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**Spawning biomass of Jack Mackerel (*Trachurus declivis*) in
the East sub-area of the Small Pelagic Fishery
during summer 2019**

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Executive Summary

Estimates of spawning biomass obtained using the Daily Egg Production Method (DEPM) are the primary biological performance indicator for quota species in the Small Pelagic Fishery (SPF).

The objective of this study was to conduct ichthyoplankton and adult trawl surveys that underpin the DEPM in the East sub-area of the SPF during January and February 2019.

Eggs and larvae of Jack Mackerel (*Trachurus declivis*) and other species were collected from *FV Santo Rocco* during 15 January to 7 February 2019. Samples were collected in vertical tows made using a bongo net. Plankton samples for morphological identification of eggs and larvae were fixed in a formalin solution. Samples to be used in a genetic validation study were fixed in an ethanol solution. An ethanol sample was taken on every second station. The total survey comprised of 205 formalin and 102 ethanol preserved samples.

Adult Jack Mackerel (*Trachurus declivis*) were sampled using a modified demersal trawl net deployed from the *FV Santo Rocco* during 15 January to 7 February 2019, in shelf and slope waters within the survey area. In trawls where Jack Mackerel were present, fish were dissected and sexed. Gonads of mature female Jack Mackerel were removed, labelled and fixed in a formalin solution. Females with ovaries removed, and mature males were labelled and frozen. Jack Mackerel were present in 13 of the 19 trawls and seven trawls had suitable numbers of adult fish.

The results of this project, and the laboratory and statistical analyses that will be conducted in a related project funded by the Australian Fisheries Management Authority, will be presented to the Resource Assessment Group for the SPF in late 2019.

The estimates of spawning biomass obtained in the AFMA study will be used to the Recommended Biological Catches and Total Allowable Catches for Jack Mackerel in the East sub-area of the SPF in 2020/21.

Keywords

Jack Mackerel, *Trachurus declivis*, East sub-area, Small Pelagic Fishery, Daily Egg Production Method.

Introduction

Background

Estimates of spawning biomass obtained using the Daily Egg Production Method (DEPM) are the primary biological performance indicator for quota species in the Small Pelagic Fishery (SPF). Recommended Biological Catches (RBCs) and Total Allowable Catches (TACs) are set under guidelines outlined in the SPF Harvest Strategy. The highest exploitation rates (e.g. 12% for Jack Mackerel) used to set RBCs and TACs are applied for the first five years after a DEPM survey is conducted (i.e. while stock/species is at Tier 1). After five years, each species/stock reverts to Tier 2 and exploitation rates used to set RBCs and TACs are halved (i.e. 6% for Jack Mackerel).

The DEPM was previously applied to Jack Mackerel (*Trachurus declivis*) in the East sub-area of the SPF in 2014. Jack Mackerel East would have reverted to Tier 2 in 2020/21 unless a DEPM survey was undertaken in 2019. The reduction in the TAC associated with reverting to Tier 2 means that the TAC in 2020/21 would have halved unless another DEPM survey was undertaken.

This reduction in catch would have impeded the development of the new mid-water operation that has been established off Ulladulla to support a new fish processing factory. The survey was conducted during January 2019 in shelf waters between south-eastern Tasmania and central New South Wales, including Bass Strait as far west as 146°30'E (Attachment 1).

This area was surveyed because previous surveys have shown that this is the likely spawning area of Jack Mackerel in the East sub-area during the peak spawning season (Sexton et al. 2017; Ward et al. 2015, 2016). Sample processing, data analysis and report write-up will be undertaken in a separate project funded by the Australian Fisheries Management Authority (AFMA).

Need

A survey to estimate the spawning biomass of Jack Mackerel in the East sub-area needed to be conducted in January 2019 to maintain the stock at Tier 1.

Objective

To conduct ichthyoplankton and adult trawl surveys for Jack Mackerel in the East sub-area of the SPF during January-February 2019.

Methods

The survey area is shown in Figure 1. This study used methods established for applying the DEPM to Australia's Jack Mackerel stocks as part of successful Fisheries Research and Development Corporation (FRDC) and AFMA funded studies conducted in 2014 in the East sub-area and 2018 in West sub-area of the SPF (Ward et al. 2016, 2018a, b).

