




Update on UK and Irish Beaked Whale Unusual Mortality Event

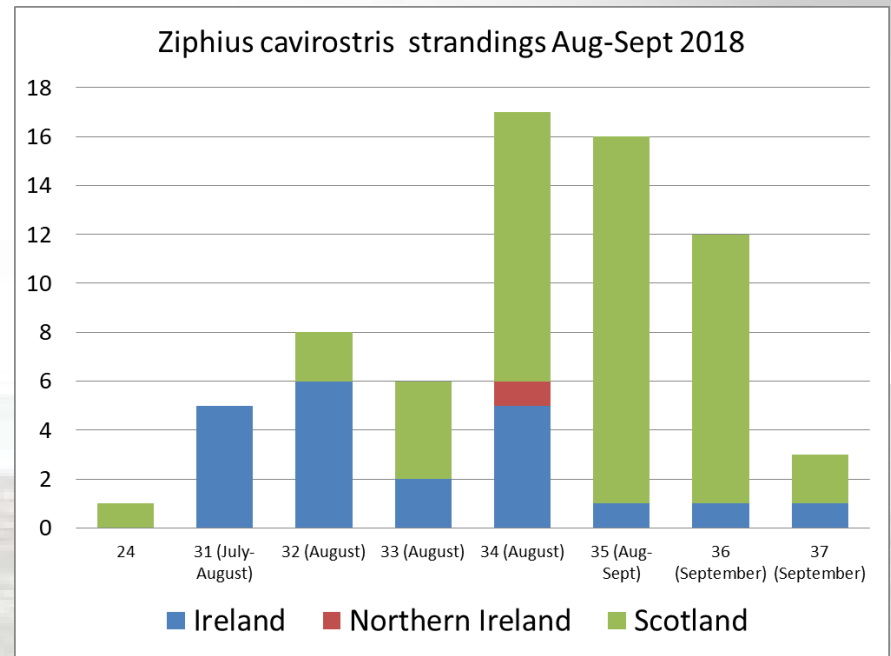
24th ASCOBANS Advisory Committee Meeting
Vilnius, 25 -27 September 2018



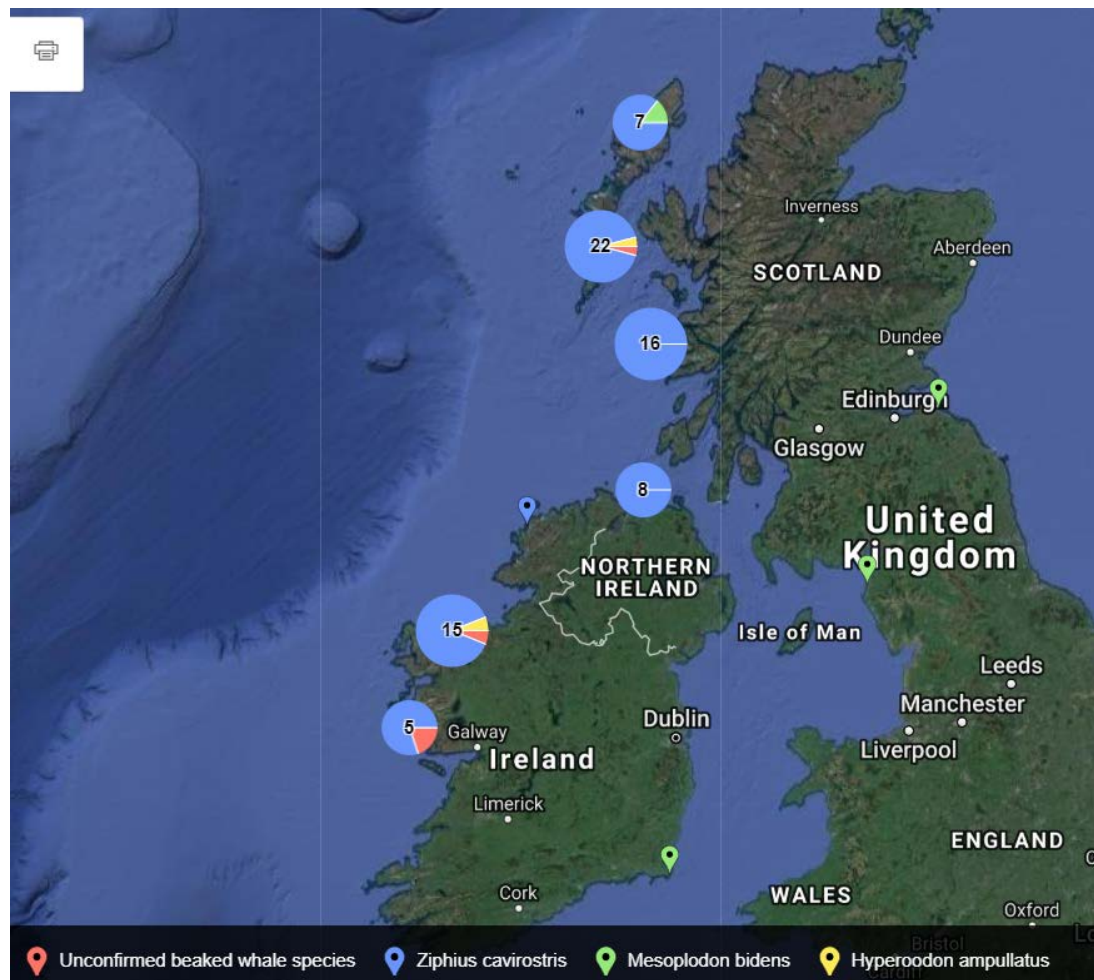
Andrew Brownlow
UK Cetacean Stranding Investigation Programme

