

BIM Gear Trials – Priorities Irish Sea

The Nephrops fishery is the main priority given the economic importance in Irish Sea worth ~ €9.5m annually at first point of sale

Key species	Irish quota (t)	Discard rate (%)
Nephrops	~3000	17
Whiting	46	97
Plaice	768	71
Haddock	511	53
Cod	120	67

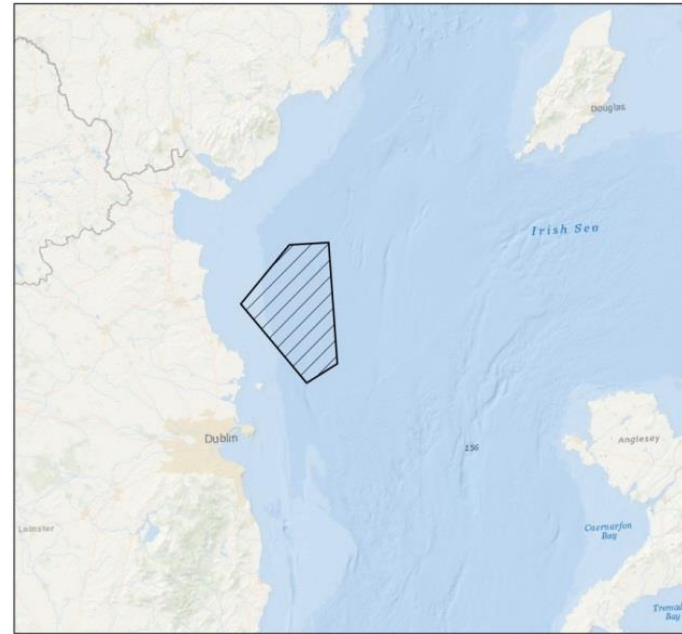
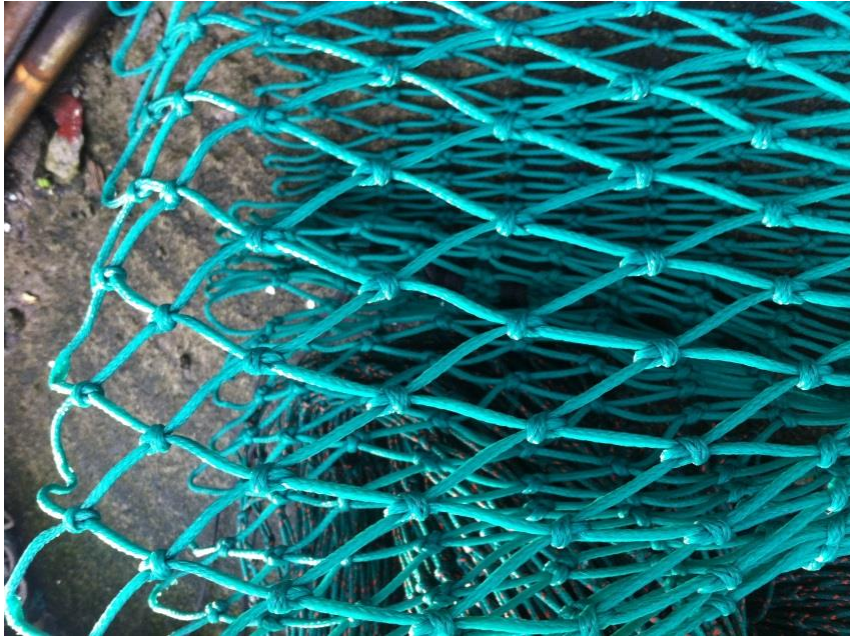


BIM Gear Trials

- Nephrops
 - Mesh size
 - Sorting grids
 - Square mesh cod-ends
- Fish
 - Quad-rigs
 - 300 mm SMP
 - Mesh size
 - Swedish grid
 - Square mesh cod-ends

