Report of the ICES Training Course:
Stock Assessment (Advanced) (TCSAA)

18–22 November 2013

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Contents

Participants at the course "Stock Assessment (Advanced)", 18–22 November 2013, ICES HQ, Copenhagen. The course was given by Jan Jaap Poos, IMARES, the Netherlands (#3 sitting from left) and Richard Hillary, CSIRO, Australia (#1 from right in the last row).

Report of the ICES Training Course Stock Assessment (Advanced)
18–22 November, 2013

by

Jan Jaap Poos and Richard Hillary

1   Summary

This was the second offering of the training course "Stock Assessment (Advanced)" under the ICES Training Programme. 18 students from 11 countries participated in the course (Annex 1). From the perspective of the instructors, the course was a success. Overall, the participants rated the course very positively, although some adjustments can improve the knowledge and skill transfer to the trainees (see 2 Recommendations).

The course is taught in R and ADMB. Practically speaking, R has become the lingua franca for statistical computation and most participants had experience with R. To help the participants in obtaining sufficient background knowledge on R, a short introductory course in R was sent around before the course. Still, some students arrived at the course with little knowledge on R. For these students, the course was probably hard to follow, but much care was taken that everybody managed to do all exercises in R. The course consisted of a number of elements:

1) An introduction to population dynamics in stock assessments
2) Explanation on how observations follow from the population dynamics, including the Baranov equation, survey time series, and plus-group dynamics
3) Exploratory data analysis for stock assessment data
4) An introduction to likelihoods
5) An introduction to optimizers
6) Creating an assessment in R and ADMB
7) Estimating parameter uncertainty in stock assessments
8) Using tagging data in stock assessments
9) Reference point estimation
10) Bayesian theory

Because of time constraints, multi-species stock assessments were not covered. Also, there was only a limited amount of time for participants to use their own data. Still, several participants used the opportunity to apply the methods taught in the course on their data.

Feedback from students was solicited using a course evaluation questionnaire (Annex 2). Feedback was received from 8 participants. The majority of the responses rated the course and its content to be "Very good". Results indicate that the amount of material covered and degree of difficulty was "average" to "too much", course organization (i.e. document detailing course aims, content, organization of teaching, assignments, reading, assessment, etc.) was "good" to "very good". The helpfulness of the teaching staff was "high" on average. The usefulness of the course materials and clarity of presentation was between "average" and "high".

Individual feedback from trainees to the question "Good features of this course/suggestions for improvement" resulted in:

2   Recommendations

From the comments in the questionnaires the following recommendations can be taken

- More theory
- Sometimes the teachers went through the R/admb code too fast, but not a major problem
- Overall, very little negative things to say. However, please stop apologizing for the maths and having to show the maths. We all know full well there are a lot of maths involved (especially by this stage).
- Teachers very professional and helpful. Towards the end of the week the speed was accelerating, and I felt we were thrown a lot of different small exercises and it became a bit overwhelming. The exercises per se were not too difficult though. Overall very nice course!

In response to the feedback, the instructors have the following considerations: Two comments indicated that there was too much material towards the end of the course. Indeed we should remove one or two exercises for the final two days, and focus more on the examples that have been introduced earlier in the course. This means both changing some examples at the beginning of the course (such that the Maximum Likelihood estimation and the Bayesian estimation of stock-recruitment relationships is done on the same North Sea herring data) and at the end of the course (such that the tagging data is dealt with only in the assessment that the participants have been gradually working towards). Like last year we conclude that moving from R slowly to ADMB on Wednesday, and essentially staying in ADMB for the rest of the course, is the essence of "advanced stock assessment". Some might argue that the course could start in ADMB on Monday - to avoid confusion and repetition - but the current approach is beneficial for the majority of participants, who were experienced in R and were happy to see how ADMB gave them the same answers, and more.

Unfortunately we did not have much time left for participants to fit the model to real fisheries data that participants brought from their work. For next year we should facilitate this by giving more time to the participants, and by providing code that makes it easy for participants to incorporate their data.

In addition to comments in the questionnaire, participants also gave feedback that:

- There should be more comments in the code
- A session on "good practices" for stock assessments would be appreciated

3 Course description

Contexts and level

This is an advanced course in fisheries stock assessment modelling where we show the generic properties of various methods used to generate historical stock abundance and mortality rate estimates. The course includes uncertainty estimation of relevant parameters. It is aimed at scientists who have some foundation in the fundamentals of stock assessments.

