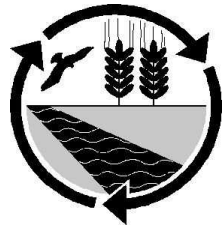


Influence of red fox (*Vulpes vulpes*) on bird diversity and abundance in farmland



Krzysztof Kujawa & Rafał Łęcki

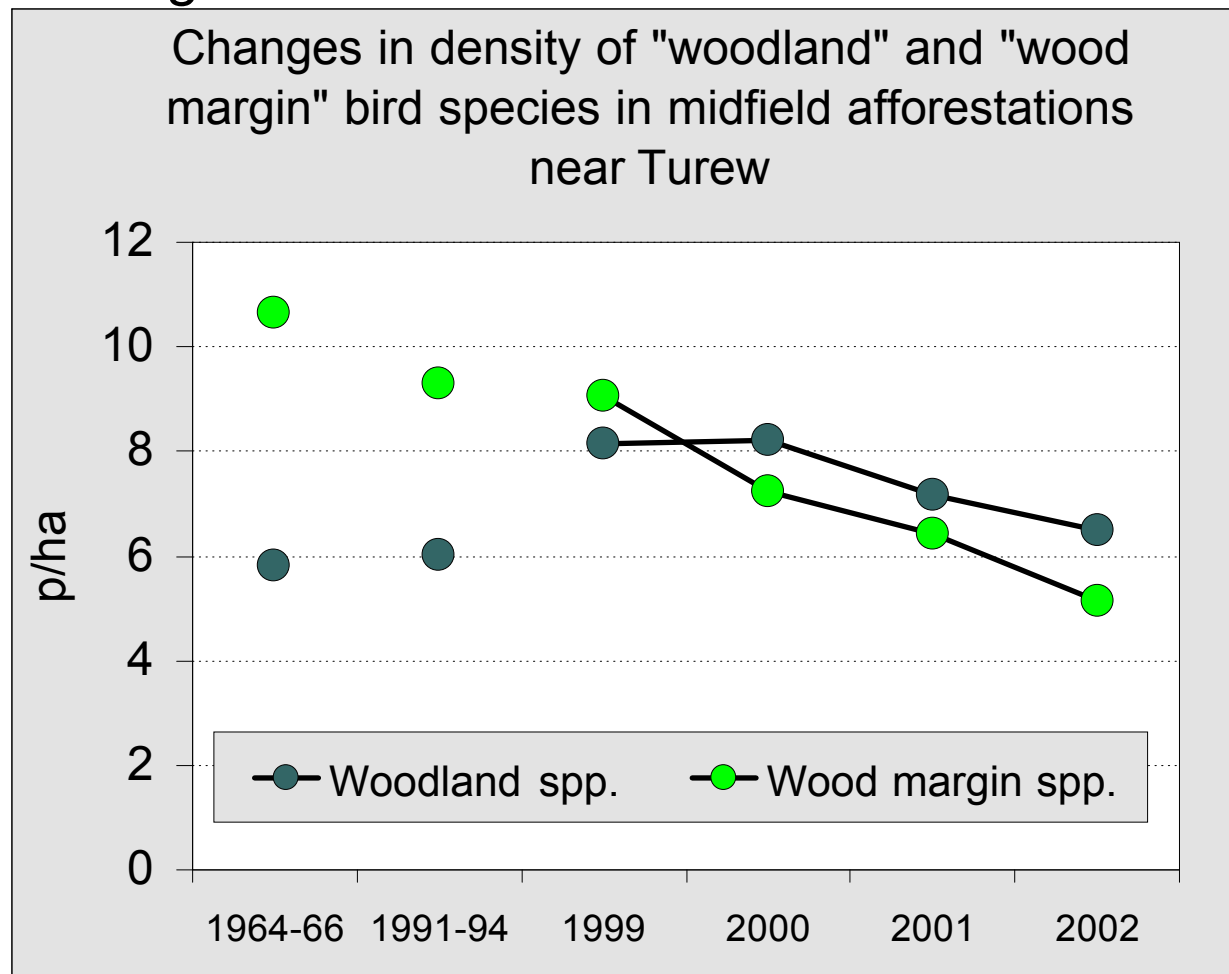
Research Center For Agricultural and Forest
Environment, Polish Academy of Sciences



Fot. Michał
Jastrzębski

Long-term study (40-years) in west Poland (mosaic farmland in the Dezydery Chłapowski Landscape Park):

- farmland bird community – stable, but some species decline
- declining species: e.g. Corn Bunting, Ortolan Bunting, Greenfinch, Starling



Reason for the decline:
intensification of
agriculture

Other reason for the decline: strong increase (5-fold since 1970s)
of red fox population size

Aim of the study:

**Recognition of the red fox impact on bird communities
occurring in farmland**



Red fox:

- opportunistic predator (feeds mainly on small rodents, but also on other animals)
- intensive hunting area – up to 600 m from den (telemetry, Marek Panek, unpubl. mat.)
- very often regarded in mass-media as main factor responsible for wildlife impoverishment

Two groups of bird species:

- **potentially endangered by red fox** („experimental” groups - **EG**): nesting on ground and in low vegetation
- **not endangered** („control” group – **CG**): nesting in tall vegetation and in tree-holes

Expected responses of bird communities to presence of red fox (active den):

In respect to space

1. Species numbers and/or densities of EG are lower in wood islands with dens (and no such differences for CG).
2. Density of EG in crop fields increases with the distance from den.

