

Training Course Data-limited stock assessment methods and reference point estimation

**ICES TRAINING
COURSE REPORT**



i Summary

The course “Data-limited stock assessment methods and reference point estimation” welcomed scientists from Canada and Europe and covered a wide range of approaches. Each day of the course covered lectures and exercises on various topics relevant to data-limited fisheries stock assessment, with the latter days including some flexible time for specific discussions or for participants to work with their own data.

Fish stock advice provision in all ICES countries depends on having an ability to assess stocks and make some prediction about how fisheries catches are likely to affect future stock states. For stocks where there exist large amounts of process knowledge and data time series including fishery independent surveys and rigorous catch data collection programs, there is often enough information to fit statistical stock assessment models. Stocks with this kind of data are usually classified as ICES Category 1 and 2 stocks. Unfortunately, most ICES stocks fall under categories 3-6 where both process knowledge and data are less well known. The situation is similar in Canada and the USA. Despite a stock being classified as data-limited does advice on sustainable stock exploitation and sustainability reference points are still required.

There is an ever-growing suite of methods and tools available now for assessing data-limited stocks. ICES has developed many methods through its WKLIFE workshop series and many of these have been coded into publicly available tools on the ICES GitHub site, though there remain many more available methods.

This course aims to explore the principles and theory behind data-limited methods used for stock assessment and how sustainability reference points can be derived from some of them. The skills learned from this course will be directly applicable in the ICES advisory process as well as fisheries management jurisdictions in Canada, the USA and elsewhere.

ii Training course information

Training course name	Data-limited stock assessment methods and reference point estimation (TCDLSA)
Date	6-10 January 2020
Venue	Malaspina Room, Coast Bastion Hotel, Nanaimo, British Columbia, Canada
Instructors	Dr. Jason Cope, NOAA, Seattle, USA
	Dr. Merrill Rudd, Scaleability LLC, Seattle, USA

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1 Background

Fish stock advice provision in all ICES countries depends on having an ability to assess stocks and make some prediction about how fisheries catches are likely to affect future stock states. For stocks where there exists large amounts of process knowledge and data time series including fishery independent surveys and rigorous catch data collection programs, there is often enough information to fit statistical stock assessment models. Stocks with this kind of data are usually classified as ICES Category 1 and 2 stocks. Unfortunately, most ICES stocks fall under categories 3-6 where both process knowledge and data are less well known. The situation is similar in Canada and the USA. Despite a stock being classified as data-limited does advice on sustainable stock exploitation and sustainability reference points are still required.

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2 Context

2.1 Objectives

This course aims to explore the principles and theory behind data-limited methods used for stock assessment and how sustainability reference points can be derived from some of them. The skills learned from this course will be directly applicable in the ICES advisory process as well as fisheries management jurisdictions in Canada, the USA and elsewhere.

The format of the course will be interactive with lectures followed by practical application of the methods. Students will be encouraged to bring their own problems and data to the course in order to confront real data situations relevant to the participants.

2.2 Level

The course will be taught at an intermediate level. It is expected that participants will have had some experience with stock assessment such that they know if their stocks of interest might be data-limited. Advanced statistical or fisheries assessment knowledge will not be required. The ability to use Excel and an introductory level of R is expected.

3 Course Programme, Product, Deliverance and Instructors

Life-history fundamentals and quantifying uncertainty were the first topics covered in the course, including a demonstration of tools for determining appropriate values to use for natural mortality rates and other life history parameters and an exercise in estimating natural mortality rates. This topic included discussions on the various areas of uncertainty applicable to data-limited stock assessments, and options for capturing scientific uncertainty in stock assessments.

Reference points, control rules, and risk assessment were the next topics covered in the course. These topics led to group-wide discussions on the applicability to various study systems of participants, including exploited marine fish, inland fish, invertebrate, and semelparous, anadromous fisheries. It was in the discussion on reference points and control rules where participants shared the fundamental differences between the fisheries in which they work, which spawned continued brainstorming and discussion throughout the week.

