

# Scaling survival: comparing survival across taxonomic units based on gestation duration

July 12, 2022

## Preamble

This is an Electronic Supplement to the manuscript Marques et al. “Quantifying Deepwater Horizon oil spill induced injury on pelagic cetaceans” submitted to Marine Ecology Progress Series (MEPS).

The master file containing links to all supplementary files related to this paper is [ESO\\_ElectronicSupplements](#).

This pdf is generated in RMarkdown by compiling a .Rmd file. The figures and results are generated using code that is not shown in this pdf but is available in the corresponding .Rmd files stored at the github repository <https://github.com/TiagoAMarques/CARMMHApapersSI>

If you make use of any of this material in your work, it would be appreciated if you would [contact Tiago Marques](#) to let him know.

## Version history

- 1.0 [date] Version included as an html Electronic supplement in the MEPS submission - *note to co-authors: this note will be deleted when we submit and we are not tracking versions prior to submitting to MEPS, that will be version 1.0 by definition*

## Introduction

In this document we look at the age specific survival used for each taxonomic unit scaled by the corresponding gestation duration, as described in the manuscript.

## Reading relevant info

We read in the species details, set the species which we want results for, and then filter the input data for those species only.

We also read in *Tursiops truncatus* bottlenose dolphin (BND) Siler model posterior values. These can then be used to estimate:

1. survival conditional on age, and
2. survivorship functions for this species.

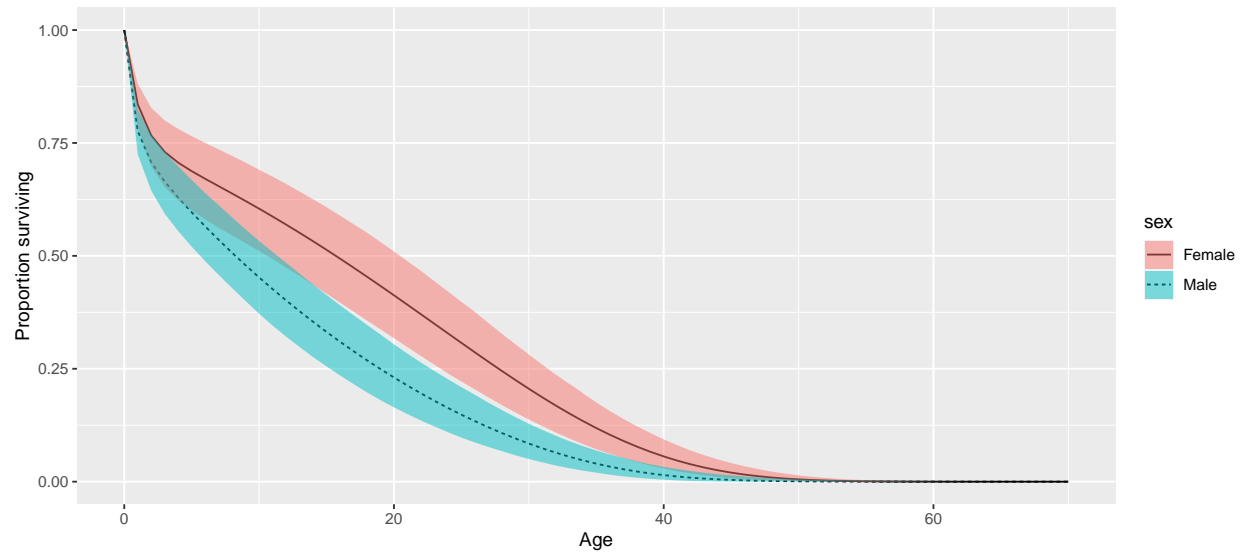
The corresponding values for all other species/stocks are obtained by scaling the *Tursiops truncatus* values by gestation duration.

## *Tursiops truncatus*

Here we represent the relevant functions and the associated variability is also illustrated.

