Acoustic deterrents in UK gillnet fisheries

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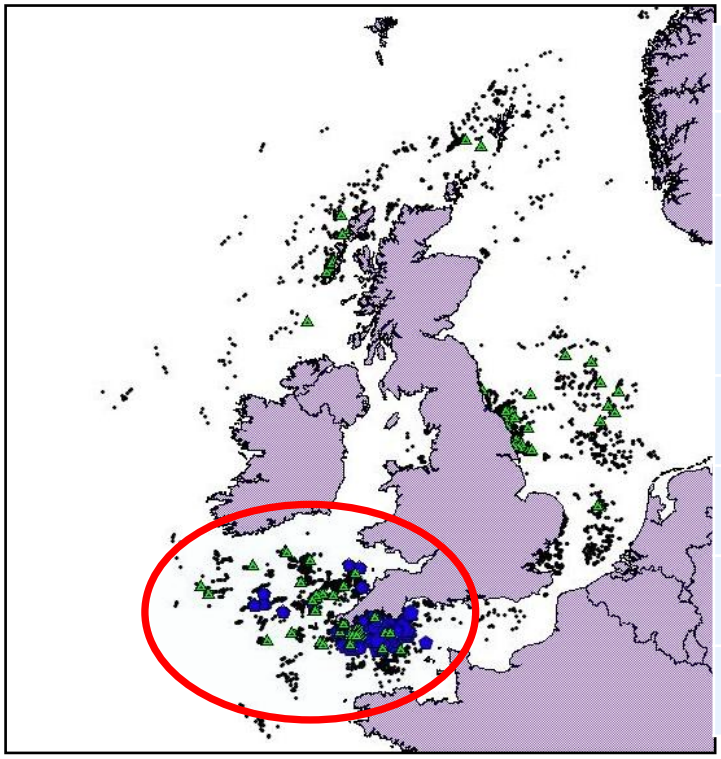
Cetacean bycatch in the western Channel and Celtic Sea

Net fisheries target: hake; monkfish/skate; pollack/cod; bass, sole, red mullet …



Estimated bycatch by year (CV)		
	Porpoises	Common Dolphins
2005	453	221
2006	728	544
2007	592 (0.58)	114 (0.78)
2008	838 (0.27)	594 (0.27)
2009	791 (0.31)	237 (0.58)
2010	540 (0.13)	290 (0.17)

(Note: inconsistent strata and estimation methods above)

Current obligations

- Bycatch known for decades
- SMRU approached in 1997 by industry
- Trials of PICE pinger shook industry confidence
- Continuation with Dukanes did not restore faith
- 2000-2005 no progress; much press coverage
- 2005 Council regulation 812/2004 in force
- Pingers mandated for all over 12m vessels in the area
- Less stringent obligations in the North Sea

Problems with implementation

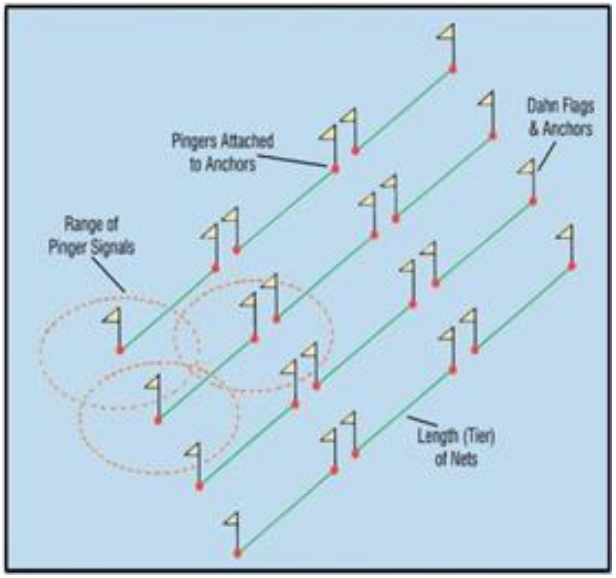
Two UK trials, one Irish and one French claimed several problems with implementation:

- Poor robustness (some issues resolved)
- Handling difficulties
- Potential crew dangers
- Battery life / management for some
- **Expense … 30 km net= 150-300 pingers**