The course introduced two key toolboxes relevant to data-limited fisheries stock assessment: the FishPath decision support system and the Data-Limited Methods (DLM) toolkit. The FishPath decision support system was introduced on the second day of the workshop. Dr. Cope led participants through the objective of FishPath, what it does and doesn't do, the various questionnaires within the tool, the online interface, and examples. The FishPath tool consists of questionnaires relating to data collection, stock assessment, and management measures, allowing for a bottom-up approach for stakeholders, managers, and scientists to discuss options for management strategies. The major tangible outputs of the FishPath tool are short-lists of data collection, stock assessment, and management measure options.

After the introduction of FishPath, the course included lectures and exercises covering the types of stock assessment tools that may be recommended by FishPath depending on data collection, fishery dynamics, and the overall socioeconomic and governance context of the fishery. These methods included risk analysis, life-history methods, indicator-based methods, length-based methods, catch-only methods, and integrated models for data-limited stocks. Literature was provided for many of the stock assessment methods discussed and included in FishPath. The course included more in-depth exercises on indicator-based methods, length-based methods, catch-only methods, and integrated models for data-limited stocks.

The DLM toolkit was discussed and explored as a complementary tool to FishPath and stock assessment models. Dr. Cope walked participants through the DLMtool online interface and provided example data for participants to explore in an exercise.

The final day of the workshop commenced with a discussion about Pacific salmon. Many of the DFO workshop participants studied the anadromous Pacific salmon, which have different approaches to data collection, stock assessment, and management measures than most marine stocks. The discussion was structured to cover the data types available, level of uncertainty, life history, management objectives, and management measures. We confronted Pacific salmon from the context of data-limited stock assessment for marine fish, including metrics, reference

points, uncertainty, the system of reporting, and management objectives, in an attempt to move beyond “what has always been done” and think about ways to improve Pacific salmon management strategies.

The rest of the final workshop day provided time for participants to focus on the tools they were most interested in, with guidance from instructors. The objective of this time was to make sure each participant left the workshop with the information and materials needed to apply these tools for the stocks they work with. We ended the day with a data-limited methods overview lecture including a summary of general rules and thoughts for approaching data-limited assessment and management.

3.1 Instructors

Dr. Jason Cope, NOAA, Seattle, USA

Dr. Merrill Rudd, Scaleability LLC, Seattle, USA

Annex 1: List of participants

Name	Institute
Andrew Smith	Department of Fisheries and Oceans Canada (DFO)
Brooke Davis	Department of Fisheries and Oceans Canada (DFO)
Carrie Holt	Department of Fisheries and Oceans Canada (DFO)
Charmaine Carr-Harris	Department of Fisheries and Oceans Canada (DFO)
Christina Bourne	Department of Fisheries and Oceans Canada (DFO)
Christine Hansen	Department of Fisheries and Oceans Canada (DFO)
Colin Gallagher	Department of Fisheries and Oceans Canada (DFO)
Dana Haggarty	Department of Fisheries and Oceans Canada (DFO)
Dustin Raab	Department of Fisheries and Oceans Canada (DFO)
Guillaume Dauphin	Department of Fisheries and Oceans Canada (DFO)
Julie Marentette	Department of Fisheries and Oceans Canada (DFO)
Katie Beach	Department of Fisheries and Oceans Canada (DFO)
Les Harris	Department of Fisheries and Oceans Canada (DFO)
Leslie Nasmith	Department of Fisheries and Oceans Canada (DFO)
Mathieu Desgagnés	Department of Fisheries and Oceans Canada (DFO)
Michael Arbeider	Department of Fisheries and Oceans Canada (DFO)
Michael Folkes	Department of Fisheries and Oceans Canada (DFO)
Monique Niles	Department of Fisheries and Oceans Canada (DFO)

