

Discards survival probabilities of flatfish and rays in North Sea pulse-trawl fisheries

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Research objectives

- To measure discards survival for:
 - Sole
 - Plaice
 - Turbot
 - Brill
 - Thornback ray

- To test measures aimed at increasing discards survival

- Flatfish pulse-trawling with 80mm meshes and 12m gears

Flatfish pulse-trawling



Pulse beam trawl

- Main target species: Sole (*Solea Solea*)
- Mixed demersal fishery
- 12m gear width
- 80mm mesh size
- Semi-automatic catch processing
- Monday-Friday



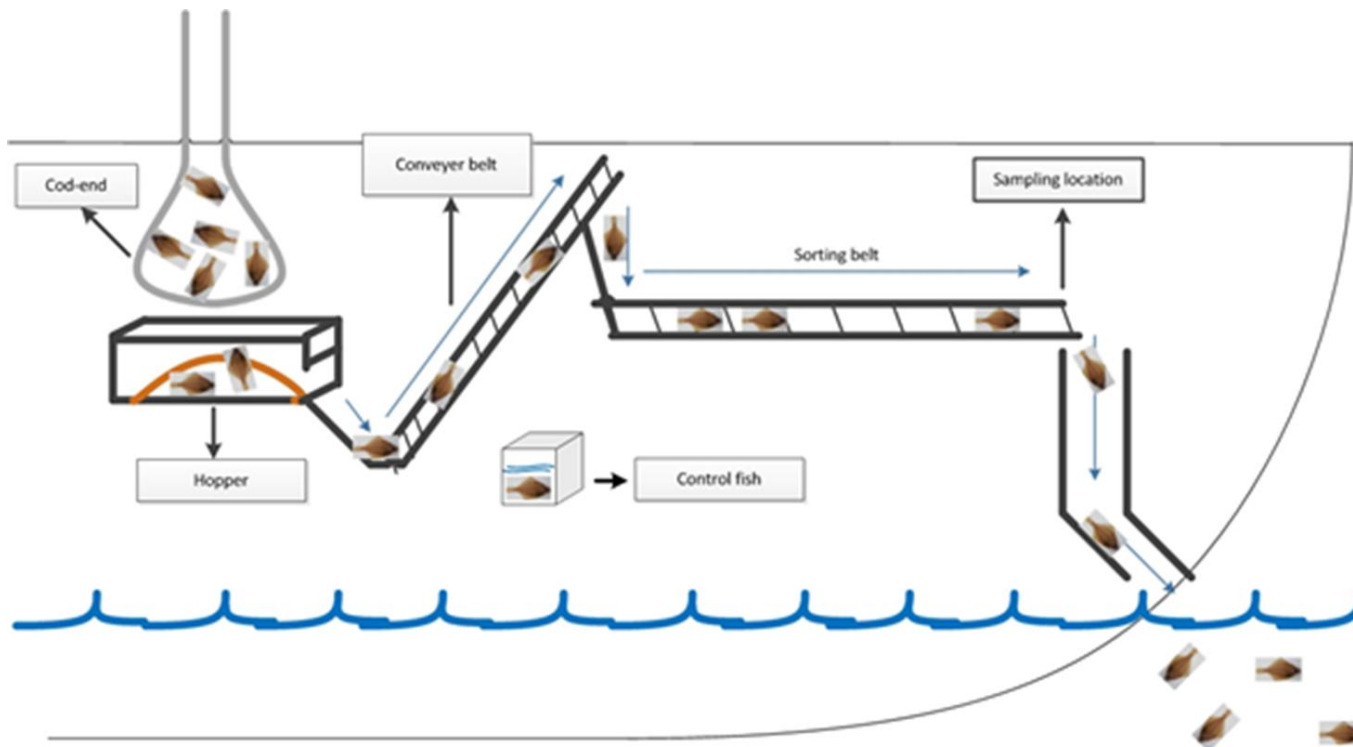
Experimental set-up

- Sampling of discards at sea
- Assessment of individual fish condition
- Housing of fish in survival units
- Survival monitoring at sea
- Transport to the lab
- Continued survival monitoring in the lab (15-18 days)

