



## Key-site monitoring in Vest-Agder in 2008

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In 2008, four islands in the county of Vest-Agder; Slettingen (57°57'N 07°29'E), Storøy (57°59'N 07°26'E), Klovholmene (58°00'N 07°19'E) and Rauna (58°03'N 06°40'E) were established as a multi-location SEAPOP key-site at the border between the Skagerrak and North Sea regions. 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 the work to be continued for the coming years. Since ca. 85% of the seabird fauna in the southern part of Norway are gulls (*Larus* spp.) and terns (*Sterna* spp.) (Barrett et al. 2006), some of these species have been selected as target species for the key-site monitoring. In addition, the continental subspecies of cormorant *Phalacrocorax carbo sinensis*, which is currently expanding fast in numbers and distribution in southern Norway, was also selected as an important key-site species. In 2008, data on reproductive performance were therefore collected for cormorant (Figure 1), lesser black-backed gull *Larus fuscus intermedius* (Figure 2) and herring gull *L. argentatus*, which breed in significant numbers on the selected sites (Table 2).

### Population trends

In Vest-Agder, the cormorant first bred at Rauna in 2003 with 7 pairs. The population here has since increased to 243 pairs in 2008, including an 18.5% increase since 2007 (Table 1). The large increase is mainly due to immigration from other colonies, as supported by observations of at least two breeding birds in 2007 that had been ringed as chicks at Toft Sø, Jylland, Denmark in 2004 and one in 2008 that had been ringed as a chick at Øra, Fredrikstad, Norway in 2005 (Olsen 2007, 2008).



**Figure 1**

Nils H. Lorentzen (left) and Morten Helberg colour-ringing cormorant chicks at Rauna, Vest-Agder on 24 May 2008. (© K.S. Olsen).



**Map:** Dispersal of three cormorants that were ringed as chicks at Toft Sø, Jylland (2) and Øra, Østfold (1), and found breeding at Rauna three years later.

**Table 1** Key population parameters (SE, n) of seabirds on the different localities in Vest-Agder in 2008. Population change is the numeric change in size of the breeding population registered between 2007 and 2008 on the basis of total censuses (t).

Species	Population change	Annual adult survival		Reproductive performance	
		Period (yrs)	Estimate %	Sampling unit	Estimate
Cormorant	+ 18.5%	No estimate yet possible <sup>1</sup>		Clutch size	3.29 (0.11, n=96)
				Chicks/nest	2.30 (n=243)
Common eider	+ 14.2%			Clutch size	3.63 (n=59)
Lesser black-backed gull		Existing data not yet analyzed			
Slettingen	- 42.7%			Clutch size <sup>2</sup>	2.14 (0.10, n=112)
				Clutch size <sup>3</sup>	2.38 (0.08, n=101)
Storøy	+ 0.6%			Fledged juv/pair	0.03 (n=121)
				Clutch size <sup>2</sup>	2.26 (0.04, n=690)
Klovholmen	+ 96.5%			Clutch size <sup>3</sup>	2.55 (0.03, n=610)
				Fledged juv/pair	0.57 (n=690)
Rauna	- 26.7%			Clutch size <sup>3</sup>	2.85 (0.37, n=20)
				Fledged juv/pair	0.25 (n=279)
Rauna	- 26.7%			Clutch size <sup>3</sup>	2.50 (0.17, n=20)
				Fledged juv/pair	0.53 (n=2250)
Herring gull		Existing data not yet analyzed			
Slettingen	- 12.5%			Clutch size <sup>2</sup>	2.70 (0.06, n=91)
				Clutch size <sup>3</sup>	2.73 (0.06, n=90)
Storøy	+ 32.5%			Fledged juv/pair	1.32 (n=91)
				Clutch size <sup>2</sup>	2.61 (0.07, n=90)
Klovholmen	+ 96.7%			Clutch size <sup>3</sup>	2.64 (0.06, n=89)
				Fledged juv/pair	0.91 (n=220)
Rauna	+ 29.0%			Clutch size <sup>3</sup>	2.90 (0.07, n=20)
				Fledged juv/pair	1.19 (n=59)
Rauna	+ 29.0%			Clutch size <sup>3</sup>	2.81 (0.12, n=21)
				Fledged juv/pair	0.76 (n=400)

1) Colour-ringing of chicks for later monitoring of survival rates was initiated in 2008; 2) Empty nests included; 3) Empty nests not included.

