

# ICES WGELECTRA REPORT 2014

SCICOM STEERING GROUP ON ECOSYSTEM SURVEYS SCIENCE AND TECHNOLOGY

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## First Interim Report of the Working Group on Electrical Trawling (WGELECTRA)

21–23 October 2014

Ostend, Belgium



**ICES**

International Council for  
the Exploration of the Sea

**CIEM**

Conseil International pour  
l'Exploration de la Mer

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## Executive summary

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The Working Group on Electrical Trawling (WGELECTRA) met in Ostend, Belgium from 21–23 October 2014 to review knowledge of the effects of electrical fishing on the marine environment, (a) evaluate the effect of a wide introduction of electric fishing; (b) conduct a pilot study on control and enforcement procedures for flatfish pulse trawling; (c) evaluate the impacts of restrictions on pulse characteristics for shrimp pulse trawling and groundrope configurations; (d) and to make an inventory of views on pulse fishing among various stake-holders in European member states. The major findings were as follows. The pulse stimulation tested in a uniform field did not result in an increased mortality or macroscopic lesions in sole, cod, brown shrimp and rag-worm. No mortality or spinal injury, but minor haemorrhages and point bleedings were found in plaice, sole, cod, armed bullhead, and bull-rout. Some effect was found on egg stages of sole, but no real effect on larval stages. Lesions were found in dab under pulse stimulation, but no clear differences between treated fish and reference fish could be distinguished. The results of tank tests on cod under pulse stimulation varied considerably, which was attributed to differences in rearing of the fish. A catch comparison between a new shrimp pulse trawl (12 electrodes and 11 bobbins) and a conventional shrimp trawl (36 bobbins) showed that shrimp landings remained the same, with less undersized shrimp and much less bycatch. Electrofishing on razor clam in Scottish waters has minimal effect on the seabed compared with conventional dredge and trawl fisheries; immediate effects on non-target species are non-lethal and effects on invertebrate behaviour are short term, but restrictions on fishing effort may be needed in view of high efficiency of electrofishing. A yearlong study in Germany showed that bycatch of non-target species can be reduced by electrical stimulation in shrimp trawling. The specifications of the groundrope arrangement (number and size of bobbins) need careful consideration too. New developments might be a twin-rig using pulse stimulation for catching plaice and sole, and the use of electrical stimulation at the position of escape windows. The group recommends meeting again next year to discuss the ToRs.

## 1 Administrative details

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**Working Group name**

Working Group on Electrical Trawling (WGELECTRA)

**Year of Appointment**

2014

**Reporting year within current cycle (1, 2 or 3)**

1

**Chair(s)**

Bob van Marlen, the Netherlands

Bart Verschueren, Belgium

**Meeting venue**

Ostend, Belgium

**Meeting dates**

21–23 October 2014

## 2 Terms of Reference a) – z)

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**ToR a**

Review knowledge of the effects of Electrical Fishing on the marine environment (changes to bycatch, impact on bottom habitat, impact on marine fauna, energy and climate related issues), in view of current technical developments and recent studies carried out in The Netherlands, Scotland, Belgium and Germany.

**ToR b**

Evaluate the effect of a wide introduction of electric fishing, with respect to the economic impact, the ecosystem impact, fleet dynamics, the energy consumption, and the population dynamics of selected species.

**ToR c**

Conduct a pilot study on control and enforcement procedures for flatfish pulse trawling.

**ToR d**

Evaluate the impacts of restrictions on pulse characteristics for shrimp pulse trawling and groundrope configurations.

**ToR e**

Make an inventory of views on pulse fishing among various stakeholders in European member states.

