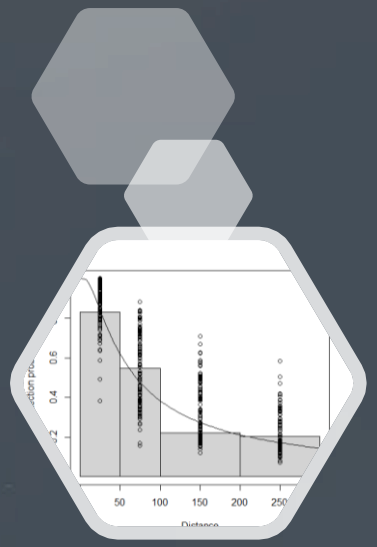


Setting Acceptable Limits for Seabird Bycatch in the Polish Baltic Sea

Dominik Marchowski
Museum and Institute of
Zoology Polish Academy of Science

$$\mathbb{E}\left[n_i|\boldsymbol{\beta},\boldsymbol{\lambda},p(\hat{\boldsymbol{\theta}};\mathbf{z}_i)\right] = a_i p(\hat{\boldsymbol{\theta}};\mathbf{z}_i)\exp\left(\beta_0 + \sum_m f_m(x_{im})\right)$$

MARINE MAMMALS AND BIRD BYCATCH IN THE BALTIC SEA Turning Knowledge into Action
Krzysztof Skóra Hel Marine Station, University of Gdańsk,
NOVEMBER, 13-14, 2025, HEL, POLAND

SETTING THE AREA OF ASESSMENT

Estimation of the abundance and distribution of the species affected to bycatch

Calculation of spatiotemporal fishing effort

Estimation the bycatch rates of birds per unit (e.g. 1000 NMD) (monitoring)

