Low Wet Grasslands selection methodology

Further development of the methodology and initial results obtained for Poland. Prospects of upscaling (IS, NO, BY, NL, DE, IE, ES)

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Aim and idea

Aim

- estimating the most important areas for habitat restoration of selected species of waders

Idea

- estimate the most important areas of bird habitats using the simplest tools and publicly available data

- focus on the original habitats of the species

- adapt the methodology to the local conditions

Tools and sources (available in PL)

Tools

- MS Office 365 (MS Excel, MS Word)

- QGIS 3.22.7 *Białowieża* (GNU General Public License)

Data sources

- Polish Bird Survey (**MPP**): Wetland Bird Survey (**MPM**), Breeding Waders Survey (**MLS**)

- Ornitho.pl – citizen scinence ornithological database

- GIS Mokradła (Instytut Technologiczno-Przyrodniczy PIB 2017)

- GoogleMaps Satellite, GoogleMaps Hybrid (Google Inc. 2022)

- OSM Standard (openstreetmap.org, 2022)

- CORINE LandCover 2012 (Instytut Geodezji i Kartografii, project co-financed by EU Funds) – habitats 4XX (wetlands) and 231 (meadows and pastures)

Species selection

Code	Species	Latin	Population 2020 (Chodkiewicz i in 2019) (breeding pairs)	Trend of population	Cathegory in Red List	Typical suitable habitat
W	Lapwing	*Vanellus vanellus*	75000	-67%	EN	floodplain meadows, extensive pastures in river valleys, arable land (spring crops, vegetables)
TRT	Redshank	*Tringa totanus*	1000	-29%	NT	wet and flooded meadows and pastures in the valleys of large rivers, require clumps of higher vegetation and access to shallow flooded areas
GG	Snipe	*Gallinago gallinago*	60000	-34%	VU	wet meadows and pastures, sedges, peat bogs
NA	Curlew	*Numenius arquata*	175	-79%	EN	vast, extensive pastures and meadows in the river valleys
LI	Black-tailed Godwit	*Limosa limosa*	1100	-84%	CR	floodplain river valleys with stagnant water areas, wet hay meadows and extensive pastures

Species not included

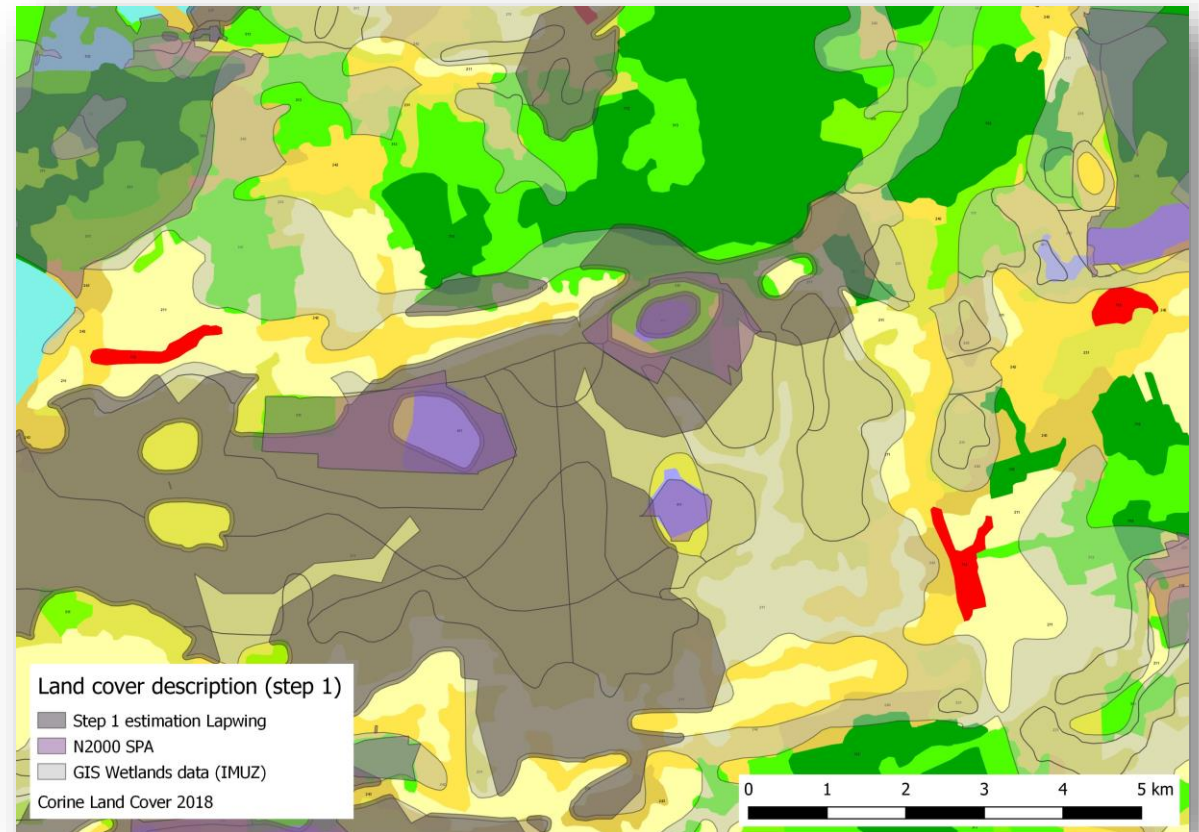| Code	Species	Latin	Population 2020 (Chodkiewicz i in 2019) (breeding pairs)	Trend of population	Cathegory in Red List	Typical suitable habitat
PH	Ruff	*Philomachus pugnax*	2	0	CR	floodplain meadows and pastures in river valleys
CA	Dunlin	*Calidris alpina schinzii*	0	0	RE	saline meadows, pastures in floodplains
HOS	Oystercatcher	*Haematopus ostralegus*	70	109	VU	seaside beaches, sandbanks and islands in the beds of large rivers (Odra, Vistula, Warta Mouth)

