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Key-site monitoring in Vest-Agder in 2009

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2009 was the second season of the SEAPOP programme in Vest-Agder, and four islands in the county; Slettingene (57°57'N 07°29'E), Storøy (57°59'N 07°26'E) and Klovholmene (58°00'N 07°19'E) in Mandal municipality, and Rauna (58°03'N 06°40'E) in Farsund municipality were surveyed. These sites were established as a multi-location SEAPOP key-site on the border between the Skagerrak and North Sea regions in 2008 (Lorentsen et al. 2009). Some of these islands have been monitored since the mid 1970s (e.g. Olsen 2008, Lorentsen & Christensen-Dalsgaard 2009, Table 1) and, thus, constitute a good basis for future work. As in 2008, data on reproductive performance were collected for the common eider, the continental subspecies of the cormorant (ssp. *Phalacrocorax carbo sinensis*), the lesser black-backed gull (ssp. *Larus fuscus intermedius*) and the herring gull, which all breed in significant numbers on the selected sites.

Unfortunately, the work on Rauna has proved to be more difficult than expected. This is mainly due to the density of breeding birds and the mixture of several species, both vulnerable ones and predators. In 2009, this resulted in high egg and chick losses for some species and some unreliable data for the project species. The future feasibility for the SEAPOP project on this location is therefore uncertain, at least without changing some of the methods used. Similar problems were not experienced on the other three localities as they are more uniform colonies with fewer species at lower densities.

Population trends

In Vest-Agder, the cormorant first bred at Rauna in 2003 when 7 pairs were registered. Since then the population has increased reaching 254 pairs in 2009, with an increase of 4.5% since 2008 (Figure 1). In 2009, a new, satellite colony was found at Rauna on the opposite side of the island in relation to the original. Both sub-colonies are within the only two areas where the herring gull is the most numerous species, a situation which complicates the research on the latter.

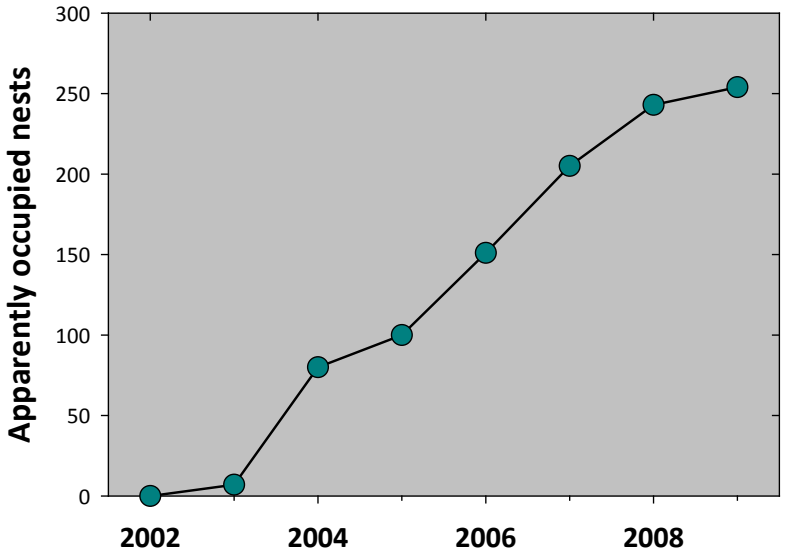

Figure 1
Population development of cormorants at Rauna.

Table 1 *Key population parameters (SE, n) of seabirds on the different sites in Vest-Agder in 2009. Population change is the numeric change in size of the breeding population registered between 2008 and 2009 on the basis of total censuses (t). For each species, the listed survival estimate was derived from the model that best fitted the data set (models covering more than two time spans are adjusted for median c-hat).*

