

Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management (720) (0173-32)

November 2018 Version 4.1

Qualification Handbook

Qualification at a glance

Industry area	Land – Countryside and Land and Wildlife
City & Guilds qualification number	0173-32
Age group	16-19 (Key Stage 5), 19+
Entry requirements	Centres must ensure that any pre-requisites stated in the <i>What is this qualification about?</i> section are met.
Assessment	To gain this qualification, candidates must successfully achieve the following assessments: <ul style="list-style-type: none"> • Three externally set, externally moderated assignment • Two externally set, externally marked exam, sat under examination conditions • Optional unit assessments as required
Additional requirements to gain this qualification	Employer involvement in the delivery and/or assessment of this qualification is essential for all candidates and will be externally quality assured.
Grading	This qualification is graded. For more information on grading, please see Section 7: Grading.
Approvals	These qualifications require full centre and qualification approval
Support materials	Sample assessments Guidance for delivery Guidance on use of marking grids
Registration and certification	Registration and certification of this qualification is through the Walled Garden, and is subject to end dates.
External quality assurance	This qualification is externally quality assured by City & Guilds, and its internally marked assignments are subject to external moderation. There is no direct claim status available for this qualification.

Title and level	Size (GLH)	TQT	City & Guilds qualification number	Ofqual accreditation number
Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management	720	1200	0173-32	601/7565/5

Version and date	Change detail	Section
1.1 May 2016	Small typographical errors	Throughout
	TQT added for qualifications Assessment component titles amended	4. Introduction
	Employer involvement guidance updated throughout	4. Employer involvement
	Summary of assessment methods and conditions	5. Assessment
	Moderation and standardisation of assessment updated throughout	6. Moderation and standardisation of assessment
	Awarding individual assessments Awarding grades and reporting results	7. Grading
	Enquiries about results Re-sits and shelf-life of assessment results Malpractice Access arrangements and special consideration	8. Administration
	2.0 July 2016	Unit 353 moved to optional in Conservation Management structure (page 16)
Unit 307 and 337 removed from optional units list (page 28)		5. Assessment
2.1 January 2017	Units 301 assessment method changed, weighting updated	1. Introduction 5. Assessment 6. Moderation and standardisation of assessment
2.2 June 2017	Addition of the examination paper based module number	1. Introduction – Assessment requirements and employer involvement 5. Assessment 5. Assessment – exam Specification 7. Grading – Awarding grades and reporting results
	Removal of AO 6-8 from Synoptic Assignments	5. Assessment – Assessment Objectives

	Addition of Provisional Grade Boundaries for the Synoptic Assignment	7. Grading
	Revised Exam Specification, Exam Duration and AO weightings	5. Assessment – Exam Specification
	Branding Changes	Throughout
2.3 September 2017	Content of unit 315 updated	Units
2.4 September 2017	Unit title for 315 amended to keep it consistent across all POSs	Qualification Structure
3.0 October 2017	Unit 353 moved to mandatory in Conservation Management structure	1. Introduction – Qualification structure and Assessment requirements and employer involvement
3.1 January 2018	Amendment to the stated GLH for the optional units for the Conservation Management structure	1. Introduction – Qualification structure
4.0 August 2018	Update to grading details	Section 7
4.1 November 2018	Assessment method for unit 301 amended	1. Introduction 5. Assessment

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1 Introduction

The following purpose is for the **City & Guilds Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management (720)**

Area	Description
OVERVIEW	
Who is this qualification for?	<p>This qualification is for you if you are aged 16-19, and want to work within the countryside. It provides you with a wide range of specialist technical practical skills, knowledge and understanding which will equip you to seek employment or further learning and training within the land and wildlife industries.</p> <p>On successful completion of the qualification, you will be awarded with either the:</p> <p>Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management (Conservation Management) (720) Or Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management (Fisheries) (720)</p>
What does this qualification cover?	<p>This qualification gives you the opportunity to learn about and build on the essentials of working within the countryside, such as estate skills, population surveys, safe use of equipment and machinery and land use and recreation. You will then choose to specialise in either conservation management or fisheries.</p> <p>Students choosing the conservation management option will go onto to further study woodland habitat management. You can then study further specialist areas such as pest and predator control, grassland habitat management, managing volunteers, ecology of game species, freshwater and wetland management and upland game management.</p> <p>If you choose to take the fisheries management you will study water quality and fish biology. You could also learn about fisheries management, stillwater fishery creation and management or cyprinid farming.</p> <p>Centres and providers work with local employers who will contribute to the knowledge and delivery of training. Employers will provide demonstrations and talks on the industry and where possible work placements will also be provided by the employers. This practically based training is ideal preparation for gaining employment in the land and</p>

wildlife industries or specialist further study.

WHAT COULD THIS QUALIFICATION LEAD TO?

Will the qualification lead to employment, and if so, in which job role and at what level?

This two-year qualification exposes you to the whole industry, and the opportunities within it. On completion, it is likely that you will enter the industry by working for an estate, land owner, farm, sporting estate /shoot or a fishery. As you will have gained a breadth and depth of skills and knowledge over a very wide range of units, you could progress within work to become a:

In conservation management pathway

- Underkeeper
- Assistant countryside warden/ranger
- Assistant estate supervisor

In fisheries pathway

- Fish farm worker

Why choose this qualification over similar qualifications?

This is typically delivered as a two course alongside another qualification such as an AS or A level. It offers a solid foundation for specialised study in different aspects of working in the land and wildlife industries. You will gain a wide range of skills and knowledge that employers recognise and value. The two pathways contain a wide variety of units that offer you the opportunity to be exposed to a wide range of experiences working in conservation management or in fisheries.

City & Guilds offers four sizes of Level 3 qualification in Land & Wildlife industries: Certificate, Diploma (540), Extended Diploma (720) and Extended Diploma (1080).

You would take the Certificate if you want an introductory qualification to develop some of the core skills and knowledge required by employers in the land and wildlife industries. The Certificate is likely to be taken alongside other programmes such as GCSEs or AS Levels over a one-year course of study.

You would take the Diploma (540) if you want a qualification to develop some of the skills and knowledge that can lead to specific roles required by employers in the land and wildlife industries. The Diploma is likely to be taken alongside other programmes such as GCSEs or AS Levels over a one-year course of study.

You would take the Extended Diploma (720) if you want to specialise, to develop most of the skills and knowledge required by employers in the land and wildlife industries. The Extended Diploma (720) is likely to be taken as part of a full-time two year programme of study, or alongside other qualifications such as AS or A Levels over a longer period of time.

You would take the Extended Diploma (1080) if you want to specialise and develop the skills and knowledge required by employers in the land and wildlife industries. The Extended Diploma (1080) is likely to be taken as a full-time programme of study over two years. By taking this large qualification, you will be exposed to, and have the opportunity to gain experience in, the wider land and wildlife sector. This will enable you to progress to a diverse range of employment opportunities, as you will have gained hands-on experience over 2 years, which employers really value.

Will the qualification lead to further learning?

You may wish to learn more through an Advanced Apprenticeship in Environmental Conservation or Game and Wildlife Management, which allows you to combine working for a wildlife trust or estate, or a similar job, typically attending one day a week at college or with a training provider.

You may wish to progress onto further learning within a Higher Education Institution.

You could take a course such as:

- Countryside Management Degree (BSc)
- Countryside Conservation Degree (BSc)
- Marine Ecology and Conservation Foundation Science Degree

WHO SUPPORTS THIS QUALIFICATION?

Employer/Higher Education Institutions/Professional Membership Body

British Association for Shooting and Conservation (BASC)
The British Trout Association (BTA)

Qualification structure

For the **Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management (Conservation Management) (720)** the teaching programme must cover the content detailed in the structure below:

Unit number	Unit title	GLH
Mandatory		
301	Principles of Health and Safety	30
302	Undertake and review work related experience in the land based industries	30
303	Land based industry machinery operations	60
304	Population surveys, ecology and conservation	60
305	Countryside recreation	60
310	Undertake estate skills	60
307	Woodland habitat management	60
353	Undertake a specialist project in the land based sector	60
Optional – Learners must be taught at least 300 GLH from the following units		
306	Principles of physical and biological environmental processes	60
308	Pest and predator control	60
309	Use of Firearms in the Environmental and Land-based Sector	60
311	Water quality	60
313	Business management in the Land-based sector	60
314	Farm Habitat Management	60
315	Undertake grassland habitat management	60
316	Coastal Management	60
317	Deer Management	60
318	Ecological Concepts and Application	60
319	Principles of tree felling and chainsaw use	60
320	Environmental interpretation in the land based sector	60
321	Heathland Habitat Management	60
322	Urban Habitat Conservation	60
323	Greenwood crafts	60
324	Managing volunteers	60
325	Adventurous activity leadership	60

326	Plant and soil science	60
327	Expeditions activities	60
328	Ecology of gamebird species	60
329	Shooting sport in the UK	60
330	Shoot Management	60
332	Working dogs	60
333	Upland Game Management	60
334	Gamebird production	60
336	Fishery management	60
338	River Fishery Creation and Management	60
339	Stillwater Fishery Creation and Management	60
340	Freshwater and wetland management	60
341	Aquatics Eco System	60
342	Coarse, game and sea angling techniques	60
343	Aquatics Welfare and Breed Development	60
351	Archaeology and landscape history	60
352	Captive Deer Herd Management	60

For the **Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management (Fisheries) (720)** the teaching programme must cover the content detailed in the structure below:

Unit number	Unit title	GLH
Mandatory		
301	Principles of Health and Safety	30
302	Undertake and review work related experience in the land based industries	30
303	Land based industry machinery operations	60
304	Population surveys, ecology and conservation	60
305	Countryside recreation	60
310	Undertake estate skills	60
311	Water quality	60
312	Fish Biology	60

Optional – Learners must be taught at least 300 GLH from the following units

306	Principles of physical and biological environmental processes	60
313	Business management in the land based sector	60
318	Ecological Concepts and Application	60
319	Principles of tree felling and chainsaw use	60
320	Environmental interpretation in the Land-based sector	60
328	Ecology of Gamebird Species	60
336	Fishery management	60
338	River Fishery and Creation and Management	60
339	Stillwater Fishery Creation and Management	60
340	Fresh water and Wetland Management	60
341	Aquatics Eco System	60
342	Coarse, game and sea angling techniques	60
343	Aquatics Welfare and Breed Development	60
344	Fish health	60
345	Ornamental pool design, installation and management	60
346	Cyprinid Farming	60
347	Salmonid Farming	60
348	Fresh water captive environments	60
349	Saltwater captive environments	60
350	Warm water and marine aqua culture	60
353	Undertake a specialist projects in the land based sector	60

Total qualification time (TQT)

Total Qualification Time (TQT) is the total amount of time, in hours, expected to be spent by a Learner to achieve a qualification. It includes both guided learning hours (which are listed separately) and hours spent in preparation, study and assessment.

Title and level	GLH	TQT
Level 3 Advanced Technical Extended Diploma in Animal Management	720	1200

Assessment requirements and employer involvement

To achieve the **Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management (Conservation Management) (720)** candidates must successfully complete **all** the mandatory assessment components **as well as** the optional assessment components for their chosen optional units.

Component number	Title
Mandatory	
002	Level 3 Land and Wildlife Management - Synoptic assignment (1)*
001/501	Level 3 Land and Wildlife Management - Theory exam (1)*
006	Level 3 Land and Wildlife Management - Synoptic assignment (2)*
005/505	Level 3 Land and Wildlife Management - Theory exam (2)*
301	Level 3 Principles of health and safety - Theory exam
302	Level 3 Undertake and review work related experience in the land-based industries - Portfolio
353	Level 3 Undertake a specialist project in the land-based sector - Assignment
Optional	
306	Level 3 Principles of physical and biological environmental processes - Assignment
308	Level 3 Pest and predator control - Assignment
309	Level 3 Use of firearms in the environmental and land-based sector - Assignment
311	Level 3 Water quality - Assignment
313	Level 3 Business management in the land-based sector - Assignment
314	Level 3 Farm habitat management - Assignment
315	Level 3 Undertake grassland habitat management - Assignment
316	Level 3 Coastal management - Assignment
317	Level 3 Deer management - Assignment
318	Level 3 Ecological concepts and application - Assignment
319	Level 3 Principles of tree felling and chainsaw use - Assignment
320	Level 3 Environmental interpretation in land-based - Assignment
321	Level 3 Heathland Habitat Management - Assignment
322	Level 3 Urban habitat conservation - Assignment
323	Level 3 Greenwood crafts - Assignment
324	Level 3 Managing volunteers - Assignment
325	Level 3 Outdoor adventure activities - Assignment
326	Level 3 Plant and soil science - Assignment

327	Level 3 Overland expeditions - Assignment
328	Level 3 Ecology of gamebird species - Assignment
329	Level 3 Shooting sport in the UK - Assignment
330	Level 3 Shoot management - Assignment
332	Level 3 Working dogs - Assignment
333	Level 3 Upland game management - Assignment
334	Level 3 Gamebird production - Assignment
336	Level 3 Fishery management - Assignment
338	Level 3 River fishery creation and management - Assignment
339	Level 3 Stillwater fishery creation and management - Assignment
340	Level 3 Freshwater and wetland management - Assignment
341	Level 3 Aquatics Eco system - Assignment
342	Level 3 Coarse, game and sea angling techniques - Assignment
343	Level 3 Aquatic welfare and breed development - Assignment
351	Level 3 Archaeology and landscape history - Assignment
352	Level 3 Captive deer herd management - Assignment

To achieve the **Level 3 Advanced Technical Certificate in Land and Wildlife Management (Fisheries) (720)** candidates must successfully complete **all** the mandatory assessment components **as well as** the optional assessment components for their chosen optional units.

Component number	Title
Mandatory	
002	Level 3 Land and Wildlife Management - Synoptic assignment (1)*
001/501	Level 3 Land and Wildlife Management - Theory exam (1)*
008	Level 3 Land and Wildlife Management - Synoptic assignment (2)*
007/507	Level 3 Land and Wildlife Management - Theory exam (2)*
301	Level 3 Principles of health and safety – Theory exam
302	Level 3 Undertake and review work related experience in the land-based industries - Portfolio
Optional	
306	Level 3 Principles of physical and biological environmental processes - Assignment
313	Level 3 Business management in the land-based sector - Assignment
318	Level 3 Ecological concepts and application - Assignment
319	Level 3 Principles of tree felling and chainsaw use - Assignment
320	Level 3 Environmental interpretation in land-based - Assignment

328	Level 3 Ecology of gamebird species - Assignment
336	Level 3 Fishery management - Assignment
338	Level 3 River fishery creation and management - Assignment
339	Level 3 Stillwater fishery creation and management - Assignment
340	Level 3 Freshwater and wetland management - Assignment
341	Level 3 Aquatics Eco system - Assignment
342	Level 3 Coarse, game and sea angling techniques - Assignment
343	Level 3 Aquatic welfare and breed development - Assignment
344	Level 3 Fish health - Assignment
345	Level 3 Ornamental pool design - Assignment
346	Level 3 Cyprinid farming - Assignment
347	Level 3 Salmonid farming - Assignment
348	Level 3 Fresh water captive environments - Assignment
349	Level 3 Saltwater captive environments - Assignment
350	Level 3 Warm water and marine aqua culture - Assignment
353	Level 3 Undertake a specialist project in the land-based sector - Assignment

In addition, candidates **must** achieve the mandatory employer involvement requirement for this qualification **before** they can be awarded a qualification grade. For more information, please see guidance in *Section 4: Employer involvement*.

Employer involvement

Component number	Title
Mandatory	
832	Employer involvement

**Number of mandatory assessments per assessment type*

2 Centre requirements

Approval

New centres will need to gain centre approval. Existing centres who wish to offer this qualification must go through City & Guilds' **full** Qualification Approval Process. There is no fast track approval for this qualification. Please refer to the City & Guilds website for further information on the approval process: www.cityandguilds.com

Resource requirements

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.

Centre staffing

Staff delivering these qualifications must be able to demonstrate that they meet the following requirements:

- be technically competent in the areas in which they are delivering
- be able to deliver across the breadth and depth of the content of the qualification being taught
- have recent relevant teaching and assessment experience in the specific area they will be teaching, or be working towards this
- demonstrate continuing CPD.

Internal Quality Assurance

Internal quality assurance is key to ensuring accuracy and consistency of tutors and markers. Internal Quality Assurers (IQAs) monitor the work of all tutors involved with a qualification to ensure they are applying standards consistently throughout assessment activities. IQAs must have, and maintain, an appropriate level of technical competence and be qualified to make both marking and quality assurance decisions through a teaching qualification or recent, relevant experience.

Physical resources

Centres must be able to demonstrate that they have access to the equipment and technical resources required to deliver this qualification and its assessment.

Learner entry requirements

Centres must ensure that all learners have the opportunity to gain the qualification through appropriate study and training, and that any prerequisites stated in the *What is this qualification about?* section are met when registering on this qualification.

Age restrictions

This qualification is approved for learners aged 16 – 19, 19+.

3 Delivering technical qualifications

Initial assessment and induction

An initial assessment of each learner should be made before the start of their programme to identify:

- if the learner has any specific learning or training needs,
- support and guidance they may need when working towards their qualification,
- the appropriate type and level of qualification.

We recommend that centres provide an introduction so that learners fully understand the requirements of the qualification, their responsibilities as a learner, and the responsibilities of the centre. This information can be recorded on a learning contract.

Employer involvement

Employer involvement is essential to maximise the value of each learner's experience. Centres are required to involve employers in the delivery of technical qualifications at Key Stage 5 and/or their assessment, for every learner. This must be in place or planned before delivery programmes begin in order to gain qualification approval. See *Section 4: Employer involvement* for more detail.

Support materials

The following resources are available for this qualification:

Description	How to access
Sample assessments	
Guidance for delivery	Available 2016 on the qualification pages on the City & Guilds
Guidance on use of marking grids	Website: www.cityandguilds.com

4 Employer involvement

Employer involvement is a formal component of Key Stage 5 Technical qualifications. It does not contribute to the overall qualification grading, but is a mandatory requirement that all learners must meet. As such it is subject to external quality assurance by City & Guilds.

