Summary of the Blueline Tilefish meristic conversions using data from the entire US Atlantic and Gulf of Mexico

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SEDAR50-DW21

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Errata

Corrections made to SEDAR50-DW21

During review of the various meristic conversion equations contained in the report, an error was found in the conversion of the linearized parameters of the Atlantic whole weight – fork length and whole weight – total length to the power equation.

Equation	Original	Corrected
FL → WW	$W = 5.51x10^{-8} L^{2.94}$	$W = 1.78x10^{-5} L^{2.94}$
TL → WW	$W = 2.04x10^{-8} L^{3.04}$	$W = 8.82x10^{-6} L^{3.04}$

A comparison of conversion equations to what were submitted to SEDAR32 revealed that some data available for the whole weight – gutted weight equation was missing. The missing data was from an NC DMF project. The updated conversion equations are as follows:

Equation	Original	Updated
GW → WW	WW = 1.05*GW	WW = 1.06*GW
WW → GW	GW = 0.95*WW	GW = 0.94*WW

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SEDAR Working Paper SEDAR50-DWxx

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Blueline Tilefish meristic conversions were developed based on a compilation of data sources. The data were available from the following sources:

- Southeast Region Headboat Survey (SRHS),
- NMFS Trip Interview Program (TIP),
- Marine Recreational Information Program (MRIP),
- Marine Resources Monitoring Assessment and Prediction Program (MARMAP),
- Southeast Fishery Independent Survey (SEFIS),
- NMFS 2015 blueline tilefish cooperative-with-industry data collection project (NMFS2015),
- Center for Quantitative Fisheries Ecology – Old Dominion University (CQFE),
- Virginia Marine Resources Commission (VMRC),
- North Carolina Division of Marine Fisheries – 2012 Exempted Fishing Permit project (NCDMF)
- NMFS/NEFSC fishery independent bottom trawl survey (NEFSC),
- Florida Fish and Wildlife Conservation Commission (FWC),
- NMFS Beaufort Laboratory Fishery Resource Grant (FRG),
- Gulf of Mexico Reef Fish Observer Program (GOM-O), and
- Gulf of Mexico fishery independent surveys, which include the bottom longline survey, pelagic acoustics survey and SEAMAP, (GOM_FI).

For analyses, each sample in the combined data sets was assigned a location; North-Atl (samples north of NC), South-Atl (samples from NC, SC, or GA), FL-Atl (samples from the Atlantic coast of FL), FL-Keys (samples from Monroe county in FL), GOM (samples from the Gulf coast of FL, MISS, AL, LA, and TX), and Unknown. The data were subsetted into these areas to determine if there were significant differences in the meristic relations by area.

The relations between length types were explored first. The natural total length (NTL) –fork length (FL) relationship was the only one in which data was available for each of the five locations (2370 samples for N-Atl, 782 for S-Atl, 163 for FL-Atl, 338 for FL-Keys, and 74 for for GOM). There was no evidence of differences in this length-length relationship by location (Figure 1). For purposes of SEDAR50 TOR #1, the data were then subset to include only samples from the North-Atl, South-Atl, FL-Atl, and FL-Keys (Table 1). Figure 2 graphically displays each paired length data points. Only data from the Atlantic were available for the whole weight-gutted weight relation and the conversion equation parameters are included in Table 1.

