Pulse fishing: what do we know?

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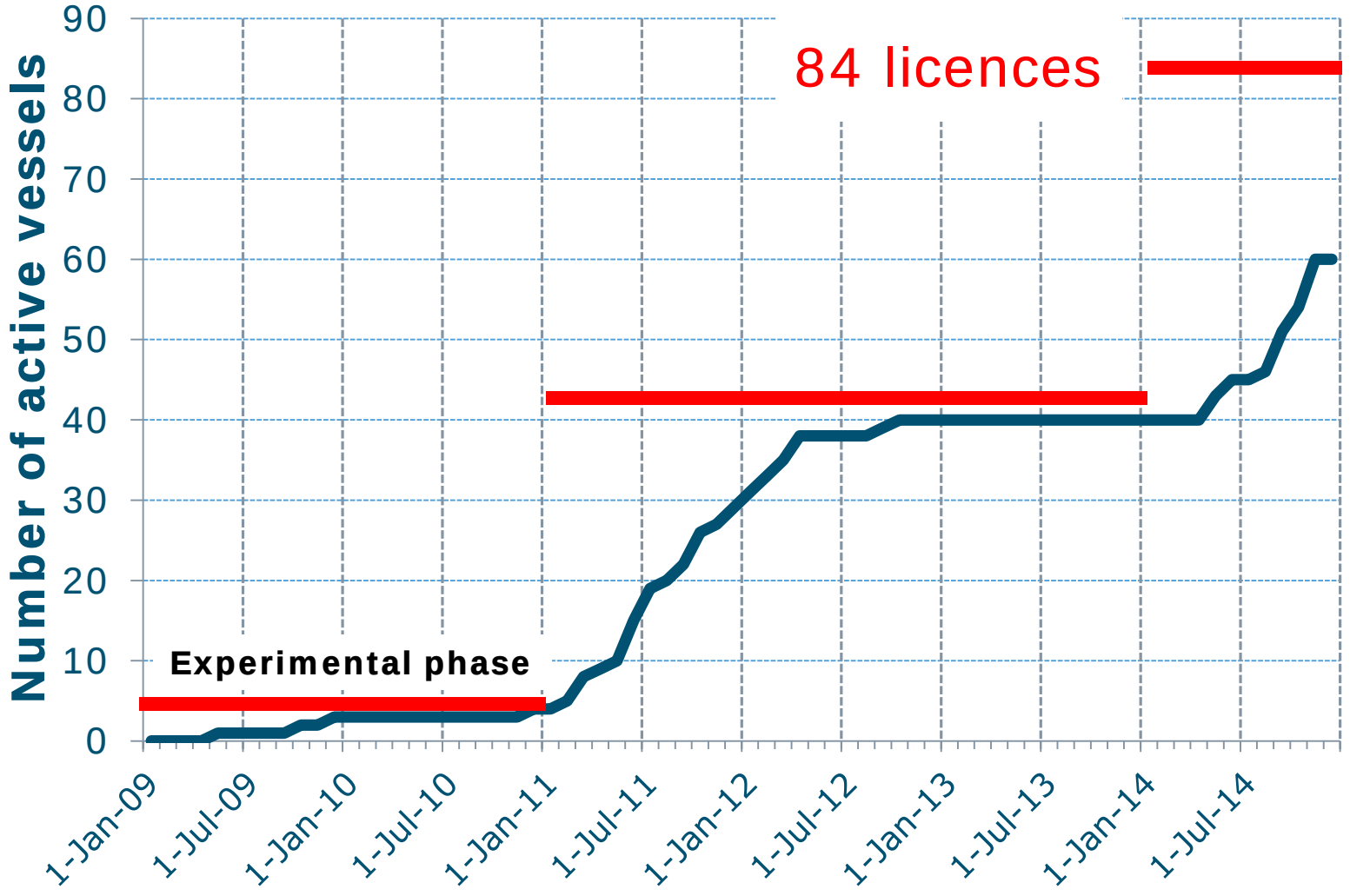
Background

- NL fleet holds 80% North Sea Dover sole quota
- Concerns about traditional fishing method (beam-trawl)
  - tickler chain impact on sea bed and benthos
  - small mesh → large bycatch of undersized fish
  - high fuel costs
- Pulse trawl:
  - increase catch selectivity
  - reduce fuel costs
  - since 2009 (commercial phase)
  - temporary licences