In respect to time

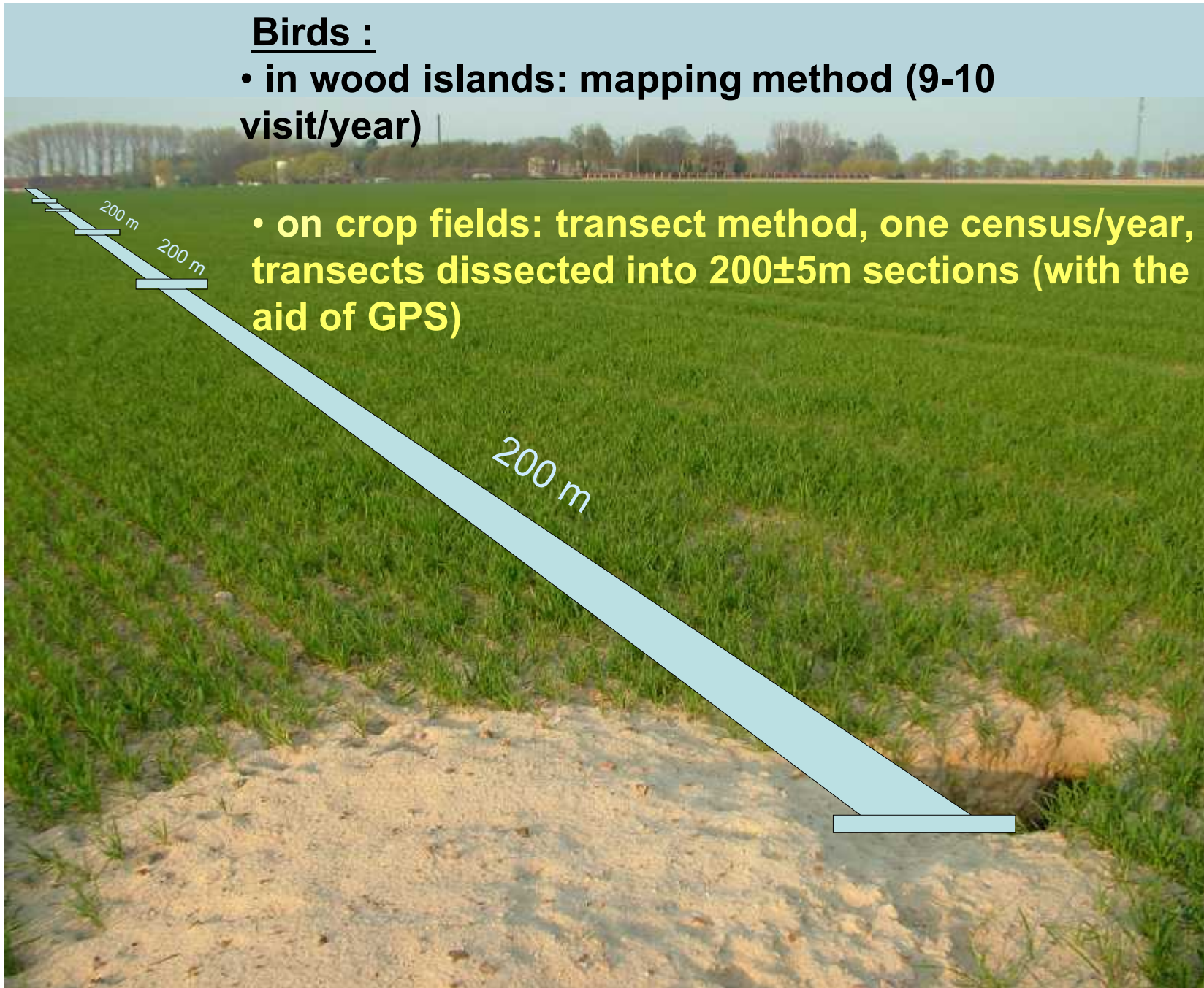
3. Density of EG in given wood islands is lower when they are occupied by red foxes (and no such reaction for CG)

Expected responses of birds are hypotheses tested in our study

Methods:

Birds :

- in wood islands: mapping method (9-10 visit/year)
- on crop fields: transect method, one census/year, transects dissected into 200 ± 5 m sections (with the aid of GPS)



Methods:

Red fox:

- localization of dens (March/April):
exploration of the study area from the air (with powered glider) and ground (car, bicycle) in March/April
- den status determination (April – July):
analysis of traces, remnants, feaces

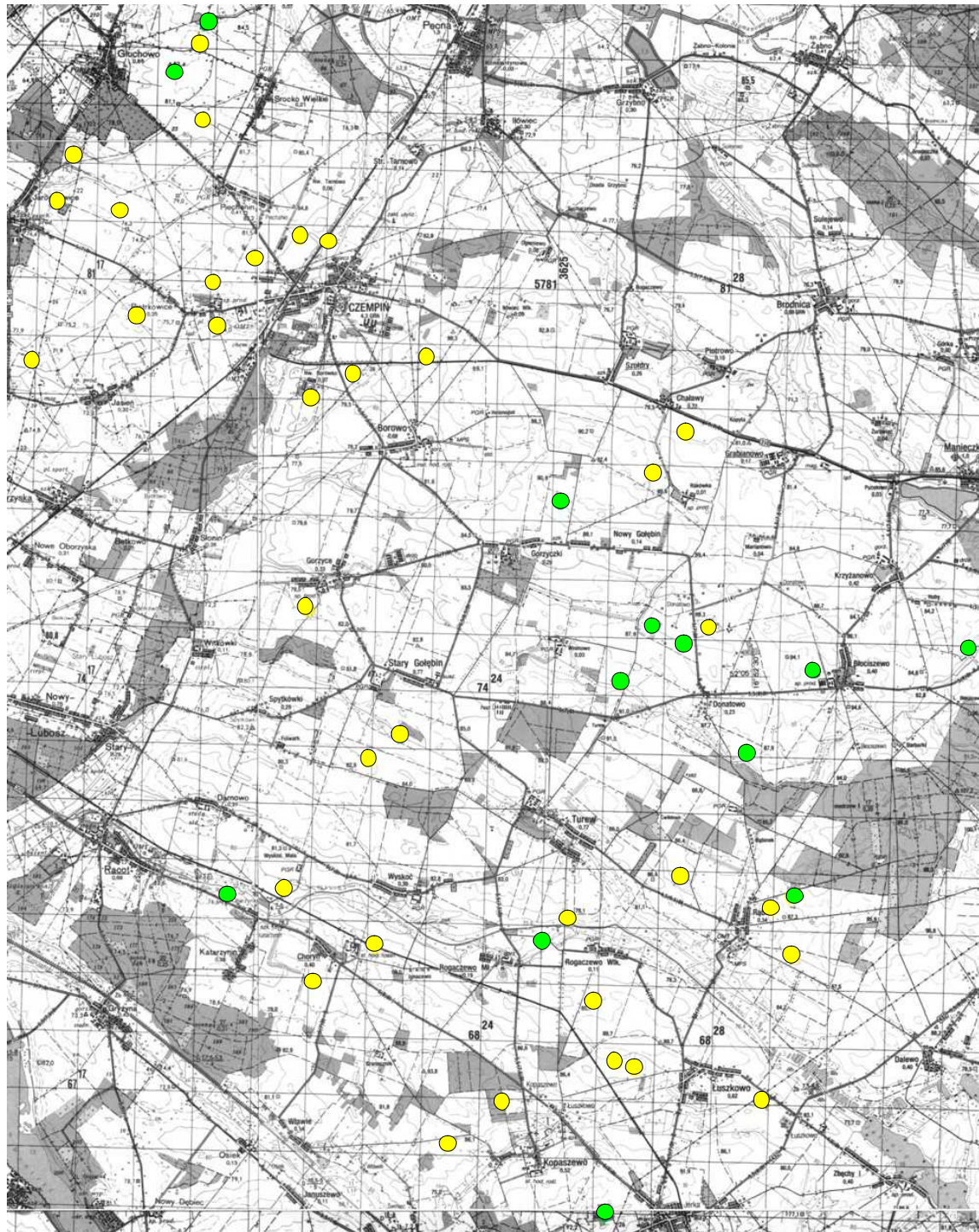


Methods:

Approach to testifying of fox impact on birds in wood islands

1. Building model of relationships between wood islands structure and birds – forward step-wise multiple regression.
2. Estimating of standardized residuals of this model.
3. Analyzing differences in residuals between wood islands with and without active den.

