# IOWA GREAT LAKES MUSKELLUNGE WEIGHT CALCULATOR

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## Project Description

Iowa's muskellunge program began in 1960 when 40 fingerling muskellunge were stocked in Clear Lake and a similar number in West Okoboji Lake. In 1975, Spirit Lake was stocked with muskellunge. Today, the program has expanded to include 8 additional reservoirs. Although many muskellunge have sampled over the years, little data on muskellunge length-weight relationships have been recorded. Several muskellunge weight estimation models have been developed using muskellunge data across the Midwest; however, no model has been developed for Iowa. Therefore, in 2012, all muskellunge brought to the hatchery during the spring broodstock gillnetting operation were measured and weighed. In addition, maximum girth and pectoral girth was recorded. A multiple regression model was developed using weight as the dependent variable, and total length, maximum girth and pectoral girth as the independent variables. The Iowa Great Lakes (IGL) multiple regression model was compared to five other models used to estimate muskellunge weight (Table 1; Figure 1). The best models for the IGL were the IGL multiple regression model, the Casselman/Crossman model, and the Crawford model. Other models tended to over/under estimate muskellunge weight. A muskellunge weight calculator was developed for easy estimation of weight using a length only model, a length and maximum girth model, and a length, maximum girth, and pectoral girth model. An average of three best models (IGL multiple regression model, Casselman/Crossman model, and Crawford model) was also provided.

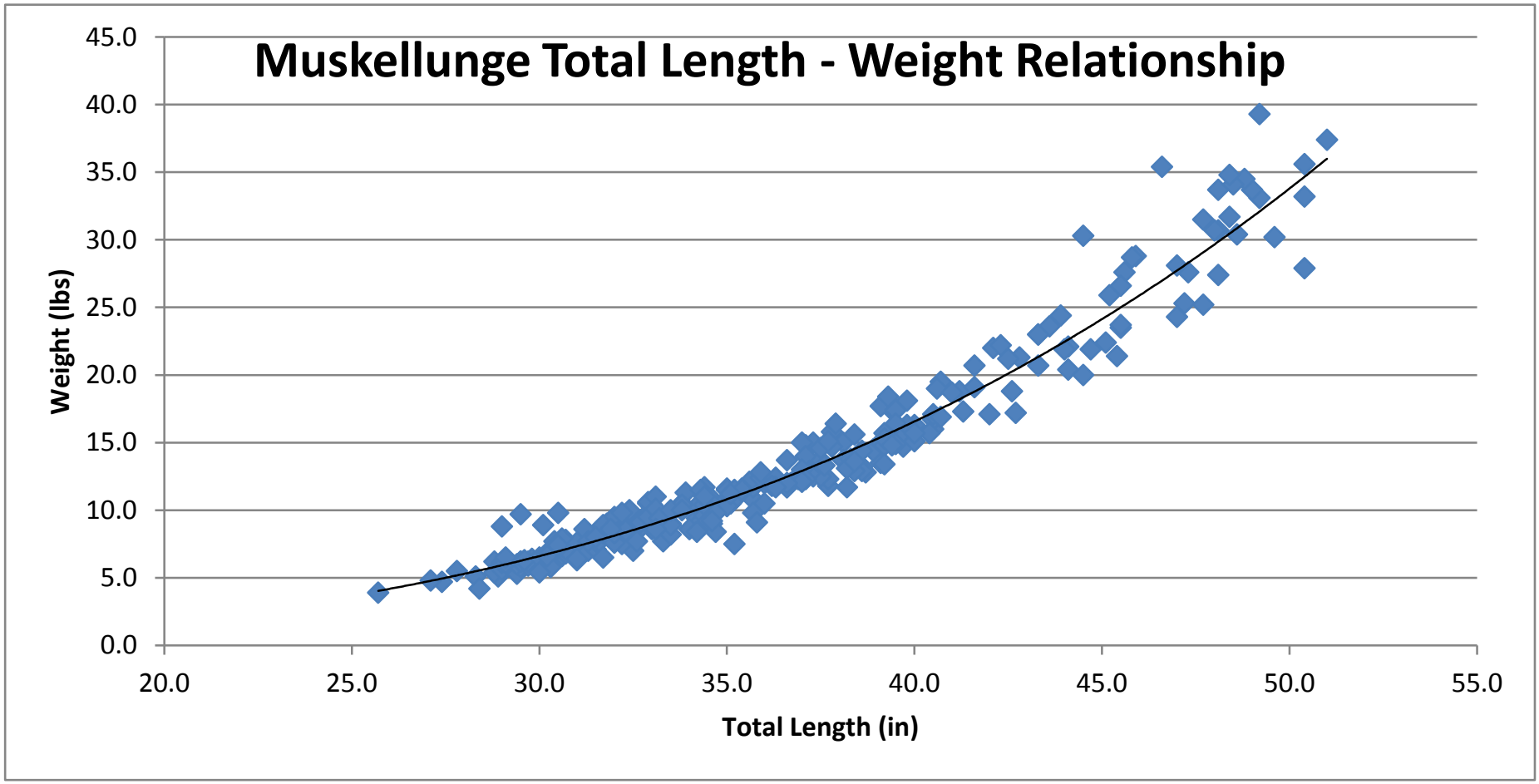
Table 1. Muskellunge length-maximum girth equations used to estimate muskellunge weight across the Midwest.