Department for Education (DfE) requirements state:

Employer involvement in the delivery and/or assessment of technical qualifications provides a clear 'line of sight' to work, enriches learning, raises the credibility of the qualification in the eyes of employers, parents and students and furthers collaboration between the learning and skills sector and industry.

[Technical qualifications] must:

- *require all students to undertake meaningful activity involving employers during their study; and*
- *be governed by quality assurance procedures run by the awarding organisation to confirm that education providers have secured employer involvement for every student.*

Extract from: **Vocational qualifications for 16 to 19 year olds, 2017 and 2018 performance tables: technical guidance for awarding organisations, paragraphs 89-90**

City & Guilds will provide support, guidance and quality assurance of employer involvement.

Qualification approval

To be approved to offer City & Guilds technicals, centres must provide an Employer Involvement planner and tracker showing how every learner will be able to experience meaningful employer involvement, and from where sufficient and suitable employer representatives are expected to be sourced.

Centres must include in their planer a sufficient range of activities throughout the learning programme that provide a range of employer interactions for learners. Centres must also plan contingencies for learners who may be absent for employer involvement activities, so that they are not disadvantaged.

As part of the approval process, City & Guilds will review this planner and tracker.

Centres which cannot show sufficient commitment from employers and/or a credible planner and tracker will be given an action for improvement with a realistic timescale for completion. **Approval will not be given** if employer involvement cannot be assured either at the start of the qualification, or through an appropriate plan of action to address this requirement before the learner is certificated.

Monitoring and reporting learner engagement

Employer involvement is a formal component of this qualification and is subject to quality assurance monitoring. Centres must record evidence that demonstrates that each learner has been involved in meaningful employer based activities against the mandatory content before claiming the employer involvement component for learners.

Centres must record the range and type of employer involvement each learner has experienced and submit confirmation that all learners have met the requirements to City & Guilds. If a centre cannot provide evidence that learners have met the requirements to achieve the component, then the learner will not be able to achieve the overall Technical Qualification.

Types of involvement

Centres should note that to be eligible, employer involvement activities **must** relate to one or more elements of the mandatory content of this qualification. This does not mean that employer involvement in the optional units is not valuable, and centres are encouraged to consider this wherever appropriate.

As the aim of employer involvement is to enrich learning and to give learners a taste of the expectations of employers in the industry area they are studying, centres are encouraged to work creatively with local employers.

Employers can identify the areas of skills and knowledge in their particular industry that they would wish to see emphasised for learners who may apply to work with them in the future. Centres and employers can then establish the type of input, and which employer representative might be able to best support these aims.

To be of most benefit this must add to, rather than replace the centre's programme of learning.

Some examples of meaningful employer involvement are listed below. Employer involvement not related to the mandatory element of the qualification, although valuable in other ways, does not count towards this element of the qualification.

The DfE has provided the following examples of what does and does not count as meaningful employer involvement, as follows^{1,2}:

The following activities meet the requirement for meaningful employer involvement:

- *students undertake structured work-experience or work-placements that develop skills and knowledge relevant to the qualification³;*
- *students undertake project(s), exercises(s) and/or assessments/examination(s) set with input from industry practitioner(s);*
- *students take one or more units delivered or co-delivered by an industry practitioner(s). This could take the form of master classes or guest lectures;*
- *industry practitioners operate as 'expert witnesses' that contribute to the assessment of a student's work or practice, operating within a specified assessment framework. This may be a specific project(s), exercise(s) or examination(s), or all assessments for a qualification.*

In all cases participating industry practitioners and employers must be relevant to the industry sector or occupation/occupational group to which the qualification relates.

The following activities, whilst valuable, do not meet the requirement for meaningful employer involvement:

- *employers' or industry practitioners' input to the initial design and content of a qualification;*
- *employers hosting visits, providing premises, facilities or equipment;*
- *employers or industry practitioners providing talks or contributing to delivery on employability, general careers advice, CV writing, interview training etc;*
- *student attendance at career fairs, events or other networking opportunities;*
- *simulated or provider-based working environments eg hairdressing salons, florists, restaurants, travel agents, small manufacturing units, car servicing facilities;*
- *employers providing students with job references.*

¹ As extracted from: Vocational qualifications for 16 to 19 year olds

2017 and 2018 performance tables: technical guidance for awarding organisations

²This list has been informed by a call for examples of good practice in employer involvement in the delivery and assessment of technical qualifications - **Employer involvement in the delivery and assessment of vocational qualifications**

³ **DfE work experience guidance**

Types of evidence

For each employer involvement activity, centres are required to provide evidence of which learners undertook it, e.g. a candidate attendance register. The types of additional evidence required to support a claim for this component will vary depending on the nature of the involvement. Eg for a guest lecture it is expected that a synopsis of the lecture and register would be taken which each learner and the guest speaker will have signed; expert witnesses will be identified and will have signed the relevant assessment paperwork for each learner they have been involved in assessing; evidence of contribution from employers to the development of locally set or adapted assignments.

Quality assurance process

As the employer involvement component is a requirement for achieving the KS5 Technical qualifications, it is subject to external quality assurance by City & Guilds at the approval stage and when centres wish to claim certification for learners.

Evidence will be validated by City & Guilds before learners can achieve the employer involvement component. Where employer involvement is not judged to be sufficient, certificates cannot be claimed for learners.

Sufficiency of involvement for each learner

It is expected that the centre will plan a range of activities that provide sufficient opportunities for each learner to interact directly with a range of individuals employed in the related industry. Centres must also provide contingencies for learners who may be absent for part of their teaching, so they are not disadvantaged. Any absence that results in a learner missing arranged activities must be documented. Where learners are unable to undertake all employer involvement activities due to temporary illness, temporary injury or other indisposition, centres should contact City & Guilds for further guidance.

Live involvement

Learners will gain most benefit from direct interaction with employers and/or their staff; however the use of technology (eg the use of live webinars) is encouraged to maximise the range of interactions. Where learners are able to interact in real time with employers, including through the use of technology, this will be classed as 'live involvement'.

It is considered good practice to record learning activities, where possible, to allow learners to revisit their experience and to provide a contingency for absent learners. This is not classed as live involvement however, and any involvement of this type for a learner must be identified as contingency.

Timing

A learner who has not met the minimum requirements cannot be awarded the component, and will therefore not achieve the qualification. It is therefore important, that centres give consideration to scheduling employer involvement activities, and that enough time is allotted throughout delivery and assessment of the qualification to ensure that requirements are fully met.

5 Assessment

Summary of assessment methods and conditions

Component numbers	Assessment method	Description and conditions
002 006 008	Synoptic assignments	<p>The synoptic assignments are externally set, internally marked and externally moderated. The assignment requires candidates to identify and use effectively in an integrated way an appropriate selection of skills, techniques, concepts, theories, and knowledge from across the content area. Candidates will be judged against the assessment objectives.</p> <p>Assignments will be released to centres as per dates indicated in the Assessment and Examination timetable published on our website.</p> <p>Where seasonality is a factor in the timing of the assignment the assignment will be released early to ensure that candidates can take the assignment to fit in with the seasonal requirements.</p> <p>Centres will be required to maintain the security of all live assessment materials. Assignments will be password protected and released to centres through a secure method.</p> <p>There will be one opportunity within each academic year to sit the assignment. Candidates who fail the assignment will have one re-sit opportunity. The re-sit opportunity will be in the next academic year, and will be the assignment set for that academic year once released to centres. If the re-sit is failed, the candidate will fail the qualification.</p> <p>Please note that for externally set assignments City & Guilds provides guidance and support to centres on the marking and moderation process.</p>

001/501 005/505 007/507	Externally marked exams	<p>The exams are externally set and externally marked, and will be taken either online through City & Guilds' computer-based testing platform (001/005/007) or as paper based test (501/505/507)..</p> <p>The exams are designed to assess the candidate's depth and breadth of understanding across content in the qualification at the end of the period of learning, using a range of question types and will be sat under invigilated examination conditions. See JCQ requirements for details: http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations</p> <p>The exam specification shows the coverage of the exam across the qualification content.</p> <p>Candidates who fail the exam at the first sitting will have one opportunity to re-sit. If the re-sit is failed the candidate will fail the qualification. For exam dates, please refer to the Assessment and Examination timetable.</p>
302 832	Portfolio	<p>This unit will be assessed by a portfolio of evidence, externally moderated by City & Guilds.</p>
301	Internally marked theory exam	<p>This theory exam is externally set, internally marked and externally moderated. It is designed to assess the candidate's depth and breadth of understanding from across the unit content area and will be sat under supervised conditions.</p> <p>This assessment is available on our website. The assessment can be taken at any point during the academic year, but evidence must be submitted on to the Moderation Portal by the deadline in Assessment and Examination timetable, published on our website.</p> <p>Centres will be required to maintain the security of all live assessment materials. Assessments will be password protected and released to centres through a secure method.</p> <p>There is no re-sit limit for this assessment. If a learner fails, they can re-sit a different version. Assessors should allow seven days before reassessment.</p>

<p>Optional units 306,308, 309, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 332, 333, 334, 336, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353</p>	<p>Unit Assignments</p>	<p>The unit assignments are externally set, internally marked and externally moderated. The assignment requires candidates to identify and use effectively skills, knowledge and understanding from across the unit content area. Candidates will be judged against the unit grading criteria</p> <p>Arrangements for release, security and re-sitting assignments are the same as detailed for the synoptic assignment.</p>
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What is synoptic assessment?

Technical qualifications are based around the development of a toolkit of knowledge, understanding and skills that an individual needs in order to have the capability to work in a particular industry or occupational area. Individuals in all technical areas are expected to be able to apply their knowledge, understanding and skills in decision making to solve problems and achieve given outcomes independently and confidently.

City & Guilds technical qualifications require candidates to draw together their learning from across the qualification to solve problems or achieve specific outcomes by explicitly assessing this through the synoptic assignment component.

In this externally set, internally marked and externally moderated assessment the focus is on bringing together, selecting and applying learning from across the qualification rather than demonstrating achievement against units or subsets of the qualification content. The candidate will be given an appropriately levelled, substantial, occupationally relevant problem to solve or outcome to achieve. For example this might be in the form of a briefing from a client, leaving the candidate with the scope to select and carry out the processes required to achieve the client's wishes, as they would in the workplace.

Candidates will be marked against assessment objectives (AOs) such as their breadth and accuracy of knowledge, understanding of concepts, and the quality of their technical skills as well as their ability to use what they have learned in an integrated way to achieve a considered and high quality outcome..

How the assignment is synoptic for this qualification

The typical assignment brief could be to maintain an area, fishery or estate ensuring all seasonal activities are planned for and performed when necessary. Candidates will be expected to carry out habitat and species surveys, build and maintain estate structures/surfaces/boundaries, operate land based machinery, apply pest and predator control methods, and possibly use firearms or manage wildlife species habitats. Candidates will be given a brief to follow, they will produce a plan of activities and apply it in practice. This will require them to draw from across the qualification content to ensure they can achieve the tasks effectively.

External exam for stretch, challenge and integration

The external assessment will draw from across the mandatory content of the qualification, using a range of shorter questions to confirm breadth of knowledge and understanding. Extended response questions are included, giving candidates the opportunity to demonstrate higher level understanding and integration through discussion, analysis and evaluation, and ensuring the assessment can differentiate between 'just able' and higher achieving candidates.

Optional unit assessments and integration into the synoptic qualification content

While the mandatory units for this qualification provide the main skills and knowledge required to work in Land and Wildlife the optional units provided give centres flexibility when devising programmes to meet local employment needs, where the purpose of the qualification demands this.

The assessments for the optional units will require that the candidate has experienced the full breadth of mandatory learning of the qualification in order to better demonstrate the rounded performance expected at higher grades.

Assessment objectives

The assessments for this qualification are set against a set of assessment objectives (AOs) which are used across all City & Guilds Technicals to promote consistency among qualifications of a similar purpose. They are designed to allow judgement of the candidate to be made across a number of different categories of performance.

Each assessment for the qualification has been allocated a set number of marks against these AOs based on weightings recommended by stakeholders of the qualification. This mark allocation remains the same for all versions of the assessments, ensuring consistency across assessment versions and over time.

The following table explains all AOs in detail, including weightings for the synoptic assignments. In some cases, due to the nature of a qualification's content, it is not appropriate to award marks for some AOs. Where this is the case these have been marked as N/A. Weightings for exams (AOs 1, 2 and 4 only) can be found with the exam specification.

Assessment objective	Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management (Conservation Management) (720) Typical expected evidence of knowledge, understanding and skills	Approximate weighting (Assignment)
A01 Recalls knowledge from across the breadth of the qualification.	Use of terminology, health and safety considerations, environmental impact, legislation, routine tasks	15%
A02 Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification.	Application of legislation, habitat management, ecology and animal life cycle, estate management options, selection of materials, equipment and machinery, implications of estate management works on the area	25%
A03 Demonstrates technical skills from across the breadth of the qualification.	Surveying, identifying species, habitat management, estate management site works, use of tools, equipment and machinery	25%
A04 Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	Applying and linking knowledge, understanding and practical skills to a particular situation, justifying decisions/ approaches taken, contingencies, reflection and evaluation.	20%
A05 Demonstrates perseverance in achieving high standards and attention to detail while showing an understanding of wider impact of their actions.	Understanding requirements of the task and following them through comprehensively, fit and finish of practical task activities, doing job but more so, checks existing equipment is working properly, equipment returned properly, made sure was left in appropriate condition, thorough planning, contingencies are considered and implemented. checking quality of work, regular review of progress, self-evaluation, adaptable, drive to ensure high standards, creative problem solving	15%
Assessment objective	Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management (Fisheries) (720)	Approximate weighting (Assignment)

	Typical expected evidence of knowledge, understanding and skills	
A01 Recalls knowledge from across the breadth of the qualification.	Use of terminology, health and safety considerations, environmental impact, legislation, routine tasks, countryside recreation in UK, water quality and aquatic species, water treatment.	15%
A02 Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification.	The operation of land-based machinery, principles of ecology, conservation strategies, countryside management techniques, processes of fish physiology, behaviour and nutrition.	20%
A03 Demonstrates technical skills from across the breadth of the qualification.	Preparing machinery, operating machinery surveying, controlling pest and predators.	30%
A04 Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	Applying and linking knowledge, understanding and practical skills to a particular situation, justifying decisions/ approaches taken, contingencies, reflection and evaluation.	20%
A05 Demonstrates perseverance in achieving high standards and attention to detail while showing an understanding of wider impact of their actions.	Understanding requirements of the task and following them through comprehensively, fit and finish of practical task activities, doing job but more so, checks existing equipment is working properly, equipment returned properly, made sure was left in appropriate condition, thorough planning, contingencies are considered and implemented. checking quality of work, regular review of progress, self-evaluation, adaptable, drive to ensure high standards, creative problem solving	15%

Exam specifications

AO weightings per exam

AO	Exam 001/501 weighting (approx. %)	Exam 005/505 weighting (approx. %)	Exam 007/507 weighting (approx. %)
AO1 Recalls knowledge from across the breadth of the qualification.	20	33	30
AO2 Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification.	60	45	48
AO4 Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	20	23	23

The way the exam covers the content of the qualification is laid out in the table below:

Assessment type: Examiner marked, written exam

Assessment conditions: Invigilated examination conditions

Grading: X/P/M/D

001/501	Duration: 2 hours		
Unit	Outcome	Number of marks	%
303	Machinery operations	12	20
304	Population survey, ecology and conservation	24	60
310	Undertake Estate Skills	12	20
N/A	Integration across the units	12	20
	Total	60	100

Assessment type: Examiner marked, written exam

Assessment conditions: Invigilated examination conditions

Grading: X/P/M/D

005/505 Conservation Management		Duration: 1 hour and 20 minutes	
Unit	Outcome	Number of marks	%
305	Land use and recreation	15	37.5
307	Woodland habitat management	16	40
N/A	Integration across the units	9	22.5
Total		40	100

Assessment type: Examiner marked, written exam

Assessment conditions: Invigilated examination conditions

Grading: X/P/M/D

007/007 Fisheries		Duration: 1 hour and 20 minutes	
Unit	Outcome	Number of marks	%
311	Water quality	18	45
312	Fish Biology	13	32.5
N/A	Integration across the units	9	22.5
Total		40	100

*These exams are sat under invigilated examination conditions, as defined by the JCQ:

<http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations>.

Entry for exams can be made through the City & Guilds Walled Garden.

6 Moderation and standardisation of assessment

City & Guilds' externally set assignments for technical qualifications are designed to draw from across the qualifications' content, and to contribute a significant proportion towards the learner's final qualification grade. They are subject to a rigorous external quality assurance process known as external moderation. This process is outlined below. For more detailed information, please refer to 'Marking and moderation - Technicals centre guidance' available to download on the City & Guilds website.

It is vital that centres familiarise themselves with this process, and how it impacts on their delivery plan within the academic year.

Supervision and authentication of internally assessed work

The Head of Centre is responsible for ensuring that internally assessed work is conducted in accordance with City & Guilds' requirements.

City & Guilds requires both tutors and candidates to sign declarations of authenticity. If the tutor is unable to sign the authentication statement for a particular candidate, then the candidate's work cannot be accepted for assessment.

Internal standardisation

For internally marked work⁴ the centre is required to conduct internal standardisation to ensure that all work at the centre has been marked to the same standard. It is the Internal Quality Assurer's (IQA's) responsibility to ensure that standardisation has taken place, and that the training includes the use of reference and archive materials such as work from previous years as appropriate.

Provision for reworking evidence after submission for marking by the tutor

It is expected that in many cases a candidate who is struggling with a specific piece of work may themselves choose to restart and rectify the situation during their normal allocated time, and before it gets to the stage of it being handed in for final marking by the tutor.