Calculation of mean bycatch for all diving species

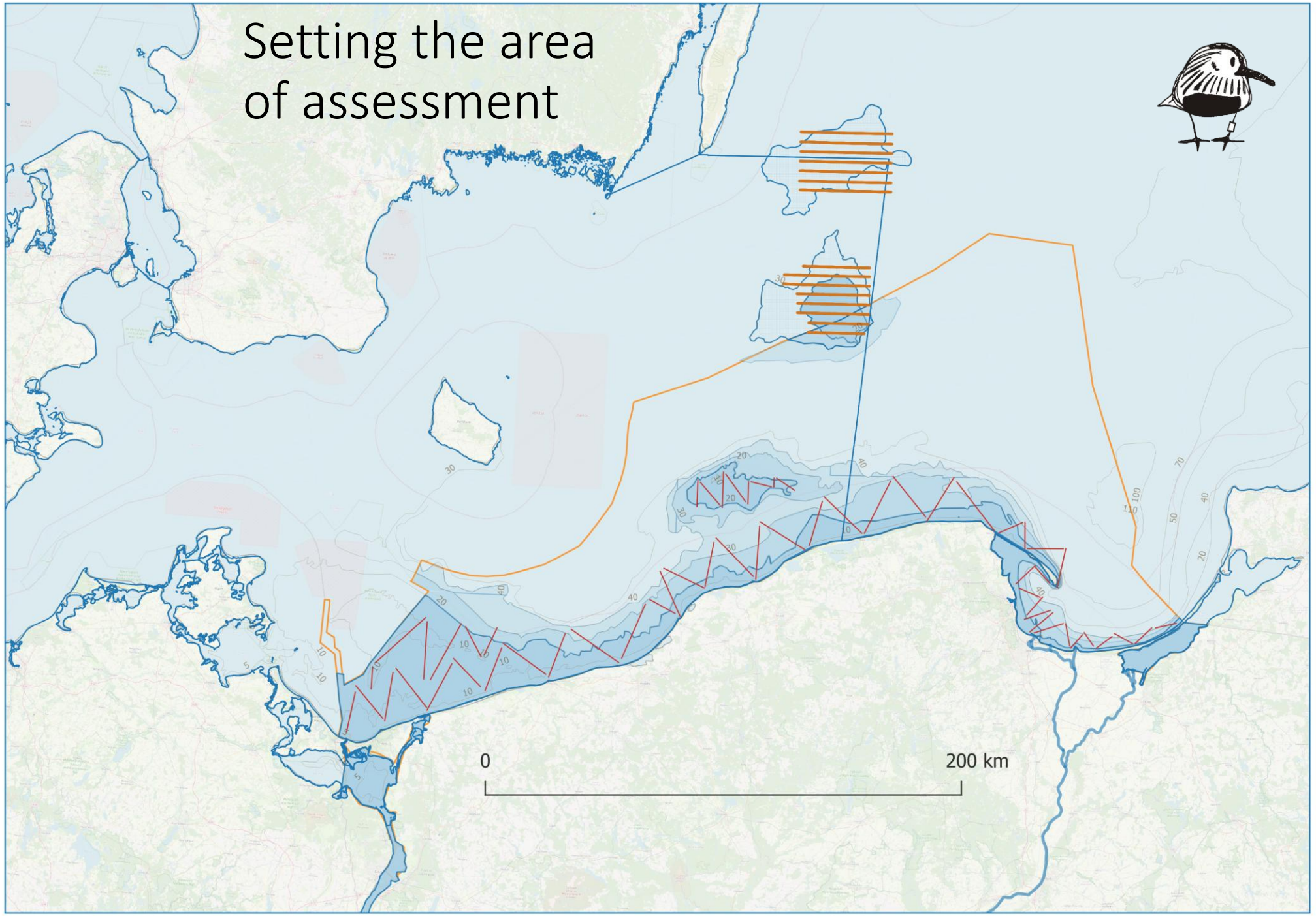
Convertion bycatch per species

Calculation the bycatch threshold using BLT (1%) or PBR

Compare the calculated values with the bycatch thresholds

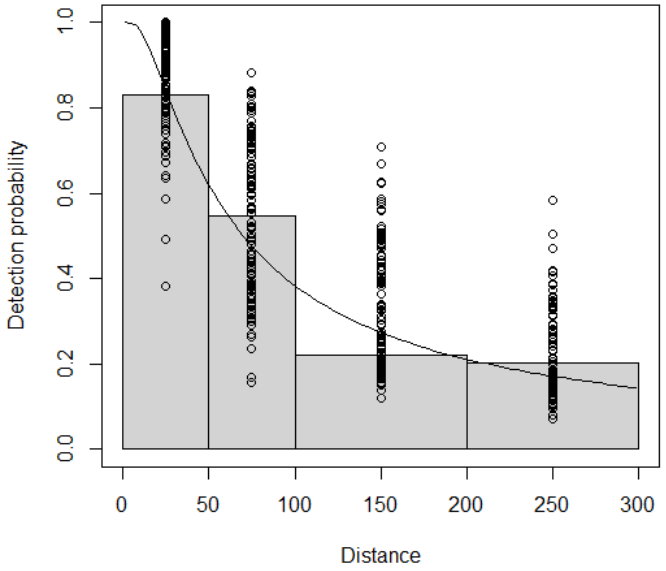
Validation of bycatch thresholds PVA

Setting the area of assessment



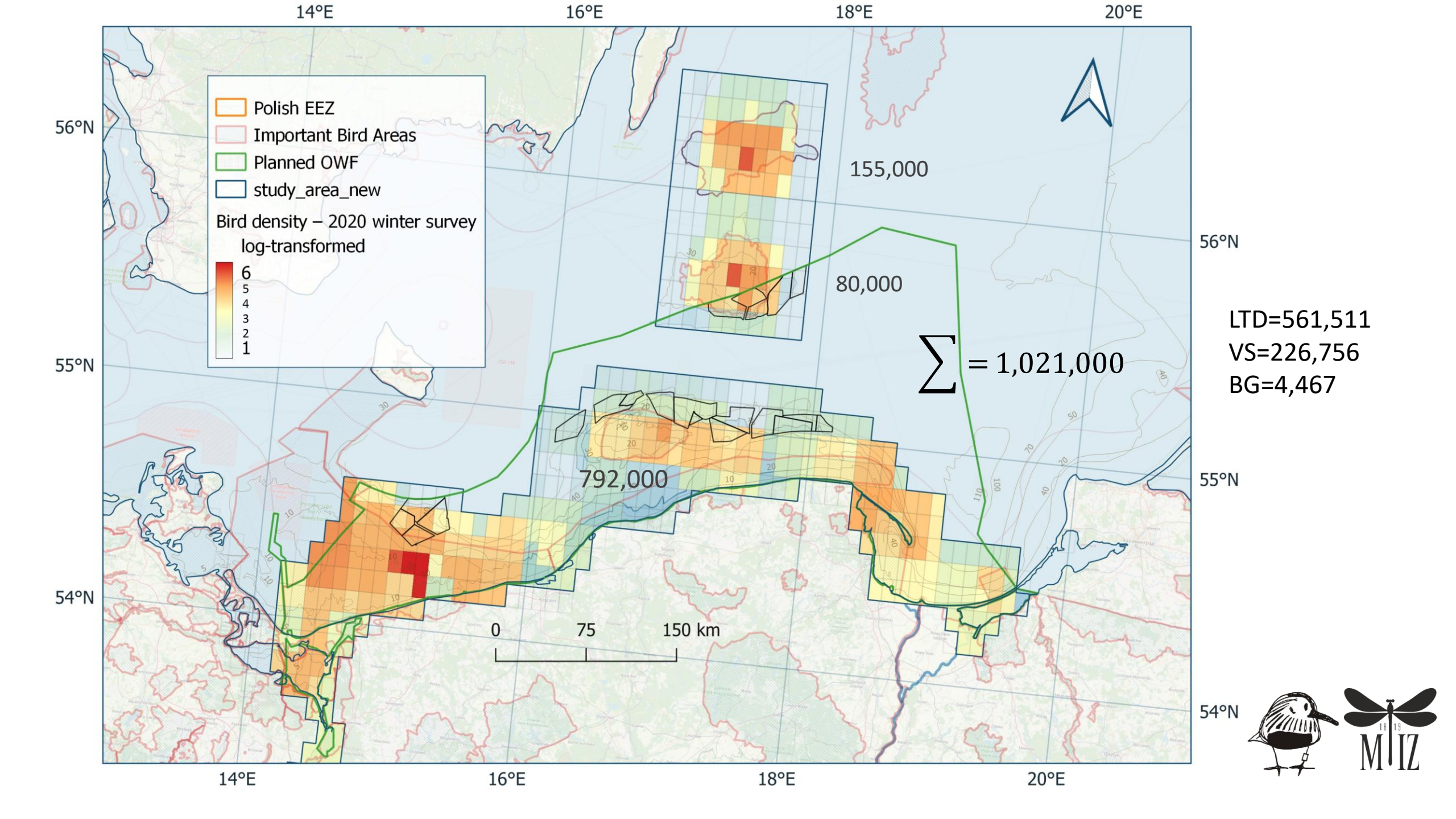
- Data from Sweden were provided thanks to Fredrik Haas from
- the Swedish Bird Survey, http://fageltaxering.se/ in 2020.

Estimation of the abundance and distribution of the species affected to bycatch in the study area



Data on seabirds are collected and analyzed according to the protocol **Distance Sampling** protocol (offshore) + **IWC** (coastal)
2011-2023 an average of **960,000** wintered in Polish sea waters (min: 971,478 – max: 2,053,237) diving birds.
The most numerous:

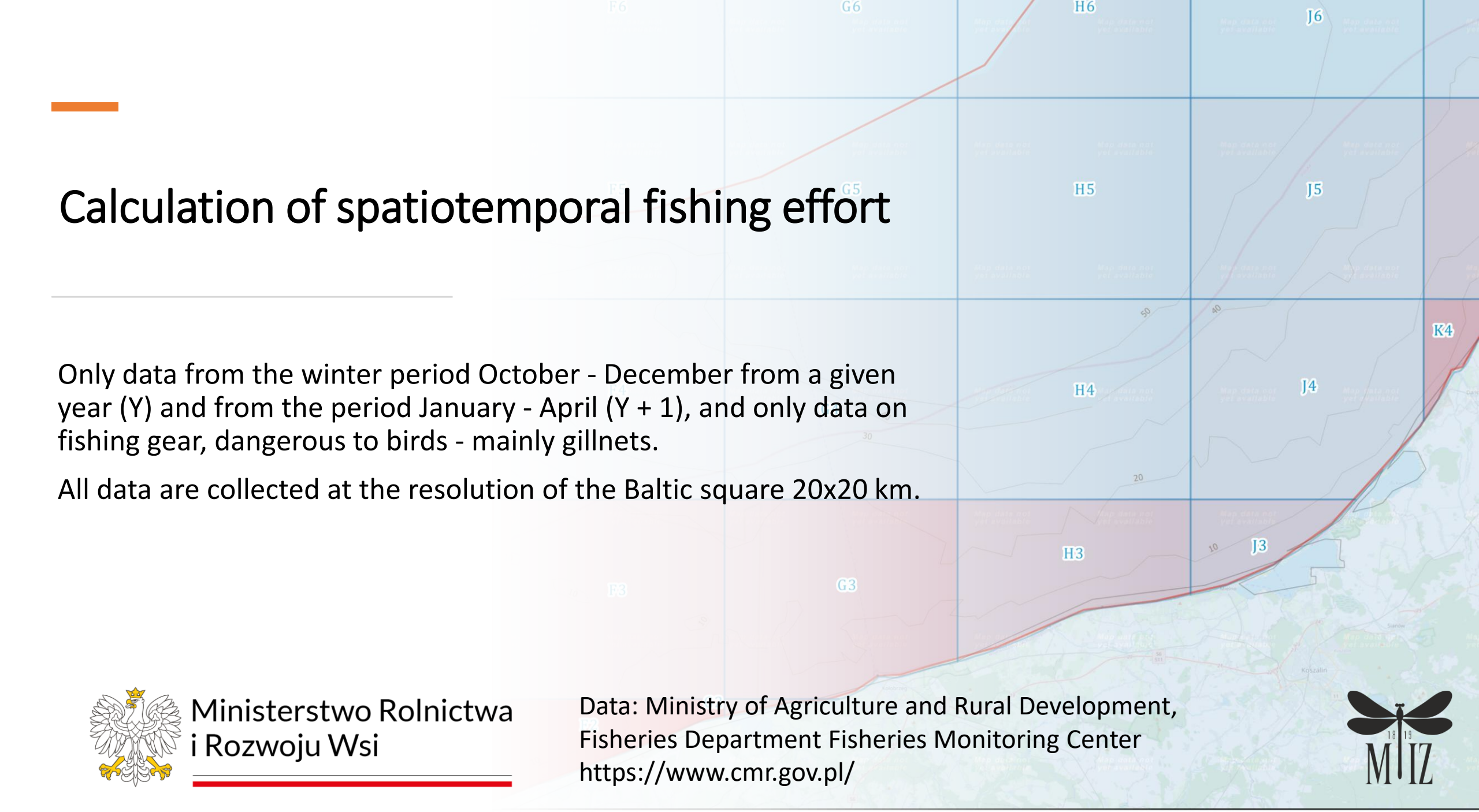
Long-tailed Duck:	428,000
Velvet Scoter:	263,000
Tufted Duck:	59,000
Greater Scaup:	30,000


14°E
16°E
18°E
20°E
56°N
55°N
54°N
Polish EEZ
Important Bird Areas
Planned OWF
study_area_new
Bird density – 2020 winter survey
log-transformed
6
5
4
3
2
1
155,000
80,000
792,000
$\sum = 1{,}021{,}000$
0
75
150 km
LTD=561,511
VS=226,756
BG=4,467

Calculation of spatiotemporal fishing effort

Only data from the winter period October - December from a given year (Y) and from the period January - April (Y + 1), and only data on fishing gear, dangerous to birds - mainly gillnets.

