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
<table>
<thead>
<tr>
<th>Country</th>
<th>Hyperoodon ampullatus</th>
<th>Mesoplodon bidens</th>
<th>Ziphius cavirostris</th>
<th>Unknown beaked whale species</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Ireland</td>
<td>1</td>
<td>1</td>
<td>22</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Scotland</td>
<td>2</td>
<td>45</td>
<td></td>
<td></td>
<td>47</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>1</strong></td>
<td><strong>4</strong></td>
<td><strong>68</strong></td>
<td><strong>2</strong></td>
<td><strong>75</strong></td>
</tr>
</tbody>
</table>
• **Is this a Unusual Mortality Event?**  
  – Yes- Average annual beaked whale stranding incidence 4.3.  
  – More cases since August 1\textsuperscript{st} 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 carcase 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.
- 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?
Cluster in the Porcupine Seabight:

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

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 to 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?