

Elements of Clarity and Content In Fishery Science Publications

Michael J. Hansen

*University of Wisconsin – Stevens Point
College of Natural Resources*

- I. Preamble
 - A. Authors are responsible for preparing their manuscripts to most clearly convey the purpose, conduct, findings, and meaning of their study.
 - B. Ease of understanding may be clouded when authors fail to write clearly or to organize their manuscript effectively.
- II. Clarity
 - A. Word problems.
 - i. Accuracy – Use definitive nouns and verbs, rather than ambiguous pronouns and neutral or ambiguous verbs.
 - ii. Precision – Avoid using nonessential words, such as adjectives and adverbs that add little to the point of the sentence.
 - B. Sentence problems.
 - i. Order – Place the subject of the sentence at the beginning, not the end of the sentence (i.e. never hide the subject at the end of the sentence).
 - ii. Parallelism – Order comparative clauses and sentences in parallel.
 - C. Paragraph problems.
 - i. Topic Sentence – Begin each paragraph with a sentence that declares the overall topic of the paragraph.
 - ii. Mixed Topics – Never describe mixed topics in the body of a paragraph.
 - D. Section problems.
 - i. Paragraph Order – Order the paragraphs within sections in a logical chronology (i.e. often in sequential (time) order).
 - E. Manuscript problems.
 - i. Parallelism – Order the elements in parallel among sections.
 - ii. Objectives – Address the study objectives explicitly in each section.
- III. Content.
 - A. Title.
 - i. The title should accurately reflect the focus and content of the paper.
 - ii. The title of each manuscript should generally be less than 12 words. Each word should be essential to clearly convey the thrust of the study.
 - iii. For case studies, include the name and location of the water body and the period of study.
 - B. Abstract.
 - i. The first sentence should declare why the study was conducted. Authors often provide far too much detail about the background of their study, which is not appropriate for the abstract.
 - ii. The second sentence should declare how the study was conducted. The second sentence may be integrated with the first sentence to succinctly

describe how and why the study was conducted. Methodological details are not appropriate for the abstract.

- iii. The bulk of the abstract should be used to describe the key findings of the study, generally, with one sentence dedicated to each major finding. The results of statistical analyses are not appropriate for the abstract; rather, the meaning of the statistical tests should be described in biological terms.
- iv. The last sentence should declare what the findings mean. In general, the last sentence should declare the single most important conclusion that the authors reached as a result of their study.

C. Introduction.

- i. The introduction should motivate the study broadly enough for the journal's audience (i.e. regional, national, or international audience). The introduction of many manuscripts often focus very narrowly on a single state or water body, but such studies still need to be motivated on broad scientific grounds for a national or international audience
- ii. The rationale for the study should be clear, but should not be cluttered with extraneous details. For example, the introduction should include only enough paragraphs, usually 3-4, to provide a succinct rationale for the study objectives. Each paragraph should be used to motivate an element of the objective and must be broadly scientific.
- iii. The last paragraph of the introduction should succinctly describe the objectives, which should be stated in terms of what the authors wished to learn (the desired end point of the study), not what they did (the means to the desired end point). For example, the study objective is not to estimate abundance, size structure, growth, or mortality of a fish population. Rather, the objective of such a study is to determine if abundance is low, if size structure is truncated, if growth is slow, or if mortality is high.

D. Methods.

- i. For field studies, the study area should be clearly described, including a general description of physical, chemical, and biological attributes.
- ii. The methods should be described in enough detail that someone else could reproduce the study and that reviewers can properly evaluate the results.
- iii. The study design should be clearly described, including the sampling units and sampling design.
- iv. The methods of analysis must be appropriate for the data.
- v. A common problem with many papers is that they often exclude details of the data analysis that are essential for judging statements of statistical results.
- vi. Each statistical procedure should be specified in enough detail that a reader could easily identify the dependent and independent variables for each test or analysis.
- vii. Equations are the least ambiguous means by which to convey the structure of an analysis.

- viii. Each test result reported in the results should be described in the methods.

E. Results.

- i. The results should include one paragraph for each major finding, which are often summarized in individual tables or figures. Thus, results are often best described with one paragraph per table or figure.
- ii. Each paragraph should begin with a topic sentence that declares the overall finding and continue with enough sentences to describe the details of the table or figure.
- iii. Details that are shown in tables should not also be reported in the text.
- iv. Results of statistical analyses should be described in Plain English, rather than statistical jargon. Authors often construct statements of statistical results backwards, rather than leading off with the subject. For example, sentences often begin with the phrase, *A statistically significant relationship was found between growth rate of largemouth bass and bluegill population density*, which fails to disclose the subject of the sentence until halfway into the sentence! To enhance understanding, begin with the subject, as in the sentence, *Growth rate of largemouth bass was significantly related to population density of bluegill ($F = 7.5$; $df = 3, 17$; $P = 0.02$).*
- v. The example above illustrates that each test result must be fully reported, including the value of the test statistic, degrees of freedom, and probability. Such details are crucial for judging the power of the test.
- vi. The probability of a test should not be reported merely as greater or less than an arbitrary decision probability level. The decision probability level (as stated in the Methods) is used to determine when to use the word, *significant*, not how to report the probability of a test result.

F. Discussion.

- i. The discussion should integrate the findings of the present study with the findings of other related studies. Authors of many papers use the discussion to *discuss or explain* the nuances of their findings, which is of little or no interest to a national or international audience.
- ii. Each paragraph of discussion should be dedicated to a major finding of the study, beginning with a topic sentence that declares how the finding compares or contrasts with other related studies, and continuing with sentences that describe the details of the comparing or contrasting studies. In general, one paragraph should be permitted for each major finding.
- iii. The discussion should be limited to the scope of the study and its findings. Discussion of issues not included in the study is not permitted.
- iv. For applied science, which is most often true in fishery science, the management implications of the research findings should be discussed in a succinct paragraph at the end of the discussion.

G. References.

- i. Each reference should be cited at least once in the text of the manuscript and each citation in the text should be listed as a reference.

- ii. Citations must follow the format as described in the *Guide for Authors*.

H. Tables.

- i. Tables should depict results that need to be shown as absolute values. If patterns are more important, then results should be depicted as figures.
- ii. Captions for all tables must be complete in describing what is contained in the table, and where and when the results were obtained.
- iii. Tables must be bounded by horizontal lines above and below the column headings and below the last row of the table. No other lines are permitted, either horizontal or vertical.

I. Figures.

- i. Figures should depict results that need to be shown as patterns of values. If absolute values are more important, then results should be depicted as tables.
- ii. Figures should be designed to convey a clear, simple image. Figures that require study are usually designed poorly and should therefore be redesigned.
- iii. Captions for all figures must be complete in describing what is contained in the table, and where and when the results were obtained.
- iv. Figures should be devoid of embellishments (chart-junk).
- v. Tick marks should be outside axes and of the same density as axes.
- vi. Eliminate extra x- and y-axes.
- vii. Never use 3-dimensional displays of 2-dimensional data.
- viii. Never use gray (half-tone) shadings.

IV. Conclusions.

- A. Writing style can be greatly enhanced by following relatively simple rules of word choice, sentence construction, and paragraph organization.
- B. Future employers will notice you if you learn how to write clearly and effectively.