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Numbers and distribution of wintering waterbirds in coastal southern Norway 2009

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The numbers and distribution of wintering waterbirds along the coast from the Swedish border to Stavanger, were surveyed from the air in February 2009 as part of the SEAPOP mapping of wintering birds in southern Norway. The aerial survey was conducted from a twin-engine Partenavia P68 Observer (Figure 1) flown by Leif Petersen, Danish Air Survey. Two observers, one in the back and one in the front co-pilot seat, counted birds on both sides of the plane. Observations were recorded to one of four distance bands with increasing perpendicular distance from the survey track line, the outer boundary being 1.5 km away (see e.g. Petersen et al. 2006, Petersen & Nielsen in prep.). Surveys were carried out along 83 parallel transect lines perpendicular to the coast and 5 km apart totalling 953 km (Figure 1). Observers on all transects were Ib Krag Petersen (NERI) and Rasmus Due Nielsen (NERI). With each observation, the species, number, distance band and behaviour were recorded directly onto a dictaphone in the airplane. All birds were identified down to species level when this was possible. Observations of marine mammals were also recorded. All transects were flown at an altitude of 76 m (250 feet) and at a speed of approximately 180 km/h (100 knots). The seaward boundary of the transects was defined roughly by the 40 m depth contour, though this was not the case in the Oslo Fjord.