In exceptional circumstances however, where a candidate has completed the assignment in the required timescales, and has handed it in for marking by the tutor but is judged to have significantly underperformed, may be allowed to rework or supplement their original evidence for remarking prior to submission for moderation. For this to be allowed, the centre must be confident that the candidate will be able to improve their performance without additional feedback from their tutor and within the required timescales ie the candidate has shown they can perform sufficiently better previously in formative assessments.

The reworked and/or supplemented original evidence must be remarked by the tutor in advance of the original moderation deadline and the moderator informed of any candidates who have been allowed to resubmit evidence.

The process must be managed through the IQA. The justification for allowing a resubmission should be recorded and made available on request. The use of this provision will be monitored by City & Guilds.

⁴ For any internally assessed optional unit assignments, the same process must be followed where assessors must standardise their interpretation of the assessment and grading criteria.

Internal appeal

Centres must have an internal process in place for candidates to appeal the marking of internally marked components, ie the synoptic assignment and any optional unit assignments. This must take place before the submission of marks for moderation. The internal process must include candidates being informed of the marks (or grades) the centre has given for internally assessed components, as they will need these to make the decision about whether or not to appeal.

Centres cannot appeal the outcome of moderation for individual candidates, only the moderation process itself. A request for a review of the moderation process should be made to **appeals@cityandguilds.com**.

Moderation

Moderation is the process where external markers are standardised to a national standard in order to review centre marking of internally marked assessments. These markers are referred to as 'moderators'. Moderators will mark a representative sample of candidates' work from every centre. Their marks act as a benchmark to inform City & Guilds whether centre marking is in line with City & Guilds' standard.

Where moderation shows that the centre is applying the marking criteria correctly, centre marks for the whole cohort will be accepted.

Where moderation shows that the centre is either consistently too lenient or consistently too harsh in comparison to the national standard, an appropriate adjustment will be made to the marks of the whole cohort, retaining the centre's rank ordering.

Where centre application of the marking criteria is inconsistent, an appropriate adjustment for the whole cohort may not be possible on the basis of the sample of candidate work. In these instances a complete remark of the candidate work may be necessary. This may be carried out by the centre based on feedback provided by the moderator, or carried out by the moderator directly.

Moderation applies to all internally marked assignments. Following standardisation and marking, the centre submits all marks and candidate work to City & Guilds via the moderation platform.. The deadline for submission of evidence will be available on Walled Garden. See the *Marking and moderation - Technicals Centre Guidance* document for full details of the requirements and process.

In most cases candidate work will be submitted directly to the moderator for moderation, This includes written work, photographic and pictorial evidence, or video and audio evidence. For some qualifications there will be a requirement for moderators to visit centres to observe practical assessments being undertaken. This will be for qualifications where the assessment of essential learner skills can only be demonstrated through live observation. The purpose of these visits is to ensure that the centre is assessing the practical skills to the required standards, and to provide the moderators with additional evidence to be used during moderation. These visits will be planned in advance with the centre for all relevant qualifications.

Post-moderation procedures

Once the moderation process has been completed, the confirmed marks for the cohort are provided to the centre along with feedback from the moderator on the standard of marking at the centre, highlighting areas of good practice, and potential areas for improvement. This will inform future marking and internal standardisation activities.

City & Guilds will then carry out awarding, the process by which grade boundaries are set with reference to the candidate evidence available on the platform.

Centres retaining evidence

Centres must retain assessment records for each candidate for a minimum of three years. To help prevent plagiarism or unfair advantage in future versions, candidate work may not be returned to candidates. Samples may however be retained by the centre as examples for future standardisation of marking.

7 Grading

Awarding individual assessments

Individual assessments will be graded, by City & Guilds, as pass/merit/distinction where relevant. The grade boundaries for pass and distinction for each assessment will be set through a process of professional judgement by technical experts. Merit will usually be set at the midpoint between pass and distinction. The grade descriptors for pass and distinction, and other relevant information (eg archived samples of candidate work and statistical evidence) will be used to determine the mark at which candidate performance in the assessment best aligns with the grade descriptor in the context of the qualification's purpose. Boundaries will be set for each version of each assessment to take into account relative difficulty.

Please note that as the merit grade will usually be set at the arithmetical midpoint between pass and distinction, there are no descriptors for the merit grade for the qualification overall.

Grade descriptors

To achieve a pass, a candidate will be able to

- Demonstrate the knowledge and understanding required to work in the occupational area, its principles, practices and legislation.
- Describe some of the main factors impacting on the occupation to show good understanding of how work tasks are shaped by the broader social, environmental and business environment it operates within.
- Use the technical industry specific terminology used in the industry accurately.
- Demonstrate the application of relevant theory and understanding to solve non-routine problems.
- Interpret a brief for complex work related tasks, identifying the key aspects, and showing a secure understanding of the application of concepts to specific work related tasks.
- Carry out planning which shows an ability to identify and analyse the relevant information in the brief and use knowledge and understanding from across the qualification (including complex technical information) to interpret what a fit for purpose outcome would be and develop a plausible plan to achieve it.
- Achieve an outcome which successfully meets the key requirements of the brief.
- Identify and reflect on the most obvious measures of success for the task and evaluate how successful they have been in meeting the intentions of the plan.
- Work safely throughout, independently carrying out tasks and procedures, and having some confidence in attempting the more complex tasks.

To achieve a distinction, a candidate will be able to

- Demonstrate the excellent knowledge and understanding required to work to a high level in the occupational area, its principles, practices and legislation.
- Analyse the impact of different factors on the occupation to show deep understanding of how work tasks are shaped by the broader social, environmental, and business environment it operates within.
- Demonstrate the application of relevant theory and understanding to provide efficient and effective solutions to complex and non-routine problems.
- Analyse the brief in detail, showing confident understanding of concepts and themes from across the qualification content, bringing these together to develop a clear and stretching plan, that would credibly achieve an outcome that is highly fit for purpose.

- Achieve an outcome which shows an attention to detail in its planning, development and completion, so that it completely meets or exceeds the expectations of the brief to a high standard.
- Carry out an evaluation in a systematic way, focussing on relevant quality points, identifying areas of development/ improvement as well as assessing the fitness for purpose of the outcome.

Awarding grades and reporting results

The overall qualification grade will be calculated based on aggregation of the candidate's achievement in each of the assessments for the mandatory units, taking into account the assessments' weighting. The qualification will be reported on a seven grade scale: Pass Pass, Pass Merit, Merit Merit, Merit Distinction, Distinction Distinction, Distinction Distinction*, Distinction* Distinction*.

All assessments **must** be achieved at a minimum of pass for the qualification to be awarded. Candidates who fail to reach the minimum standard for grade pass for an assessment(s) will not have a qualification grade awarded and will not receive a qualification certificate.

The approximate pass grade boundary for the synoptic assignments in this qualification are:

Synoptic Assignment	Approximate Pass Mark (%)
002	40
006	40
008	40

Please note that each synoptic assignments is subject to an awarding process before final grade boundaries are confirmed.

The contribution of assessments towards the overall qualification grade is as follows:

Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management (Conservation Management) (720)

Assessment method	Grade scale	% contribution
Synoptic Assignment (002)	X/P/M/D	30%
Exam (001/501)	X/P/M/D	20%
Synoptic Assignment (006)	X/P/M/D	30%
Exam (005/505)	X/P/M/D	20%

Both synoptic assignments and exams are awarded (see 'Awarding individual assessments', at the start of Section 7, above), and candidates' grades converted to points. The minimum points available for each assessment grade is listed in the table below. The range of points between the pass, merit and distinction boundaries will be accessible to candidates. For example; a candidate that achieves a middle to high pass in an assessment will receive between 8 and 10 points, a candidate that achieves a low to middle merit in an assessment will receive between 12 and 14 points. The points above the minimum for the grade for each assessment are calculated based on the candidate's score in that assessment.

	Pass	Merit	Distinction
Exam 001/501: 20%	6	12	18
Exam 005/505: 20%	6	12	18
Assignment 002: 30%	6	12	18
Assignment 006: 30%	6	12	18

The candidate's points for each assessment are multiplied by the % contribution of the assessment and then aggregated. The minimum points required for each qualification grade are as follows:

Qualification Grade	Minimum points
Distinction*	20.5
Distinction	17
Merit	11
Pass	6

Candidates achieving Distinction*, Distinction*, Distinction* will be the highest achieving of the Distinction candidates.

Level 3 Advanced Technical Extended Diploma in Land and Wildlife Management (Fisheries) (720)

Assessment method	Grade scale	% contribution
Synoptic Assignment (002)	X/P/M/D	30%
Exam (001/501)	X/P/M/D	20%
Synoptic Assignment (008)	X/P/M/D	30%
Exam (007/507)	X/P/M/D	20%

Both synoptic assignments and exams are awarded (see ‘Awarding individual assessments’, at the start of Section 7, above), and candidates’ grades converted to points. The minimum points available for each assessment grade is listed in the table below. The range of points between the pass, merit and distinction boundaries will be accessible to candidates. For example; a candidate that achieves a middle to high pass in an assessment will receive between 8 and 10 points, a candidate that achieves a low to middle merit in an assessment will receive between 12 and 14 points. The points above the minimum for the grade for each assessment are calculated based on the candidate’s score in that assessment.

	Pass	Merit	Distinction
Exam 001/501: 20%	6	12	18
Exam 007/507: 20%	6	12	18
Assignment 002: 30%	6	12	18
Assignment 008: 30%	6	12	18

The weighted average of candidate’s points for each assessment is calculated, and the overall grade of the qualification will then be determined using the following criteria.

Qualification Grade	Minimum points
Distinction*, Distinction*	20.5
Distinction, Distinction*	18.7
Distinction, Distinction	17
Merit, Distinction	14

Merit, Merit	11
Pass, Merit	8.5
Pass, Pass	6

Candidates achieving Distinction*, Distinction * will be the highest achieving of the Distinction candidates.

8 Administration

Approved centres must have effective quality assurance systems to ensure valid and reliable delivery and assessment of qualifications. Quality assurance includes initial centre registration by City & Guilds and the centre's own internal procedures for monitoring quality assurance procedures.

Consistent quality assurance requires City & Guilds and its associated centres to work together closely; our Quality Assurance Model encompasses both internal quality assurance (activities and processes undertaken within centres) and external quality assurance (activities and processes undertaken by City & Guilds).

For this qualification, standards and rigorous quality assurance are maintained by the use of:

- internal quality assurance
- City & Guilds external moderation.

In order to carry out the quality assurance role, Internal Quality Assurers (IQAs) must have and maintain an appropriate level of technical competence and have recent relevant assessment experience. For more information on the requirements, refer to *Section 2: Centre requirements* in this handbook.

To meet the quality assurance criteria for this qualification, the centre must ensure that the following procedures are followed:

- suitable training of staff involved in the assessment of the qualification to ensure they understand the process of marking and standardisation
- completion by the person responsible for internal standardisation of the Centre Declaration Sheet to confirm that internal standardisation has taken place
- the completion by candidates and supervisors/tutors of the record form for each candidate's work.

External quality assurance

City & Guilds will undertake external moderation activities to ensure that the quality assurance criteria for this qualification are being met. Centres must ensure that they co-operate with City & Guilds staff and representatives when undertaking these activities.

City & Guilds requires the Head of Centre to

- facilitate any inspection of the centre which is undertaken on behalf of City & Guilds
- make arrangements to receive, check and keep assessment material secure at all times,
- maintain the security of City & Guilds confidential material from receipt to the time when it is no longer confidential and
- keep completed assignment work and examination scripts secure from the time they are collected from the candidates to their dispatch to City & Guilds.

Enquiries about results

The services available for enquiries about results include a review of marking for exam results and review of moderation for internally marked assessments.

For further details on enquiries and appeals process and for copies of the application forms, please visit the **appeals page** of the City & Guilds website at **www.cityandguilds.com**.

Re-sits and shelf-life of assessment results

Candidates who have failed an assessment or wish to re-take it in an attempt to improve their grade, can re-sit assessments **once only**. The best result will count towards the final qualification. See guidance on individual assessment types in Section 5.

Factors affecting individual learners

If work is lost, City & Guilds should be notified immediately of the date of the loss, how it occurred, and who was responsible for the loss. Centres should use the JCQ form, JCQ/LCW, to inform City & Guilds Customer Services of the circumstances.

Learners who move from one centre to another during the course may require individual attention. Possible courses of action depend on the stage at which the move takes place. Centres should contact City & Guilds at the earliest possible stage for advice about appropriate arrangements in individual cases.

Malpractice

Please refer to the City & Guilds guidance notes *Managing cases of suspected malpractice in examinations and assessments*. This document sets out the procedures to be followed in identifying and reporting malpractice by candidates and/or centre staff and the actions which City & Guilds may subsequently take. The document includes examples of candidate and centre malpractice and explains the responsibilities of centre staff to report actual or suspected malpractice. Centres can access this document on the City & Guilds website.

Examples of candidate malpractice are detailed below (please note that this is not an exhaustive list):

- falsification of assessment evidence or results documentation
- plagiarism of any nature
- collusion with others
- copying from another candidate (including the use of ICT to aid copying), or allowing work to be copied
- deliberate destruction of another's work
- false declaration of authenticity in relation to assessments
- impersonation.

These actions constitute malpractice, for which a penalty (eg disqualification from the assessment) will be applied.

Where suspected malpractice is identified by a centre after the candidate has signed the declaration of authentication, the Head of Centre must submit full details of the case to City & Guilds at the earliest opportunity. Please refer to the form in the document *Managing cases of suspected malpractice in examinations and assessments*.

Access arrangements and special consideration

Access arrangements are adjustments that allow candidates with disabilities, special educational needs and temporary injuries to access the assessment and demonstrate their skills and knowledge without changing the demands of the assessment. These arrangements must be made before assessment takes place.

It is the responsibility of the centre to ensure at the start of a programme of learning that candidates will be able to access the requirements of the qualification.

Please refer to the *JCQ access arrangements and reasonable adjustments and Access arrangements - when and how applications need to be made to City & Guilds* for more information. Both are available on the City & Guilds website: <http://www.cityandguilds.com/delivering-our-qualifications/centre-development/centre-document-library/policies-and-procedures/access-arrangements-reasonable-adjustments>

Special consideration

We can give special consideration to candidates who have had a temporary illness, injury or indisposition at the time of the examination. Where we do this, it is given after the examination.

Applications for either access arrangements or special consideration should be submitted to City & Guilds by the Examinations Officer at the centre. For more information please consult the current version of the JCQ document, *A guide to the special consideration process*. This document is available on the City & Guilds website: <http://www.cityandguilds.com/delivering-our-qualifications/centre-development/centre-document-library/policies-and-procedures/access-arrangements-reasonable-adjustments>

UAN:	A/507/4634
Level:	3
GLH:	30

What is this unit about?

This unit aims to provide learners with an understanding of the principles of health and safety and how these can be applied in practice within land-based or related industries. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Learners will be able to recognise common health and safety practices and processes which they will encounter within the workplace. The land-based sector has one of the worst fatal accident records of any major industrial sector and a lack of basic training and/or competency is often a contributory factor. There is a need for new entrants to these industries to gain essential health and safety knowledge in order to minimise harm to themselves and to improve attitudes and behaviour in the workplace. In addition, the learners have the opportunity to consider factors which are specific to their workplace.

This unit must be taught alongside **all** technical units within the qualification ensuring learners gain an appreciation of its importance and so that they are equipped with knowledge and understanding to protect themselves and others when working in the industry.

Learning outcomes:

In this unit, learners will be able to

1. Understand health and safety legislation
2. Understand the risk assessment process
3. Understand first aid requirements
4. Understand safe manual handling principles
5. Understand the use of fire extinguishers

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand health and safety legislation

Topics

- 1.1 Impact of good and bad practice upon individuals and businesses
- 1.2 Key legislation relating to health, safety and welfare
- 1.3 Statutory duties of employers, employees and the self-employed
- 1.4 Consequences of not complying with statutory duties
- 1.5 How individuals can contribute to establishing a good health and safety culture

Topic 1.1

Learners will know direct and indirect consequences of poor standards of workplace health and safety practice on both businesses and individuals, to include:

Financial eg:

- prosecution fines and legal fees
- compensation claims
- repairs/replacement of equipment
- recruit and train new staff
- increased insurance premiums

Emotional eg:

- guilt and grief
- stress

Reputation eg:

- loss of reputation
- bad publicity

Employees eg:

- reduced staff morale and productivity
- increased staff turnover and sickness

Social eg:

- loss of independence
- reduced social activity

Topic 1.2

Learners will know key legislation relating to health, safety and welfare within the workplace, for example, Health and Safety at Work etc. Act 1974 and the Management of Health and Safety at Work Regulations 1999. Learners will understand the importance of accident and incident reporting in accordance with the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013. Learners will understand the legal status and practical implications of approved codes of practice and industry specific best practice guidance.

Topic 1.3

Learners will know the statutory duties of employers, employees and the self-employed, to include:

Employers:

- provide a safe working environment
- provide safe equipment and systems of work.
- provide information, instruction, training and supervision.
- arrange for the safe storage, transport and use of articles and substances.
- provide adequate welfare facilities.

Employees:

- take reasonable care of their own health and safety.
- take reasonable care of other people who may be affected by what they do or don't do at work.
- cooperate with their employer on health and safety.
- not interfere with or misuse anything provided for their health, safety or welfare

Topic 1.4

Learners will know the powers of health and safety enforcement officers (eg inspection, investigation and guidance) and identify the range of enforcement actions and penalties that may be imposed (eg prohibition and improvement notices, intervention fee and prosecutions).