We examine various assumptions as well as strength and weaknesses of different methods. The course will take you through the different steps that are part of any stock assessment. First: exploratory data analysis and the potential information content in the available data; Second: we discuss setting up structured population dynamic models. As a third step, we link these population dynamics models to existing data by calculating model predictions for catch, survey, and other relevant types of data. Finally, we discuss and demonstrate several tools that can help in fitting the models to data, such as different optimizing/sampling tools, and importantly, we discuss how to estimate and present uncertainties in the stock assessment models.

Objectives

The general objective of the course is to train stock-assessment scientists and advisors in population dynamics and advanced stock assessment. The course intends to put theory into practice as much as possible by working on examples from different angles.

4   Course programme and instructors

The five-day course is organized as a series of morning sessions that focus on theoretical concepts and afternoon work sessions. These work sessions are completed in different software environments such as R and AD model builder (see flr-project.org and admb-project.org). Programme in Annex 3.

Instructors:

Jan Jaap Poos,
Wageningen IMARES
PO Box 68
1970 AB Ijmuiden
The Netherlands
janjaap.poos@wur.nl

Richard Hillary,
CSIRO Marine and Atmospheric Research
Castray Esplanade
Hobart 7001,
Australia
Rich.Hillary@csiro.au

Annex 1: List of participants

NAME	ADDRESS	TELEPHONE/FAX	E-MAIL
Jan Jaap Poos **Instrutor**	Wageningen IMARES PO Box 68 1970 AB IJmuiden, The Netherlands		janjaap.poos@wur.nl
Richard Hillary **Instructor**	CSIRO Marine and Atmospheric Research Castray Esplanade Hobart 7001 Australia		Rich.Hillary@csiro.au
Anna Luzenczyk	National Marine Fisheries Research Institute Department of Fisheries Resources ul. Kollataja 1 81-332, Gdynia Poland	+48 606870728	anna.luzenczyk@mir.gdynia.pl
Robert O'Boyle	Beta Scientific Consulting Inc. 1042 Shore Drive Bedford, Nova Scotia, Canada, B4A 2E5	+1 9024 46 13 01	betasci@eastlink.ca
Matthias Bernreuther	Johann Heinrich von Thünen Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries Institute of Sea Fisheries Palmaille 9 22767 Hamburg Germany	+49 4038 90 52 38	matthias.bernreuther@ti.bund.de
Jennifer Devine	Havforskningsinstituttet Demersal fishes PO Box 1870 Nordnes 5817 Bergen Norway	+47 90259201	jennifer.devine@imr.no
Fatma Alkiyumi	Marine Science & Fisheries Center Fisheries biology section Ministry of Agriculture & Fisheries Wealth PO Box 467 100 Muscat Sultanete of Oman	+00968-24736449	fatma.kiyumi@gmail.com

NAME	ADDRESS	TELEPHONE/FAX	E-MAIL
Oleg Il'In	Kamchatka Research Institute of Fisheries and Oceanography Laboratory of Marine Commercial Fish ul. Naberezhnaya, 18 683000, g.Petropavlovsk-Kamchatsky, Russian Federation	8(4152)425796	ilin.o.i@kamniro.ru
Youen Vermard	Ifremer, centre Manche Mer du Nord, Fisheries department 150 quai Gambetta, 62200 Boulone sur mer France	+333 21 99 50 72	yvermard@ifremer.fr
Marianne Robert	Ifremer Department of Fisheries Science and Technology Station de Lorient 8, rue François Toullec 56100 Lorient France	+33 2 97 87 38 23	marianne.robert@ifremer.fr
Marie Savina-Rolland	Ifremer Unité halieutique Manche Mer du Nord 150 Quai Gambetta BP 699 62321 Boulogne sur Mer Cedex France	+33 6 66 56 75 95	Marie.Savina.Rolland@ifremer.fr
Isabella Bitetto	COISPA Tecnologia & Ricerca Via dei Trulli, 18/20 70126 Bari Italy	393496 82 01 06	bitetto@coispa.it
Ane T. Laugen	Swedish University of Agricultural Sciences Department of Ecology Box 7044, 75007 Uppsala, Sweden	+46 705 573485	ane.laugen@slu.se
Caroline Durif	Institute of Marine Research Austevoll 5392 Storebø Norway	+47 468 47 514	caroline.durif@imr.no
Nan Yao	Florida International University Biology Department 3000 NE 151 Street, MSB 312A, North Miami, FL 3318, USA	3347 59 92 96	nyao001@fiu.edu