### 3 Summary of Work plan

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Year 1	<p>Fundamental research on the effect of pulse stimulation on a range of species, both juvenile and adults stages by PhD workers under guidance of ILVO and University Ghent, Belgium.</p> <p>Pilot study on defined control and enforcement procedures for flatfish pulse trawling by IMARES, Netherlands.</p> <p>Further tank experiments on wild-caught cod, using pulse simulators by IMARES, Netherlands, and ILVO, Belgium.</p> <p>Study effects of pulse beam trawling on benthic invertebrates in EU-project BENTHIS by IMARES, Netherlands, and ILVO, Belgium.</p> <p>Monitor economic performance of more vessels in EU-project BENTHIS by LEL, Netherlands.</p> <p>Ongoing experiments with electrical shrimp fishing in Belgium and the Netherlands by ILVO Fishery, Belgium.</p> <p>Study on effects on electric fishing for Ensis by Marine Scotland Science, and the possibilities of using other, lower energy pulse systems than currently used.</p> <p>Study to optimize the front part (particularly the groundrope) of shrimp-pulse-trawls with respect to a) maintaining commercial catch rates; b) reducing unwanted bycatch; c) reducing energy consumption in Germany by Thünen Institute.</p> <p>Comment on the technical development of an electrical twin-trawl system as part of the Dutch “Masterplan Duurzame Visserij” by IMARES IJmuiden, The Netherlands.</p> <p>Make an inventory of views on pulse fishing among various stakeholders in European member states.</p>
Year 2	<p>Fundamental research on the effect of pulse stimulation on a range of species, both juvenile and adults stages by PhD workers under guidance of ILVO and University Ghent, Belgium.</p> <p>Study effects of pulse beam trawling on benthic invertebrates in EU-project BENTHIS by IMARES, Netherlands, and ILVO, Belgium.</p> <p>Monitor economic performance of more vessels in EU-project BENTHIS by LEL, Netherlands.</p> <p>Ongoing experiments with electrical shrimp fishing in Belgium and the Netherlands by ILVO Fishery, Belgium.</p> <p>Study on effects on electric fishing for Ensis by Marine Scotland Science, and the possibilities of using other, lower energy pulse systems than currently used.</p> <p>Study to optimize the front part (particularly the groundrope) of shrimp-pulse-trawls with respect to a) maintaining commercial catch rates; b) reducing unwanted bycatch; c) reducing energy consumption in Germany by Thünen Institute.</p> <p>Comment on the technical development of an electrical twin-trawl system as part of the Dutch “Masterplan Duurzame Visserij” by IMARES IJmuiden, The Netherlands.</p> <p>Evaluate the impacts of restrictions on pulse characteristics for the shrimp pulse fishery and consider recommendations for groundrope configurations by IMARES, Netherlands, Thünen Institute Germany, and ILVO, Belgium.</p> <p>Comment on the technical development of an electrical twin-trawl system as part of the Dutch “Masterplan Duurzame Visserij” by IMARES IJmuiden, The Netherlands.</p> <p>Make an inventory of views on pulse fishing among various stakeholders in European member states.</p>

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Year 3	<p>Fundamental research on the effect of pulse stimulation on a range of species, both juvenile and adults stages by PhD workers under guidance of ILVO and University Ghent, Belgium.</p> <p>Study effects of pulse beam trawling on benthic invertebrates in EU-project BENTHIS by IMARES, Netherlands, and ILVO, Belgium.</p> <p>Monitor economic performance of more vessels in EU-project BENTHIS by LEI, Netherlands.</p> <p>Ongoing experiments with electrical shrimp fishing in Belgium and the Netherlands by ILVO Fishery, Belgium.</p> <p>Study on effects on electric fishing for Ensis by Marine Scotland Science, and the possibilities of using other, lower energy pulse systems than currently used.</p> <p>Study to optimize the front part (particularly the groundrope) of shrimp-pulse-trawls with respect to a) maintaining commercial catch rates; b) reducing unwanted bycatch; c) reducing energy consumption in Germany by Thünen Institute.</p> <p>Comment on the technical development of an electrical twin-trawl system as part of the Dutch “Masterplan Duurzame Visserij” by IMARES IJmuiden, The Netherlands.</p> <p>Evaluate the impacts of restrictions on pulse characteristics for the shrimp pulse fishery and consider recommendations for groundrope configurations by IMARES, Netherlands, Thünen Institute Germany, and ILVO, Belgium.</p> <p>Comment on the technical development of an electrical twin-trawl system as part of the Dutch “Masterplan Duurzame Visserij” by IMARES IJmuiden, The Netherlands.</p> <p>Make an inventory of views on pulse fishing among various stakeholders in European member states.</p>
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#### 4 List of Outcomes and Achievements of the WG in this delivery period

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Intermediate results were presented. Publications are foreseen in later years.

#### 5 Progress report on ToRs and workplan

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Year	ToR	Planned work	Status
1	a	Fundamental research on the effect on pulse stimulation on various species, both juvenile and adults stages by PhD workers under guidance of ILVO and University Ghent, Belgium.	<p>Continuous work by Desender and Soetaert.</p> <p>Soetaert presented work on a range of species. Sole, cod, brown shrimp and ragworm were subjected to a range of electrical stimuli in a uniform field. The pulse parameters varied were frequency, field strengths, pulse duration, pulse type, pulse shape, exposure time and orientation of the animal. None of the pulses tested, resulted in an increased mortality or macroscopic lesions in the species examined.</p>