Topic 1.5

Learners will understand how individuals can contribute to establishing a good health and safety culture within their workplace, for example:

- prompt reporting of defective safety equipment or other matters of concern
- always use control measures and personal protective equipment (PPE) as instructed
- help others to work safely by sharing knowledge and good practice
- set a good example to others by always working safely
- follow instructions and safe working procedures

Learning outcome:

2. Understand the risk assessment process

Topics

2.1 Principles of risk assessment

2.2 Workplace hazards

2.3 Risk assessment

Learning outcome 2 provides learners with the knowledge on the requirements and importance of carrying out risk assessments. Learners will be expected to carry out risk assessments in practice when performing their industry specific activities as required.

Topic 2.1

Learners will understand the legal requirement to carry out suitable and sufficient risk assessments. They will understand the responsibilities of the employer, self-employed and employee within the risk assessment process and identify when expert advice and guidance may be required (eg lack of experience or knowledge).

Topic 2.2

Learners will know common hazards associated with a workplace which could result in serious harm to themselves or others (eg visitors, colleagues, members of the public).

Topic 2.3

Learners will understand how to undertake a detailed risk assessment within the context of their workplace, following the Health and Safety Executive 'Five Steps to Risk Assessment', to include:

- identification of the hazards
- identification of who might be harmed and how they might be harmed
- evaluation of the risks and decide how the level of risk may be controlled
- recording and implementation of the results, as well as communication to others who may be affected
- reviewing risk assessments and suggesting when risk assessments should be reviewed.

Learners will also know the hierarchy of risk control:

- elimination
- substitution
- safe working procedures
- training, instruction and supervision
- personal and respiratory protective equipment (PPE/RPE).

Learning outcome:

3. Understand first aid requirements

Topics

3.1 Planning for emergencies and first aid provision in the workplace

3.2 Procedures when encountering an accident or medical emergency

3.3 First aid for common emergencies

In this outcome learners will explore the importance of planning to and subsequently how to manage common first aid emergencies which may arise in the workplace, with emphasis upon their workplace. Learners should be aware of the aims of first aid (ie, preserve life, prevent injuries worsening and promote recovery) Evidence towards this outcome could come from a current first aid training qualification (ie, appointed persons or first aid at work).

Topic 3.1

Learners will understand the importance of emergency planning, especially for lone or isolated working, and the responsibilities of a first aider. Learners will also know the minimum requirements for first aid at work and identify supplementary arrangements which may be appropriate for their workplace.

Topic 3.2

Learners will know the procedures to follow when encountering an accident or medical emergency. Learners will know how to check the incident site to minimize risk to themselves, assess the situation, and how and when to contact the emergency services and identify prioritisation of activities (eg, 'DRABC').

Topic 3.3

Learners will know how to manage the following common situations as well as other significant situations appropriate to their workplace:

- wounds and burns
- choking
- severe bleeding

- shock
- concussion
- unconscious casualties
- falls from height
- suspected broken limbs and dislocations
- heart attacks.

Learners will know how to recognise their own limitations and explain how to monitor the condition of the casualty and prevent an injury from worsening.

Learning outcome:

4. Understand safe manual handling principles

Topics

4.1 Principles of safe manual handling

4.2 Safe manual handling of common items

In this outcome learners will need to investigate the principles of risk assessment relevant to manual handling in order to plan for and safely move a range of common items associated with their workplace. Learners should have access to a range of common mechanical aids and these should be used as appropriate.

Topic 4.1

Learners will understand how manual handling at work should be minimised and identify appropriate alternatives and mechanical aids. They will know the common causes of injuries associated with poor manual handling within the workplace.

Topic 4.2

Learners will understand how to safely move a range of common items within their workplace. They will know appropriate mechanical aids for a range of common manual handling activities within their workplace.

Learning outcome:

5. Understand the use of fire extinguishers

Topics

5.1 Use of fire extinguishers

Topic 5.1

Learners will know the types, use and colours of portable fire extinguishers, to include:

- water
- dry powder
- foam
- CO2.

Learners will know how to recognise their own limitations in managing fires in the workplace.

Guidance for delivery

On completion of this unit, the learner will have developed an understanding of some of the key underlying principles and practices of health and safety to help prepare them to enter the workplace. It will be important that delivery relates to example situations that are vocationally relevant to the learners.

Visiting speakers eg paramedics, health and safety consultants or inspectors could enhance the relevance of the subject to learners.

Suggested learning resources

Books

Farmwise - Your Essential Guide to Health and Safety in Agriculture Health and Safety Executive
Published by: Health and Safety Executive Books, 2013
ISBN: 0717665097

Health & Safety at Work Essentials Chadder, P & Duncan, M
Published by: Lawpack Publishing Ltd., 8th Edition, 2014
ISBN: 1910143006

Health and Safety at Work: An Essential Guide for Managers Stranks, J
Published by: Kogan Page, 9th edition, 2010
ISBN: 0749461195

Websites

Health and Safety Executive (HSE) [http:// www.hse.gov.uk](http://www.hse.gov.uk)

The Royal Society for the Prevention of Accidents (ROSPA) <http://www.rosipa.com/>

Unit 302

Undertake and review work related experience in the land based industries

UAN:	F/507/4635
Level:	3
GLH:	30

What is this unit about?

The aim of this unit is to give learners the skills needed to identify, participate in and review work experience in the environmental and land-based sector. The unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Learning outcomes

In this unit, learners will be able to

1. Determine employment opportunities in the environmental and land-based industries
2. Prepare for a work-based experience in the environmental and land-based industry
3. Understand the importance of effective interpersonal skills in the workplace
4. Review a work-based experience in the environmental and land-based sector

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Determine employment opportunities in the environmental and land-based industries

Topics

1.1 Career and progression opportunities within an environmental and land-based industry

In this outcome, learners will explore the different job roles and responsibilities, and the job titles commonly associated with them in their specialist sector. This background understanding is likely to require some formal classroom teaching. Learners should be encouraged to explore the range of employment opportunities and career paths within their specialist sector. Learners will then consider the skills and qualifications that are required for appropriate jobs for themselves and should be encouraged to think about skills and qualifications that they may need to acquire to achieve their employment and careers ambitions. This should help them to identify suitable work experience.

Topic 1.1

Learners will know the job roles relevant to the land based sector, to include:

- managerial
- supervisory
- team worker
- trainee
- volunteer
- common job titles within the relevant sector,
- main duties and responsibilities.

Learners will also know the skills, qualifications and experience needed to fulfil duties and responsibilities of appropriate jobs, to include:

- job specific
- vocational
- personal.

Learning outcome:

2. Prepare for a work-based experience in the environmental and land-based industry

Topics

2.1 Appropriate work-based experience and the application process

2.2 Interview skills

This outcome involves learners going through the process of applying for work experience. They will need to locate suitable job adverts or work experience opportunities, but can be supported by centres suggesting suitable placements. When applying for work experience learners should produce, as a minimum, a detailed curriculum vitae and letter of application using a computer. It will be beneficial for learners to attend a real or simulated interview, and reflect on their performance outlining how they could improve their effectiveness.

Topic 2.1

Learners will find a suitable job opportunity based on existing skills, experience, qualifications, development of skills and experience to achieve future employment goals. They will use a range of sources of information about work opportunities eg trade magazines, websites Learners will , complete an application form (if applicable), curriculum vitae and letter of application.

Topic 2.2

Learners will know how to prepare for an interview eg research the business and job role, suitable dress and personal presentation, information to find out and suitable questions to ask.

Learners will also know how to behave in an interview, eg:

- attend punctually
- dressed appropriately
- answering questions
- completion of other tests (eg practical, aptitude)
- reflection on interview performance.

Learning outcome:

3. Understand the importance of effective interpersonal skills in the workplace

Topics

3.1 The importance of effective interpersonal skills in the workplace

It would be appropriate for employers to be invited to outline to learners their expectations in the workplace.

Topic 3.1

Learners will understand the importance of effective interpersonal skills in the workplace when dealing with customers and colleagues, to include:

- effective communication (eg addressing others face to face, appropriate telephone manner, effective written communication, use of social media)
- courtesy and helpfulness
- appropriate dress and body language
- product knowledge
- use of technical terms.

Learning outcome:

4. Review a work-based experience in the environmental and land-based sector

Topics

- 4.1 Present evidence of activities and achievements during a work-based experience
- 4.2 Review a work-based experience, identifying strengths and areas for improvement
- 4.3 Evaluate future career aspirations

In this outcome, learners will use evidence from their work experience to present a report (eg written or visual), on their work experience business, job role, learning and achievements. They will then review the effectiveness of the workplace, making realistic and justified suggestions for improvement. Review of their own workplace performance and achievements should include all of

the content identified, with reference to relevant evidence, eg reports, progress reviews, and the extent to which their aims, objectives/targets have been achieved. Learners should consider further training and experience that will help them to achieve their career ambitions.

Topic 4.1

Learners will present evidence of activities and achievements during a work-based experience to include, as appropriate: name of work experience provider, nature of the organisation (type of business, products or services, customers), organisation structure chart, main duties and responsibilities, regular daily working routine, evidence of safe working practices (eg PPE, risk assessments).

Topic 4.2

Learners will review their work-based experience, identifying strengths and areas for improvement, to include:

- work rate
- work quality and effectiveness
- punctuality
- attendance
- reliability
- dress and personal presentation
- working relationships with others work experience aims
- objectives and targets.

Topic 4.3

Learners will evaluate career aspirations, to include:

- advantages and disadvantages of identified pathways
- suitability to personal interests
- skills and qualifications.

Guidance for delivery

Learners on vocational courses should have experience of the type of work that they hope to do, and of the expectations of potential future employers.

Ideally this unit should be undertaken in a real business environment relevant to the subject interest of the learner, but actual work experience may be gained by a number of routes, eg as part of an industrial placement whilst within the programme, whilst working on a planned daily or weekly basis on the centre's commercial and/or educational facilities, whilst undertaking voluntary work within the industry, as previous relevant and current work experience in the industry or as a member of a group of learners invited to carry out practical work on a suitable business.

Throughout the unit, the emphasis should be on safe working. It is expected that learners will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working.

Learners should complete a minimum of 150 hours of work experience to achieve this unit. If work experience is in the industry, centres should be mindful of their responsibilities for ensuring that work placements have appropriate supervision, insurance and health and safety policies in place.

It is recommended that a summary report is completed by the employer at the end of the work placement.

UAN:	J/507/4636
Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of the principles of land based machinery operations and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learners will study the purpose and operation of land based machines including machine operating and working principles. They will explore routine maintenance and appropriate Personal Protective Equipment. They will also develop knowledge of the legal requirements and industry best practice guidance for land based machinery. They will learn how to safely operate and maintain machinery and consider the different conditions in which machinery might need to operate.

Learning outcomes

In this unit, learners will be able to

1. Understand the purpose and operation of land based industry machinery
2. Prepare land based industry machinery for work
3. Operate land based industry machinery

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the purpose and operation of land based industry machinery

Topics

1.1 Current legislation and industry guidance for land based industry machinery operation

1.2 Purpose and operation of land based machines

In Learning outcome 1 learners must understand the significance of current legislation and industry best practice guidance to the machinery they operate. Learners must also demonstrate understanding of the construction and working principles of a selection of machines commonly used in their specific land based industry, and knowledge of their work and performance parameters.

Topic 1.1

Learners will understand the significance of current legislation and industry best practice guidance to the machinery they operate. To include:

- Legislation: eg Provision and Use of Work Equipment Regulations 1998 (PUWER), Health and Safety at Work Act 1974, Management of Health and Safety at Work Regulations 1999, Control of Substances Hazardous to Health Regulations 2002 (COSHH), Manual Handling Operations Regulations 1992, Personal Protective Equipment (PPE) at Work Regulations 1992, Environmental Protection Act 1990, Wildlife and Countryside Act 1981, Control of Noise at Work Regulations 2005, Control of Vibration at Work Regulations 2005, Lifting Operations and Lifting Equipment Regulations 1998
- Industry best practice guidance.

Topic 1.2

Learners will understand the purpose, operating and working principles and limitations of land based industry machinery. For example:

- Purpose built, trailed, tractor mounted, self-propelled or pedestrian ,
- Power source (eg electric, battery, spark ignition, compression ignition, PTO and hydraulic)
- Drive and transmission systems
- Cutting mechanisms
- Cutting/loading capacity or range
- Input and output ranges and levels
- Terrain suitability
- Safety features.

Learning outcome:

2. Prepare land based industry machinery for work

Topics

2.1 Machinery preparation

- 2.2 Carry out pre-use checks
- 2.3 Identify common faults and suggest appropriate remedial action
- 2.4 Check and report on safety requirements

In Learning outcome 2 learners will demonstrate the ability to prepare machines for work. Machines will be specific to learners' area of study. It is essential that manufacturers' recommendations, user's manuals and machinery handbooks are available to the learner. It is expected that learners do this for three different machines.

Topic 2.1

Learners will prepare selected land based industry machinery for work in accordance with the manufacturers' recommendations, user's manual or machinery handbook.

Topic 2.2

Learners will carry out pre-use checks for selected land based industry machinery in accordance with the manufacturers' recommendations, user's manual or machinery handbook.

Topic 2.3

Learners will identify common faults and suggest appropriate remedial action to the machinery available to them. Common faults may include:

- Incorrect, polluted or lack of fuel
- blocked filters (air, fuel, oils)
- poor oil pressure
- damaged sprockets and fouled drive systems
- damaged or blunt blades
- fouled or incorrectly set gap of spark plugs
- starter recoil tension
- blocked mechanisms.

Topic 2.2

Learner will be able to check and report on the safety requirements for selected land based industry machinery in accordance with the manufacturers' recommendations, user's manual or machinery handbook.

Learning outcome:

3. Operate land based industry machinery

Topics

- 3.1 Carry out risk assessments
- 3.2 Ways to minimise possible environmental impacts of using selected land based industry machinery
- 3.3 Operate land based industry machinery
- 3.4 Carry out post operating procedures

In outcome 3 learners will be required to operate land based industry machinery. It is anticipated that the delivery of this outcome will be through supervised practical training and the learners will be able to consolidate operational skills within realistic working environments. As a minimum, it is expected that the learner will be able to operate three powered machines appropriate to their area of study in a realistic industrial environment where possible. The learner should be given appropriate time in order to develop operational skills before assessment. The learner is not required to transport machinery, but should be aware of transport requirements.

Topic 3.1

Learners will carry out risk assessments for the machines they are to operate in accordance with The Management of Health and Safety at Work Regulations 1999.

Topic 3.2

Learners will know how to minimise possible environmental impacts of land based industry machinery, eg:

- Oil and fuel spillage and storage
- Emissions
- Soil stability and erosion
- Protected species
- Waste disposal
- Watercourses.

Topic 3.3

Learners will demonstrate safe and efficient operation of specialist land based industry machinery, to include as appropriate:

- Risk assessment
- Adherence to industry safety guidance and operator's manual,
- Safe start and stop,
- Monitoring of machine performance and output
- Effective communications
- Clearance of blockages,
- Conversion between work and transport positions
- Economic operation
- Safe and efficient operation.

Topic 3.4

Learners will carry out post operating procedures appropriate to machinery operated, to include:

- Cleaning
- Inspecting for and reporting of damage or defects
- Lubrication
- Storage.

Guidance for delivery

This unit is designed to give learners knowledge, understanding and practical skills to enable them to recognise and understand the working principles of land based industry machinery typically used in their area of study.

Learners will be able to demonstrate pre use checks and fault finding of a range of selected machines. They will be able to prepare machines for work and operate them safely and efficiently. An emphasis will be put on the use of manufacturers' recommended procedures, health and safety issues and safe working practices.

Learners must show awareness and consideration of hazards and risks at all times, particularly during operational situations where levels of risk may vary at any given time.

Where possible, tasks should be undertaken in a real working environment. Following operations, learners will demonstrate simple inspection and maintenance and pre storage tasks to minimise degeneration of the machine, and to ensure it is in a useable condition for subsequent operations.

Suggested learning resources

Books

Arboricultural Association Health and Safety Package
Published by: Arboricultural Association, 2005
ISBN: 0900978406
Arboricultural Association

Winching Operations in Forestry: Tree Takedown and Vehicle Debogging
Published by: Stationary Office Books, 2004
ISBN: 085538638X
Ireland, D

Tractors Fundamentals of Machine Operation
Published by: John Deere Publishing, 1994
ISBN: 0866912126
Hathaway, L

Chainsaw Operator's Manual: The Safe Use of Chainsaws
Published by: Landlinks Press, 2009
ISBN: 0643090282
Kestel, B

Tractor Operation and Maintenance
Published by: Inkata Press, 1999
ISBN: 0750689145
Southorn, N

Tractor Power
Published by: Farming Press, 2000
ISBN: 0852365144
Williams, M

Journals and magazines

- Arboricultural Association newsletter
- Forestry and British Timber
- Arboriculture and Forestry Advisory Group (AFAG) Safety Guides
- Forest Industry Safety Accord (FISA) Safety Guides

Websites

The Arboricultural Association <http://www.trees.org.uk>
The Forest Industry Safety Accord <http://www.ukfisa.com>

The Forestry Commission

<http://www.gorestry.gov.uk>

The Health and Safety Executive

<http://www.hsegov.uk>

Unit 304

Population surveys, ecology and conservation

UAN:	D/507/7090
Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of the principles of ecology and conservation and how these can be applied in practice within the land-based sector. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector of further education and training.

The unit aims to enable learners to explore a range of ecosystems and will allow them to investigate how ecosystems naturally change through time and how they are affected by human activity. Learners will understand how an ecosystem functions and will investigate the roles of different organisms and how these different organisms interact. Learners will also understand the value of the services that ecosystems provide. Learners will also understand how natural resources, species and habitats are protected both nationally and internationally and will investigate a range of current conservation strategies.

The unit also aims to enable learners to be able to identify and conduct surveys of ecosystems, habitats and populations.

The applied purpose of this unit is for learners to develop a sound understanding of the principles of ecology and conservation, and to learn how to accurately undertake field surveys. The new skills and knowledge acquired through this unit will enable learners to both accurately assess the status and condition of habitats and species as well as knowing how such resources would be best protected in the future.