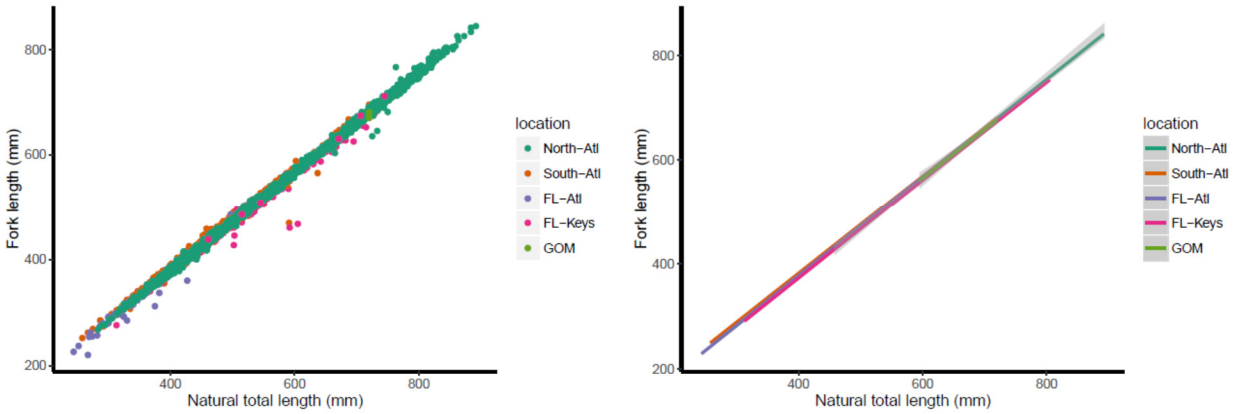

Figure 1. Exploring the possibility of different Blueline Tilefish length-length relationships by location. The figure on the left shows each sample while the figure on the right shows the regression line (gray shaded areas around each line indicate 95% CIs) for each location.

Table 1. Linear regressions for Blueline Tilefish length-length and whole weight-gutted weight for the Atlantic region extending from the Florida Keys north to Maine. MTL = maximum total length – caudal fin compressed (aka pinched total length); NTL = natural total length – caudal fin not compressed; FL = fork length; SL = standard length; GW = gutted weight; and WW = whole weight.

Conversion	N	Units	Intercept (95% CI)	Slope (95% CI)	Model R^2	Range of x
MTL → FL	970	mm	-2.44 (-4.50; -0.38)	0.95 (0.94; 0.95)	0.9962	333 - 854
FL → MTL	970	mm	4.66 (2.49; 6.82)	1.05 (1.05; 1.06)	0.9962	312 - 822
NTL → FL	3653	mm	3.15 (2.31; 3.98)	0.94 (0.94; 0.94)	0.9973	244 - 892
FL → NTL	3653	mm	-1.96 (-2.85; -1.06)	1.06 (1.06; 1.06)	0.9973	220 - 844
SL → FL	1185	mm	26.98 (23.25; 30.70)	1.10 (1.09; 1.10)	0.9831	262 - 716
FL → SL	1185	mm	-16.63 (-20.15; -13.11)	0.90 (0.89; 0.90)	0.9831	312 - 822
GW → WW	295	g	No intercept	1.06 (1.05; 1.06)	0.9991	270 - 5100
WW → GW	295	g	No intercept	0.94 (0.94; 0.95)	0.9991	280 - 5300