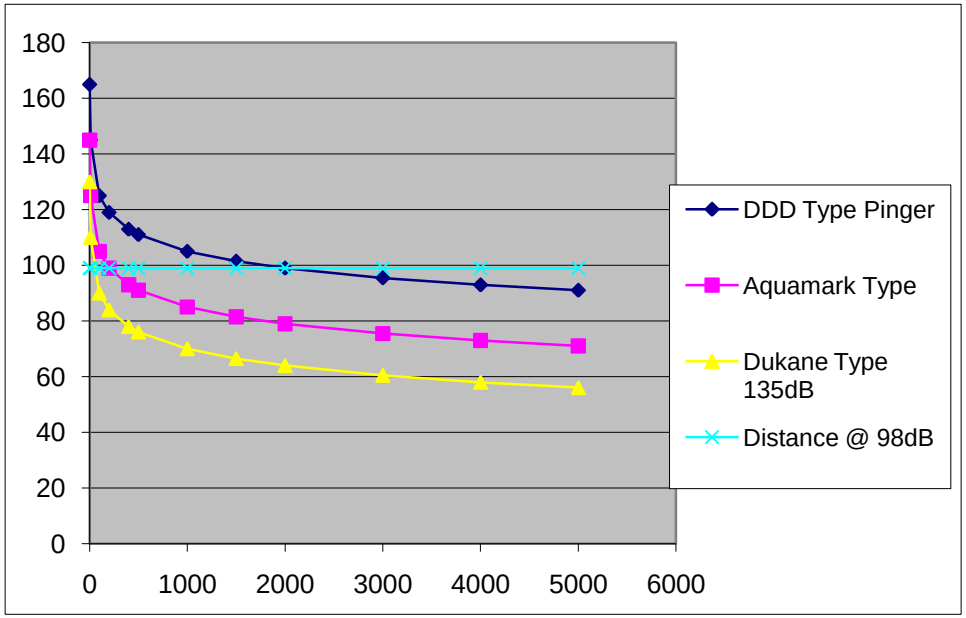
Commission sympathetic to industry reservations.

Industry Suggestion:

- Fewer louder pingers would:
- Enable devices to be attached / detached at each haul:
  - reduce risk to crew
  - reduce risk of snagging
- Simplify pinger management
- Cost a lot less!



A louder pinger:



DDD-02 - STM

Should be effective to about 2km ?
Therefore 4km spacing okay ????

