Agenda Item 5.5: Disturbance by high-speed ferries

Report on the potential impact of high-speed ferries on small cetaceans in the ASCOBANS Area and adjacent waters

Submitted by the Secretariat

NOTE FROM THE SECRETARIAT:
IN THE INTERESTS OF ECONOMY, DELEGATES ARE KINDLY REMINDED TO BRING THEIR OWN COPIES OF THESE DOCUMENTS TO THE MEETING

Report on the potential impact of high-speed ferries on small cetaceans in the ASCOBANS Area and adjacent waters

by Holger Auel, ASCOBANS Secretariat

Data sources

- the Parties' replies to a questionnaire distributed by the Secretariat;
- supplementary information from travel agencies, shipping companies, internet and press articles collected by the Secretariat;
- a letter by Olaf G. Christiani from the Danish Ministry of Environment and Energy summarising the results of the Danish study.

A. High-speed ferry routes in the Baltic and North Seas

A table of high-speed ferry connections in the Baltic, North and Irish Seas is appended as Annex A. According to this compilation about 40 fast ferry routes are operating in the ASCOBANS Area and adjacent waters. The listing may not be complete, since not all Parties responded to the questionnaire and many new connections have recently been established or will be in service soon.

Massive concentrations of high-speed ferry routes occur at three "hot-spots": in the English Channel, in the Irish Sea and within the Inner Danish Waters (Kattegat and Belt Sea).

B. Potential disturbance of small cetaceans by high-speed ferries

Two scientific studies have been conducted to evaluate the potential effects of high-speed ferries on small cetaceans in the ASCOBANS Area. The results of both investigations are summarised below.

1) Durlston Marine Research Area – Bottlenose dolphins *Tursiops truncatus*

Study area

Durlston Marine Research Area (MRA) is located on the English south coast, near Bournemouth. The exact position is on the southeast tip of Purbeck, near Swanage in Dorset. The western limit of the MRA is Anvil Point, the eastern limit Peveril Point, giving a total coastline of approximately 2.75 km (Browning 1997).

Cetacean population

In 1988 it was recognised that bottlenose dolphins *Tursiops truncatus* frequent the waters off Durlston. The abundance of bottlenose dolphins is highest in April/May and in October/November. A recorded increase in annual sighting rates from 1988 to 1996 may not reflect a positive trend in abundance, but an increase in sighting effort.

Sightings of common dolphins *Delphinus delphis* and long-finned pilot whales *Globicephala melas* are occasionally reported. Although anecdotal records from the middle of this century refer to a local population of harbour porpoise *Phocoena phocoena*, there have been very few recent records of this species (Browning 1997).

The study described here concentrated on a semi-resident group of bottlenose dolphins, comprising at least 5 individuals

High-speed ferry route

On 1st March 1997, Condor Ferries introduced a high-speed ferry service between Poole, on the central southern coast of England, and the Channel Islands. "Condor Express" is a wave-piercing catamaran with a top speed of 41 knots (76 km/h); it is the fastest ferry operating in the UK. The ship is 86 metres in length, 26 metres wide and has a draught of 3.5 meters when planing. The ferry's course takes it through the Durlston Marine Research Area four times per day and it passes Durlston Head at a distance of approximately 2 km.

Study design and results

Browning et al. (1997) assessed the acoustic signature of the "Condor Express". Compared with conventional ferries that ply the same route, the noise output from the catamaran is much greater and therefore perceived over an extended range.

The dominant emissions within the frequency range 100 Hz to 20 kHz are two discrete narrow output peaks around 500 Hz. This noise is directional and strongest directly ahead of the vessel. The two peaks may be caused by the turbo blowers on the propulsion engines. Machinery noise also produces a continuous spectrum across the range of 100 Hz to above 5 kHz with highest output levels below 1 kHz. Besides machinery, the major noise source is the large amount of displaced water falling back and impacting the sea surface. This causes a significant contribution to the noise levels in the higher part of the spectrum, particularly above 10 kHz (Browning et al. 1997).