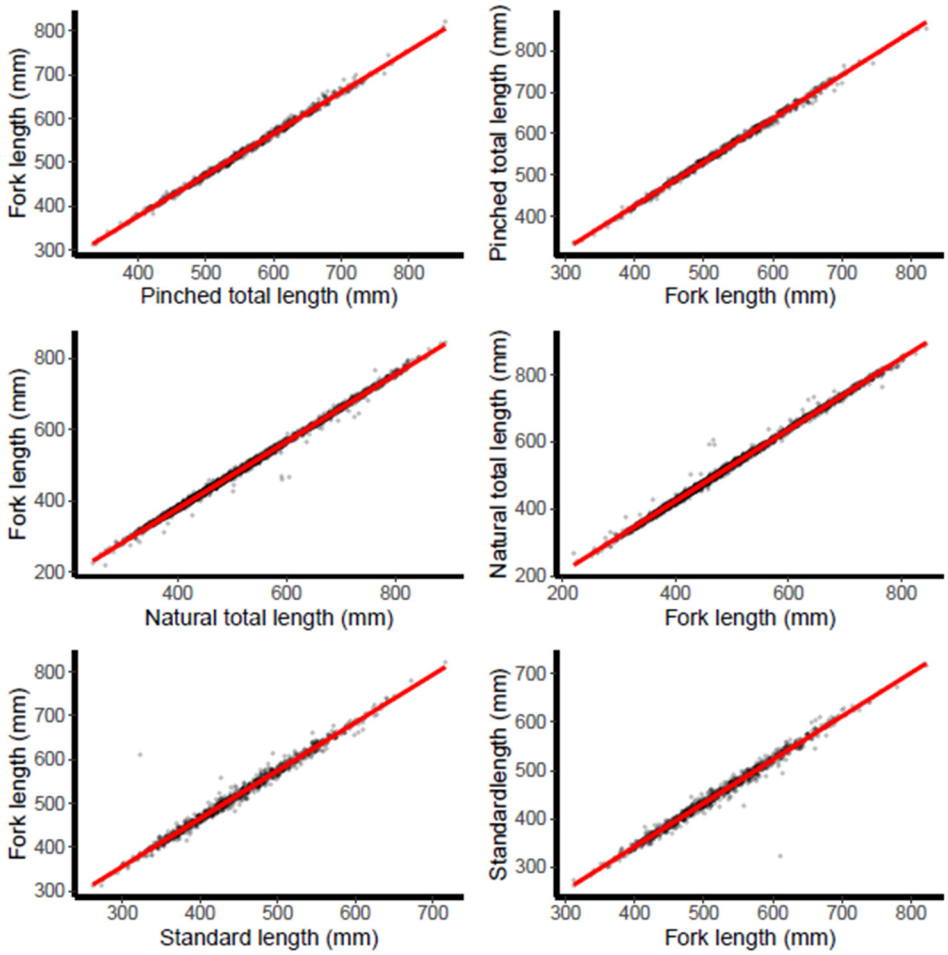

Figure 2. Atlantic Blueline Tilefish length-length relationsips for each paired length type. Pinched total length is the same as maximum total length.

Next, the whole weight (WW) – fork length relations were explored by area. The data were linearized with the ln-ln transformation and converted to the power equation including ½ MSE to account for transformation bias. Figure 3 illustrates the regression lines from the power equation for each area and Table 2 has the area-specific whole weight – fork length regression equations. Though there appears to be subtle differences in the equations along a latitudinal gradient, the 95% confidence intervals of all the equations overlap. Table 3 includes the sample sizes by data source and area. Some of the variability in the weight-length plot can be explained by the different methods for weighing the fish in the various data sources. For example, some fish are weighed at sea as done in NMFS2015 and GOM-O sampling events, which generally did not have motion compensating scales. These data points had a higher degree of variability in weights at length. Fishery-independent data sources which weigh fish at sea, have motion compensated scales and more controled, laboratory environment in which to work. Other fish are weighed on land as in MRIP and SRHS. For this reason, one WW-length equation for the Atlantic Blueline Tilefish is recommended (Table 4). Figure 4 graphically displays the paired whole weight – length data points.

Table 2. Blueline Tilefish converions from fork length (mm) to whole weight (g) by area using the model Ln(weight) = Ln(length). Equation converted to power equation including ½ MSE to account for transformation bias:

Location	N	Intercept (95% CI)	Slope (95% CI)	Model R^2	Range of lengths (mm)
North-Atl	673	-11.13 (-11.41; -10.84)	2.97 (2.92; 3.01)	0.9617	286 - 910
South-Atl	3307	-10.36 (-10.57; -10.14)	2.85 (2.82; 2.89)	0.8875	252 - 887
FL-Atl	293	-12.63 (-13.08; -12.17)	3.21 (3.14; 3.29)	0.9594	220 - 635
FL-Keys	654	-11.18 (-11.49; -10.88)	2.98 (2.93; 3.03)	0.9572	276 - 839
GOM	6387	-11.67 (-11.82; -11.52)	3.05 (3.03; 3.08)	0.9105	190 - 810

Location	MSE	Converted Power Equation ($W = aL^b$)	Predicted W(95% CI) L =300; L = 750
North-Atl	0.0172	$W = 1.48x10^{-5}L^{2.97}$	330(320-339); 4990(4904-5078)
South-Atl	0.0341	$W = 3.24x10^{-5}L^{2.85}$	380 (373-388); 5196(5121-5272)
FL-Atl	0.0169	$W = 3.32x10^{-6}L^{3.21}$	303(296-310); 5756(5454-6074)
FL-Keys	0.0133	$W = 1.40x10^{-5}L^{2.98}$	343(334-353); 5281(5180-5384)
GOM	0.0124	$W = 8.62x10^{-6}L^{3.05}$	316(311-320); 5179(5139-5219)

Table 3. Sample sizes of Blueline Tilefish whole weight – fork length data available for analysis by data source and area. (Note: weight – length data from FWC were not included in analysis because the data may have been duplicated in SRHS, MRIP or TIP.)

