

## Supplementary material

Colony codes: GK – Gardzka Kępa (12), KR – Kąty Rybackie (12), BR – Brwilno near Płock (12), CH – Chutkowice (12), KS – Kiersity (12), GA – Gaładuś (12), GO – Gołdap (12), OS – Osiek (10), JS – Sławskie Lake (12), MO – Mosty (11), ZB – Zborowskie Lake (12), DD – Dzierżno Duże Lake (12), JA – Jawory (12), PO – Pogorzałki (10), MA – Malczyce (12), LI – Limajno Lake (12), KI – Kiełcz (12), RA – Raszyn (12), OT – Otmuchów (12), ST – Stobrawa (12), PL – Płoskinia (12), WR – Wrocław Zoo (4).

*Descriptions:* ARA\_LAND - Arable land, ARTIF\_AREAS - Artificial, non-agricultural vegetated areas, FORESTS- Forests, HET\_AGRO - Heterogeneous agricultural areas, INDUST\_UNITS- Industrial, commercial and transport units, INL\_WAT - Inland waters, INL\_WET - Inland wetlands, MAR\_WAT- Marine waters, MINE\_DUMP - Mines, dump and construction sites, OPEN\_SPACE - Open spaces with little or no vegetation, PASTURES – Pastures, PERM\_CROPS - Permanent crops, SCRUB\_VEGET - Scrub and/or herbaceous vegetation associations, URBAN FABRIC – Urban fabric

**Table S1.** Proportion of particular habitat types in a 20 km buffers around the studied colonies of grey herons. Habitat types according to the Corine Land Cover CLC2012 model.

Code	ARA_LA ND	ARTIF_A REAS	FORESTS	HET_AGR O	INDUST_ UNITS	INL WAT	INL_WET	MAR_WA T	MINE_DU MP	OPEN_SP ACE	PASTURE S	PERM_CR OPS	SCRUB_V EGET	URBAN_F ABRIC
GK	0.257775	0.001202	0.308387	0.033062	0.002538	0.010272	0.018111	0.195427	0.000001	0.000186	0.14477	0.000201	0.006139	0.02193
KR	0.288168	0.000295	0.051412	0.026879	0.000001	0.013441	0.007434	0.578013	0.000001	0.00247	0.010629	0.001064	0.00053	0.019667
BR	0.450062	0.003617	0.272359	0.107853	0.013146	0.052205	0.00324	0.000001	0.000483	0.00102	0.027995	0.000517	0.034797	0.032707
CH	0.592998	0.000001	0.191245	0.080271	0.000001	0.006997	0.000276	0.000001	0.000001	0.00022	0.083937	0.001765	0.006117	0.036173
KS	0.648159	0.001472	0.136618	0.064268	0.001433	0.024771	0.012249	0.000001	0.005164	0.000001	0.077544	0.000421	0.008868	0.019033
GA	0.343597	0.000223	0.202156	0.257713	0.00048	0.040344	0.003279	0.000001	0.000001	0.000001	0.124235	0.000431	0.014869	0.012671
GO	0.394929	0.000001	0.346778	0.144692	0.001392	0.014256	0.003463	0.000001	0.000001	0.000001	0.060481	0.000001	0.025419	0.008588
OS	0.346489	0.000947	0.458289	0.024796	0.000001	0.025101	0.000748	0.000001	0.000231	0.000001	0.099326	0.001343	0.022958	0.019773
JS	0.338262	0.001800	0.482496	0.010593	0.001075	0.019955	0.002508	0.000001	0.000475	0.000001	0.094882	0.000001	0.010542	0.037408
MO	0.110827	0.005996	0.232592	0.029777	0.014701	0.001142	0.004073	0.484395	0.000605	0.003922	0.039351	0.000001	0.001153	0.071465
ZB	0.343782	0.000358	0.480979	0.046024	0.003126	0.005743	0.001025	0.000001	0.000973	0.000001	0.065841	0.000001	0.017365	0.034784
DD	0.426361	0.008946	0.318893	0.025836	0.031172	0.008537	0.000001	0.000001	0.006565	0.000001	0.039201	0.000001	0.048201	0.086287
JA	0.349504	0.000001	0.498988	0.034097	0.000001	0.014637	0.000305	0.000001	0.000001	0.000001	0.054046	0.000001	0.026854	0.021567
PO	0.291319	0.004051	0.282753	0.07966	0.005775	0.005249	0.035403	0.000001	0.001933	0.000001	0.229229	0.000205	0.007508	0.056915
MA	0.612809	0.003586	0.199514	0.034116	0.004476	0.010049	0.000208	0.000001	0.002005	0.000001	0.046808	0.001126	0.028146	0.057159
LI	0.463806	0.002574	0.30875	0.057951	0.006636	0.022811	0.003158	0.000001	0.000001	0.000001	0.071088	0.000001	0.030257	0.032969
KI	0.430211	0.002525	0.411499	0.035999	0.004432	0.007315	0.00128	0.000001	0.000588	0.000001	0.050219	0.001568	0.013958	0.040405
RA	0.27574	0.046278	0.139279	0.086611	0.054652	0.013937	0.000001	0.000001	0.008095	0.001513	0.060199	0.012319	0.013571	0.287806
OT	0.594428	0.004652	0.16694	0.071111	0.003291	0.026494	0.004947	0.000001	0.001672	0.000001	0.067686	0.000001	0.005873	0.052906
ST	0.52346	0.002325	0.308152	0.011286	0.005896	0.015746	0.000001	0.000001	0.002794	0.000001	0.067916	0.00128	0.012988	0.048159
PL	0.586828	0.000874	0.284584	0.044194	0.002612	0.002845	0.00651	0.009612	0.000001	0.000001	0.026838	0.000001	0.020151	0.01495
WR	0.542616	0.032264	0.117008	0.026828	0.037269	0.010384	0.000001	0.000001	0.004568	0.000001	0.071213	0.001857	0.009283	0.14671