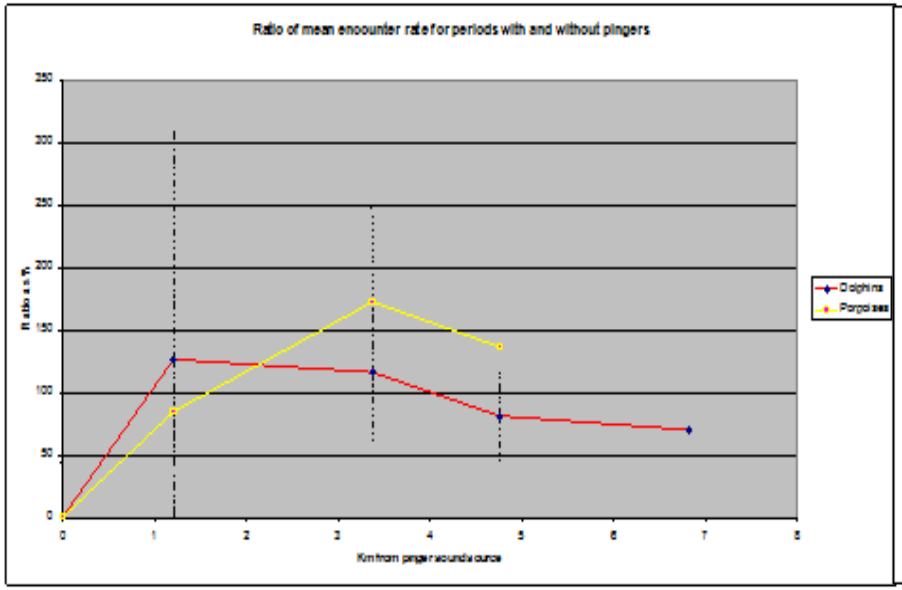
Exclusion trials

- Concerns about exclusion with loud devices
- Experimental set up 2007:
  - 2 DDD-02 set on a 10-net fleet
  - 6 T-Pods set around the site 0-6.8 km
  - Two weeks off, 2-on, 2-off, 2-on, 2-off
- Experiment repeated in 2008:
  - 6 pods set 0.5 - 2.8km
  - 1 pod lost 2007; 2 pods lost 2008 –trawlers.

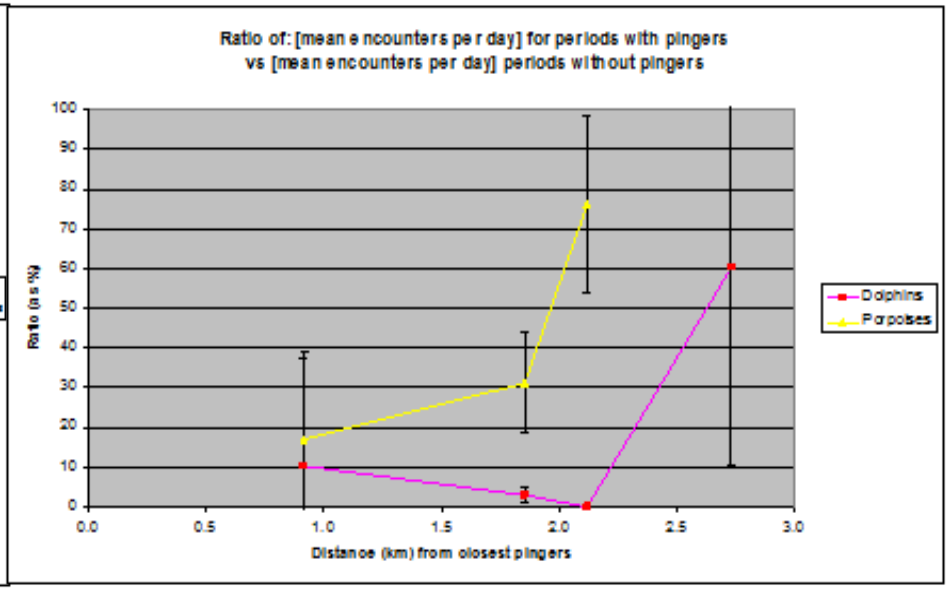
Results

Comparison of average detection positive minutes per day at each pod location when DDDs were present, as a proportion of the average dpms per day at the same locations when DDDs were absent. Note different Y scales between years.

April 2007



April 2008



- Looks like >2 or >3 km effect – but effect decreases away from sound source
- Porpoises and 'dolphins' (very likely *Delphinus*) both react.
- Consistent with theoretical assessment

