

Supplement 1 – Survey Methods/Results

Survey data

To compliment analysis of the logbook data, phone surveys were conducted with MMF skippers. Only currently operating or recently retired fishers with several years' experience in the fishery were interviewed. The survey questions measured perceptions of how depredation had changed across their careers (see Supplement 2 below for full questionnaire). Interviews were carried out by the same researcher, using standard questions with the 'Collector for ArcGIS' (ESRI) application. The first section of the interview surveyed the fishers career extent and the second recorded their experience of depredation within the MMF. Interviews were carried out with human ethics approval from The University of Western Australia (RA/4/20/5131), with each interview lasting approximately 20-30 minutes.

Results

The survey interviewed 5 fishers whose effort represented approximately 50% of the total fishing effort between 2006 to 2018. This included 3 skippers from zone 3, one from zone 2 and one from zone 1. Each of these skippers was a long-term fisher with over 30 years of experience within the MMF. All fishers perceived depredation metrics had increased over time, reporting an increase in total fish lost and a reduction in the time between arriving at a site and the first depredation event in a session (Figure A1). Most fishers believed depredation to be higher during peak season. Fishers perceived that sharks from the whaler group (family *Carcharhinidae*) were predominantly responsible for depredation, though they noted it was very difficult to identify the species involved. Fishers also mentioned cod (*Epinephelus* spp.) were occasionally responsible for depredation. In terms of fisher response to depredation, all noted they had adapted fishing methods to reduce losses, either by constantly moving site when losses increased or by minimising the number of struggling mackerel in the water at one time by reducing the number of lines.