Summary

- >70 beaked whale reported dead stranded on Uk and Irish Atlantic coast during August and September 2018
- Majority Cuvier's beaked whales (*Ziphius cavirostris*)
- All cases in decomposition code 4 or 5
- Very limited necropsy data available
- Anthropogenic noise a potential causal factor

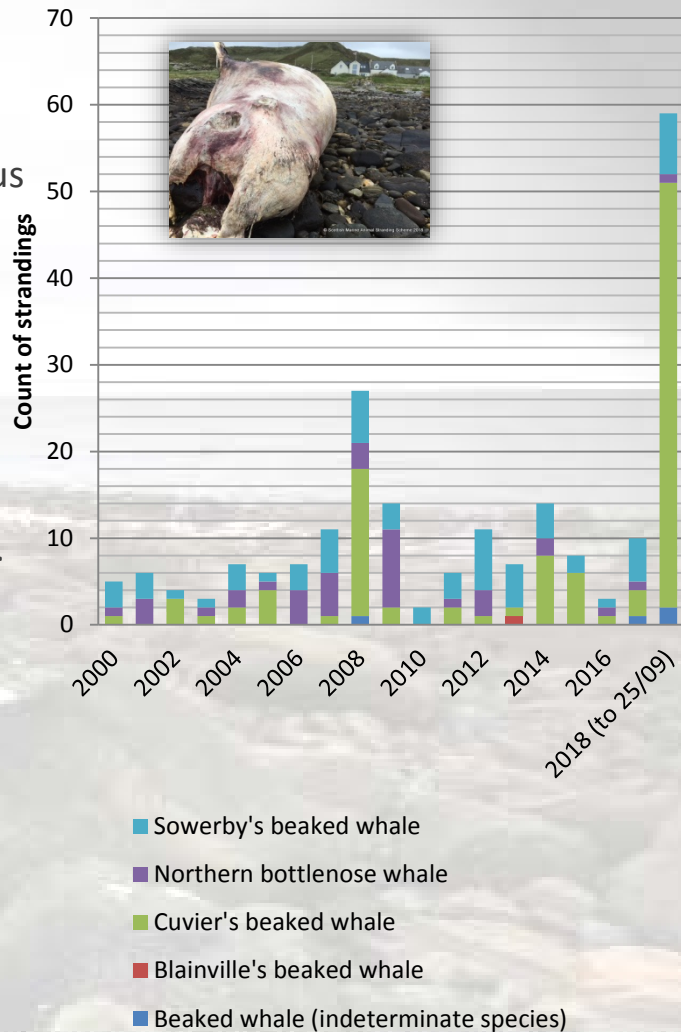


Country	Hyperoodon ampullatus	Mesoplodon bidens	Ziphius cavirostris	Unknown beaked whale species	Grand Total
England		1			1
Ireland	1	1	22	2	26
Northern Ireland			1		1
Scotland		2	45		47
Grand Total	1	4	68	2	75





