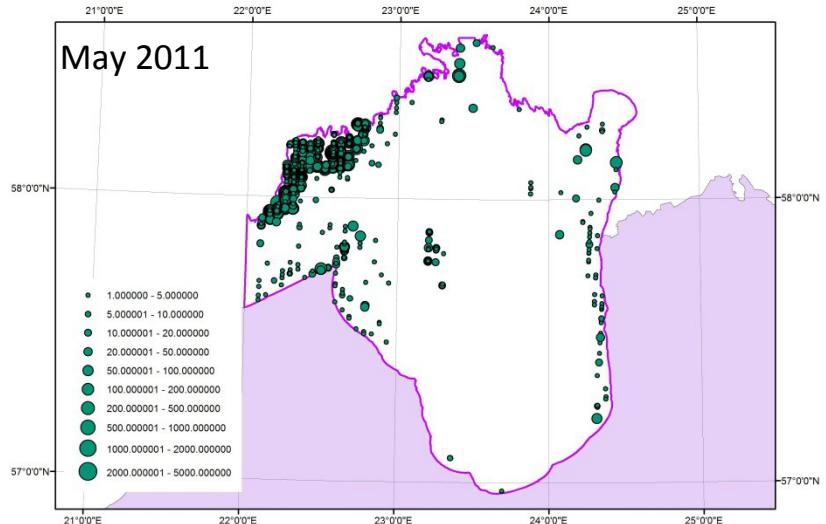
Scoters *Melanitta sp.*

Divers *Gavia sp.*

Little Gull *Larus minutus*

All waterbird species (except gulls)

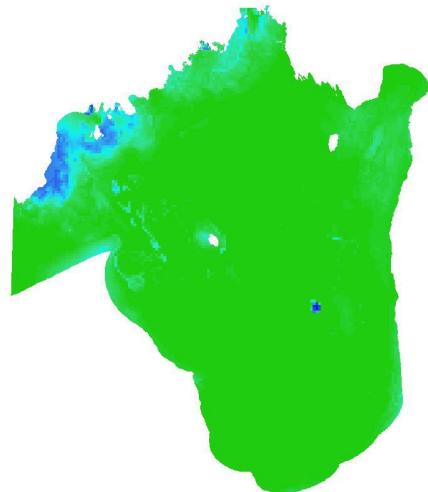
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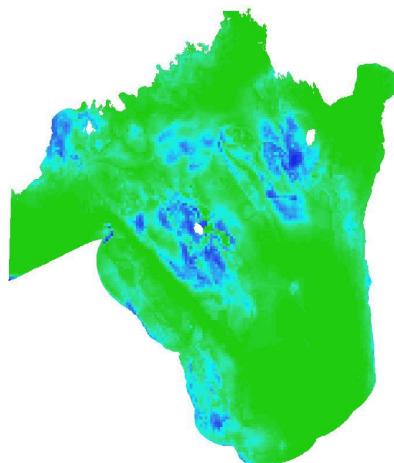


