

# Training course on analyses of VMS data for ecosystem and economic impacts of fisheries

---

## ICES TRAINING COURSE REPORT



# Contents

1	Background.....	4
2	Context .....	5
	2.1 Objectives .....	5
	2.2 Level.....	5
3	Course Programme, Product, Deliverance and Instructors.....	6
	3.1 Programme .....	6
	3.2 Course products.....	7
	3.3 Deliverables .....	7
	3.4 Course instructors.....	7
	3.5 Recommendations .....	7
	3.6 Review of online format .....	7
	Annex 1: List of participants.....	8
	Annex 2: Agenda .....	9
	Annex 3: Survey results.....	10

## i Training course information

---

<b>Training course</b>	Training course on Analyses of VMS data for ecosystem and economic impacts of fisheries
<b>Date</b>	8-12 February 2021
<b>Location</b>	Online via Microsoft Teams
<b>Instructors</b>	Niels Hintzen, Wageningen Marine Research, Netherlands
	Kartell Hamon, Wageningen Economic Research, Netherlands

---

## ii Summary

An advanced course on VMS and logbook analyses was held remotely from 8-12<sup>th</sup> of February 2021. 28 participants from varying countries, both ICES and non-ICES members, participated in the course and worked on four main topics: i) how to quantify the impact of spatial closures on harbours / fleet segments, ii) quantify the aggregation of bottom fishing activity, iii) linking research survey data to fisheries data to quantify spatial overlap and iv) quantifying and resolving uncertainty in VMS and logbook data. Each of the topics was introduced through a lecture and followed by a practical. Specific student questions that were not addressed in any of the four topics were covered in a final session on the last course day.

# 1 Background

Growing pressures by various human activities on the marine environment and international commitments to the conservation of biodiversity or seafloor integrity have led to increased interest in marine spatial planning and in the tools required for an assessment of the impact of these pressures. Fishing is considered, given its widespread occurrence, to be the main human activity impacting the seafloor. Vessel Monitoring by Satellite (VMS) system data have been collected from 2000 onwards and cover the majority of EU fishing fleet capacity. These data have proven to be a valuable source of information on the spatial distribution of fishing effort: especially when combined with logbook data. The combined analyses has allowed researchers to investigate the fine details of fishing behaviour, estimate the distribution of landings at high precision. There are many other applications for which VMS and logbook data can be of extreme value, such as analyses to support spatial fisheries management and nature conservation, all in the context of the Ecosystem Approach to Fisheries Management.

## 2 Context

### 2.1 Objectives

The aim of this course is therefore to introduce participants to novel approaches to study the ecological and economic impact of fishing in relation to bottom impact, economic impact of wind farms or Natura 2000 areas, and interaction with vulnerable species.

The course makes use of available tools embedded in the VMStools software library but has a strong focus on the conceptual use of VMS and logbook data for all sorts of applications useful in contributing to an Ecosystem Approach to Fisheries Management.

### 2.2 Level

The course was intended for people with previous experience with R and vmstools. In particular, participants were expected to be familiar with introductory material available on the wiki (<https://github.com/nielshintzen/vmstools/wiki>) covering:

- Getting VMS and logbook data into R
- Cleaning and processing VMS and logbook data
- Linking VMS and logbook data
- Linking VMS and logbook data to spatial grids
- Making maps and tables

## 3 Course Programme, Product, Deliverance and Instructors

### 3.1 Programme

In addition to the following topics covered during the course, there was room for student problems. The first session was used to answer questions regarding the introductory practicals. Additional chat sessions were held to answer remaining questions (see time schedule below).

#### 1. ISLA: Individual Stress Level Analyses

The economic importance of specific fishing grounds to fishers varies within a fleet. To capture this variation and understand how dependent fishers are to an area we use the individual stress level analysis. We calculate the proportion of income coming from a specific area at the individual level and show the distribution of the individual stress level for the fleet considered. The stress level can be given for different groups (home harbours, vessel size, main gear), helping decision maker understand the sensitivity of closing particular areas and identify the part of the fishery impacted by their decision.

