

A LONG-TERM STUDY OF BREEDING WATERFOWL POPULATIONS IN THE FINNISH BALTIC SEA

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Study site: Aasla is an island located in the Sea Archipelago, South-western Finland (60 18'N, 21 57'E). Its location, on the fringe of the inner archipelago, makes it a relevant breeding ground for numerous waterfowl. The shore of the island is a succession of open, rocky beach and bays made of reeds. There are also 9 inland lakes in Aasla ranging from oligotrophic to meso-eutrophic.

Methods: The data covered the period 1975-2014. The bird censuses were conducted by one observer: Lennart Saari and consisted of a combination of point and round counts. The total study area is about 40 km² including the terrestrial habitats. The census covered all the inland waters and the seashore. The breeding pair census was repeated 3 times in spring. The breeding pair number was estimated for each species based on the census that best suited its breeding phenology. Only species with more than 5 breeding pairs recorded during the whole study period are presented here.

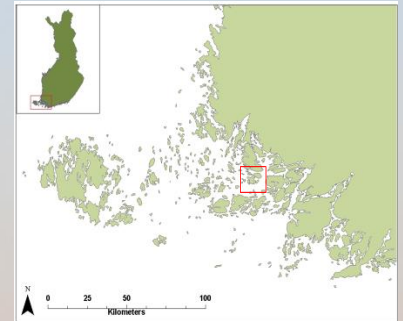


Fig 1. Location of the study area: Aasla in the Archipelago Sea, Finland.

Species	r _s	P	1 st Atlas (1975-79)	2 nd Atlas (1986-89)	3 rd Atlas (2006-10)	Total number of pairs
Velvet scoter -- <i>Melanitta fusca</i>	-0.925	0.000	22.6 (13.1)	6.3 (2.6)	0	221
Common pochard -- <i>Aythya ferina</i>	-0.905	0.000	28.4 (15.6)	7.5 (2.5)	0.4 (0.6)	335
Tufted duck -- <i>Aythya fuligula</i>	-0.821	0.000	69 (29.7)	17.8 (4.3)	6.6 (3.7)	1325
Horned grebe -- <i>Podiceps auritus</i>	-0.786	0.000	6.8 (1.5)	2.5 (1.9)	1.2 (0.8)	138
Eurasian coot -- <i>Fulica atra</i>	-0.774	0.000	53.4 (21.1)	14 (4.2)	11.4 (7.3)	882
Goldeneye -- <i>Bucephala clangula</i>	-0.737	0.000	262.2 (35.6)	246.3 (48.7)	162 (37.8)	8618
Wigeon -- <i>Anas penelope</i>	-0.733	0.000	9.6 (4.1)	2.5 (2.1)	0	120
Great crested grebe -- <i>Podiceps cristatus</i>	-0.711	0.000	115.4 (37.3)	58.3 (9.2)	33.3 (14.6)	2479
Mallard -- <i>Anas platyrhynchos</i>	-0.649	0.000	120.6 (24.2)	72 (27)	71.4 (26)	3903
Red-breasted Merganser -- <i>Mergus serrator</i>	-0.342	0.031	6.8 (2.2)	11 (2.9)	4 (2.9)	432
Teal -- <i>Anas crecca</i>	-0.270	0.092	12.6 (7.4)	15.3 (6.6)	14 (6)	509
Garganey -- <i>Anas querquedula</i>	-0.058	0.723	0.8 (1.3)	0.3 (0.5)	0.6 (0.9)	11
Common merganser -- <i>Mergus merganser</i>	0.003	0.986	49.8 (4.4)	73.8 (21.5)	51.6 (13.7)	3111
Shoveler -- <i>Anas clypeata</i>	0.025	0.877	2.6 (2.1)	0.3 (0.5)	1.2 (1.6)	38
Water rail -- <i>Rallus aquaticus</i>	0.046	0.778	0.2 (0.5)	0.8 (0.5)	0.6 (0.6)	33
Gadwall -- <i>Anas strepera</i>	0.442	0.004	0	0	0	5
Barnacle goose -- <i>Branta leucopsis</i>	0.504	0.001	0	0	0.6 (1.3)	8
Greylag goose -- <i>Anser anser</i>	0.592	0.000	0	0.3 (0.5)	3.4 (3.6)	42
Red-necked Grebe -- <i>Podiceps grisegena</i>	0.630	0.000	0.8 (0.5)	0.3 (0.5)	1.2 (0.5)	50
Common Eider -- <i>Somateria mollissima</i>	0.637	0.000	279 (62)	522.3 (103.6)	646.8 (99.9)	25531
Canada goose -- <i>Branta canadensis</i>	0.652	0.000	0	0	3.4 (2.8)	37
Mute swan -- <i>Cygnus olor</i>	0.684	0.000	2 (1)	10.8 (11)	32.6 (10.6)	941
TOTAL	0.097	0.552	1042.6 (74.2)	1068.3 (215.8)	1039.3 (125.7)	48768

Table 1. Results of Spearman test per species for the period 1975-2014 (in green negative correlation, in red positive correlation), mean (SD) number of breeding pairs for the 3 Finnish Bird Atlas periods and total number of pairs recorded during the whole period.

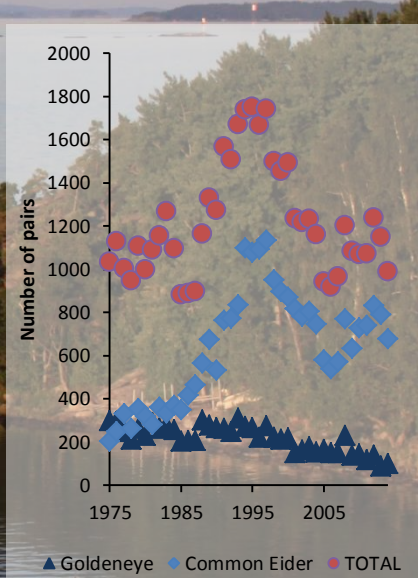


Fig 2. Number of breeding pairs of Goldeneye, Common Eider and all species combined observed from 1975 to 2014 at Aasla.

Results: Among the 22 species of waterfowl which have been recorded as breeding pairs at Aasla from 1975 to 2014, 10 have dramatically decreased over the study period whereas 7 have increased.

Discussion: Decline in some of the species may be the result of eutrophication, climate change and predation. The coastal area has been under influence of industrial, municipal and agricultural waste waters since the 1950's, but negative signs of eutrophication on waterfowl populations only started to be detected at the beginning of the 1990's. Harsh winters in Europe (e.g. 1985-1987) caused crashes in the breeding populations of some species. The arrival of Pine Marten (*Martes martes*) on the island may also explain the decrease of the breeding population of some species such as Goldeneye. Comparison with other sites are sought for.

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