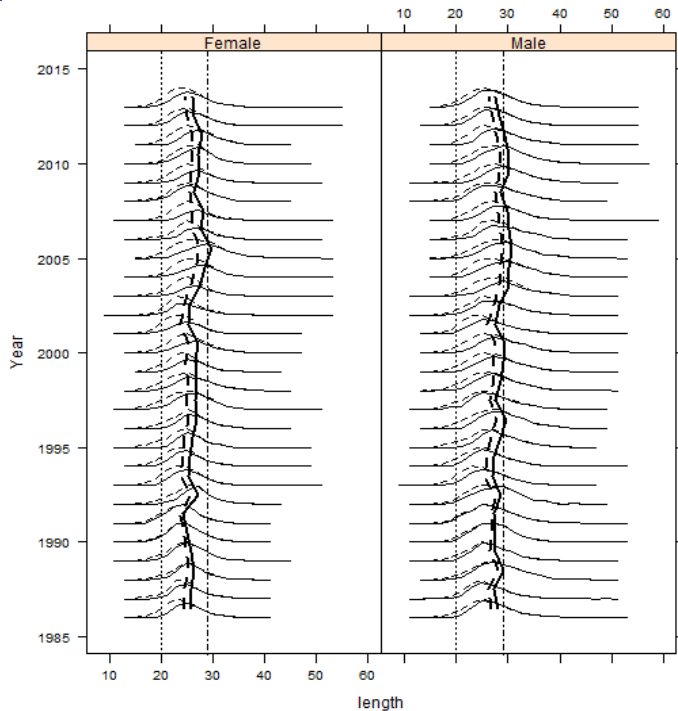


Assessment of an increase in cod-end mesh size in the Irish Sea Nephrops fishery



- A total of 13 hauls carried out in July 2015
- Four cod-end mesh sizes tested at the same time in a Quad-rig
- Tows of normal duration
- Economic projections in the context of the LO

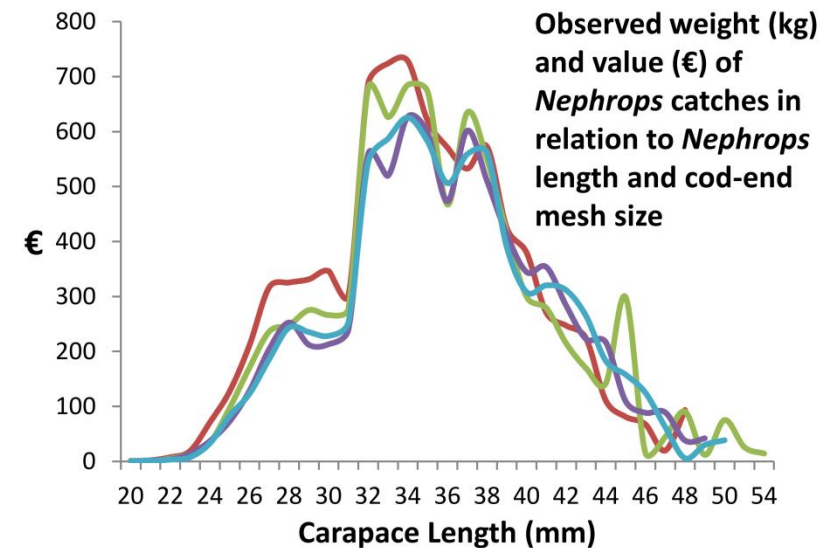
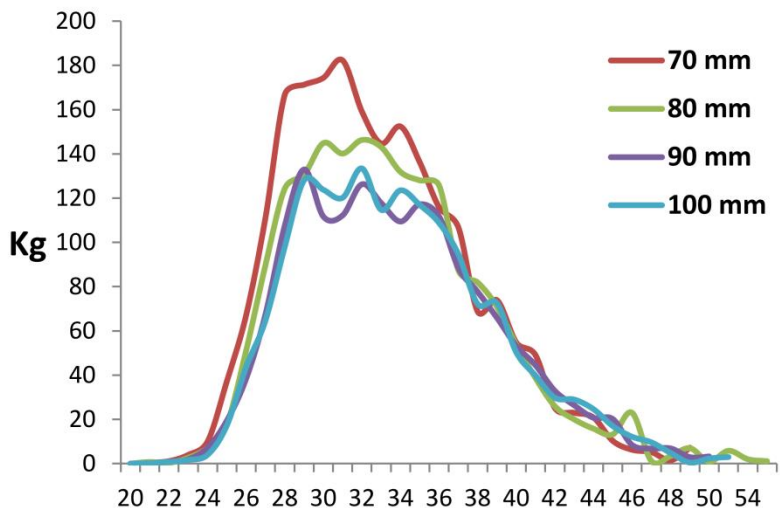
Observed Nephrops catches