#### 2. Aggregation of fishing

Swept Area Ratios for bottom gears are often calculated to quantify the impact on the benthic community. We demonstrate how to easily calculate SARs but also look at the location and intensity of fishing within ICES rectangles using a statistical approach. We use the underlying distribution of fishing intensity to more appropriately predict small scale (within an ICES rectangle) distribution of fishing under changes in effort.

#### 3. Bycatch & high risk areas

The risk to repeatedly catch small sized fish or vulnerable species has strong spatial correlation. We demonstrate how to display spatial species distribution-at-length from survey data and calculate spatial overlap with the fisheries from VMS and logbook data. We calculate a measure of spatial correlation of unwanted bycatch (either by species or by length) to come up with a measure that indicates the distance between consecutive fishing tows with low probability of similar catch composition.

#### 4. Uncertainty in spatial fisheries data

VMS and logbook data are linked a posteriori to increase the spatial resolution of fishing activities. In this part we investigate how the assumptions made to 1) define when a vessel is fishing based on speed thresholds and 2) distribute the daily catch per ICES rectangle (resolution in logbooks) on fishing VMS points, influence the resulting maps. We also relate the temporal resolution of VMS data (interval between pings) to the spatial resolution of maps as more frequent pings allow higher resolution maps.

The course was divided in two types of activities, “contact hours” when all participants were expected to attend and “self-study” when participants went through the practicals on their own time and at their own rhythm. During self-study assignment hours, students were expected to discuss problems among themselves using functionality in Microsoft Teams. The instructors kept a close watch and intervened where necessary, both during the morning sessions in CET and evening sessions in EST.

## 3.2 Course products

### Presentations

The presentations were shared with the participants in the dedicated Teams group. The Teams group was available up to two months after the course. The presentations could be downloaded.

### Scripts

Exercises are available on the public vmstools website <https://github.com/nielshintzen/vmstools/wiki/Introduction-VMS-advanced-course>, the solutions of each practical have been updated after the course to incorporate the questions and remarks of participants.

## 3.3 Deliverables

There were no deliverables associated to this course.

## 3.4 Course instructors

Niels Hintzen, Wageningen Marine Research, IJmuiden, The Netherlands

Katell Hamon, Wageningen Economic Research, Wageningen, The Netherlands

## 3.5 Recommendations

This course covers advanced topics, it was given for the first time following a few years of introductory courses. It was obvious that some participants could have benefited from the introductory course. The two courses (introductory and advanced) could be given on alternate years.

## 3.6 Review of online format

- Teams worked well, we used different channels for the different practicals
- Link to Microsoft Teams was shared ahead of the course and preparatory material was shared there, meaning all participants had checked whether they could access before the first day
- The social aspect of the course was missing (coffee and having meals together)
- Students helped each other using the chat function of Microsoft Teams.
- Online it is harder to identify the participants with more difficulties. A few preferred asking questions to us individually than in the group chat. On the other hand, a lot more questions were asked on the chat for everyone to see.



## Annex 1: List of participants

Name	Country (of institute)
Ailbhe Kavanagh	Ireland
Alexander Holdgate	Denmark
Caitlin Gilmour	England
Casper Kraan	Germany
Christian von Dorrien	Germany
Gianfranco Anastasi	UK
Guillermo Felipe Martin Gonzalez	Ireland
Helen Holah	Scotland
Holly Perryman	Norway
Inne Withouck	UK
Janne Haugen	USA
Joanne Pollett	United Kingdom
Katarzyna Krakówka	Poland
Lara Salvan	Denmark
Mairi Fenton	UK
María Mateo	Spain
Natasha Besseling	South Africa
Nikolaj Reducha Andersen	Denmark
Nina Faure Beaulieu	South Africa
Nixon Bahamon	Spain
Pablo Couve	Spain
Patricia Breen	Ireland
Paul Coleman	Ireland
Régis Santos	Portugal
Samantha Stott	England
Stella Nemecky	Germany
Sylvan Benaksas	United Kingdom
Xiaozi Liu	Norway

## Annex 2: Agenda

The time table for the course is given below and shows the outline for the course, both in Eastern Standard Time (EST) and Central Europe Time (CET). Contact hours are between 8:00 and 12:00 EST (being 14:00 and 18:00 CET). These are indicated in gray in the time table. Outside of the contact hours the participants work on assignments within the four topics.