Distribution of active dens in the study area in 2006



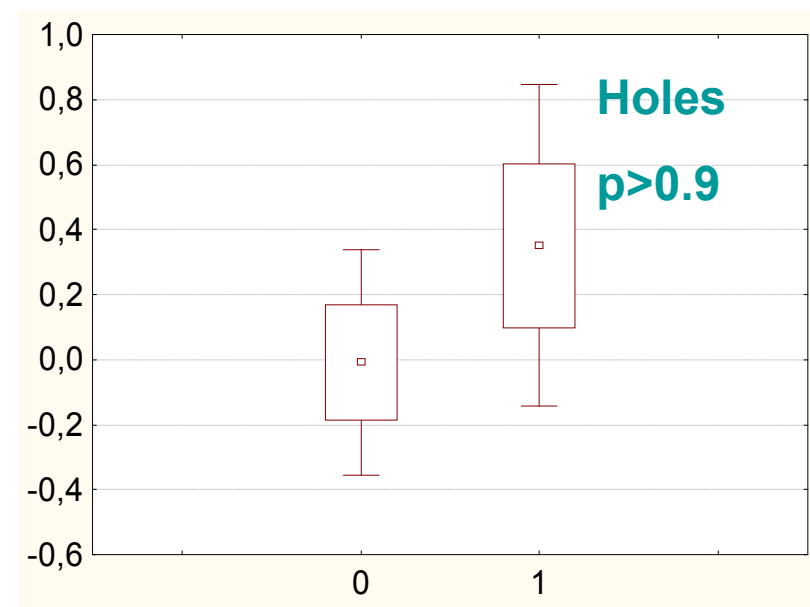
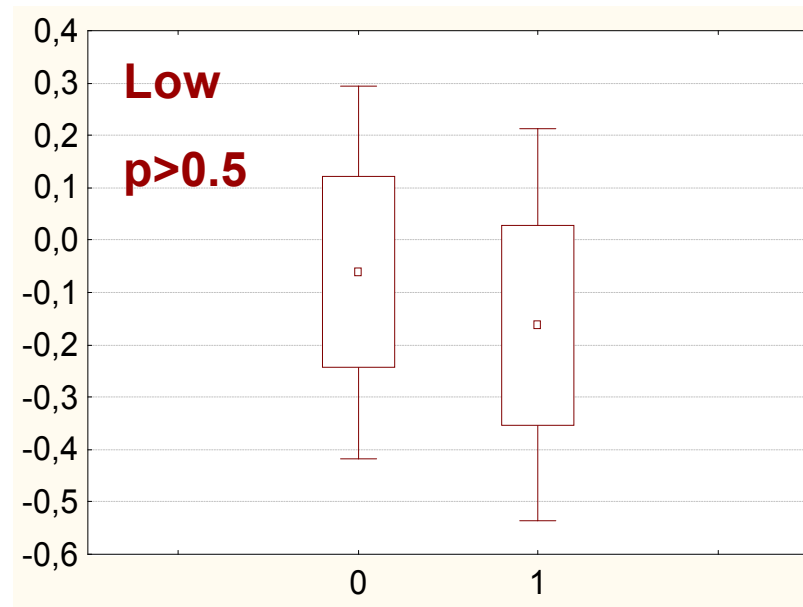
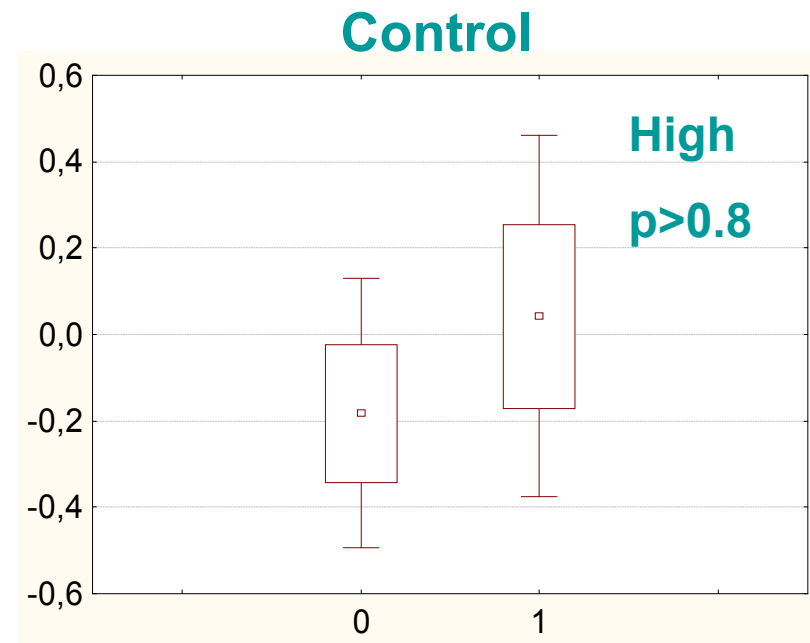
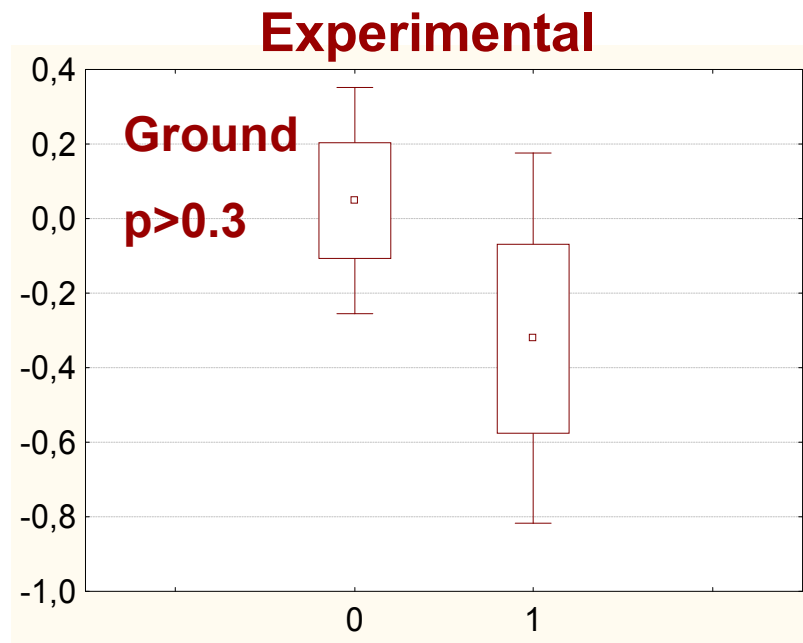
- Dens in small wood islands
- Dens in open crop fields

5 km

Hypothesis 1

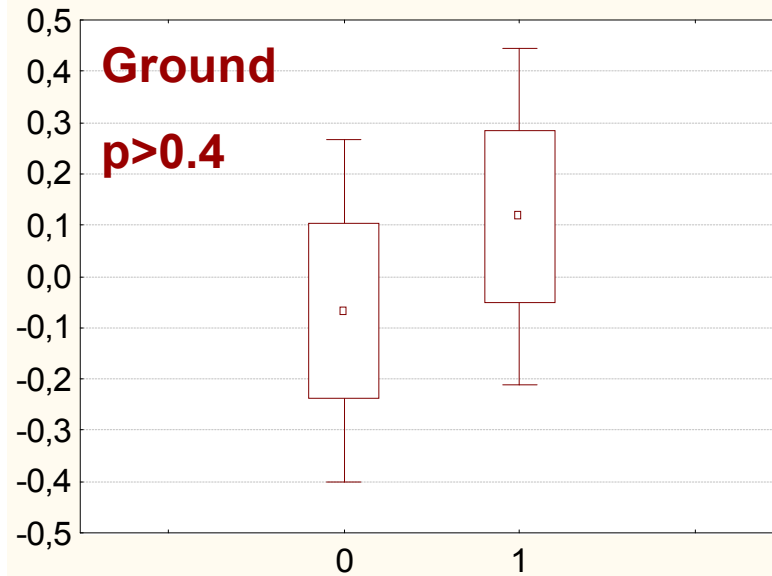
Species number and/or density of EG
are lower in wood islands with dens