Learning outcomes

In this unit, learners will be able to

1. Understand the principles of ecology and how ecosystems function
2. Understand human impacts on global ecosystems and biodiversity
3. Understand national and international conservation strategies
4. Carry out flora and fauna surveys

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the principles of ecology and how ecosystems function

Topics

- 1.1 Ecological principles and ecosystems
- 1.2 Population dynamics and how populations change.
- 1.3 Predator prey interactions within populations
- 1.4 Types of evolution within animal populations and classification

Topic 1.1

The learner will understand the ecological principles and ecosystems:

- Definitions
- levels of organization (cells, tissues, organisms, individuals, populations, communities, ecosystems, biomes)
- characteristics of major biomes
- trophic levels
- energy flow
- ecological pyramids
- abiotic and biotic factors
- food chains
- food webs
- niches (carnivore, herbivore, omnivore, generalists, specialists)
- species adaptation.

Topic 1.2

The learner will understand the principles of population dynamics:

- Growth
- Dispersion
- genetic variability
- continuity in time
- factors that influence population
- size
- form
- resources
- demes
- fluctuations
- fecundity
- natality
- mortality
- immigration
- emigration
- dispersal
- breeding strategies (r and K)

- concepts of carrying capacity
- metapopulations
- density dependent and independent factors.

Topic 1.3

The learner will understand predator prey interactions:

- Relationship types (eg true predation, parasitism, parasitoidism, grazing)
- hunting strategies
- predation theories
- predator and prey density
- Boom-bust cycles
- life tables and survivorship.

Topic 1.4

The learner will understand evolution and taxonomy:

- Historical development of biota
- five kingdoms
- taxonomy
- species classification
- concept of a species
- types of evolution (eg divergent, convergent, parallel, co-evolution)
- speciation
- development of the theory of evolution (eg Darwin, Mendel, Wallace).

Learning outcome:

2. Understand human impacts on global ecosystems and biodiversity

Topics

2.1 Changes in global ecosystems

2.2 Global wildlife population fluctuations

2.3 Population changes in ecosystems

Topic 2.1

The learner will understand the reasons for change in global changes in ecosystems:

- Overharvesting of plants and animals
- introduction of non-native species
- habitat destruction
- fragmentation
- climate change and pollution
- changing seasons and phenology
- disease
- decrease in biological diversity
- population shifts
- trends
- scales

- individuals
- species
- communities
- changing ecological niches.

Topic 2.2

The learner will understand the reasons for global wildlife population fluctuation:

- Seasonality
- Migration
- emerging diseases
- climate change
- habitat destruction
- influence of man.

Topic 2.3

The learner will understand population changes in ecosystems

Learning outcome:

3. Understand national and international conservation strategies

Topics

3.1 National conservation strategies for wildlife and their habitats

3.2 International conservation strategies for wildlife and their habitats

Topic 3.1

The learner will understand the national conservation strategies:

- Relevant legislation and regulations (eg Wildlife and Countryside Act 1981 (+ relevant amendments)
- National Environment and Rural Communities Act 2006
- Conservation (Natural Habitats etc) Regulations 1994
- CRoW Act 2000
- Badger Act
- Marine and Coastal Access Act 2009.

Specific Conservation Projects/Strategies (Royal Society for the Protection of Birds (RSPB), Wildlife Trusts, Wild Trout Trust, Zoological Society London (ZSL), Forestry Commission, National Trust, British Trust for Ornithology (BTO), GWCT (Game and Wildlife Conservation Trust), Environment Agency, Local Rivers Trusts).

Species re-introduction / re-habilitation projects (eg sea eagle, salmon, european eel, water vole, beaver, grey partridge, white clawed crayfish, capercaillie, black grouse, large blue butterfly, sand lizard, short-haired bumblebee).

Current agri-environment schemes, landscape scale projects.

Topic 3.2

The learner will understand International Conservation Strategies:

Relevant conventions, legislation and regulations eg Water Framework Directive, Ramsar, Natura 2000, Habitats Directive and European Protected Species (EPS), Birds Directive, Bern Convention, Bonn Convention, Convention on Biological Diversity (CBD), CITES.

Current Conservation strategies : charity strategies, International Union Conservation of Nature (IUCN), endangered species international, Worldwide Fund for Nature (WWF), application of the Convention on International Trade in Endangered Species (CITES), UN Convention on Biological Diversity, British and Irish association of zoos and aquariums (BIAZA), Marine Conservation Society (MCS).

Learning outcome:

4. Carry out flora and fauna surveys

Topics

4.1 Method to survey habitats

4.2 Habitat survey planning

4.3 Habitat surveying

Topic 4.1

The learner will know the different methods of surveying habitats (eg Phase One Habitat Survey, simplified NVC surveys).

Topic 4.2

The learner will be able to plan and select an appropriate method to undertake a habitat survey:

- Objective setting and planning
- risk assessment
- health and safety
- legislation
- codes of practice.

The learner will select an appropriate survey method: (eg Quadrats, Transects, Kick Sampling, Longworth Trapping, Pitfall Traps, Point Counts, Dung Counts, Vantage point counts, Tracks and Signs, Seine netting, trapping, tow nets, quantitative electric fishing, connective rod snakes.

Topic 4.3

The learner will be able to carry out a habitat Survey and present results.

Guidance for delivery

This unit is designed to provide an overview of the principles of ecology and conservation that influence wildlife populations at a National and International level. Learners will build their understanding of how ecosystems function and how species interact. They will also investigate the 'species' concept and will learn how species have emerged and diversified to create the current levels of global biological diversity.

The unit should consider a range of species and habitats from both the UK and internationally and learners should be encouraged to develop their understanding of the historic, current and emerging issues facing habitats and species. Learners should then be able to examine a range of strategies at both national and international levels that have been put in place to help safeguard the future of habitats and species. Through the examination of an extensive range of national and global

case study examples the learner should be able to appreciate the nature and scale of many of the threats impacting on global ecosystems.

Learners will apply their learning by undertaking a range of habitat and species surveys. Safe working practice, risk assessments and permissions will all be sought and followed at all times.

Learners will learn through formal lectures, site visits with expert guidance, museum visits, in addition to carrying out habitat and species surveys,

Learning outcome 1

Learners will study the underpinning principles of ecology and how ecosystems function. They will investigate how the natural world functions and how species interact. Concepts of energy flow through ecosystems should be investigated and the roles played by different organisms should be examined. The characteristics of the main global biomes and ecosystems should be explored and learners will be encouraged to look at how species and communities of organisms have evolved within different environments through history. Learners will study the natural population dynamics of different species and case studies should be used extensively to illustrate these fluctuations.

Learning outcome 2

Learners will look at how global ecosystems have been damaged, modified, altered by human beings. This part of the unit should give learners the opportunity to examine the nature of changes in global ecosystems and to evaluate the scale of ecosystem change. The impacts of anthropogenic changes can then be studied with a particular focus on the effects on overall biological diversity. Modern concepts such as 'ecosystem services' should be explored to assist the learners appreciation of the value of global ecosystems. This learning outcome could be delivered through group exploration of a range of case studies in addition to lectures and classroom sessions. Visual media such as relevant DVD and video footage could be used to help contextualise learning.

Learning outcome 3

Learners will explore the range of national and international methods of protecting habitats and species. Both legislative measures and specific conservation projects could be explored and the effectiveness of these measures could also be discussed and evaluated, Learners could look at specific case study examples of species and how they are afforded protection both nationally and internationally. This learning outcome could be contextualised by additional guest speakers and site visits and presentations looking at case studies of notable species.

Learning outcome 4

Learners should be given the opportunity to undertake a broad habitat survey that identifies the general habitat types and landscape characteristics of a local area, A Phase One Habitat Survey would be ideal and the resources needed to complete this survey are listed in the suggested learning resources section. In addition, learners should plan and carry out an appropriate survey on a local animal population. An appropriate survey technique should be agreed and health and safety, relevant laws, and codes of practice should be adhered to at all times. By undertaking these surveys learners will gain experience in assessing the status of populations and the type and quality of habitat. The selection of an appropriate survey method should be left at the discretion of each centre but should be a recognised, industry relevant survey technique for the species selected.

Employer engagement

This unit will provide ample opportunities for employer engagement as site visits, guest speakers and presentations could be built in to the delivery of this unit. For example, centres should use their industrial contacts to arrange opportunities for employer engagement. In addition, the unit covers

the undertaking of a range of surveys. Established survey methods should be used by the learners as this will provide them with a key applicable skill when sourcing employment.

Suggested learning resources

Books

- Conservation and the genetics of populations
Published by: Blackwell Pub., 2007
ISBN: 0470671459
Allendorf, F & Luikart, G
- Ecology
Published by: Blackwell Pub., 2006
ISBN: 1405111178
Begon, M; Townsend, C & Harper, J
- Ecology: Principles and Applications. 1st ed.
Published by: Cambridge University Press, 1998
ISBN: 9780521588027
- Live Trapping Small Mammals. 1st ed.
Published by: Mammal Society, 2006
ISBN: 9780906282540
Gurnell, J & Flowerdew, J
- Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit: Field Manual
JNCC
Published by: Joint Nature Conservation Committee, 1990
ISBN: 9780861396375
- Behavioural Ecology : An evolutionary approach
Published by: Wiley Blackwell, 1977
ISBN: 0632035463
Krebs, JR & Davies, B
- 99% Ape: How evolution adds up
Published by: Natural History Museum, 2008
ISBN: 0565092316
Silvertown, J et al
- Ecological Census Techniques: A handbook
Published by: Cambridge University Press, 2nd edition, 2006
ISBN: 9780521606363
Sutherland, W(ed)
- Essentials of Ecology, 3rd Edition
Published by: Wiley-Blackwell, 2008
ISBN: 9781405156585
Townsend, C; Begon M & Harper, J
- Practical field ecology
Publisher: John Wiley & Sons; 1 edition, 2011
ISBN-10: 0470694297
ISBN-13: 978-0470694299
Wheater, C; Bell, J & Cook, P

Journals and magazines

- Journal of Ecology
- British Wildlife
- Conservation Land Management
- Ecology
- BBC Wildlife
- Birds
- Forest Life
- Shooting and Conservation

Websites

Natural History Museum	http://www.nhm.ac.uk
Joint Nature Conservation Committee	http://www.jncc.defra.gov.uk
Naturenet	http://www.naturenet.net
Game and Wildlife Conservation Trust	http://www.gwct.org.uk
Green Facts	http://www.greenfacts.org/en/ecosystems
IUCN	http://www.iucn.org
CIEEM	http://www.cieem.net
Natural England	https://www.gov.uk/government/organisations/natural-england
The Atlantic Salmon Trust	http://www.atlanticsalmontrust.org
The Marine Conservation Society	http://www.mcsuk.org
NASCO – North Atlantic Salmon Conservation Organisation	http://www.nasco.int
BIAZA – British and Irish Zoo Association	http://www.biaza.org.uk

UAN:	H/507/7091
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for learners to acquire the skills and knowledge used in countryside recreation provision, and how these can be applied in practice.

The learners will examine the question “is there a need for countryside recreation” looking at both the historical perspective, and the current picture of countryside recreation provision within the UK. By understanding the current provision, the learners will be able to examine the impacts that countryside recreation have upon the natural resource, and also the impact that socio-economic factors, climate, and other trends have upon the type of countryside recreation provision.

The learners will examine some of the key organisations involved in delivery, planning, and management of countryside recreation, to assess how a network of organisations has evolved to fulfil the need of countryside recreation, whilst still working within the confines of the factors mentioned above.

Having understood the “why” and “what” of countryside recreation, the learners will understand some of the physical and psychological techniques of ensuring good recreation visitor management. This will involve an exercise in providing guided walks, as a practical assessment, to furnish the students with a practical skill in countryside recreation, namely the provision of guided walks, a consistently popular countryside recreation activity.

Learning outcomes:

In this unit, learners will be able to

1. Know the importance of countryside recreation in the UK
2. Understand factors affecting countryside recreation and impacts of countryside recreation
3. Know the roles and responsibilities of organisations involved in countryside recreation
4. Understand techniques for managing countryside recreation

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Know the importance of countryside recreation in the UK

Topics

1.1 Historical context

1.2 Increase in provision

Topic 1.1

The learner will know how countryside recreation has evolved. This topic will give the learner an awareness, eg:

- Pre 19th century – right to roam on common land, land owners use for country sports
- 19th century – enclosures acts, rural depopulation led to need for countryside recreation,
- Early 20th century – Birth of organisations to meet demand eg Cycle touring club, Youth Hostel Association, Commons and Open Spaces Society, National Trust, Ramblers Association, BASC, British Field Sports Society
- Mid 20th century - National Parks and Access to the Countryside Act
- Late 20th century – Advent of sustainable tourism and outdoor adventure.

Topic 1.2

The learner will know the factors that have caused increases in recreation demand and provision, eg:

- Interest in wildlife and countryside
- leisure time
- access opportunities
- disposable income
- exercise
- media exposure
- recreational opportunities and activities (eg walking, angling, field sports, bird watching etc).

Learning outcome:

2. Understand factors affecting countryside recreation and impacts of countryside recreation

Topics

2.1 External factors that impact on countryside recreation

2.2 Impacts of countryside recreation on the environment

Topic 2.1

The learner will understand the external factors that impact on countryside recreation and their effect on the environment:

- Demographic factors – age, race, gender, economic status, level of education, income level and employment
- Financial factors – cost of participation, disposable income

- Social trends – leisure time, availability of transport
- Technology factors – media, equipment development
- Political factors – developments in legislation, pressure groups.

Topic 2.2

The learner will understand the impacts of countryside recreation on the environment, eg:

- Erosion
- Traffic
- Litter
- Pollution
- Disturbance
- Habitats
- Conflicts
- Noise
- Aesthetics
- rural economy
- employment.

Learning outcome:

3. Know the roles and responsibilities of organisations involved in countryside recreation

Topics

- 3.1 Aims/objectives of organisations
- 3.2 Organisation structure
- 3.3 Responsibilities of the organisation

Organisations to include Local councils, wildlife trusts, local charitable organisations and volunteer groups, other individual sport governing bodies.

Topic 3.1

The learner will know the aims and objectives of different organisations involved in countryside recreation.

Topic 3.2

The learner will know the different organisation structures, eg:

- Countryside Management - Natural England, Association of National Park Authorities, RSPB
- Game Management – BASC, NGO, Countryside Alliance
- Fishery Management – Environment Agency, Angling Trust.

Topic 3.3

The learner will understand the responsibilities of the different organisations.

Learning outcome:

4. Understand techniques for managing countryside recreation

Topics

4.1 Countryside recreation activities

4.2 Provision of outdoor activity planning

Topic 4.1

The learner will understand different types of opportunities for recreation activities in the countryside, eg:

- Walking
- Angling
- field sports
- bird watching.

Topic 4.2

The learner will understand how to plan for outdoor activities.

Guidance for delivery

This unit aims to provide learners with an understanding of the factors which affect countryside recreation opportunities and how these opportunities can benefit those accessing the countryside, those living and working in it and the countryside itself.

As learners will be engaged in visits and some practical activity there should be an emphasis on safe working practices, including the use of appropriate Personal Protective Equipment (PPE), and appropriate risk assessments should be undertaken.

In Learning outcome 1, learners will need to gain an understanding of the types of recreational opportunities available in the countryside. It would be helpful to experience this first hand through trips and visits to a range of local recreational sites. This outcome also includes gaining an understanding of reasons for an increase in countryside recreation. It would be particularly relevant to include recent factors, such as the economic climate and increased interest in the environment. This Outcome also includes gaining an overview of the changing face of recreation and developments in the activities available.

In Learning outcome 2 learners gain an understanding of the factors influencing countryside recreation, and the impacts of countryside recreation on the environment. In undertaking this the learners will gain a thorough understanding of the issues surrounding countryside recreation and the uptake of activities.

In Learning outcome 3 the learners gain an understanding of some of the key organisations involved with countryside recreation provision and planning and the roles and responsibilities of these organisations. This outcome would benefit from visiting speakers from those key organisations visits and web based research.

In Learning outcome 4 learners are required to research, observe and evaluate participation in countryside activities. This outcome will help support independent learner through the research, communication skills through speaking to participants and evaluation techniques through collecting feedback and reflection on the activities observed. The activities should be agreed between the learner and the tutor and be relevant to the qualification pathway. This outcome will help the learner to develop their knowledge and skills in activities that may offer career or progression opportunities.

Suggested learning resources

Books

Market research for countryside recreation
Published by: Countryside Commission, 1996
ISBN-10: 0861704657
ISBN-13: 978-0861704651
Countryside Commission

Countryside recreation, access, and land use planning
Published by: Spon, 1994
ISBN-10: 0419155503
ISBN-13: 978-0419155508
Curry, N

Countryside recreation – a handbook for managers
Published by: Spon, 1994
ISBN 0203992806,
ISBN 9780203992807
Bromley, P

Countryside recreation
Published by: Longman, 1991
ISBN-10: 0582050359
ISBN-13: 978-0582050358
Glyptis, S

Leisure marketing
Published by: Longman, 1992
ISBN-10: 0582093716
ISBN-13: 978-0582093713
Leadley, P

Car parks in the countryside: a practical guide to planning, design, and construction
SNH
Published by: Scottish Natural Heritage, 2000
ISBN: 1 85397 087 5 B

Countryside recreation in a changing society
Published by: TMS partnership ltd 1991
ISBN: 1 872256 26 0
Harrison, C

Countryside Recreation Site Management: A Marketing Approach
Published by: Routledge 2002
ISBN-10: 041524885X
ISBN-13: 978-0415248853
Ian Keirle

Websites

Scottish Natural Heritage (car park planning, design, construction)

	http://www.snh.gov.uk/publications-data-and-research/publications
Outdoor recreation network	http://www.outdoorrecreation.org.uk/
Sports and recreation alliance	http://www.sportandrecreation.org.uk/
Basc (the recreational value of shooting)	http://basc.org.uk/wp-content/uploads/downloads/2014/07/The-Value-of-Shooting2014.pdf
DCMS	https://www.gov.uk/government/organisations/department-for-culture-media-sport
Scottish natural heritage (furniture design sheets)	http://www.snh.org.uk/publications/online/accessguide/design_sheets.asp
Sport England (recreation planning guidance)	http://www.sportengland.org/facilities-planning

Unit 306

Principles of physical and biological environmental processes

UAN:	K/507/7092
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for learners to understand where life exists, and the consequent land usage, dependant on the geology, climate and water availability.

