

Fish Condition

- I. What is condition of fish? Some index that correlates well with the “health” of the fish. In most cases, we are talking about the relative “plumpness” of a fish. Plump should mean that the fish has high fat reserves and is growing well.
- II. Recall the length - weight relationships
 - A. For given fish that is not growing, length varies little
 - B. However, weight at any given length can vary substantially
- III. Before we talk about condition, realize that there are several ways to quantify length
 - A. Fork length
 - B. Standard length
 - C. Total length
- IV. Fulton’s condition index (K)
 - A. How calculated
 1. Assumes that an isometric length-weight relationship is the norm; hence $b=3$ in the length-weight regression
 2. Metric quantification
 - a. $K = (W/L^3) \times 100,000$; W is in g; L is in mm
 - b. K varies from species to species and within species; a $K = 1$ indicates that the fish is in the isometric “normal” condition
 3. English quantification
 - a. $C = (W/L^3) \times 10,000$; W is in pounds; L is in inches
 - b. The scaling factor differs between the two methods
 4. Problems with Fulton’s K or C
 - a. K and C are not equivalent
 - b. Index values change depending on the length unit
 - c. Index values are not comparable among species
 - d. Index values increase with length for some species; probably because of the assumption that $b = 3$
- V. Relative weight (W_r)
 - A. $W_r = (W/W_s) \times 100$; where W_s is a standard weight
 - B. Standard weight - needs to be determined for a species
 1. The 75th percentile weight for fish of any given length
 - a. Collect length-weight data from multiple populations
 - b. Categorize data and determine 75th percentile values of weight
 - c. Create a length-weight regression from these data
 2. Regression-line percentile technique
 - C. Benefits of this technique
 1. W_r is independent of length
 2. Intuitive
 3. Comparable across species; a W_r for one species is similar to that for another
 4. W_r is correlated with physiological quantities such as % fat
- VI. Residuals from average length-dependent weights
- VII. Other indices

- A. RNA/DNA ratio
 - 1. DNA is relatively constant in fish (only one copy/cell)
 - 2. RNA production is proportional to protein synthesis = protein growth
 - 3. High RNA/DNA ratio indicates active protein synthesis and growth
- B. Liver somatic index (LSI)
 - 1. $LSI = \text{mass liver} / \text{body mass}$
 - 2. LSI - increases with toxins, parasites, stress
 - 3. LSI may not be good indicator of condition
- C. Gonadosomatic index (GSI)
 - 1. $GSI = \text{mass gonad} / \text{body mass}$
 - 2. Varies seasonally; increases prior to spawning
 - 3. High GSI indicates good reproductive potential and good condition