Bird species number (residuals) in wood islands without (N=42) and with (N=22) dens in respect to „experimental” and „control” guilds (2005)

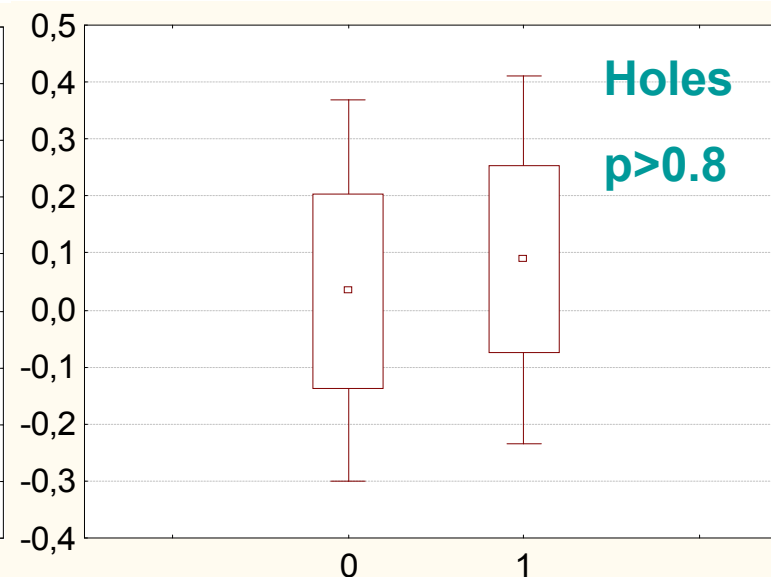
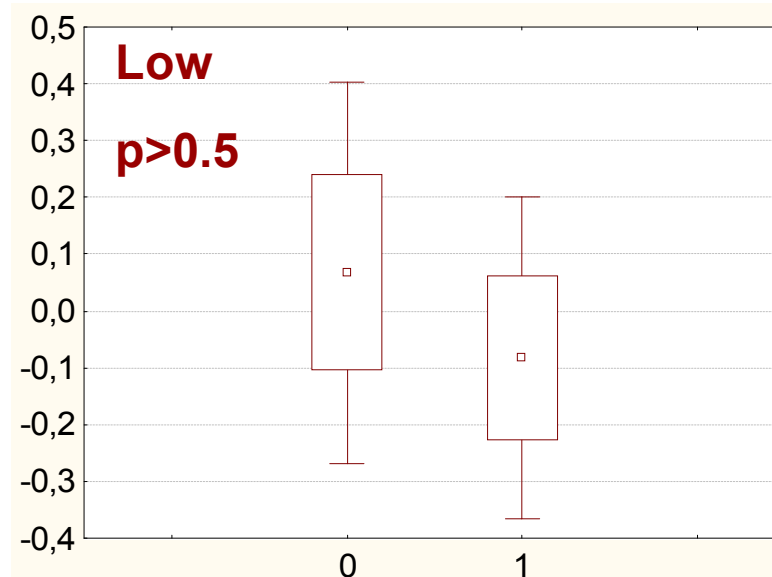
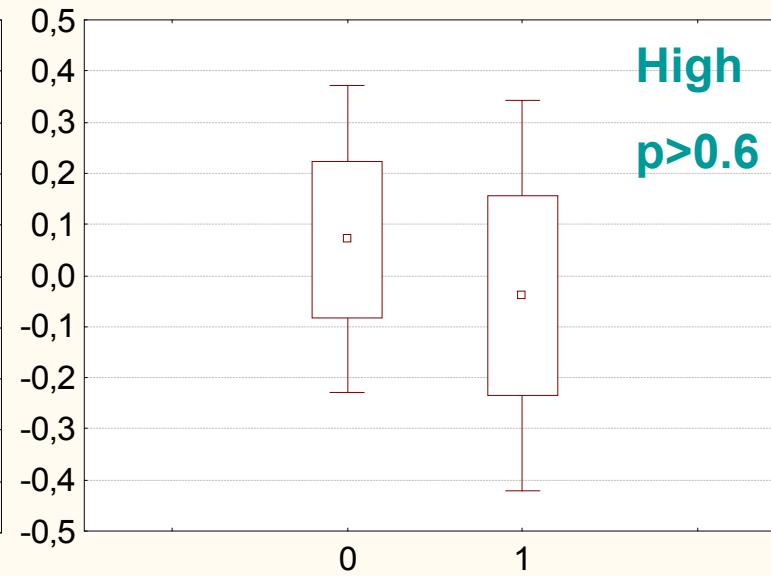


Bird density (residuals) in wood islands without (N=42) and with (N=22) dens in respect to „experimental” and „control” guilds (2005)