- **Is this a Unusual Mortality Event?**
 - Yes- Average annual beaked whale stranding incidence 4.3.
 - More cases since August 1st than in the whole of the previous decade
- **Is this due to increased abundance?**
 - Probably not, no increase in sightings data associated with this event (Seawatch, Shorewatch, HWDT Whale Track)
- **Is there an increase in carcass reporting?**
 - Some increase in effort in Scotland.
 - No unusual on-shore wind profile- but this to be quantified.
- **Any evidence for infectious or toxic disease?**
 - Unclear from pathological data, unlikely based on epidemiological analysis
 - Strandings incidence not consistent with infectious or toxic aetiology
- **Any evidence for trauma**
 - No evidence for skeletal trauma
 - Acoustic trauma likely inconclusive due to decomposition state and lack of necropsy investigation in Ireland



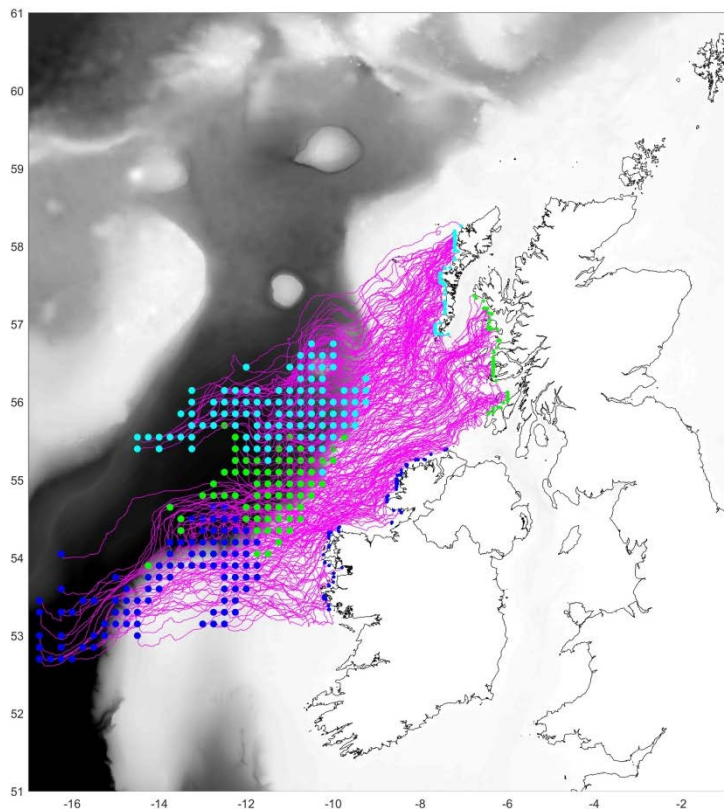


Cuvier's Beaked Whale *Ziphius cavirostris*



- Cuvier's beaked whales are an elusive, cryptic deep diving species
- Distributed tropical to temperate waters
- Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA) survey (2007) **7,000** (95% CI: 4,300 –11,400) **Population level effect?**
- Known to be susceptible to acoustic disturbance, especially mid-range sonar.
 - Dolman & Pinn et al (2010). A note on the unprecedented strandings of 56 deep-diving whales along the UK and Irish coast. Marine Biodiversity Records. 3. [10.1017/S175526720999114X](https://doi.org/10.1017/S175526720999114X).
 - Fernández & Jepson et al(2004) Beaked whales, sonar and decompression sickness. Nature, [doi: 10.1038/nature02528, 2004](https://doi.org/10.1038/nature02528)
 - Tyack et al (2011) Beaked Whales Respond to Simulated and Actual Navy Sonar. PLOS ONE 6(3): doi.org/10.1371/journal.pone.0017009
- Exposure to sonar could lead to direct barotrauma, gas bubble emboli, longer dive duration, less foraging behaviour and potentially risk of stranding

