

# Investigating the stock status of Indian Ocean Bigeye tuna using the a4a statistical catch-at-age assessment method.

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October 2013

```
## Warning: replacing previous import 'barchart' when loading 'lattice'
## Warning: replacing previous import 'bwplot' when loading 'lattice'
## Warning: replacing previous import 'densityplot' when loading 'lattice'
## Warning: replacing previous import 'dotplot' when loading 'lattice'
## Warning: replacing previous import 'histogram' when loading 'lattice'
## Warning: replacing previous import 'splom' when loading 'lattice'
## Warning: replacing previous import 'stripplot' when loading 'lattice'
## Warning: replacing previous import 'xyplot' when loading 'lattice'
## Warning: replacing previous import 'expand' when loading 'Matrix'
```

## Introduction

A recently developed statistical catch-at-age stock assessment method, designed for evaluating the status of stocks with intermediate data quality, is applied here to Indian Ocean bigeye tuna. The method provides huge flexibility for the rapid evaluation of the effects in parameter estimates and uncertainty of different submodels for fishing mortality-at-age (the F model), survey catchability-at-age (the Q model), stock recruitment (the R model) and observation variance (the V model).

The model does not attempt to substitute more complex stock assessments that make use of all sources of data, like tagging, but to provide a tool for rapid exploration of the influence of different assumptions and data sources. This capability is achieved by combining a powerful optimization engine (ADMB) with an intuitive user interface using linear models as expressed in the R language.

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## The a4a stock assessment model

FLR (Kell et al. 2007)

### Data

```
## Warning: cannot open compressed file
## 'data/bet_iotc_2011.RData', probable reason 'No
## such file or directory'
```

```
## Error: cannot open the connection
```

### Catch-at-age

The catch-at-age dataset made available by the IOTC Secretariat <sup>1</sup> was used.

```
## Error: error in evaluating the argument 'data' in selecting a method for function 'ggplot2::ggplot'
##   error in evaluating the argument 'object' in selecting a method for function 'catch': R
```

### CPUE index

## Model structure and assumptions

### Fixed parameters

Parameter	Value
M	0.8
M	0.4

Table 1: PARAMS

<sup>1</sup>[http://iotc.org/files/proceedings/2013/wptt/BET\\_ASPMv2.zip](http://iotc.org/files/proceedings/2013/wptt/BET_ASPMv2.zip),  
27/09/2013

downloaded

**Estimated parameters**

**Model runs**

**Simulation of catchability fitting**

**Results**

**Population trajectories**

**Reference points**

**Residual diagnostics**

**Discussion**

**Appendix I: a4a model population dynamics**

**Appendix II: Code of final run**

**References**

Kell, Laurence Thomas, Iago Mosqueira, Philippe Grosjean, Jean-Marc Fromentin, Dorleta Garcia, Richard Hillary, Ernesto Jardim, et al. 2007. “FLR: an open-source framework for the evaluation and development of management strategies.” *ICES Journal of Marine Science* 64 (apr): 640–646. doi:10.1093/icesjms/fsm012.