

Supplementary material

1 Appendix 1.

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3 Table A1. A priori set of predictor variables for age at first reproduction and reproductive performance in the
 4 year of first breeding (at age 2 years) for goldeneye females. Minimum and maximum values of predictors
 5 are given in parentheses for both analyses.

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Predictor, abbreviation	Definition	Presumed impact route and traits affected	Analysis used	
			Age at first reproduction	Performance at first reproduction
Ice cover in hatch year; Icehatchy	Maximum ice cover (km ²) in the Baltic Sea in the hatch year	Maternal; size, growth	x (49 000, 405 000)	x (49 000, 405 000)
NAO index in hatch year; NAOhatchy	Winter NAO index in the hatch year	Maternal; size, growth	x (-2.540, 2.860)	x (-2.320, 2.860)
Mother's age; Motherage	Number of years from the first capture the mother to the year before the recruit's hatch year; skip years included	Maternal; size, growth	x (3, 13)	x (3, 13)

Mother's breeding experience; Motherexperience	Number of years in which the mother was known to have bred successfully (≥ 1 duckling left the nest box) in the study area before the recruit's hatch year; skip years excluded	Maternal; size, growth	x (0, 10)	x (0, 10)
Mother's body mass; Mothermass	Mother's body mass (g) in the recruit's hatch year	Maternal; size, growth	x (530, 675)	x (530, 675)
Mother's wing length; Motherwing	Mother's wing length (mm) in the recruit's hatch year	Maternal; size, growth	x (188, 212)	x (189, 210)
Relative hatch date; Relhatchd	Recruit's hatch date minus mean hatch date in the population that year; a larger value signifies a later hatch date relative to population mean the same year	Maternal/environmental; size, growth	x (-17, 14)	x (-15, 14)

Temperature first two weeks; Temptwo	Mean daily ambient temperature (°C) during the first two weeks after hatch	Environmental; growth, condition	x (8.5, 20.0)	x (8.5, 20.0)
Temperature first four weeks; Tempfour	Mean daily ambient temperature (°C) during the first four weeks after hatch	Environmental; growth, condition	x (10.3, 19.0)	x (10.6, 19.0)
Ice cover first two winters; Icefirsttwo	Sum of maximum ice cover (km ²) in the Baltic Sea in the recruit's first two winters	Environmental; condition	x (119 000, 742 000)	x (119 000, 742 000)
Ice cover in the second winter; Icesecond	Maximum ice cover (km ²) in the Baltic Sea in the recruit's second winter	Environmental; condition	x (49 000, 405 000)	x (49 000, 405 000)
NAO index first two winters; NAOfirsttwo	Sum of winter NAO indices in the recruit's first two winters	Environmental; condition	x (-3.450, 5.230)	x (-3.450, 5.230)
NAO index in the second winter; NAOsecond	Winter NAO index in the recruit's second winter	Environmental; condition	x (-2.540, 2.860)	x (-2.540, 2.860)

Relative nest site limitation at age two years; Nestlim	The proportion of occupied nest boxes of all nest boxes available in the study area in the year when the recruit was two years old	Density dependence; constrain the start of reproduction	x (0.195, 0.294)
Recruit's body mass; Ownmass	Recruit's body mass (g) in the year of first reproduction	Maternal/Environmental; condition	x (500, 675)
Recruit's wing length; Ownwing	Recruit's wing length (mm) in the year of first reproduction	Maternal/environmental; size	x (187, 211)

Table A2. Pair-wise correlations between predictor variables considered to explain age at first reproduction (n = 141). Predictor variables and their abbreviations explained in Table A1.

	Icehatchy	NAOhatchy	Motherage	Mother- experience	Mothermass	Motherwing	Relhatchd	Temptwo	Tempfour	Icefirsttwo	Icesecody	NAOfirsttwo	NAOsecody	Nestlim
Icehatchy	1.000													
NAOhatchy	-0.546	1.000												
Motherage	-0.222	0.043	1.000											
Motherexperience	-0.233	0.035	0.884	1.000										
Mothermass	-0.049	0.029	0.132	0.152	1.000									
Motherwing	-0.032	-0.031	0.203	0.157	0.330	1.000								
Relhatchd	-0.052	0.189	-0.313	-0.322	-0.154	-0.134	1.000							
Temptwo	0.152	0.089	-0.161	-0.148	-0.058	-0.032	0.212	1.000						
Tempfour	0.100	0.087	-0.178	-0.170	0.016	0.025	0.242	0.860	1.000					
Icefirsttwo	0.283	-0.406	0.045	0.065	0.019	-0.010	-0.197	-0.027	-0.121	1.000				
Icesecody	0.064	-0.296	0.161	0.174	0.037	-0.045	-0.115	-0.067	-0.125	0.730	1.000			
NAOfirsttwo	-0.028	0.124	-0.131	-0.119	0.029	-0.046	0.016	0.096	0.142	-0.579	-0.680	1.000		
NAOsecody	0.011	-0.016	-0.196	-0.171	-0.074	-0.066	0.057	0.032	0.013	-0.297	-0.644	0.747	1.000	

Nestlim	-0.013	0.190	-0.015	0.042	0.161	0.097	-0.059	0.044	0.309	-0.291	-0.298	0.448	0.217	1.000
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Table A3. Pair-wise correlations between predictor variables considered to explain the relative hatch date of the recruit's own brood at first reproduction at age 2 years (n = 79). Predictor variables and their abbreviations explained in Table A1.

	Icehatch y	NAOhatch y	Motherag e	Mother- experienc e	Mothermas s	Motherwin g	Relhatch d	Temptwo w	Tempfour w	Icefirsttwo y	Icesecund y	NAOfirsttwo y	NAOsecond y	Ownmas s	Ownwin g
Icehatchy	1.000														
NAOhatchy	-0.544	1.000													
Motherage	-0.213	-0.018	1.000												
Motherexperience	-0.267	0.005	0.870	1.000											
Mothermass	-0.118	-0.015	0.175	0.174	1.000										
Motherwing	-0.050	-0.168	0.175	0.183	0.377	1.000									
Relhatchd	0.010	0.141	-0.324	-0.365	-0.166	-0.067	1.000								
Temptwow	0.207	0.083	-0.140	-0.100	-0.044	-0.059	0.213	1.000							
Tempfourw	0.118	0.077	-0.124	-0.100	0.067	0.025	0.255	0.864	1.000						
Icefirstwoy	0.339	-0.304	-0.025	0.013	0.080	0.101	-0.166	0.018	-0.100	1.000					
Icesecundy	0.135	-0.237	0.094	0.073	0.115	0.020	-0.102	-0.093	-0.140	0.745	1.000				

NAOfirstwoy	-0.001	0.049	-0.092	-0.114	-0.134	-0.081	0.012	0.104	0.194	-0.590	-0.694	1.000			
NAOsecondy	0.000	-0.062	-0.210	-0.125	-0.208	-0.024	0.056	0.016	0.038	-0.339	-0.679	0.738	1.000		
Ownmass	0.053	0.186	0.037	-0.096	0.178	-0.071	-0.063	-0.089	-0.076	0.077	0.142	-0.146	-0.167	1.000	
Ownwing	-0.142	-0.052	0.056	0.049	0.248	0.196	-0.018	-0.162	-0.160	-0.062	0.023	-0.100	-0.026	0.343	1.000