Species	**Population change**	**Annual adult survival**		**Reproductive performance**	
		Period (yrs)	Estimate %	Sampling unit	Estimate
Cormorant	+ 4.5%	No estimate yet possible [1]		Clutch size	2.70 (0.09, 254)
				Large chicks/nest	1.78 (*n*=254)
Common eider	– 24.2%			Clutch size	3.19 (0.12, 121)
				Small chicks on sea	0.77 (*n*=401) [2]
				Large chicks on sea	0.41 (*n*=401) [2]
Lesser black-backed gull					
Slettingene	– 7.5%	2006-09 (3) [3]	82.6 (3.4, 115)	Clutch size [4]	2.72 (0.07, 109)
				Fledged juv./pair	1.29 (*n*=112)
Storøy	– 18.8%	See estimate above [3]		Clutch size [4]	2.63 (0.04, 534)
				Fledged juv./pair	0.89 (*n*=560)
Klovholmene	– 6.8%	See estimate above [3]		Clutch size [4]	2.61 (0.06, 254)
				Fledged juv./pair	0.96 (*n*=260)
Rauna	+ 1.1%	1999-09 (10)	85.1 (1.4, 480)	Clutch size [4]	2.71 (0.10, 21)
				Fledged juv./pair	0.91 (*n*=2275)
Herring gull					
Slettingene	+ 31.9%	No estimate yet possible		Clutch size [4]	2.77 (0.06, 62)
				Fledged juv./pair	0.88 (*n*=120)
Storøy	– 16.4%	No estimate yet possible		Clutch size [4]	2.54 (0.08, 121)
				Fledged juv./pair	0.82 (*n*=184)
Klovholmene	– 3.4%	No estimate yet possible		Clutch size [4]	2.18 (0.20, 34)
				Fledged juv./pair	1.75 (*n*=57)
Rauna	+ 42.5%	2007-09 (2)	77.7% (7.6, 55)	Clutch size [4]	2.86 (0.07, 22)
				Fledged juv./pair	0.37 (*n*=570)

1) *Colour-ringing of chicks for later monitoring of survival rates was initiated in 2008;* ***2)*** *See text for description on how these estimates were obtained;* ***3)*** *Applies for Slettingene, Storøy and Klovholmen as one;* ***4)*** *Empty nests included.*

Table 2 *Population sizes (number of apparently occupied nests) of cormorant, common eider, lesser black-backed gull and herring gull on the four SEAPOP key-site colonies in Vest-Agder in 2009.*

Species	**Slettingene**	**Storøy**	**Klovholmene**	**Rauna**	**Total**
Cormorant	0	0	0	254	254
Common eider	Not assessed	Not assessed	Not assessed	401	
Lesser black-backed gull	112	560	260	2275	3207
Herring gull	120	184	57	570	931

Figure 2 *(and cover photo)*
Mixed colony of cormorants, lesser black-backed gulls and herring gulls at Rauna. The photo was taken on 6 July and shows almost fledged juveniles of cormorant, adult herring gulls and both adults and large chicks of lesser black-backed gulls. Great black-backed gulls, oystercatchers, common eiders and greylag geese also nest in the same area. This illustrates the difficult conditions for field work in many parts of the island due to the disturbance imposed. (© Tor A. Olsen)

The common eider has been monitored in Vest-Agder since 1988 using aerial surveys of adult males in the breeding areas, boat surveys in Farsund and by post-hatching counts of nests on Rauna. The counts of adult males from boat early in the breeding season in Farsund correlate well with the nest counts at Rauna. For this report we have therefore analysed only the nest counts at Rauna, where the breeding population has increased at an annual rate of 10.1% since 1988, but with a recent decrease of 24% from 2008 to 2009 (Table 1), when the colony counted 401 nests.

In the colonies monitored through the National Monitoring Programme for Seabirds, the breeding population of the lesser black-backed gull in Vest-Agder has decreased at an annual rate of 2.3% in 1988-2009, whereas that of the herring gull increased at an annual rate of 2.2% in the same period. For both species, the annual rates of change were higher over the last ten years (2000-2009), –6.4% and +3.7% for lesser black-backed gulls and herring gulls, respectively. For the lesser black-backed gull, the rate of change between 2008 and 2009 ranged from –19% (Storøy) to +1% (Rauna), with an overall decrease of 4%. For the herring gull the overall rate of change between 2008 and 2009 was +21%, ranging from –16% (Storøy) to +42.5% (Rauna). For both species, the general population trend at the key-sites for the last decade corresponds to that in the whole of Vest-Agder. The reasons for the large differences between years are probably mixed, including movements of breeding birds

between different colonies and different proportions of established breeders deferring to breed in different years. There were also problems in distinguishing lesser black-backed gull and herring gull nests when counting in the colonies. Counts from photographs of adult birds present in the colony have been tried at Rauna, but with no particular success. The presence of the two species seems to vary with time, perhaps due to the inter-specific differences in feeding habits and timing of breeding.

