

Preface

This book is an introduction to the key methods and underlying concepts of mathematical models in ecology and evolution. It is intended to serve the needs of a broad range of undergraduate and postgraduate ecology and evolution students who need to access the mathematical and statistical modelling literature essential to their subjects. It assumes minimal mathematics and statistics knowledge (see below) while covering a wide variety of methods, many of which are at the forefront of ecological and evolutionary research. The book will also highlight the applications of modelling to practical problems such as sustainable harvesting and biological control.

There are many other ways in which this book could have been written and you will find examples of quite different treatments of modelling in the literature. In particular the book could focus on (and be lead by) applications, for example by asking whether models are helpful in understanding climate change or saving cod populations or reducing the incidence of malaria. The answer is yes to all of these but it was felt that it is better to try to understand the general principles underlying the models and then examine the applications. Doubtless my ideas of synthesis and generality are not those of others but it is an attempt to detect and reveal order. I also wanted to write a book with a lighter touch and so have avoided writing lengthy descriptions of method. Hopefully this makes the book accessible to a wider readership.

Understanding of the text will be helped by a familiarity with the basics of the following mathematical and statistical methods and concepts:

- manipulation of algebraic equations,
- logarithms and powers,
- differentiation,
- variance and standard error,
- significance and hypothesis testing.

Many thanks to Hils and Ed for encouragement and valuable comments. I have learnt much from interactions with colleagues at the Open University and previously at Imperial College. My interest in mathematical models was inspired by the lectures of Brian Goodwin and John Maynard Smith.

Michael Gillman
September 2008