**Table S2.** Concentration of particular elements in post-hatching eggshells of grey herons in the studied colonies.

Element	Al	As	Cd	Cr
Code	mean (range) [mg/kg]	mean (range) [mg/kg]	mean (range) [µg/kg]	mean (range) [mg/kg]
GK	3.80 (3.05-5.85)	0.28 (0-0.52)	6.6 (3.5-18.5)	0.11 (0.02-0.23)
KR	16.09 (4.41-36.31)	0.31 (0-0.60)	14.9 (8.3-21.1)	0.51 (0.41-0.65)
BR	12.31 (5.06-16.92)	0.39 (0.18-0.73)	14.1 (9.1-19.6)	0.46 (0.34-0.69)
CH	13.97 (10.46-17.45)	0.30 (0.06-0.51)	12.7 (6.5-23.2)	0.45 (0.31-0.74)
KS	13.33 (3.29-17.10)	0.46 (0.23-0.65)	10.4 (4.5-18.6)	0.33 (0.07-0.49)
GA	13.31 (9.78-15.60)	0.36 (0.15-0.51)	6.4 (0-12.8)	0.02 (0-0.05)
GO	18.11 (14.09-35.58)	0.44 (0-1.01)	6.9 (2.9-14.6)	0.04 (0-0.15)
OS	12.28 (9.74-15.50)	0.31 (0-0.78)	7.2 (0-0.0140)	0.03 (0-0.12)
JS	10.38 (2.56-28.70)	0.39 (0.22-1.26)	7.3 (0-16.2)	0.03 (0-0.13)
MO	12.66 (8.92-27.43)	0.53 (0-1.32)	8.1 (2.5-14.9)	0.09 (0-0.24)
ZB	9.13 (4.87-19.58)	0.48 (0.26-0.78)	10.7 (0-29.3)	0.04 (0-0.11)
DD	8.37 (3.17-17.91)	0.38 (0.17-0.48)	5.2 (0-7.9)	0.08 (0-0.43)
JA	10.87 (7.73-27.40)	0.89 (0.54-1.13)	37.5 (28.4-48.7)	0.06 (0-0.19)
PO	6.18 (5.36-7.31)	0.75 (0.33-1.28)	43.7 (34.9-56.3)	0.16 (0-0.35)
MA	16.02 (8.72-28.99)	1.07 (0.45-1.37)	43.6 (33.9-57.7)	0.11 (0-0.27)
LI	8.27 (5.00-17.51)	0.77 (0-1.08)	29.9 (11.1-46.1)	0.25 (0-0.39)
KI	12.02 (7.51-17.51)	0.46 (0.23-0.64)	37.2 (28.8-46.3)	0.09 (0-0.18)
RA	6.79 (5.19-11.08)	0.63 (0-0.94)	22.8 (9.8-37.5)	0.09 (0-0.23)
OT	13.45 (5.57-33.13)	0.70 (0-1.29)	32.3 (22.2-42.2)	0.08 (0-0.22)
ST	11.18 (5.55-43.17)	1.00 (0.59-1.40)	36.0 (22.1-50.4)	0.05 (0-0.18)
PL	13.83 (5.82-61.55)	0.51 (0-1.26)	25.3 (15.7-35.9)	0.07 (0-0.19)
WR	14.34 (5.99-32.89)	0.91 (0.53-1.20)	27.7 (22.6-31.1)	0.06 (0-0.21)