The 500 Hz lines may have the potential to cause disturbance to the bottlenose dolphins in the MRA because of the discrete nature of the spectrum compared with ambient noise. The other effect of the noise is that of raising the wideband noise levels and therefore reducing the range over which the animals can use their own sounds. This is particularly true in the 10-20 kHz part of the spectrum where the animals use tonals to communicate. The opinion of the authors is that this is unlikely to have a major impact on the study animals as most observed tonal usage is for short-range inter-animal communication where signal to noise ratios are so high that raising the ambient noise by 30 dB will have little affect. Similar increases in background noise level are regularly recorded from natural phenomena, such as storms or spring tides.

In order to address the issue of potential disturbance by the new ferry service, the number and timing of dolphin sightings recorded since the service commenced are compared with those from previous years. Fig. 1 displays the number of days on which bottlenose dolphin sightings were recorded from March 1997 to the end of September 1997 in comparison with sighting rates during the same seven month period from 1991 to 1996. The frequency of dolphin sightings for 1997 is well within the range for the period 1991-1996, falling within 1 standard deviation of the mean (mean = 45.5, standard deviation = 22.7). This result suggests no depression in sightings frequency since the ferry service began (Browning et al. 1997).

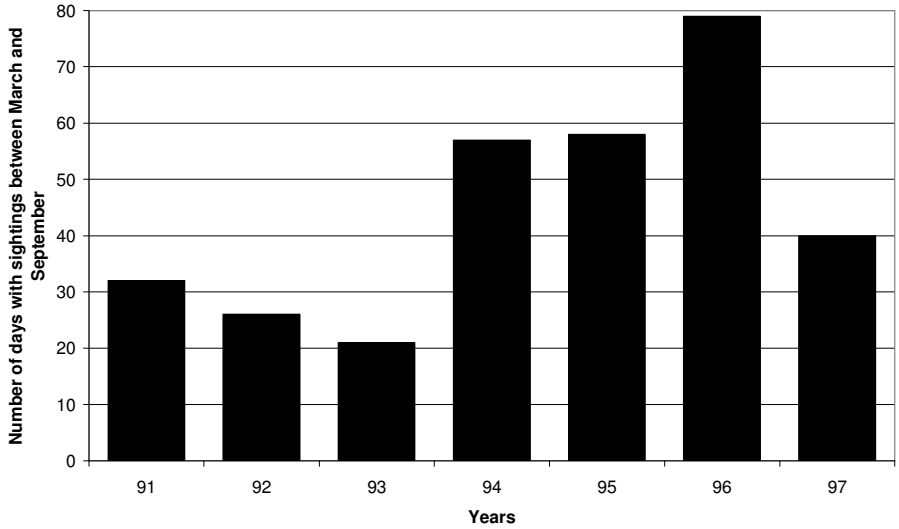

Fig. 1 Number of days with dolphin sightings between March and September per year before (1991-1996) and after (1997) the establishment of the high-speed ferry route.

Thus, the dolphin sightings analysis shows no discernible affect on the number or timing of sightings. However, the analysis is weakened by the lack of correction for study effort. On at least one occasion, dolphins have been sighted within minutes of the ferry's passage through the MRA, and dolphins have been observed to approach and bow-ride the ferry on its approach, at reduced

speed, to the Channel Islands. Both of these facts support the sightings analysis (Browning et al. 1997).

Besides the potential acoustic disturbance, which might be less problematic in this case, the high speed of the catamaran ferry may prevent marine mammals from being able to predict the path of, and hence avoid, the craft. There is thus a real risk that cetaceans may suffer physical damage from direct impacts with fast boats and vessels (Browning 1997).

2) Kattegat – Harbour porpoise *Phocoena phocoena*

Study period and area

The effects of high-speed ferries on seabirds, seals and porpoises were studied during three study periods: the summer of 1996, autumn of 1996 and spring of 1997. The studies were carried out in the EC-SPA (Specially Protected Area for Birds, according to the EC Birds Directive) between the Islands of Samsø and Vejrø in central Denmark (Kattegat Sea), where the high-speed ferries of Cat-Link pass through.

Study design and hypothesis

The behaviour of harbour porpoises was observed and their reactions to approaching ferries were recorded. The hypothesis to be tested with the traditional ferries of Ask/Urd (using the same route) as reference was "The passing of high-speed ferries does not disturb porpoises to a larger extent than traditional ferries".