May 2011



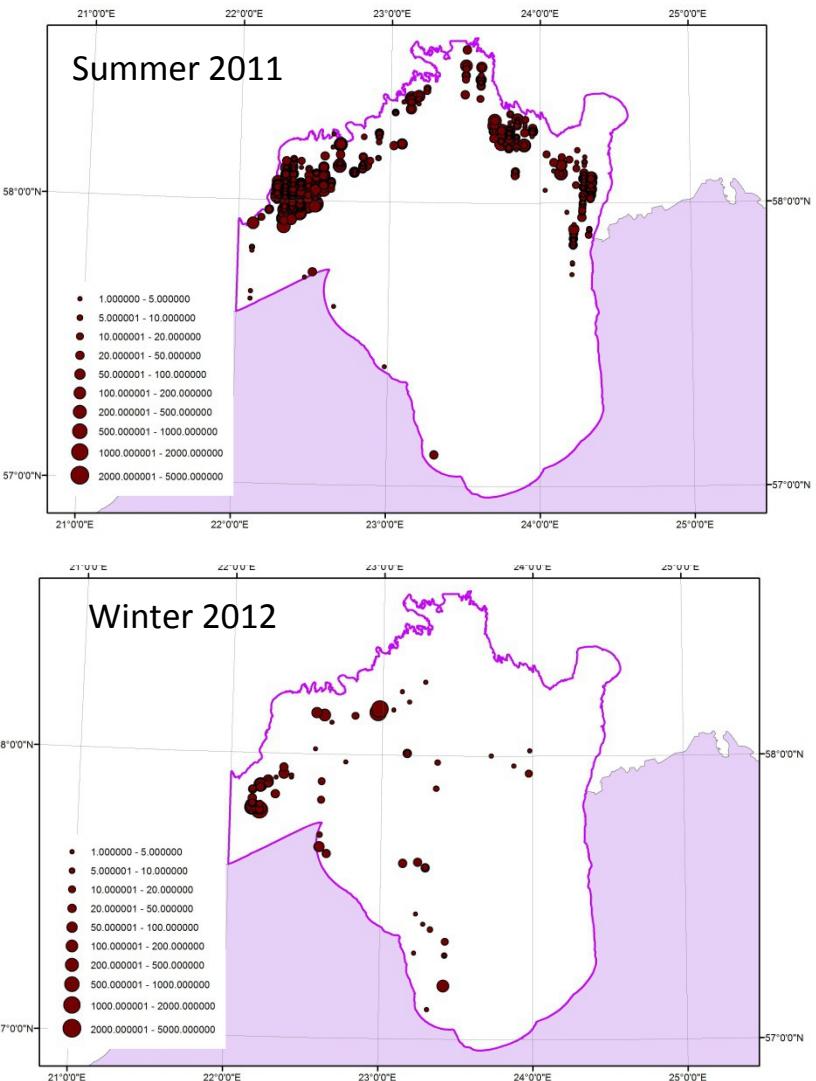
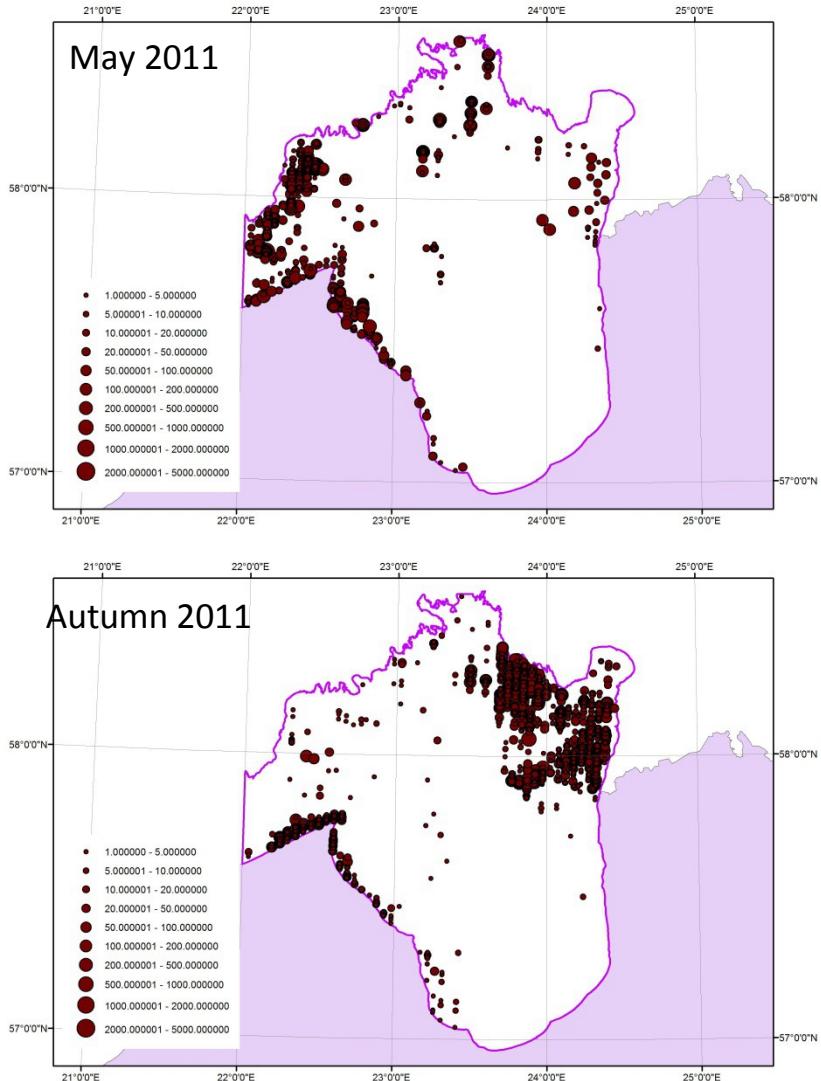
Summer 2011