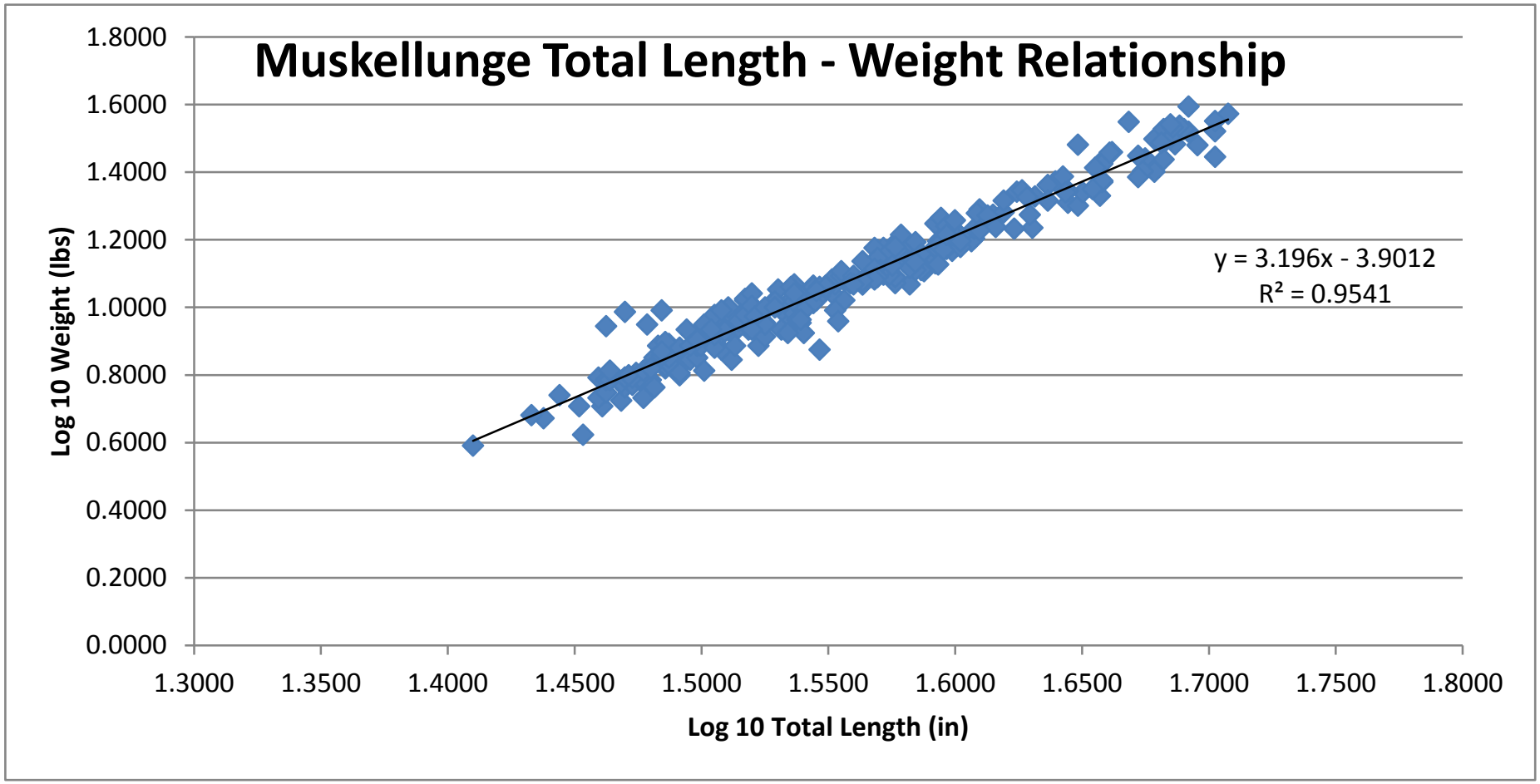
| Model | Equation |
|---|---|
| Standard | G * G * (TL / 800) |
| Wilkinson/Ramsell | (G - 0.75) * (G - 0.75) * (TL / 800) |
| Casselman/Crossman | (0.0000418 * ((TL * G)^1.441)) / 0.453592 |
| Crawford | ((TL * G)/25)-10 |
| Hannon | (TL^3)/2800 |