Habitat selection

Natura 2000/Habitat Directive

- 6410 - Molinia meadows on calcareous, peaty or clayey-silt-laden soils

- 6510 - Lowland hay meadows

- 6440 - Alluvial meadows of river valleys of the *Cnidion dubii*

- 1330 - Atlantic salt meadows

- 1340 - Non-coastal natural salt basins

Not enough data and to low precision to use these.

Other sources

- GIS-prepared shp layers

- Mostly free available for non-commercial and scientific use

- CORINE LandCover database – habitats 4XX (wetlands) and 231 (meadows and pastures).

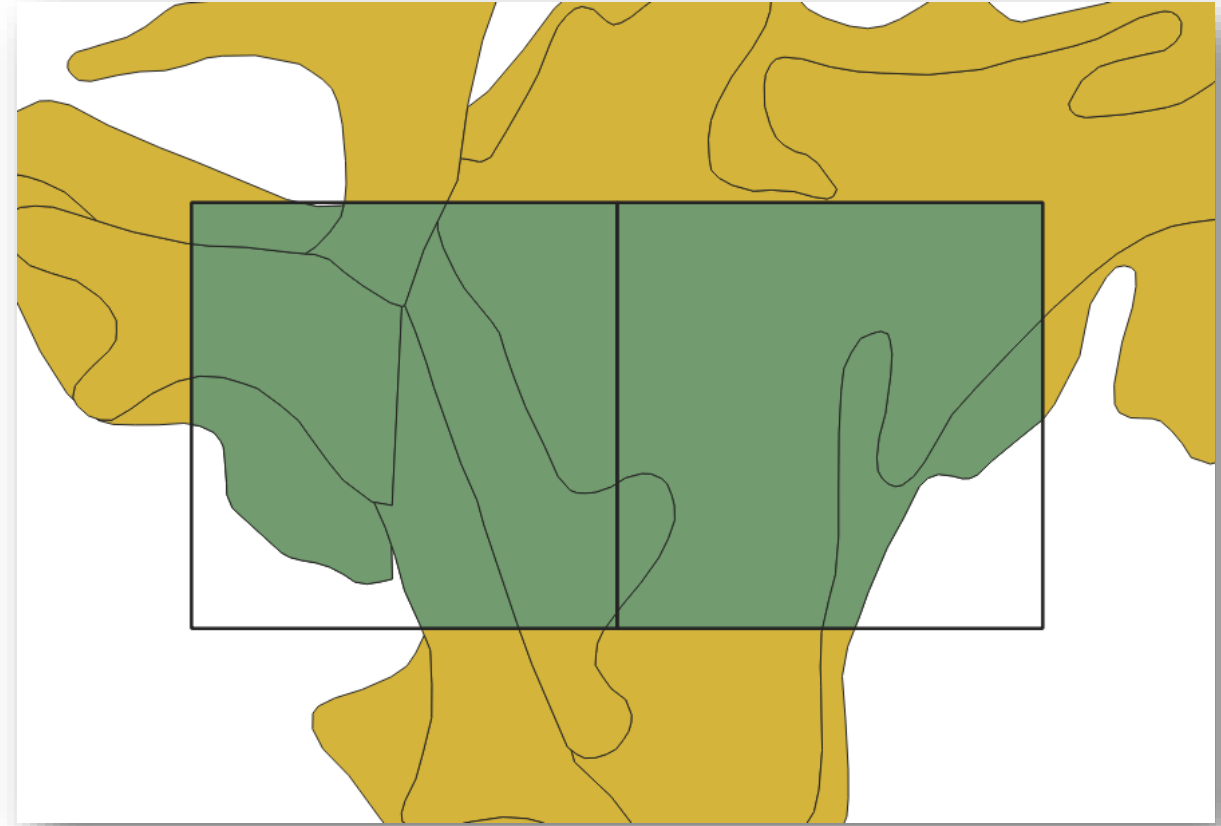- Baza GIS Mokradła (GIS Wetlands Database) – without polygons: undefined, forest, water/wetland rush.

