Higher National Unit specification: general information

Unit title: Data Management for Ecological Surveying

Unit code: FM44 34

Superclass:	RH
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Source:	Scottish Qualifications Authority
Version:	01

Unit purpose: The Unit is designed to give candidates the skills to set up and utilise systems for the management of ecological survey data, using digital in-field data collection techniques.

On completion of the Unit the candidate should be able to:

1 Design a system for managing ecological survey data.
2 Collect data digitally direct into a Geographic Information System (GIS) using in-field technologies.
3 Interrogate data and provide reports suitable for ecological assessment.

Recommended prior knowledge and skills

Entry to this Unit is at the discretion of the delivering centre, however, candidates would benefit from having completed Unit F502 34 *Geographic Information Skills* or equivalent.

Credit points and level

1 Higher National Unit credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*)

SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.

General information (cont)

Core Skills There are opportunities to develop the Core Skills components of *Numeracy* Using Graphical Information, *Information and Communication Technology, (ICT), Problem Solving* with Critical Thinking Reviewing and Evaluation and *Working with Others* at SCQF level 5, although there is no automatic certification of Core Skills or Core Skill components.

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

The most appropriate approach to delivery is to integrate this Unit with a Unit that requires the candidate to carry out a realistic survey project in a suitable context.

Assessment

The Unit could be assessed holistically through a project report which meets the Evidence Requirements of all three Outcomes.

Higher National Unit specification: statement of standards

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The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Outcome 1

Design a system for managing ecological survey data.

Knowledge and/or Skills

♦ Requirements analysis for ecological data
♦ Field sheet production
♦ Creating spreadsheets to incorporate field sheet and desk study data fields
♦ Data validation rules to standardise electronic data entry including applying lists and field types and linking sheets

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

♦ identify analysis needs and end goal for data collected
♦ design a field sheet with fields and codes for different evidence types to standardise data entry
♦ create a spreadsheet to mirror field sheet design with additional columns for linked data
♦ create selection lists in spreadsheet package
♦ link work sheets based on field values.

Assessment Guidelines

The assessment of this Outcome could be combined with Outcomes 2 and 3 as part of a single assessment for the Unit. This could be conducted through producing a project report based on an actual survey conducted by the candidate. The report may be presented in any suitable way.

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Outcome 2

Collect data digitally direct into a Geographic Information System (GIS) using in-field technologies.

Knowledge and/or Skills

- Field recording GIS software
- Building forms for in-field data entry
- Setup of hand-held device or Personal Digital Assistant (PDA) mapping with base maps
- Gathering data in the field
- Digitising of field sheet data
- Data validation

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- create a vector file based on field sheet and spreadsheet designs
- build forms for field data entry into vector file using lists and data type restrictions
- set up a PDA with base mapping with correct projection in conjunction with GPS datums
- use PDA in the field to collect ecological survey data
- link external data to GIS
- validate GIS data through visual truthing and editing of data.

Assessment Guidelines

The assessment of this Outcome could be combined with Outcomes 1 and 3 as part of a single assessment for the Unit. This could be conducted through producing a project report based on an actual survey conducted by the candidate. The report may be presented in any suitable way. The data collected for this Unit suits a group field data collection exercise.

Higher National Unit specification: statement of standards (cont)

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Outcome 3

Interrogate data and provide reports suitable for ecological assessment

Knowledge and/or Skills

- Proximity analysis including adding buffer zones
- Overlay analysis highlighting intersecting data
- Spatial data selections
- Summarise data for reporting, in GIS software (including maps) and spreadsheets.

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- add buffer zones to data based on fields within data
- run queries to highlight intersecting data
- join data based on spatial attributes
- spatially select data
- map ecological constraints and activities (using buffers and exclusion zones)
- summarise attribute data within GIS
- summarise data in spreadsheet package.

Assessment Guidelines

The assessment of this Outcome could be combined with Outcomes 1 and 2 as part of a single assessment for the Unit. This could be conducted through producing a project report based on an actual survey conducted by the candidate. The report may be presented in any suitable way.

Higher National Unit specification: support notes

Unit title: Data Management for Ecological Surveying

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

Outcome 1

This Outcome introduces the candidate to data management within an ecological survey setting. The candidate will learn about analysing the needs of different survey types, for instance protected species surveys (point data) and habitat surveys (polygon, line and point data). The candidate will create field sheets and spreadsheets to manage different types of ecological survey data and learn how to link different datasets together within spreadsheets using lookups. They will produce lists of values for constraining data entry within the spreadsheet.