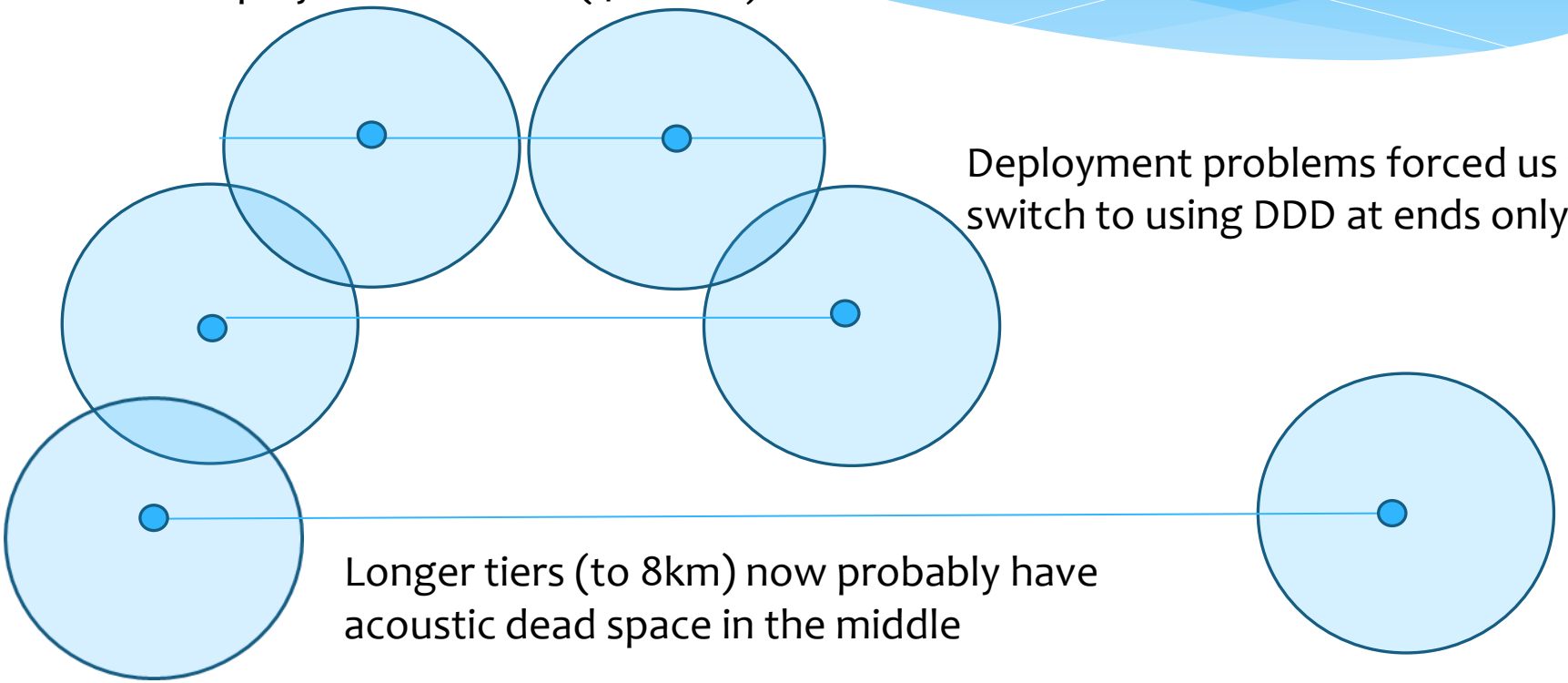
Fishery trials

- Fleet of ~22 gillnet boats >12m
- About 5 are UK flagged but Spanish
- UK flagboats mainly fish outside 812 area
- Most of the remainder part of CFPO

- **Working with the Cornish Fish Producers Organisation, 2008-2011**
- **Observers have worked with 15 vessels; ca 1700 hauls observed**
- **Skippers have contributed around 200 more haul details that we trust.**
- **We have observed a mix of pingered and unpingered hauls.**
- **Unpingered hauls due to shortage of DDDs on some trips.**
- **Some non pingered trips also observed.**
- **Objectives: to see how they reduce bycatch, best spacing, engage industry**

‘Experimental’ details

Initial DDD deployment method (4km net)



Deployment problems forced us to switch to using DDD at ends only

Longer tiers (to 8km) now probably have acoustic dead space in the middle

NB: These were seen mainly as handling trials by industry.
Experimental design not possible to control.
But benefit from being realistic and allow spacing issues to be explored