Autumn 2011



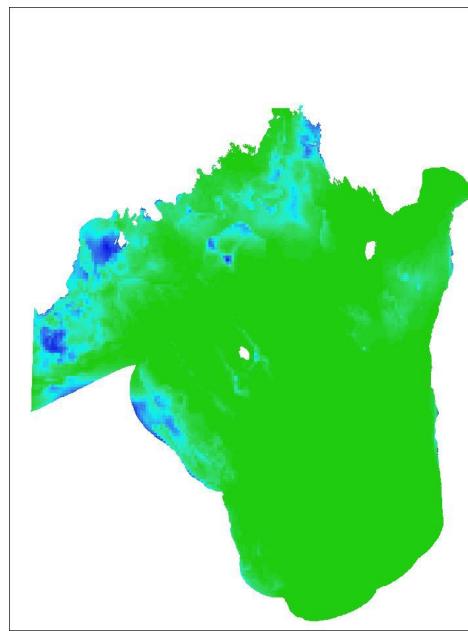
Winter 2012

Scoters *Melanitta sp.*

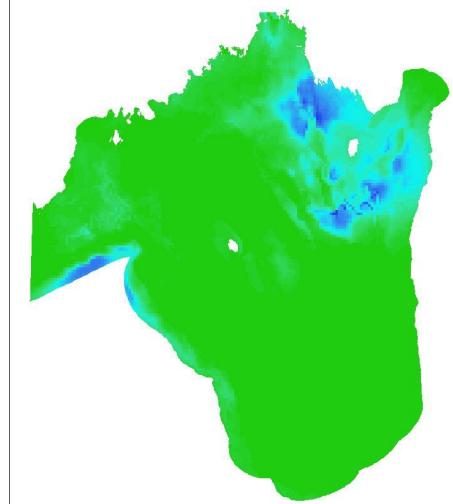


Scoters *Melanitta* sp.