Reproductive success and food supply

The cormorant clutch size averaged 2.7 eggs or small chicks per nest when counted on 14 May, whereas 1.78 chicks per nest were registered on 6 July by counting large chicks and juveniles in the colony on a number of photos taken from a distance. The breeding success of cormorants in 2009 was lower than in preceding seasons, but was still good. A total of 70 chicks (most of them about 2-3 weeks old) were colour-ringed for later monitoring of survival rates. Pellets and food loads were collected from the cormorants in connection with the nest counting and chick ringing, but these still have to be analysed.

The clutch size of the common eider at Rauna averaged 3.19 eggs per nest on 5 June. At this time as many as 30% of the clutches were still unhatched. This was the second consecutive season with such a late hatching date. Production is measured by counting chicks on the water along the beaches of the mainland, where all the broods quickly relocate. This is done twice per season. The number of small chicks observed soon after the majority of the nest had hatched was only 0.77 chicks per nest. Approximately 40 days later, the number of remaining large chicks/juveniles was 0.41 per nest. Although more than one in two had survived the period, this is considered to be a poor result. Compared to previous years, 2009 differed with a very poor hatching success, or alternatively, large losses of chicks immediately after hatching. Chick survival for those that managed to move away from the nest site at Rauna to their normal foraging areas, was however considered to be normal.

The mean clutch sizes (including empty nests) of lesser black-backed gulls ranged from 2.61 to 2.72 eggs per nest among the four colonies (Table 1), whereas those of herring gulls in the same colonies ranged from 2.18 to 2.86 eggs per nest. The timing of the registration of clutch size could very well be the main reason for the latter variance, since egg predation is frequent and causes decreased clutch size at the end of the incubation period.

Gull chick production was estimated using three methods. At Slettingene and Klovholmene, where the breeding season was quite synchronous, fledged young were counted, whereas at Rauna the number of fledged juveniles was estimated twice during the chick-rearing period using capture-mark-recapture of ringed chicks combined with counts of dead chicks and juveniles after the first count. At Storøy, the numbers of large chicks and juveniles with and without colour rings were used to estimate total production. In 2009, the production of fledged juveniles of lesser black-backed gull was probably the best for the last 15 years. The majority of all colonies, both the SEAPOP sites and other localities, had high numbers of juveniles at the end of the breeding season. At the SEAPOP sites, the mean number of fledged juveniles per pair varied from 0.89 to 1.29 among the colonies, with an overall mean of 0.92 (*n*=3207). Herring gull breeding success varied more, from 0.37 to 1.75 with an overall mean of 0.61 (*n*=931). However, the low estimate of chick production for herring gulls at Rauna (0.37 juv./pair, Table 1) is uncertain due to a very small sample size used in the capture-

mark-recapture method. Additional counts of juveniles here were also carried out too late. The general impression was that herring gull had poorer chick production than lesser black-backed gull at this locality. The overall breeding success in 2009 was, nevertheless considered as good for both gull species.

In Vest-Agder, the gulls have been ringed to monitor adult survival since 1995, mostly through the colour-ringing of chicks. This project will continue in SEAPOP and will, in some of the sites, be supplemented with ringing of breeding adults. Experience from previous years indicates that a significant proportion of the individually colour-ringed chicks recruit into the breeding populations at the key-site colonies, and can thus be used for later monitoring of adult survival. In 2009, 432 adult breeding lesser black-backed gulls and 117 adult breeding herring gulls carrying coded colour rings were identified at the four SEAPOP sites, and a further 959 lesser black-backed gull chicks and 237 herring gull chicks were ringed.

A total of 26 food loads (mainly regurgitations of chicks) from lesser black-backed gulls and six food loads from herring gulls were collected in 2009, but have yet to be analysed.

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