Muhammad Yamin Janjua	Department of Fisheries and Oceans Canada (DFO)
Natalie Asselin	Department of Fisheries and Oceans Canada (DFO)
Natascia Tamburullo	ESSA Technologies
Renald Belley	Department of Fisheries and Oceans Canada (DFO)
Roanne Collins	Department of Fisheries and Oceans Canada (DFO)
Rod Bradford	Department of Fisheries and Oceans Canada (DFO)
Ross Tallman	Department of Fisheries and Oceans Canada (DFO)
Sanaollah Zabihi-Seissan	Department of Fisheries and Oceans Canada (DFO)
Stefanie Haase	Thuenen Institute of Baltic Sea Fisheries
Sven Stötera	Thuenen Institute of Baltic Sea Fisheries
Xinhua Zhu	Department of Fisheries and Oceans Canada (DFO)

Annex 2: Results of the survey

1/5/2021

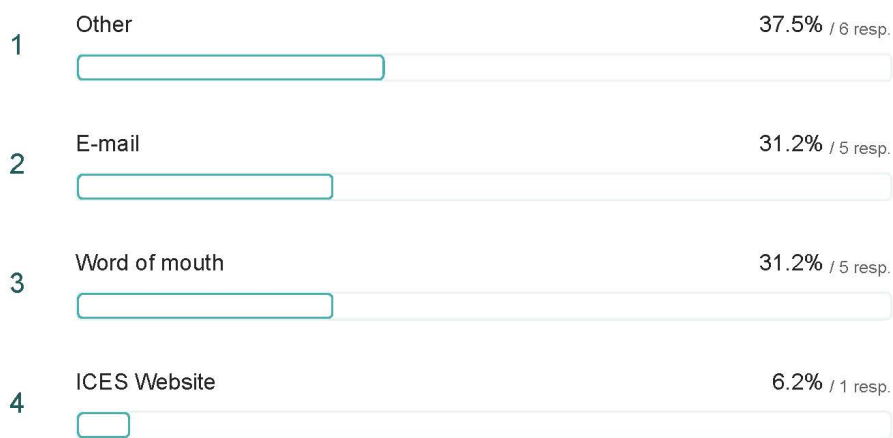
ICES TC Survey - Data-limited stock assessment methods and reference point estimation

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16 responses

How did you hear about this course?

16 out of 16 answered



1/5/2021

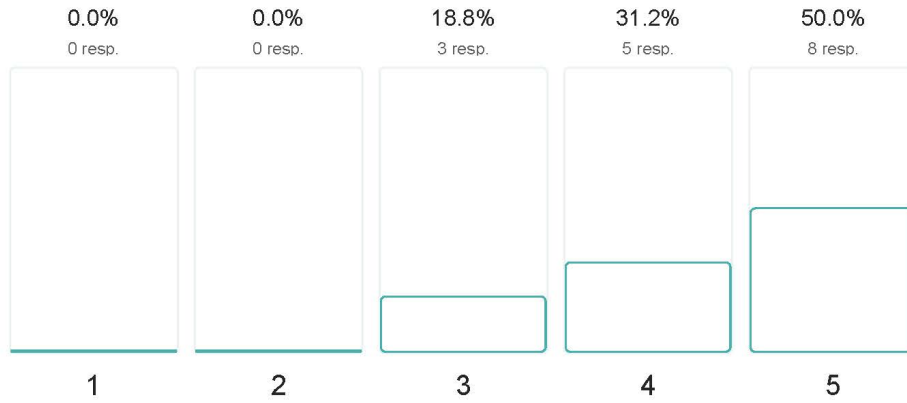
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Course content

Did the Training course meet your expectations?