The unit introduces climate and weather and the importance of the water cycle in the development of rocks and soils. This leads into how the different rocks and soils support a range of habitats and their prevalence in the British Isles. In turn these habitats support a range of industries and activities of interest to the learner including Countryside activities, Game management and Fishery management.

Learning outcomes:

In this unit, learners will be able to

1. Recognise the scientific principles and processes that influence weather and climate
2. Know the physical and biological processes within the lithosphere
3. Understand the biological processes within the biosphere
4. Relationship between environmental processes and land use

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Recognise the scientific principles and processes that influence weather and climate

Topics

1.1 Weather and climate

1.2 Water and the hydrological cycle

Topic 1.1

The learner will know the processes that influence the climate and weather in the earth-atmosphere system:

- statistics of temperature
- humidity
- atmospheric pressure
- wind
- rainfall.

Topic 1.2

The learner will be able to describe:

- the physical properties of water
- the biological properties of water
- the processes involved in each phase of the hydrological cycle.

Learning outcome:

2. Know the physical and biological processes within the lithosphere

Topics

2.1 Origins and characteristics of rocks

2.2 Factors affecting soil composition and formation

2.3 The distribution of major rock and soil types found in the British Isles

Topic 2.1

The learner will know the origins and characteristics of rocks:

- sedimentary
- lithification
- Igneous
- metamorphic.

Topic 2.2

The learner will explain factors affecting soil composition and formation:

- soil particles:
 - clay
 - sand
 - silt

- organic matter
- soil profiles
- erosion
- leaching (eg; eluviation and illuviation, podsolisation, gleying).

Topic 2.3

The learner will know the distribution of the major rock and soil types in the British Isles.

Learning outcome:

3. Understand the biological processes within the biosphere

Topics

3.1 Biotic

3.2 Energy transfers in plants and animals

Topic 3.1

Photosynthesis: process for photosynthesis.

respiration: definition of aerobic and anaerobic respiration.

Topic 3.2

Carbon and nitrogen cycles, food chains and food webs.

Learning outcome:

4. Relationship between environmental processes and land use

Topics

4.1 Land cover

4.2 Land use

4.3 Future land use

Topic 4.1

Environmental processes and land cover (eg; moor, rivers, lakes, mountains, forests, woodland, arable, grassland).

Topic 4.2

Environmental processes and land use (eg; Country Parks, Wildfowl centres, Hill walking, Grouse moors, Deer stalking, Chalkstream angling, Stillwater angling).

Topic 4.3

Environmental changes and future land use (impact of eg; acidification, desertification, species destruction, succession and colonisation).

Guidance for delivery

This unit will provide the learner with an introduction to the natural environment and how the planet works. This is fundamental to understanding the limited nature of natural resources by looking at how they are formed. Where life exists, and consequent land usage, depends on the geology,

climate and water availability. By looking at the physical processes of rock formation and erosion, moving toward soil formation, the unit will cover how weather and climate influence the plants and animals that exist within a particular habitat. Learners will learn through formal lectures, as well as field trips and should be able to carry out appropriate field work within this unit.

In Learning outcome 1 learners will be taught about weather systems, how they are measured and the resultant climates as well as the movement of water round the planet.

In Learning outcome 2 learners will investigate the distribution of Britain's underlying geology explaining how rocks and soils are formed. It may be supported by carrying out a local soil survey to explore how the soil has been formed and what parent rocks may have been involved.

In Learning outcome 3 knowing how the biosphere transmits energy via photosynthesis and respiration so that learners can investigate the movements of the elements nitrogen and carbon within the biosphere and so bring together the building blocks of life. This leads into an understanding of food chains and food webs.

In Learning outcome 4 learners will be able to link the environment to their chosen pathway of study and why activities (eg angling, fish farming, shooting, deer stalking, rock climbing, bird watching etc) take place in different areas and regions of the British Isles. Learners will be expected to consider how human activity (eg fossil fuel use, erosion, building) may alter the environment and future use of the land.

By the end of the unit the learner will have knowledge and understanding of environmental processes and the environmental impacts of human activities on the planet.

Suggested learning resources

Books

- | | |
|--|------------|
| The Earth System
Published by: Prentice Hall, 3 rd edition, 2009
ISBN-10: 0321597796
ISBN-13: 978-0321597793 | Kump et al |
| Basic Environmental Science
Published by: Routledge, 2 nd edition, 2000
ISBN 0415211765 | Allaby, M |

Unit 307

Woodland habitat management

UAN:	Y/507/4642
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is to provide learners with an understanding of the principles of woodland habitat management and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The aim of this unit is to provide learners with the ability to recognise the features of woodland habitats and the skills required for their management.

Learning outcomes:

In this unit, learners will be able to

1. Understand the historical development of woodland
2. Survey the structures and features within a woodland ecosystem
3. Understand the management of woodland habitats
4. Manage woodland habitats.

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcomes:

1. Understand the historical development of woodland

Topics

- 1.1 Historical influences that have created the current level of woodland cover in the UK
- 1.2 The development of woodland types and management systems
- 1.3 Historic features within woodland

In this outcome learners will explore how woodland management has evolved over the years and be able to explain the development of differing management systems. Learners will be able to identify and compare historic features which may be present and be able to discuss historical features that have shaped woodland cover in the UK.

Topic 1.1

Learners will discuss the historical human and abiotic influences which have shaped woodland cover across the UK including areas such as:

- the Vera Hypothesis
- the ice age
- wildwood
- Mesolithic
- Neolithic
- Bronze Age
- Iron Age
- Roman,
- Domesday Book
- Middle Ages
- Industrial Revolution
- First World War
- Forestry Commission
- the Second World War
- post-war destruction 1950s and 60s greening and Forestry expansion including recent community forest initiatives.

Topic 1.2

Learners will understand and categorise woodland types and discuss the development of management systems including succession, National Vegetation Classification (wet woodlands, lowland, upland and scrub communities), ancient woodlands, ancient semi-natural, primary and secondary as well as systems such as coppicing, coppice with standards, wood pastures, pannage and wooded common.

Topic 1.3

Learners will identify and compare any historic features found within woodlands including:

- woodland name

- boundary shape
- wood banks
- out-grown hedges
- ditches
- pits
- charcoal hearths
- saw pits
- tracks
- indicator species.

Learning outcomes:

2. Survey the structures and features within a woodland ecosystem

Topics

2.1 Carry out woodland survey

2.2 Report on structures and features of a woodland ecosystem

2.3 Summarise the ecological importance of a woodland

In this outcome learners will be able to carry out a woodland survey using specific techniques and report on structures and features recorded. Learners will also explore how different woodlands vary.

Topic 2.1

Learners will carry out a woodland survey and record the following data:

- risk assessment: identification of potential risks and hazards, severity of potential injury (hazard), likelihood of harm (risk), control methods to minimise or avoid risk
- quantitative data collection (for example quadrats and simple line transects)
- qualitative data collection (quality of habitat, species distribution)
- species identification (flora and fauna)
- Stand composition
- Woodland canopy structure
- Abiotic and biotic factors influencing species abundance and diversity
- Archaeological and historic features
- record, map and present information from surveys in various forms (written, data and pictorial) graphs, pie chart and basic statistics etc.

Topic 2.2

Learners will report on the ecological structure of a woodland including ground stand composition, the shrub, sub and upper canopy. Learners will also report on the archaeological and historic features as identified in Topic 1.3 such as woodland name, boundary shape, wood banks, out-grown hedges, ditches, pits, charcoal hearths, saw pits, tracks and indicator species.

Topic 2.3

Learners will summarise the ecological importance of a selected woodland including, main habitat types present. Micro and mosaic habitats, species abundance/diversity and regionally or internationally significant flora and fauna.

Learning outcomes:

3. Understand the management of woodland habitats

Topics

3.1 Different woodland habitats and relevant management techniques

3.2 Equipment and resources for practical management of woodland habitats

In this outcome learners will examine a range of woodland habitats including different techniques employed in their management. Learners will also prepare for the practical management of woodland habitats including equipment and resources.

Topic 3.1

Learners will recognise different woodland habitats including:

- Glades
- Rides
- woodland edges
- veteran trees
- veteranisation
- deadwood
- ponds
- streams
- bog
- thicket and dense shade etc.

Learners will also recognise relevant management techniques including areas such as:

- management plans
- health and safety
- planting/sowing (trees, shrubs and ground flora)
- natural regeneration
- thinning
- clearance
- coppice
- agroforestry
- silvicultural systems.

Topic 3.2

Learners will understand both equipment and resources for the practical management of woodland habitats including:

- personal Protective Equipment (PPE) (eg boots, safety helmet, waterproof clothing and gloves etc.)
- first aid kit
- planting equipment
- fencing equipment
- pruning equipment
- saw
- tools for vegetation clearance
- coppicing tools
- maintenance (eg cleaning, oiling, sharpening).

Learning outcomes:

4. Manage woodland habitats

Topics

4.1 Recommend improvements to the management of woodland habitats

4.2 Produce method statements for improvements to the management of woodland habitats

4.3 Carry out practical management of woodland habitats

In this outcome learners have the opportunity to safely carry out practical management of a woodland habitat. Learners will have an understanding of management plans, including suitable aims and objectives and be able to recommend improvements to the management of woodland habitats.

Topic 4.1

Learners will recommend improvements to the management of woodland habitats covering areas such as:

- increased diversity and habitat creation through ride management
- scalloping
- ecotones
- veteranisation
- dead wood management
- invasive species control
- sustainable management
- waste management.

Topic 4.2

The learner will produce method statements for improvements to the management of woodland habitats

Topic 4.3

Learners will safely carry out practical management of woodland habitats, such as:

- planting/sowing (trees, shrubs and ground flora)
- thinning
- clearance
- coppice
- glade creation
- pond creation
- dead wood introduction
- bird boxes
- bat boxes.

Guidance for delivery

This unit is designed to provide the learner with sound knowledge and skills required to recognise features of woodland habitats and prepare, plan and undertake practical management of woodland habitats. Learners will develop an understanding of the historical influences that have affected woodland cover and understand the range of woodland habitats present today. An understanding of the management techniques available for woodland habitats will be developed along with the opportunity to put some techniques into practice. The unit should cover a wide range of possible activities and potential sites.

Throughout the unit the emphasis should be on safe working and sustainability. It is expected that learners will be aware of safe working practices and be familiar with accepted practices and behaviours within the context in which they are working. The importance of sustainable practices should be woven into the delivery throughout.

This unit aims to extend the learners knowledge and skills involved with woodland habitat management. Emphasis should be placed upon the importance of planning and health and safety. Centres are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of woodlands to add depth to the learner experience and put practices into context.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are they are linked directly with interactive lessons in a real environment. Learners must be given the opportunity to deal with a range of activities in different situations that reflect current industry trends.

Suggested learning resources

Books

Tree Planting and Aftercare: A Practical Handbook Published by: BTCV, 2001 ISBN: 0946752257	Agate, E
Woodlands: A Practical Handbook Published by: BTCV, 2002 ISBN: 0946752338	Agate, E
Waterways & Wetlands: A Practical Handbook Published by: BTCV, 2001 ISBN: 0946752303	Agate, E & Brooks, A
A Handbook of Native Trees and Shrubs Published by: New Holland Publishers, 2004 ISBN: 1843306069	Bedoyere, C
Portrait of a Woodland: Biodiversity in 40 Acres Published by: Search Press, 2004 ISBN: 1844480135	Bedoyere, C
Managing Your Woodland for Wildlife Published by: Pisces Publications, 2010 SBN-10: 1874357455	Blakesley, D & Buckley, P
Ecology and Management of Coppiced Woodlands Published by: Kluwer Academic Publishers, 1992 ISBN: 0412431106	Buckley, G
Hampshire Countryside Heritage 2: Ancient Woodland	Colebourne, P; Court, N & Howe, J

Published by: Hampshire County Council, 1995
ISBN-10: 0900908750

The Management of Semi-Natural Woodlands
Published by: Forestry Commission, 1997
ISBN: 0855382600
Forestry Commission

The management of semi-natural woodlands: 3. Lowland mixed broadleaved woods
Published by: Forestry Commission, 1994
Forestry Commission

The Management of Semi-natural Woodlands - 1. Lowland Acid and Oak Woods
Published by: Forestry Commission, 2003
Forestry Commission

Managing Ancient and Native Woodland in England
Published by: Forestry Commission England, 2010
Forestry Commission

Managing Native Broadleaved Woodland
Published by: TSO, 2010
ISBN-10: 011497344X
Harmer, R; Kerr, G & Thompson, R

Wildlife Conservation in Managed Woodlands and Forests. 2nd ed.
Published by: Research Studies Press, 2003
ISBN: 0863802060
Harris, E & Harris, J

The Identification of Soils for Forest Management
Published by: Forestry Commission, 2002
ISBN: 0855385596
Kennedy, F

Woodland Conservation and Management. 2nd ed.
Published by: Springer, 1993
ISBN: 0412557304
Peterken, G

The History of the Countryside
Published by: J.M. Dent, 1996
ISBN-10: 1842124404
Rackham, O

Woodland
Published by: Collins, New Naturalist, 2006
ISBN-10: 0007481047
Rackham, O

Trees and Woodland in the British Landscape
Published by: Dent, 2010
ISBN-10: 1842124692
Rackham, O

Trees and Woodlands in the British Landscape: The Complete History of Britain's Trees, Woods and Hedgerows
Published by: Orion Publishing, 2001
Rackham, O

ISBN: 1842124692

Woodland Habitats
Published by: Routledge, 1999
ISBN: 0415180902

Read, H & Frater, M

Wildlife Rangers' Handbook
Published by: The Stationery Office Books, 1994
ISBN: 0117103268

Springthorpe, G & Myhill, N

Woodland Management - A Practical Guide
Published by: The Crowood Press Ltd, 2005
ISBN-10: 1847976174

Starr, C

Woodland Rides and Glades: Their Management for Wildlife, 2nd Edition

Published by: Joint Nature Conservation Committee, 1993
ISBN: 1873701330

Warren, M & Fuller, R

Woodland Management and Conservation
Published by: David & Charles PLC, 1990
ISBN: 0715393294

Watkins, C

Journals and magazines

- British Wildlife
- Quarterly Journal of Forestry

Websites

The Forestry Commission	www.forestry.gov.uk
Natural England	www.naturalengland.org.uk
The Royal Forestry Society	www.rfs.org.uk
The Woodland Trust	www.woodlandtrust.org.uk

UAN:	T/507/7094
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to pest and predator control skills and understanding and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

Control of pests and predators is an integral part of good countryside management. The ability to eliminate and deter unwanted animals can benefit natural ecological preservation as well as the man-made environment. The ability to efficiently control pests and predators in accordance with relevant legal obligations is a sought after skill.

Learning outcomes

In this unit, learners will be able to

1. Know the principal UK pest and predator species and their legal status
2. Understand the ecology of common UK pest and predator species
3. Control pests and predators

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Know the principal UK pest and predator species and their legal status

Topics

- 1.1 UK pest and predator species
- 1.2 Tracks and signs of locally occurring pests and predators
- 1.3 Locally occurring pests and predators
- 1.4 Level of protection afforded to a range of pest and predator species

Topic 1.1

The learner will know the principal UK pest and predator species eg:

- Fox
- Badger
- Stoat
- Weasel
- Mink
- Polecat
- pine marten
- otter
- rat
- rabbit
- house mouse
- grey squirrel
- cat (domestic, feral & wild)
- crow (carrion and hooded)
- rook
- magpie
- jackdaw
- jay
- raven
- buzzard
- sparrow hawk
- tawny owl
- hen harrier
- goshawk
- peregrine falcon
- woodpigeon
- canada goose.

Topic 1.2

The learner will know the tracks and signs of locally occurring pests and predators eg (as appropriate to the species):

- Faeces
- Footprints
- homes/nests
- fur/feathers
- evidence of kills
- smell.

Topic 1.3

The learner will know how to survey a areas to identify locally occurring pests and predators:

- Faeces
- Tracks
- Browsing
- Fraying
- bark stripping
- ground flora degradation
- loss of habitat structure
- road traffic collisions
- crop damage.

Topic 1.4

The learner will know the level of protection afforded to a range of pest and predator species eg:

- Wildlife & Countryside Act 1981
- Annual General Licence to kill
- take or disturb birds
- Protection of Badgers Acts.

Learning outcome:

2. Understand the ecology of common UK pest and predator species

Topics

2.1 Ecology of avian pest or predator species

2.2 Ecology of mammalian pest or predator species

Topic 2.1

The learner will understand the ecology of avian pest or predator species:

- Ecology:
 - Life-cycle especially breeding behaviour
 - distribution and preferred habitats
 - population status
 - diet
 - impact and damage caused as a pest/predator
- Avian eg:
 - Crow
 - Magpie
 - Buzzard
 - sparrow hawk

- wood pigeon
- red kite
- tawny owl
- Canada geese
- Rooks
- Goshawk
- Jay
- peregrine falcon
- jackdaw
- raven
- hen harrier.

Topic 2.2

The learner will understand the ecology of selected mammalian pest or predator species:

Mammalian:

- Fox
- Rat
- Badger
- Stoat
- Mink
- Rabbit
- grey squirrel
- weasel
- cats
- polecat
- pine marten
- otter
- hedgehog.