	Cu	Fe	Hg	Mn
	mean (range) [mg/kg]	mean (range) [mg/kg]	mean (range) [mg/kg]	mean (range) [mg/kg]
GK	1.51 (0.80-1.91)	5.11 (2.75-10.64)	0.08 (0.02-0.15)	1.12 (0.46-1.94)
KR	2.90 (2.31-3.49)	9.98 (4.74-26.41)	0.15 (0-0.71)	1.60 (0.75-2.68)
BR	2.74 (2.33-3.69)	8.34(6.05-10.08)	0.12 (0.04-0.19)	1.74 (0.91-2.76)
CH	2.35 (2.05-3.09)	9.02 (6.91-11.66)	0.13 (0.03-0.16)	2.72 (1.49-5.04)
KS	2.14 (0-2.48)	6.36 (4.70-7.76)	0.09 (0.05-0.14)	1.97 (0.67-4.72)
GA	2.04 (1.07-5.61)	5.84 (3.16-13.44)	0.11 (0-0.17)	1.14 (0.55-2.12)
GO	1.51 (1.18-1.79)	4.64 (2.42-9.34)	0.09 (0.05-0.16)	2.13 (0.41-2.79)
OS	1.42 (0.85-1.99)	3.90 (2.44-6.71)	0.09 (0-0.17)	0.72 (0.33-1.28)
JS	1.45 (0.91-1.79)	3.25 (1.76-4.89)	0.10 (0.03-0.17)	1.71 (0.43-3.94)
MO	1.62 (1.17-2.12)	18.89 (2.15-85.26)	0.08 (0.03-0.13)	4.46 (0.53-17.14)
ZB	1.75 (1.21-2.06)	8.27 (4.24-17.06)	0.12 (0.05-0.23)	4.17 (0.36-27.28)
DD	1.20 (0.79-1.53)	8.20 (4.07-19.27)	0.09 (0.06-0.14)	1.34 (0.61-3.61)
JA	1.67 (1.19-1.98)	10.65 (6.45-31.19)	0.29 (0.09-0.82)	5.59 (1.69-13.25)
PO	1.89 (1.68-2.25)	6.67 (5.05-8.68)	0.24 (0.13-0.31)	0.59 (0.35-1.31)
MA	1.33 (0.95-1.69)	19.37 (8.85-38.82)	0.22 (0.12-0.32)	1.92 (0.85-5.69)
LI	1.18 (0.73-1.41)	7.52 (4.15-10.91)	0.30 (0.14-0.74)	1.49 (0.78-2.59)
KI	1.52 (1.28-1.71)	14.71 (7.29-31.89)	0.25 (0.14-0.33)	4.89 (1.65-17.56)
RA	1.11 (0.74-1.58)	8.51 (6.11-13.66)	0.20 (0.09-0.34)	4.29 (0.96-16.17)
OT	1.49 (0.88-1.78)	12.35 (5.67-38.71)	0.26 (0.13-0.37)	6.04 (1.01-11.26)
ST	1.22 (0-1.85)	9.46 (5.78-16.69)	0.23 (0.13-0.29)	3.63 (0.83-7.13)
PL	1.67 (1.21-2.02)	5.04 (2.97-7.95)	0.16 (0.08-0.21)	1.98 (0.93-3.42)
WR	1.64 (1.48-1.93)	5.35 (4.77-6.41)	0.17 (0.11-0.24)	0.77 (0.38-1.01)

