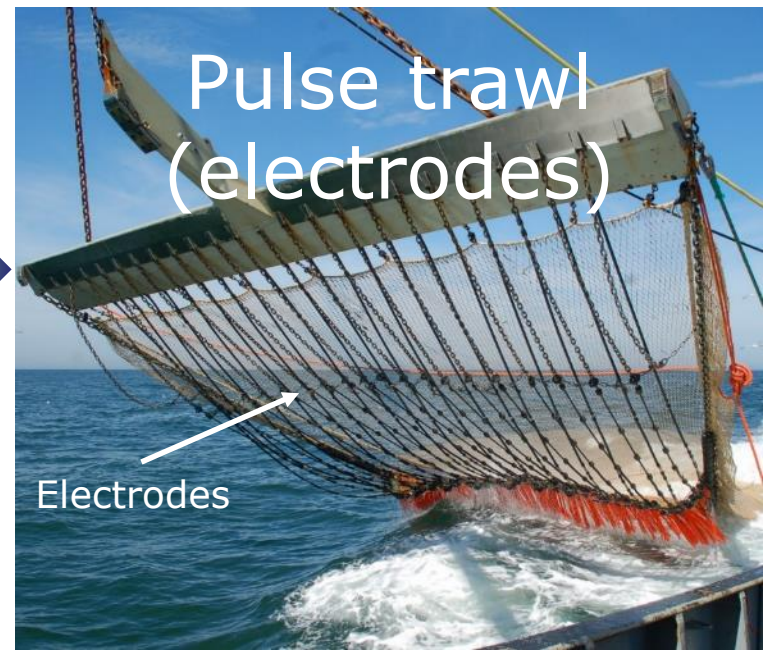
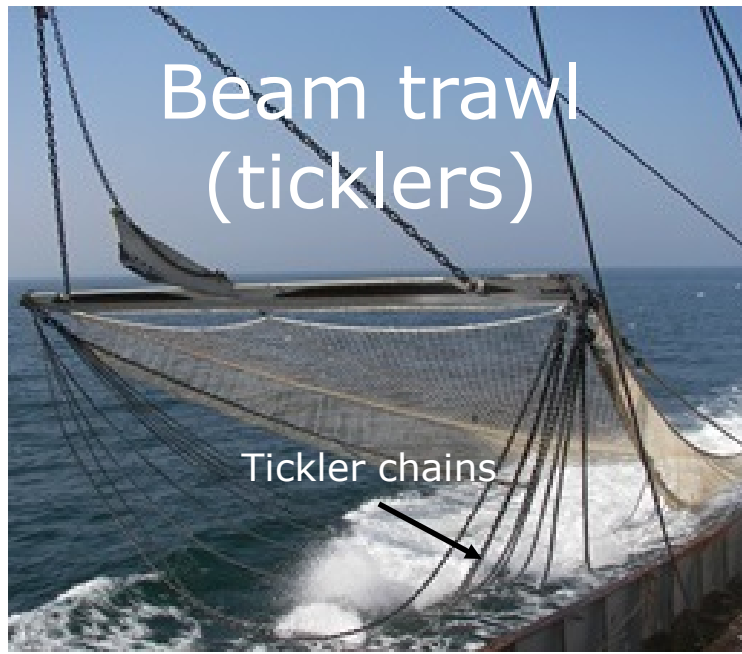