Experimental



Control



Hypothesis 1

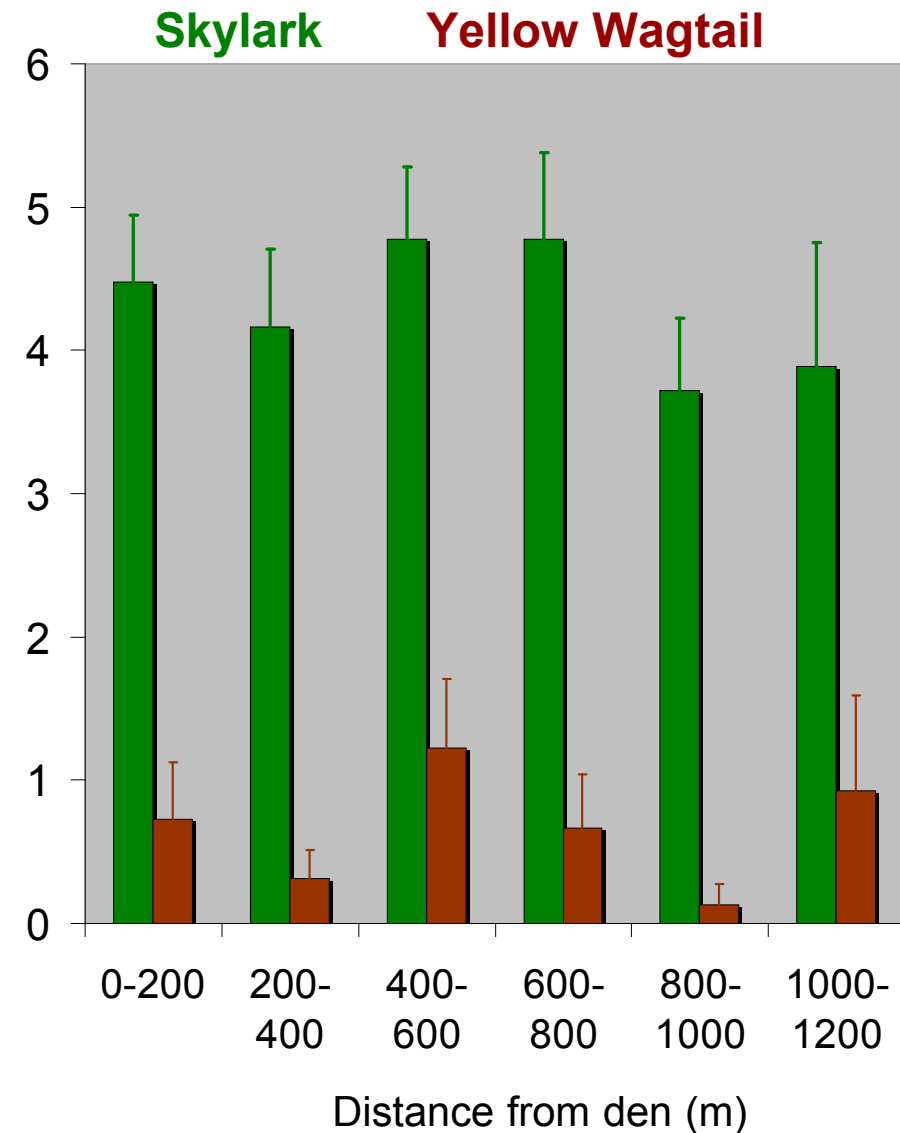
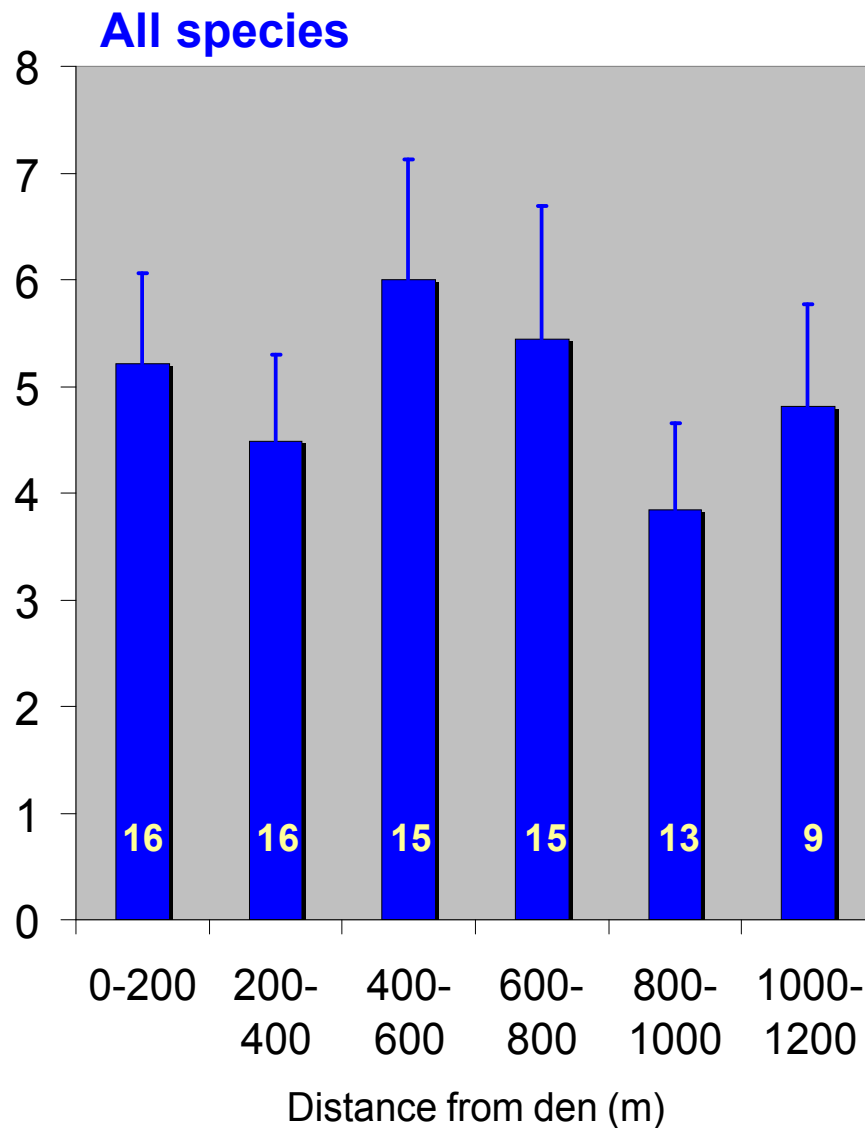
Species number and/or density of EG
are lower in wood islands with dens

Not confirmed

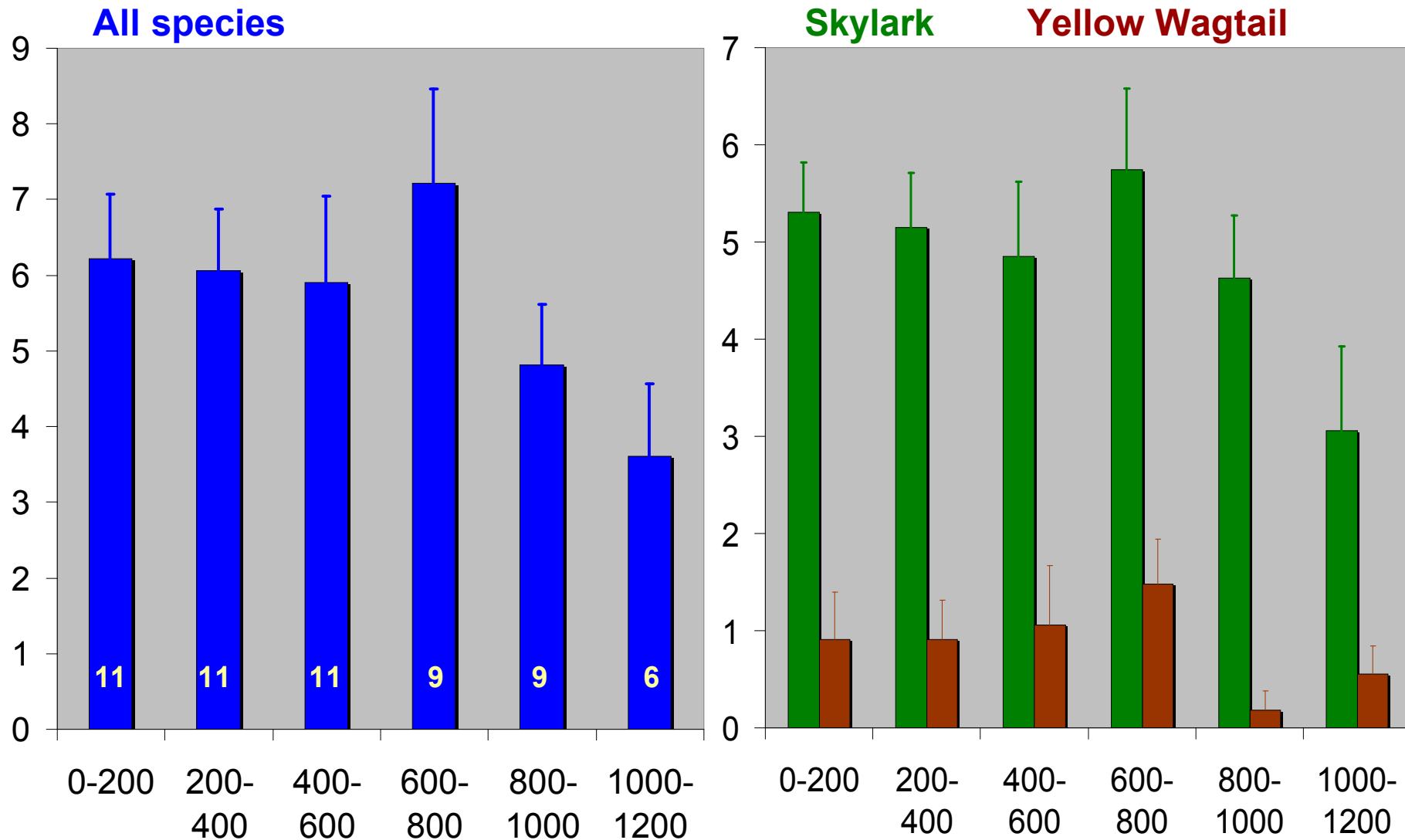
Hypothesis 2

Density of EG in crop fields increases
with the distance from den

Bird density index (mean number of singing males per 10 ha with confidence level for $\alpha=0.05$) in relation to distance from occupied red fox dens
Early breeding season – IV (2006)



