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Preface

GIS, or geographic information systems, are becoming an increasingly important part of modern biological sciences, and this will continue as more and more biologists acquire good GIS skills. However, despite this growing importance, there is a distinct lack of books and resources aimed specifically at undergraduate biologists to help them learn how to effectively use GIS in their studies. Instead, biology students, and other novice biological GIS users, often have to struggle with materials written for geographers, and somehow learn to adapt the skills they develop for their careers as biologists. Understandably, this causes problems for many biologist and leads to them either failing to grasp the important role that GIS can play in so many aspects of biological research, or worse, being put off using this important tool altogether.

This book aims to provide biologists with a practical introduction to using GIS using language which they are already familiar with, and using biological examples to explain how GIS works and why it can be useful to biologists. In addition, it provides practical exercises based on the types of things a biologist would want to be able to do with GIS, which the novice biological GIS user can work through to help set them on the road to using GIS in their future careers in a useful and meaningful way. Thus, this book is not a detailed '*How To …*' guide for using GIS, but instead it aims to act as a primer to give biologists an entry point into the use of GIS in biological research.

This book was developed from the more detailed, and area specific, GIS books (such as *An Introduction To Using GIS in Marine Biology*) which are also available from *Pictish Beast Publications*, and that are primarily aimed at postgraduate and practicing researchers. This means that while it contains some of the same background information, this is provided in a simplified manner in this book. In addition, the information is presented here in the same easy-to-understand format that is used in the more detailed books, especially the instructions for the practical exercises. This means that if readers of this book become sufficiently interested in the use of GIS in biological research, and wish to expand their knowledge of GIS, they can move from the basic introduction contained in this volume to the more detailed books without having to familiarise themselves with a different way of presenting this information.

This book is divided into two sections. The first section provides background information on GIS and its uses in biological research, while the second provides six practical exercises which novice biological GIS users can work through to develop their GIS skills. With one exception (exercise five in chapter sixteen), these practical exercises are based on real biological data sets, and I would like to thank those who provided me with data from their research

projects for use in this book. For those who are interested, and where appropriate, specific references, including links to organisational websites, are provided in the introductory section of each exercise. In contrast with the other exercises, exercise five is based on a fictitious disease that was inspired by a post-apocalyptic survival novel called *For Those In Peril On The Sea* by Colin M. Drysdale. However, while this disease is fictitious, it is presented in this book in a biological context that will be familiar to many epidemiologists, and seeks to answer a real epidemiological question about how we can seek to understand how diseases spread in space and time, and what this means for our attempts to control and contain them.

Two versions of the instructions for these exercises are provided, one based around the leading commercially available GIS software package (ESRI's ArcGIS© software) and one based around the leading open source, and so freely available, GIS software package (QGIS or Quantum GIS). This means that students can use the same resource regardless of whether their institution has access to commercial GIS software or not. In addition, it helps students see how the same things can be done in different GIS software packages and prepares them for situations in their future careers where they might not have access to commercial GIS software.

This book would not have been possible without the many students and researchers whom I have worked with over the years and who have inspired me to learn much more about GIS in order to help them with their research than I ever would have done on my own. So, in no particular order (and with apologies to those whom I may have forgotten), thanks to Graham Pierce, Karen Hall, Jennifer Learmonth, Caroline Schweder, Laura Mandleberg, Barry Nicholls, Sarah Canning, Sonia Mendes, Caroline Weir, Wezddy del Torro, Ruth Fernandez, Ross Macleod and Lee Hastie. Thanks also to Kenny Dale, Helen Rossall, Ann Mayo, Andrea Airns, Melvi Macleod and Melanie Findlay for their comments on early drafts of this book. Finally, and most importantly, thanks to Sarah Bannon for her help and support, both while writing this book, and with life beyond it (as, believe it or not, there is life outside of GIS).