- Control fish to detect experiment induced mortality
- ICES guidelines for discards survival research

Sampling of discards at sea

- 3 commercial pulse-trawlers during regular fishing
- 9 trips, spread-out over 1 year
- End of sorting belt – just before discarding

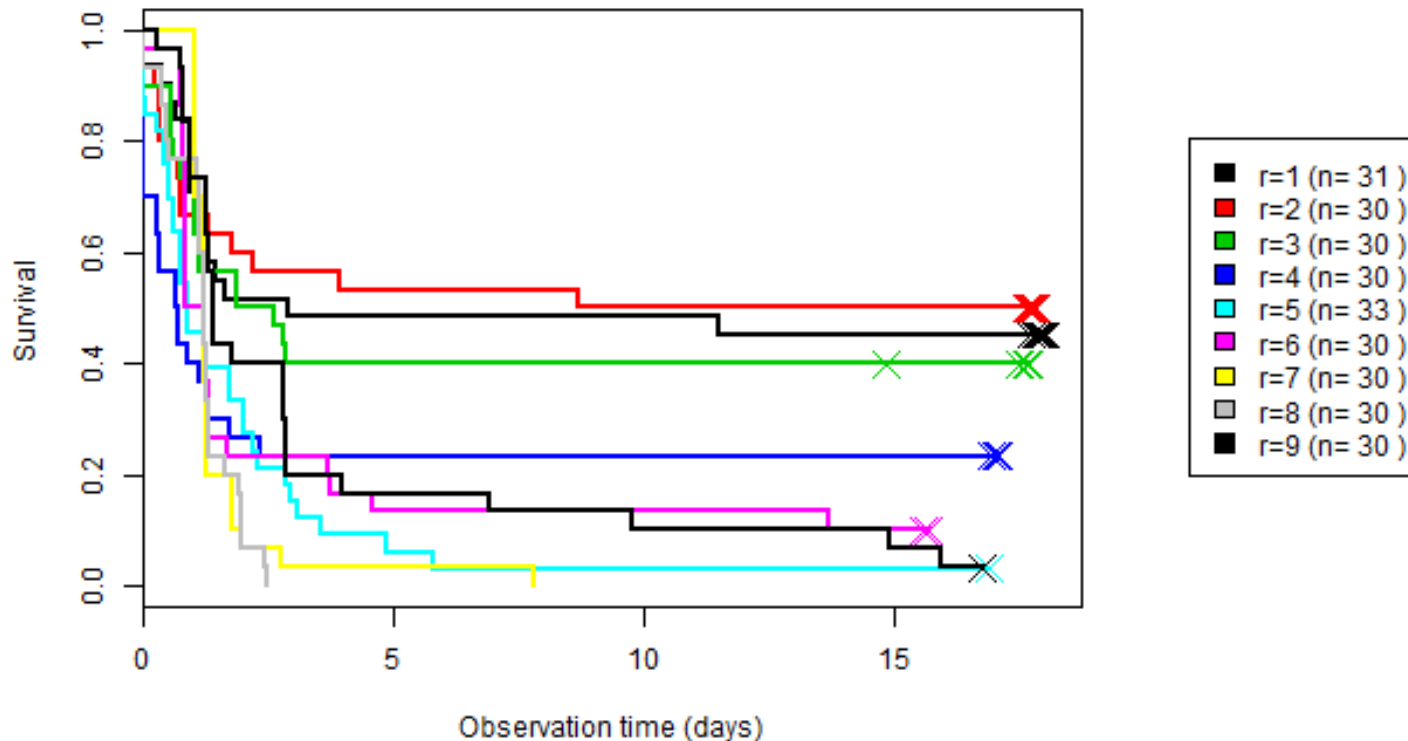


Sole (*Solea Solea*) – per trip



- Large variation among trips: 0-50%
- Varying fishing conditions throughout the year