**Table S2. Count.**

Element	Mo	Ni	Pb	Sc
Code	mean (range) [mg/kg]	mean (range) [mg/kg]	mean (range) [mg/kg]	mean (range) [mg/kg]
GK	0.032 (0-0.099)	0.12 (0.04-0.25)	0.57 (0.39-0.77)	0.005 (0-0.019)
KR	0.092 (0.042 - 0.189)	0.18 (0.03-0.27)	0.66 (0.36-0.93)	0.019 (0-0.044)
BR	0.069 (0.021-0.120)	0.19 (0.06-0.28)	0.55 (0.45-0.75)	0.014 (0.005-0.027)
CH	0.064 (0.024-0.133)	0.22 (0.14-0.31)	0.46 (0.12-0.89)	0.016 (0.006-0.032)
KS	0.045 (0-0.081)	0.19 (0.05-0.27)	0.47 (0.25-0.68)	0.021 (0-0.045)
GA	0.010 (0-0.052)	0.14 (0.10-0.21)	0.32 (0.05-0.63)	0.014 (0-0.030)
GO	0.010 (0-0.027)	0.14 (0.07-0.18)	0.51 (0.37-0.69)	0.019 (0-0.039)
OS	0.010 (0-0.029)	0.12 (0.09-0.16)	0.51 (0.25-0.76)	0.014 (0-0.026)
JS	0.015 (0-0.046)	0.0935 (0-0.1481)	0.42 (0.26-0.57)	0.005 (0-0.019)
MO	0.008 (0-0.042)	0.130 (0.095-0.174)	0.48 (0.25-0.60)	0.007 (0-0.018)
ZB	0.011 (0-0.036)	0.067 (0-0.232)	0.49 (0.27-1.34)	0.003 (0-0.011)
DD	0.015 (0-0.051)	0.0142 (0-0.0776)	0.53 (0.28-0.83)	0.004 (0-0.021)
JA	0.043 (0-0.212)	0.162 (0.122-0.186)	0.534 (0.085-1.106)	0.097 (0.042-0.168)
PO	0.024 (0-0.060)	0.152 (0.137-0.177)	0.448 (0.088-0.626)	0.037 (0-0.085)
MA	0.029 (0-0.117)	0.137 (0.101-0.184)	0.398 (0.124-0.908)	0.077 (0.034-0.164)
LI	0.023 (0-0.190)	0.130 (0.111-0.155)	0.457 (0.096-0.851)	0.055 (0.021-0.104)
KI	0.005 (0-0.058)	0.135 (0.111-0.159)	0.634 (0.232-1.087)	0.110 (0-0.186)
RA	0.008 (0-0.097)	0.129 (0.111-0.172)	0.531 (0.231-0.883)	0.080 (0.013-0.165)
OT	0.019 (0-0.072)	0.115 (0.094-0.160)	0.416 (0.125-0.723)	0.067 (0-0.200)
ST	0.018 (0-0.086)	0.121 (0.091-0.157)	0.372 (0-0.657)	0.081 (0.035-0.157)
PL	0.014 (0-0.049)	0.122 (0.103-0.151)	0.366 (0.037-0.801)	0.044 (0.025-0.072)
WR	0.018 (0-0.052)	0.122 (0.106-0.138)	0.415 (0.228-0.538)	0.056 (0.035-0.075)
	Se	Sr	V	Zn
	mean (range) [ppm]	mean (range) [ppm]	mean (range) [µg/kg]	mean (range) [mg/kg]