Cod-end mesh size (mm)	70	80	90	100	Total
Total Weight (kg)	2093	1837	1642	1662	7234
Δ 70 mm (%)		12.23	21.55	20.59	
≥ 25 mm CL (kg)	2040	1808	1612	1638	7098
Δ 70 mm (%)		11.39	20.97	19.71	
< 25mm CL (kg)	53	29	30	24	136
Δ 70 mm (%)		44.70	43.85	54.73	

- ~ 12% less Nephrops (weight) retained in 80 mm v 70 mm cod-end
- MLS of 20 mm CL in the Irish Sea but discarding starts ~ 25 mm CL
- ~ 45% less Nephrops (weight) < 25 mm CL retained in 80 mm v 70 mm cod-end
- Nephrops catches were large during the trial, Mean CL ~ 30 mm, < 3% Nephrops < 20 mm CL

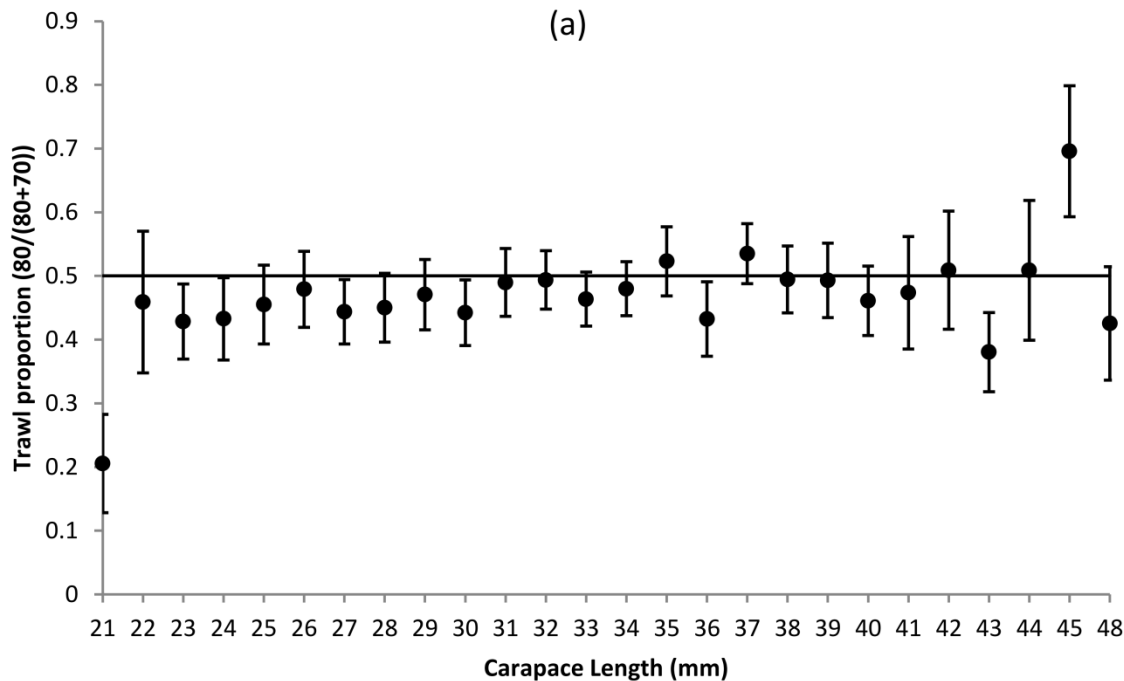
Observed Nephrops values



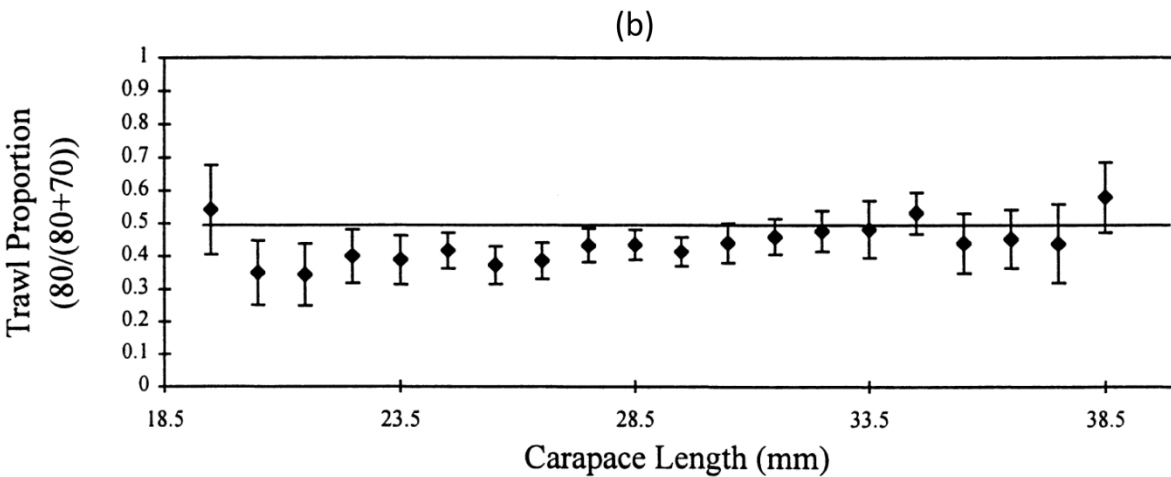
Cod-end mesh size (mm)	70	80	90	100	Total
Total Value (€)	8496	8039	7486	7562	31584
Delta 70 mm (%)		5.37	11.88	10.99	
≥ 25 mm CL	8395	7984	7430	7517	31327
Delta 70 mm (%)		4.90	11.50	10.46	
< 25mm CL	100	55	56	46	257
Delta 70 mm (%)		45.20	43.98	54.61	

- ~ 12 % weight loss corresponding to ~ 5% value loss in 80 mm
- ~ Doubling of economic loss in 90 and 100 mm

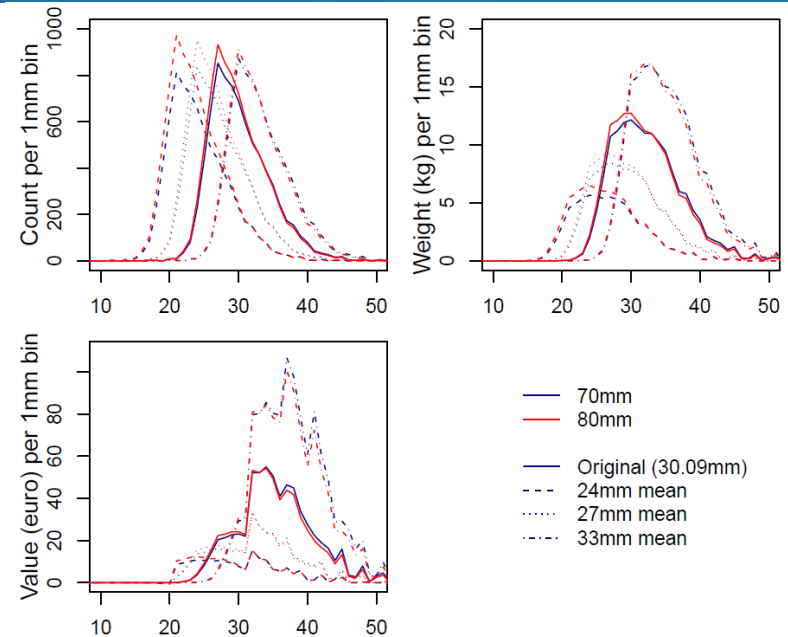
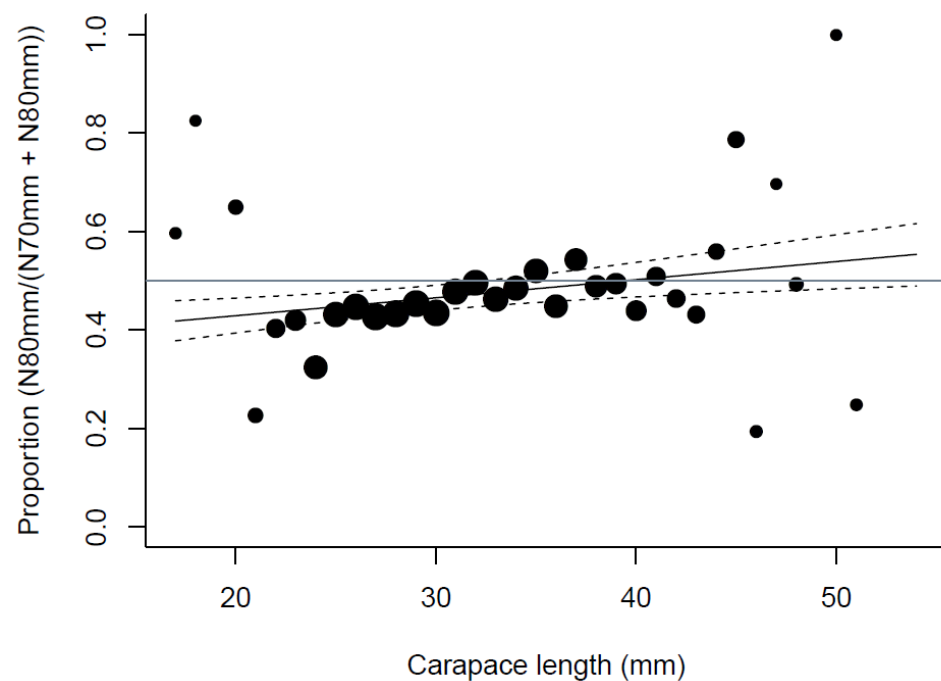
Relationship between P80 and CL