Land cover description (step 1)
- Step 1 estimation Lapwing
- N2000 SPA
- GIS Wetlands data (IMUZ)
Corine Land Cover 2018

0   1   2   3   4   5 km

Bird numbers estimations

Current number and trend

- The assessment of the current number of individual species was based on the study by Chodkiewicz et al. 2019. The abundance trend presented in this study was also used. These data are the basis for the classification of individual species in the Polish Red List of Birds (Wilk et al. 2020), the requirement of being up-to-date (last 3 years) is maintained.

Current density (lack of data)

- estimation based on MPM and MLS, which are by methodology conducted twice every year, in 1x1 km squares in selected favourable habitats.

- Data from 2021, max of 2 controls for each species (number of breeding pairs)

- Each square contains a mosaic of the habitats from which it has been selected suitable part, by intersection with GIS Mokradła and CORINE (in QGIS).

- **The density was: the number of all breeding pairs / the total area of suitable habitat within the monitoring squares.**

	MPM [p/100 ha]	MLS [p/100 ha]
W	2,81	2,79
TRT		1,24
GG	2,32	
NA		1,01
LI		1,61

Historical number and density

Code	Density 1990-2005	Density 2021
W	13,9	2,79
TRT	3,8	1,24
GG	3,6	2,32
LI	8,2	1,61
NA	0,6	1,01

Main source

- Krogulec J. (ed.). 1998. Ptaki łąk i mokradeł. Fundacja IUCN Poland

Issues

- Lack of overall number estimations within Poland in 1990-2006

- Densities were estimated for several test areas, but without average in the country.

Solution

- target number of breeding pairs for each species was estimated using current number and trend

- the historical = target density was averaged from the available data (weighted average)

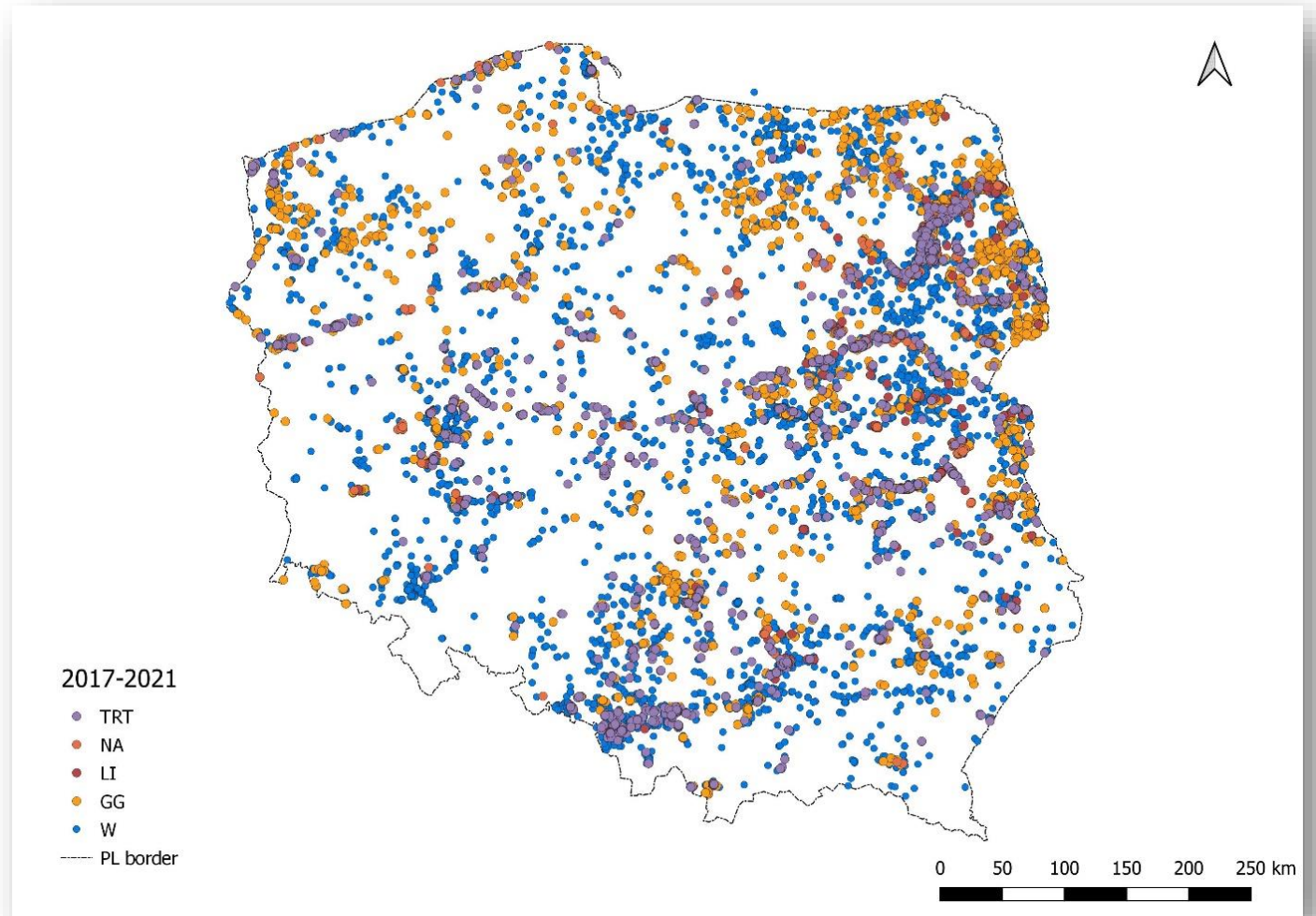# Historical density – weighted average – example for Lapwing