NAME	ADDRESS	TELEPHONE/FAX	E-MAIL
Manuel Dureuil	GEOMAR Helmholtz Centre for Ocean Research Kiel and University of Kiel Evolutionary Ecology of Marine Fishes GEOMAR Helmholtz Centre for Ocean Research Kiel West shore Campus Düsternbrooker Weg 20 Room A18 24105 Kiel Germany	491627 30 66 16	m.dureuil@directbox.com
Susana Segurado	Sustainable Fisheries Partnership Science, Research and Data Division 4348 Waialae Ave.#692, Honolulu, HI 96816 USA		susana.segurado@sustainablefish.org
Patrícia Gonçalves	Instituto Português do Mar e da Atmosfera (IPMA) Modelling and Management Fishery Resources Unit Av. Brasília 1449 -006 Lisbon Portugal	+ 351 213027000 (ext.1320)	patricia@ipma.pt
Katja Enberg	Institute of Marine Research Norway Pelagic Fish P.Box 1870 Nordnes 5817 Bergen Norway	+47 41006368	katja.enberg@bio.uib.no
Clara Ulrich	DTU Aqua Charlottenlund Castle 2920 Charlottenlund, Denmark	+45 21157486	clara.ulrich@gmail.com

Annex 2: Response on the course evaluation questionnaire

1. How did you hear about this course? (website, word of mouth, other?)

Website
6 (67%)

E-mail
2 (22%)

Word of mouth
1 (11%)

other
0 (0%)

Total: 9

2. Course Content

	Too little/eas	Average		Too much/dif		
(%)	0	0	22	78	0	0
Amount of material covered?						
	1	2	3	4	5	N/A
(%)	0	0	56	33	11	0
Degree of difficulty?						
	1	2	3	4	5	N/A

Total: 9

3. Course Organization

	Very Poor		Average		Very Good	
(%)	0	0	0	56	44	0
Quality of course outline?						
	1	2	3	4	5	N/A
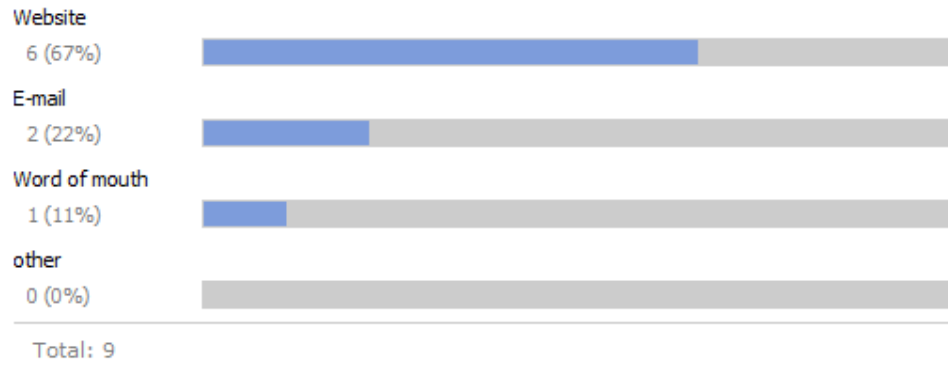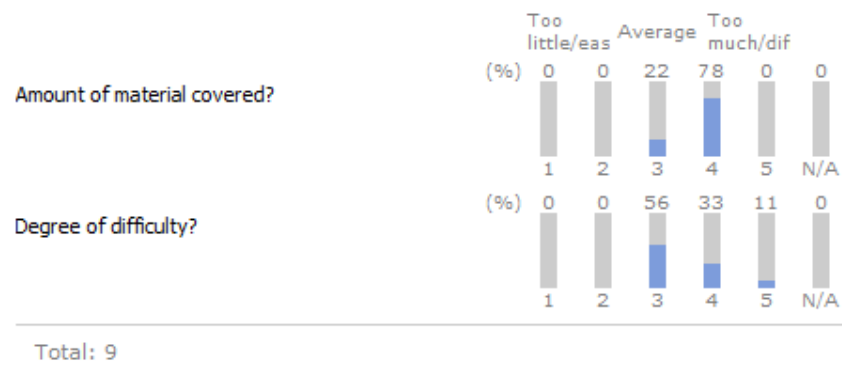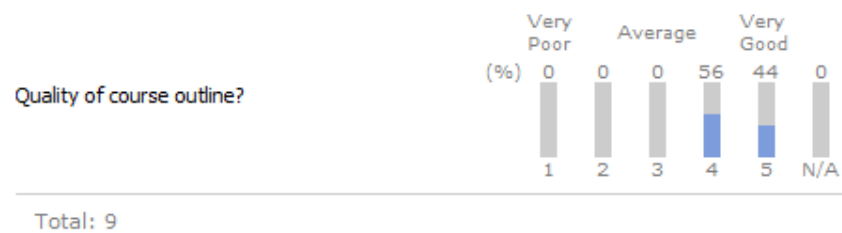
Total: 9