Results 1: Observation summary

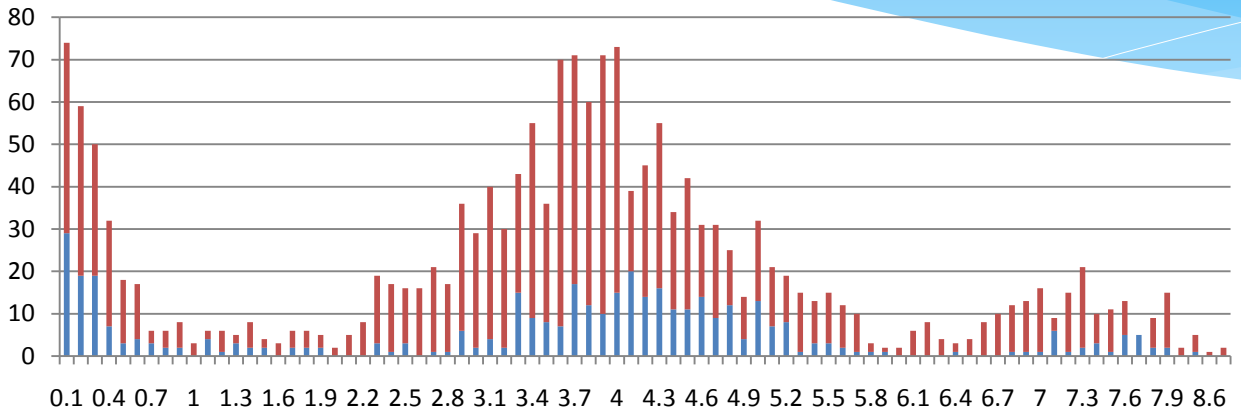
No of Hauls	DDDs Used?	Porpoises	Dolphins	Seals
Observations by SMRU observers alone				
780	No	16	3	8
929	Yes	7	2	29
1,709	-	23	5	37
All Observations – SMRU and Skippers				
907	No	19	3	8
999	Yes	7	2	29
1,906	-	26	5	37

Results 2: interpretation of bycatch

1. Nets with DDDs caught significantly fewer porpoises when skippers observations included ($p=0.01$: χ^2 Test with skipper data, $p=0.02$ without)
2. Overall bycatch rate with DDDs is 63% (or 66%) lower than without.
3. No bycatch associated with any abnormal voltages.
4. No significant difference for common dolphins: numbers too low …
5. Difference in seal bycatch due to one abnormal trip with 18 seals caught
6. Seal damaged fish: no difference in proportion of fleets attacked by seals (1 or more damaged fish) on DDD use: with = 25%; without = 22.5%

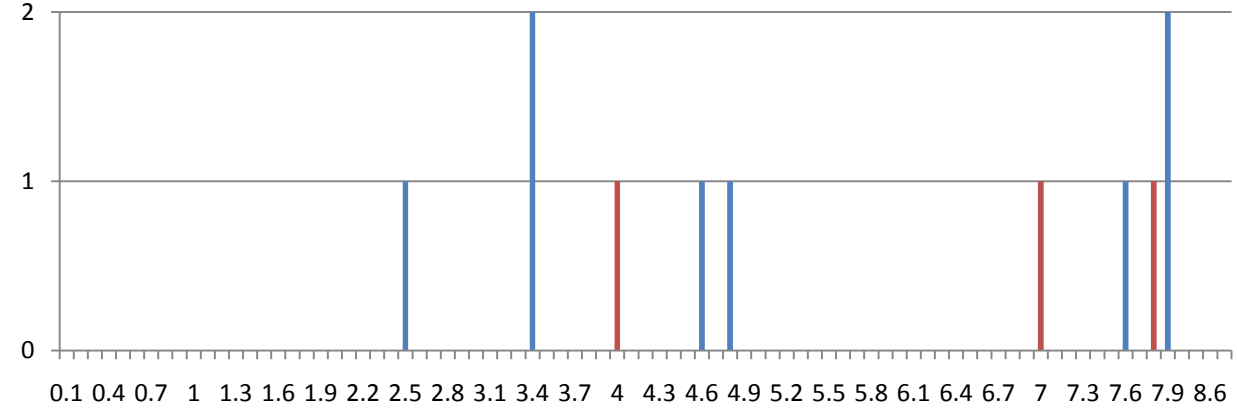
Results 3: spacing & net lengths

LFD of nets hauled with and without DDDs



Species	Distance to closest DDD Km
C. dolphin	1.3
C. dolphin	2.5
H. porpoise	1.2
H. porpoise	1.3
H. porpoise	1.6
H. porpoise	1.9
H. porpoise	2.1
H. porpoise	2.2
H. porpoise	3.1

And distribution of porpoise bycatches by net length and DDD



Results 4: interpretation of spacings

- Results hard to interpret (and not finished):

- 63% reduction overall.