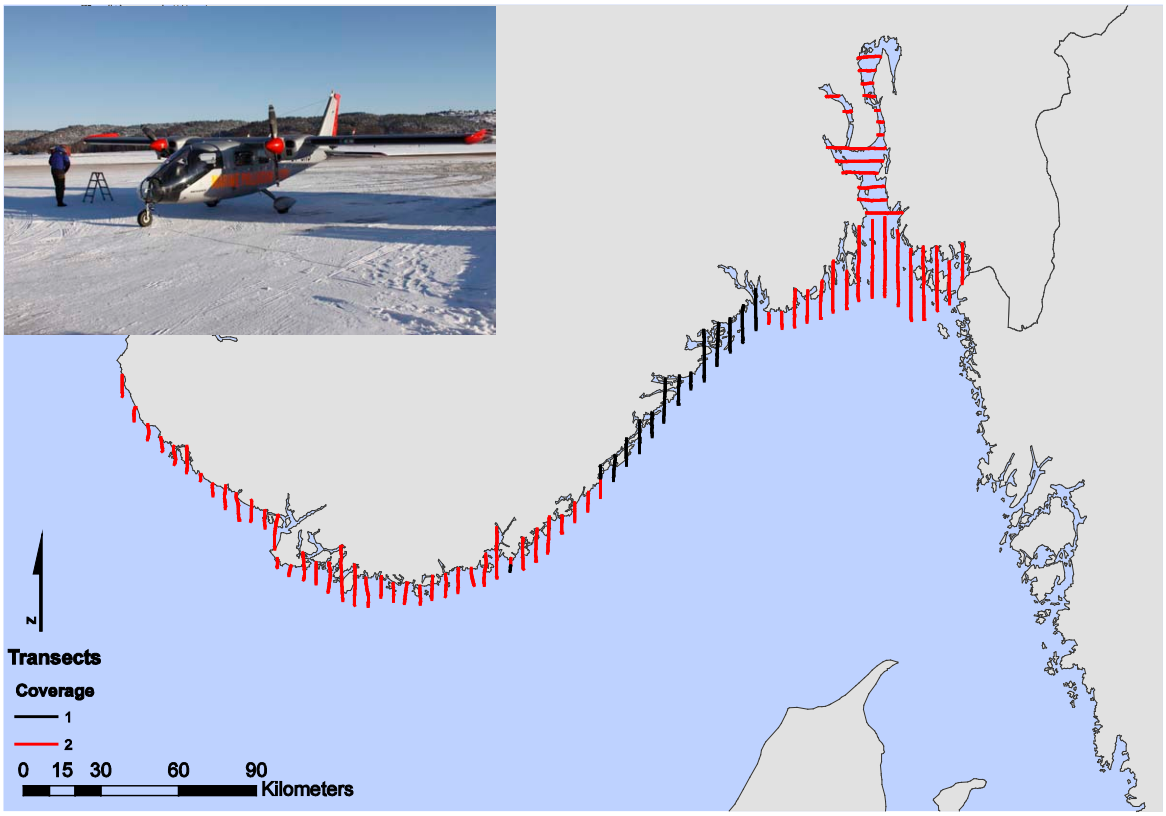

Figure 1

Map showing the transect lines surveyed during February 2009 and the plane, a Partenavia P68 Observer (upper left corner) used during the surveys. (© R. Due Nielsen)

Data handling and analysis

Observation data and flight track data were entered into tables and a combination of *ArcGIS*/*ArcView GIS* and *Turbo Pascal* software was used to geo-locate each bird observation and to assign observations to transect band and side of flight track.

Spatial modelling was used to estimate abundance and distribution of common eider and red-breasted merganser. Abundance was described as numbers of birds/km^2 to a surface covering grid square of 500 x 500 m cells. Detection probability was adjusted for observer performance, survey conditions and spatial heterogeneity in the detectability of birds using the software *Distance Sampling* (ver. 6). This software also facilitates the use of spatial modelling, using spatially explicit environmental parameters (in this case geographical coordinates, water depth and distance to coast) as covariates to create a bird density surface. A description of the method for fitting the detection function and the procedure for spatial modelling is given in Petersen & Nielsen (in prep).

Results

The results from the aerial survey are published in a separate report (Petersen & Nielsen in prep.). Here we will only focus on the results for the most numerous species, which were (in descending order) the common eider, herring- and unidentified gulls and red-breasted merganser (Table 1).

Table 1. *The ten most numerous species observed during the aerial survey along the Skagerrak coast in February 2009.*

Species	Number of observed clusters	Number of observed individuals	Estimated number of individuals
Common eider	624	10 122	45 554
Herring gull	416	3501	
Unidentified gull	33	2472	
Red-breasted merganser	135	1187	7583
Common goldeneye	36	437	
Mallard	53	430	
Mute swan	88	360	
Cormorant and shag	96	297	
Great black-backed gull	126	202	
Common scoter	9	121	

Common eiders were recorded along the entire coast line, with the largest aggregations in the archipelagos around the mouth of the Oslo Fjord (Figures 2 and 3) where flocks of more than 100 birds were numerous.

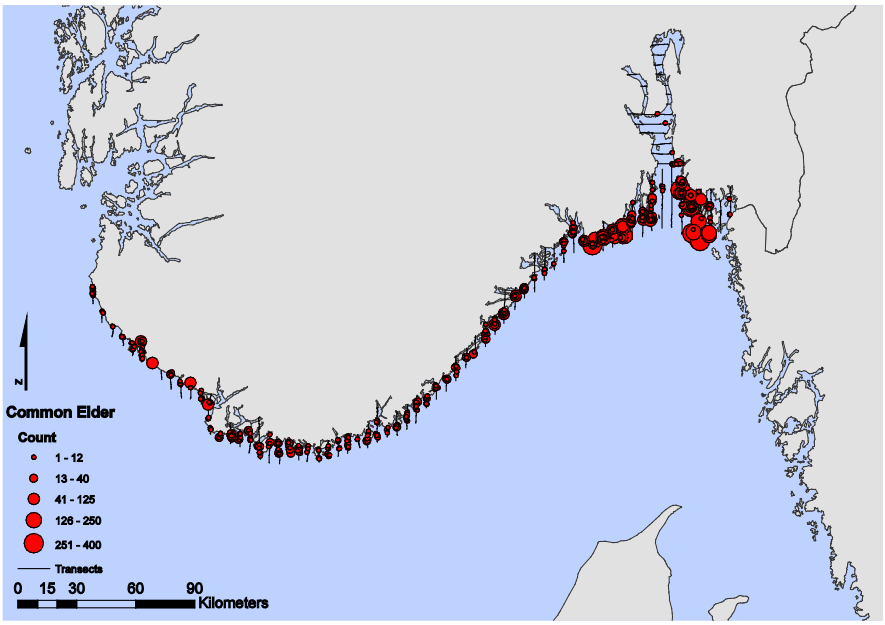

Figure 2

Distribution of Common Eider observed during aerial survey in February 2009.