EST	CET	Monday	Tuesday	Wednesday	Thursday	Friday
3:00 - 4:00	9:00 - 10:00		ISLA	Aggregation	Bycatch	Uncertainty
4:00 - 5:00	10:00 - 11:00		ISLA	Aggregation	Bycatch	Uncertainty
5:00 - 6:00	11:00 - 12:00		ISLA	Aggregation	Bycatch	Uncertainty
6:00 - 7:00	12:00 - 13:00		ISLA	Aggregation	Bycatch	Uncertainty
7:00 - 8:00	13:00 - 14:00	Breakfast / lunch	Breakfast / lunch	Breakfast / lunch	Breakfast / lunch	Breakfast / lunch
8:00 - 9:00	14:00 - 15:00	Introduction	Recap ISLA	Recap aggregation	Recap Bycatch	Recap uncertainty
9:00 - 10:00	15:00 - 16:00	Recap VMStools		Intro bycatch	Recap Bycatch	Student problems
10:00 - 10:30	16:00 - 16:30	BREAK	BREAK	BREAK	BREAK	BREAK
10:30 - 11:00	16:30 - 17:00	Recap VMStools	Intro Aggregation	Bycatch	Intro uncertainty	Student problems
11:00 - 12:00	17:00 - 18:00	Introduction ISLA	Aggregation	Bycatch	Uncertainty	Student problems
12:00 - 13:00	18:00 - 19:00	Lunch /dinner	Lunch /dinner	Lunch /dinner	Lunch /dinner	Lunch /dinner
13:00 - 14:00	19:00 - 20:00	ISLA	Aggregation	Bycatch	Uncertainty	
14:00 - 15:00	20:00 - 21:00	ISLA	Aggregation	Bycatch	Uncertainty	
15:00 - 16:00	21:00 - 22:00	ISLA	Aggregation	Bycatch	Uncertainty	
16:00 - 17:00	22:00 - 23:00	ISLA	Aggregation	Bycatch	Uncertainty	