Learning outcome:

3. Control pests and predators

Topics

3.1 Correct control of pests and predators using lethal methods

3.2 Deterring pests and predators using non-lethal methods

Correct methods must be applied according to any relevant legislation and codes of practice for each control method. Correct methods should also include best practice techniques as undertaken by professional pest controllers and gamekeepers and should include field craft required to improve catch rates.

Topic 3.1

The learner will undertake the correct methods of control pest and predators using lethal method, eg:

- Spring traps - Fenn, Magnum, Kania, and DOC traps plus any other relevant ones listed on the most recent edition of the Spring Traps Approval Order
- Snares - Fox and rabbit
- Live catch traps - Larsen, ladder/crow cage, and mink rafts

- Rodenticides - Any second generation anticoagulant rodenticide approved for use outdoors.
- Metallic Phosphides - Talunex and Phostoxin
- Firearms - Lamping, Sitting-Out, Bolting, Driven, Decoying, Ad hoc shooting
- Domestic animals - Dogs, Ferrets, Birds of Prey.

Topic 3.2

The learner will understand how to deter pest and predators using non-lethal methods eg:

- Exclusion
- Audible
- Visual
- Scent
- Taste
- Electrical
- diversionary feeding
- habitat manipulation.

Guidance for delivery

This unit is designed to provide the learner with sound knowledge and skills required to control the effects of vertebrate pests and predators. Throughout the unit, the emphasis should be on safe working and the humanitarian application of effective control techniques. It is expected that learners will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working.

Learning outcomes 1 and 2 cover the identification and ecology of the common vertebrate pests and predators likely to be encountered in the UK. These will include agricultural pests as well as those pests and predators related to game and wildlife management. The legal status of species is considered, together with the relevant legislation. The basic process of identification using size, colour, signs, and tracks is also covered as well as species ecology, breeding, habitat and populations. Populations of pests and predators on given sites will be determined by surveys. These fundamental elements can then be transposed across all the other related species studied. Deer are not studied in this unit, as this topic is covered in 'Understand Deer Management'.

In Learning outcome 1, learners must be able to identify the main UK pest and predator species either in pictorial form or as physical specimens. They must also be familiar with the tracks and signs of locally common pest and predator species. This knowledge should be used to survey a local area to identify the presence of common pests and predators.

Learning outcome 2 requires learners to explain the ecology of selected avian and selected mammalian pest or predator species. Tutors should identify the species or agree them through discussion with the learners.

Learning outcome 3 looks in more detail at lethal control techniques, the variety of traps and methods available, their specific uses, and related legislative obligations and codes of practice. The setting and positioning of lethal control methods is covered, and this unit should be delivered in a practical setting. For Learning outcome 3 learners are required to demonstrate an understanding of the correct methods of controlling pests and predators using selected lethal methods. All activities should be completed with regard to the appropriate health and safety risk assessments and practices, and should be consistent with relevant legislation and codes of practice.

Learning outcome 3 also covers the use of non-lethal techniques to prevent damage from pests and predators, and determines their effectiveness. It covers their use and related codes of practice and legislation. This is a vital measure when considering the number of protected species that can have an impact on game and wildlife populations, and the use of deterrents in situations where lethal control is difficult or unnecessary. In Learning outcome 3 learners should be encouraged to review the effectiveness of a range of deterrents in common usage and should demonstrate an understanding of what affects their effectiveness.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for teachers to develop a method of maintaining contact with a range of employers in the sectors may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

Suggested learning resources

Books

Animal Tracks and Signs Published by: Oxford University Press, 2001 ISBN: 0198507963	Bang, P & Dahlstrom, P.
Animal Traps and Trapping Published by: Stackpole Books. 1982 ISBN: 0811701037	Bateman, J.
Foxing with Lamp and Rifle Published by: Foxearth Publishing, 2001 ISBN: 0954020606	Bucknell, R
Rabbiting with Ferret, Dog, Hawk and Gun Published by: The Crowood Press, 2005 ISBN: 978-1861268020	Frain, S
Fox Control Published by: Quiller Publishing Ltd., 2006 ISBN: 978-1904057819	Frain, S
Practical Pest Control in the Countryside Published by: Coch-y-Bonddu, 1998 ISBN: 978-0952851080	Hogg, G
Modern Vermin Control, 3 rd edition Published by: Gold Cockerel Series, 2001 ISBN: 978-0947870041	Roberts, M

Websites

The Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Welsh Assembly Government	www.wales.gov.uk
Scottish Executive Environment and Rural Affairs Department	www.scotland.gov.uk
Department of Agriculture and Rural Affairs Northern Ireland	www.dardni.gov.uk
National Gamekeepers Organisation	www.nationalgamekeepers.org.uk
The British Association for Shooting and Conservation	www.basc.org.uk
The Game Conservancy Trust	www.gwct.org.uk

DVD

Trapping Techniques: Part 1 - Moles, Squirrels, Rabbits and Mink, Countryman Pest Control, Steve Caple, 2002

UAN:	J/507/7097
Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of the principles of using firearms in the land-based sector and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

In the land-based industries, firearms are an essential tool, used for recreational purposes on inanimate targets as well as for culling of species where other methods are not appropriate or legal. Practice on inanimate targets is essential before shooting live targets, ensure that culling is humane and efficient.

Recreational target shooting is a rapidly expanding sport and can offer diversification opportunities for landowners. Similarly, game and rough shooting opportunities are increasingly in demand and have become important sources of income. Culling of deer is essential for the maintenance of healthy deer populations that are in balance with their environment, and shooting is the only widely used legal method of culling.

Learning outcomes

In this unit, learners will be able to

1. Understand shotgun parts, ammunition, ballistics and legislation
2. Use shotguns safely and efficiently
3. Know rifle parts, ammunition, ballistics and legislation
4. Use rifles safely and efficiently

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand shotgun parts, ammunition, ballistics and legislation

Topics

1.1 Working parts of a shotgun

1.2 Shotgun ballistics

1.3 Types of and variations in shotgun ammunition

1.4 Legislation controlling the use, ownership and storage of shotguns.

Topic 1.1

Learners will know the working parts of a shotgun (As appropriate to action).

Action Types eg:

- Semi-auto
- pump action
- over and under
- side by side
- hammer guns.

Stock to include:

- Butt
- Comb
- Grip.

Action to include:

- safety catch
- barrel selector
- top lever
- trigger
- trigger guard
- locks
- hammers/tumblers
- firing pins receiver
- magazine
- bolt
- ejector port
- holding open device
- bolt release catch.

Barrels to include:

- extractors/ejectors

- chamber
- bore
- choke or multi-choke
- top rib
- mid rib
- bead.

Topic 1.2

The learner will know simple shotgun ballistics:

Internal Ballistics:

- Effect of barrel walls on lead shot
- choking restrictions
- forcing cone.

External ballistics:

- effect of shot size
- distance and choke on pattern
- shot velocities.

Terminal Ballistics:

- Effect of lead vs steel
- wound paths
- max effective killing range
- fall out range of shot.

Topic 1.3

Learners will know types of and variations in shotgun ammunition:

- Bores, eg: 10, 12, 16, 20, 28 and calculation method for bore size.
- Calibres, eg: .410", 9mm.
- UK Shot sizes, eg: Slugs, LG, SSG, AA, BB, 3, 5, 6, 7 7.5, 8, and dust. Lead and non-toxic shot.
- Wad types: photo-plastic, fibre.
- Cartridge components: crimp, head, primer, propellant, case.
- Cartridge lengths, eg: 2" (50mm), 2½" (65mm), 2¾" (70mm), 3" (75mm), 3½" (89mm).

Topic 1.4

Learners will understand the legislation controlling the use, ownership and storage of shotguns:

- The Firearms Act 1968, Firearms (Amendment) Act 1988, Firearms (Amendment) Act 1997, Firearms Acts (Amendment) Regulations 2010. Legal definition of a Shotgun.

Certificates: production on demand by police, role in transferring shotguns. Factors that preclude people from possessing certificates.

Transferring Shotguns: Different categories of transferring firearms and shotguns, need to inform police of transfer. Legal lending of shotguns, use of shotguns and rifles by non-certificate holders.

Storage: Shotguns.

Use: Shooting on private land, carrying shotguns in public places, shooting near roads, use at clubs or grounds. Restrictions created by age on the use of shotguns.

Learning outcome:

2. Use shotguns safely and efficiently

Topics

2.1 Ammunition selection for shotgun and target

2.2 Handle shotguns safely

2.3 Efficiently use shotguns

2.4 Clean shotguns

Topic 2.1

The learner will be able to use and select appropriate ammunition for shotgun and target:

- Interpretation of proof information on shotgun including:
 - chamber length
 - bore size
 - safe working pressure and choke
- Interpretation of cartridge information:
 - cartridge length
 - bore
 - shot type
 - pressure generation
- Variety of targets eg:
 - clay pigeons
 - wildfowl
 - game
 - pest birds
 - fox
 - ground game
 - pest mammals
- Understanding of reasons for checking cartridge selection:
 - Use of steel shot in non-steel proofed guns and tight chokes
 - Use of nitro powder in black powder proofed guns
 - Use of longer cartridges in shorter chambers
 - Mixing of 20 bore and 12 bore cartridges.

Topic 2.2

The learner will handle shotguns safely:

- Suitable Shotgun Actions:
 - Semi auto/Pump action
 - break barrel
- Pre shooting handling:
 - Carriage in slip
 - removal from slip
 - carriage out of slip un-loaded
- Condition checking:

- Pitting
- Dents
- Bulges
- lose actions
- non-functional parts of the action
- Loading shotguns:
 - Safe load
 - muzzle righting zone
 - reloading after shot
- Correct handling of Shotguns when eg:
 - rough shooting
 - shooting from a peg
 - shooting from a cage
 - shooting from a hide/butt
 - shooting from a vehicle
- Obstacle crossing:
 - on own
 - in company
- Unloading:
 - safe unload
 - condition check
 - re-placing in slip
- Actions on stoppage:
 - Misfire
 - Hangfire
 - barrel blockage
- Correct transport in vehicles when not shooting
- Muzzle Awareness.

Topic 2.3

The learner will efficiently use shotguns:

- Eye Dominance:
 - checking dominance
 - effect on shooting style
- Gun fit:
 - stock length
 - cast
 - combe height
- Body position:
 - Feet
 - weight distribution
- Mount:
 - Grip
 - gun movement
 - correct position in shoulder
 - cheek on comb
 - opening of eyes
- Shooting techniques:

- CPSA method
- maintained lead
- swing through
- Use of gun:
 - removal of safety catch
 - loading cartridges
 - shooting single targets
 - shooting pairs of targets
- Clay Pigeons eg:
 - Standards
 - Midi
 - Mini
 - Battue
- Targets:
 - Incoming
 - going away
 - crossing.

Topic 2.4

The learner will clean shotguns.

Safety checks before cleaning:

- stripping gun for cleaning
- cleaning bores/chokes
- cleaning action
- lubrication of metal parts
- maintaining wood
- re-assembly of shotguns
- safety inspection of estate/club guns under Provision and Use of Equipment at Work Regulation 1998.

Learning outcome:

3. Know rifle parts, ammunition, ballistics and legislation

Topics

3.1 Working parts of a rifle

3.2 Rifle ballistics

3.3 Types of and variations in rifle ammunition

3.4 Legislation controlling the use, ownership and storage of rifles

Topic 3.1

The learner will know rifle Working Parts (As appropriate to action):

- Action Types eg:
 - Bolt action
 - straight pull
 - semi-auto
 - falling block
 - air rifles

- Stock to include:
 - Butt
 - Comb/cheek rest
 - Grip
 - fore-end
- Action to include:
 - safety catch
 - bolt
 - firing pin
 - magazine
 - breech/ejector port
 - holding open device
 - bolt release catch
 - magazine release catch
- Trigger:
 - single stage
 - two stage
 - hair
 - set trigger guard
- Barrels:
 - Chamber
 - Lands
 - Rifling
 - Crown
 - Threads
- Sights:
 - Mounts
 - telescopic sights
 - open sights
- Accessories:
 - Sling
 - Bipod
 - muzzle break
 - sound moderator
 - lights.

Topic 3.2

The learner will know simple rifle ballistics.

Internal ballistics:

- rifle obturation
- rifle twist rates
- effect of speed and bullet weight on stability.

Intermediate ballistics:

- effect of rifle crown damage
- How moderators and muzzle breaks work.

External ballistics:

- trajectories graphs and ballistic arcs
- effect of wind on a bullet.

Terminal Ballistics:

- bullet expansion
- fragmentation
- hydrostatic shock
- cavitation and crushing
- bullet tumble.

Topic 3.3

The learner will know the types and variations in rifle ammunition.

How to interpret rifle ammunition naming. Imperial calibres; 177HMR, .22LR, .22-250rem, .243win, .308win etc. Metric calibres: 5.56X45 NATO, 6.5x55 Swedish etc.

Components: Cases; rim-fire, centre-fire, magnum, super short magnum. Components: rim/belt, flash hole, primer pocket, primer, propellant. Bullets: weights, Bullet types: full metal jacket, ballistic tip, soft point, hollow point, round nose, partition.

Topic 3.4

The learner will know the legislation controlling the use, ownership and storage of rifles:

- Legislation Violent Crime Reduction Act 2006, the Firearms Act 1968, Firearms (Amendment) Act 1988, Firearms (Amendment) Act 1997, Firearms Acts (Amendment) Regulations 2010.
- Legal definitions: firearm, air gun.

Certificates: production on demand by police, role in transferring firearms and ammo. Controls created by Firearms certificates on use of rifles/firearms; location of use, expanding ammo, targets allowed for firearm, ammo quantities, calibres allowed, sound moderator possession. Factors that preclude people from possessing certificates.

Transfer: Requirement for prior approval for firearms purchase. Different categories of transferring firearms, need to inform police of transfer. Lending: Estate rifle clause, club rifles, use of rifles by non-certificate holders.

Storage: Rifles, Rifle Ammo, rifle components, Air rifles.

Use: Shooting on private land, carrying firearms in public places, shooting near roads, use at clubs, grounds and ranges. Age: restrictions created by age on the use of firearms, shotguns and air rifles.

Learning outcome:

4. Use rifles safely and efficiently

Topics

4.1 Appropriate ammunition for a given rifle and target.

4.2 Safely handle rifles

4.3 Efficiently use rifles

4.4 Clean rifles

Topic 4.1

The learner will select appropriate ammunition for a given rifle and target.

Topic 4.2

The learner will handle Rifles safely:

- Suitable Rifle Actions:
 - Bolt action
 - Semi Auto
 - Straight Pull
- Pre shooting handling:
 - Carriage in slip/box
 - removal from slip/box
 - condition checking
 - fitting bolt
 - carriage out of slip un-loaded
- Loading Rifles:
 - safe load of magazine
 - under-loading
 - making ready
 - muzzle righting zone
- Correct handling of Rifles when eg:
 - stalking in open ground
 - stalking in woodlands
 - shooting from hide/high seat
 - shooting from a vehicle
 - Shooting at night (Lamping) and on ranges
- Considerations prior to taking a safe shot:
 - blind spot caused by height difference between telescopic sights and line of bore
 - distance rifle bullets travel without correct back stop
 - ricochet
- Obstacle crossing:
 - on own
 - in company
- Unloading:
 - safe unload
 - removal of bolt
 - condition check
 - re-placing in slip/box
- Actions on stoppage:
 - Misfire
 - hang fire
 - barrel blockage
- Correct transport in vehicles when not shooting
- Muzzle Awareness.

Topic 4.3

The learner will handle Rifles efficiently:

- Shooting positions:
 - Prone
 - Sitting
 - Kneeling
 - Standing
 - shooting from a bench
 - vehicle
 - high seat
- Rifle Zeroing:
 - mean point of aim
 - mean point of bullet impact
 - methods of aligning mean point of aim with mean point of impact
- Estimation of Distance:
 - Judgement of distance to targets
 - adjustment of point of aim to maintain accuracy at different distances
- Correction for Wind:
 - Estimation of wind speed and direction
 - adjustment of point of aim to maintain accuracy in windy conditions
- Shooting techniques:
 - Correct hold
 - eye relief from sights and sight picture
 - Testing and adjusting position, breathing, trigger operation, post trigger operation actions. Shooting with bipods, rests, sticks
- Grouping Analysis:
 - Causes of grouping patterns and corrections
 - vertical group – breathing
 - horizontal group – trigger squeeze
 - split group – movement between shots, pull shots.

Topic 4.4

The learner will clean rifles.

Safety checks before cleaning, cleaning bores, cleaning action, lubrication of metal parts, maintaining wood, cleaning optics, cleaning sound moderators, safety inspection of estate/club guns under Provision and Use of Equipment at Work Regulation 1998.

Guidance for delivery

In Learning outcome 1 the learner must be able to identify the component parts of shotguns and options within the associated shotgun ammunition. In addition the learner must be able to explain simple internal, external and terminal ballistics of the firearms. Learners must be provided with access to suitable shotguns to become familiar with the location and operation of component parts. In separate sessions learners should be able to identify from real life examples the variety of shotgun cartridges available in the UK. Then using a mix of theory and practical shooting experiments with pattern plates, chronographs, ballistic software and different shooting distances the learners should gain an understanding of how variations in ammunition/firearms type affects ballistic performance.

Learners should research the legislation associated with the use of shotguns. A scenario based approach may help learners relate the legislation covered to real world firearms use.

In Learning outcome 2 the learner is required to demonstrate the safe handling of a shotgun. This should begin with the learner being able to interpret shotgun proof information and select an appropriate cartridge for a given shotgun. The learner should be able to identify some issues with the incorrect selection of cartridges. The learner should then be able to safely load, handle, shoot and unload a shotgun. Where possible particular effort should be made to allow students to practice handling semi-automatic shotguns owing to their increased popularity. During the live firing the learner should be able to demonstrate applied knowledge of basis shotgun shooting techniques. This outcome must be delivered via practical sessions that allow the learner to gain hands on experience with shotguns. Particularly attention must be paid to safety in the delivery of this outcome, safe handling training must take place with snap caps or dummy rounds and small student to staff ratios must be employed to maintain legal and safety standards where non-certificate holders are being taught. The live firing element must take place in a coaching format in a clay ground environment.