Detailed descriptions of the methods used in the present study are provided in Ward et al. (2015, 2018 a, b). In summary, surveys to estimate DEPM parameters were conducted in shelf waters between south-eastern Tasmania and central New South Wales in the summer of 2019.

Eggs and larvae of Jack Mackerel and other species were collected from *FV Santo Rocco* during 15 January to 7 February 2019 (Figure 1). Samples were collected in vertical tows made using a bongo net as described in Ward *et al.* (2015). The locations of the plankton sampling sites are shown in Figure 1. Plankton samples for morphological identification of eggs and larvae were fixed in a formalin solution. Samples to be used in a genetic validation study were fixed in an ethanol solution. An ethanol sample was taken on every second station. The total survey comprised of 205 formalin and 102 ethanol preserved samples.

Adult Jack Mackerel were sampled using a modified demersal trawl net deployed from the *FV Santo Rocco* during 15 January to 7 February 2019 (Figure 1), in shelf and slope waters within the survey area. The locations and dates where trawls were undertaken are shown in Figure 1 and Table 1. Where Jack Mackerel were present in trawls, fish were dissected and sexed. Gonads of mature female Jack Mackerel were removed, labelled and fixed in a formalin solution. Females with ovaries removed, and mature males were labelled and frozen. Jack Mackerel were present in 13 of the 19 trawls and seven trawls had suitable numbers of adult fish (Table 1).

