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Cetaceans & Ship Strike Risk in the ASCOBANS Agreement Area

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ASCOBANS - International Agreement on the Conservation of Small Cetaceans in the Baltic, NE Atlantic, Irish & North Seas

(signed 1991; ratified 1994)



SHIPPING IN THE ASCOBANS AGREEMENT AREA



• Some of the busiest waterways in the world occur in NW Europe (Source: VOS data)

SPECIES WITH EVIDENCE OF PHYSICAL TRAUMA, UK CETACEAN STRANDINGS INVESTIGATION PROJECT, 1995-2010



15 (4%) n = 346

1 (6%) n = 16

OTHER CETACEAN SPECIES WITH SIGNS OF PHYSICAL TRAUMA IN THE ASCOBANS AREA



USE OF AIS & VOS DATA FOR PLOTTING SHIP DENSITIES

- 1) <u>AIS (Automatic Identification System)</u>: VHF broadcast system regularly sending information on vessel identity, position, course, and speed
- Ships with gross tonnage of 300+ tonnes
- Fishing vessels with overall length >15 metres (2012)
- 200 AIS (mainly shore-based) receivers used in this study; effective range of each base station said to be 40 nm
- 2) <u>World Meteorological Organization VOS Monitoring System</u>: Unique identifier codes for ships, stationary buoys and oil platforms
- >1 million mobile ship data points from 3,374 commercial & research vessels over a 12-month period
- Voluntary scheme so unknown number of vessels not captured by the scheme

DISTRIBUTION OF SHIPPING, 15 AUG 2010



(Source: www.marinetraffic.com/ais/)

DISTRIBUTION OF SHIPPING, S. NORTH SEA & CHANNEL



DISTRIBUTION OF VESSEL SPEEDS IN ASCOBANS AGREEMENT AREA



• most vessels are travelling between 10 and 20 knots

(Source: AIS data)

AIS PLOT FOR SHIPPING IN ASCOBANS REGION, 20 Feb 2010



(Source: www.marinetraffic.com/ais/)

TREATMENT OF SHIPPING DATA

1) <u>AIS</u>:

- Scripts were written for automatic downloads of AIS data from MarineTraffic website for the Irish Sea region
- Sample of ten datasets over different days were plotted in ArcView using an ESRI grid format
- Mean numbers of vessels per grid cell were calculated, split also into speed categories (<5, 5-10, 10-15, 15-20, 20+ nm/h)
- Any vessel with a speed of <1 nm/h was excluded

2) <u>VOS</u>:

- All mobile ship data were connected to create ship tracks, with the assumption that ships travel in straight lines
- Any tracks crossing land were removed, and the remaining 800,000 line segments were buffered to be 1 km wide to account for the width of the shipping lanes
- All buffered segments were summed to account for overlapping ship tracks, and summed ship data then converted to 1km² raster cells

DISTRIBUTION MAPS SHOWING RELATIVE ABUNDANCE



(Source: Reid, Evans & Northridge, 2003)



MAPPING CETACEAN DISTRIBUTION

- Sixteen research groups contributed 37,000 h of survey data over the period 1990-2007
- Spatial coverage in the Irish Sea amounted to >90% (376/414 cells)
- 22,500 sightings (78,000 individuals) of 12 cetacean species
- Potential biases in sightability were examined
- GIS maps of sighting rates prepared using a grid with resolution 10' latitude x 10' longitude, following correction for variations in sightability (e.g. sea state, platform speed & height)
- Interpolated plots of relative density were derived using Inverse Distance Weighting
- Low effort cells (2 h or less/cell) were filtered out before applying the interpolation process
- Relative risk of ship strike = density of vessels scaled by speed x sightings rates of all cetacean/whale species for each cell

SUMMARY OF EFFORT FROM VISUAL SURVEYS



(Source: Baines & Evans, 2009)





(Source: VOS data)

CETACEAN RELATIVE DENSITIES IN THE IRISH SEA



(Source: Baines & Evans, 2009)

VESSEL DENSITIES IN THE IRISH SEA



(Source: AIS data)

VESSEL DENSITIES FOR DIFFERENT SPEED CATEGORIES



(Source: AIS data)

CETACEAN RELATIVE DENSITIES IN THE IRISH SEA



(Source: Baines & Evans, 2009)

SHIPPING COLLISION RISK AREAS IN THE IRISH SEA



(Source: Baines & Evans, 2009)





(Source: VOS data)

DISTRIBUTION OF SURVEY EFFORT, 1990-2010



SEASONAL VARIATION IN SURVEY EFFORT

a) Jan - Mar

b) Apr - Jun





d) Oct - Dec

12 des

Effort hours

• 0.05 - 10

10 - 100 0

100 - 500

500 - 1000

1000 - 10000



SEASONAL VARIATION IN CETACEAN DENSITIES









SEASONAL VARIATION IN WHALE DENSITIES





d) Oct - Dec

203

< 0.1

0.5 - 1

1-2.5

2.5 - 5

5 - 10

0.1 - 0.5



CETACEAN DENSITIES IN THE ASCOBANS AREA



SEASONAL VARIATION IN SHIP STRIKE RISK TO ALL CETACEANS IN THE ASCOBANS AREA



SEASONAL VARIATION IN SHIP STRIKE RISK TO WHALES IN THE ASCOBANS AREA



SHIP STRIKE RISK IN THE ASCOBANS AREA

a) All Cetaceans

b) Large Whales









= main areas of overlap with large whales

CONCLUSIONS

- Both methods of collection of shipping data have limitations:
- AIS data rely upon a receiving station having complete coverage main gaps occur >50 nm of a base station, only large vessels currently recorded; military vessels, most fishing boats and pleasure craft normally not included
- VOS data provided on a voluntary basis so only a portion of commercial shipping covered - gaps include some ferry routes, as well as military vessels, fishing boats and pleasure craft
- Nevertheless, both methods highlight the same areas as having high shipping densities: English Channel, southernmost North Sea, coasts of NW Spain & Portugal, Danish Belt Seas, and western & central Baltic
- Cetacean distribution data limited by gaps in survey effort mainly offshore (could be partly rectified by inclusion of CODA & NASS data), but indicate main risk areas as Bay of Biscay & NW Spain

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