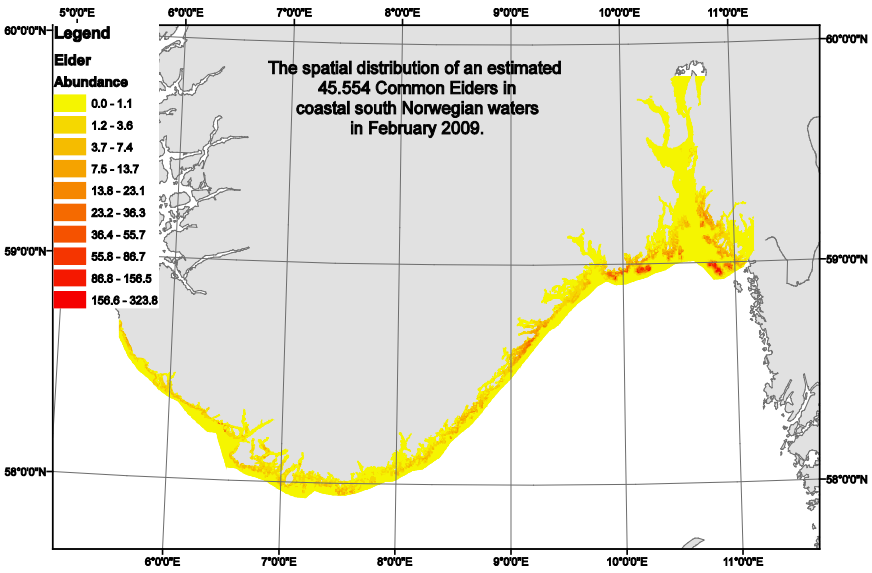

Figure 3

The spatial distribution of 45 554 common eiders in coastal waters of southern Norway in February 2009. Abundance is expressed as numbers of individuals/km^2.

A total of 1178 red-breasted mergansers were registered along the Skagerrak coast. The majority of these birds were observed along the coast of Vestfold County (Figures 4 and 5) and outside the mouth of the Oslo Fjord where flocks of up to 150 birds were seen.

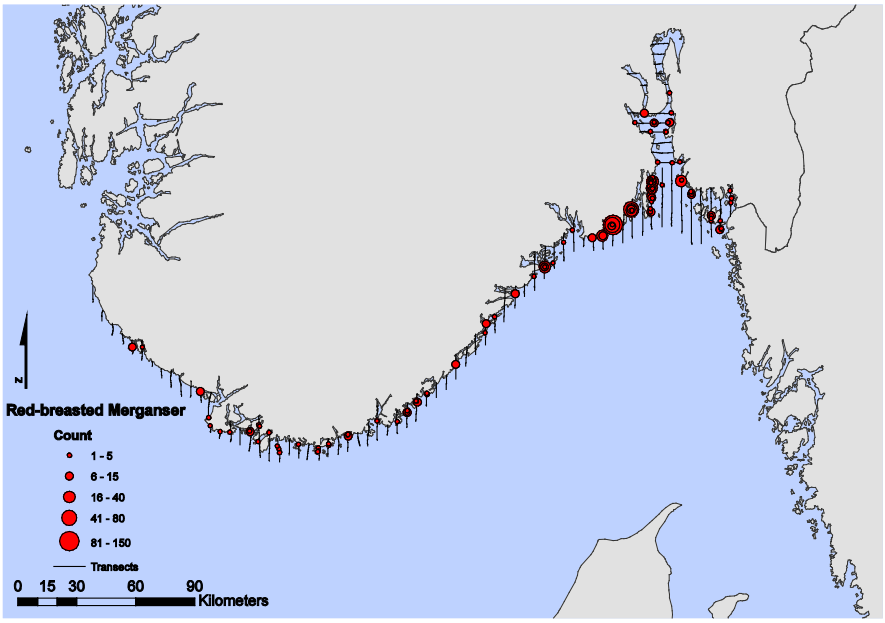

Figure 4

Distribution of red-breasted merganser observed during the aerial survey in February 2009.

