Pulse fishing

Short review

Hans Polet

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ILVO
Instituut voor Landbouw- en Visserijonderzoek

Studies

Effects of pulse fields on marine organisms

- Direct effects, short term: *wide range of studies*
- Indirect effects: *ongoing*
- Long term effects : *ongoing*
- Wider ecosystem effects : *ongoing*

Design of the fishing gear: *technical file by vessel*

Catch composition: *data available, although limited*

Catch per unit of effort: *ongoing*

Selectivity: *one study for sole gear, several studies for shrimp gear*

Characteristics of the electric field

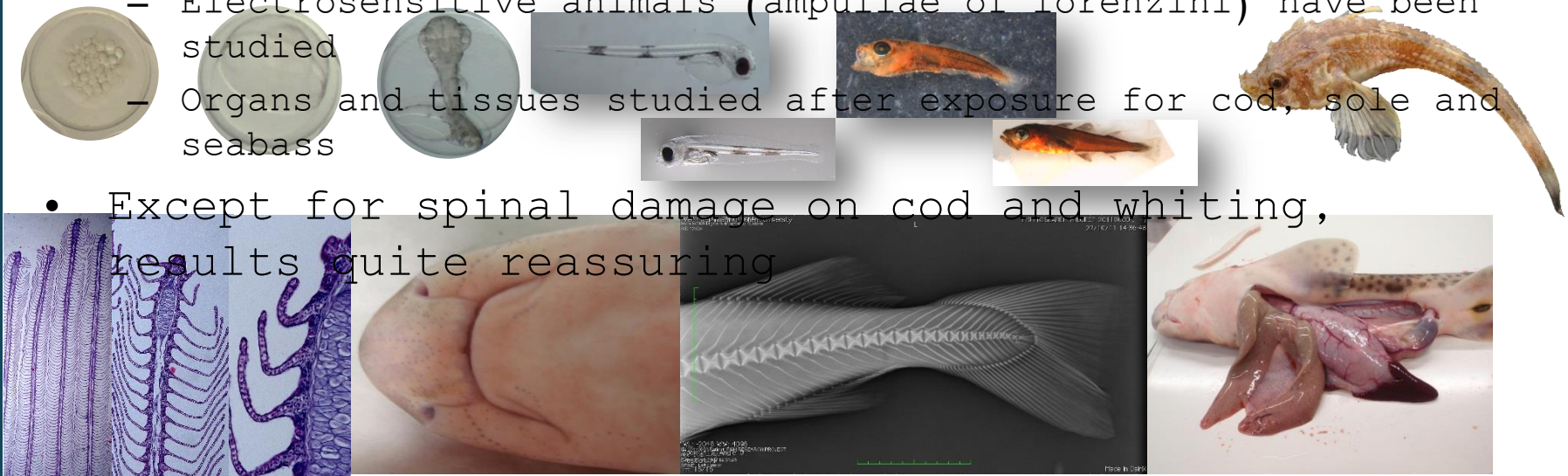
- How does it work ? *well known*
- Variation in the fishery ? *not so clear*

Seafloor disturbance

- Seafloor disturbance: *good studies available*
- Trawl path mortality: *studies available, not conclusive*

Effects of pulse fields on marine organisms

- Wide range of studies on direct effects
  - Varying the different pulse settings to worst-case thresholds and determine safe range (tested parameters: frequency, amplitude, pulse duration, exposure time, pulse shape and pulse polarity)
  - Wide range of commercial fish, non-commercial fish and invertebrates exposed
  - Life stages: different egg and larvae development stages exposed
  - Issue of injuries and ulcers in flatfish is being studied
  - Spinal damage and internal bleeding has been intensively studied
  - Electrosensitive animals (ampullae of lorenzini) have been studied
  - Organs and tissues studied after exposure for cod, sole and seabass
- Except for spinal damage on cod and whiting, results quite reassuring