Effects of pulse trawls on marine ecosystem: checking the facts

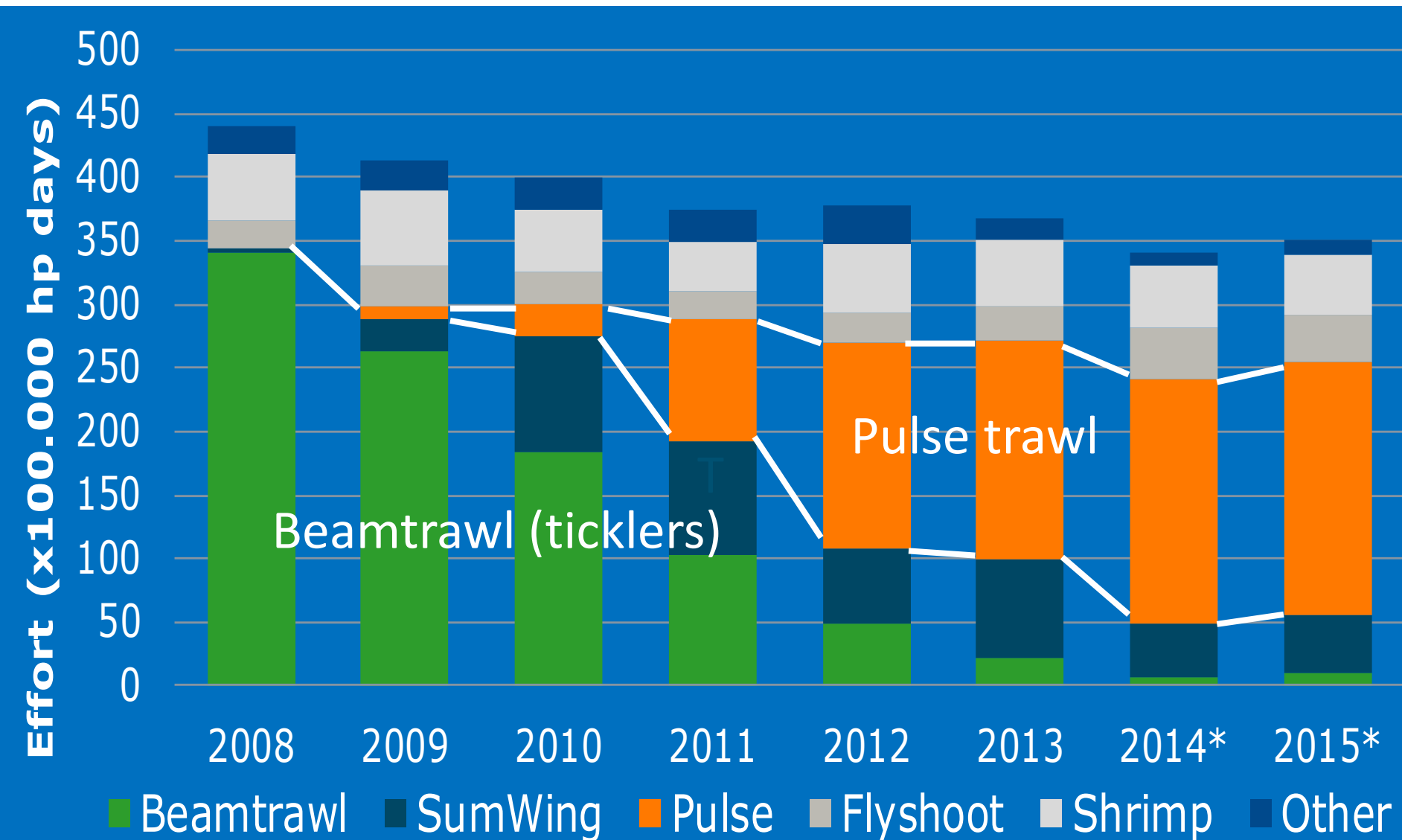
Adriaan D. Rijnsdorp: Wageningen University & Research
Strasbourg, January 15, 2018