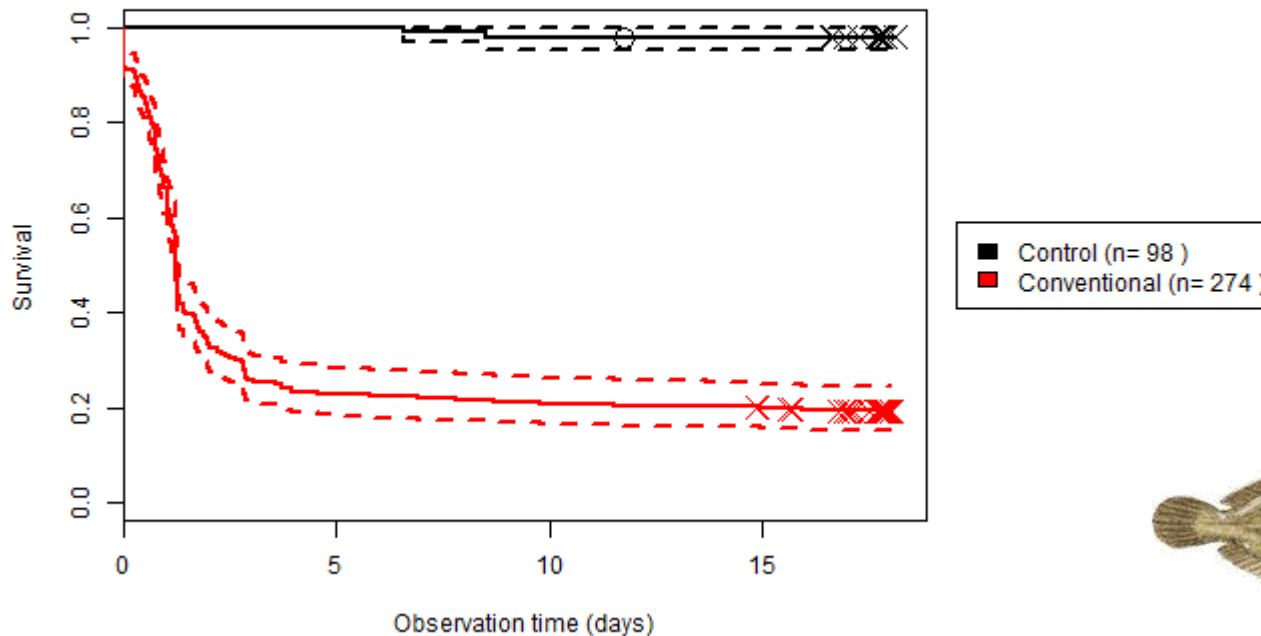
Trip 1-2-3-4-5-6-7-8-9, species = Sole



Sole (*Solea Solea*) – all 9 trips combined

- Survival control-fish ~100%
- Monitoring period was sufficiently long - stabilization
=> *Experiment technically successful*