GK	0.577 (0.186-1.121)	151.17 (81.74-203.68)	55.5 (0-142.0)	3.39 (1.21-6.63)
KR	0.927 (0.193-2.508)	186.28 (94.77-265.19)	26.0 (0-88.1)	7.74 (5.14-10.49)
BR	0.493 (0.243-0.884)	85.16 (55.69-112.26)	33.4 (0-168.5)	9.15 (6.12-16.86)
CH	0.484 (0.037-0.938)	60.36 (26.37-83.65)	28.2 (0-89.8)	9.59 (6.36-18.12)
KS	0.573 (0.132-0.959)	75.35 (42.46-129.62)	21.9 (0-144.0)	5.63 (2.74-7.94)
GA	0.441 (0.204-0.801)	47.61 (26.36-95.19)	23.8 (0-95.1)	8.49 (0.09-15.28)
GO	0.539 (0.252-0.936)	41.76 (31.39-60.10)	25.6 (0-94.3)	7.36 (1.86-14.62)
OS	0.565 (0-0.793)	83.87 (31.59-125.59)	69.4 (0-158.5)	5.63 (2.83-10.98)
JS	0.5151 (0.2126-0.9887)	60.21 (43.85-86.45)	32.0 (0-122.6)	4.18 (1.77-7.26)
MO	0.552 (0.315-0.876)	232.90 (152.10-336.48)	50.8 (0-126.9)	5.50 (2.37-12.02)
ZB	0.614 (0.314-0.966)	136.39 (68.43-207.66)	50.5 (0-123.5)	12.21 (7.98-20.75)
DD	0.6451 (0.1616-0.9659)	193.46 (138.60-223.18)	33.1 (0-87.9)	5.02 (2.93-7.81)
JA	0.601 (0.259-1.063)	72.94 (41.77-93.45)	13.32 (0-358.9)	26.12 (20.03-45.04)
PO	0.526 (0.032-1.041)	45.55 (28.97-64.75)	159.2 (96.6-258.2)	6.99 (2.19-14.47)
MA	0.716 (0.2908-1.4359)	60.69 (38.86-83.71)	163.9 (13.3-298.5)	5.55 (3.29-9.05)
LI	1.386 (0-3.696)	55.59 (32.76-91.93)	5.4 (0-202.6)	24.96 (13.62-35.07)
KI	2.163 (1.518-2.589)	60.44 (30.87-80.41)	169.9 (37.2-283.9)	20.93 (7.85-33.49)
RA	2.094 (1.458-2.719)	50.69 (36.46-78.37)	94.3 (0-248.3)	20.07 (13.33-31.81)
OT	1.960 (1.426-2.410)	69.57 (38.69-120.03)	133.9 (0-267.0)	6.23 (3.37-9.98)
ST	1.9251 (1.2553-2.7669)	70.46 (48.65-93.94)	140.5 (15.2-269.3)	12.83 (4.26-26.88)
PL	1.8099 (1.0937-2.4916)	83.90 (58.59-146.86)	116.9 (0-283.5)	5.25 (2.08-9.42)
WR	2.148 (1.810-2.612)	63.35 (42.006-85.087)	210.3 (158.1-243.8)	13.09 (5.82-16.25)

Concentrations of Ca and Mg – main components of an eggshell ranged between 334.11-370.26 g/kg and 0.89-1.27 g/kg, respectively.