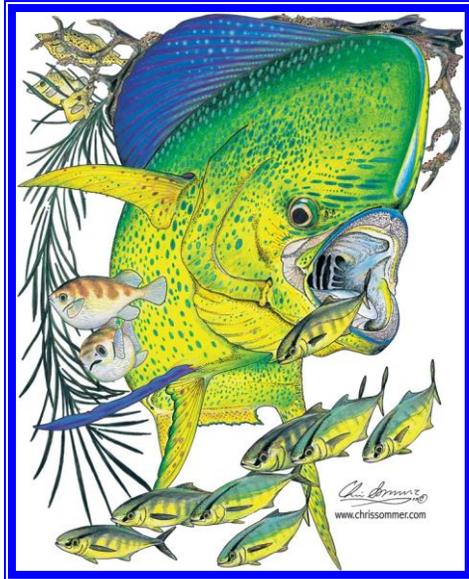


Cooperative Science Services, LLC Dolphinfish Research Program

June 2013



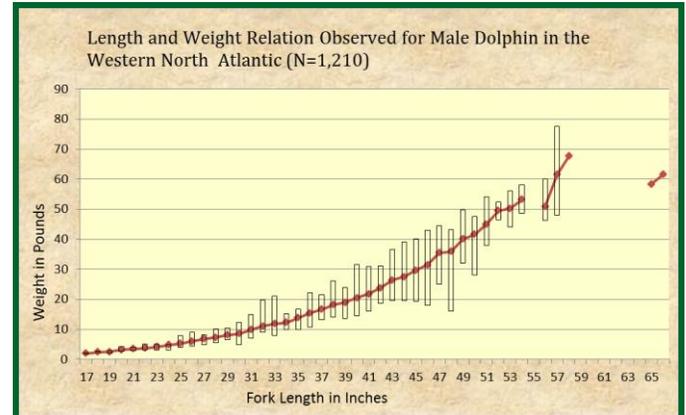
Weight at Length Relation in Dolphin

The last issue of this newsletter highlighted the need for length-weight-sex data on dolphinfish from the entire western North Atlantic. Tag recoveries from this study have linked the dolphin found in the Bahamas and throughout the Caribbean to the fish found off the U.S. East Coast. To get a comprehensive understanding of the dolphin stock, information needs to be assembled from throughout its range, one of the goals of the DRP.

A big step toward this goal was taken in 2012, when the Marine Resources Division of the Puerto Rico Department of Natural and Environmental Resources provided DRP a copy of their data on dolphinfish's length, weight and sex for the years of 2011 and 2012. This file contained usable information on more than 1,800 dolphin caught by recreational anglers on this Caribbean island.

Volunteers and DRP staff collected data on 630 dolphin caught recreationally along the U.S. East Coast in 2012. This served to supplement the records of 927 fish collected in previous years, bringing the U.S. East Coast data base to a total of 1,557 fish. Combining the East Coast records with those from Puerto Rico, we have a respectable data set containing records on 1,210 male dolphin and 2,145 female dolphin.

The length-weight relationship was examined in one-inch fork length increments for each sex. One of the first things you notice when looking at the weights of the individuals in any size grouping is the wide variation. A good example is male dolphin 45 inches in length. While on average they weighed 29.7 pounds, individuals in that size class ranged from 19.4 to 40.1 pounds. Three primary factors contribute to the weight diversity: the amount of food in the stomach, the fish's stage of reproduction, and how well the fish had been eating for the month or two prior to capture.



Dolphin of both sexes varied widely in weight at all lengths as depicted by the vertical bars in the graph above.

The wide variations in weight require large samples, at least 100 fish per length unit per sex, to provide an accurate representation for the average weight at each length. Large sample size also helps to smooth over any incidental human error in measuring that might occur. Thus the larger the sample size the smoother the weight to length graph should appear.

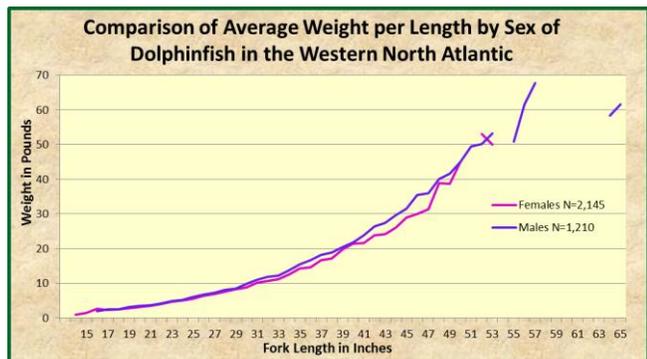
The following graph compares the two sexes when data for all locations and years are combined. The lines for each sex suggest a relatively steady and parallel growth for the two sexes. Disparities are shown at the high and low ends of the graph because of the small number of specimens representing one or both of the sexes. Small sample sizes existed for females less than 18 inches and over 48 inches in length and for males less than 19 inches and over 53 inches in length.