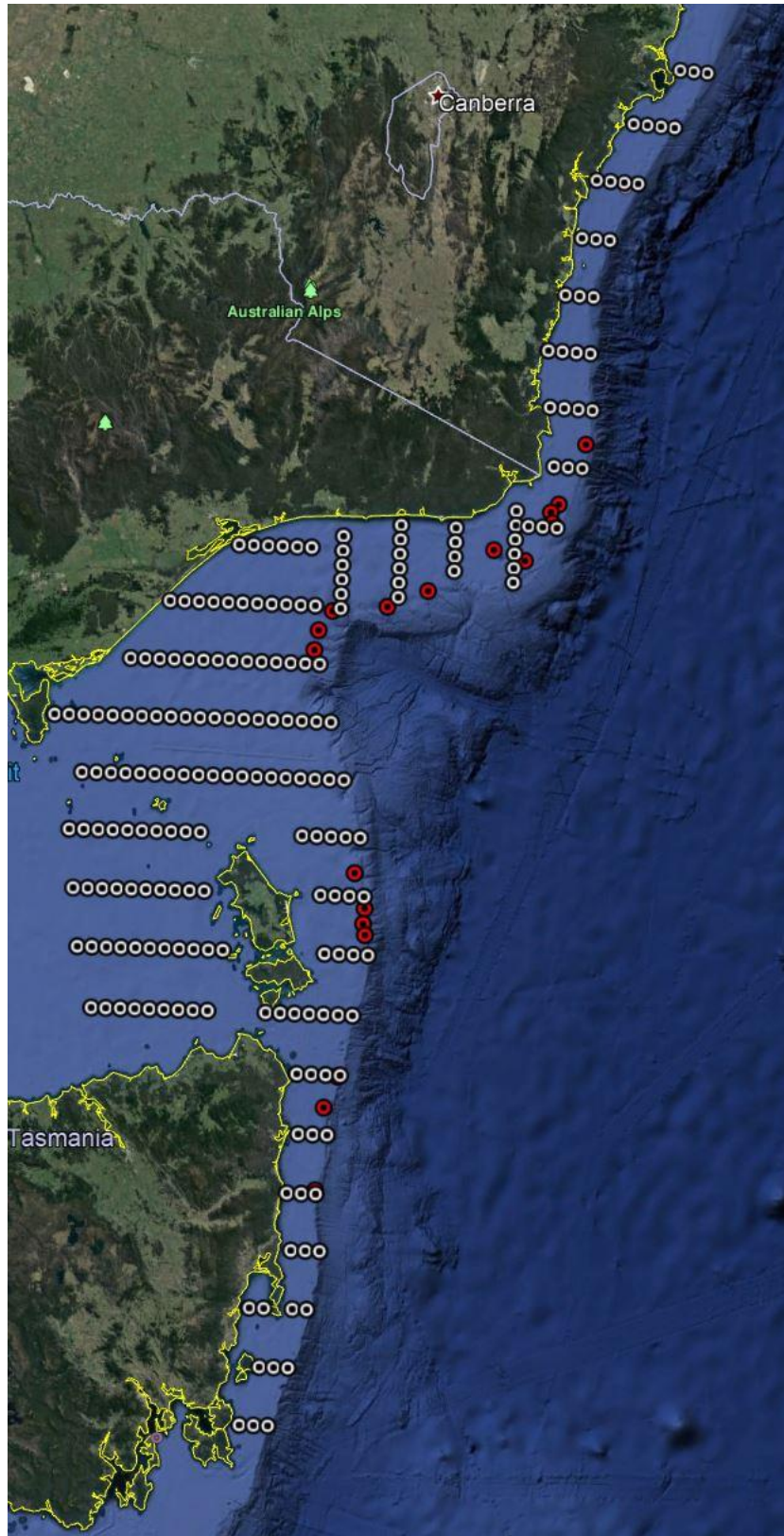


Figure 1: Map showing locations of plankton sites sampled (white circles) and adult trawls (red circles) from the *FV Santo Rocco*.

Table 1: Date, time and locations at which trawls for Jack Mackerel were conducted from *FV Santo Rocco*.

Trawl no.	Date	Start Time	Start Latitude	Start Longitude	Duration of trawl h.m	Depth of trawl (minimum, m)	Sample	Number of Adult Jack Mackerel
1	17/01/19	9:10	-35°27.633	150°45.909	4:00		NA	
2	19/01/19	8:45	-37°18.259	150°18.432	1:25	143	1	13
3	19/01/19	15:23	-37°42.676	150°04.444	0:15	130	NA	
4	24/01/19	7:15	-37°46.352	150°05.384	2:09	139	2	57
5	24/01/19	10:40	-37°39.76	150°07.80	2:35	135	3	136
6	24/01/19	15:20	-37°59.992	149°54.147	2:10	138	NA	
7	24/01/19	18:30	-37°56.93	149°40.36	2:30	121	NA	
8	25/01/19	7:20	-38°12.211	149°12.473	2:15		NA	
9	25/01/19	10:40	-38°18.287	148°55.11	2:40	133	NA	
10	25/01/19	15:05	-38°20.57	148°31.42	2:37	169	4	30
11	25/01/19	18:45	-38°34.10	148°24.18	2:05	137	5	5
12	26/01/19	17:40	-38°27.320	148°25.665	3:40	141	6	277
13	01/02/19	15:40	-40°00.744	148°50.865	4:15	128	7	160
14	02/02/19	10:00	-40°05.88	148°50.48	2:50	124	NA	4
15	02/02/19	15:15	-40°09.67	148°51.50	4:05	121	8	76
16	03/02/19	6:30	-39°48.91	148°45.79	3:15	125	9	160
17	04/02/19	9:15	-40°57.82	148°42.16	3:45	129	10	7
18	04/02/19	13:40	-41°08.58	148°36.47	2:20	119	11	19
19	05/02/19	11:30	-41°36.88	148°34.19	4:10	117	12	172

Results, Discussion and Conclusions

The egg and larval survey was completed as planned. Adult sampling was not as successful as previous surveys (e.g. Ward et al. 2015) due to the limited horsepower and relatively low towing speed of *FV Santo Rocco*. Sample processing, data analysis and report write-up will be undertaken in a separate project funded by AFMA. Standard laboratory procedures will be used to identify and stage eggs of Jack Mackerel. Egg identifications will be confirmed using molecular techniques. Statistical procedures developed in FRDC Project 2014/026 will be used to estimate egg production.

Extension and Adoption

The results of this project and the laboratory and statistical analyses that will be conducted in the AFMA project will be presented to the Resource Assessment Group for the SPF in late 2019.

Implications

Estimates of spawning biomass obtained in the AFMA study will be used to determine the RBC and TAC for Jack Mackerel in the East sub-area of the SPF in 2020/21.

Appendices

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