- Gradual reduction in P80 in relation CL evident in (a) the current study and (b) Briggs et al 1999
- Similar results for single, twin and quad – rigs and also in Bay of Biscay (Nikolic et al 2015)



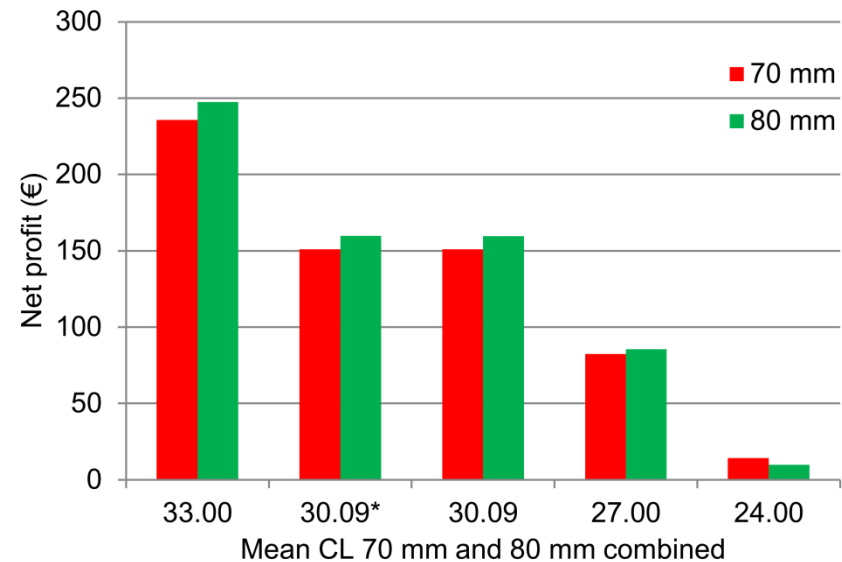
Modelling proportional differences



- Results of GLMM highly significant correlation between CL and P80
- Basis for simulation of a range of catch length compositions for 70 and 80 mm cod-ends
- Mean CL of 33, 30, 27, and 24 mm

Economic projections

Mesh size (mm)	Mean CL 70 & 80 (mm)	Gross profit (€000)	Trips (No.)	Total costs (€000)	Net profit (€000)	Δ 70 profit (€000)	Δ 70 Profit (%)
70	33.00	555	6.23	319	236		
70	30.09*	406	7.76	255	151		
70	30.09	411	8.18	260	151		
70	27.00	313	11.05	230	82		
70	24.00	235	15.44	221	14		
80	33.00	576	6.07	329	248	12	4.98
80	30.09*	438	8.85	278	160	9	5.72
80	30.09	430	8.30	271	160	9	5.67
80	27.00	327	11.67	242	86	3	3.74
80	24.00	247	17.02	237	10	-4	-31.30



- Economic impacts on range of length compositions projected in relation to 100 t quota and LO requirements
- Reduced catches of small Nephrops afforded extra opportunity to catch increased quantities of larger more valuable Nephrops
- Costs of extra fishing effort were outweighed by benefits of increased access to the resource
- More profitable to use the 80 mm cod-end over the course of a season



Nephrops mesh size: conclusions

- ~ 5% increase in profitability over the course of a fishing season for plausible Nephrops length scenarios
- Consistent P80 to CL relationships across single, twin, quad-rigs, different areas, times of year suggests potentially broad application
- Larger than 80 mm not economically feasible for reducing catches of small Nephrops
- Increase in mesh size makes economic and biological sense