16 out of 16 answered

★ **4.3 Average rating**



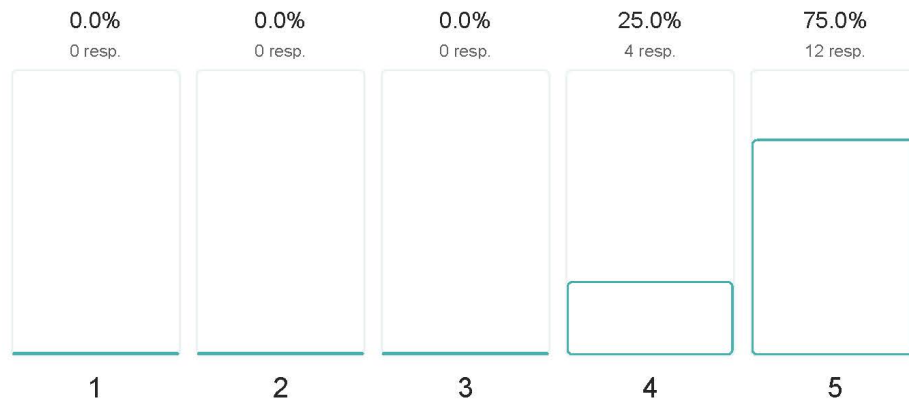
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Was the level of instruction appropriate?

16 out of 16 answered

★ 4.8 Average rating



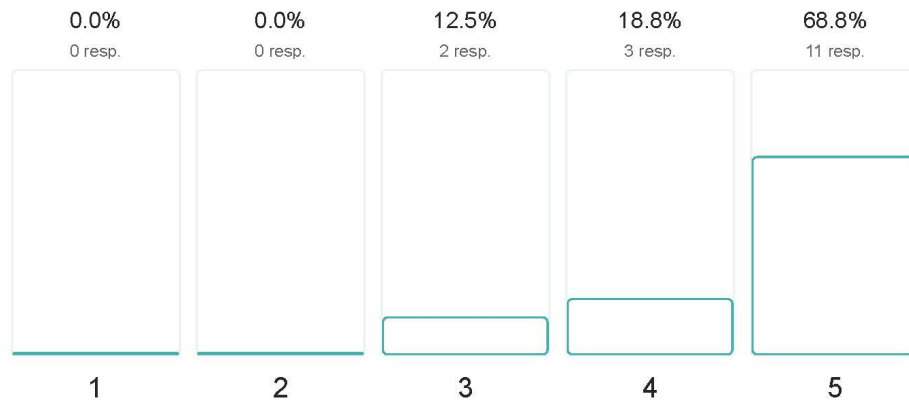
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Was the length of the training course appropriate?

16 out of 16 answered

★ 4.6 Average rating



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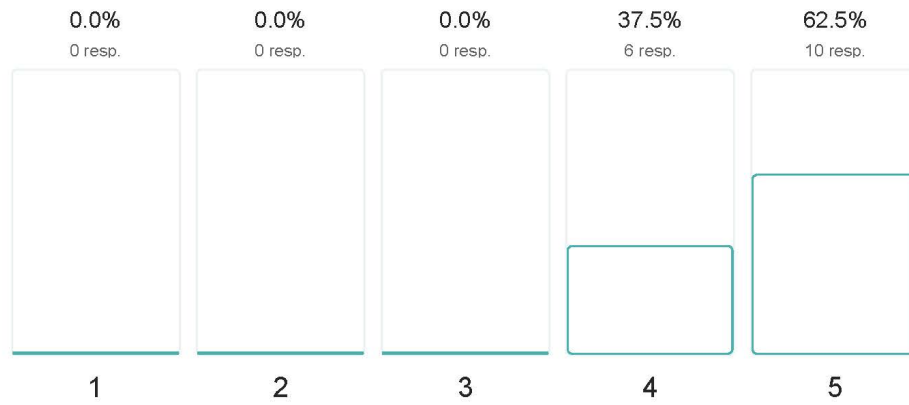
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Course Organization

Inscription to the training course and communication with organizers were efficient.

