Development of an ageing error matrix for U.S. blueline tilefish (*Caulolatilus microps*)

Sustainable Fisheries Branch, National Marine Fisheries Service,
Southeast Fisheries Science Center – Beaufort Lab (contact: Eric Fitzpatrick)

SEDAR32-AW-03

Submitted: 24 April 2013

Please cite this document as:

Sustainable Fisheries Branch, National Marine Fisheries Service, Southeast Fisheries Science Center – Beaufort Lab. 2013. Development of an ageing error matrix for U.S. blueline tilefish (*Caulolatilus microps*). SEDAR32-AW03. SEDAR, North Charleston, SC. 10 pp.

Notice on SEDAR Working Papers

This information is distributed solely for the purpose of pre-dissemination peer review under applicable information quality guidelines. It has not been formally disseminated by NOAA Fisheries. It does not represent and should not be construed to represent any agency determination or policy.

Development of an ageing error matrix for U.S. blueline tilefish (*Caulolatilus microps*)

Sustainable Fisheries Branch, National Marine Fisheries Service, Southeast Fisheries Science Center, 101 Pivers Island Rd., Beaufort, NC 28516

24-April-2013

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 blueline tilefish in the U.S. south Atlantic.

Methods

A random set of 281 blueline tilefish otoliths were exchanged between South Carolina Department of Natural Resources (SCDNR), National Marine Fisheries Service (NMFS) in Beaufort, North Carolina and Old Dominion University in Virginia. The NMFS Beafort lab had two personnel provide independent age readings of these otoliths. The SCDNR produced a consensus age reading for each otolith in the set. Old Dominion University provided one independent age reading of these otoliths.

This set of four separate age readings were then compared in a pairwise fashion. Agreement among the four readers was zero percent while agreement between the Beaufort lab was 26% (Figure 1 and Figure 2).

Methods described in Punt et al. (2008) and AGEMAT software were used to compute an ageing error matrix for blueline tilefish. No attempt was made to account for bias since the true age of the sample was unknown. Eleven samples (3.9%) were removed from the analysis if the sample was not assigned an age by both readers. Punt et al. (2008) suggests excluding the top 1% of older aged samples due to small sample sizes. For blueline tilefish, thirteen samples (4.8%) were excluded. Convergence problems occurred with AGEMAT when a third or fourth reader was included (ODU and/or SCDNR). The input data used to develop the ageing error matrix are provided in Appendix 1 and only include otoliths read by Beaufort lab personnel.

Results

The resulting ageing error matrix is in Table 1.

Table 1. Blueline tilefish ageing error matrix for use in SEDAR 32 Assessment Workshop.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15+**
1	0.833	0.165	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.210	0.580	0.202	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.020	0.226	0.507	0.226	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.002	0.036	0.239	0.446	0.239	0.036	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	0.000	0.005	0.056	0.242	0.395	0.242	0.056	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	0.000	0.001	0.011	0.074	0.238	0.352	0.238	0.074	0.011	0.001	0.000	0.000	0.000	0.000	0.000
7	0.000	0.000	0.002	0.019	0.091	0.230	0.314	0.230	0.091	0.019	0.002	0.000	0.000	0.000	0.000
8	0.000	0.000	0.001	0.005	0.030	0.103	0.220	0.283	0.220	0.103	0.030	0.005	0.001	0.000	0.000
9	0.000	0.000	0.000	0.002	0.010	0.041	0.112	0.208	0.255	0.208	0.112	0.041	0.010	0.002	0.000
10	0.000	0.000	0.000	0.001	0.004	0.016	0.051	0.118	0.195	0.231	0.195	0.118	0.051	0.016	0.004
11	0.000	0.000	0.000	0.000	0.002	0.007	0.023	0.060	0.120	0.183	0.210	0.183	0.120	0.060	0.032
12	0.000	0.000	0.000	0.000	0.001	0.003	0.011	0.030	0.068	0.121	0.170	0.191	0.170	0.121	0.113
13	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.016	0.038	0.074	0.119	0.159	0.175	0.159	0.254
14	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.009	0.021	0.044	0.077	0.116	0.148	0.160	0.420
15	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.005	0.013	0.027	0.050	0.080	0.112	0.137	0.573