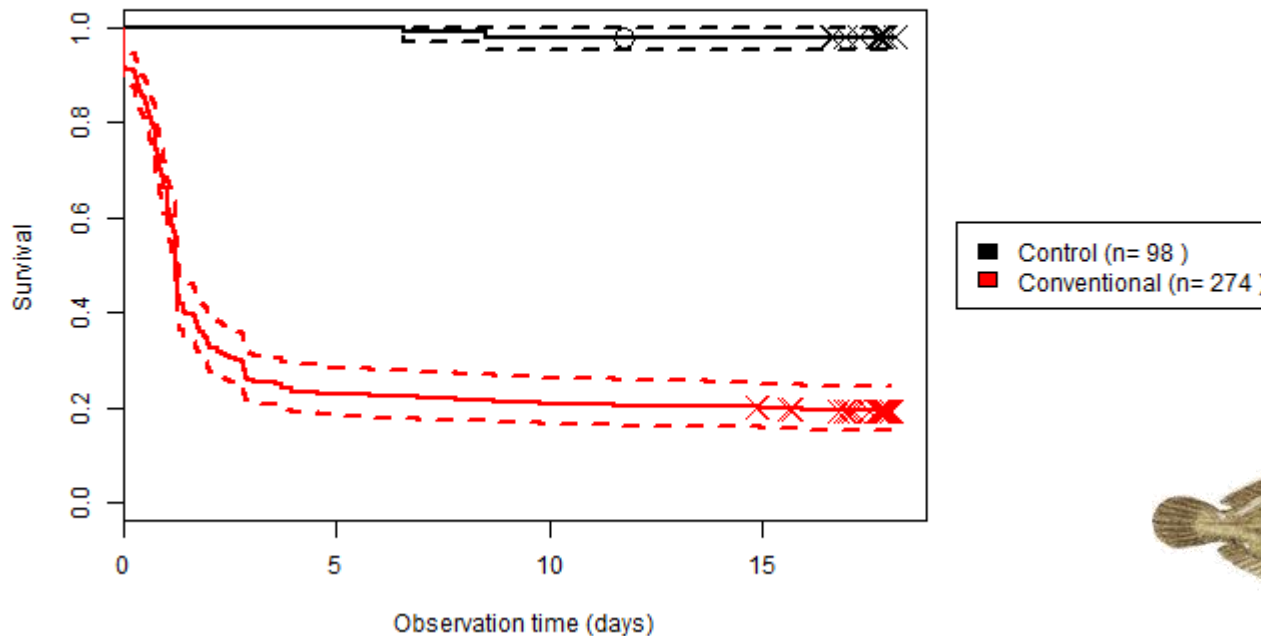
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Sole (*Solea Solea*) – all 9 trips combined

- ~90% sampled discards is alive upon sampling
- Most mortality occurs within 5 days
- Survival test-fish: 19% (95%CI 13-28%)

