



*Providing Training, Advice And
Consultancy On The Use Of Geographic
Information Systems In Ecology*

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An Introduction To Using GIS In Marine Mammal Research

Preliminary Course Timetable And Contents

Day One

09:00 – Welcome And Introduction.

9:05 – Session One: Background To GIS Part 1:

- 1.1 What is GIS and why is it useful in marine biology?.
- 1.2 The structure of GIS projects in ArcGIS software.
- 1.3 An introduction to data layers.
- 1.4 The importance of projections, coordinate systems and datums.
- 1.5 Understanding resolution and scale in GIS projects.

10:00 – Session Two: Background To GIS Part 2:

- 2.1 Things to think about before you start your GIS project
- 2.2 An introduction to ArcGIS software

11:00 – Break

11:30 – Session Three (Practical Session): Starting A GIS Project:

- 3.1 Setting the projection, coordinate system and datum for your data frame.
- 3.2: Adding existing data layers to your GIS project.
- 3.3 Adding locational data as a point data layer.
- 3.4 How to create a new data layer.

13:00 – Lunch.

14:00 – Session Four: Collecting Data For Use In A GIS Project:

- 4.1 Data collection for GIS projects.
- 4.2 Using GPS data in a GIS project.
- 4.3 The importance of error checking your data during data input.
- 4.4 Error checking other peoples data.

14:30 – Session Five (Practical Session): Making A Map For A Presentation, Report Or Publication (with break at 15:30):

- 5.1 Setting the extent of your map.
- 5.2 Selecting the right projection.
- 5.3 Making sure that your data layers are displayed correctly.
- 5.4 How to deal with legends

- 5.5 Adding latitude and longitude information around the edges.
- 5.6 Adding a scale bar.
- 5.7 How to ensure that multiple maps of the same area are identical.

17:00 – Close.

Day Two

09:00 – Session Six: An Introduction To Working With Raster Data Layers:

- 6.1 What are raster data layers and why are they useful?
- 6.2 Things you need to think about before creating raster data layers.

09:30 – Session Seven (Practical Session): Working With Raster Data Layers (with a break at 10:30):

- 7.1 Making a raster data layer of species distribution.
- 7.2 Making a raster data layer of survey effort.
- 7.3 Making a presence-absence raster data layer for a species.
- 7.4 Making a species richness raster data layer.
- 7.5 Making raster data layers of habitat variables (such as water depth, seabed slope, seabed aspect and standard deviation of seabed slope).

12:30 – Session Eight: Using GIS To Investigate Spatial Relationships

- 8.1 What are spatial joins and how can you do them in GIS.

13:00 – Lunch.

14:00 – Session Nine (Practical Session): Investigating Spatial Relationships (with a break at 15:30):

- 9.1 Linking species locational records to habitat variables such as water depth to compare habitat preferences between species.
- 9.2 Linking habitat variables to presence-absence data from a raster data layer.

17:00 – Close.

Day Three

09:00 – Session Ten: How to Translate Biological Tasks Into The Language Of GIS:

- 10.1 Using flow diagrams to work out what steps you need to do to do a biological task in GIS.
- 10.2 Automating tasks in GIS.
- 10.3 How to find out how to do specific tasks in GIS.
- 10.4 Using Extensions and scripts.
- 10.5 Using non-GIS software to do specific tasks.

10:30 –Break.

11:00 – Session Eleven (Practical Session) Creating And Using Polygon Grid Data Layers:

- 11.1 Using a polygon grid to calculate abundance per unit survey effort for each grid cell for a study area.
- 11.2 Linking environmental data to a polygon grid data layer.

13:00 – Lunch.

14:00 – Session Twelve: Extracting Data For Statistical Analysis:

- 12.1 Preparing data for statistical analysis.

12.2 Exporting data from a GIS project for use in statistical analysis.

14:30 – Session Thirteen (Practical Session) Exporting Data From Your GIS (with a break at 15:30):

13.1 How to export data layers from a GIS project for use in other software

13.2 How to add latitude and longitude to a data layer before exporting it so it can be re-plotted in a GIS project at a later date.

17:00 – Close.

Day Four

09:00 – Session Fourteen: Planning And Conducting Data Collection For GIS Projects:

14.1 Creating a GIS project to help plan your data collection.

14.1 Collecting information on point location (such as sampling sites).

14.2 Collecting information along survey tracks and transects.

14.3 The importance of error-checking your data.

09:30 – Session Fifteen (Practical Session): Creating A GIS Project From Marine Mammal Survey Data (with a break at 10:30):

15.1 Creating a GIS-compatible spreadsheet or database for your data

15.2 Converting latitude and longitude coordinates into decimal degrees so that they can be plotted in a GIS project.

15.3 Transferring data from a GPS for use in a GIS project

15.4 Checking that your data plot in the correct locations in your GIS.

15.5 Re-creating survey tracks as line data layers from recorded waypoints stored in an Excel datasheet.

13:00 – Lunch.

14:00 – Session Sixteen: Investigating Home Ranges Of Individual Animals:

16.1 Minimum convex polygons (MCPs).

16.2 Kernel analysis.

16.3 Investigating travel distances between successive sightings of the same individual.

14:30 – Session Seventeen (Practical Session): Using Minimum Convex Polygons And Kernel Analysis To Investigate Home Ranges Of Individual Animals (with a break at 15:30):

17.1 Creating a MCP.

17.2 Identifying a home range with kernel analysis.

17.3 Identifying a home range with kernel analysis when there are barriers to movements (such as land).

17:00 – Close.

Day Five

09:00 – Session Eighteen: Using Species Distribution Modelling (SDM) For Cetacean Conservation And Management:

18.1 What is species distribution modelling (SDM)?

18.2 Theoretical background.

18.3 Why is SDM potentially useful for cetacean conservation?

18.4 Why the practical application of SDM to cetacean conservation is not easy.

10:00 – Session Nineteen: How To Set Up And Conduct a SDM Study On Cetaceans (with a break at 10:30):

- 19.1 The importance of ensuring your survey coverage is representative.
- 19.2 Selecting your modelling approach (effort-based, taxon-based or presence-only).
- 19.3 Selecting your dependent variable (presence, number of groups or number of individuals).
- 19.4 Selecting your environmental variables (empirical selection vs hypothesis testing).
- 19.5 Selecting an appropriate resolution and extent.
- 19.6 Selecting your statistical approach.
- 19.7 The importance of validation with an independent data set when using SDMs for conservation and management purposes.

13:00 – Lunch.

14:00 – Session Twenty: Case Studies In The Use Of SDMs In Marine Mammal Research:

- 20.1. Using SDM to model the impact of climate change on cetacean species ranges.
- 20.2 Investigating temporal and spatial variations in habitat use in harbour porpoises using SDMs.

14:30 – Session Twenty One (Demonstration): Using SDM To Model The Distribution Of Harbour Porpoises In The Northern North Sea:

- 21.1 This session will demonstrate how a SDM can be created based on the cetacean data set which has been used within the earlier practical sessions of this course.

15:30 – Review Of Course And Opportunity To Ask Any Remaining Questions

16:30 – Close.