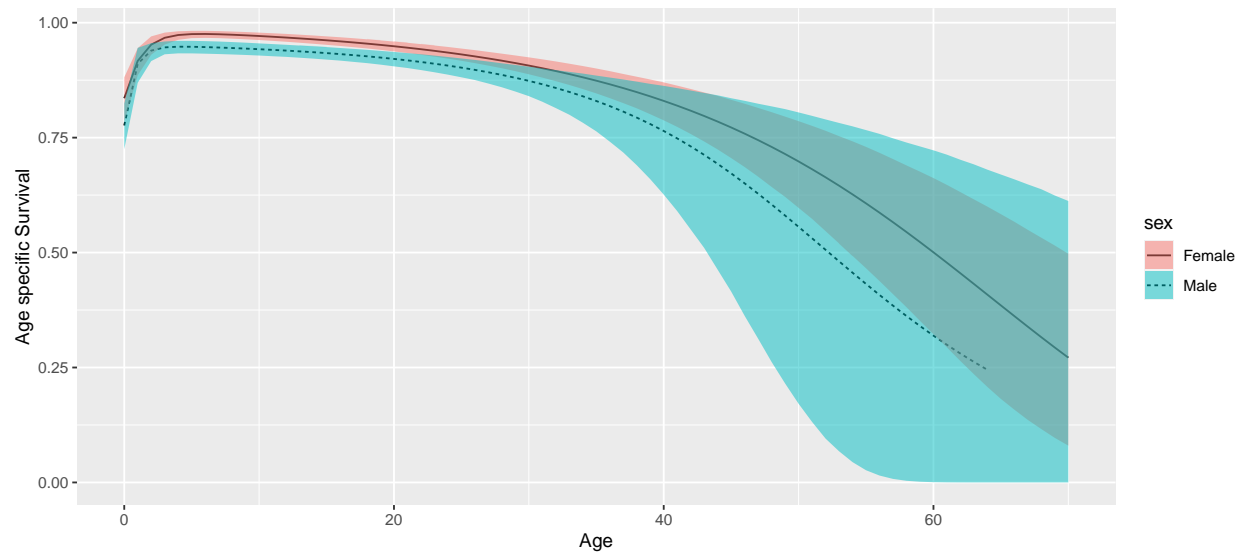
## Survivorship function

We plot the age specific survival aka survivorship function for BND. See Schwacke et al. (2017) and the corresponding online material for details on how this was derived based on a Siler model fitted to strandings data.