Survey	North-Atl	South-Atl	FL-Atl	FL-Keys	GOM
MRIP	24	1362	155	108	10
SRHS	0	496	132	301	16
NMFS2015	302	502	0	59	0
GOM-O	0	0	0	179	6361
MARMAP/ SEFIS	0	793	6	0	0
TIP	0	0	0	6	6
CQFE	347	0	0	0	0
FRG	0	154	0	0	0
GOM-FI	0	0	0	0	0
NEFSC	0	0	0	0	0
VMRC	0	0	0	0	0
Total	673	3307	293	654	6387

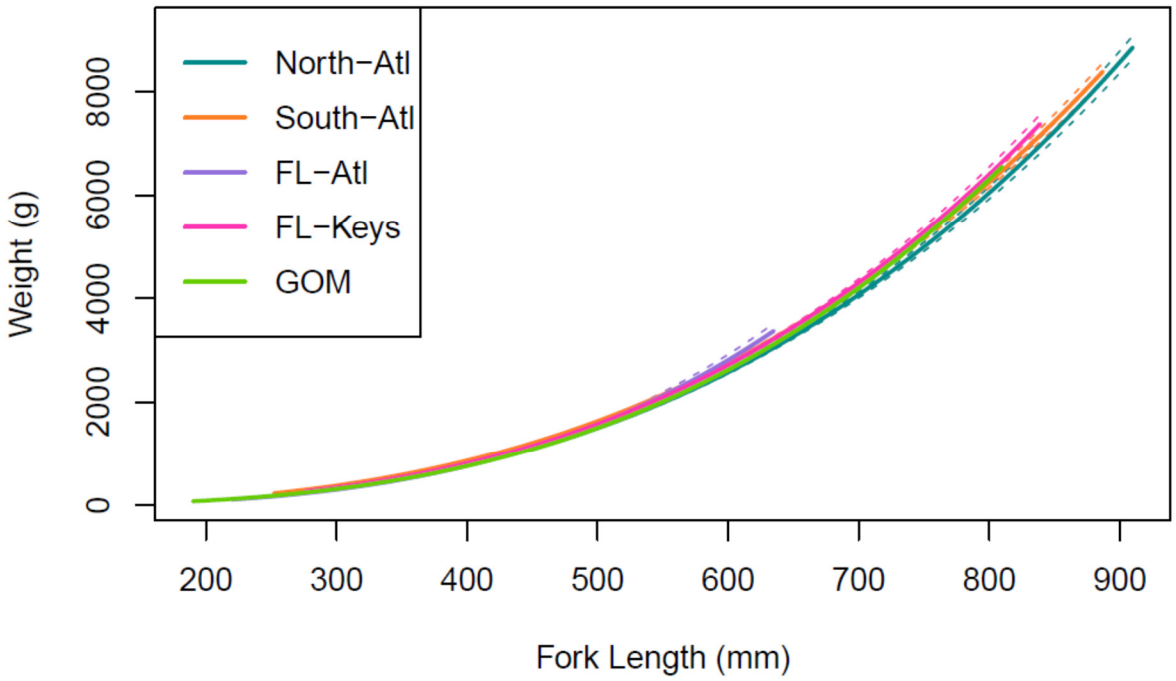

Figure 3. Exploring the possibility of different Blueline Tilefish fork length-whole weight relationships by location. The figure shows the regression line and 95% CI from each location.

Table 4. Atlantic Blueline Tilefish conversions from length (mm) to weight (g) using the model Ln(weight) = Ln(length) and conversely from weight (g) to length (mm) using the model Ln(length) = Ln(weight). FL = fork length. NTL = natural total length. WW = whole weight. Whole weight – length converted to a power equation, which included ½ MSE to account for transformation bias.

Conversion	N	Intercept (95% CI)	Slope (95% CI)	Model R^2	Range of x
FL → WW	4927	-10.95 (-11.10; -10.80)	2.94 (2.92; 2.97)	0.9244	220 – 910 (mm)
WW → FL	4927	3.91 (3.89; 3.93)	0.31 (0.31; 0.32)	0.9244	76 – 9254 (g)
NTL → WW	2286	-11.65 (-11.82; -11.48)	3.04 (3.01; 3.07)	0.9552	206 – 884 (mm)
WW → NTL	2286	3.94 (3.92; 3.96)	0.31 (0.31; 0.32)	0.9552	100 – 9253 (g)