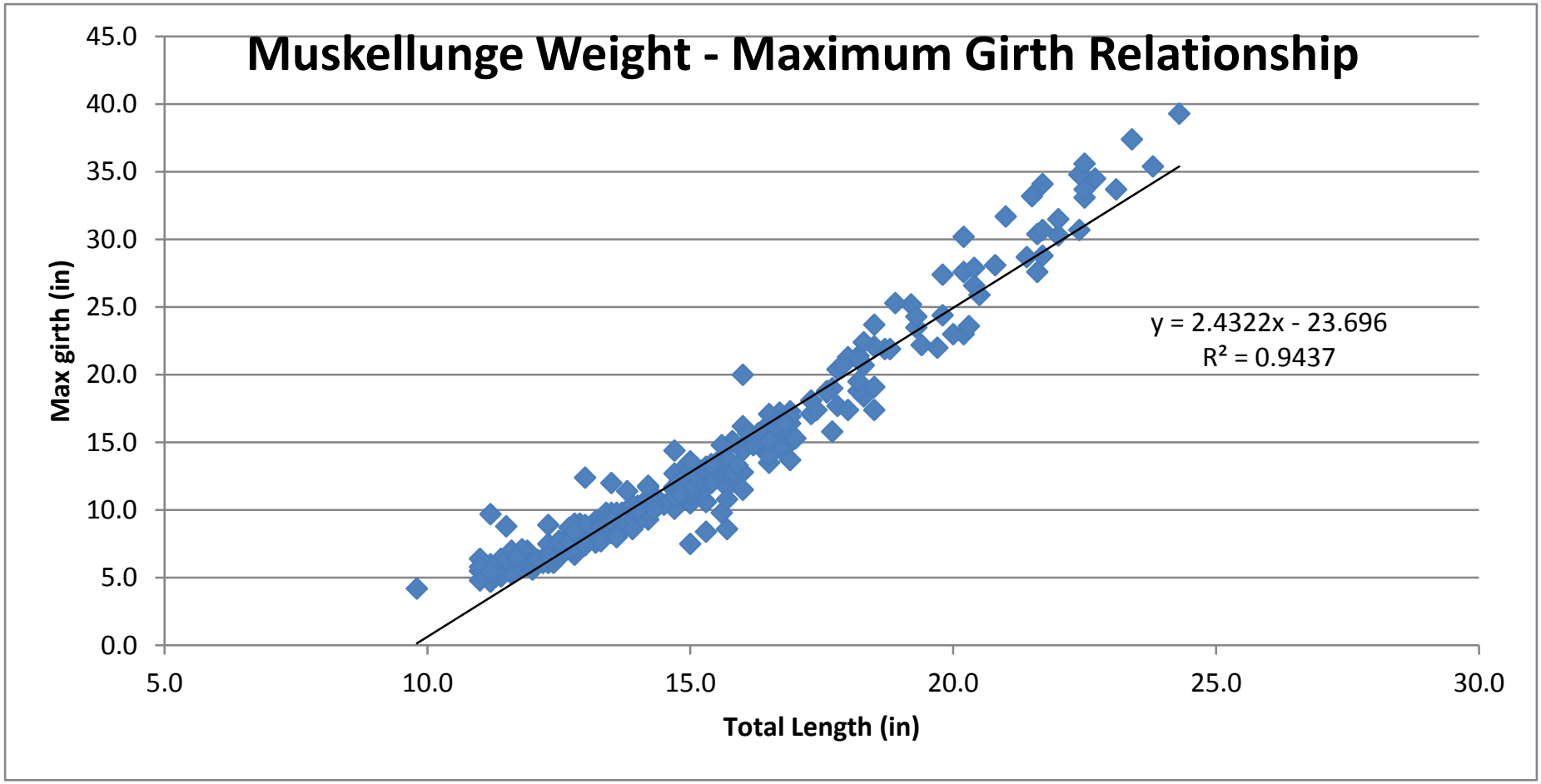
* TL = Total Length; G = maximum girth

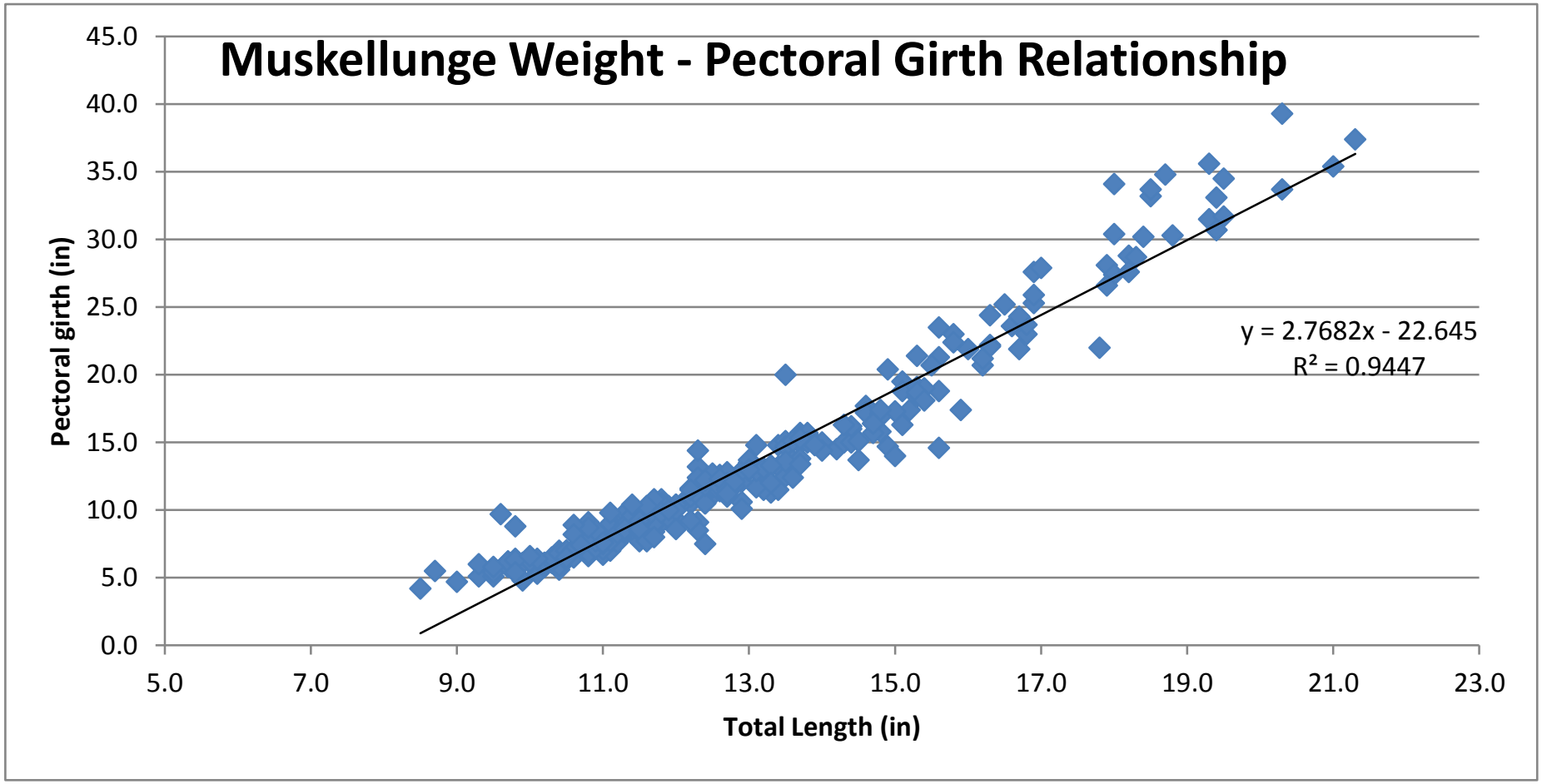
# Iowa Great Lakes Muskellunge - 2012

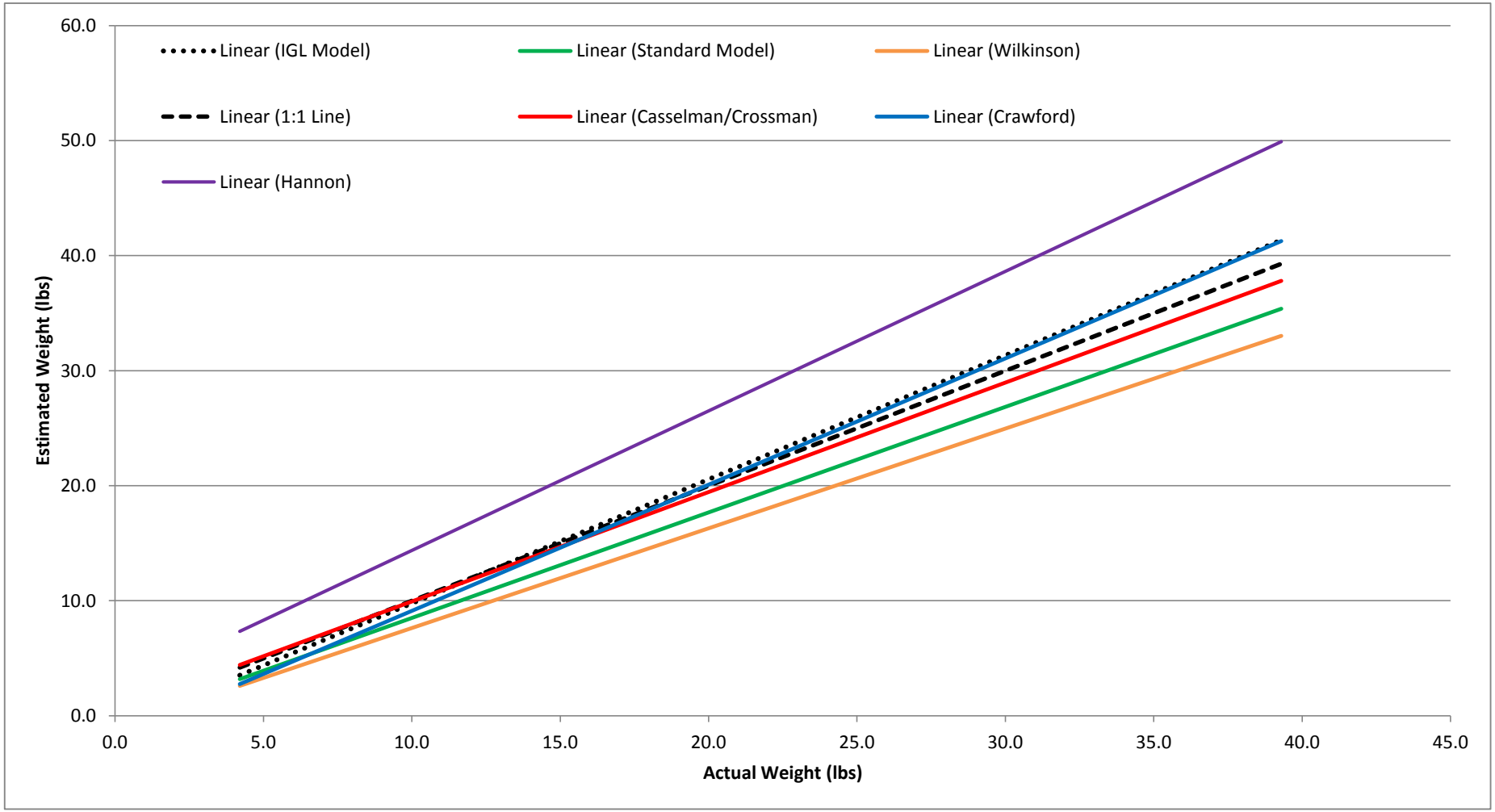
| Row Labels | Values N | Mean TL | SD TL | Mean Max Girth | SD Max Girth | Mean Pectoral Girth | SD Pectoal Girth |
|---|---|---|---|---|---|---|---|
| F | 129 | 39.4 | 6.1 | 17.0 | 3.2 | 14.5 | 2.9 |
| M | 164 | 34.2 | 3.9 | 14.0 | 1.8 | 11.9 | 1.7 |
| **Grand Total** | **293** | **36.5** | **5.6** | **15.3** | **2.9** | **13.1** | **2.6** |


Muskellunge Total Length - Weight Relationship
Weight (lbs)
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
Total Length (in)