In order to dismiss the hypothesis, the effects from high-speed ferries had to be larger than the effects from the traditional ferries. The behaviour of the wildlife was studied in general and in some experimental situations, where the speeds and routes of the ferries were varied.

Results and conclusions

The study showed the following results:

- Porpoises exhibited avoidance behaviour in 46% of the observations from Cat-Link compared to 33% in relation to Ask/Urd. However, it is not statistical significant that Cat-Link disturbs porpoises more than Ask/Urd.
- The average distance of avoidance for Cat-Link is a little larger than for Ask/Urd, although there is no statistically significant difference.

Thus, porpoises had a tendency to be more disturbed by high-speed ferries than by traditional ferries, but the tendency was not statistically significant, so that the hypothesis could not be dismissed. Whereas the high-speed ferries of Cat-Link disturbed seabirds more than the traditional ferries Ask/Urd, a similar effect on seals and porpoises could not be detected with certainty (Grøn & Buchwald 1997).

There is apparently no large difference in the effect of disturbance from the high-speed ferries Cat-Link in comparison to the conventional ferries Ask/Urd. The hypothesis that "The passing of high-speed ferries does not disturb porpoises to a larger extent than traditional ferries." could thus not be rejected. The conclusions should be adopted with reservations due to the data material's limited size and the large variation in the porpoise behaviour.

Irrespective of this result, high-speed ferries account for the largest part of the total disturbance as they sail more often than the traditional ferries (Grøn & Buchwald 1997).

References

Browning LJ (1997) Durlston Marine Research Area - a status report on the physical environment, wildlife and human use. Durlston Coastwatch report, Swanage, UK. 24 pp.

Browning LJ, Williams AD & Harland E (1997) Cetacean disturbance by high-speed ferries: a preliminary assessment. Proceedings of the Institute of Acoustics, Vol 19 Part 9:85-95

Grøn P & Buchwald E (1997) Effekter af hurtigfærgesejlads på havfugle, sæler og marsvin. Slutrapport. Skov- og Naturstyrelsen. Carl Bro & Bio/consult, Copenhagen. (Effects of high-speed ferries on seabirds, seals and harbour porpoises.)

Annex A: List of high-speed ferry connections in the ASCOBANS Area and adjacent waters