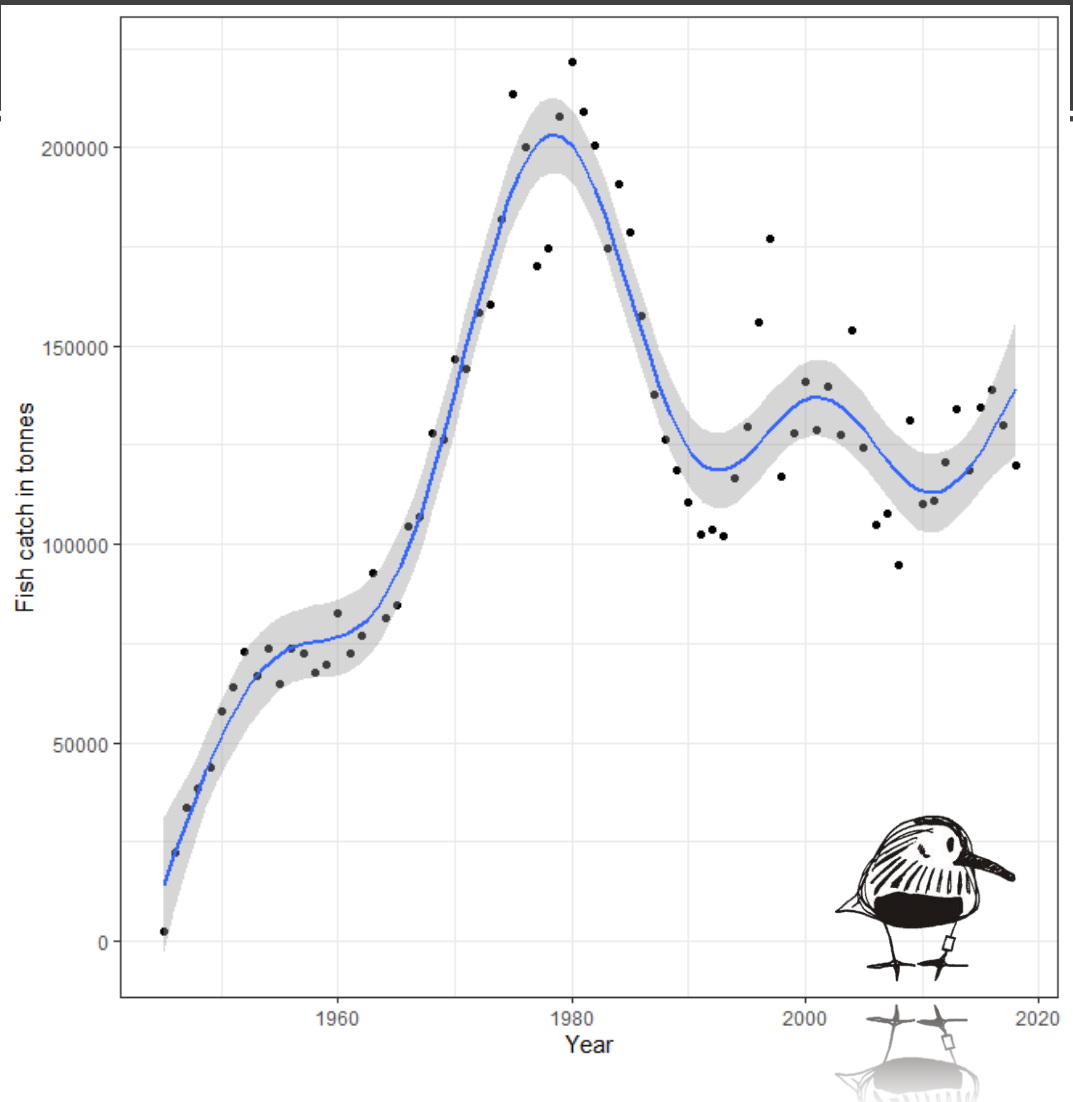
All data are collected at the resolution of the Baltic square 20x20 km.



Ministerstwo Rolnictwa i Rozwoju Wsi

Data: Ministry of Agriculture and Rural Development, Fisheries Department Fisheries Monitoring Center https://www.cmr.gov.pl/