What we know

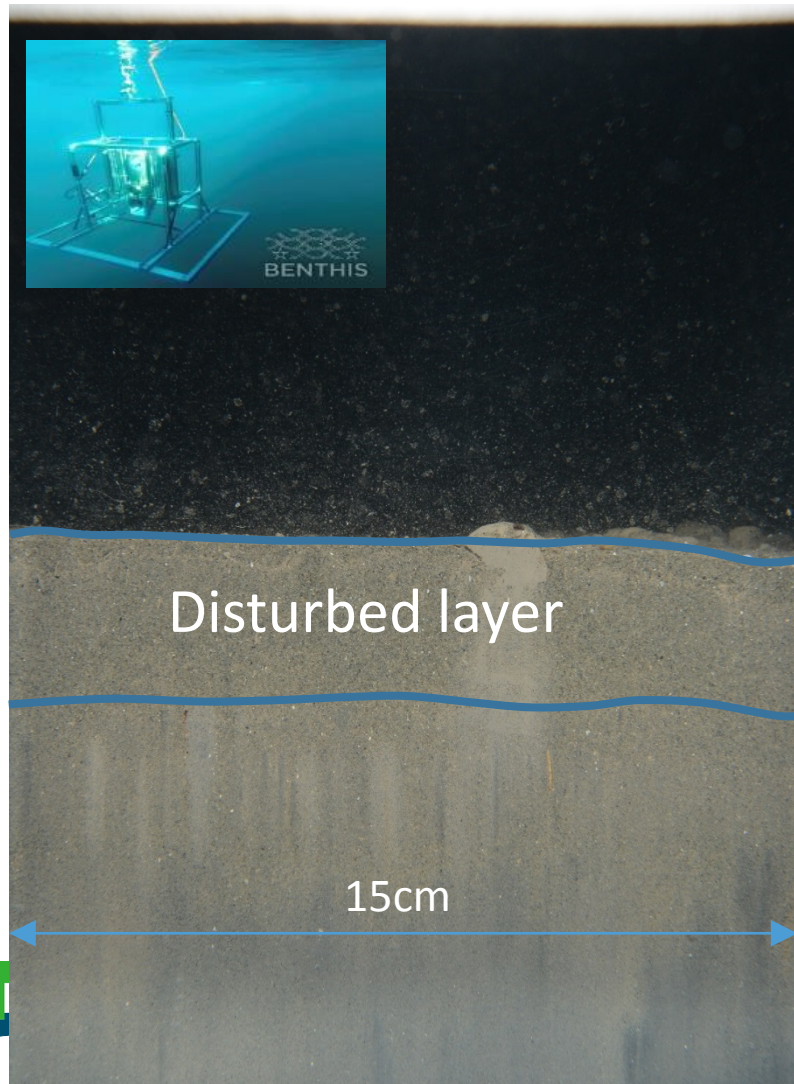
- Time trend in fishing effort
- Effects of mechanical disturbance (FP7-BENTHIS 2012-2017. www.benthis.eu)
- Effects of electrical stimulation (2 PhDs Gent University; Wageningen Marine Research)
- Effects on catch efficiency and selectivity (WMR)

Time trend in fishing effort by gear

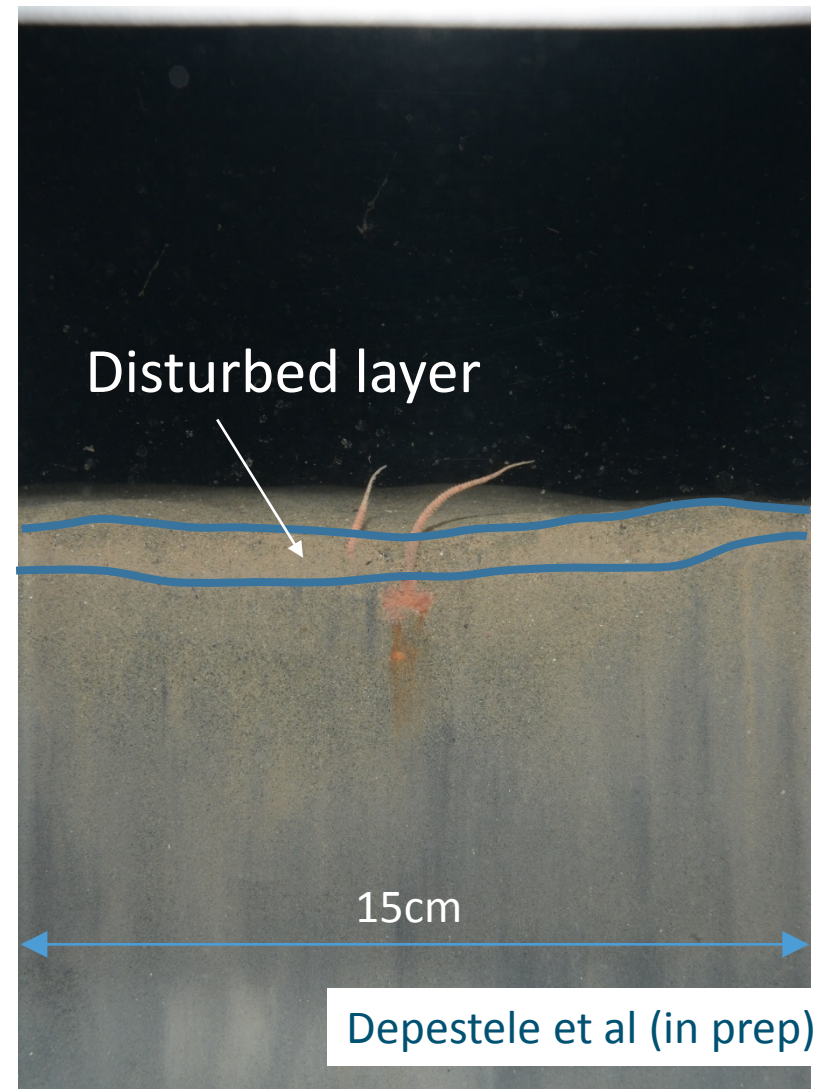


Sea bed disturbance

Beam trawl ticklers (T)

