

A GUIDE TO SIMPLE STATISTICS

Suggestions from members for possible future items in the Bulletin are always welcome. One of the most frequent requests we have received in the past has been for an introductory guide to data analysis. The need for this was recently repeated by many members of the WSG international general committee. One basic reason for producing such a guide is that many of the people collecting wader measurements have not been taught statistical methods. Self instruction is a good way to learn but there is no book on statistics which starts from very basic principles and deals in a clear way with the problems frequently encountered by wader measurers. For many years the British Trust for Ornithology has been planning such a guide but it has not yet been produced.

To meet the undoubted need and popular demand we invited Dr. Jeremy Greenwood to write a series of articles on basic statistics and we are pleased to announce that he has agreed to do so. He is a particularly appropriate author because he makes considerable use of statistics both in biological research and in teaching biology students. He is also blessed with the faculty of clear concise writing. His first article appears below and others will follow in each Bulletin for some time. Author and editors are anxious that the series should suit readers' requirements as well as possible and we would welcome any comments or queries which can either be sent directly to Dr. Greenwood or to either of the editors. Do not be reluctant to ask or comment. Remember that the series is intended for those with little or no previous knowledge of statistics so no question is too simple.

The Editors

INTRODUCTORY STATISTICS 1.

by Jeremy J.D. Greenwood

Statistics provides techniques for handling numerical data and for reducing them to a state of order, so that scientific conclusions may be drawn from them. With the present emphasis among wader workers on biometrical and population data, few readers of this bulletin will need convincing that statistics has something to offer them. However many people find that, although there are plenty of books that offer a whole set of statistical tools, these books do not adequately explain which tool is appropriate to which job or allow the reader to feel that he understands the principles underlying the use of each tool.

These notes are designed to fill that gap. I hope that they will be useful to those with no previous knowledge of statistics, allowing them to carry out elementary analyses correctly and confidently, as well as providing a secure base from which to go on to more advanced methods. My approach will be to explain the methods and the ideas behind them in common-sense terms. I shall assume no mathematical ability beyond that of elementary arithmetic. In places it may be necessary to use some unfamiliar terminology but this will always be fully explained - not only in verbal terms but also by illustration through an example.

This first note is concerned with the description of data. The two other major areas of applied statistics - the estimation of population characteristics and the testing of hypotheses - will be considered later.

Data care

Let us assume you look after your equipment well and take care in making your measurements. Most people do. Equal care should be taken to conserve the integrity of the data. It should be recorded clearly and unambiguously - and any calculations you do should be recorded equally carefully. Though it is sensible to keep a permanent record separate from your field notebook, the latter is always the best source of the data for the calculations, since the permanent record will almost always contain transcription errors.

Never throw away original data - you may always need it for checking.

In any data, the last digit used should indicate the precision of the measurement. A record of 21cm implies measurement to the nearest 1cm; one of 21.0cm implies measurement to the nearest 0.1cm. The question of how many significant figures should be preserved during the calculations is not one that can be answered shortly. It is determined by the number required in the answer and by the extent to which rounding off carried out early in the calculation affects the accuracy of the final answer. Since modern calculators remove so much of the arithmetic labour, there is generally no reason for not working to the limits of accuracy of the calculator.