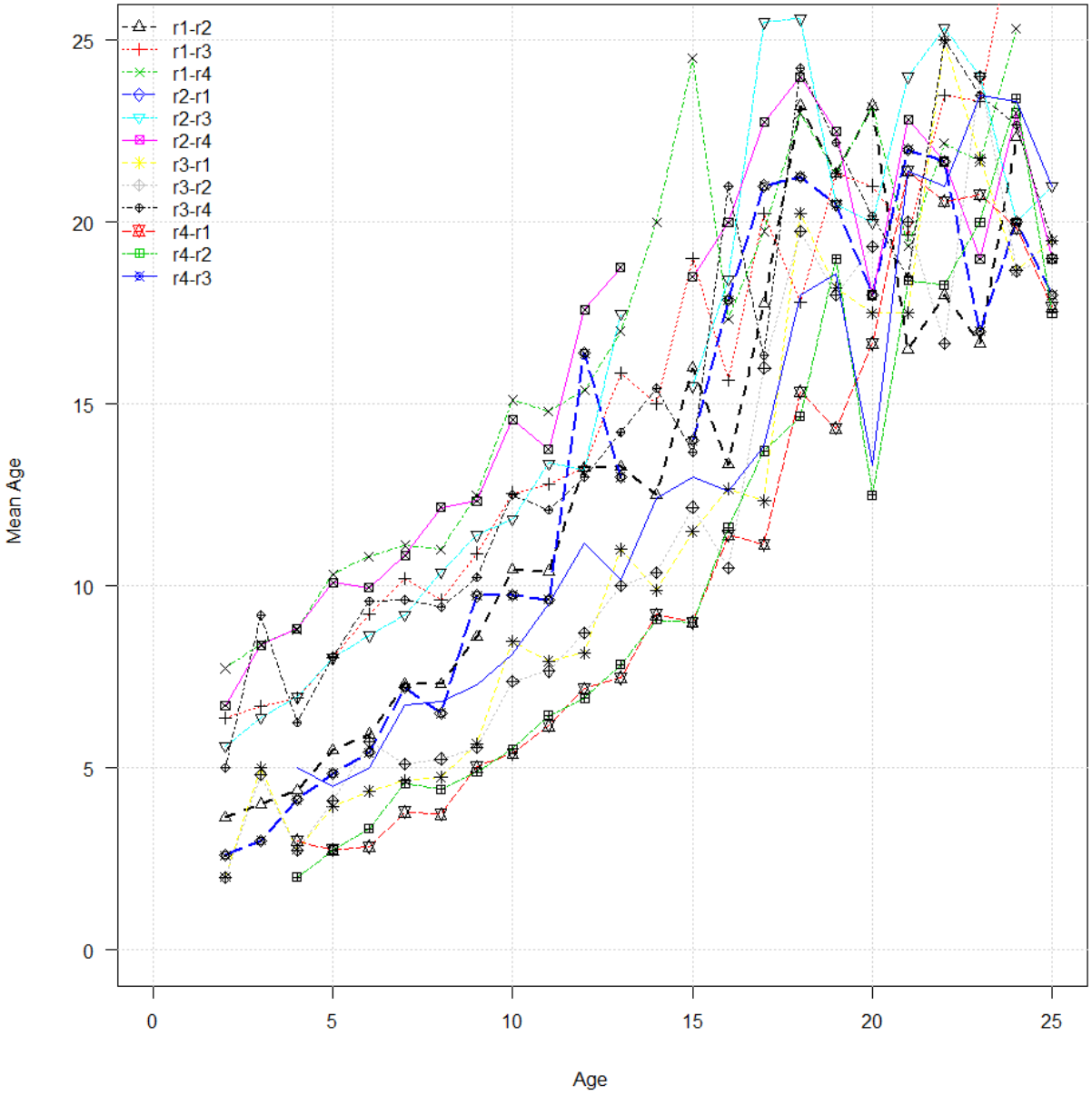

Figure 1. Mean age of blueline tilefish otoliths from paired reader comparison. Readers are as follows; two readers from National Marine Fisheries Service (Beaufort (R1 and R2) South Carolina Departement of Natural Resources (SCDNR-R3), and one reader from Old Dominion University (R4). Labels indicate paired readers, with the first representing the readers whose ages were the base for computing the mean age of the second reader.