Fishing effort in Polish EEZ in years 1945-2020



Great Scaup female. Phot. Miłosz Kowalewski

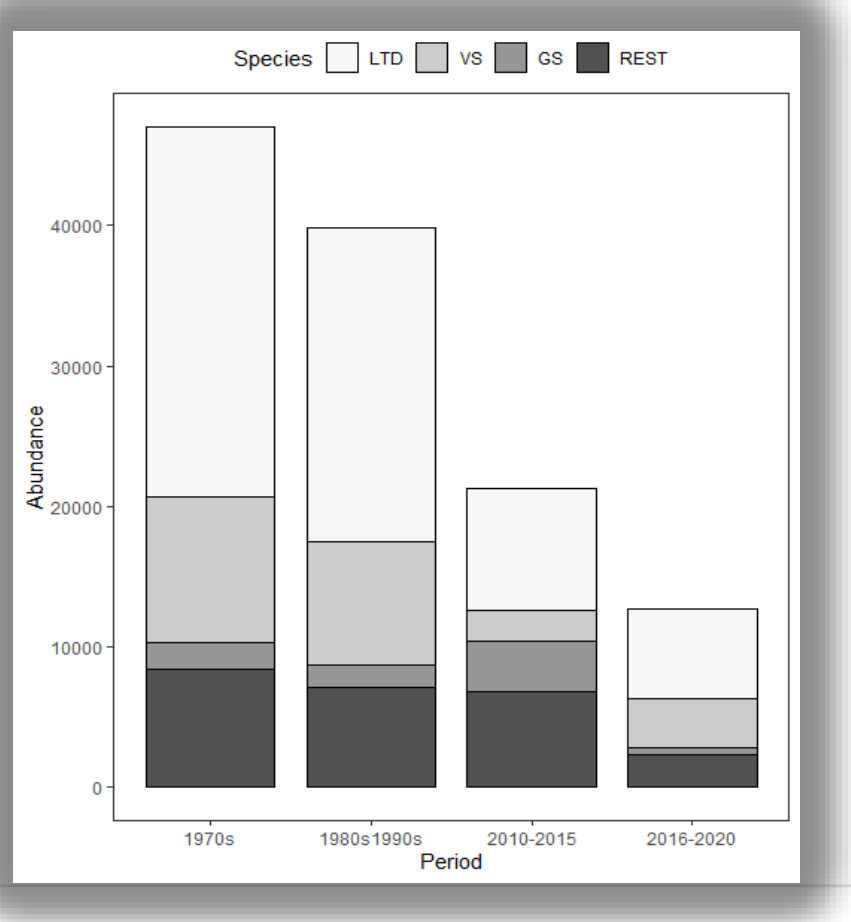
Estimation of bycatch rates for different types of nets - number of birds per 1000 NMD (monitoring, study)

Types of gillnets	Bycatch ind./1000 NMD
Cod, flounder, and turbot gillnets	0.221 (0.218 - 0.225 95% CI)
Herring, perch, roach, garfish and spart gillnets	0.227 (0.217 – 0.238 95% CI)
Zander and bream gillnets	0.651 (0.447 – 1.386 95%CI)
Trout, salmon, pike and whitefish gillnets and one-side anchored nets	0.279 (0.250 – 0.309 95%CI)

(Psuty et al. 2017)

Then, it is necessary to compare whether the bird densities calculated for our area (Baltic Square) are consistent with the bird densities calculated in the area where bycatch rates were estimated.