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		<p>A study on short-term effects of pulse stimulation on various adult marine fish (plaice, sole, cod, armed bullhead, bull-rout) was presented by Desender. No mortality or spinal injury, but minor haemorrhages and point bleedings were found.</p> <p>Preliminary results of a short-term survival study of different life stages of sole were presented by Desender. Minor effect was found on 1 egg stage, right before hatching (only 4 replicates), no real effect on other egg (1) or larval stages (3) seen (7 replicates).</p>
a	Study on effect of electrical stimulation on dab ( <i>Limanda limanda</i> L.)	<p>De Haan presented progress on a study on the relation between pulse exposure and skin lesions in dab (De Haan et al., 2014 paper in prep ). Lesions were found, but no clear differences between treated fish and reference fish could be distinguished. The outcome showed that no direct relation could be concluded.</p>
c	Pilot study on defined control and enforcement procedures for flatfish pulse trawling by IMARES, Netherlands.	<p>De Haan presented a short project to design and implement a Monitoring and control system for Pulse Fishery in cooperation with producers and the Ministry of Economic Affairs.</p> <p>A project for a pilot study was negotiated with the Ministry of Economic Affairs for both flatfish and shrimp pulse fishery, and granted. The work is to begin in 2015.</p>
a	Further tank experiments on wild-caught cod, using pulse simulators by IMARES, Netherlands, and ILVO, Belgium.	<p>Studies were presented by De Haan and Soetaert. The results varied considerably, which was attributed to differences in rearing of the fish.</p>
b	Study effects of pulse beam trawling on benthic invertebrates in EU-project BENTHIS by IMARES, Netherlands, and ILVO, Belgium.	<p>Work from BENTHIS is still ongoing and was not presented at this meeting.</p>
b	Monitor economic performance of more vessels in EU-project BENTHIS by LEI, Netherlands.	<p>Work from BENTHIS is still ongoing and was not presented at this meeting.</p>
a	Ongoing experiments with electrical shrimp fishing in Belgium and the Netherlands by ILVO Fishery, Belgium.	<p>Verschuereen presented a catch comparison between a new shrimp pulse trawl (12 electrodes and 11 bobbins) and a conventional shrimp trawl (36 bobbins). Shrimp landings remained the same, with less undersized shrimp and much less bycatch.</p>

a	Study on effects on electric fishing for ensis by Marine Scotland Science, and the possibilities of using other, lower energy pulse systems than currently used.	A report on recent work of Murray was presented at the meeting. The findings were: Electrofishing (using this system) is a potentially low impact method of harvesting razor clams ( <i>Ensis siliqua</i> ); the impact on the seabed is minimal compared with conventional dredge and trawl fisheries; immediate effects on non-target species are non-lethal and effects on invertebrate behaviour are short term. Electrofishing is a very efficient and a sustainable fishery that may require restrictions on fishing effort.
d	Study to optimize the front part (particularly the groundrope) of shrimp-pulse-trawls with respect to a) maintaining commercial catch rates; b) reducing unwanted bycatch; c) reducing energy consumption.	Stepputtis of Thünen Institute in Germany presented work on a shrimp pulse trawler over 13 months. In total +9% more small shrimps were caught, and the bycatch was -9.4%. Optimization was found by using larger bobbins of 300 to 400 mm.
e	Comment on the technical development of an electrical twin-trawl system as part of the Dutch “Masterplan Duurzame Visserij” by IMARES IJmuiden, The Netherlands.	An electrified twin-rig using pulse stimulation for catching plaice and sole was presented by Verschueren. It is being developed under the Dutch “Masterplan Duurzame Visserij”. LEI Wageningen UR made the prediction that 30-50 of such vessels will eventually be built and traditional beam trawlers will disappear. Pulse modules will be placed on the head line of the net fed by a power cable and electrodes will run down to the footrope.
e	Make an inventory of views	A short project in The Netherlands was presented by Van Marlen with the objective to make an inventory of shrimp pulse fishing research topics. A skype meeting was held between IMARES and ILVO to update a draft list of such topics. Stakeholder interviews are planned in this study.

## 6 Revisions to the work plan and justification

No changes.

## 7 Next meetings (Interim reports only)

Two options were mentioned: a meeting in conjunction with the ICES WGCRAN meeting on 18-22 May 2015 in IJmuiden, the Netherlands. The second option is October 2015, thus allowing more new results to be presented.

## Annex 1: List of participants

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## Annex 2: Recommendations

Recommendation	Adressed to
1. Meet again in October 2015 for 3 days, venue to be decided later.	ICES Secretariat, SCICOM
2. Meeting in conjunction with the ICES WGCRAN meeting on 18-22 May 2015 in IJmuiden, the Netherlands ???	ICES Secretariat, SCICOM, WGCRAN ???