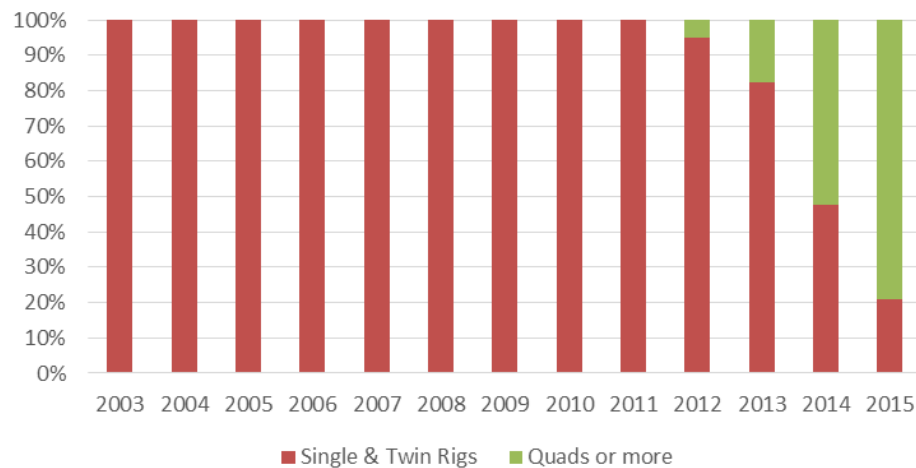


Fish: Quad-rigs

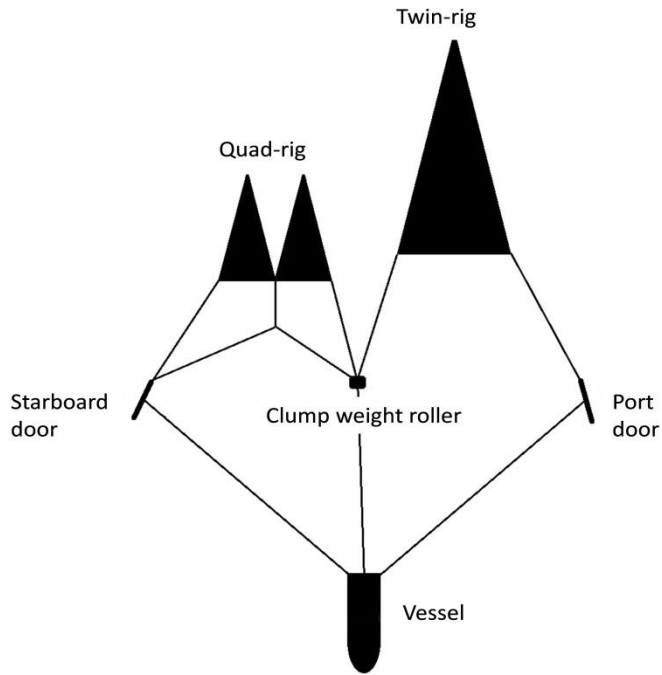
Nephrops Landings



Nephrops Landings



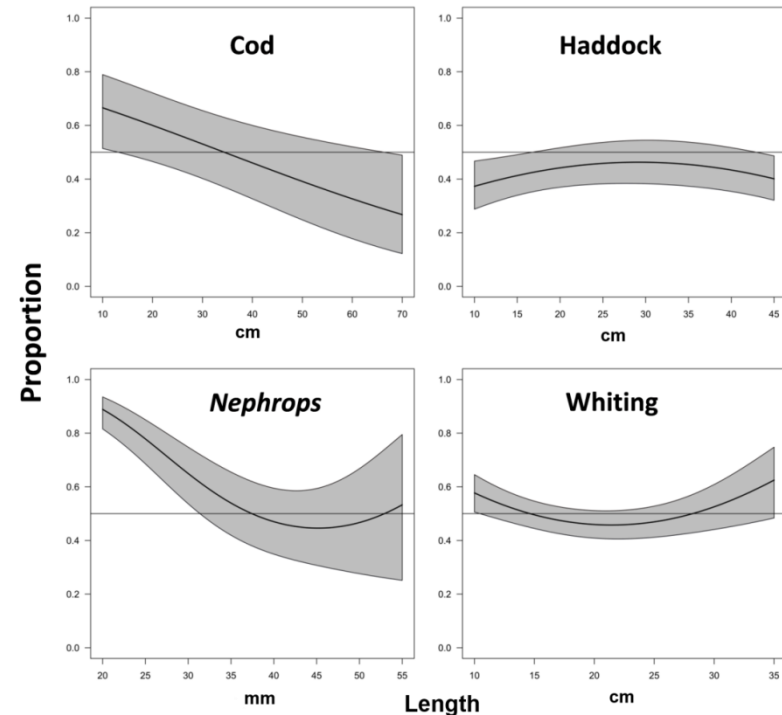
Catch comparison of Quad and Twin-rig trawls in the Celtic Sea *Nephrops* Fishery