Bird density index (mean number of singing males per 10 ha with confidence level for $\alpha=0.05$) in relation to distance from occupied red fox dens
Late breeding season – V/VI (2005)



Hypothesis 2

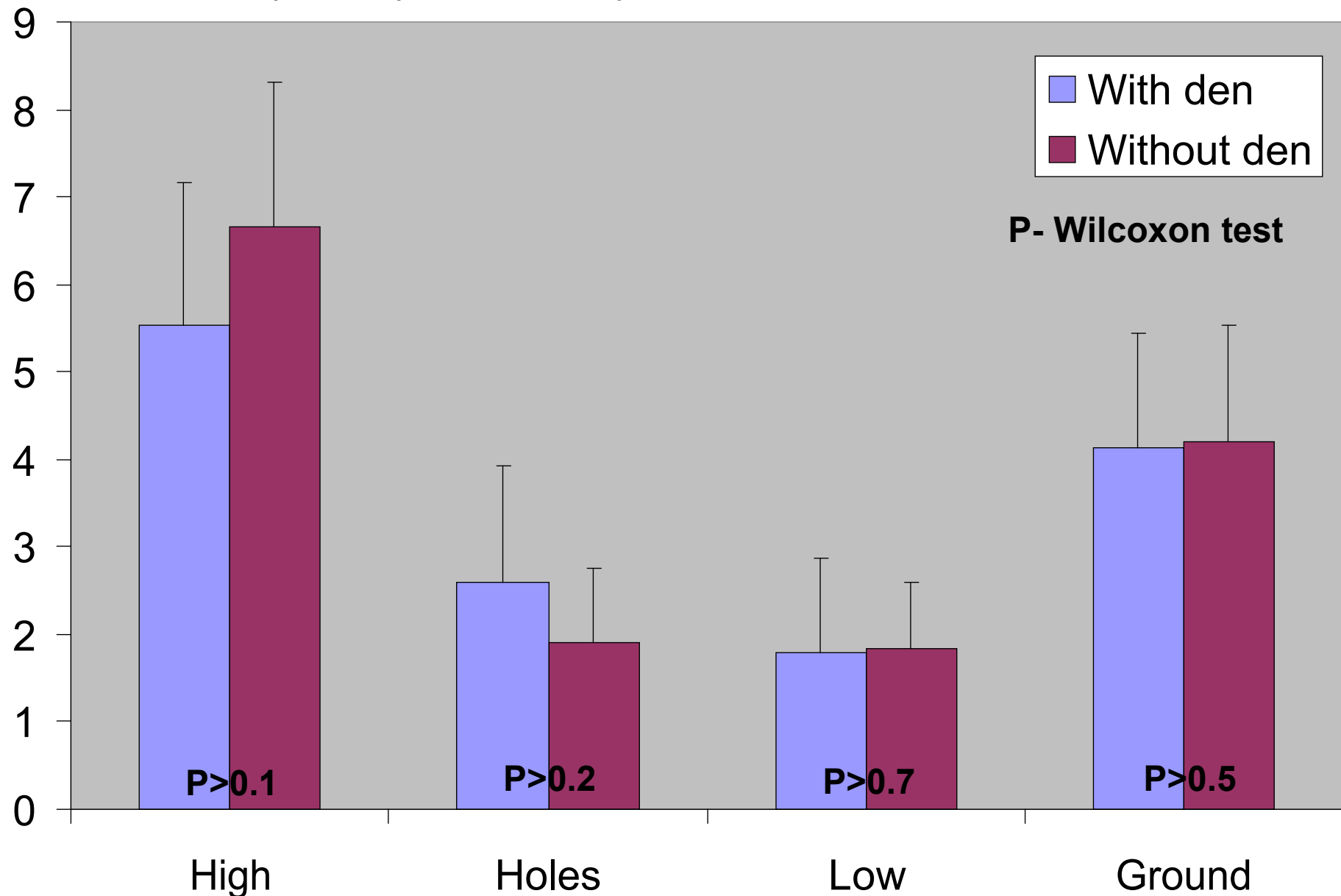
Density of EG in crop fields increases
with the distance from den

Not confirmed

Hypothesis 3

Density of EG in given wood islands is lower when they are occupied by red foxes

Comparison of bird density (with 95% conf. level) in given wood islands (N=23) between years with den and without den



Hypothesis 3

Density of EG in given wood islands is lower when they are occupied by red foxes

Not confirmed

CONCLUSIONS:

Fot. Michał Jastrzębski

No expected responses of birds have not been observed.

Variability in bird community occurring in studied farmland seems to be not influenced by red fox presence.



Acknowledgments:

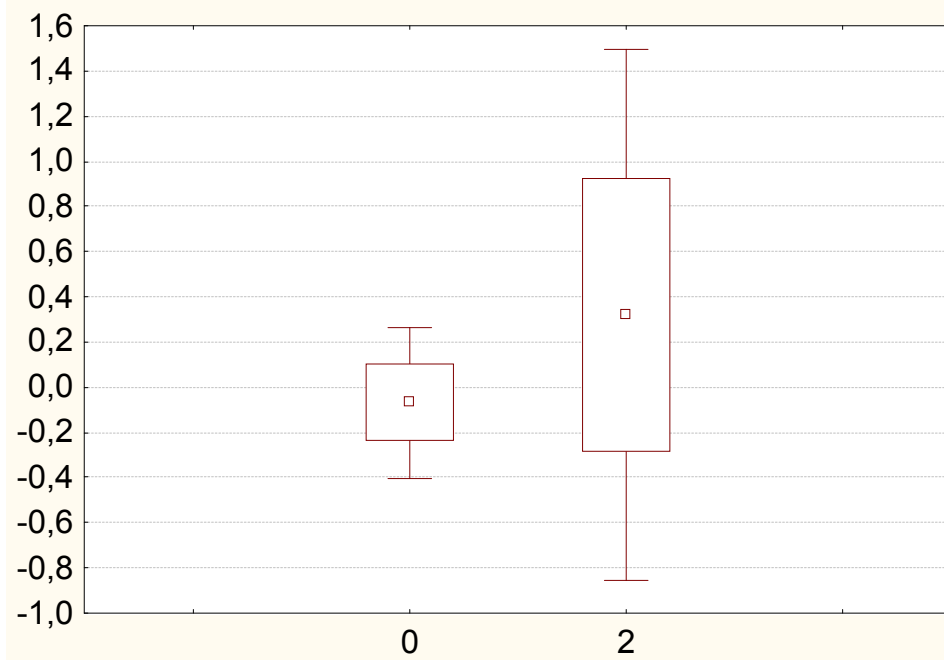
We are deeply grateful to Dr. Marek Panek from Polish Hunting Association for his many-sided help during realization of the project. Study are supported by grant of Polish Committee of Scientific Research. We also thank Michał Jastrzębski for pictures of red foxes.