Test area (Krogulec 1998)	No. of breeding pairs (A)	Density [pairs/100ha] (B)	weight (W = A x B)
Dolina Odry	31	4,7	145,7
Dolina Warty	17	2,8	47,6
Dolina Baryczy	52	7,4	384,8
Dolina Nidy	32	3,8	121,6
Dolina Pilicy	170	18,9	3213
Dolina Wieprza	115	18,5	2127,5
Dolina Liwca	69	9,7	669,3
Dolina Narwi	106	15	1590
Nietlickie Bagna	6	0,6	3,6
Average density ($\sum$W / $\sum$A)	**13,9**		

Bird estimations

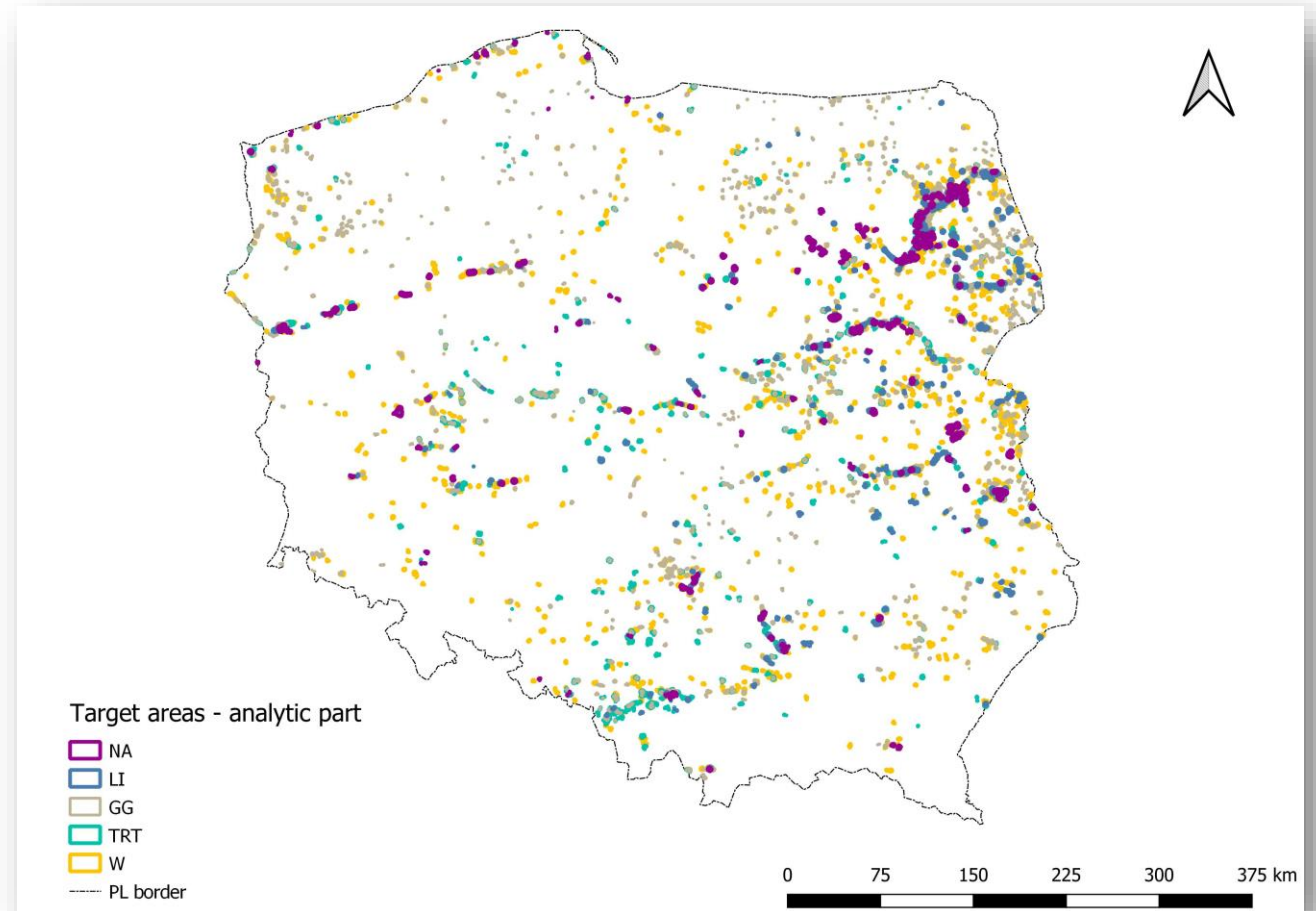| Code	Current population [pairs]	Trend	Target population [pairs]	Target area [km2]
W	75000	-67%	230000	11870
TRT	1000	-29%	1400	710
GG	60000	-34%	90000	8333
NA	175	-79%	830	1066
LI	1100	-84%	6900	804

The numbers in Lapwing and Snipe are quite large, which carries the risk of problems with the availability of such land area. This should appear during the estimation of suitable areas in next steps.