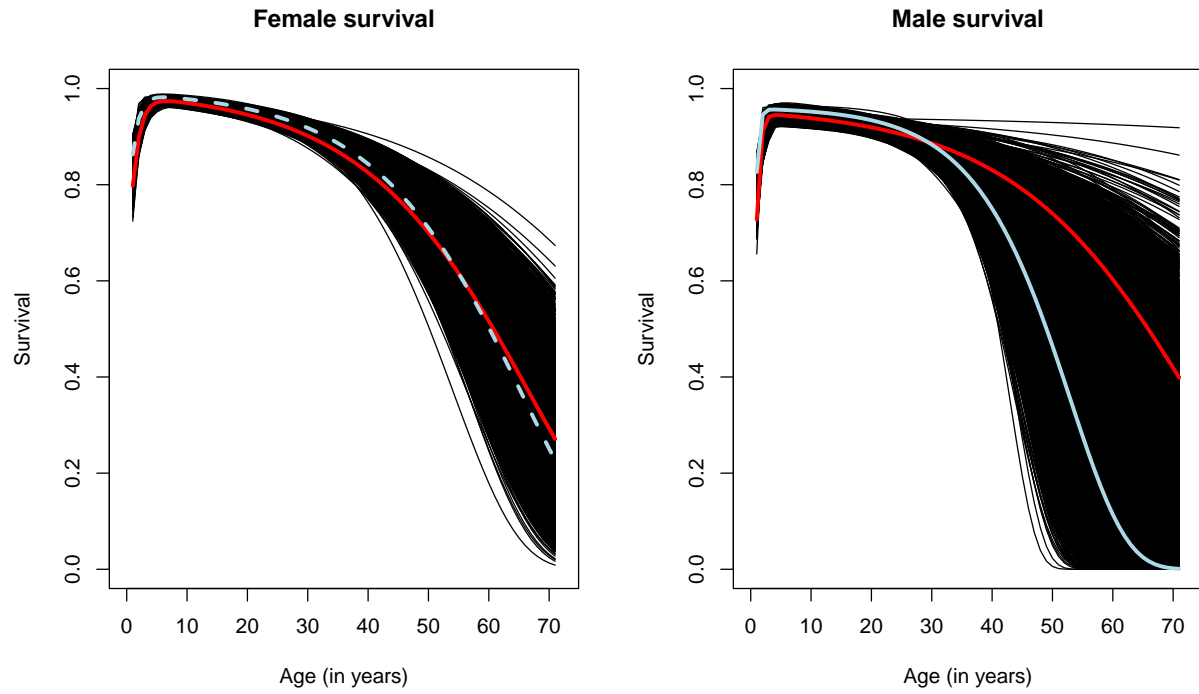


## Age specific Survival

We plot age specific survival



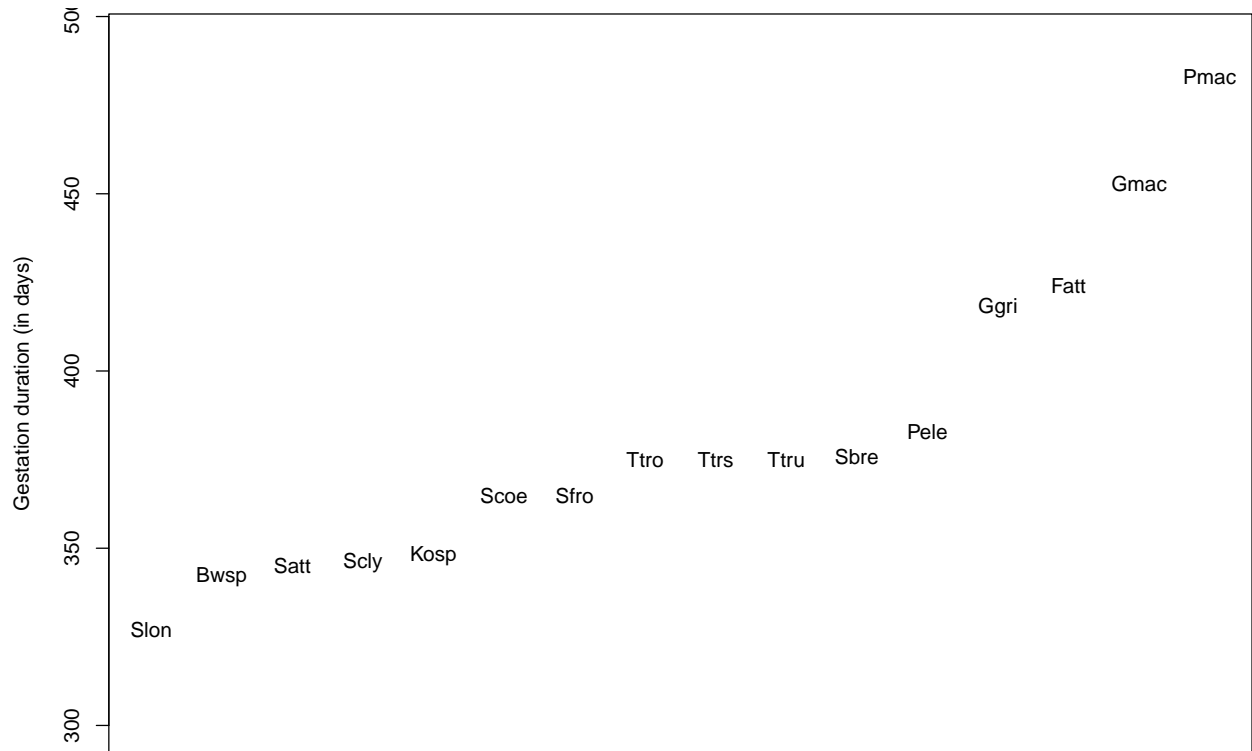
It is relevant to appreciate that the survival curves across iterations will tend to cross, and therefore we cannot really talk about higher survival probabilities across the board for a single iteration; the survival might be higher in a particular iteration for younger animals but higher for older animals. This is illustrated in the image below, where two iterations are highlighted (in green and red) against all the iterations.