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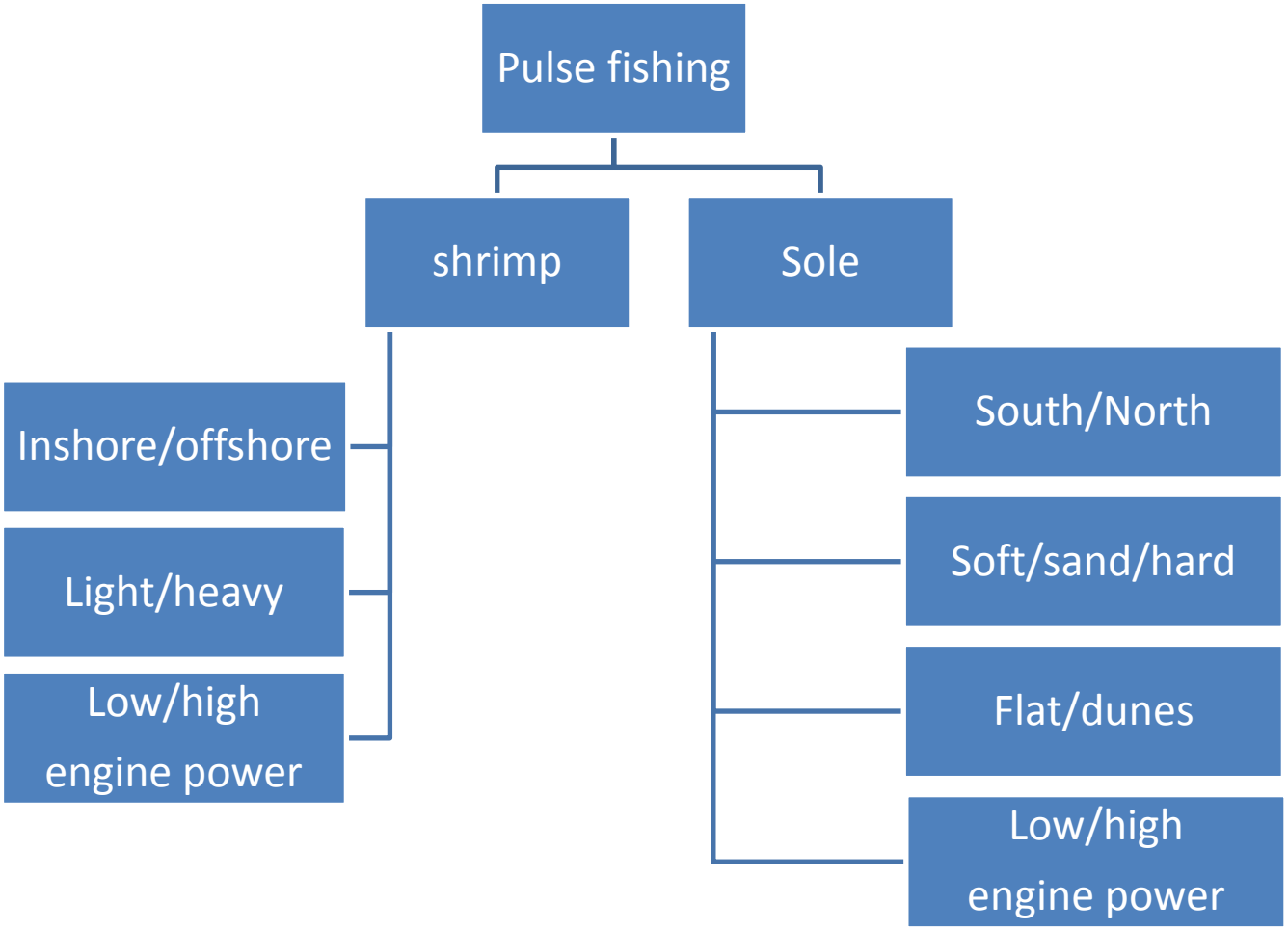
Design of the gear

Pulse gear evolves quickly



Variability in design

Variability in design

Variability in design

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Catch composition – shrimp pulse