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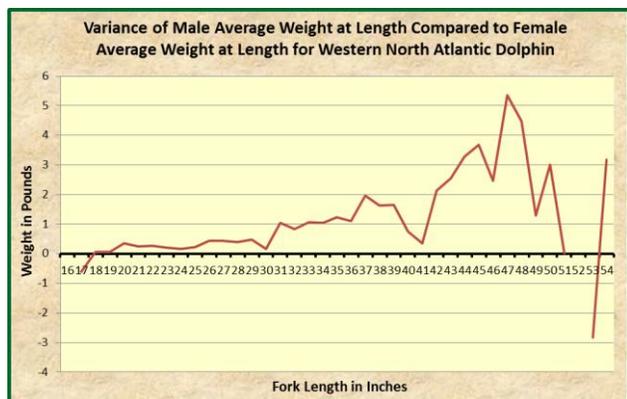
GRADY-WHITE BOATS





Discounting the wide overlap in weight at length for individuals of both sexes, males over 30 inches are shown to be heavier on average than females of the same length.

Taking a close look at the average weight at length for the sexes, males are shown to out-weigh females of the same length from an early age. The following graph depicts the variation in the average weight of male dolphins to females of the same length. The zero line represents the average weight of females at that length. The red line represents the difference in the observed average weight of males of the same size. Differences above the zero line indicates the males weighed more, while points below the zero line suggest the males weighed less than the females.



Based on average weight per length, males weighed more than females of the same length from 18 to 50 inches. Sample sizes below and above this range consisted of only one or two individuals per unit for one or both sexes.

Males between 18 and 30 inches in length outweighed females by 0.05 to 0.48 pounds. Males more than 30 inches showed an overall trend of increasing the weight spread over females as their length increased, weighing from one to five pounds heavier per given length. Many age and growth studies of dolphin have reported that the sexes have similar length-weight relations. This difference in opinion is likely the result of a limited sampling time period and limited geographical area sampled in these studies and is further clouded by the wide variations in weight among individuals of both sexes at any length.

Dolphinfish Length and Weight Relations

The following table summarizes the average weight observed for dolphin of each sex based on data recorded from the U.S. Atlantic coast and Puerto Rico. These are averages and individual weights will vary.

Average Weight by Length for Male and Female Dolphinfish
 Shown in Inches and Pounds. Males = 1,210, Females = 2,145

Fork Length	Weight in Pounds	
	Females	Males
15	0.99	
16	1.44	
17	2.61	2.00
18	2.36	2.42
19	2.44	2.49
20	2.81	3.16
21	3.20	3.44
22	3.47	3.74
23	3.96	4.16
24	4.65	4.82
25	5.05	5.27
26	5.61	6.04
27	6.34	6.78
28	6.87	7.27
29	7.62	8.10
30	8.35	8.51
31	8.76	9.81
32	10.20	11.04
33	10.75	11.81
34	11.24	12.27
35	12.53	13.75
36	14.29	15.39
37	14.62	16.58
38	16.59	18.21
39	17.25	18.89
40	19.76	20.50

Fork Length	Weight in Pounds	
	Females	Males
41	21.40	21.75
42	21.62	23.76
43	23.86	26.40
44	24.23	27.50
45	26.00	29.68
46	28.97	31.44
47	30.06	35.42
48	31.42	35.90
49	38.80	40.09
50	38.61	41.62
51	45.00	45.02
52		49.49
53	53.05	50.21
54	50.00	53.17
55		
56		50.90
57		61.53
58		67.70
59		
60		
61		
62		
63		
64		
65		58.40
66		61.50

The Dolphinfish Research Program needs your financial support. No federal funds support this important research. This program exists because of private donations.

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Dolphin Sex Ratio

Fishermen have frequently asked what the normal sex ratio is for dolphinfish. This usually follows a large number of dolphin being laid out on a dock where it becomes apparent that most are females. The short answer is no one really knows.

Last year in my own dock sampling, I encountered what I thought was an unusually high incidence of male dolphin. This thought was also reported by Jim Lyons who sees hundreds of dolphin each year in his fish-cleaning service at Hatteras Harbor Marina in North Carolina. But without years of recorded data that quantifies the number of males and females, making up complete catches at any location or during any time period, any suspected change in sex ratio is simply speculation.

There are many contributors to bias the sex ratio. Even the behavior of the species can contribute to bias (males are more aggressive feeders). Anglers can bias the results by the size of baits being used; large baits can eliminate smaller females from being caught. Most of my own sampling has been done in connection with tournaments where anglers focus on the largest fish, which in the case of dolphin, commonly involves males. This automatically biases LWS to reflect a higher portion of males in the data, rather than what is in the total dolphin catch. Complicating the issue is the difficulty in distinguishing males less than 30 inches in fork length, before the distinctive blunt head shape has fully developed.

To address this, I spent four days in early May this year at a South Carolina marina, sampling total catches of individual private and charter boats. A total 151 dolphin were processed ranging in size from 22.75 to 47.5 inches in fork length. This unbiased look at the catch found it contained 89 females and 62 males, or 41 percent males. In the sample, females ranged in size from 22.75 to 42 inches, while males ranged from 22.75 to 47.5 inches in fork length.

This is a small sample, but I plan to continue using this form of sampling during the year in order to begin looking at this question.



At 19.5 inches FL, this male dolphin is beginning to exhibit the blunt forehead that distinguishes males from females.

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