## Comparing all species

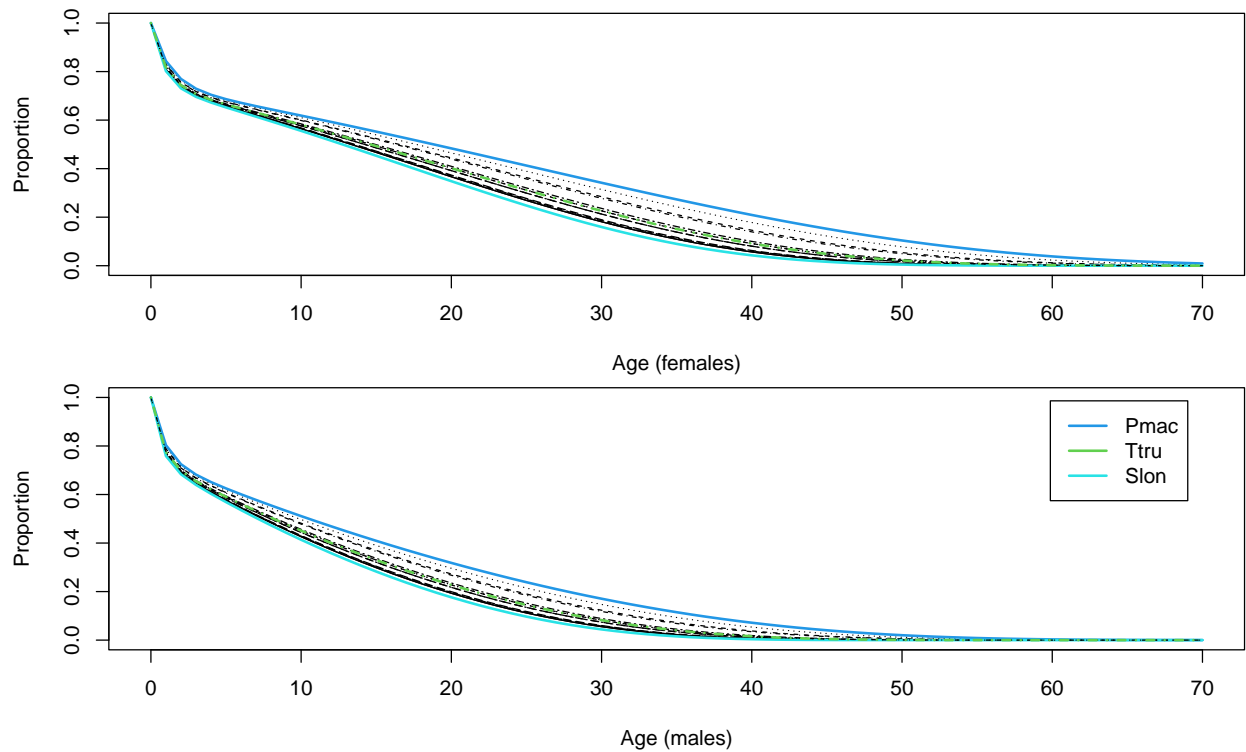
The scaling is done by gestation duration, so we look at the gestation duration considered for each of the species. The rationale for each species gestation duration used is provided on a separate document included as a separate file: [ES3\\_GestationDuration](#).