- Fleets <4km : 1 porpoise in 665 fleets with DDDs
  13 porpoises in 465 fleets without.
  >> p=0.0001; **95% lower bycatch rate** with DDDs
- Fleets >4km: 6 porpoises in 973 fleets with DDDs
  3 porpoises in 305 fleets without
  >> NS ; 37% lower bycatch rate with DDDs

- Overall, 22% of observed net >2km from closest DDD
  Yet 3 of 7 porpoises taken in such areas
  Bootstrap simulation p = <0.04

- No evidence of Increased bycatch rate in long nets with widely spaced DDDs

Implications for over 12m boats

If all the over 12m boats used DDDs – two per fleet, no fleets >4km:

Target/metier	Days 2010	Byc/day	Take by metier
Pollack/cod	913	0.10	93
Hake	361	0.11	41
Tangle	1277	0.06	80
Other	47	0.00	0
TOTAL	2598		
Approx porp bycatch	200		215
Expected with DDDs on 4km max nets	10		11
Porpoises 'saved' / yr	190		204

Industry issues

- Hake fishery seeking MSC certification
- Need to negotiate to limit fleet lengths
- DDDs appear robust
- Only need few, can be shot on anchor lines
- Can be serviced individually and recharged
- Concerns about charging practicalities

Under 12m sector overview

- Overall 622 UK registered fishing vessels using gillnets in 2010 in VIIefghj
- Only 22 of these were over 12m
- 96% are under 12m and do not therefore need to use pingers

- Isn't this just a little silly?

- Not necessarily:
  - average number of days at sea per >12m boat =118
  - average number of days at sea per <12m boat =18

- Negative effects of pingers may outweigh their benefits if used by all ??

Exclusion effects – use of pingers

Calculations based on the Cornish (western end of England) fleet only:
(This is about half the UK registered fleet fishing in the western Channel / Celtic Sea)

		Exclusion zone: putative diameter of complete exclusion.					
Length class	No of boats	Fumunda 100 m	Fumunda 200 m	Aquamark 200 m	Aquamark 400 m	DDD 2 km	DDD 4 km
>12m	21	0.04%	0.07%	0.07%	0.14%	0.74%	2.10%
10-12m	11	0.01%	0.01%	0.01%	0.01%	0.13%	0.50%
8-10m	89	0.02%	0.05%	0.05%	0.09%	1.13%	4.53%
<8m	210	0.02%	0.03%	0.03%	0.04%	0.96%	3.86%
All	331	0.08%	0.17%	0.17%	0.28%	2.96%	10.99%

Assumes same spacing as the exclusion zones listed above

Mix and match … 1% loss?

Population consequences:

	Over 12:	Under 12:	Total
Days at sea	2598	10800	
Expected catch per day	0.077	0.030	
Porpoise bycatch 2010	215	325	540
Expected if >12 use pingers	11	325	336
Expected reduction	95%	0%	38%
No of boats	22	600	

Celtic Sea / Western Channel	Porpoise Abundance	1.7% EU take limit	UK 2010 take	% of total take limit
Present scenario	137000	2329	~540	23%
Reg 812/2004 implemented by UK			~336	14%

Need to negotiate strategy for bycatch reduction with other range states

Effects of current legislation:

* Disproportionate reduction in bycatch by targeting 4% of the fleet
* Other strategies could be explored (>10m; over 12 + all large mesh; …)
* Limiting pinger requirements to what is necessary has several benefits:
* 1) lessens overall disturbance especially in coastal zone
* 2) lessens chances of habituation (if it occurs)
* 3) makes enforcement easier
* 4) + increases chances of compliance by limiting to 'professionals'
* 5) Less impact on profitability of the sector
* But – contravenes present government commitment to reduce towards zero
* Hard to say what is necessary to achieve current conservation goals

Some Final Thoughts

* Getting the fishing community to use mitigation is difficult.
* It helps a lot if there is constructive help for them.
* It also helps if there are incentives (eg certification).
* There must be demonstrably workable solutions.
* Collateral effects should be considered.
* It is always necessary to know what the objective is.
* In most cases conservation objectives will need to be addressed by more than one country or fishery, so co-ordination is required.

Acknowledgements

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