



## Latvian breeding bird counts

- Organised by the Latvian Ornithological society
- Volunteer based
- Started in 2005
- A part of the Biodiversity monitoring programme
  - Funded by the Nature Conservation Agency

- 40 – 50 routes counted annually

### Systematic + random position of routes

- Predefined layout of «monitoring squares»
- Observer chooses desirable square
- Location of the route within a square chosen randomly

## Transects

Route length 4 km: 2 transect lines 2km long 1 km apart; 8 sections

## Distance belts and counting times

Section length – 500 m

Counting in 3 distance belts

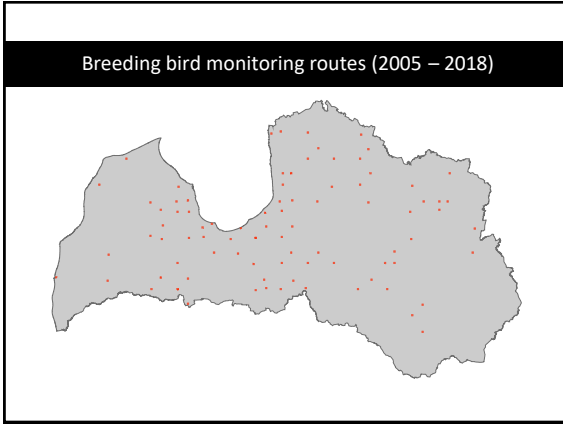
- 0 – 25 m from transect
- 25 – 100 m from transect
- >100 m from transect

4 times per season

- 0      20 III – 1 IV
- 1      20 IV – 30 IV
- 2      10 V – 25 V
- 3      5 VI – 20 VI

## Section maps

- 8 sections
- 500 m
- All observations mapped
- Field form filled for each section

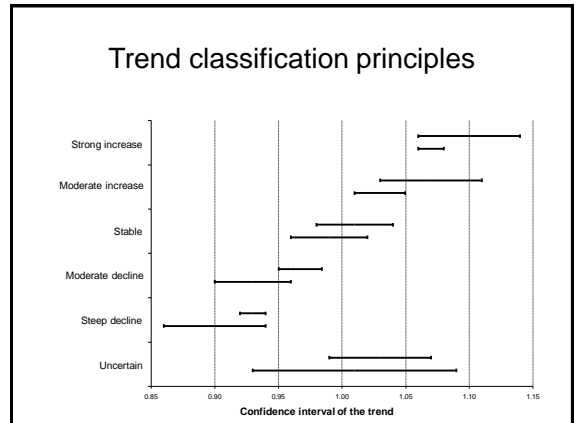


### Outputs

- Annual population indices > 100 bird species
- Annual population trends > 100 bird species
- Annual Farmland Bird Index and Forest bird index
- Population estimates

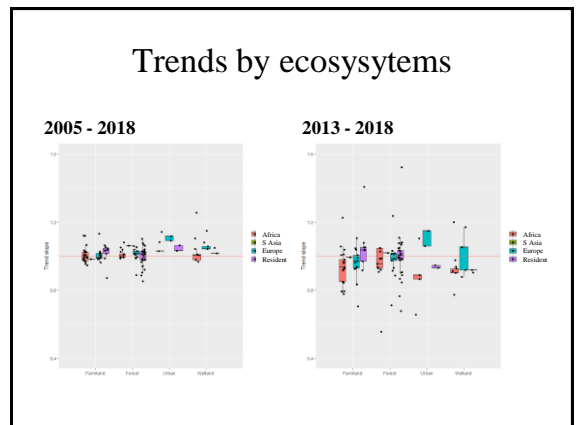
### Trend analysis

- TRIM (Trends and Indices for Monitoring data)
  - In  $count_{i,j} \sim site_i + year_j$
  - Imputation of missing data
  - Population indices
  - Linear trend (multiplicative slope; S)
  - Confidence interval  $CI = S \pm 1.96 SE$
  - Trend classification