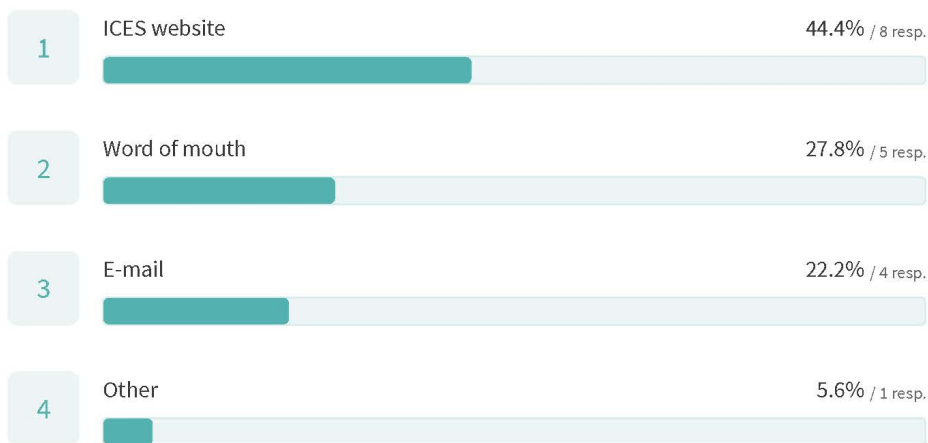
## Annex 3: Survey results

### TCVMS 2021

18 responses

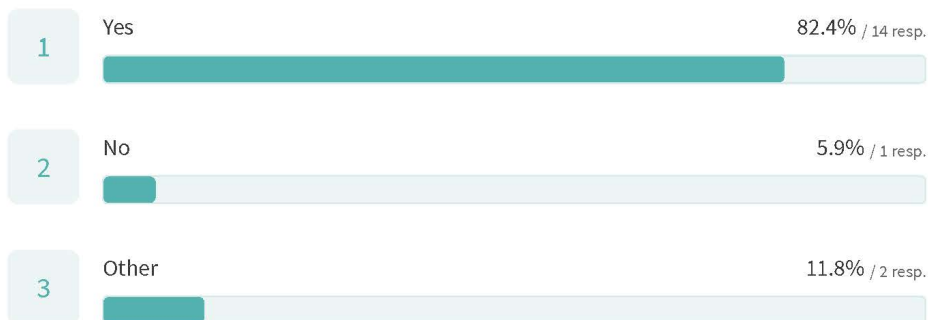
How did you hear about this course?

18 out of 18 answered



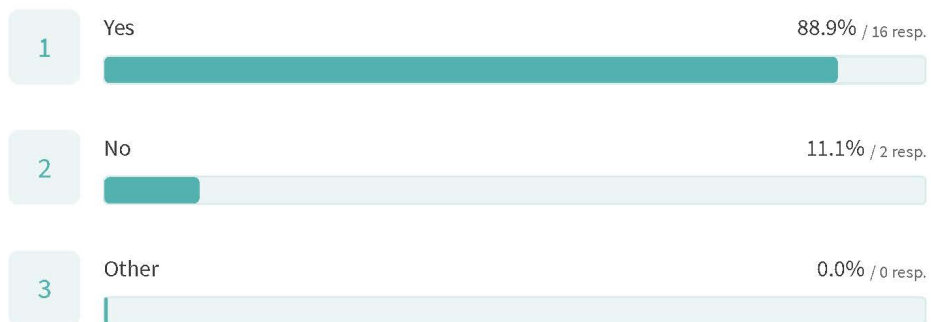
Did the training course meet your expectations?

17 out of 18 answered



Inscription to the training course and communication with organizers were efficient

18 out of 18 answered



The instructors were helpful, informative, and approachable.