The Hovercran selective shrimp pulse trawl (HA 31)

- Increase in commercial catch: max. 9% (early summer)
- Reduction in discarded shrimp: -
- By-catch reduction: -50 to -76%
- Result = almost pure shrimp catc
- Reduction drag resistance: -23%

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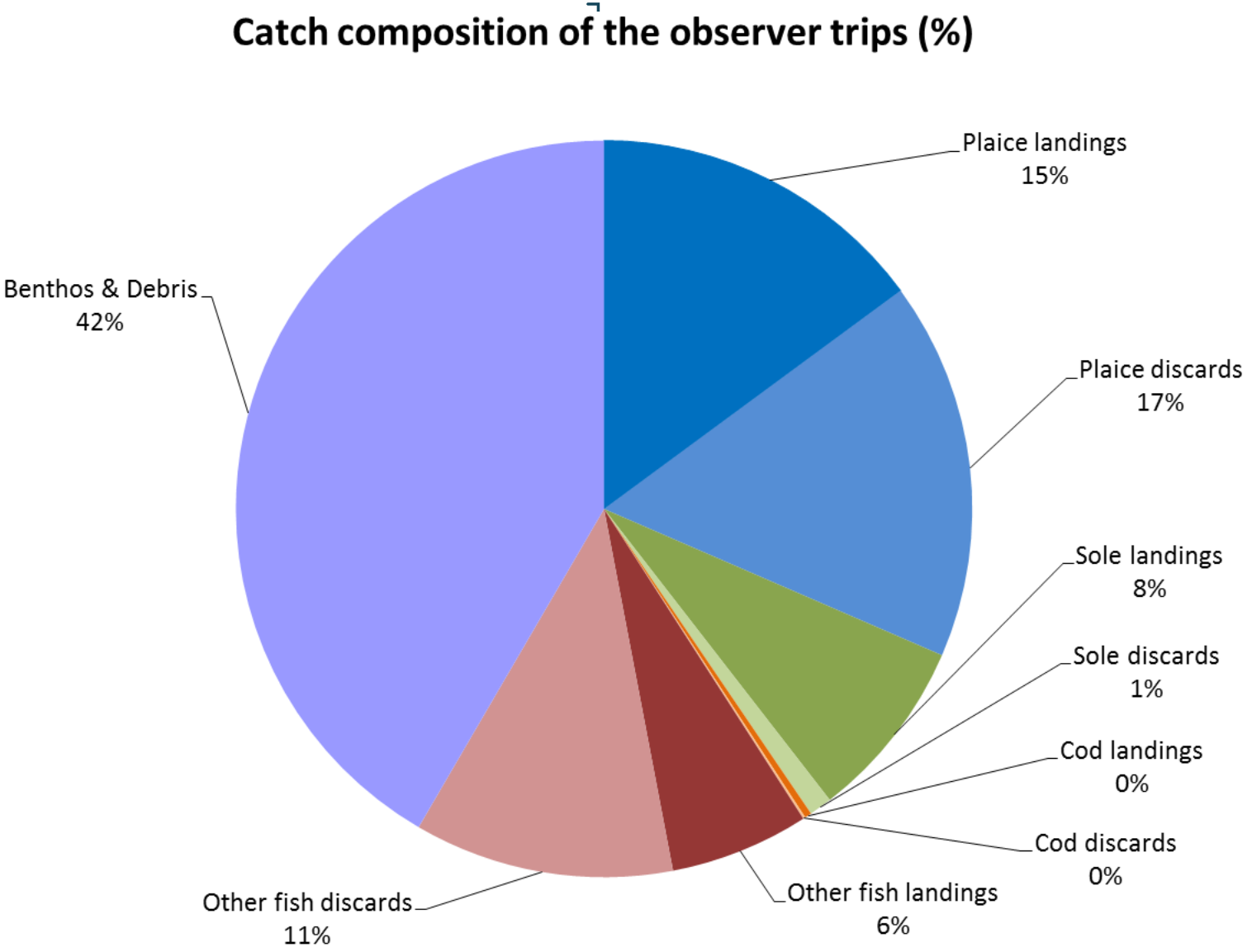
Catch composition – sole