16 out of 16 answered

★ 4.6 Average rating



1/5/2021

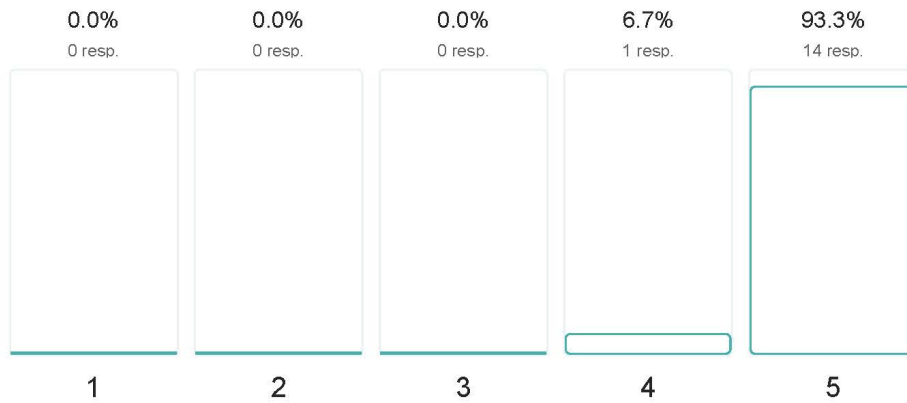
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Teaching and Learning Support

The instructors were helpful, informative, and approachable.

15 out of 16 answered

★ 4.9 Average rating



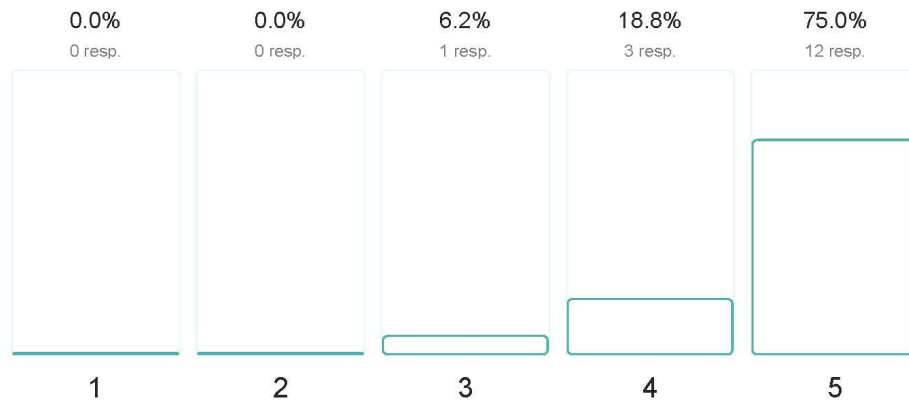
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The working documents were presented in a way that facilitated learning.

16 out of 16 answered

★ 4.7 Average rating



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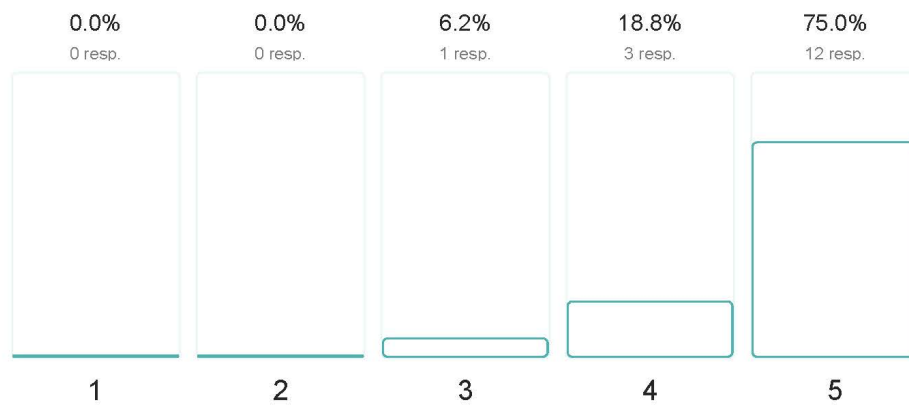
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Overall Evaluation

How would you rate this training course?