Trip 1-2-3-4-5-6-7-8-9, species = Sole

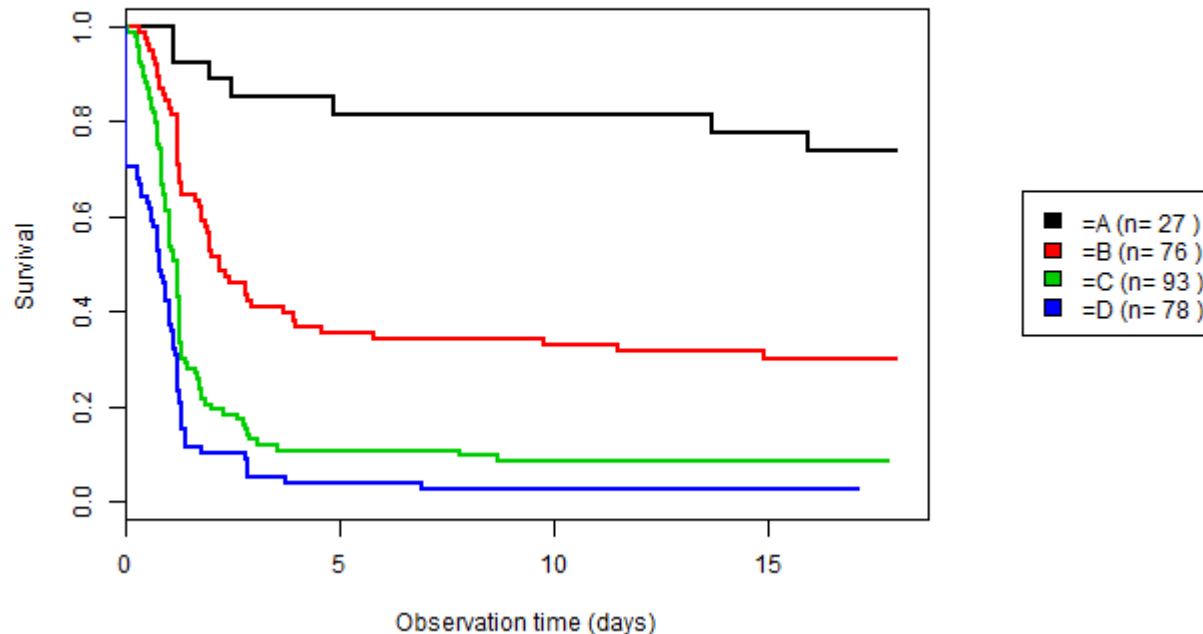


Sole – trips combined – split by fish condition classes



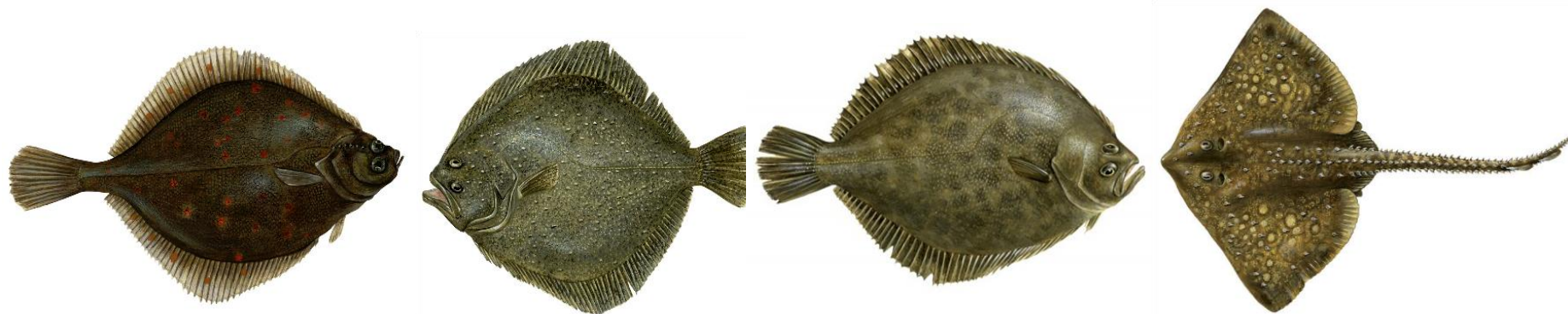
- Strong effect of fish condition on survival
- Small proportion of fish in best condition (A) in catches
- Improving fish condition = key to increase survival

Trip 1-2-3-4-5-6-7-8-9, species = Sole



Survival other species

Species	Number	Overall discards survival probability (%)		
		Obs.	Estimate	95% CI UL
Plaice	558	14%	11%	18%
Sole	274	19%	13%	28%
Turbot*	111	30%	20%	43%
Brill*	90	13%	7%	23%
Thornback ray*	99	53%	40%	65%



What measures can be taken to increase survival?

- Investigated during (same) 9 trips
- Conventional versus modified practices
- Same methods – different samples for modified practices
- Plaice as indicator species
- Three measures:
 - Water filled hopper
 - Shorter hauls
 - Knotless cod end

Water filled vs dry hopper

- Implemented on 1 side of the vessels
- Paired comparison within hauls
- Multiple hauls per trip
- Total of 8 trips