4. Teaching and Learning Support

	Low	Average		High	
	1	2	3	4	5	N/A

Helpfulness of teaching staff?

(%)	0	0	0	11	89	0
	1	2	3	4	5	N/A

Usefulness of course materials?

(%)	0	0	11	22	56	11
	1	2	3	4	5	N/A

Clarity of presentation?

(%)	0	0	11	44	44	0
	1	2	3	4	5	N/A
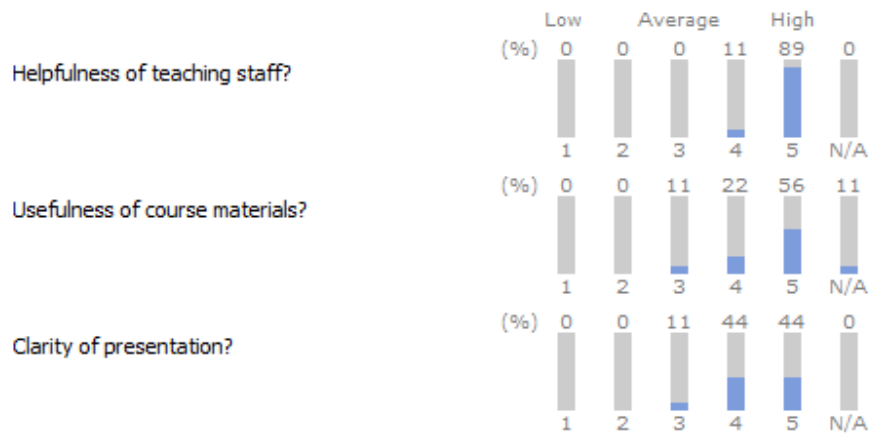
Total: 9

5. Overall Evaluation

	Very Poor	Average		Very Good	

Overall, how would you rate the course content?

(%)	0	0	0	33	67	0
	1	2	3	4	5	N/A

Overall, how would you rate the organisation of the course?

(%)	0	0	0	44	56	0
	1	2	3	4	5	N/A

Overall, how would you rate the quality of the teaching?

(%)	0	0	0	22	78	0
	1	2	3	4	5	N/A

Overall, how would you rate this course?

(%)	0	0	0	33	67	0
	1	2	3	4	5	N/A
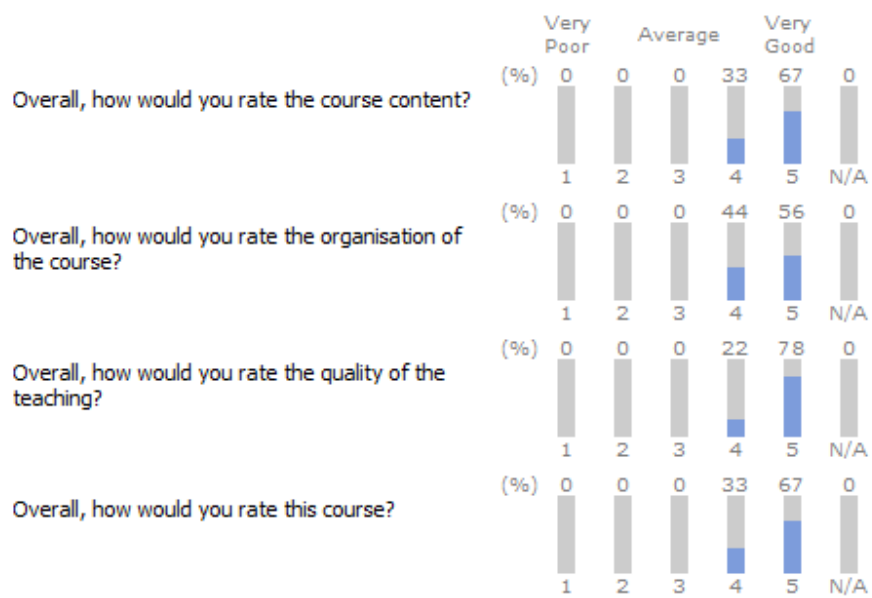
Total: 9