Initial carcase drift modelling results



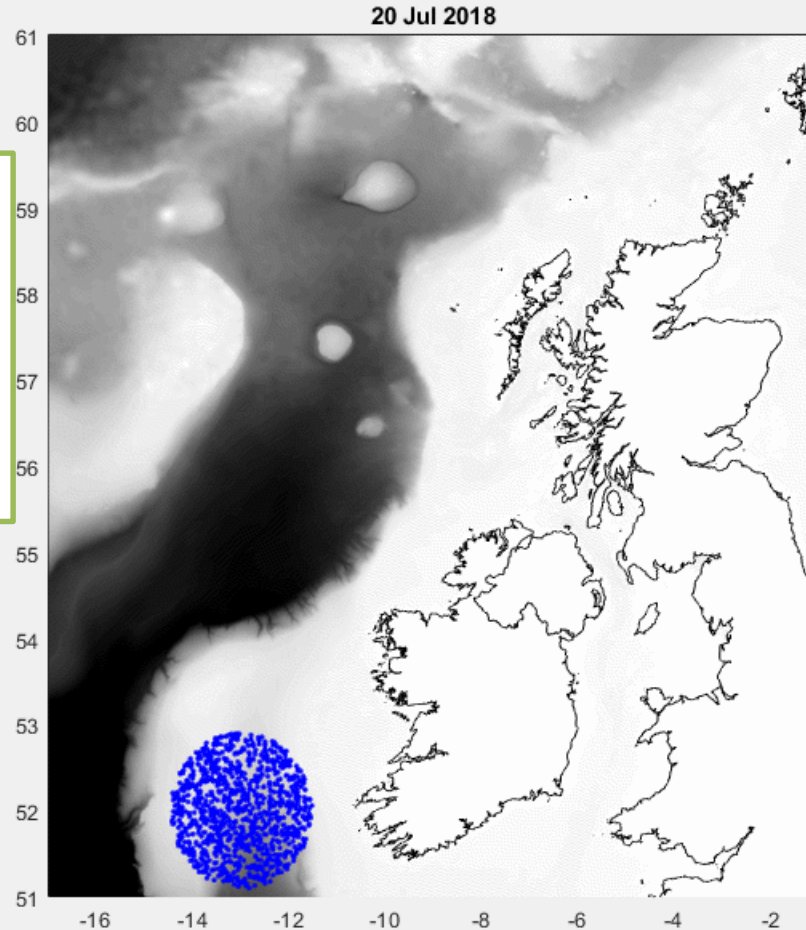
- Three distinct regions that have received strandings:
- **West Ireland**
- **Western Isles**
- **West Scotland**
- Some areas with no strandings at all

Single localised source doesn't reproduce the geographic spread and relatively short timespan of strandings:

- Insult constrained **temporally** but not **spatially**?
- Carcass drift properties different?
- Wider source area?
- Animals dispersed before dying?
- Model assumptions wrong?

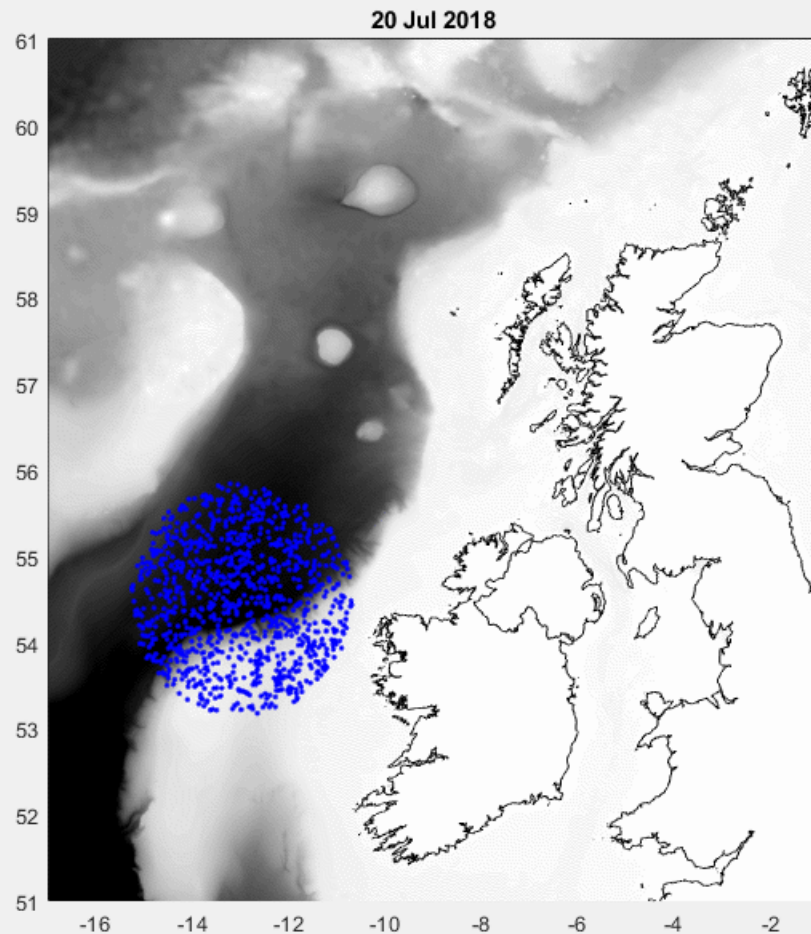
- Mortalities randomly scattered in a circle
- Most influence ocean currents
- Downwind drift in the 1% to 2% range

Cluster in the
Porcupine
Seabight:



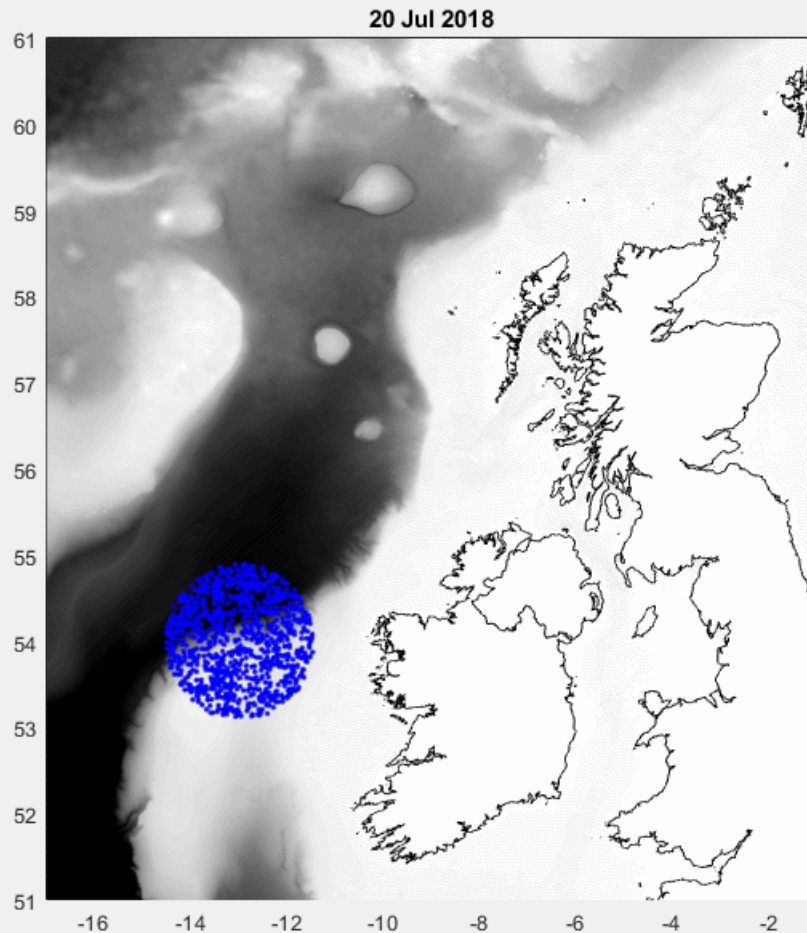
Clearly not a fit...

Larger and more
northerly source



Better fit to data

Smaller source
region



Seems to miss out
strandings in
Western Isles

Inverse carcass drift modelling- next steps

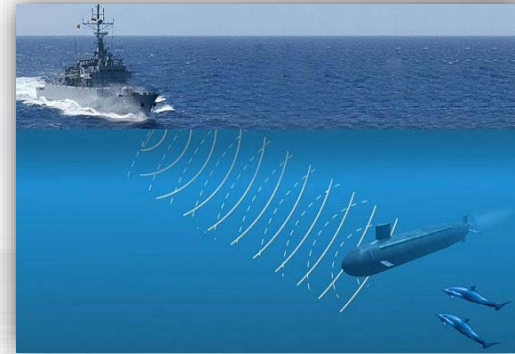
- Refine ocean and wind models used – acquire higher resolution AMM15 from the Met Office
- Expedite analysis of acoustic records collected under the COMPASS project (EU INTERREG VA)
- Refine the wind/wave/carcass drift representation
- Incorporate estimations of carcass decomposition to improve temporal pattern of strandings.
- Run simulations with varied drift/buoyancy characteristics, detection probability, etc to generate more probabilistic maps of the source
- Incorporate Icelandic strandings?

Collaboration, led by Andy Dale, Scottish Association of Marine Science
NERC urgency fund application invited- **requesting letters of support**

Ongoing work...

Acoustic

- Identify other noise sources
 - Earthquakes
 - Seismic?
 - Mid range sonar?
 - Request sent to UK Ministry of Defence for MOD activity between 01 July to 10th August 2018 in the area of 51° and 57° N and 10° and 18° W
 - **Other nations' noise generating activity?**



Genetic

- Preliminary analysis of mtDNA short fragments to identify species and sex
- Subsequent analysis using ddRAD may elucidate kinship relationships and measures of genetic diversity and population structure.

Health

- Screening for morbillivirus by PCR
- Screening for POP from blubber samples
- Histopathology pending



Questions?