Current distribution of selected species

2017-2021
- TRT
- NA
- LI
- GG
- W
- ----- PL border

0   50   100   150   200   250 km

Data obtained from **Ornitho.pl** database, using records of surveyed species with specified breeding cathegory (A, B or C) from 2017-2021. The data is available as CSV file with coordinates of each recording, so can be easily imported to QGIS and transformed to a SHP layer for further analysis.
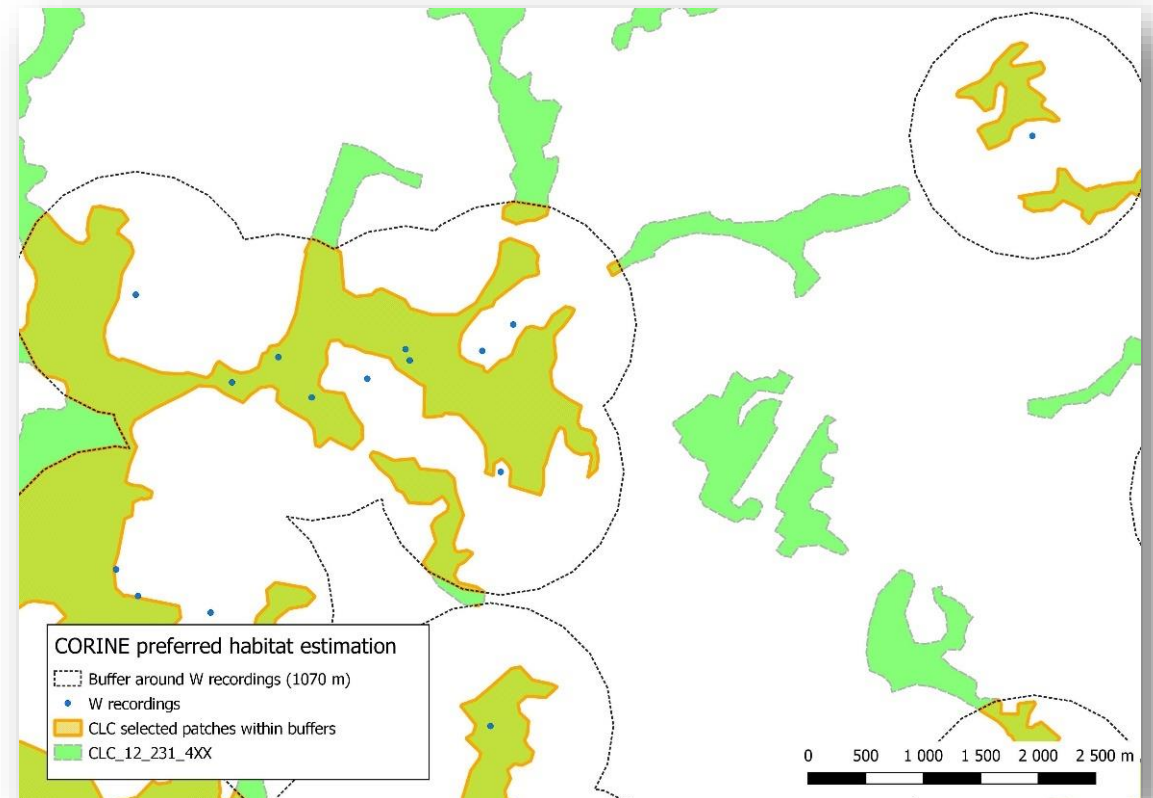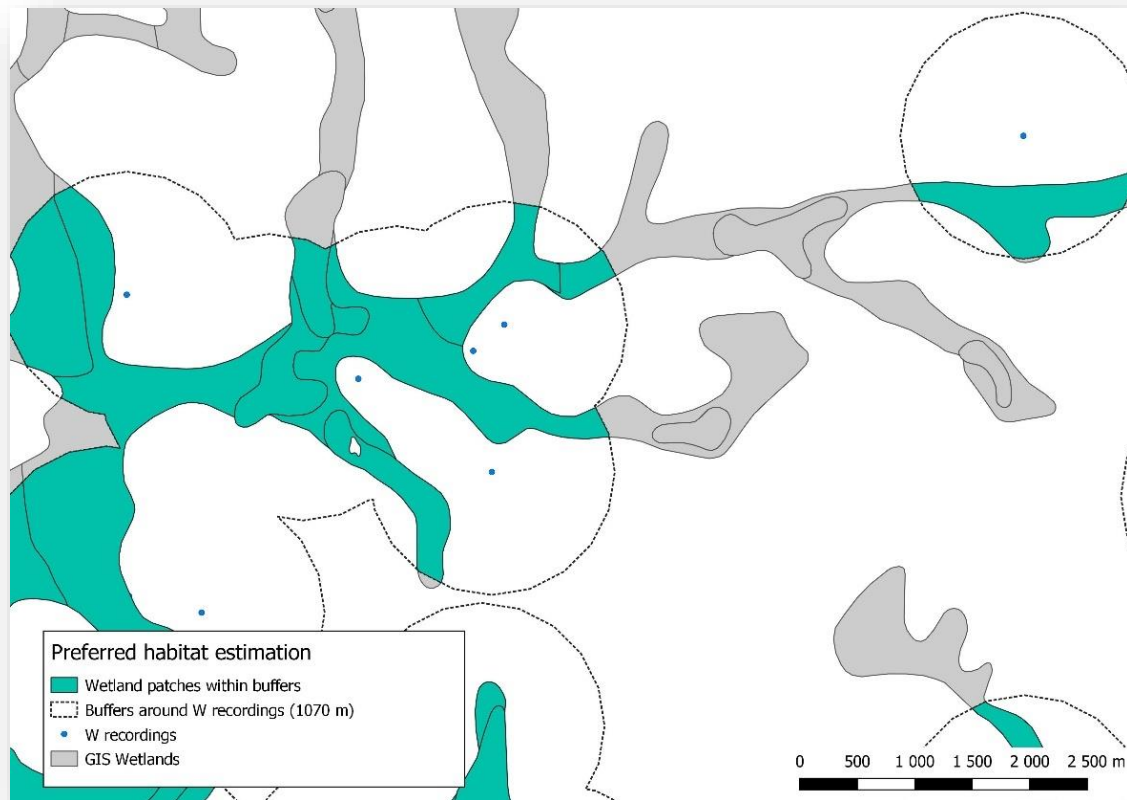
Target areas estimation – analytic part