**Table 2** Population sizes (number of apparently occupied nests) of cormorant, lesser black-backed gull and herring gull on the four SEAPOP key-site colonies in Vest-Agder in 2008.

Species	Slettingen (Mandal)	Storøy (Mandal)	Klovholmene (Mandal)	Rauna (Farsund)	Total
Cormorant	0	0	0	243	243
Lesser black-backed gull	121	690	279	2250	3340
Herring gull	91	220	59	400	770



**Figure 2** (and cover photo)  
Female lesser black-backed gull  
'JVR2' with her mate at Rauna  
on 10 May 2008. (© K.S. Olsen)

The common eider *Somateria mollissima* has been monitored in Vest-Agder since 1988 using aerial surveys of adult males in the breeding areas, boat surveys in the municipality of Farsund and, since 1989, by counts of nests at the island of Rauna. For this report we have used the post-hatching nest counts at Rauna where the breeding population has increased at an annual rate of 13.0% in the period 1989-2008 and 14.2% from 2007 to 2008 (Table 1), when the colony counted 529 nests. Compared to the overall results from the aerial counts of males in Vest-Agder, which indicate a 0.6% annual rate of increase in 1988-2008 (Lorentsen & Christensen-Dalsgaard 2009), the development of the eider population at Rauna has been extremely positive. The reasons for the huge increase at Rauna are unknown, but restrictions to human traffic in the nature reserve are probably very important (Olsen 2008).

In the colonies monitored through the National monitoring programme for seabirds, the breeding population of the lesser black-backed gull *Larus fuscus intermedius* in Vest-Agder decreased at an annual rate of 2.1% in 1988-2008, whereas that of the herring gull *L. argentatus* increased at an annual rate of 1.8% in the same period. For both species, the annual rates of change have been lower over the last ten years (1999-2008) than in the whole period monitored; -6.3% and +0.3% for lesser black-backed gulls and herring gulls, respectively. Rates of change from 2007 to 2008 were extremely variable between the different key-site colonies (Table 1). For the lesser black-backed gull, the rate of change between 2007 and 2008 ranged from -43% (Slettingen) to +97% (Klovholmen), with a mean of +6.9%, whereas the annual rate of change for the herring gull ranged from -13% (Slettingen) to +98% (Klovholmen), with a mean of +36.4%. The reasons for these large differences are probably mixed, including inter-annual movements of breeding birds between the different colonies, different proportions of the established breeders deferring to breed in different years, and possibly also some problems with distinguishing between lesser black-backed gull and herring gull nests when counting in the colonies.

### Reproductive success and food supply

The cormorant colony was only visited once in 2008, on 24 May, when clutch size averaged 3.3 eggs per nest, whereas 2.3 chicks per nest were registered on 5 July by counting visible chicks in the nests

on a number of photos of the colony taken from a distance. The breeding success for cormorants in 2008 was judged as good, and the 21 largest chicks (about 2 weeks old) were colour ringed for enabling later monitoring of survival rates (Figure 1).

The mean clutch size (when excluding empty nests) of lesser black-backed gulls ranged from 2.4 to 2.9 eggs per nest among the four colonies (Table 1), with an overall mean of 2.5 eggs per nest ( $SE=0.03$ ,  $n=751$ ), whereas that of herring gulls in the same colonies was more stable and ranged from 2.6-2.9 eggs per nest, with an overall mean of 2.7 eggs per nest ( $SE= 0.04$ ,  $n=220$ ).

Gull chick production was estimated using three methods. At Slettingen 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. Again production was much more variable in the lesser black-backed gull than in the herring gull (Table 1). In the former, the mean number of fledged juveniles per pair varied from 0.03 to 0.6 among the colonies, with an overall mean of 0.5 ( $n=3340$ ), whereas that in herring gulls varied from 0.8 to 1.3 with an overall mean of 0.9 ( $n=770$ ). The overall breeding success in 2008 was judged as moderate for the lesser black-backed gull, and good for the herring gull.

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 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 monitoring of adult survival. In 2008, 340 adult breeding lesser black-backed gulls and 100 adult breeding herring gulls carrying coded colour rings were identified at the four SEAPOP sites, and a further 732 lesser black-backed gull chicks and 272 herring gull chicks were ringed. Data to estimate adult survival from previous years have not yet been made available for the programme.

A total of 28 food loads (mainly regurgitations of chicks) from lesser black-backed gulls and four food loads from herring gulls were collected in 2008, but have not yet been analysed.

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