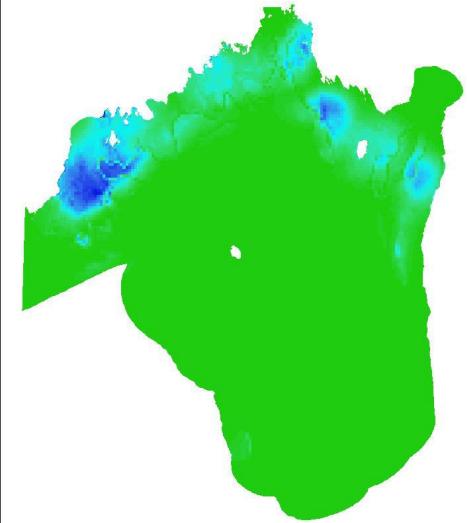
May 2011



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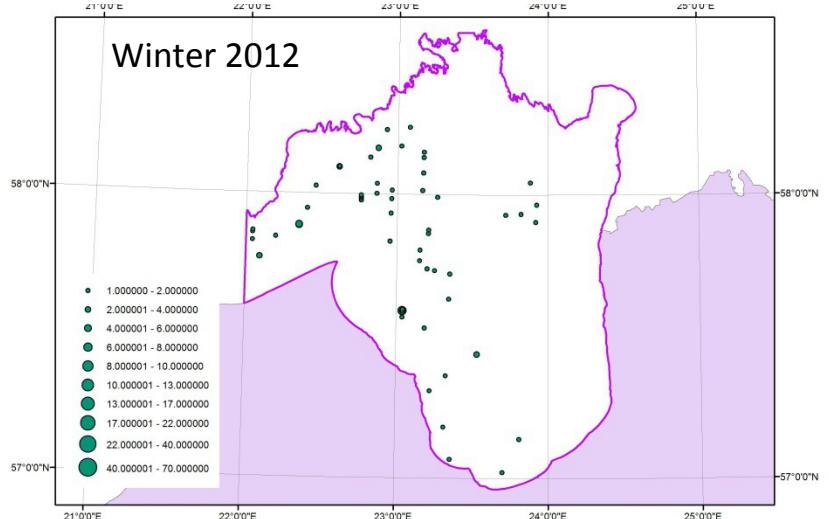
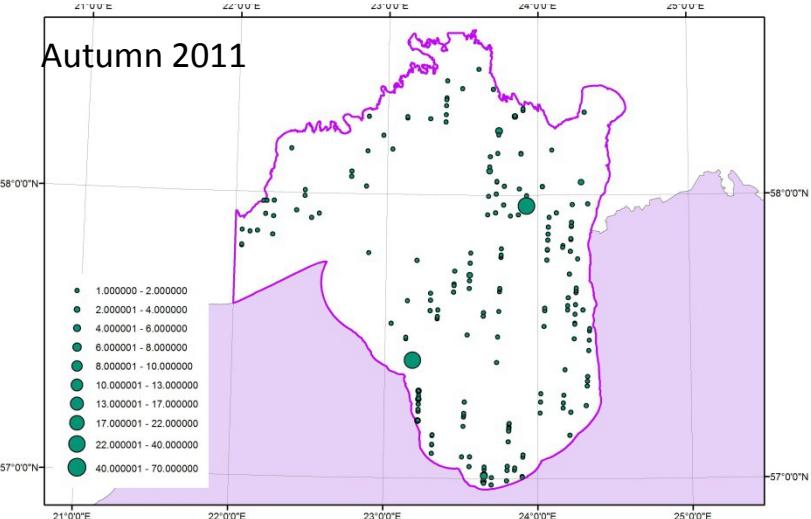
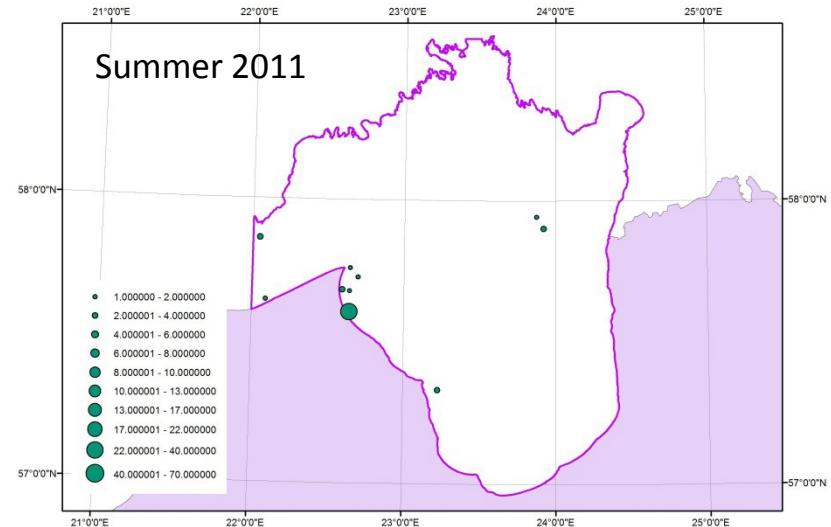
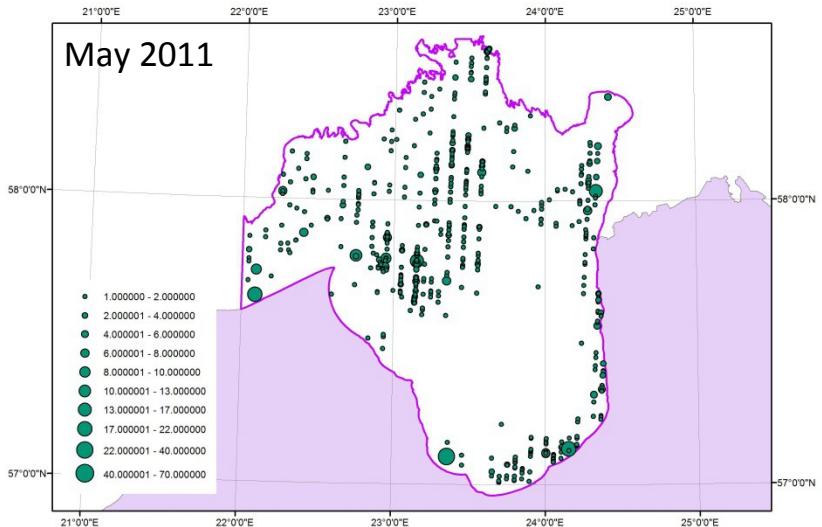
Summer 2011