Rasenberg et al., 2013 – Imares

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Catch composition - sole

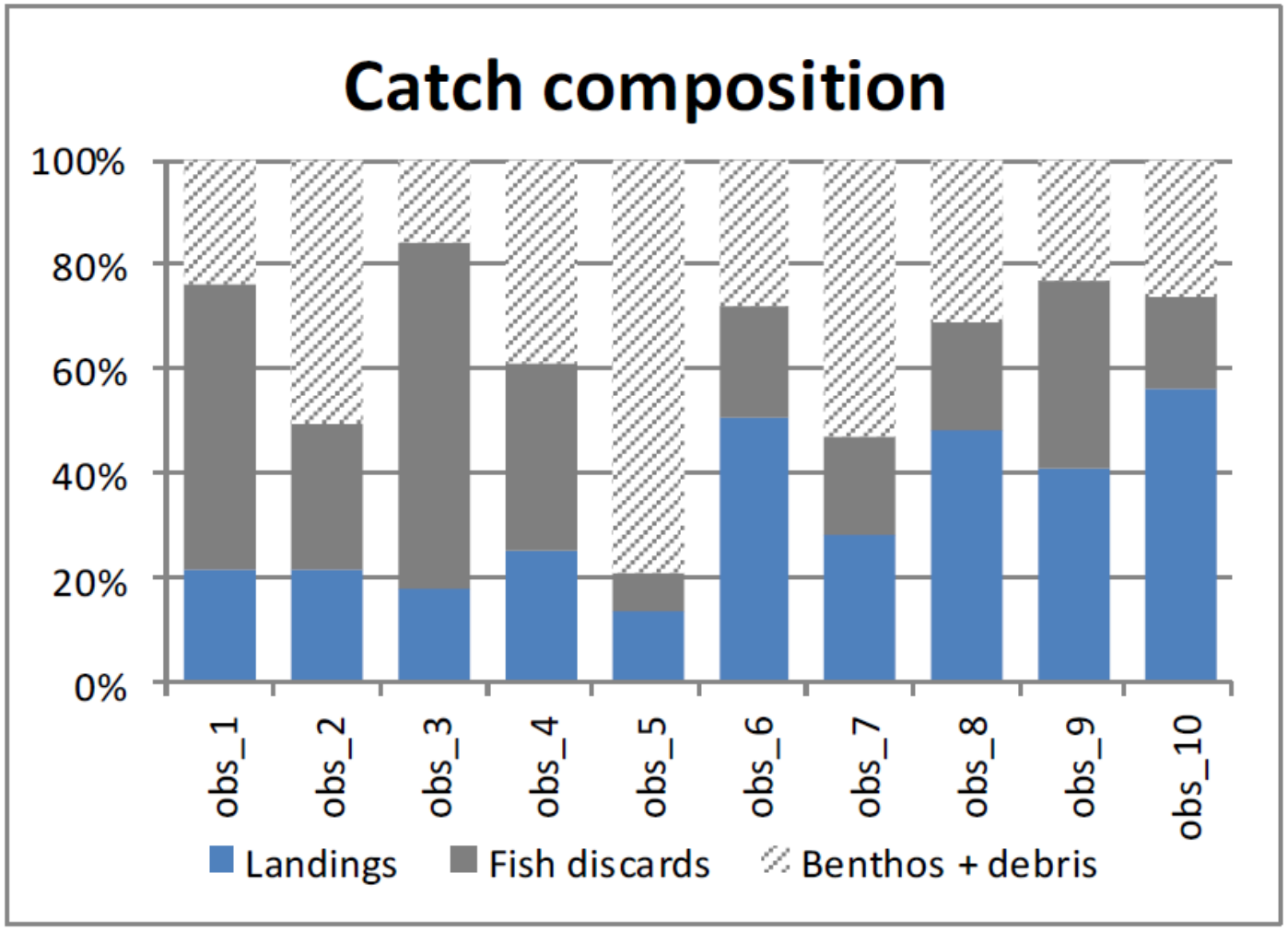

Figure 4.6: *Catch composition by observer trip*

Rasenberg et al., 2013 – Imares

Catch per unit of effort – sole pulse

Table 4.6: *Observed plaice and sole landings, discards (kg/hour), including standard deviation, and DC% for the pulse self-sampling trips (>300hp) monitoring observer trips (>300hp) and beam trawl trips from the DCF (>300hp) in 2012 (CVO, in prep.)*