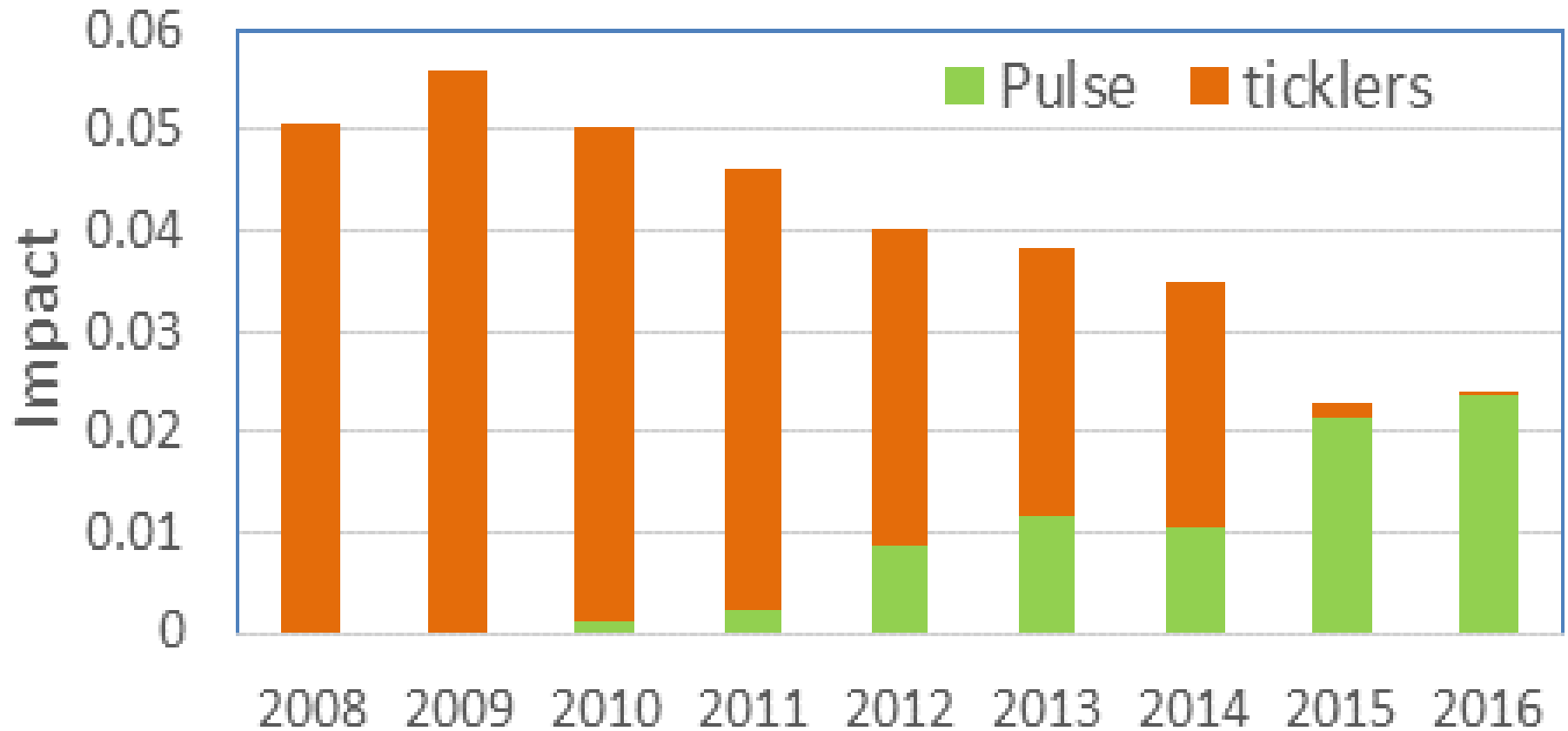


Pulse trawl (P)