The range in gestation duration is shown below (note the x axis is just an index, species are shown from left to right in the increasing order of their gestation duration).



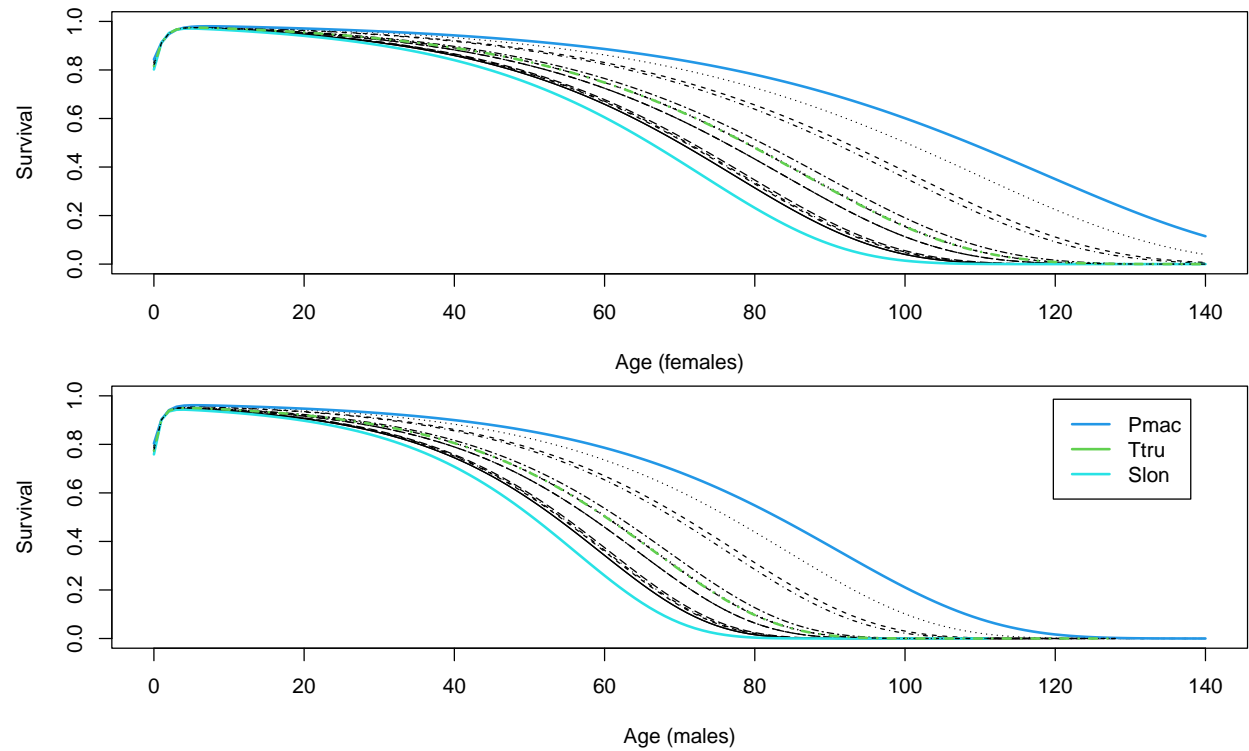
## Survivorship function

We present the scaled survivorship by taxonomic unit and sex below. For reference BB BND shown in green, sperm whale in blue and spinner dolphin in light blue



## Age specific survival

We present the scaled age specific survival by function below. For reference BB BND shown in green, sperm whale in blue and spinner dolphin in light blue



## References

Schwacke, L.H., L. Thomas, R.S. Wells, W.E. McFee, A.A. Hahn, K.D. Mullin, E.S. Zolman, B.M. Quigley, T.K. Rowles and J.H. Schwacke. 2017. An age-, sex- and class-structured population model for estimating nearshore common bottlenose dolphin injury following the Deepwater Horizon oil spill. *Endangered Species Research* **33**: 265-279. DOI: [10.3354/esr00777](https://doi.org/10.3354/esr00777).