

Case study on potential barrier effects of the Great Belt Bridge, Denmark, on harbour porpoises (*Phocoena phocoena*)



by

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SUMMARY

This study addresses potential barrier effects of the planned Fehmarnbelt fixed link on harbour porpoises.

Visual observations along the Great Belt Bridge did not reveal a general avoidance reaction of porpoises towards the bridge.

Ongoing investigations will address more specifically whether porpoises alter their behaviour in close proximity to the bridge as compared to further away. It may also show whether the bridge might act as an artificial reef providing a new feeding ground.

INTRODUCTION

Fehmarnbelt A/S has planned to construct a fixed link crossing the Fehmarnbelt from Puttgarden to Rødby.

Even though some observations of marine mammals close to bridges exist (Wilson *et al.*, 1997, Hastie *et al.*, 2004), there is limited knowledge on the potential barrier effect that bridge pillars may impose. With regards to the planned bridge, this issue is especially relevant as the bridge is planned at a strategically important location for regional movements between the two subpopulations of harbour porpoises in the Baltic Sea.

Investigations at the already existing Great Belt Bridge, Denmark, presented a good opportunity to study reactions of porpoises towards bridges. Results of this study will be used for the Environmental Impact Assessment of the planned Fehmarnbelt Fixed Link.

STUDY SITE/ METHODS

The Great Belt divides the islands of Funen and Zealand. High porpoise abundance was found around the Great Belt Bridge (Teilmann *et al.* 2008).



Fig. Study site. Numbers 1-8 indicate observation points along the bridge to record porpoise behaviour under influence of the bridge.

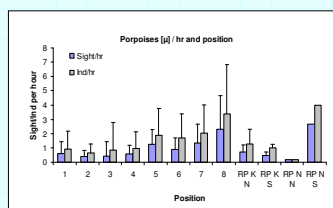
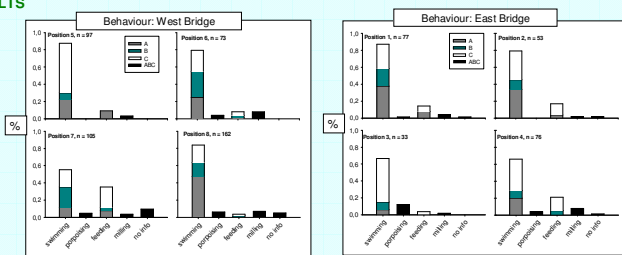
Porpoise behaviour was observed at 4 positions at each end of the bridge on the mainland and at 4 positions on Sprogø. Additionally, 4 reference points at 5 km distance north and south of the bridge were used to record porpoise behaviour without influence of the bridge. Each observer monitored an area 3 km ahead in a 90° angle, which was subdivided into sections A, B and C.

Fig. Map shows scan areas at Positions 5 and 8. Each scan area is divided into sections A, B, and C. Area covered with each section see inset table.



For each observation number of animals, age, behaviour and swimming direction were recorded. Behaviour was classified as resting, feeding, porpoising and swimming. Further it was noted whether porpoises swam underneath the bridge. Environmental data were recorded every 30 min.

RESULTS



From Jul. to Nov. 2009 447 hours of observing were achieved with a clear peak of sightings in August.

In total, 380 observations were recorded with 662 porpoise individuals.

13,3% of all sightings included a calf.

Mostly „swimming“ was noted followed by „feeding“, „milling“ and lastly „porpoising“ with a significantly higher amount of feeding activity at Position 7 ($p < 0.000$, $\chi^2 = 30.41$).

Highest no. of observations were generally noted along the West Bridge (especially at Position 8 with 2.3 sightings/hr).



19 porpoises were observed directly under the bridge.

DISCUSSION

Since some individuals were seen crossing underneath the bridge, and high sighting rates occurred in the vicinity of the bridge, it can be concluded that there is no general avoidance reaction of harbour porpoises towards the bridge in a way that it constitutes a complete barrier to porpoise movement.

Due to the inability to identify individual porpoises from sightings, we can not address inter-individual differences. This will only be possible by analysing radio-tracking data. Thus the possibility that the bridge acts as a barrier to a certain percentage of porpoise individuals still exists.

Focus of the next field season will be intensified observations at reference points to be able to better compare porpoise behaviour and to see whether more feeding occurs in close vicinity of the bridge.

A C-POD study along the bridge and aerial surveys further deliver complementary results.

Literature cited:
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