Thank you for attention!

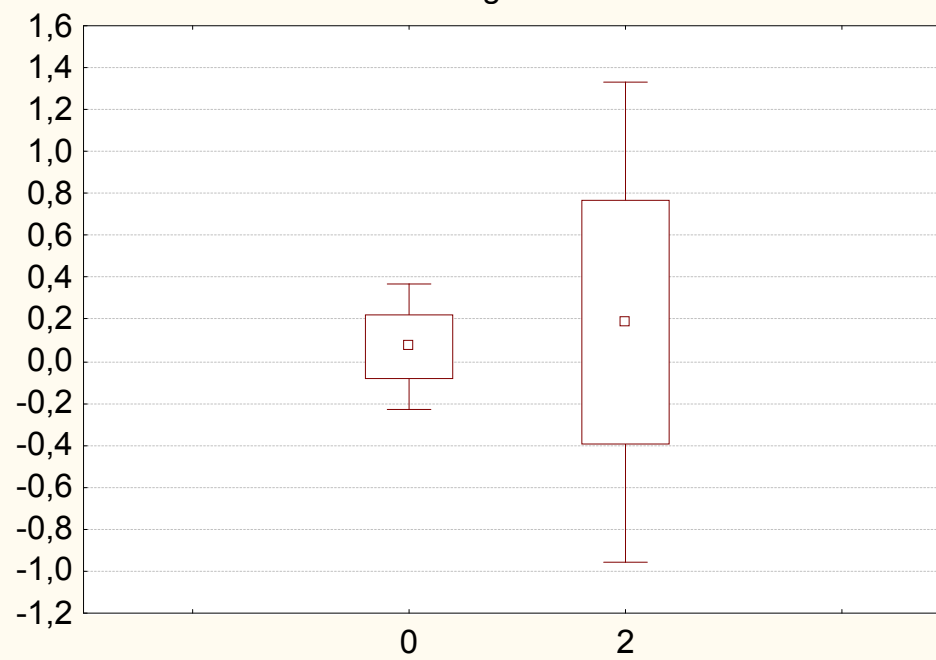


Fot. Michał Jastrzębski

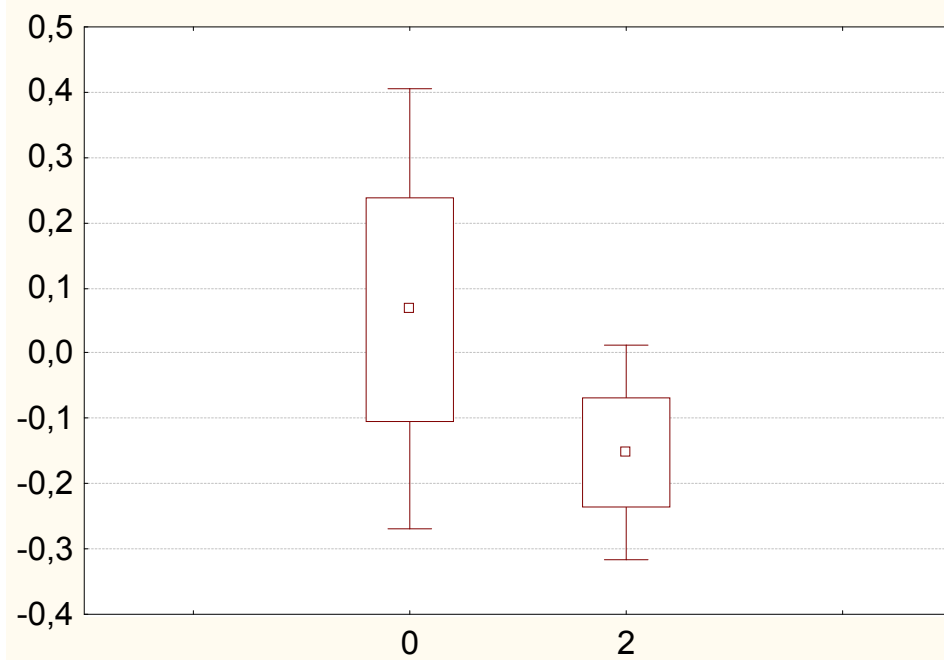
Ground



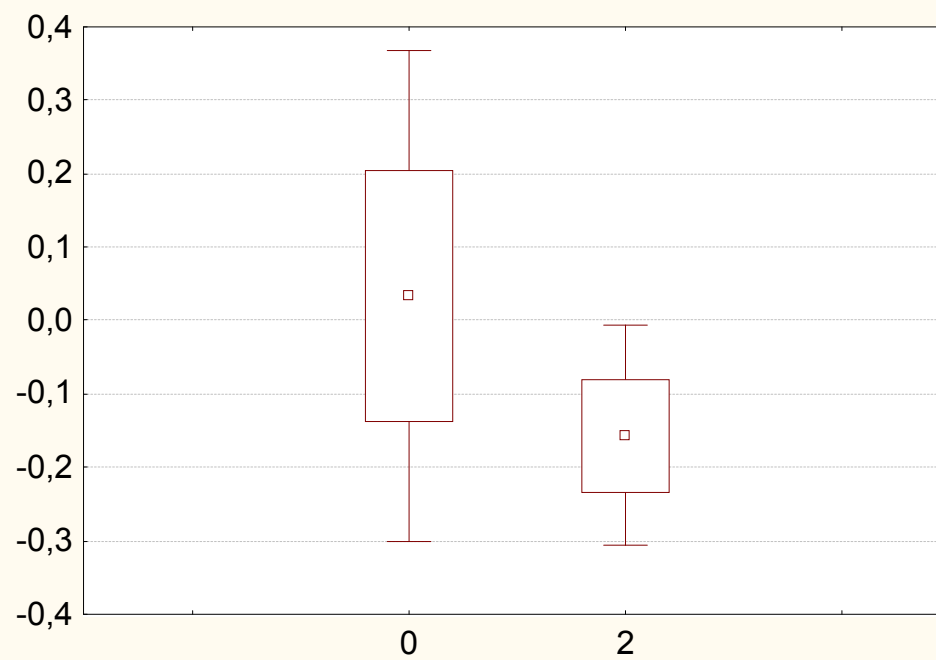
High



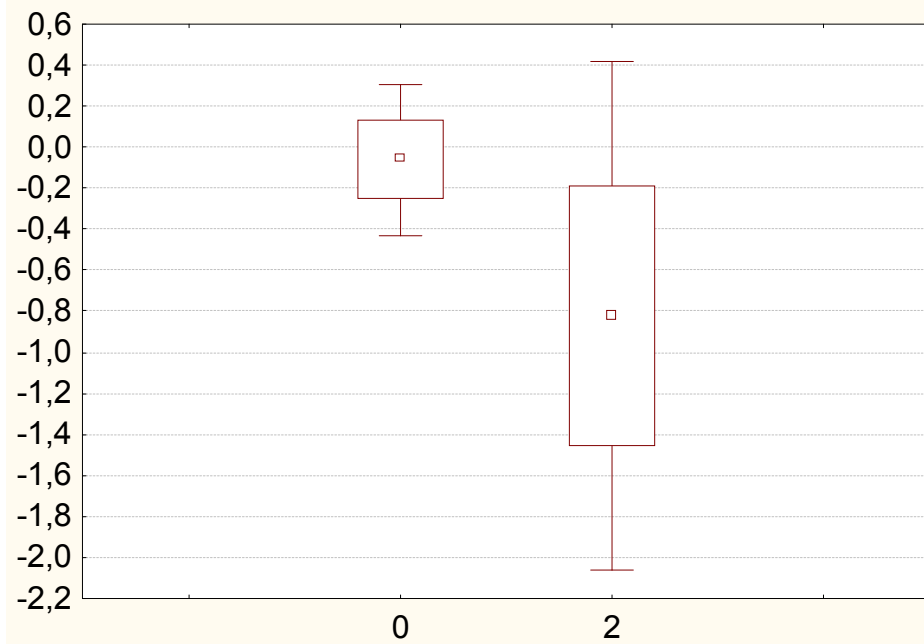
Low



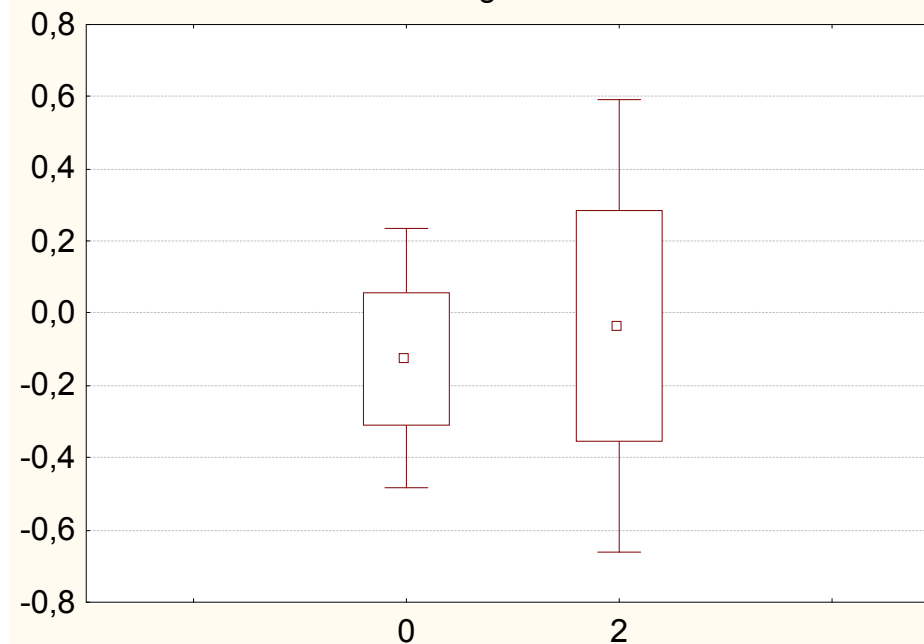
Holes



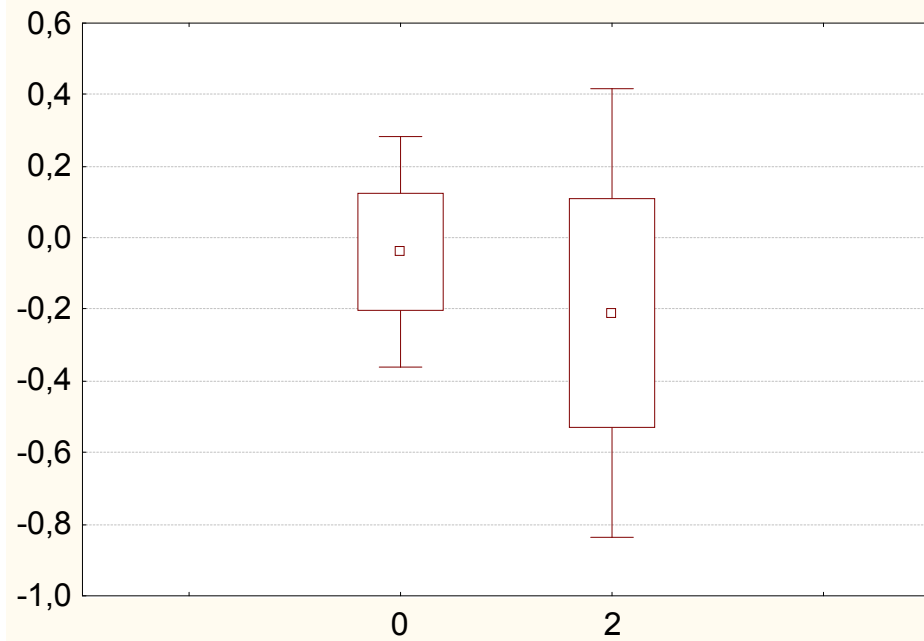
Ground



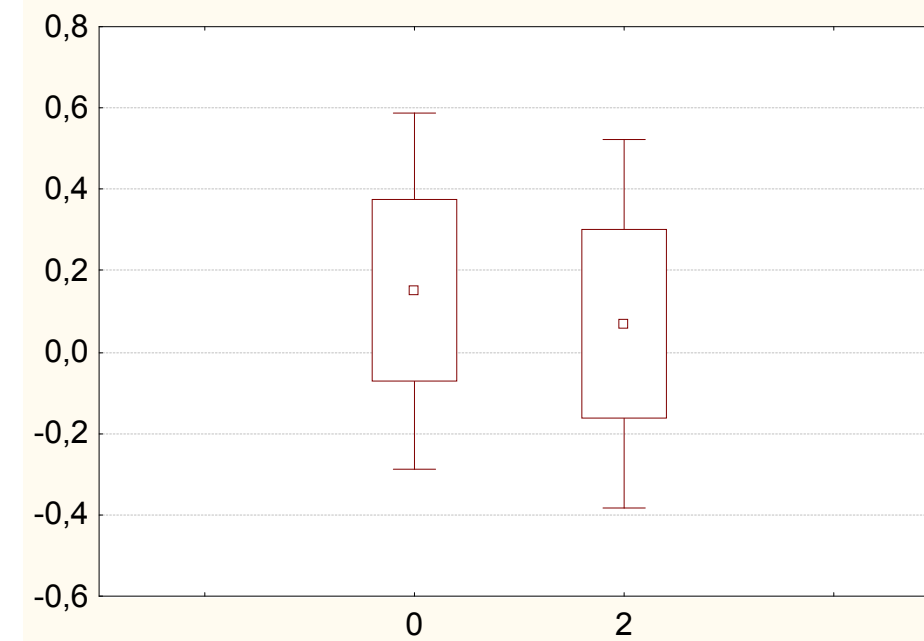
High



Low



Holes



Methods:

Structure of small wood islands:

- area
- shape index (relative length of border line)
- percentage cover of canopy layer, under canopy layer, shrub layer and herb layer
- Shannon diversity index of treestand species composition
- share of dicotyledons in herb layer
- the variables listed above allow to predict more than 50% of variability in bird density in small wood islands

Statistical analysis:

- forward step-wise regression: model of relation between structure of vegetation and bird density
- residuals derived from the model used for testifying of red fox impact