Winter 2012

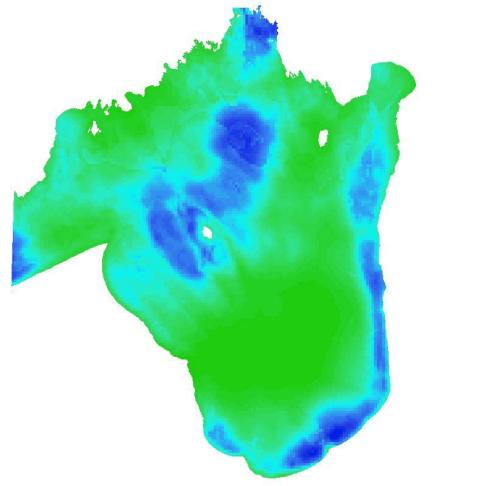


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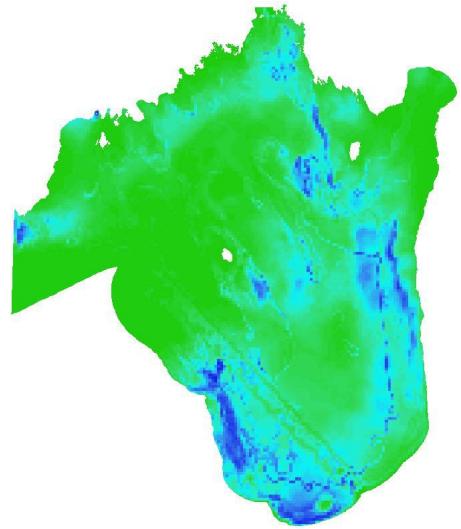


Divers *Gavia* sp.

