

A progressively earlier pupping season of the common seal (*Phoca vitulina*) in the Wadden Sea

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INTRODUCTION

Common seals (*Phoca vitulina vitulina*) give birth in the Wadden Sea area during the summer months. The Wadden Sea is an area which is intensively used by humans both for economical and recreational purposes. Orphaned pups found along the coastline are brought to the Seal Rehabilitation and Research Centre (SRRC) in Pieterburen for rehabilitation. The SRRC has rehabilitated seals from the Wadden Sea, North Sea and the Dutch Southwest Delta waters, since 1971. The seals that undergo rehabilitation are orphaned pups and sick or injured seals, mostly of common seals and grey seals (*Halichoerus grypus*).

ADVANCED PUPPING SEASON

Over time, the pupping season has advanced in this region. Analysis of stranding dates of orphaned pups admitted for rehabilitation, revealed a shift of, on average, 0.86 days forward each year over the period 1974-2008, with a total advance of 26 days.

The dataset (N=310) includes only seals stranded in the Wadden Sea region. The dataset includes only pups which still had an umbilical stub on the day of stranding as these are the youngest pups with the shortest time lapse between birth date and stranding date. The stranding dates were converted into day of the year (Jan 1=1), taking the leap years into consideration.

OTHER AREAS

An advanced pupping season was also described for common seals in German waters by Abt (2005). In contrast to the advance observed in the current study, a progressive delay in mean birth date was observed for common seals (*Phoca vitulina concolor*) on Sable Island, Canada (Bowen et al., 2003). A temporal shift in pupping dates have also been observed for common seals (*Phoca vitulina richardii*) on Tugidak Island in Alaska (Jemison and Kelly, 2001).

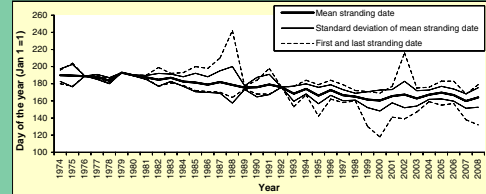


Fig. 1. Stranding dates of orphaned pups with an umbilical stub per year, showing mean date with standard deviations and the dates of the first and last stranding.



CHANGES IN THE REPRODUCTION CYCLE

Although the pupping season became progressively earlier, there were no indications of any negative impact on the condition of the pups. The reproduction cycle can be changed in two ways, namely through changing the timing of implantation or through changes of the period of active gestation. A change in implantation may not express itself in any consequences for the pup, whereas change in the gestation period is likely to. As no effects on the condition of the pups were observed in this shift of nearly a month, we conclude that a change in the termination of the delayed implantation period has probably occurred. It appears that there is more flexibility than expected from a photoperiod-cued mechanism.

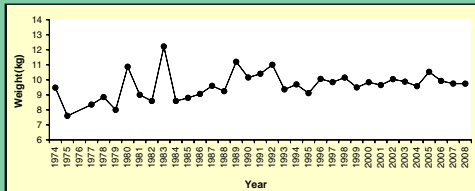


Fig.2. The annual average weight of stranded pups with an umbilical stub.



DISCUSSION

Shifts in phenology could reflect an adaptive response of the animals to altered local circumstances, which may ultimately be induced by larger scale phenomena, such as food availability or climate change. Shrimp is an important component of the weaned seals diet and Beukema (1992) found a correlation between shrimp recruitment and temperature for the Wadden Sea. We therefore hypothesize that the common seals in the Wadden Sea have changed their phenology cycle in response to altered peaks in food abundance in the Wadden Sea.

During recent years the mean stranding date of seals has not advanced to dates earlier than day 160, perhaps indicating that the maximal forward timing of females has been reached. If the physiological constraints of seals are indeed being approached, this may result in a mismatch between trophic levels.



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