--- *Chapter One* ---

Introduction

The aim of this workbook is to help marine biologists familiarise themselves with using GIS in their research. To do this, it uses the same Task Oriented Learning (TOL) approach first introduced in *An Introduction To Using GIS In Marine Biology* to provide five exercises based around investigating the home ranges of individual animals with a GIS project. Specifically, these exercises cover estimating home ranges using two common approaches. These are minimum convex polygons (MCP) and kernel density estimates (KDEs). In addition, there are exercises that demonstrate how to work with home ranges once they have been estimated, such as looking at the overlap between the home ranges of individual animals. As such, it does not represent a stand alone GIS book and is meant to act as a companion guide to the original book rather than to replace it in any way. It does not provide any background information on using GIS as this has already been covered within *An Introduction To Using GIS In Marine Biology* itself. Instead, it simply provides instructions for doing the exercises themselves.

Thus, this workbook is primarily aimed at those who have read some or all of *An Introduction To Using GIS In Marine Biology*. If you have not already done so, it is recommended that, at a minimum, you read chapters seven ('*Translating biological tasks into the language of GIS*'), eleven ('*How to use the 'How To...' sections of this book*') and twenty ('*How to combine instruction sets for basic tasks to create instruction sets for more complex tasks*') of *An Introduction To Using GIS In Marine Biology* before working through any of these exercises. It will also help if you are familiar with the basics of GIS (chapter two), common concepts and terms in GIS (chapter three), the importance of projections, coordinate systems and datums (chapter four), types of GIS data layers (chapter five), starting a GIS project (chapter six) and how to set up a GIS project (chapter thirteen). Finally, it is worth at least flicking through chapters thirteen to nineteen to familiarise yourself with how instruction sets are laid out using the TOL approach introduced in *An Introduction To Using GIS In Marine Biology*.

This supplementary workbook uses ArcGIS® 10.2 software to illustrate how the tasks related to investigating home ranges of individual animals should be done. However, similar processes are likely to be used to achieve similar outcomes in other GIS software. The exercises provided in this book are designed to be worked through in a sequential manner. This is because the same data sets are used throughout and you will need to use some of the data layers generated in earlier exercises for later ones. In addition, the exercises lead on from each other in a manner that develops your familiarity with using GIS to investigate the home ranges of individual animals. For example, exercise one covers how to calculate a minimum convex polygon (MCP) to estimate an individual's total home range, while the second covers the more detailed assessment of home ranges that can be done using kernel density estimates (KDEs). Finally, exercises four and five will involve working with data layers that you will create in exercises one and three to demonstrate how the home ranges of different individuals can be compared.

The exercises are provided using the same flow diagram based format introduced in the 'How To...' reference guide section of *An Introduction To Using GIS In Marine Biology*, and specifically in chapter twenty which outlined how to combine individual instruction sets to work out how to do more complex tasks. This means that for each exercise, you will first find an outline of what will be achieved by the end of it, why it is useful for marine biologists to be able to do this and what data layers you will need to start with. You will then find a summary flow diagram which will detail the order which individual instruction sets for basic tasks must be done. Finally, you will find a set of numbered instruction sets based on those provided in *An Introduction To Using GIS In Marine Biology*. These have been customised to make them specific to the data set used for each example. In order to complete a specific exercise, you will need to work through each of these instruction sets in the order given in the summary flow diagram. In order to allow you to know whether you are progressing correctly, figures will be provided at regular intervals which will show you what the contents of various windows in the individual software packages being used for each exercise should look like at that specific stage.

The data sets used in each exercise can be downloaded from www.gisinecology.com/ books/marinebiologysupplementaryworkbook.

<u>NOTE</u>: The instruction sets provided here are for training purposes only, and are only meant to be an aid to learning how to use GIS in marine biological research. While every effort has been made to ensure that these instructions are complete and error-free, they come with no guarantee of accuracy and, as with all technical books, some errors may have slipped through undetected. Whenever I become aware of any such issues, I will post corrections on www.GISinEcology.com/books/marinebiology/corrections rather than waiting to correct them in the next edition of this book. Before doing any of the exercises in this book, you should check this webpage to see if any corrections have been posted there. In addition, it is important to realise that there is no guarantee that these instructions will produce the desired outcome in every circumstance. As a result, if you are using the instruction sets provided here to learn how to do critical tasks, it is essential that you check (and then double check) that they work for your given circumstances rather than blindly following them without thinking. The author will not be responsible for any errors which occur because of the application of these instruction sets to real world situations.

<u>NOTE</u>: As with many things in GIS, there may be more than one way to do the exercises outlined in this book. The instructions presented here will work for the data set provided and for the exercises outlined in this book. If you find an alternative way to do them which works for your data, or if you have someone who can show you how to do them in another way, feel free to do them differently.