

Estimating Weights of Big Bass

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A light rain falls from the sky as the angler winds his swimbait back to the boat. So far, the morning total is two fish -- a solid 9-pounder and a fish estimated between 11 and 12 pounds. As the angler continues his retrieve, the swimbait comes into view five feet below the surface, followed by a large black silhouette. Anticipation mounts and the angler watches as the big mouth opens and fully engulfs the swimbait.

The fight ensues and the angler eventually boats the enormous bass. The angler has caught many fish in the 8- to 12-pound class but this fish is far greater in size than anything caught prior. Without a scale in the boat, the angler heads to the marina to get an official weight on the trophy bass. As luck would have it though, the marina is closed and there is no way to verify the weight of the fish without a thirty minute drive into town.

Not wanting to risk the welfare of the enormous bass, the angler takes measurements of the trophy and reluctantly releases it back into the water to continue its life without the knowledge of its actual weight.

The Need for an Accurate Formula

A scenario, like the one presented above, invokes the need for a formula in which anglers can take measurements of a trophy bass and still have confidence that the weight estimated is somewhat accurate. Also, as anglers get closer to the world record bass, the need becomes even more evident that an accurate formula must be developed in order to debunk or verify possible world record catches.

With these concerns, and by request from In-Fisherman magazine, I set out to develop a formula that would be accurate for record-class bass. Over the course of a year, I collected data from various sources like the San Diego Parks Department, Mike Long, and the Texas Parks and Wildlife Department. With these data, I was able to determine the inaccuracy of current formulas in use and also come up with a better formula for bass of giant proportions.

Current Models and Their Faults

Although weight estimation formulas have been around for a long time, they have unfortunately been misused by anglers. For example, it is rumored that the standard formula of $Weight = L \times G^2 / 800$ was developed for marlin. Other models exist but it is not certain what fish these formulas were developed for. In any event, it doesn't take much thought to realize that a marlin does not have the same body shape as a bass and even more so, a trophy bass. Herein lays the problem with these formulas.

Recently, the IGFA adopted a formula, developed by Don Peters, specifically for largemouth bass. Although it works well with most bass, it falls short with monster bass. The reason for this shortfall is due to the fact the formula was developed with data from a broad size range of bass. Not a specific size range.

New Big Bass Formula

The toughest part of formula development lies in obtaining accurate data. Inaccurate data produces an inaccurate formula. So, with the help of the entities mentioned above, I was able to collect length, girth and weight data of 67 certified bass greater than 14.25 pounds.

A non-linear regression analysis was then conducted on the data based on three parameters. The result of this analysis provides a formula that exceeds the accuracy of the current formulas in use when it comes to estimating the weight of a trophy class largemouth bass. Results from the analysis, along with the results of three other common models, are presented in Table 1.

Formula Name	Formula	Maximum Mass % Difference	Average Mass % Difference	Mass % Difference Standard Deviation
Big Bass Formula	$W = \frac{L^{0.68}G^{0.79}}{7.0}$	-17.29 to +10.98	- 0.01	+/- 6.71
IGFA 927-Formula	$W = \frac{LG^2}{927}$	-23.78 to +21.77	+1.20	+/- 10.23
800-Formula	$W = \frac{LG^2}{800}$	-6.82 to +29.23	+14.73	+/- 8.83
1200-Formula	$W = \frac{LG^2}{1200}$	-60.27 to -2.04	- 27.9	+/- 13.24

Table 1. Results from weight estimation model analysis.

Results and Discussion

For a formula to be statistically sound, there should be little or no bias in the results it produces. For example, if a formula consistently overestimates the weight of a fish, it is said to have a positive bias. In order to determine whether a bias was present in the old and new formulas, an analysis comparing actual weight and estimated weight was conducted. If the formulas were sound, the estimated weights would be evenly spread above and below the actual weights.

The bias analysis method used for this study was by means of the Average Mass Percent Difference. This value is the average weight difference between the estimated weight and the actual weight of the bass used in this study. Statistically, this value should be close to

zero signifying even distribution of the results above and below the actual weight. For example, an estimate for one fish could give a result 5-percent lower than the actual weight, while an estimate for another fish could be 5-percent high. The average mass percent difference of these two estimates would be zero.

Both the Big Bass Formula and IGFA-927-formula meet this requirement although the "Big Bass" formula produced tighter, more accurate results as shown by the standard deviation. The 800-formula, on the other hand, averages almost a 15-percent overestimate of the actual weight while the 1200-formula underestimates weight by almost 28-percent.

Conclusions

Although no weight estimation formula will produce results with 100-percent accuracy, if used with care, they can provide a good idea of the relative weight of any fish. The analysis presented above now gives anglers a better tool in which to more accurately determine what a monster bass weighs in the event there is no scale and they want to release their fish.

Noteable

> This formula was developed using bass larger than 14.25 pounds and therefore, may not be accurate for fish lower than this weight. For bass smaller than this weight, it is best advised to use the newly adopted IGFA formula by Don Peters.

> Further reading on weight estimation formulas can be found in In-Fisherman's 2005 Bass Guide and the IGFA's World Record Game Fishes publication printed in 2002.