6. Good features of this course/suggestions for improvement:

more theory
1 (17%)

some times the teachers went through the R/admb code too fast, but not a major problem
1 (17%)

1 (17%)

Overall, very little negative things to say. However, please stop apologizing for the maths and having to show the maths. We all know full well there are a lot of maths involved (especially by this stage).
1 (17%)

Teachers very professional and helpful. Towards the end of the week the speed was accelerating, and I felt we were thrown a lot of different small exercises and it became a bit overwhelming. The exercises per se were not too difficult though. Overall very nice course!
1 (17%)

I commend the competence of instructors and all the knowledge imparted. The fact that all models are programmed in R and ADMB, free software, ensures a wide application of the course content.
1 (17%)

Total: 6

7. Have you taken any other ICES training courses?
If so, how well did they prepare you for this course?

not at all
1 (17%)

somewhat
4 (67%)

very well
1 (17%)
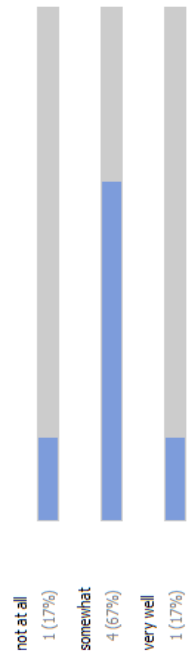
Total: 6

Annex 3: Course Programme

Monday, 18 November 2013	
9.00 – 10.00	Welcome ICES Staff
10.00 – 10.30	**Tea/Coffee**
10.30 – 11:30	Lecture introduction to stock assessment
11:30-13:00	Lecture population dynamics
13:00-14:00	**Lunch**
14.00 – 15.30	Lab population dynamics
15.30 – 16.00	**Tea/Coffee**
16.00 – 18.00	Lab population dynamics
18.00 – 20.00	*Icebreaker*
Tuesday, 19 November 2013	
9. 00 – 10.15	Lecture on basic stock assessments
10.15 – 10.45	**Tea/Coffee**
10.45 – 13.00	Lecture likelihood estimations and optimizers
13.00 – 14.00	**Lunch**
14.00 – 15.00	Lab likelihood estimation and optimizers
15.00 – 15.30	**Tea/Coffee**
15.30 – 17.30	Lab stock assessment in R
Wednesday, 20 November 2013	
9.00 – 10.15	Lecture uncertainty estimation in likelihood approaches
10.15– 10.45	**Tea/Coffee**
10.45 – 13.00	Lecture ADMB for maximum likelihood estimation
13.00 – 14.00	**Lunch**
14.00 – 15.00	Lab growth estimation and S-R relationships in ADMB
15.00 – 15.30	**Tea/Coffee**
15.30 – 18.00	Lab stock assessment in ADMB

Thursday, 18 October 2012	
9.00 – 10.15	Lab assessment in ADMB
10.15 – 10.45	**Tea/Coffee**
10.45 – 13.00	Lab MCMC in ADMB
13.00 – 14.00	**Lunch** & Group photo
14.00 – 15.00	Lecture Bayesian statistics
15.00 – 15.30	**Tea/Coffee**
15.30 – 16.30	Lab on Bayesian statistics
16:30 – 18:00	Lecture on reference points
18.15 – 22.00	Course dinner (optional, expenses to be covered by participants)
Friday, 19 October 2012	
9.00 – 10.15	Lab on reference points
10.15 – 10.45	**Tea/Coffee**
10.45 – 12.30	Lecture on tagging
12.30 – 13.30	**Lunch**
13.30 – 14.30	Lab on tagging
14.30 – 18:00	Questions and answers, evaluation, Bring your own data