Type of fishery	Plaice			Sole		
	L	DC	%DC	L	DC	%DC
Pulse trawl, self-sampling	37 ±43	27 ±45	42%	35 ±19	6 ±26	15%
Pulse trawl, observers	61 ±44	66 ±66	52%	32 ±14	4 ±4	10%
Beam trawl	90 ±86	87 ±71	49%	29 ±14	6 ±10	17%

Table 4.5: *Observed numbers/hour, including standard deviation, of starfish and crabs in the pulse monitoring observer trips (>300hp) and beam trawl trips from the DCF (>300hp) in 2012 (CVO, in prep).*

Type of fishery	Starfish nr/hour	Crabs nr/hour
Pulse trawl, observers	1411 (±284)	465 (±94)
Beam trawl	8753 (±2592)	1120 (±244)

Rasenberg et al., 2013 – Imares

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Selectivity

- Rule of thumb: cleaner catches and lower towing speed give better selectivity
- One field study carried out in 2016 (Benthis project)
- More field trials needed

Characteristics of the electric field

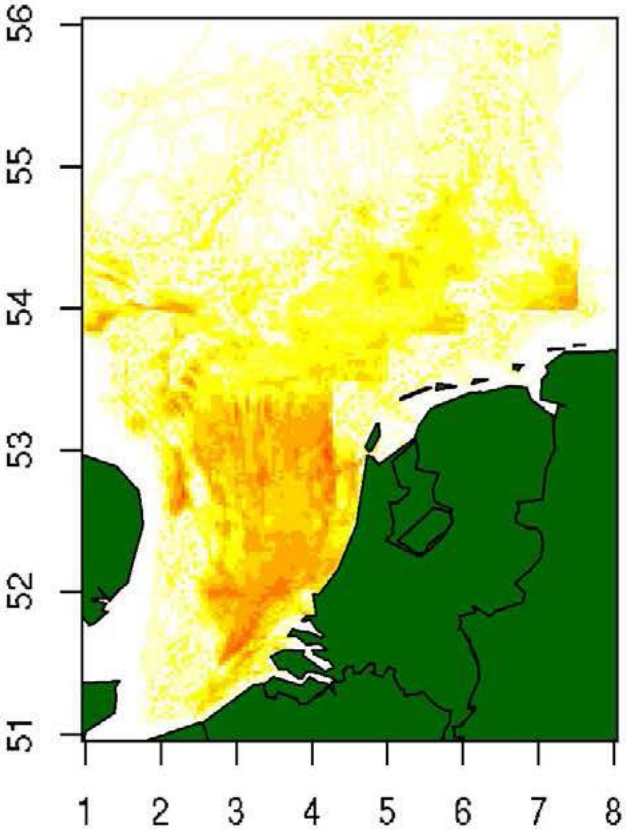
- In theory well known, good simulation software available
- Each Dutch pulse trawler has a technical file with detailed description – available to control agency