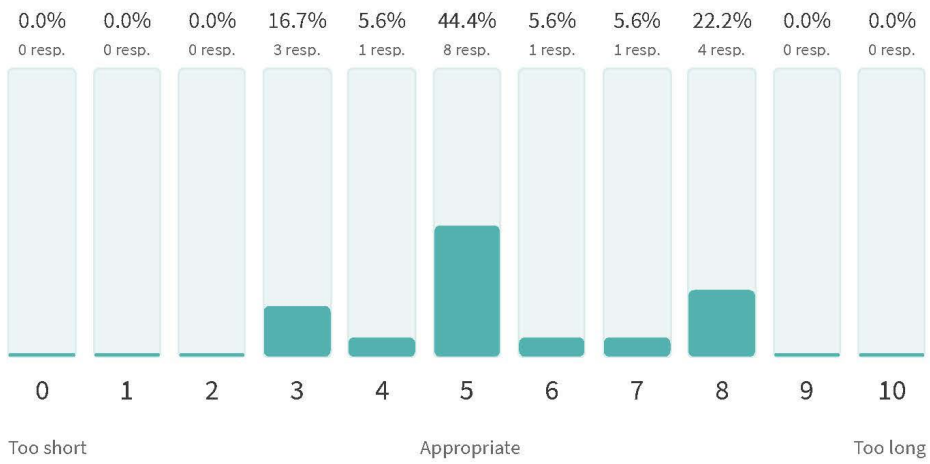
18 out of 18 answered



The length of the training course was

18 out of 18 answered

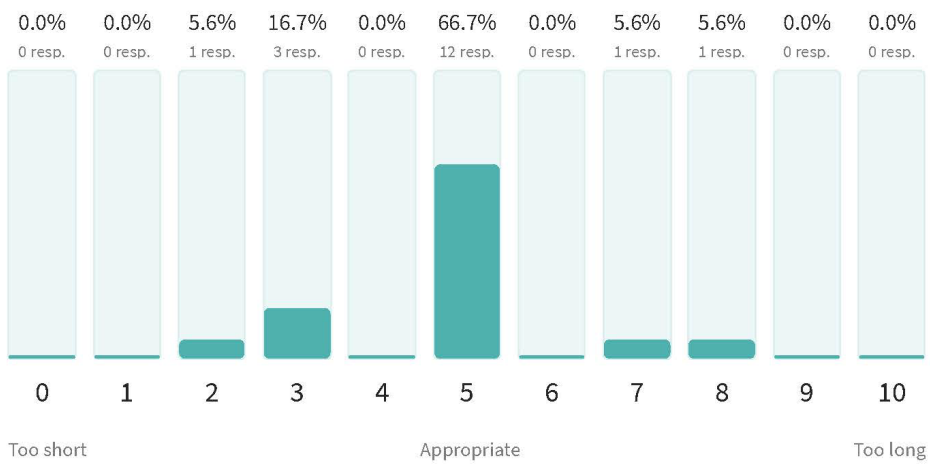
### 5.4 Average rating



The length of the lectures were

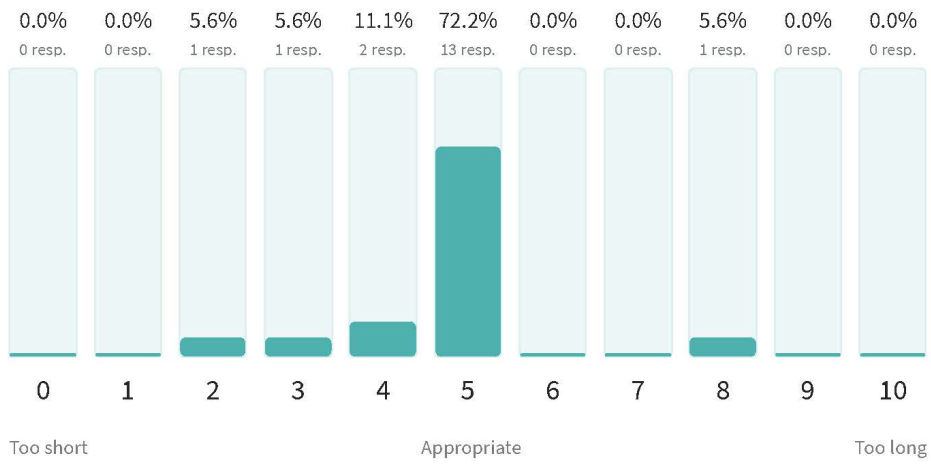
18 out of 18 answered

### 4.8 Average rating



The length of the Q&A sessions were  
 18 out of 18 answered

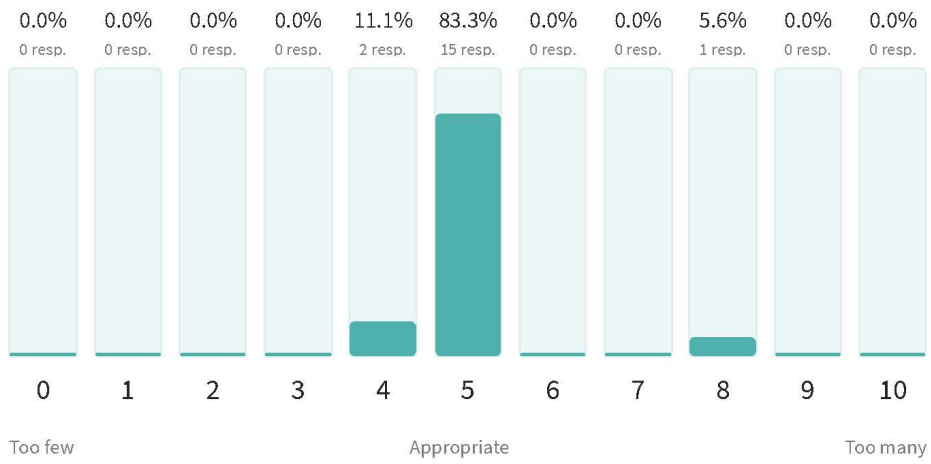
4.8 Average rating



The amount of breaks during the course were

18 out of 18 answered

### 5.1 Average rating



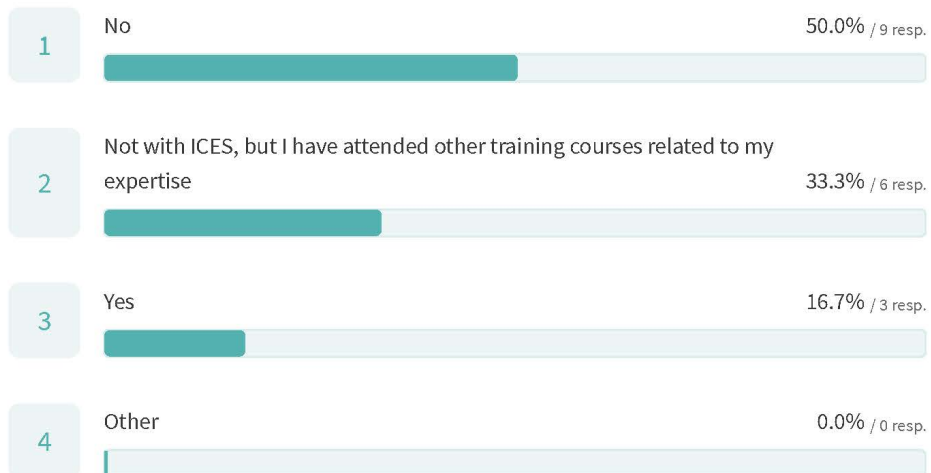