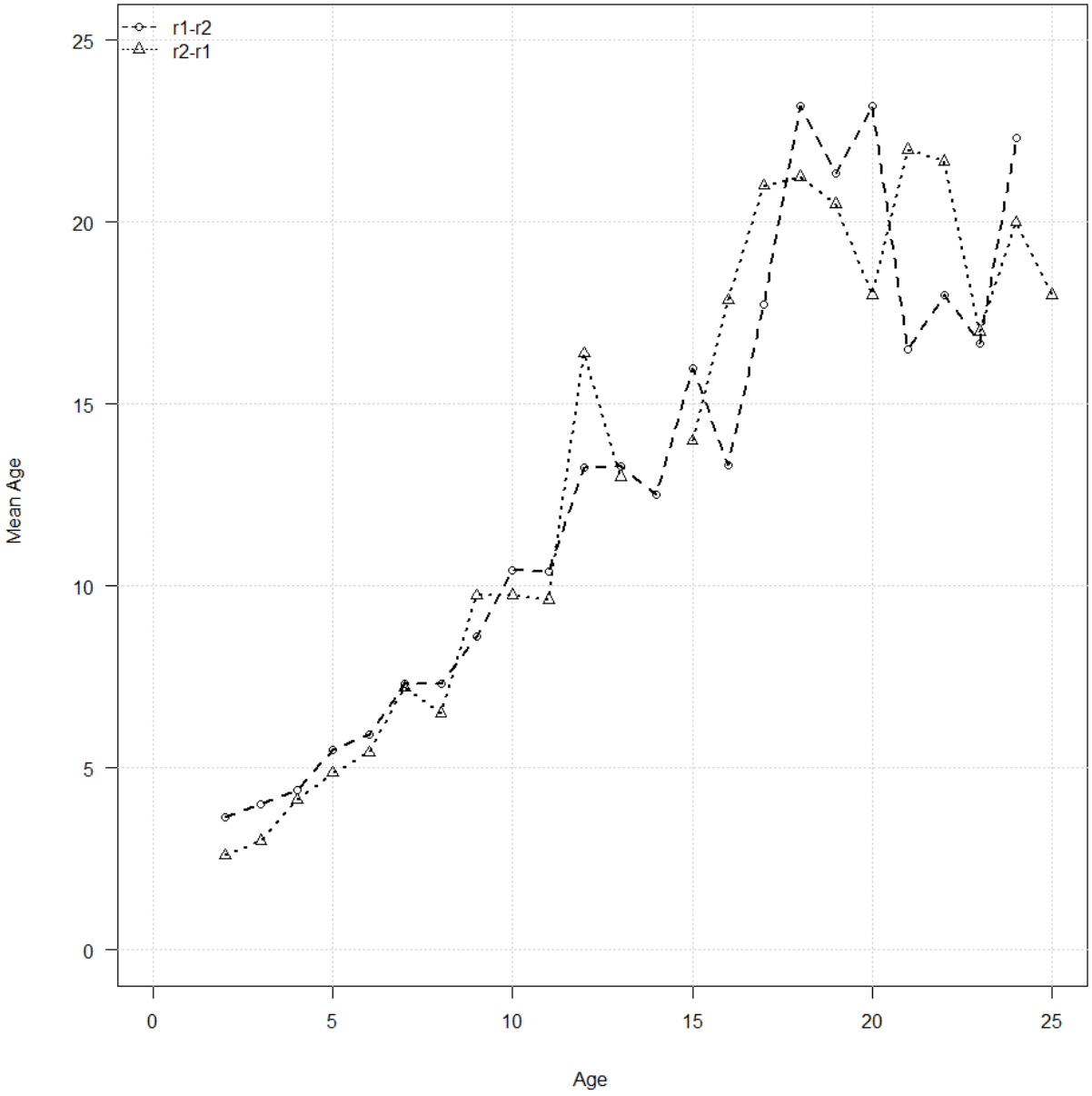

Figure 2. Mean age of blueline tilefish otoliths from paired reader comparison. Readers are as follows; two readers from National Marine Fisheries Service (Beaufort (R1 and R2). Labels indicate paired readers, with the first representing the readers whose ages were the base for computing the mean age of the second reader.

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

```
# Maximum number of readers
  2
# Number of data sets
  1
# Number of points per data set
  100
# Which readers per data set
  2
# Readers per data set:
   1  2
#  447   19   20
# minimum and maximum age
2   25
# Reference age
  5
# Minus groups
   2
# Plus groups
  15
# Option for bias
   0    0
# Option for standard deviation
   2   -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)

5                    2          2
5                    2          3
4                    2          4
3                    2          6
1                    2          8
2                    3          2
6                    3          3
7                    3          4
```

5	3	5
1	3	6
1	3	7
2	4	2
3	4	3
15	4	4
9	4	5
4	4	6
1	4	7
1	5	3
9	5	4
18	5	5
12	5	6
1	5	7
5	5	8
4	6	4
7	6	5
10	6	6
1	6	7
2	6	8
1	6	9
1	7	4
3	7	5
4	7	6
6	7	7
6	7	8
4	7	9
3	8	6
6	8	7
2	8	8
1	8	9
1	9	6
2	9	7
1	9	8
3	9	9
3	10	9
1	11	7
1	11	8
1	12	9
1	13	9
1	22	9
1	5	10
1	6	11
1	7	10
1	7	11
1	8	10
2	9	10
1	9	11
3	10	10
2	10	11
1	10	15
1	11	10
1	11	11
1	11	16

1	12	10
2	12	11
1	12	13
1	12	15
1	12	16
1	12	21
2	13	10
1	13	12
2	13	13
1	14	12
1	14	13
1	15	16
2	16	12
1	16	16
2	17	15
1	17	18
1	17	23
1	18	18
1	18	19
1	18	20
1	18	25
1	19	17
1	19	21
1	20	17
1	20	19
1	20	22
1	20	24
1	21	16
1	21	17
1	22	18
2	22	19
1	22	21
1	22	22
1	23	12
1	23	16
1	23	22
1	24	17
1	24	21