Seafloor disturbance

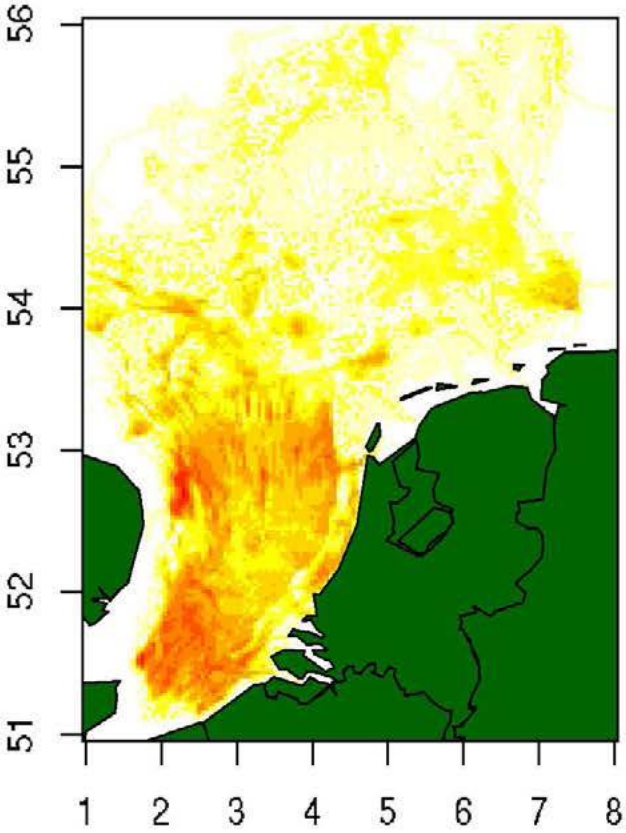
- Sediment penetration of pulse trawl is lower than beam trawl (Benthis project)
- Trawl path mortality less conclusive although results point at less mortality for the pulse trawl

Distribution pattern Dutch flatfish trawlers

Tickler chain beam trawls



Pulse trawls



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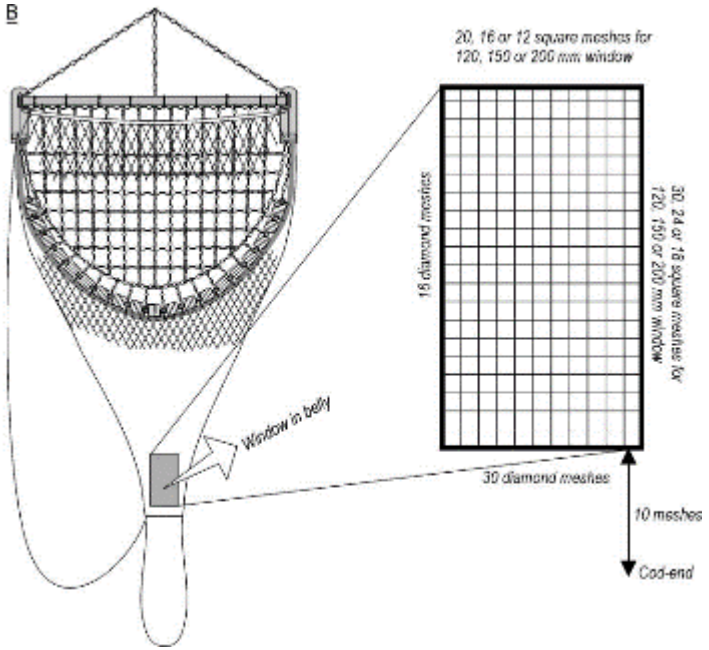
Other applications of pulse fields



Benthos release panel

benthos	-83%
sole	-45%

without (e)BRP

with (e)BRP

Pulsed benthos release panel (e-BRP)

sole	-17%

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Conclusions

- Pulse fishing has potential towards more sustainable fishing
- The effects of pulse fields on marine organisms, as studied by now, are quite reassuring
- There are knowledge gaps, especially on wider ecosystem effects and long term effects
- The main issue is not so much the potential effects of pulse gear but competition, capacity and unintended redistribution of effort – a challenge for management

Thank you

Institute for Agriculture, Food
and Fisheries Research
Ankerstraat 1
8400 Oostende – België
T + 32 (0)59 56 98 37

hans.polet@ilvo.vlaanderen.be
www.ilvo.vlaanderen.be

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is landbouw & visserij

ILVO
Instituut voor Landbouw- en Visserijonderzoek