### Population trends

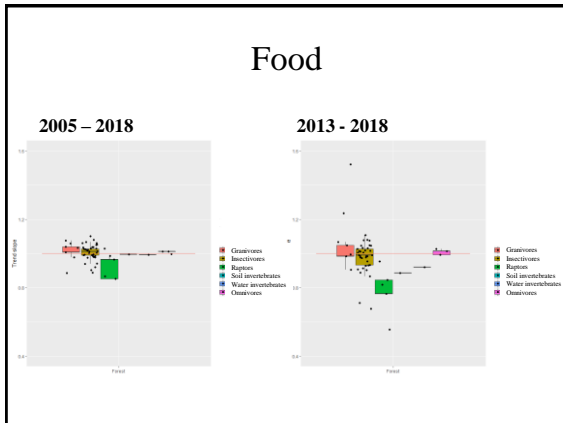
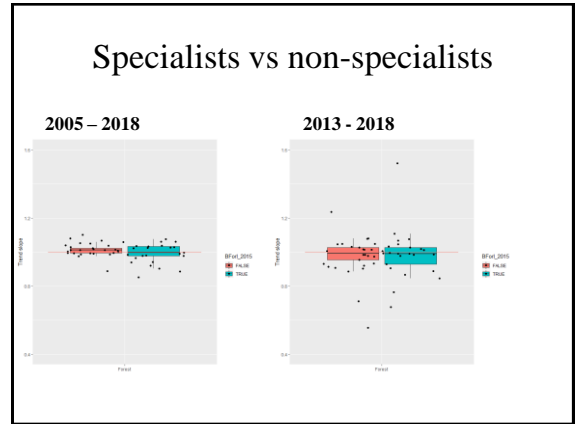
Trend	All birds		Forest birds	
	2005 - 2018	2013 - 2018	2005 - 2018	2013 - 2018
Steep decline	2	8	2	1
Moderate decline	11	19	5	10
Stable	28	4	14	2
Moderate increase	28	7	12	5
Strong increase	0	0	0	0
Uncertain	37	68	21	36
<b>Total</b>	<b>106</b>	<b>106</b>	<b>54</b>	<b>54</b>



### Forest birds: trends by traits

- Migration strategy
- Food
- Edge preference/avoidance
- Specialist/non-specialist (EBCC)
- Nesting strategy
  - Hole/open nesting
  - Nest height
  - Clutch size

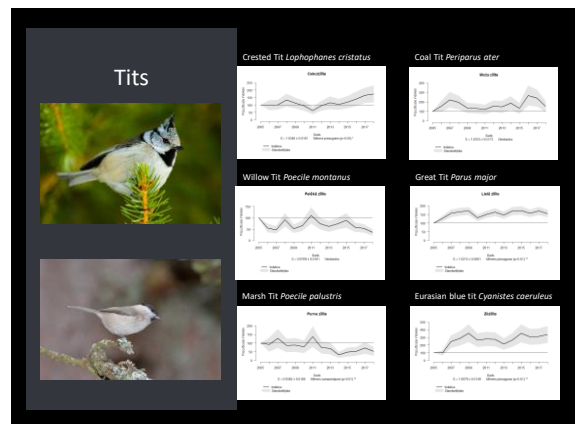
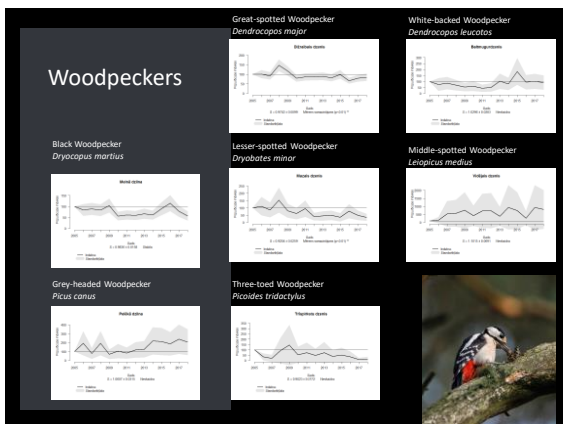
- GLM
- Slope ~ ...
- Weight: 1/SE of trend slope
- **ALL PREDICTORS UNINFORMATIVE**  
 $\Delta AIC < 2$