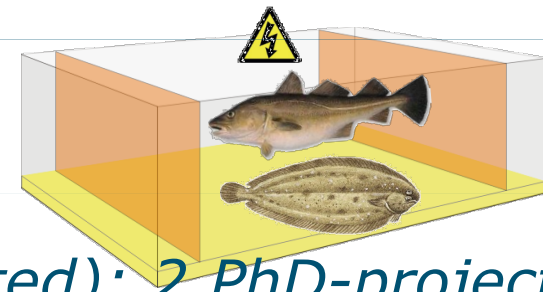


Benthic impact reduced by 50%

Benthic impact (PD2)



Effects of electricity



- *2 PhD-projects Univ Gent (completed); 2 PhD-projects ongoing (Wageningen, NIOZ); experiments WMR*
- Exposure (worst case) to commercial sole pulse
 - Fractures induced in cod, but not in other fish species (plaice, sole, dab, sea bass)
 - No lesions found in dab
 - No effect of food detection (catshark)
 - No extra mortality of worms and shrimps
 - No effect on development / mortality in 6 out of 8 egg/larval stages of cod
- Injury rate in commercial samples
 - ~10% cod; ~2% whiting

Survival experiments (Dutch vessels)

- Survival of discards (much) better than in tickler chain beam trawl

	Pulse	Beam
Plaice	~15%	~10%
Sole	~30%	~5%
Rays	~60%	

Van Beek et al (1990) Neth J Sea Res
Van der Reijden et al (2017) ICES JMS
Molenaar et al (in prep)

Catch efficiency and selectivity

- Catch efficiency pulse / beam trawl (tickler)
 - Higher for sole
 - Lower for plaice and other fish species
 - Much lower for benthos
- Logic consequence
 - bycatch of pulse trawl smaller than beam trawl per kg sole quotum
- Size selectivity uncertain

Van Marlen et al. (2014) Fish Res
Poos et al. (in prep)

Fact check (1)

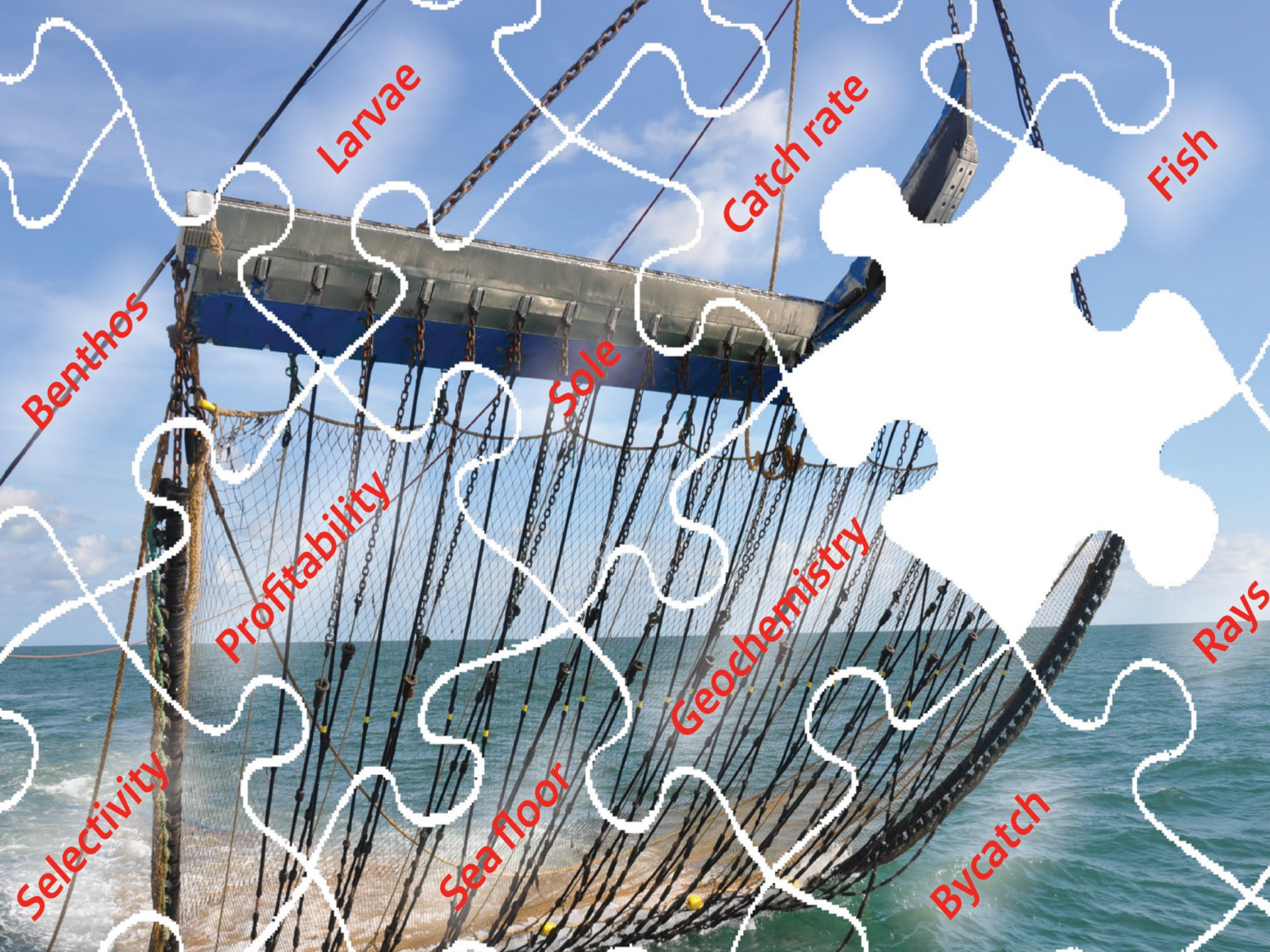
Accusations	Fact check
Effects of electricity on eggs, juveniles and electro-sensitive species such as rays and sharks are devastating	Untrue: refuted by the available experiments
Marine organisms brutalized: 50-70% of cods show a fractured spine and internal bleeding as a result of the electric shock	Untrue: fractures in pulse catch: whiting ~2%; cod ~10% No evidence for fractures in flatfish
Sea is a graveyard after pulse has passed	Untrue: pulse impose lower mortality on benthos and discards
Stocks and benthic sea life are being depleted, pulse leads to overfishing', 'it is five times as efficient'	Untrue: pulse is more efficient but total effort is limited by sole quota
Fish caught with pulse is of such bad quality that it cannot be used, because of burns, broken backs	Untrue, except for a part of the cod catch. Quality of fish is better due to lower speed and less benthos / debris