Name of craft	Route	Frequency	Speed km/h / knots	Capacity/Size
Baltic Sea				
Baltic Jet	Putbus ⇔ Swinemünde/Stettin		65/.	
Baltic Jet	Warnemünde ⇔ Gedser	1 daily	65/35	40 x 10 m
Baltic Jet	Warnemünde ⇔ Burgstaaken	1 daily	65/35	40 x 10 m
Flying Adler-Line	Sassnitz ⇔ Swinoujcie	2 daily	66/36	290 Pass.
Destination Gotland N.N.	Nynäshamn ⇔ Visby		./36	112 m
HSC Nordic Jet	Helsinki ⇔ Tallinn	3 daily	70/38	
Polferries Boomerang	Swinoujcie ⇔ Malmö		./36	82 m, 5330 gr. ton.
Scandlines Berlin Express	Rostock ⇔ Gedser	max. 6 daily		
TT Line Clipper Delphin	Trelleborg ⇔ Rostock	max. 3 daily	66/36	600 Pass., 175 Cars 82 m, 5333 gr. ton. 24000 kW
Kattegat & Belt Sea				
Flying Cat SAS (2 craft)	Malmö ⇔ Copenhagen	25 daily	65/36	180 Pass.
Mols-Linien	Sjællands Odde ⇔ Ebeltoft	16 daily		
Scandlines Cat-Link	Århus ⇔ Kalundborg	max. 12 daily	85/56	
Scandlines Felix	Dragør ⇔ Limhamn	max. 10 daily	./36	82 m, 5337 gr. ton.
Stena Carisma	Frederikshavn ⇔ Göteborg	4 daily	70/40	900 Pass., 210 Cars 84 m, 8631 gr. ton.
Superseacat One	Frederikshavn ⇔ Göteborg	3 daily	./42	100 m, 4465 gr. ton
North Sea				
Elbe-city-jets Hanseblitz	Hamburg ⇔ Stade	max. 22 daily		
Hanse Jet	Cuxhaven ⇔ Helgoland	3 daily	70/35	342 Pass, 40 x 10 m 2 x 2000 kW
Hansestar	Hamburg ⇔ Cuxhaven	2 daily	70/35	322 Pass, 33 x 10 m 2 x 1500 kW
Highspeed Cat No. 1	Norderney ⇔ Helgoland Cuxhaven ⇔ Helgoland		80/35-40	450 Pass, 52 x 13 m 9289 kW
Speedways MS Vargøy	Hamburg ⇔ Helgoland Helgoland ⇔ Cuxhaven	2 daily	65/36	230 Pass, 40 x 10 m 2 x 2700 kW
English Channel				
Channel Hoppers	Portsmouth ⇔ Channel Is.	1 daily	./32	164 Pass.
Varangerfjord				
Condor 9 & 10	Channel Is. ⇔ St. Malo		./35	450 Pass., 49 m
Condor Express	Poole ⇔ Channel Islands	2 daily	/40	774 Pass, 185 Cars
Condor 10/Vitesse	Weymouth ⇔ Channel Islands	1 daily	/38	774 Pass, 185 Cars
Holyman Diamant/Rapide (2 craft)	Dover ⇔ Ostend	max. 7 daily	/39	674 Pass, 155 Cars 81 x 26 m 4112 gr. ton.
Hoverspeed Great Britain	Folkestone ⇔ Boulogne	4 daily	70/35	600 Pass, 90 Cars 74 m, 3003 gr. ton.
P & O Stena Elite	Newhaven ⇔ Dieppe	3 daily	/37	600 Pass, 150 Cars
P&O SuperStar Express	Portsmouth ⇔ Cherbourg	max. 7 daily		900 Pass, 175 Cars
Red Funnel /Red Jet 1	Southampton ⇔ Isle of Wight		./34	138 Pass., 32 m
Red Funnel/Red Jet 2	Southampton ⇔ Isle of Wight		./34	138 Pass., 32 m
Red Funnel/Red Jet 3	Southampton ⇔ Isle of Wight		./33	190 Pass., 32 m
Red Funnel/Shearwater 5	Southampton ⇔ Isle of Wight		/35	67 Pass., 22 m
Red Funnel/Shearwater 6	Southampton ⇔ Isle of Wight		./35	67 Pass., 22 m
Seacat	Folkstone ⇔ Boulogne	6 daily		600 Pass, 80 Cars
Seacat Isle of Man	Dover ⇔ Calais	max. 4 daily	70/35	550 Pass, 80 Cars 57 m
Stena Discovery HSS	Harwich ⇔ Hoek van Holland	2 daily	/40	1500 Pass, 360 Cars
Wightlink (2 craft)	Portsmouth ⇔ Isle of Wight	ca. 24 daily	./30	440 Pass.

Name of craft	Route	Frequency	Speed km/h / knots	Capacity/Size
Irish Sea				
Jetliner	Larne ⇔ Cairnryan	max. 6 daily	./35	580 Pass, 160 Cars 95 x 17 m 4675 gr. ton.
Seacat Danmark	Isle of Man ⇔ Belfast, Dublin Liverpool	max. 2 daily	./35	550 Pass, 80 Cars 74 m, 3003 gr. ton.
Seacat Scotland	Stranraer ⇔ Belfast	4 daily	70/35	450 Pass, 80 Cars 74 x 26 m 3000 gr. ton.
Stena Explorer HSS	Dun Laoghaire ⇔ Holyhead	max. 6 daily	/40	1500 Pass, 360 Cars
Stena Lynx	Fishguard ⇔ Rosslare	max. 4 daily	/37	450 Pass, 84 Cars
Stena Voyager HSS	Stranraer ⇔ Belfast	5 daily	/40	1500 Pass, 375 Cars 127 x 40 m 19638 gr. ton.
Super Seacat Two	Liverpool ⇔ Dublin	max. 2 daily	./38	782 Pass, 178 Cars 100 m, 4700 gr. ton