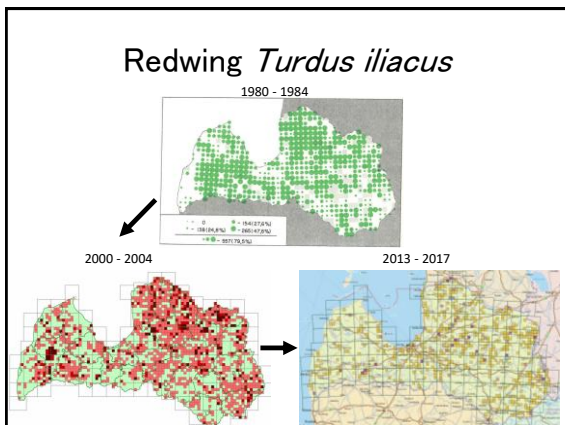
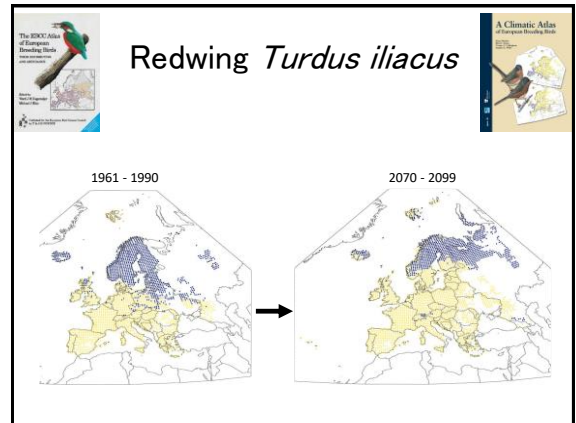
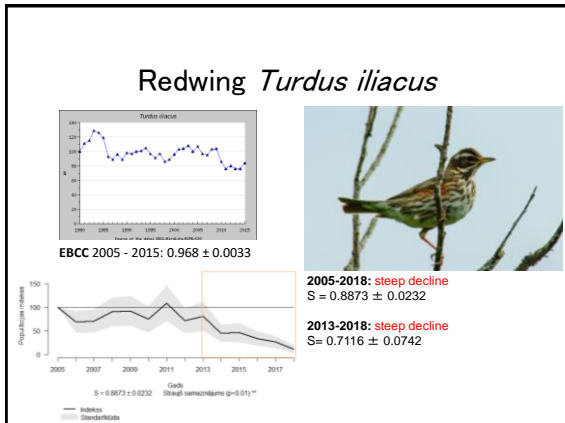
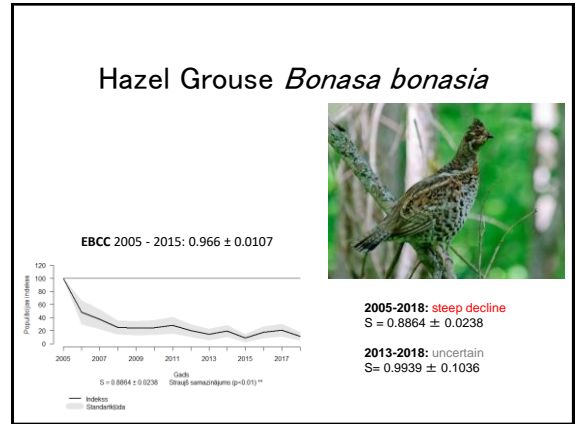
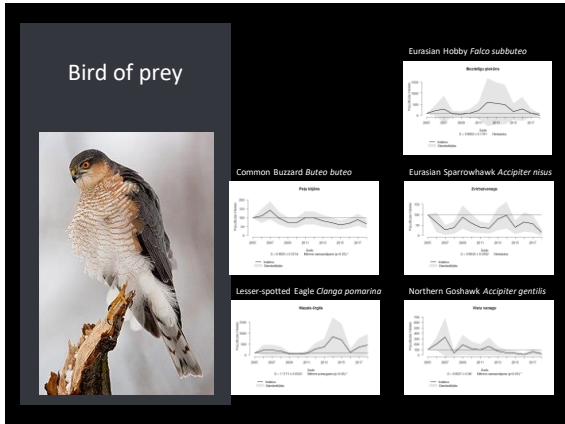


### Forest bird index

- Species used:
  - Northern Goshawk *Accipiter gentilis*
  - Eurasian Sparrowhawk *Accipiter nisus*
  - Hazel Grouse *Bonasa bonasia*
  - Grey-headed Woodpecker *Picus canus*
  - Black Woodpecker *Dryocopus martius*
  - Lesser-spotted Woodpecker *Dryobates minor*
  - White-backed Woodpecker *Dendrocopos leucotos*
  - Three-toed Woodpecker *Picoides tridactylus*
  - Mistle Thrush *Turdus viscivorus*
  - Wood Warbler *Phylloscopus sibilatrix*
  - Goldcrest *Regulus regulus*
  - Red-breasted Flycatcher *Ficedula parva*
  - Pied Flycatcher *Ficedula hypoleuca*
  - Long-tailed Tit *Aegithalos caudatus*
  - Marsh Tit *Poecile palustris*
  - Willow Tit *Poecile montanus*
  - Crested Tit *Lophophanes cristatus*
  - Coal Tit *Periparus ater*
  - Eurasian treecreeper *Certhia familiaris*
  - Spotted nutcracker *Nucifraga caryocatactes*
  - Common crossbill *Loxia curvirostra*
  - Eurasian bullfinch *Pyrrhula pyrrhula*
  - Hawfinch *Coccothraustes coccothraustes*

- Geometric mean index
- No species weighting





### Summary

- The forest species are not performing overall worse than other ecosystem species
- The 2 steep declining birds are linked to forests
- Species 5-year trends are worse than 13-year trends
- Variance in trend slopes is larger in forest species occurring all-year round
- The tested traits do not explain variance in the trends of forest species
- Forest bird index has been overall stable with non-significant declining trend

