Development of an ageing error matrix for U.S. gray triggerfish (*Balistes Capriscus*)

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Development of an ageing error matrix for U.S. gray triggerfish (Balistes Capriscus)

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Introduction

Ageing error has recently been incorporated in SEDAR assessed species in the U.S. south Atlantic to provide an estimate of uncertainty among ages. Inclusion of ageing error in a catch-at-age type stock assessment tends to accentuate recruitment estimates, as compared to the same estimates without ageing error. Other estimates from a stock assessment are affected as well, but the direction and magnitude of change is often unpredictable due to other data sources and factors in the model. This analysis computes an ageing error matrix for gray triggerfish in the U.S. south Atlantic.

Methods

A random set of 198 gray triggerfish spines were exchanged between South Carolina Department of Natural Resources (SCDNR) and National Marine Fisheries Service (NMFS) in Beaufort, North Carolina. The NMFS Beafort laboratory had two personnel provide independent age readings of these spines. The SCDNR produced a consensus age reading for each spine in the set.

This set of three separate age readings were then compared in a pairwise fashion. Agreement among the three readers was 24 % while agreement between the Beaufort lab was 37% (Figure 1). Figure 1 suggests very little agreement beyond age 9.

Methods described in Punt et al. (2008) and AGEMAT software were used to compute an ageing error matrix for gray triggerfish. No attempt was made to account for bias since the true age of the sample was unknown. Ten samples (5%) were removed from the analysis if the sample was not assigned an age by all three readers. Punt et al. (2008) suggests excluding the top 1% of older aged samples due to small sample sizes. For gray triggerfish, ten samples (5%) were excluded. The input data used to develop the ageing error matrix are provided in Appendix 1.

Results

The resulting ageing error matrix is in Table 1.

Table 1. Gray triggerfish ageing error matrix for use in SEDAR 32 Assessment Workshop.

	1	2	3	4	5	6	7	8+
1	0.910	0.090	0.000	0.000	0.000	0.000	0.000	0.000
2	0.139	0.723	0.138	0.001	0.000	0.000	0.000	0.000
3	0.005	0.188	0.615	0.188	0.005	0.000	0.000	0.000
4	0.000	0.020	0.226	0.507	0.226	0.020	0.000	0.000
5	0.000	0.004	0.050	0.242	0.408	0.242	0.050	0.004
6	0.000	0.002	0.017	0.087	0.232	0.322	0.232	0.107
7	0.000	0.002	0.011	0.043	0.114	0.206	0.251	0.375
8	0.001	0.003	0.010	0.030	0.067	0.121	0.172	0.597