May 2011



Autumn 2011



Summer 2011

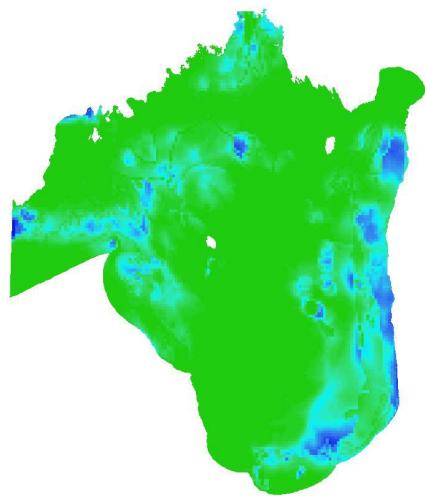


Winter 2012

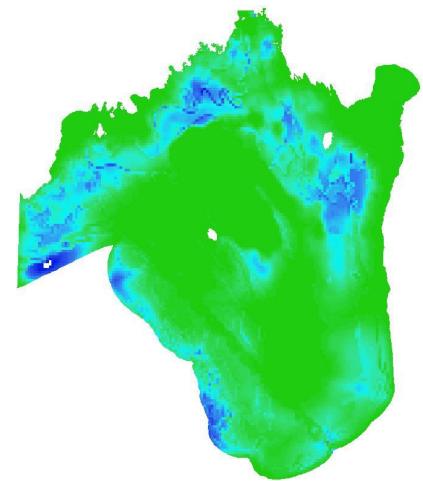


Little gull *Larus minutus*

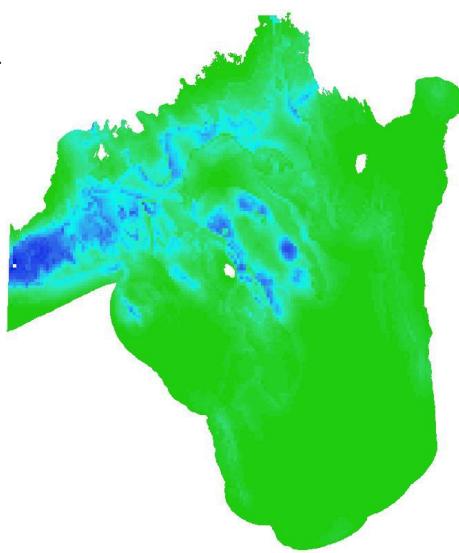
May 2011



Summer 2011



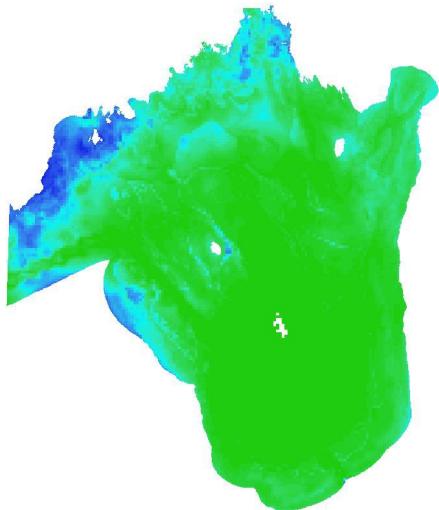
Autumn 2011



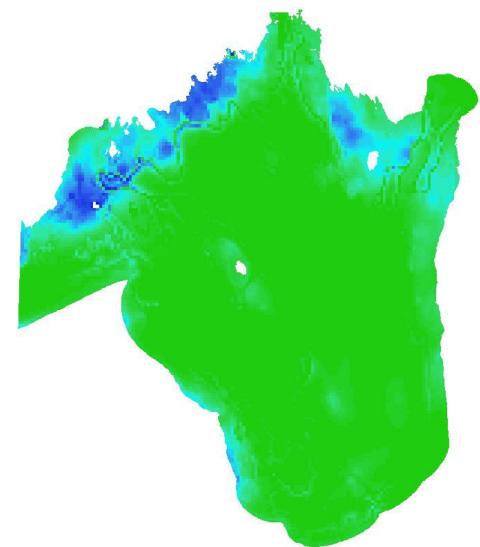
Winter 2012

All waterbirds

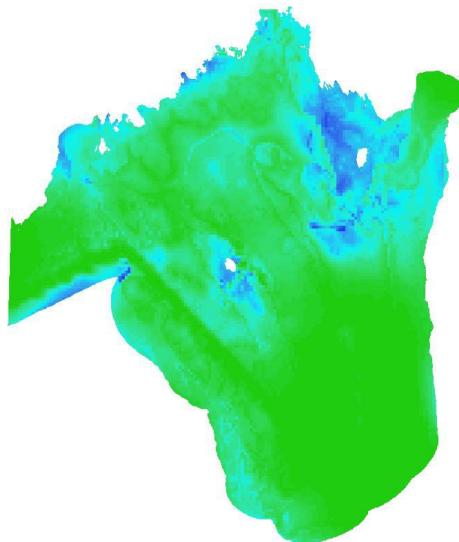
May 2011



Summer 2011



Autumn 2011



Winter 2012

Outputs for WP4

1. Maximum density for selected species and groups (from all seasons combined)
2. Relative maximum importance for selected species and species groups from all seasons (the maximum value from seasonal (No.1) maps for the particular species/groups)
3. Combined importance map for non-breeding birds



Further work

- Finalise distribution maps
- Submit to WP4
- Update with densities of historical data
- Species richness/diversity
- Support distribution maps for breeding birds





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