16 out of 16 answered

★ 4.7 Average rating



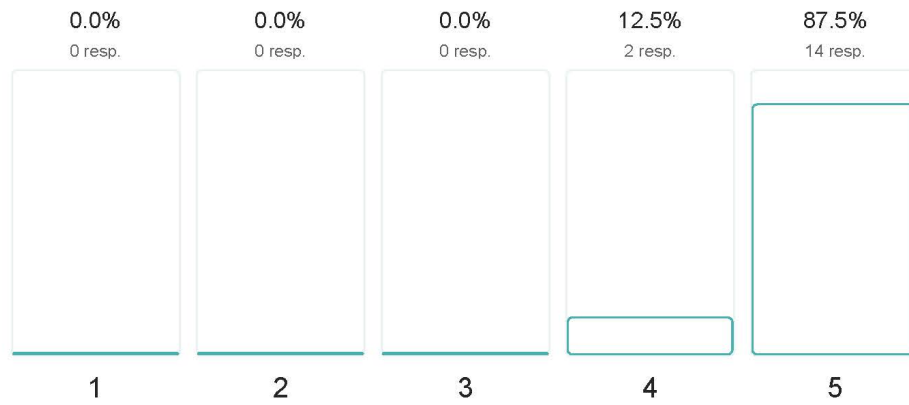
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How would you rate the quality of the teaching?

16 out of 16 answered

★ 4.9 Average rating

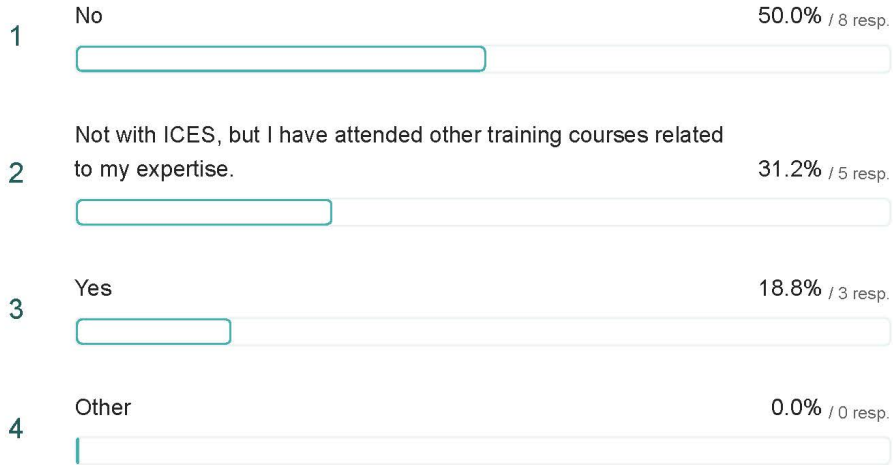


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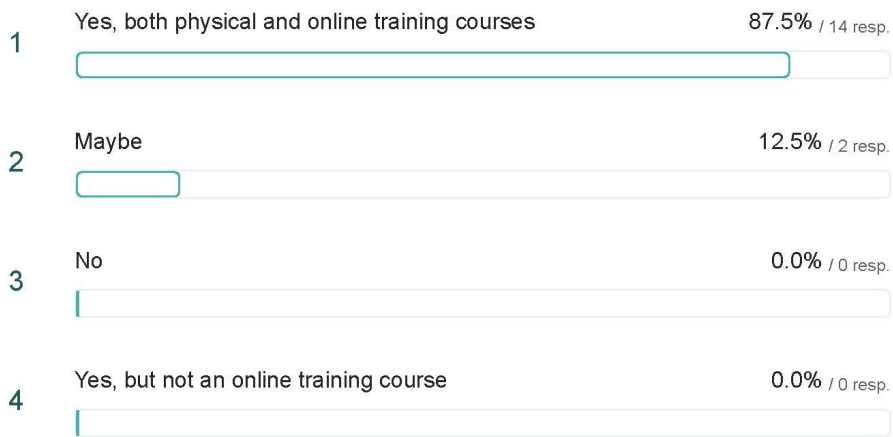
Have you taken any other ICES training courses?

16 out of 16 answered



Would you be interested in another training course within ICES?

16 out of 16 answered



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Social Event

Do you feel that you have benefited from networking opportunities on the course?

16 out of 16 answered