Target areas - analytic part
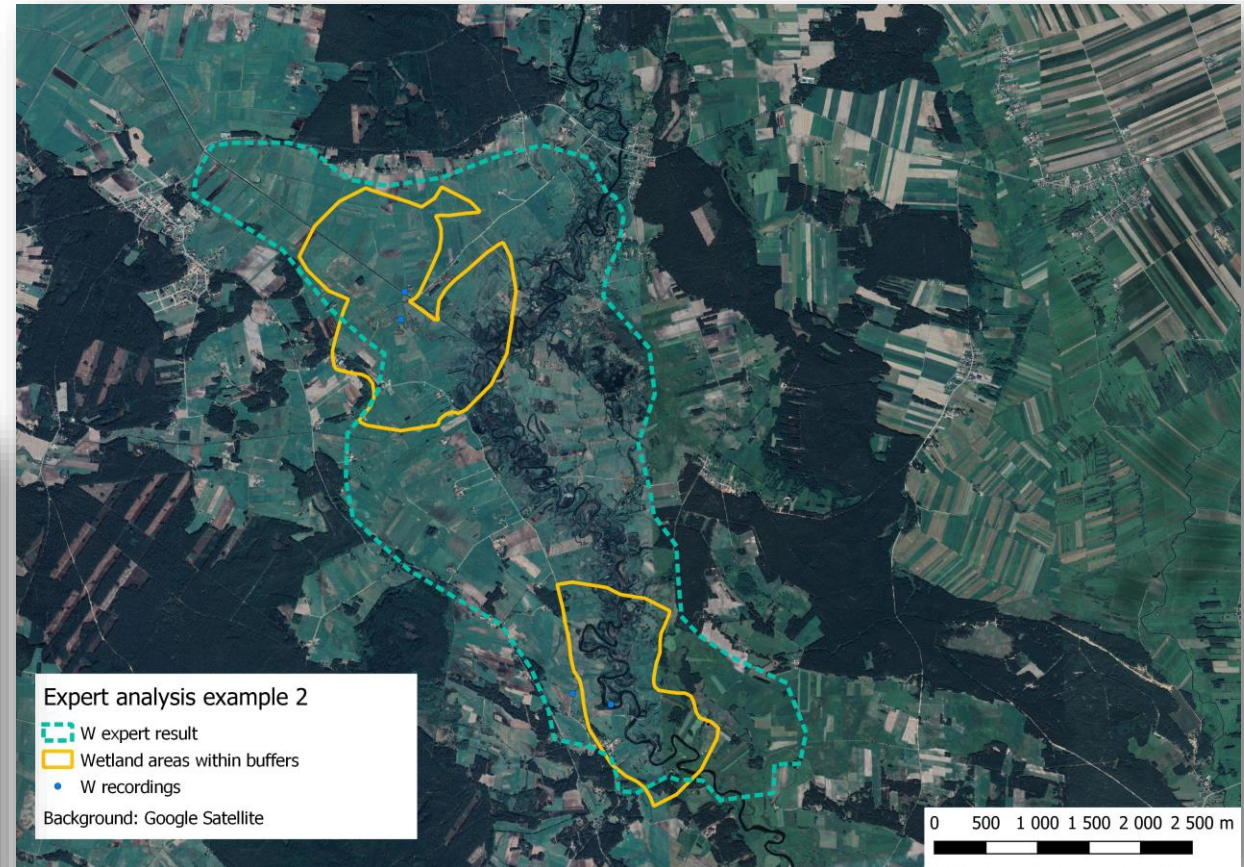- NA