The issues of data backups, organisation and risk management could be discussed as part of this Outcome. Field sheets and spreadsheets could be designed for a protected species survey. Linked work sheets could specify buffer distances for work exclusion zones for different species.

The forms created in this Outcome could form the basis for Outcomes 2 and 3.

Outcome 2

This Outcome introduces the candidate to the use of GIS software in the field. Topics covered could include:

Applications of in-field GIS: whether direct digitisation is the most applicable method, or whether field sheets and GPS should be used. The upload of GPS coordinates to the GIS could be included.

GIS form creation: Using list values, restricting fields to data types, including mandatory fields.

Setting up PDA base mapping: base map loading; internal GPS setup; transformations between projections (GPS vs BNG)

Collecting field data into GIS: GPS position window; GPS precision; exact vs relative positions — offsets, incorporating photos into a system with unique IDs.

Digitising data: use created spreadsheets to enter descriptive data; link to map based on IDs.

Validate data: check data visually on map; check attributes completed correctly; edit any errors within attribute table.

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The issues of when field GIS can be useful and when it can be a hindrance could be discussed. ESRI ArcPad could be used as field recording software, with inbuilt form development tools.

Base mapping could include Ordnance Survey data or aerial photography. The field data could be a survey of protected species in point format. Lists for data entry could come from the values defined in Outcome 1.

The data compiled in this Outcome could be based on Outcome 1 and form the basis of Outcome 3.

Outcome 3

This Outcome introduces more advanced analysis tools within the GIS. Topics covered could include:

Buffers: adding buffers based on the value of a field, possibly within a linked table for exclusion zones of protected mammals.

Mapping: combining ecological constraint areas (buffer zones), activity areas (felling or development zones), and highlight intersecting areas where works would have to be managed.

Summarise data: produce site statistics from attribute data (counts, sums); export to spreadsheet package and analyse (perhaps through a pivot table) data on individual species.

Buffer zones could be created using linked data from Outcome 2. Intersect queries could overlay these buffer zones and potential work areas. Spatial selections of data could be used to create summary data for specific areas. Requirements for further applications of data and GIS eg 3D analysis of flight data could be discussed as part of this Outcome to give candidates understanding of advanced data analysis tools.

The data compiled in Outcomes 1 and 2 could form the basis of this Outcome.

Guidance on the delivery and assessment of this Unit

The Unit can be taught to a group and delivered alongside ecological surveying skills units including taxon identification. The assessment for the Unit lends itself to a project which would cover all Outcomes.

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Opportunities for developing Core Skills

Core Skill		Outcome 1	Outcome 2	Outcome 3
1 Communication				
Written Communication	(Reading)			
	(Writing)			
Oral Communication				
2 Numeracy				
Using Numbers		SCQF level 5	SCQF level 5	SCQF level 5
Using Graphical Information				
3 Information and Communication Technology (ICT)				
Using Information Technology		SCQF level 5	SCQF level 5	SCQF level 5
4 Problem Solving				
Critical Thinking		SCQF level 5		
Planning and Organising		SCQF level 5	SCQF level 5	
Reviewing and Evaluating		SCQF level 5	SCQF level 5	SCQF level 5
5 Working with Others				
Working with Others			SCQF level 5	

Open learning

Although this Unit could be delivered by distance learning, it would require a considerable degree of planning by the centre to ensure the sufficiency and authenticity of candidate evidence. Arrangements would have to be made to ensure that:

♦ the practical activity in Outcome 2 is supervised by a responsible person and clearly recorded (using an assessment checklist, or on video) for the assessor

♦ the assessor is, at some point, able to question the candidate on that performance (face-to-face, by telephone, online)

♦ the correct hardware and software are available to the candidate.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**

History of changes to Unit

Version	Description of change	Date

Glossary of terms

PDA — Personal Digital Assistant or hand held device
BNG — British National Grid

General information for candidates

Unit title: Data Management for Ecological Surveying

The Unit is designed to give you the skills to set up and utilise systems for the management of ecological survey data, using digital in-field data collection techniques. It will involve the use of hand-held devices for creating GIS data directly in the field with in-built GPS receivers. It will focus on the use of this data to provide mapping and summary information for ecological assessments.

The assessment will be holistically for the Unit, with the candidate designing the system, adding and analysing the data and producing maps and summary reports.

Numeracy skills of Using Graphical Information are developed in Learning Outcomes 1, 2 and 3*; ICT* skills are required in all Outcomes; *Problem Solving* skills are developed in planning the system and the data collection process of Outcomes 1 and 2, followed by reviewing and evaluating how the data is best arranged in the GIS and spreadsheets for all Outcomes; *Working with Others* is required in the group work for Outcome 2.