Conversion	MSE	Converted Power Equation ($W = aL^b$)
FL → WW	0.0295	$W = 1.78 \times 10^{-5} L^{2.94}$
WW → FL	0.0031	$W = 49.83 L^{0.31}$
NTL → WW	0.0227	$W = 8.82 \times 10^{-6} L^{3.04}$
WW → NTL	0.0023	$W = 51.56 L^{0.31}$

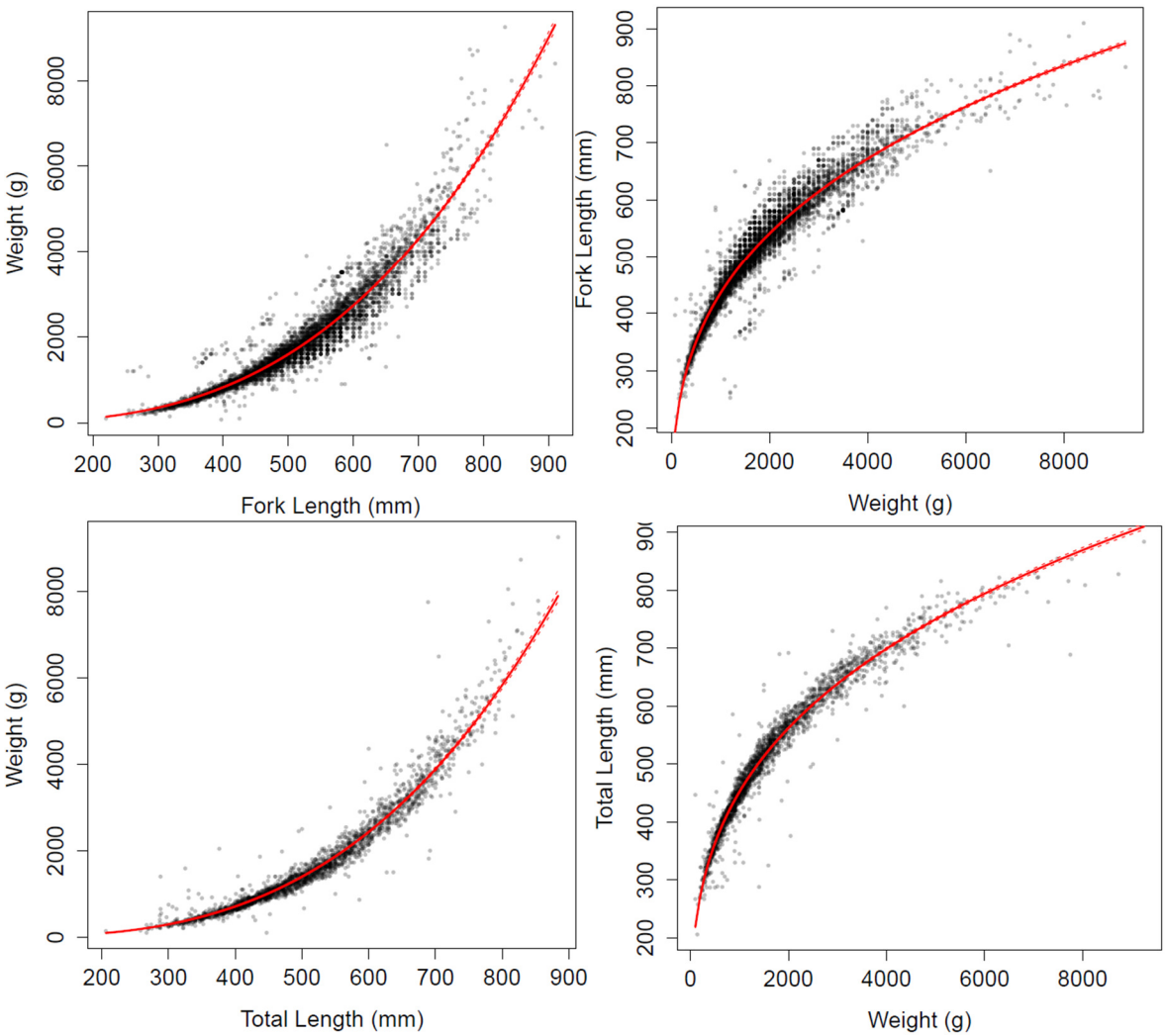

Figure 4. Atlantic Blueline Tilefish whole weight - length data plots. Total length refers to natural total length.