Did you receive sufficient support regarding platform testing and set-up?

18 out of 18 answered



Have you attended any other ICES training courses?

18 out of 18 answered

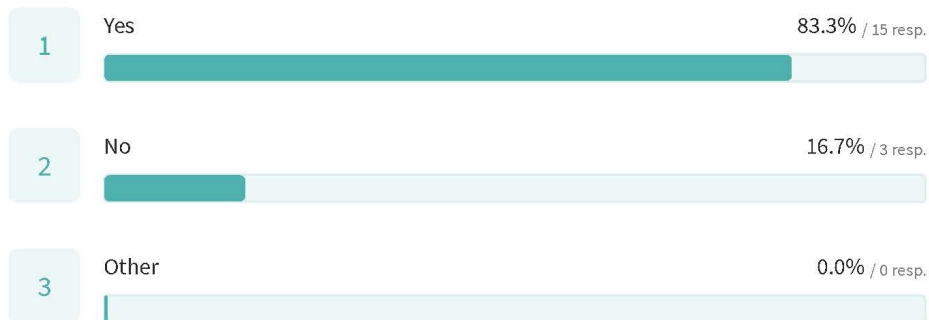




---

Have you previously used Microsoft Teams for meetings or online courses?

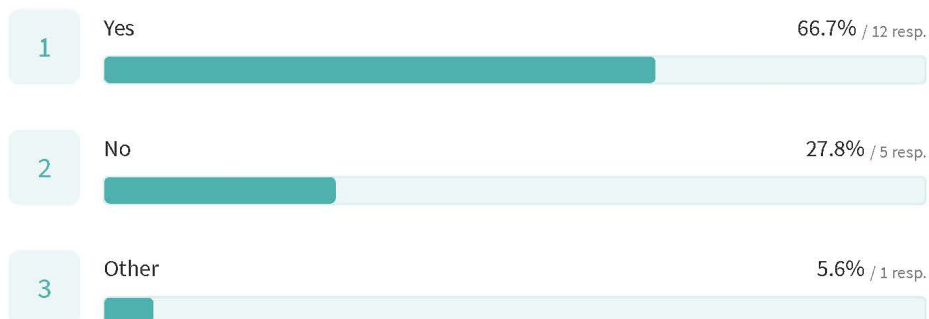
18 out of 18 answered



---

Would you have been able to join this course if it had not been online (without COVID travel restrictions affecting)?

18 out of 18 answered



---

Would you be interested in another training course within ICES?

18 out of 18 answered