Muskellunge Total Length - Weight Relationship
Log 10 Weight (lbs)
1.8000
1.6000
1.4000
1.2000
1.0000
0.8000
0.6000
0.4000
0.2000
0.0000
1.3000
1.3500
1.4000
1.4500
1.5000
1.5500
1.6000
1.6500
1.7000
1.7500
1.8000
Log 10 Total Length (in)
y = 3.196x - 3.9012
R² = 0.9541


Muskellunge Weight - Maximum Girth Relationship
Max girth (in)
Total Length (in)
y = 2.4322x - 23.696
R² = 0.9437
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0

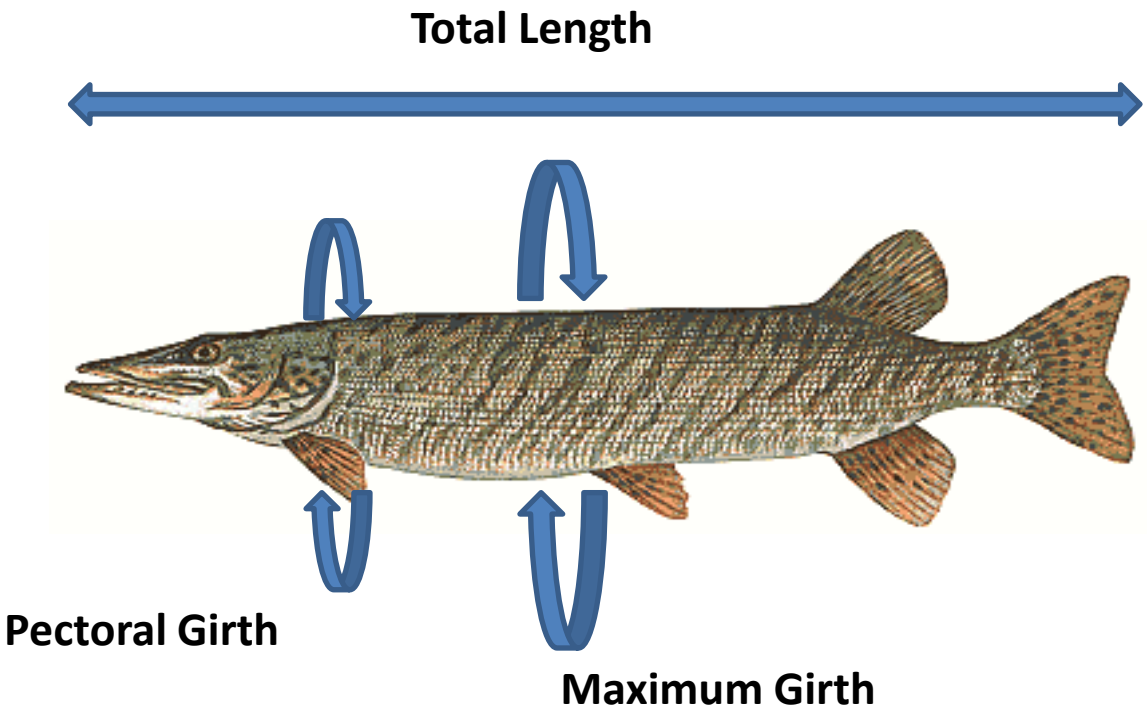

Muskellunge Weight - Pectoral Girth Relationship
Pectoral girth (in)
Total Length (in)
y = 2.7682x - 22.645
R² = 0.9447
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
5.0
7.0
9.0
11.0
13.0
15.0
17.0
19.0
21.0
23.0


Linear (IGL Model)
Linear (Standard Model)
Linear (Wilkinson)
Linear (1:1 Line)
Linear (Casselman/Crossman)
Linear (Crawford)
Linear (Hannon)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Estimated Weight (lbs)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
Actual Weight (lbs)

# Iowa Great Lakes Muskellunge Weight Calculator

| | | |
|---|---|---|
| Total Length | = | 39.4 |
| Maximum Girth | = | 16.2 |
| Pectoral Girth | = | 13.5 |

| | | Estimated Weight |
|---|---|---|
| Length Only Model | = | 15.5 |
| Length and Maximum Girth Model | = | 15.0 |
| Length, Maximum and Pectoral Girth Model | = | 14.7 |




**Next Best Fit Models**

| | | Estimated Weight |
|---|---|---|
| Casselman/Crossman Model | = | 14.9 |
| Crawford Model | = | 15.5 |
| Average of 3 Models | = | 15.0 |