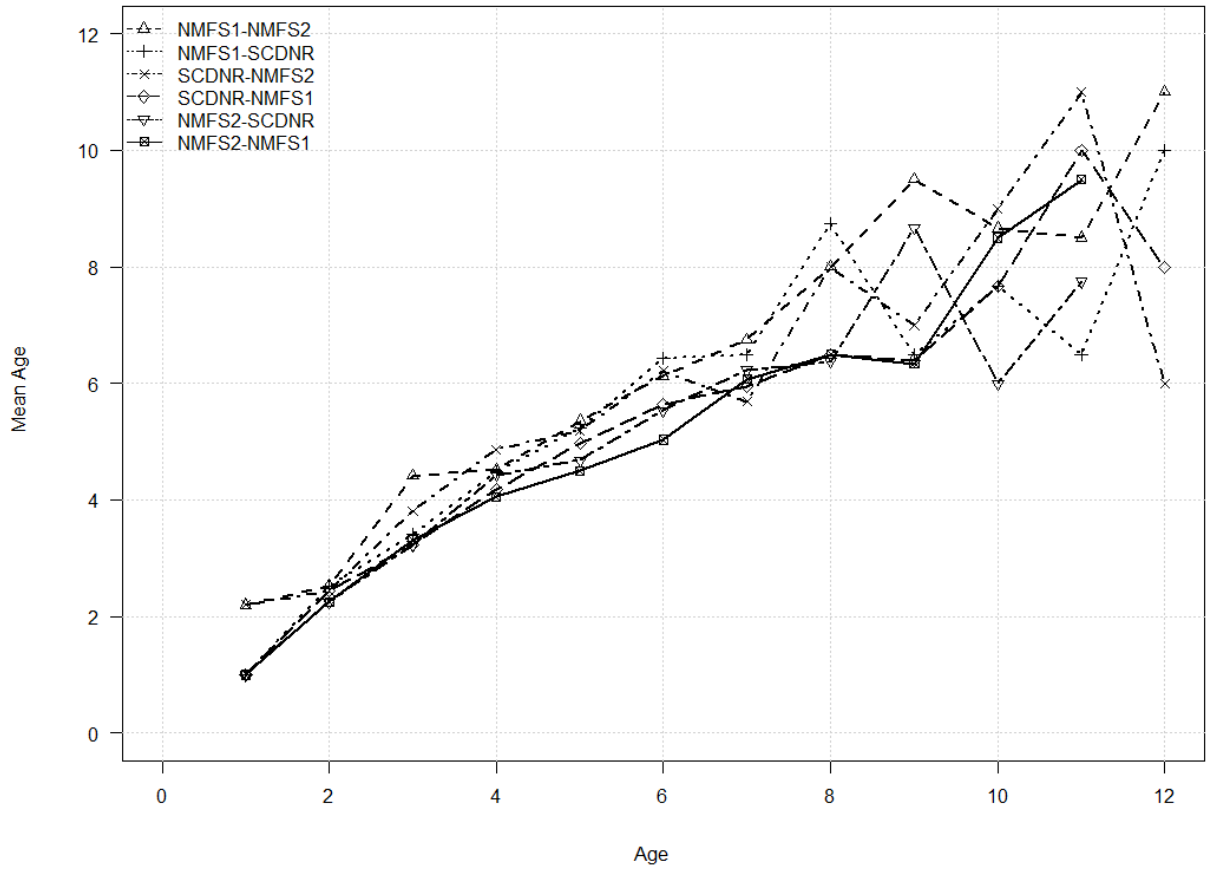

Figure 1. Mean age of gray triggerfish spines from paired reader comparison. Readers are as follows; South Carolina Departement of Natural Resources (SCDNR) and two readers from National Marine Fisheries Service (Beaufort (NMFS1 and NMFS2). Labels indicate paired readers, with the first representing the readers whose ages were the base for computing the mean age of the second reader.

Appendix 1. Gray triggerfish ageing input file used in AGEMAT software to develop an ageing error matrix for SEDAR 32 Assessment workshop.

```
# Maximum number of readers
  3
# Number of data sets
  1
# Number of points per data set
  81
# Which readers per data set
  3
# Readers per data set:
   1  2 3
#  447   19   20
# minimum and maximum age
1   9
# Reference age
  4
# Minus groups
   1
# Plus groups
 7
# Option for bias
   0    0   0
# Option for standard deviation
   2   -1  -1
# Option for effective sample size
   0
# Use Par File (1=Yes)
0

# Min, Max, Init, Phase for sigma and bias
  0.0  40.0  0.2  1
-10.0   1.0  0.1  1
  0.0  40.0  7.0  1

# Min, Max, Phase for Probs
-20 20 2

# Min, Max, Init, Phase for the slopes
-10 1.0  0.0  2


# Data Set #    1 (AEP: the count of readings should be column 1)

2          1          1          1
1          1          2          1
1          1          3          1
1          1          4          1
9          2          2          2
2          2          2          3
4          2          3          2
1          2          4          4
```

1	2	5	7
2	3	2	2
1	3	2	3
4	3	3	3
2	3	3	4
3	3	4	3
1	3	4	4
8	3	5	3
2	3	5	5
1	3	6	3
4	3	6	4
1	3	8	6
1	4	2	4
4	4	3	3
4	4	3	4
1	4	3	7
2	4	4	3
14	4	4	4
3	4	4	5
1	4	4	7
1	4	4	8
6	4	5	4
3	4	5	5
1	4	5	6
1	4	5	7
7	4	6	4
1	4	6	5
1	4	6	6
1	4	6	7
1	4	7	4
1	4	9	9
1	5	3	3
1	5	3	4
3	5	4	4
4	5	4	5
1	5	4	6
1	5	4	7
3	5	5	4
14	5	5	5
3	5	5	6
1	5	5	7
1	5	6	5
3	5	6	6
1	5	6	7
1	5	7	4
3	5	7	5
1	5	8	6
1	5	8	8
1	6	4	9
1	6	5	4
3	6	5	5
1	6	5	6
1	6	6	5
2	6	6	6

1	6	6	7
1	6	7	6
1	6	7	7
1	6	7	9
1	6	8	5
1	6	9	8
1	7	5	2
1	7	5	7
2	7	6	6
1	7	6	7
1	7	6	9
1	7	7	6
1	7	7	7
1	7	7	8
1	7	8	4
2	7	9	8
1	8	8	7
1	8	8	8
1	9	9	9