
Lead PI: Dr. Adam Barkley—University of Massachusetts Dartmouth SMAST Program

1. How closely did the research team follow the original planned scope of work?
   
   In the proposal, the following objectives are stated: 1) evaluating the use of RAMP in estimating the mortality of each species; 2) identifying the relationship between RAMP and mortality, and 3) identifying stressors that impact the mortality of each species. The research team met these objectives.

2. If there were differences between scheduled and completed tasks, did the project team address these and explain why there were differences?
   
   It would be helpful to include some information in the final report regarding why the analyses could not be extended to summer flounder (this information is now only summarized in the Final Report Summary).

3. In the results, analysis, and discussion sections of the report, did the team answer their original research question(s)?
   
   In the final report, the team states that the primary objective was to develop a relationship between reflex impairment and mortality that will allow the estimation of discard mortality. The research team did identify and plot these relationships, although it would have been helpful to show the prediction intervals in these relationships rather than simply the confidence intervals, as the application of these RAMP – mortality curves is to predict the mortality from a given RAMP value. It would also be helpful to show the mortality data as the proportion of fish that died within a RAMP level (as in Figure 1), as this is essentially what the logistic regression is fitting.

   This is more of a general issue, as the utility of this research is in the ability to improve upon the current assumption of 100% discard mortality. If any discarded fish survive, then there are errors with the current assumption. However, there are also errors in predicting mortality from the fitted curves. Some evaluation of these relative errors would be helpful, and could be conducted with cross-validation techniques.

4. Were analytical techniques appropriately used? Was the experimental methodology statistically sound and supportive of the conclusions drawn?

   The appropriate statistical techniques were used, but I suspect that more information could have been obtained from the data. For example, it is not clear to me that the RAMP scores from the 20th, 40th, and 60th day were used in the analysis, which could provide information on how recovery of the RAMP reflexes
relates to mortality.

The discriminant analysis is interesting, and shows that some of RAMP predictors are perhaps more useful than others in predicting mortality. It seems like this information could be used to develop an improved RAMP predictor, as the current RAMP scores assigns equal weight to all 7 RAMP variables regardless of their relation to mortality. In any event, for the RAMP scores in which there was a variation in the mortality of individual fish, it would be interesting to show the proportion that showed these more important RAMP characteristics within the two groups (dead or alive).

5. Was the raw data included in the appendix complete?

Given that there was no appendix and no raw data in the final report, I would have to say no.

6. Was the information clearly presented? Were figures and tables appropriately used?

In my opinion, I found the report somewhat difficult to follow. Some very useful pieces of information that would have helped were omitted, such as the sample sizes of fish for the experiments and summaries of the overall mortality rate; statements such as “19 fish survived through holding day 19” do not mean much unless we know the initial number. The conclusion that winterpane flounder is more susceptible to stressors is entirely dependent on the observed mortality, and the only quantitative statement on this topic is that all fish were dead at day 42. (By the way, this seems inconsistent with Figure 8, which I had thought showed whether individual fish are either alive or dead at day 60. When were the RAMP measurements used for the analysis taken?). Other information is redundant (e.g., the first two sentences in the ‘Analysis’ section) or not completely presented (why were only windowpane flounder tagged with double bar tags, and what does this have to do with the study?). Tables 3 to 5 are presented in the text as coefficients of linear discrimination functions, but appear to actually contain correlation matrices. Finally, on page 13 I think ‘hardy’ is meant rather than ‘hearty’, and there were a few awkward phrases such as ‘flat increasing’ (maybe use ‘linearly increasing’) and ‘sea water lab water temperature’ (perhaps just say ‘laboratory water temperature’).

7. In the discussion section, did the team offer comments on results including observations made while conducting the research; explanations of why a particular gear, sampling strategy, or laboratory technique may or may not have worked as anticipated; how project research results may have advanced the knowledge base about the research topic area; and ideas about follow up research?

The research team does interpret the results in the discussion, and identify which factors may contribute more heavily to discard mortality rates and how this information could be used by the fishing industry. The team notes that results from the work on yellowtail flounder have been presented in assessment meetings and proposed for incorporation into assessment techniques, and it would be useful to have a similar discussion on the prospects for incorporating the results for the other two species into the assessment/management procedures.

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1. How closely did the research team follow the original planned scope of work?
   The research team followed the planned SoW as stated with the exception of working with summer flounder (*Paralichthys dentatus*) because these were not attainable.

2. If there were differences between scheduled and completed tasks, did the project team address these and explain why there were differences?
   Yes, the team explained that not enough summer flounder were collected for testing because of timing conflicts with industry partners and high mortality during initial collections. The schedule was extended, apparently to collect more fish.

3. In the results, analysis, and discussion sections of the report, did the team answer their original research question(s)?
   The team answered the original research question for 3 of the 4 target species (yellowtail flounder, winter flounder, and windowpane) by providing an estimate of mortality and a confidence interval as predicted by reflex measures relative to trawl tow time and time on deck (in air). Further, they specified which of the RAMP metrics were instructive for which species.

4. Were analytical techniques appropriately used? Was the experimental methodology statistically sound and supportive of the conclusions drawn?
   The experimental methods and statistical tools were sound and supportive of the conclusions.

5. Was the raw data included in the appendix complete?
   Derived data, (correlation coefficients and DFA model results were included, but raw data was not included in the appendix as text, (although in some cases presented graphically). The difference is that someone who wanted to re-run the statistical analyses would have to extract the data values from the graphs by eyeballing them from the axes in order to input them, and fish cannot be identified individually among different graphs because they appear as circles without IDs. In other words, the math can’t be easily checked, which I think is the purpose of including raw data.
6. Was the information clearly presented? Were figures and tables appropriately used?

Information was generally clearly presented through graphics, tables, and text. I would have favored a multivariate plot of the DFA results, rather than horizontal bar graphs, for conveying more information synthetically.

7. In the discussion section, did the team offer comments on results including observations made while conducting the research; explanations of why a particular gear, sampling strategy, or laboratory technique may or may not have worked as anticipated; how project research results may have advanced the knowledge base about the research topic area; and ideas about follow up research?

The discussion was generally thorough regarding the questions above. In the Implications section, the team suggests that these RAMP score correlations are useful to assessing mortality for these species caught by other methods. Is it possible (likely) that the type of injury affects different reflexes differently? For example, could trauma to organs from a type of gear injury (other than trawls) transmit to latent mortality through a mechanism that does not immediately impair the reflexes in the same way that air exposure (respiration difficulty or dehydration) result in latent mortality? I would suggest that this also might be tested at some level for other gear types rather than being as broadly assumed as here.

I would also welcome details in the Discussion about the difference between “wet” and “dry” decks and “air exposure” to understand the mechanisms that lead to latent mortality and how to avoid them. Presumably, lying on an actually dry deck would strip mucus from a fish in a different way than lying on a deck that is wet but does not have enough water flowing over it (i.e. from a hose) to wet the gills for proper ventilation (is that still a “dry deck”), which is “air exposure”, maybe as in a tote? So either infection of the mucosa or respiratory stress might be mechanism through which fish on a “dry” deck are killed, but in the second case “dry” means “not sufficient water for respiration” while “wet” means running water?