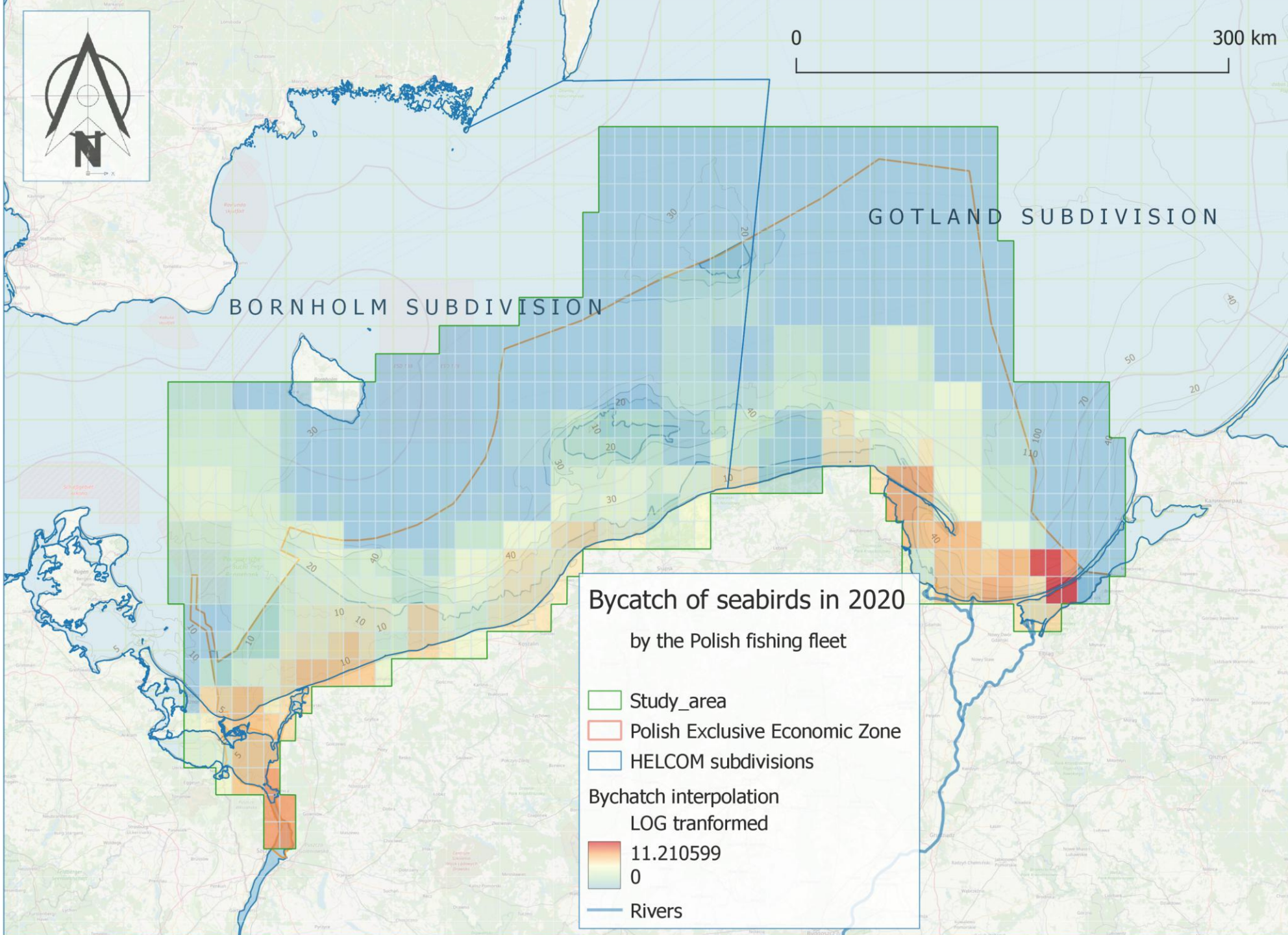
Phot. Piotr Chara



Calculation of mean bycatch for all diving species

The average bycatch for PEEZ for 2013-2020 was 15,300 birds yearly

Predicted bycatch map



Convertion the total bycatch value to individual species

- The abundance of birds converted to the overall bycatch estimate, proportionally.
- Values can be corrected by weighted exposure factor (*WF*)

- *WF = (F+B)/2*

- *F* - feeding method, 1 = vertical, 2 = horizontal; *B* - behavior, 1 = solitary, 2 = gregarious

The most abundant diving bird species present in the bycatch in the Polish EEZ, their abundance, and the scale of the bycatch (mean and confidence intervals). Mean for the seasons 2015/16 – 2019/20.

Gotland subdivision

Species	Abundance	Bycatch mean	Bycatch 95%CI-	Bycatch 95%CI+
VS	72,834	3,036	2,444	4989
LTD	49,606	2,135	1,726	3,475
TD	14,414	594	479	985
CS	7,804	353	281	593
GS	5,674	238	193	386

Bornholm subdivision

Species	Abundance	Bycatch mean	Bycatch 95%CI-	Bycatch 95%CI+
LTD	331,757	2,305	2,294	3113
VS	167,324	1,318	1,117	1,469
CS	62,064	450	384	552
GS	22,724	190	170	221
TD	16,333	141	110	133

Calculation the bycatch threshold using BLT or PBR and compare the calculated values with the bycatch thresholds

*BLT = N*m*0.01*

where *BLT* — BirdLife International threshold value, *N* — estimated population size, *m* — annual mortality of adults of particular species

335,500*0.25*0.01= 839 < 4,440

*PBR = 0.5*Rmax*Nmin*f*

Rmax — maximum potential rate of population growth; *Nmin* — minimum population abundance; *f* — a coefficient in the range 0.1–1 reflecting the status of the population and its priority protection.