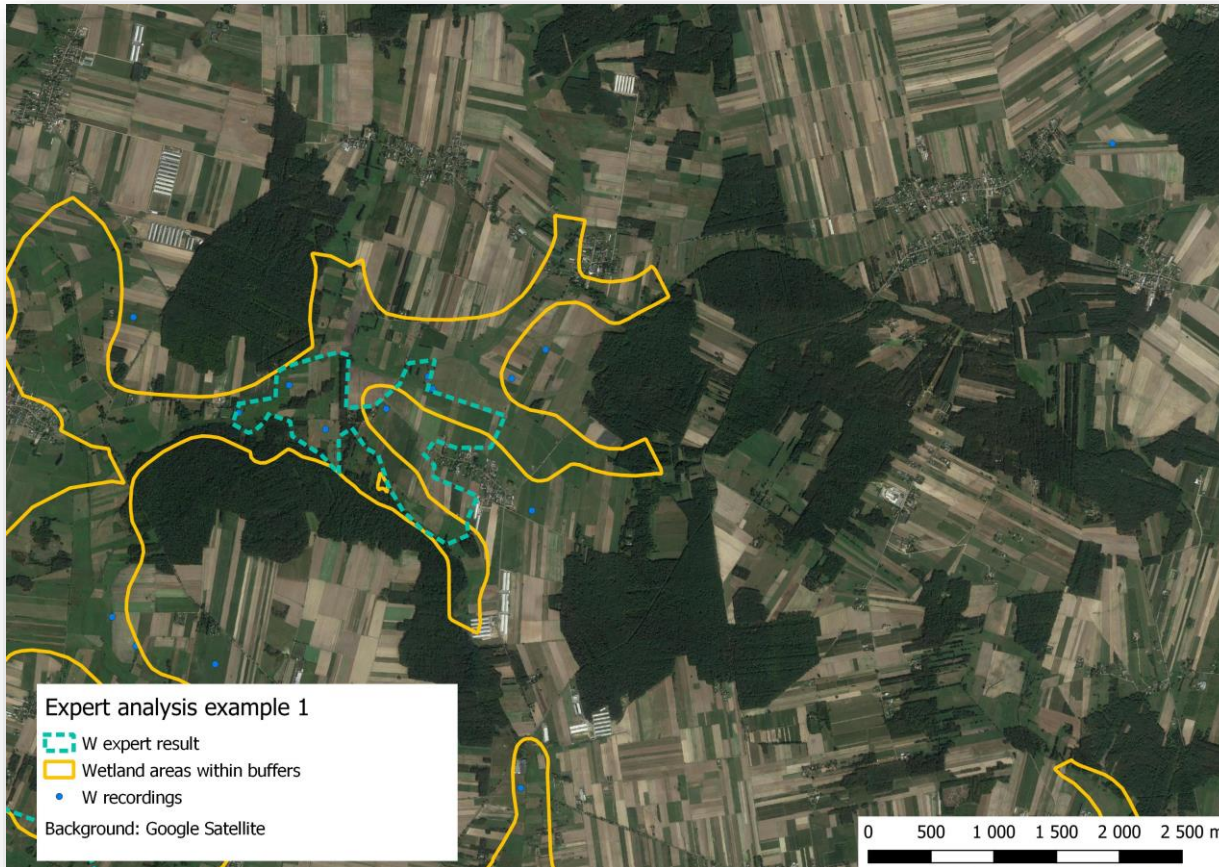- LI
- GG
- TRT
- W
- PL border