Number of pulse trawlers in North Sea



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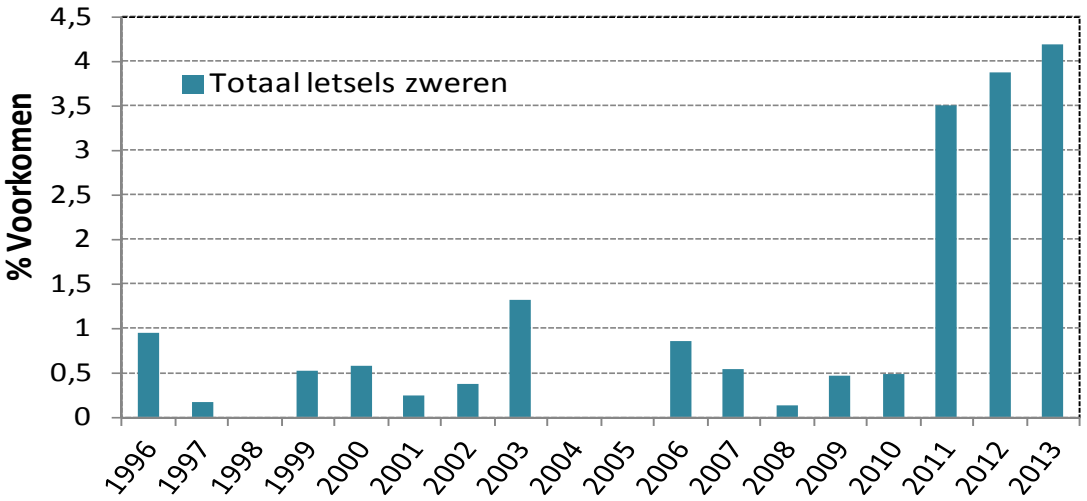
Concerns around pulse development

- Adverse effect of electricity on marine organisms?
  - mortality
  - injuries
  - ulcers

% dab with ulcers (Belgian coast)



(ILVO: Devriese, L., 2014)

- Increase in fishing efficiency and risk of over-exploitation?

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Effects on catches (compared to beam-trawl)

Comparative fishing studies, discards research EU Data Collection Framework, industry self-sampling programme, analyses of auction data by IMARES

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Catches: marketable fish (compared to beam-trawl)

- Landings per Unit of Effort (2011): pulse lower landings (71% less plaice, 86% less sole)
- Self-sampling (2013): similar catches of sole, less plaice
- *Indications* efficiency increase sole

Catches: fish discards (compared to beam-trawl)

- Comparative fishing (2006, 2011): significantly less total fish discards and plaice
- Self-sampling vs. DCF observer programme (2013): less sole and less plaice discards

Catches: benthos (compared to beam-trawl)

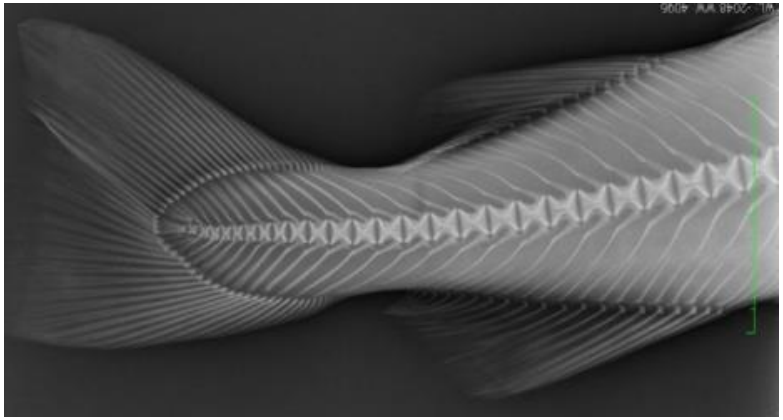
- Comparative fishing (2006, 2011): significantly less benthos in pulse
- Self-sampling vs. DCF observer programme (2013): significantly less benthos in pulse

Effects of electricity

Lab experiments + field observations by ILVO Belgium, University Ghent Belgium, IMARES Wageningen UR

Effects on cod (spinal damage)

- In lab (farmed cod):
  - Damage depends on size of cod and position in relation to electrodes
  - Effects on large cod (50%)
  - Juveniles undamaged



- Commercial catches:
  - About 10% of cod damaged
  - Means 0.5% on a North Sea scale

Effects on dab (ulcers):

- Three groups of 50 dab
- Single exposure experiment
- Maximum exposure
  - DELMECO pulse (60V)
  - HFK pulse (70V)
  - Reference group (not exposed)
- After 1 week all dab examined for lesions, ulcers, wounds, parasites
- No ‘injuries’ due to pulse exposure observed