PBR (f=0.1) = 3,268 < 4,440

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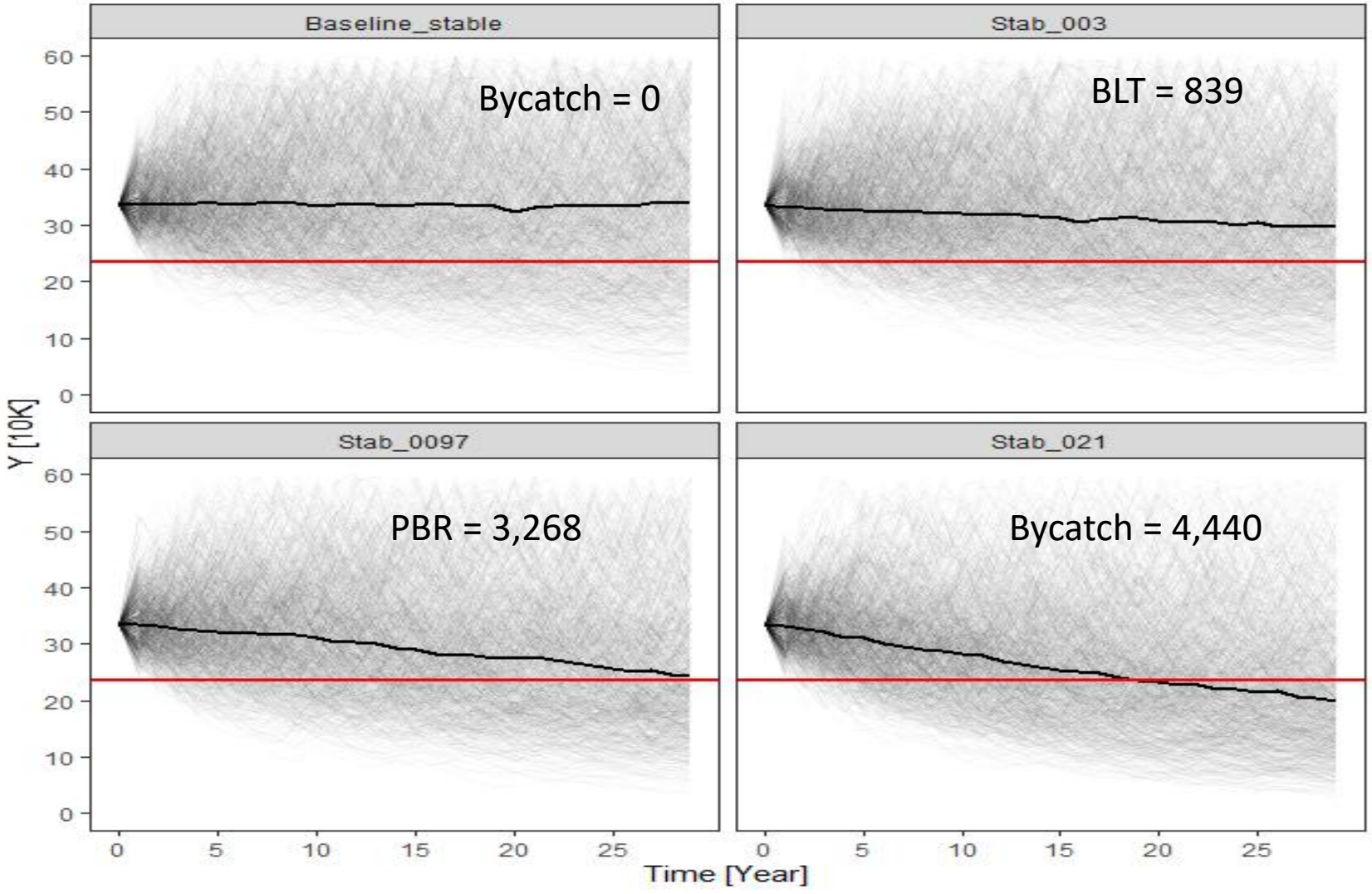
Validation of bycatch thresholds by species - Population Viability Analysis (PVA)



-30% line

THANK YOU!