Steps

- estimation of current occupied area per pair (in ha)

- increasing the 10x area and creating a circular buffer around each species statement (overlapping buffers are combined)

- overlaying the resulting polygons on the CORINE LandCover and GIS Mokradła layers (intersection)

- SHP multipolygon layer was divided into single polygons, which were combined together if touching each other. Polygons less than 100 ha were deleted

GIS Mokradła vs. CORINE LandCover

Preferred habitat estimation
- Wetland patches within buffers
- Buffers around W recordings (1070 m)
- W recordings
- GIS Wetlands

0   500   1 000   1 500   2 000   2 500 m

CORINE preferred habitat estimation
- Buffer around W recordings (1070 m)
- W recordings
- CLC selected patches within buffers
- CLC_12_231_4XX

0   500   1 000   1 500   2 000   2 500 m

Target areas estimation – expert part

Expert analysis example 1
- W expert result
- Wetland areas within buffers
- W recordings

Background: Google Satellite

0 500 1 000 1 500 2 000 2 500 m

Expert analysis example 2
- W expert result
- Wetland areas within buffers
- W recordings

Background: Google Satellite

0 500 1 000 1 500 2 000 2 500 m

Aim and idea

In Poland the decrease of numbers of target species breeding populations is connected both with habitat loss and lower breeding density. Due to this situation, we consider two steps of conservation/restoration activities.
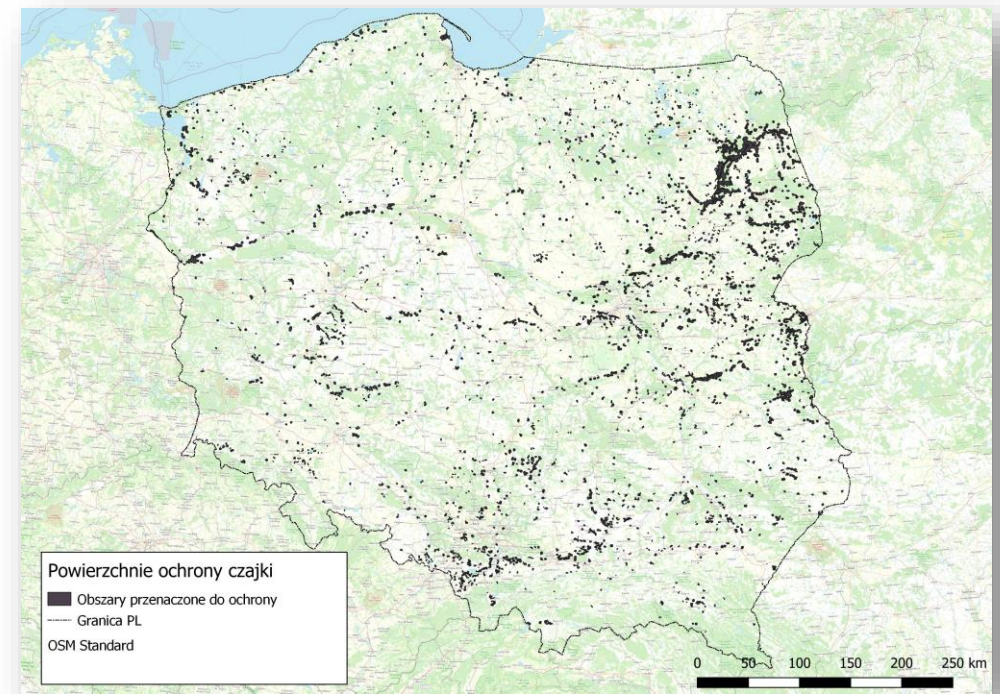
1. Breeding density management

By proposing areas for protection and restoration where the target species are currently breeding, we expect to strengthen their populations. The consequence of proper management of these areas will be the expected increase in the density of breeding populations. This will also result in an increase in the size of these populations, but they would not probably reach the target numbers estimated using current number and trend.

2. New areas of occurrence

In order to increase the population size to the target level, it will be necessary to restore the habitats where these birds do not currently nest. Due to the limited possibilities of influencing protective measures and their restoration, we are not able to propose areas for such activities on a sufficiently large scale in the course of this analysis. Probably during the implementation of stage 1, the birds will also start increasing the range, occupying suboptimal habitats. On this basis, it will be possible to indicate these habitats for protection and gradually strive to rebuild the bird population.

Lapwing – area proposed for conservation/restoration

Further development

Further development should take into account the available data in every country and provide individual approach if needed.

- Natura 2000 database (EU sources) – similar to other countries, bird data available suggest lower population. The data available are also difficult for spatial analysis as they are defined within the whole N2000 area, consisting of different habitats. **For this analysis it is necessary to have the current (max 3 years back) set of bird data, including estimated number, trend and distribution within the country. It is good also to have the similar set for 1990-2000, or some partial data for regions/selected test areas. It is also necessary to somehow estimate the current density in suitable habitats.**

- The priority Natura 2000 habitats are described within the boundaries of the habitat areas and often do not coincide with the data from bird areas regarding the presence of the target species. Therefore, the inclusion of specific priority habitats was abandoned and the wetland database was used.

- In Poland most bird data gathered in 1970s – 2000s are dispersed in multiple publications in local periodicals. The used publication (Krogulec J. (ed.) 1998) is probably the only comprehensive source on waders. There is lack of overall estimations of population numbers within the country. **In this case, the target number can be estimated using current data (number and trend).**

- Target number estimated using current population and trend estimation may be oversized, as in some species the rate of decline in the population seems to be accelerating. In PL we do not have enough data to make an accurate estimate or correction. **This should be considered during expert analysis.**

- In Poland the mosaic of wetlands and other habitats justifies the designation of areas for protection / restoration only within the boundaries of relevant habitats. Otherwise, these boundaries would include areas unsuitable for birds (forests, buildings, etc.).

- In our case the most effective way to obtain the suitable habitat was using GIS Wetlands database. Otherwise it would be preferable to use CORINE Land Cover database or to rely on expert knowledge and ortophotomaps. Whether the analysis is based on GIS software or Excel or other – final expert overview is needed.

Thank you for your attention.