Effects on electroreceptors sharks and rays

- Physical responses
- No mortality
- Behaviour or feeding not affected
- Egg production not affected

Ecosystem effects

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Ecosystem effects (compared to beam-trawl)

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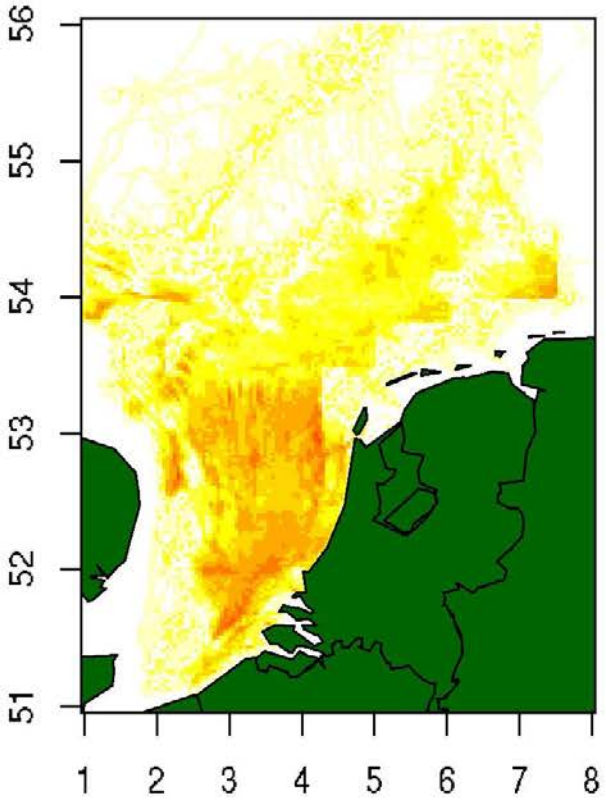
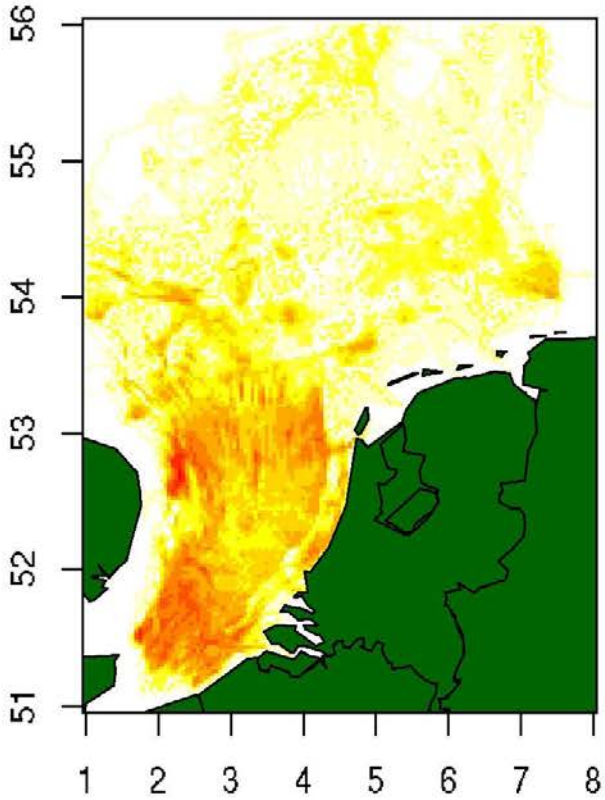
- Reduction in
  - bycatch of undersized fish
  - bycatch of benthic invertebrates
  - penetration depth
- Trawl path mortality
  - under study
- Change in distribution pattern
  - consequences to be studied