Fact check (2)

Accusation	Fact check
China developed electric trawling in the 1990s but banned it in 2000 after having witnessed the rapid deterioration of marine ecosystems as well as dramatic social consequences.	Lack of regulation resulted in the misuse of electrical pulse parameters that caused damage to juvenile shrimps and other benthic species" (Yu et al. 2007 ICES JMS 64: 1592-1597
The radical efficacy of electric trawlers causes small-scale fishers to go bankrupt, as industrial fishers monopolize and deteriorate the resources	Pulse vessels may outcompete other gears when fishing on the same fishing grounds (Sys et al. 2016 ICES JMS

Conclusion

- Scientific evidence shows
 - Pulse trawls have a smaller ecological impact on the marine ecosystem (footprint, seabed disturbance, benthic impact, discard survival) than beam trawls
 - Experiments on effect of pulses (worst case exposure) did not find adverse effects. The few indications for adverse effects found require further research
 - Clear adverse effects only observed in cod and whiting but not in flatfish (fractures). Further research to study more species and effect body size
- Ongoing research program to
 - fill knowledge gaps
 - impact assessment pulse – traditional gear



Larvae

Catch rate

Fish

Benthos

Sole

Profitability

Geochemistry

Rays

Bycatch

Sea floor

Selectivity

Impact Assessment 2016-19 (2.5 million Euro)

■ Research consortium

- Wageningen University and Research (WMR, EZO)
- Netherlands Institute for Sea Research (NIOZ, Yerseke)
- Belgium Fisheries Research (ILVO, Ostend)

■ International Advisory Board

- Chair: prof dr Michel Kaiser (Bangor University)

■ Input to ICES (annually)

- WGELECTRA
- ICES Advice foreseen around summer 2019

■ STECF

Impact Assessment 2016-19 (2.5 mEuro)

- Marine organisms (Wageningen University)
 - response of selected marine organisms to pulse exposure
- Benthic ecosystem (NIOZ)
 - effect of pulse trawling on functioning and biogeochemistry of benthic ecosystems (short-term and long-term effects)
 - 2018: Experimental trawling (pulse & traditional) in closed area
- 'Sea bed' (Wageningen Marine Research)
 - effect of pulse trawling on the fish stocks and benthic ecosystem (North Sea scale)
- Synthesis (Wageningen Marine Research)
 - effect of transition of tickler chain beam trawl fleet to pulse trawl fleet on bycatch and adverse effects on benthic ecosystem?