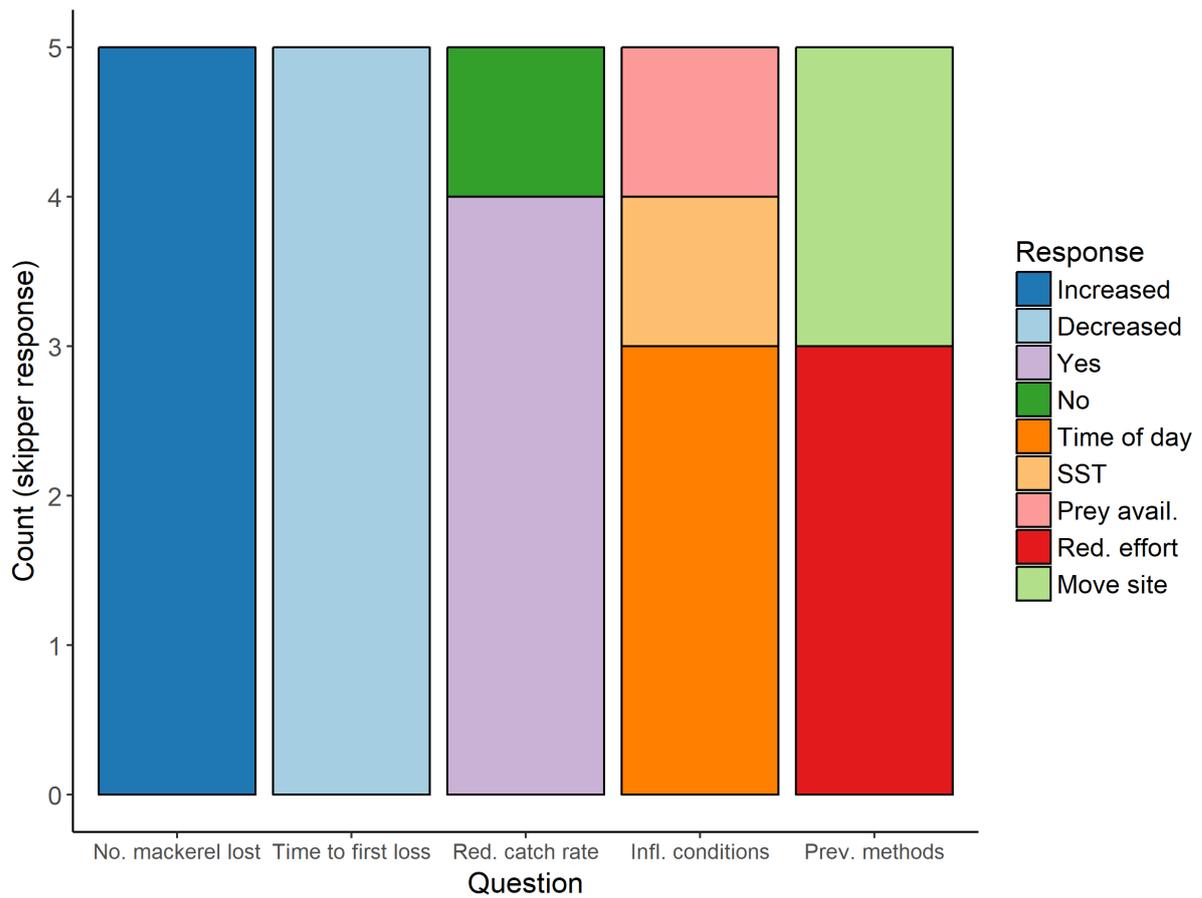


Figure S1. Survey responses for the most important questions for five long-term fishers from the Mackerel Managed Fishery. Questions were: a) has the number of mackerel lost changed across your career; b) has the time for the first depredation event in a session changed across your career; c) does depredation reduce mackerel catch rate; d) what environmental conditions have the most influence on the depredation rate; e) how do you change your fishing methods to avoid depredation. SST = sea surface temperature. Prey avail. = prey availability. Red. effort = reduce effort.

Supplement 2. Survey questionnaire

- Q1 Do you currently hold a licence in the MMF?
- Q2 Are you still fishing in the MMF?
- Q3 Can you tell me in what year did you start fishing in the MMF?
- Q4 Which zones have you fished in during your time in the MMF?
- Q5 What was a typical season fished i.e. what were the start and end months?
- Q6 In your time within the MMF, have you ever lost a targeted fish to shark depredation?
- Q7 If the previous answer was yes, would you say the number of fish you are losing to sharks has changed over this period?
- Q8 In terms of the time of year that depredation occurred, can you recall which season depredation occurred the most in?
- Q9 Are there particular areas where you encounter shark depredation more so than other areas?
- Q10 Do you think there are any conditions which may influence or be associated with depredation, and if so how?
- Q11 Did depredation occur more often when trolling, handlining, jigging or other?
- Q12 For boats fishing in zone 1 (Kimberley), did depredation occur more when fishing from the main vessel or from the smaller vessels?
- Q13 Do you notice any difference in the depredation rate when fishing with lures or baits?
- Q14 Have you changed your fishing methods in response to shark depredation?
- Q15 Do you notice any difference in the depredation rate when targeting grey mackerel compared to Spanish mackerel?
- Q16 Does the size of fish matter for depredation?
- Q17 When hooked mackerel are lost to depredation what approximate proportion of times are part of the fish recovered as opposed to the whole fish lost?
- Q18 Over your career, have you noticed whether the length of time it takes for you to start losing fish in a session to shorten or lengthen?
- Q19 What species of shark would you say are responsible for depredation?
- Q20 How much would you say you spend on average per year on fishing gear to replace that lost to depredation?
- Q21 Do you think depredation influences the mackerel catch rate?
- Q22 In your experience is depredation of hooked mackerel by other species, such as large cod, occurring?
- Q23 Do you think that depredation occurs for released/undersized mackerel and released bycatch?
- Q24 When recording the number of mackerel taken per fishing session, do you leave that column blank if no fish were lost in that session?
- Q25 If you think depredation is becoming an increasing problem for the MMF, what do you think can and should be done to mitigate it, to some degree?
- Q26 Is there anything else you would like to add in relation to shark depredation in the MMF?