Change distribution pulse trawlers: consequences for ecosystem effects

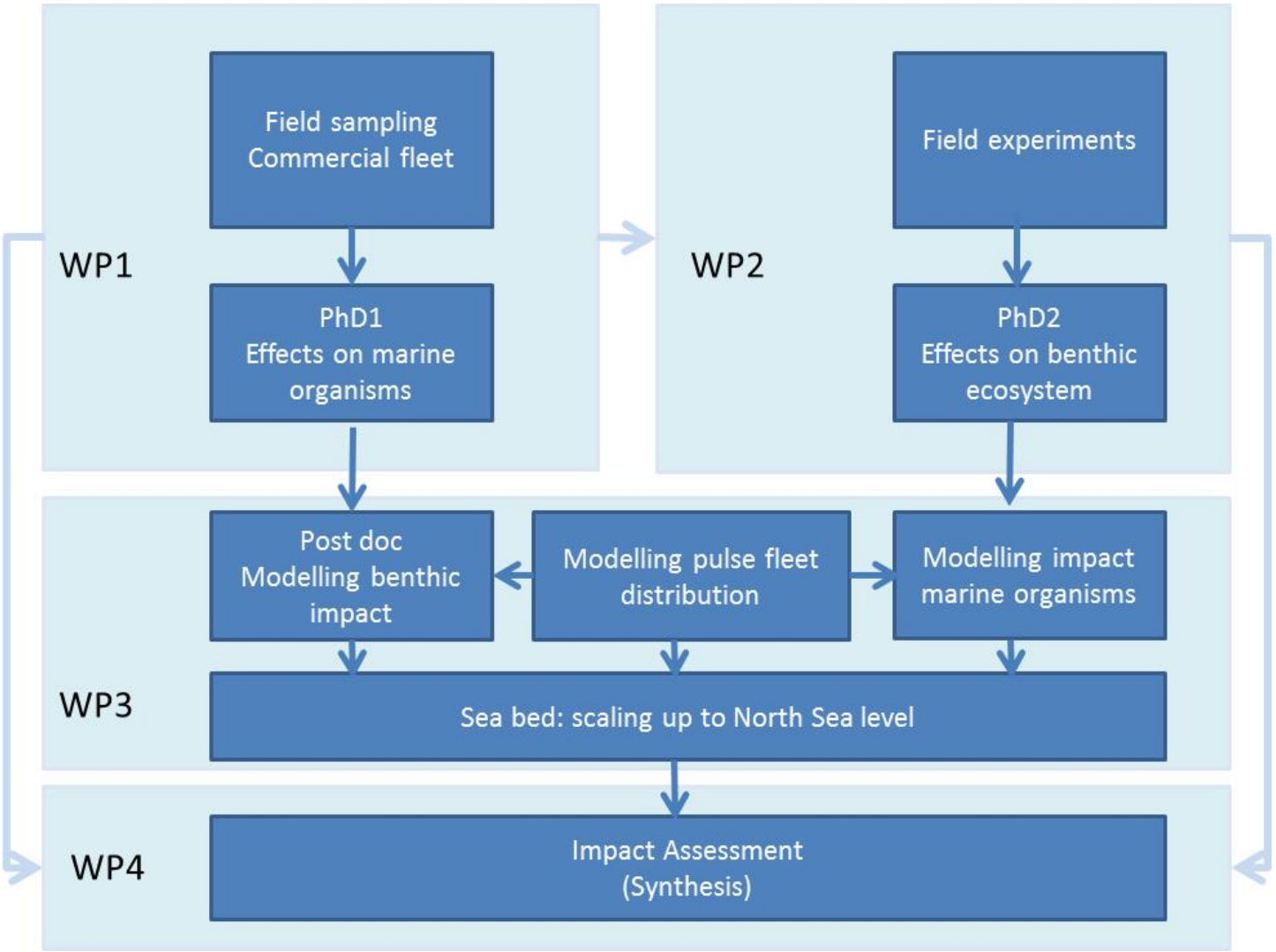
Tickler chain beam trawls



Pulse trawls



Research programme for knowledge gaps



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Research programme: PhD1 - Effect on marine organisms

- Objective
  - To develop a predictive model on the distribution of the electrical field in various organisms and their effect on activity and survival
- Approach:
  - Lab experiments (fish, benthos)
  - Modelling
- Model species
  - Roundfish, flatfish, sharks and rays
  - Bivalves, crustaceans, polychaetes, sea urchin

Research programme: PhD2 - Effect on the benthic ecosystem

- Objective
  - To develop a predictive model of the impact of electrical pulses on benthic ecosystem functioning in particular on the biogeochemistry
- Approach
  - Lab and Field experiments
  - Use of closed area (Oyster Grounds / Frisian Front)

Research programme: Upscaling effects to fleet and ecosystem level

- Objective
  - To develop predictive models of the ecosystem effects (bycatch, proportion of injured fish, benthic ecosystem functioning) on the level of the fleet and North Sea

- Approach
  - Modelling spatial distribution pulse trawl fleet in relation to benthic habitats (high resolution)
  - Modelling effect pulse trawls on ecosystem functioning

We do not yet fully understand the ecosystem effects of pulse fishing, but indications are that the pulse technique can play an important role in results-based management.

Thank you for your attention

More information:

www.pulsefishing.eu

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