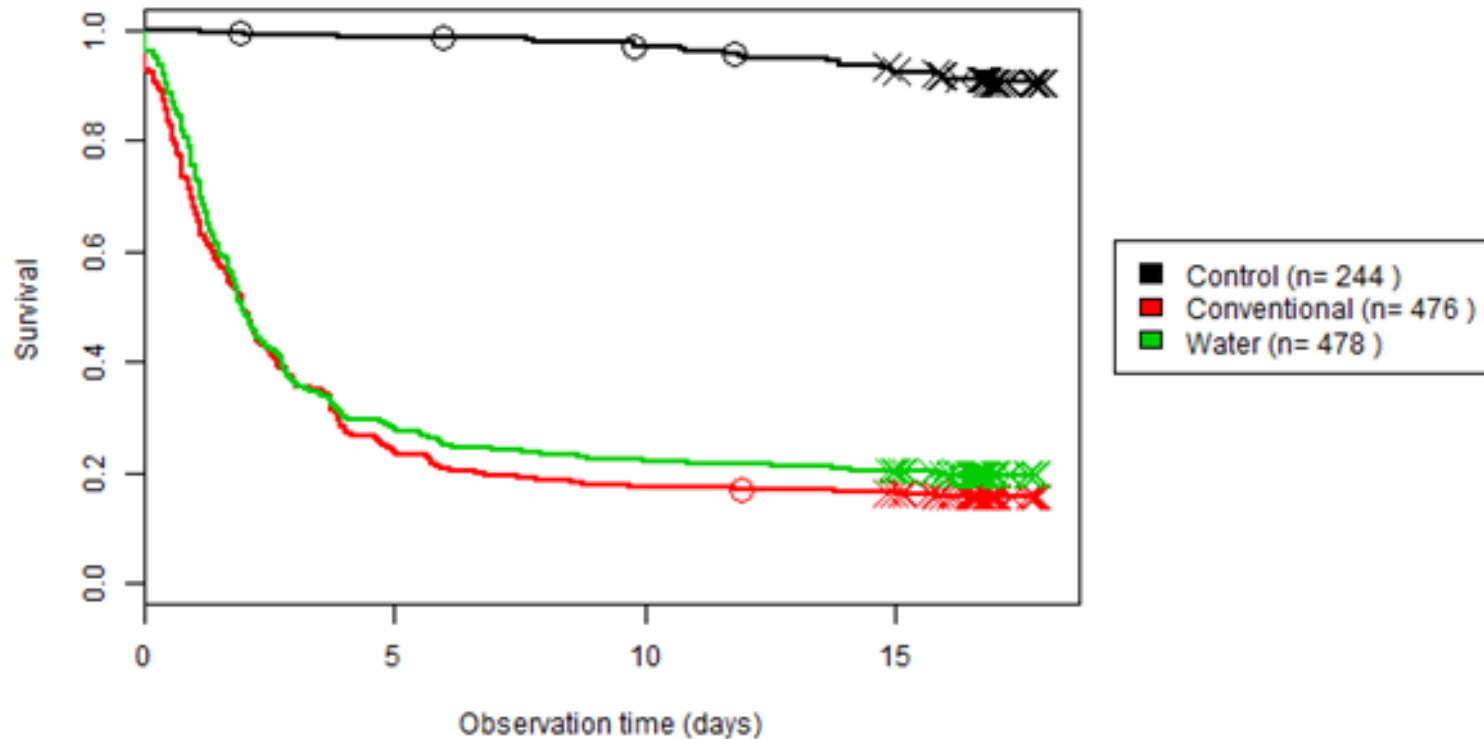
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Water filled vs dry hopper - Results

- All trips combined: no effect of a water filled hopper on plaice discards survival

Trip 1-2-3-4-6-7-8-9, species = Plaice



Water filled vs dry hopper – Trip level

- 3 trips survival water filled > dry hopper
- Some trips indicating negative effect of water filled hopper?
- Effect of conditions yet to be established

Sea trip	Dry hopper	Water filled hopper	p-value
1	15%	18%	0.69
2	15%	29%	0.0009
3	12%	15%	0.77
4	3%	10%	0.03
6	22%	18%	0.74
7	20%	10%	0.17
8	17%	12%	0.26
9	20%	45%	0.01

Water filled hopper can increase discards survival under specific conditions.

Conclusions

- Discards survival was established for plaice and sole
- Indicative discards survival was established for turbot, brill and thornback ray
- Discards survival varies with:
 - Species
 - Trips & underlying factors
 - Fish condition
- Improving fish condition = key to increase survival
- A water filled hopper can increase discards survival under (yet to be established) specific conditions

More information

- Reports
- Factsheets
- Infographics
- Video

All available at:

<http://www.wur.eu/fishsurvival>

<http://www.wur.nl/overlevingvis>

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