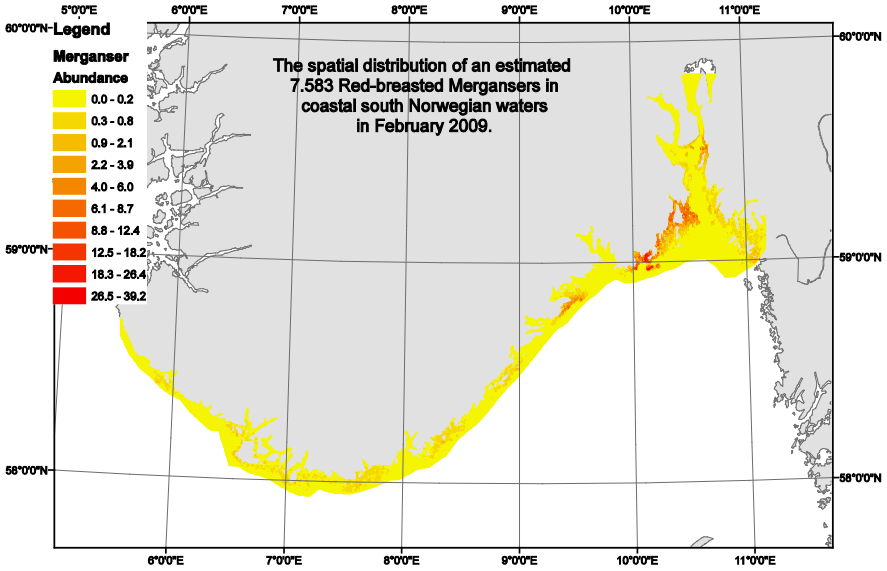

Figure 5

The spatial distribution of 7583 red-breasted mergansers in coastal waters of southern Norway in February 2009. Abundance is expressed as numbers of individuals/km^2.

The aerial survey was judged as a very effective way to get data on the abundance and distribution of wintering seabirds along an extended coastline within a limited timeframe. The survey was performed during excellent weather conditions, which greatly influenced the success of the project. Based on this experience, project plans have been developed to conduct a similar survey along the coast from Rogaland to the Lofoten area.

References

Petersen, I. & Nielsen, R.D. in prep. Distribution of wintering birds in Southern Norway. NERI Technical report.

Petersen, I.K., Pihl, S., Hounisen, J.P., Holm, T.E., Clausen, P., Therkildsen, O.R., Christensen, T.K. 2006. Landsdækkende optælling af vandfugle januar-februar 2004. Danmarks Miljøundersøgelser, Aarhus Universitet.

Cover photo:
Many small islands and rocks are found along the coast of Southern Norway. Common eiders, gulls and cormorants were the most abundant seabirds in these habitats. *(© R. Due Nielsen / I. Krag Petersen)*

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SEAPOP (SEAbird POPulations) is a long-term monitoring and mapping programme for Norwegian seabirds that was established in 2005 and implemented on the full national scale in Norway, Svalbard and adjacent sea areas in 2008. The programme is financed by the Ministry of the Environment, the Ministry of Petroleum and Energy and the Norwegian Oil Industry Association, and aims to provide and maintain the most important base-line knowledge of seabird distribution, demography and ecology needed for an improved management of these marine environments. More info about SEAPOP is found on the programme's web site www.seapop.no, including an up-to-date list of associated publications from which all reports can be freely downloaded as pdf documents.

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