- Two gears towed simultaneously
- Thirty hauls carried out over a 5 day period in April 2014
- Total catches compared

Quad-rig: Results

Species	Twin-rig (kg)	Quad-rig (kg)	Difference (%)
Cod	137	53	-61
Haddock	428	266	-38
Whiting	259	252	-3
Hake	108	63	-42
Ling	109	37	-66
Monkfish	124	109	-12
Witch	59	41	-31
Plaice	36	38	6
Lemon sole	16	16	0
Black sole	10	13	30
Total <i>Nephrops</i>	469	722	54



- Major reductions in quantities of whitefish in the Quad-rig
- Major increases in *Nephrops*
- Similar catches of whiting but whiting were small
- Whiting ↓ 60% in the North Sea
- Benefits also likely to apply in the Irish Sea

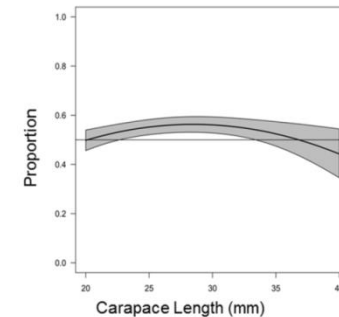
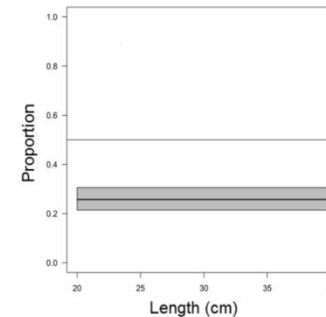
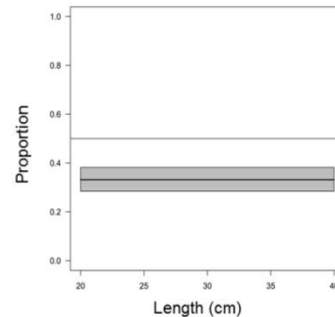
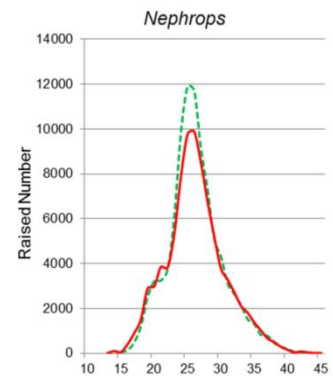
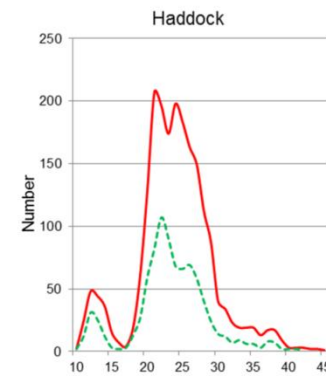
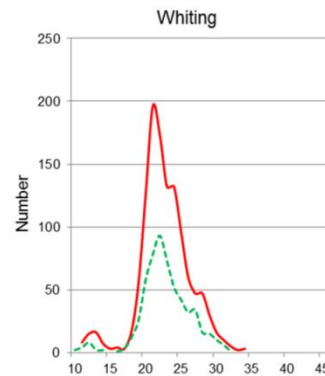
Fish: 300 SMP



- A 300 mm SMP deployed 9 – 12 m from the cod line was compared to a control trawl with no SMP in Quad-rig trawls
- A total of 23 hauls carried out over a 4 day period in August 2014
- Total catches compared

300 SMP: Results

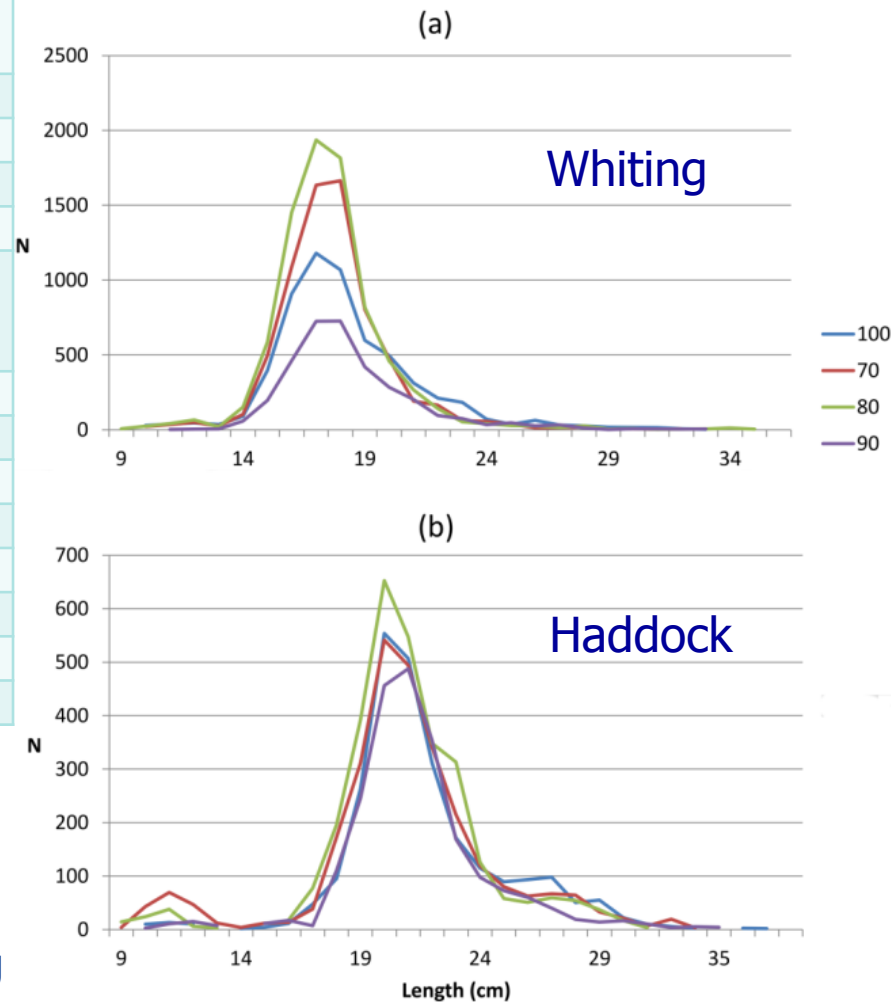
Species	Control (kg)	300 mm SMP (kg)	Difference (%)
Whiting	136	66	-52
Haddock	214	65	-70
<i>Nephrops</i>	1106	1262	14
Cod	2	1	-50
Witch	116	76	-34
Monk	27	25	-7
Plaice	26	12	-55
Bulk catch	2043	1800	-12



- Major reductions in quantities of whiting and haddock
- Cod catches low
- No reduction in *Nephrops*

Fish: Mesh size

Cod-end mesh size (mm)	70	80	90	100	Total
Mixed flats	859	597	320	461	2236
Whiting	515	572	216	484	1787
Haddock	352	483	370	452	1657
Lesser spotted dogfish	202	362	353	312	1229
Mixed non-commercial round-fish					
Cod	103	119	76	103	400
Monkfish	55	106	52	53	266
Thornback ray				18	18
Turbot		5			5
Blonde ray			4		4
Black sole		1	1	1	3
Brill		3			3
Plaice	2				2



- 90 and 100 mm may be an option for Nephrops vessels which need to reduce bycatch of whiting
- ~ 30% reduction in mixed flatfish catches in 80 compared with 70 mm cod-end good for reducing impacts of LO on plaice
- Swedish grids (trials done) and square mesh cod-ends (trial Oct) are also potential options for fish

Sum Up

- Nephrops
 - Increased cod-end mesh size from 70 to 80 mm makes sense
 - Grids and square mesh cod-end work commencing shortly
- Fish
 - Quad-rigs and 300 mm SMPs greatly assist in reducing fish discards
 - Increased mesh size good for plaice and potentially whiting
 - Grids are proven to work and square mesh cod-ends also good potential for dealing with fish

Reports available at <http://www.bim.ie/our-publications/fisheries/>