In Learning outcome 3 the learner must be able to identify the component parts of rifles and options within the associated rifle ammunition. In addition the learner must be able to explain simple internal, external and terminal ballistics of the firearms. Learners must be provided with access to suitable rifles to become familiar with the location and operation of component parts. In separate sessions learners should be able to identify from real life examples the variety of rifle cartridges available in the UK. Then using a mix of theory and practical shooting experiments with targets, chronographs, ballistic software and different shooting distances the learners should gain an understanding of how variations in ammunition/firearms type affects ballistic performance. Learners should research the legislation associated with the use of rifles. A scenario based approach may help learners relate the legislation covered to real world firearms use.

In Learning outcome 4 the learner is required to demonstrate the safe handling of a rifle. The learner should be able to safely load, handle, shoot and unload a rifle. Where possible particular effort should be made to allow students to practice handling rifles shooting from vehicles and at night as these are increasing popular methods for pest control and have had recent fatal accidents associated with them. During the live firing the learner should be able to demonstrate applied knowledge of basis shotgun shooting techniques. This outcome must be delivered via practical sessions that allow the learner to gain hands on experience with rifle. Particularly attention must be paid to safety in the delivery of this outcome, safe handling training must take place with dummy rounds and small student to staff ratios must be employed to maintain legal and safety standards where non-certificate holders are being taught. The live firing element must take place in a coaching format on a home office approved range where firearms rifles are used with learners under the age of 17 without their own firearms certificate. Where this legal clause cannot be met learners should be assessed using air rifles.

Employer Engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for lecturers to develop a method of maintaining contact with a range of employers in the sectors may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

This unit has the possibility to involve employers through visits to professional clay ground and rifle ranges. Visits or practical work placements to shooting estates or pest controllers could help put the learning into context and broaden the learner's experience of firearms use.

Suggested learning resources

Books

- The BASC Handbook of Shooting: An Introduction to the Sporting Shotgun
British Association for Shooting and Conservation (BASC)
Published by: Quiller Publishing Ltd., 6th edition, 2010
- Smallbore Rifle Shooting: A Practical Guide
Published by: The Crowood Press Ltd, Ramsbury, 2010
Fenning, C
- The Sporting Rifle: A User's Handbook
5th ed. Shropshire: Quiller Publishing, 5th edition, 2009
Marshall-Ball, R
- Fair Game: The Law of Country Sports and the Protection of Wildlife
Published by: Pelham Books, 3rd edition, 1997
Parkes, C & Thornley, J
- Practical Ballistics: An Introductory Guide for Rifle and Shotgun Shooters
Published by: The Crowood Press Ltd, Ramsbury, 2014
Potter, L
- Sporting Rifles
Published by: The Crowood Press Ltd., Ramsbury, 2009
Potts, B

Websites

- BASC Firearms Department Guidance <http://basc.org.uk/firearms/guidance-and-fact-sheets/>
- BASC Air Rifle Code of Practice <http://basc.org.uk/airgunning/basc-air-rifle-code-of-practice/>
- BASC Lamping (Night Shooting) Code of Practice
<http://basc.org.uk/cop/lamping/>
- Scottish Deer Management Group Firearms Best Practice Guide
<http://www.bestpracticeguides.org.uk/guides/firearms-intro>
- The CPSA Clay Target Shooter's Handbook
<https://www.cpsa.co.uk/userfiles/file/CTSH.pdf>

Journals and Magazines

- Shooting Times and Country Magazine
- Sporting Gun
- Sporting Rifle
- British Association for Shooting and Conservation - Shooting and Conservation Magazine
- Clay Pigeon Shooting Association - Pull Magazine

Unit 310

Undertake estate skills

UAN:	K/507/4645
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is to introduce learners to common estate skills and knowledge and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or into further/higher education.

The learner will look at constructing, repairing and maintaining boundaries, structures and surfaces. They will build their experience and confidence in developing practical skills in a range of situations. The learner will be able to contextualise practical management work to a particular habitat that lies within their primary area of learning.

Learning outcomes

In this unit, learners will be able to

1. Construct, repair or maintain boundaries
2. Construct, repair or maintain structures
3. Construct, repair or maintain surfaces
4. Carry out practical habitat management work

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome

1. Construct, repair or maintain boundaries

Topics

- 1.1 Types of boundaries
- 1.2 Prepare for work on boundaries
- 1.3 Select equipment and materials
- 1.4 Construct, repair or maintain boundaries

In this outcome learners will develop the practical skills needed to construct, repair or maintain at least **two** different boundaries.

Topic 1.1

Learners will know the types of boundaries, e.g.

- hedge, bank, ditch
- fence (post and rail, post and wire, electric, netting)
- wall (stone, brick).

Topic 1.2

Learners will plan the task, clear debris and prepare the site, ensure livestock and public safety, consider factors associated with the location (e.g. power supply, waste disposal, equipment and materials storage).

Topic 1.3

Learners will select materials and equipment relevant to the task, taking into account health and safety, sustainable practice and cost implications.

Topic 1.4

Learners will undertake the task safely (e.g. implementation of risk assessment and appropriate Personal Protective Equipment (PPE)) and to the required standards.

Learning outcome

2. Construct, repair or maintain structures

Topics

- 2.1 Types of structures
- 2.2 Prepare for work on structures
- 2.3 Select equipment and materials
- 2.4 Construct, repair or maintain structures

In this outcome, learners will construct, repair or maintain at least **two** different structures. These may typically be constructed from wood, metal, stone or brick. Learners are not expected to be able to fully construct substantial structures such as animal or machinery housing, however, it is anticipated that delivery could include repair and maintenance of such larger structures as would

be found in an estate setting. Large structures requiring repair or maintenance may include animal house or pen, machinery or feed store, garden furniture, shed and pergola.

Topic 2.1

Learners will know the different types of structures e.g. gate, stile, horse jump, bird box, table, bench, door, raised bed, composting area or swim platform, animal house or pen, machinery or feed store, garden furniture, shed and pergola.

Topic 2.2

Learners will plan the activity, clear debris and prepare the site, ensure livestock and public safety, consider location factors (power supply, waste disposal, equipment and materials storage).

Topic 2.3

Learners will select materials and equipment relevant to the task, taking into account health and safety, sustainable practice and cost implications.

Topic 2.4

Learners will undertake the task safely (e.g. implementation of risk assessment and appropriate Personal Protective Equipment (PPE)) and to the required standards.

Learning outcome

3. Construct, repair or maintain surfaces

Topics

3.1 Types of surfaces

3.2 Prepare for work on surfaces

3.3 Select equipment and materials

3.4 Construct, repair or maintain surfaces

In this outcome learners are required to construct, repair or maintain **one** surface (e.g. path, road and hard standing) which could be either solid (e.g. decking, concrete and paving), or loose (e.g. gravel, wood chippings and sand). Where appropriate, learners should be aware of timeliness considerations, for example preparing concrete at the right time for construction.

Topic 3.1

Learners will know different types of surfaces, eg:

- solid (e.g. decking, concrete and paving)
- loose (e.g. gravel, wood chippings and sand).

Topic 3.2

Learners will plan the task, clear debris and prepare the site, ensure livestock and public safety, consider factors associated with the location (e.g. power supply, waste disposal, equipment and materials storage).

Topic 3.3

Learners will identify and select materials and equipment relevant to the task, taking into account health and safety, sustainable practice and cost implications.

Topic 3.4

Learners will undertake the task safely (e.g. implementation of risk assessment and appropriate

Personal Protective Equipment (PPE)) and to the required standards.

Learning outcome

4. Carry out practical habitat management work

Topics

- 4.1 Habitat management activities
- 4.2 Prepare for habitat management work
- 4.3 Select equipment and materials
- 4.4 Carry out practical habitat management work

In this outcome learners should be aware of time considerations for practical habitat management work, for example preparing concrete at the right time for construction.

Topic 4.1

Learners will know different types of activities required for habitat management, eg: mowing, renovation, tree and shrub planting, clearing unwanted vegetation, coppicing, pruning, thinning, pond, stream and ditch clearance, and control of invasive species.

Topic 4.2

Learners will plan the task, clear debris and prepare the site, ensure livestock and public safety, consider factors associated with the location (e.g. power supply, waste disposal, equipment and materials storage)

Topic 4.3

Learners will identify and select materials and equipment relevant to the task, taking into account health and safety, sustainable practice and cost implications

Topic 4.4

Learners will undertake the task safely (e.g. implementation of risk assessment and appropriate Personal Protective Equipment (PPE)) and to the required standards.

Guidance for delivery

This unit has a very practical focus, and aims to enable learners to develop estate skills which can be applied to a range of situations and circumstances. The unit has been written such that naturally occurring and locally relevant opportunities can be used in selecting sites, structures and surfaces to construct, repair or maintain.

As learners will be engaged in practical activity there should be an emphasis on safe working practices, including the use of appropriate personal protective equipment (PPE), and appropriate risk assessments should be undertaken. At Level 3 it is expected that learners will take an active part in completing risk assessments, so that this becomes an integral part of all practical activity. Learners should also be made aware of the impact on the environment, and sustainability concepts should also be demonstrated where possible.

Learners should have the opportunity to undertake estate skills activity in a land-based setting wherever possible to maximise the vocational relevance. It will be most beneficial if the structures, boundaries and surface selected are for a clear purpose above and beyond delivery of this unit. It is understood that there will not be opportunities to carry out construction, repair *and* maintenance in each of the categories, but it would be appropriate for the skills of construction, repair and maintenance to each be developed in one aspect of the unit.

It is anticipated that most delivery of this unit will take place in a practical setting, with supervised practice of skills. Delivery will also include some classroom based activity in ensuring learners have a good understanding of planning, materials selection and preparation, and underpinning knowledge.

Suggested learning resources

Books

Agate E (Ed), Brooks A and Adcock S (1999) *Dry Stone Walling: A Practical Handbook*. The Conservation Volunteers.

Agate E (2001) *Fencing: A Practical Handbook*. The Conservation Volunteers.

Agate E (2001) *Footpaths: A Practical Handbook*. The Conservation Volunteers.

Agate E and Brooks A (1998) *Hedging: A Practical Handbook*. The Conservation Volunteers.

Agate E (Ed) (2001) *Tree Planting and Aftercare: A Practical Handbook*. The Conservation Volunteers.

Agate E (2000) *Tool Care: A Maintenance and Workshop Manual*. The Conservation Volunteers.

Agate E (2001) *Waterways & Wetlands: A Practical Handbook*. The Conservation Volunteers.

Agate E (Ed) (2002) *Woodlands: A Practical Handbook*. The Conservation Volunteers.

Maclean M (2006) *Hedges and Hedgelaying – A Guide to Planting, Management and Conservation*. The Crowood Press.

Roberts, M. (1997) *Poultry House Construction*. Gold Cockerel Books

Roberts, M. (1999) *The Smallholder's DIY*. Gold Cockerel Books

Roberts, M. (2005) *Farm and Smallholder Fencing: A Practical Guide to Permanent and Electric Livestock Fencing on the Farm and Smallholding*. Gold Cockerel Books

Stokes A (1999) *Health and Safety Overview for Practical Conservation Project: A Guide to Good Practice for Conservation Groups and Land Managers*. The Conservation Volunteers.

Websites

The Conservation Volunteers	www.tcv.org.uk
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Health and Safety Executive	www.hse.gov.uk
The Wildlife Trusts	www.wildlifetrusts.org
Forestry Commission	www.forestry.gov.uk

Unit 311

Water quality

UAN:	A/507/7095
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to skills and knowledge associated with water quality and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or on to further/higher education.

Learning outcomes

In this unit, learners will be able to

1. Understand physical, chemical and biological factors, which influence water quality and aquatic species
2. Measure water quality
3. Undertake recording and interpretation of water quality data
4. Understand the principles of water treatment

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand physical, chemical and biological factors, which influence water quality and aquatic species

Topics

- 1.1 The hydrological cycle
- 1.2 The impact of the physical environment on water quality
- 1.3 The impact of chemical and biological factors on water quality
- 1.4 The impact of changes in water quality on aquatic habitats, flora and fauna

Topic 1.1

Learners will know the definition of the hydrological cycle and know each phase (precipitation, condensation etc).

Topic 1.2

Learners will understand the effect of physical factors: (to include temperature, turbidity, suspended solids human activity, geographical features, surface & topographical features) on water quality.

Topic 1.3

Learners will understand the effect of Chemical factors: (to include alkalinity, ammonia, carbon dioxide, nitrates and nitrites, dissolved oxygen, pH, phosphates and hardness) and biological factors: (to include health of aquatic organisms, biological oxygen demand, micro-organisms, flora and fauna present in ecosystem) on water quality.

Topic 1.4

Learners will understand the impact of changes in water quality on aquatic habitats, and aquatic flora and fauna.

Learning outcome:

2. Measure water quality

Topics

- 2.1 Water quality analysis
- 2.2 Biological sampling of an aquatic habitat

Topic 2.1

Learners will measure basic water quality factors:

- Physical factors:
 - water quantity
 - flow (eg meters)
 - temperature (eg probes)
 - turbidity (eg light meter)
 - geographical features (eg satellite pictures)
 - surface topographical features
- Chemical factors (eg test kits):
 - dissolved oxygen
 - pH

- ammonia
- nitrite
- nitrate
- others eg hardness, chlorine, salinity.

Topic 2.2

Learners will collect and analyse biological samples from an aquatic habitat:

- Sampling methods, eg:
 - kick samples
 - dip nets
- Biological factors, eg:
 - indicator species
 - invertebrates
 - vertebrates
 - macrophytes
 - algae
 - biological oxygen demand
 - microbiological testing.

Learning outcome:

3. Undertake recording and interpretation of water quality data

Topics

3.1 Water quality survey of an aquatic habitat

3.2 Water quality report of an aquatic habitat

Topic 3.1

Learners will collect and analyse water quality data:

- Record and formulate data, eg:
 - weather conditions
 - disease treatments
 - husbandry factors
- Assess water quality in relation to biological indicators, commonly used to set environmental quality standards, eg:
 - River Invertebrate Prediction and Classification System (RIVPACS), Community Description Class (CDC) or Trent Biotic Index (TBI).

Topic 3.2

Learners will report on the water quality of an aquatic habitat and evaluate water quality data in terms of the quality of the environment for aquatic species, relate findings to current legislation, eg:

- Water Framework Directive.

Learning outcome:

4. Understand the principles of water treatment

Topics

4.1 Commonly used methods of water treatment.

4.2 Legislation impacting on water quality

Topic 4.1

The learner will understand the following commonly used methods of water treatment:

- Water treatment methods, eg:
 - Aeration

- ion exchange
- sedimentation
- biological filtration
- solids removal
- activated sludge techniques
- UV treatment
- *ozonisation: nitrogen and phosphorus removal*
- Algal control, eg:
 - Bacteria
 - sequence treatment.

Topic 4.2

The learner will understand how current legislation impacts on water quality and the need for water treatment in the fish management industry eg Water Framework Directive, Urban Waste Water Directive.

Guidance for delivery

This unit will be delivered through practical activities, theory sessions and visits to suitable aquatic habitats. The unit delivery will require the development of industry links through site visits and guest expert speakers, who will enrich the learning experience by talking about specific locations where water monitoring and treatment are used.

Unless the centre has a variety of water bodies on site, a lot of this unit will involve site visits, guest speakers and organised visits for practical work. However, theory can be delivered using a wide range of techniques including lectures, discussions, seminar presentations, supervised practical's and research using the internet and/or library resources.

Learning outcome 1 will provide the underpinning knowledge for the remainder of the unit and requires classroom delivery.

Learning outcome 2 should be taught practically and requires a given aquatic habitat (eg lake, river) for learners to familiarise themselves with and learn how to collect samples to assess water quality. Ideally the location will provide a range of sampling opportunities (eg sampling points above and below an outlet pipe). Analysis of samples are best done in a laboratory setting.

Site visits should be checked for suitability and a risk assessment of activities carried out. Industry partners that run estates and catchments can support practical's through expert guidance about the specific location, as well as sometimes being able to design sessions and practical work. Learners may have the opportunity to use different equipment and kick sample for small invertebrates, thus also having the opportunity to generate data and evidence.

Learners must become familiar with legal requirements and health and safety issues to consider when recording and checking water quality, for example safe levels of chemicals, invertebrate sampling, and government quality requirements.

Some of the techniques can be carried out by setting up a scenario in a laboratory or classroom if suitable equipment is available. Samples can be collected from a variety of sources and analysis completed in the classroom. The use of data logging equipment could be linked to a series of science-based lectures where, if in a college environment, science specialists may be able to help.

Learning outcome 3 requires the learners to produce a report based on water quality data, ideally this will be the data collected during Learning outcome 2.

Learning outcome 4 introduces the commonly used methods of water treatment and requires the learners to evaluate the effectiveness of a minimum of 3 different water treatment methods. Additionally learners are required to have knowledge of relevant legislation that impacts on water quality and the need for water treatment in the fish management industry. Visiting speakers or site visits would be valuable to contextualise the importance of complying with current legislation.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for teachers to develop a method of maintaining contact with a range of employers in the sectors may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

Suggested learning resources

Access to an aquatic habitat is essential so learners can experience the environments where water quality testing is carried out on a regular basis. Habitats that support small invertebrates would be preferable. The equipment required will include the normal safety gear used in laboratories and in the field; a range of dissolved oxygen meters, thermometers and chemical test kits; water sampling equipment; basic water flow measurement equipment; record keeping equipment and a calculator.

Tutors delivering this unit should be experienced in analysing water and evaluating the results in relation to the effects on aquatic life.

Books

The Interpet Manual of Fish Health, 2nd Edition Published by: Interpet Publishing, 2002 ISBN: 1842860674	Andrews, C; Carrington, N & Exell, A
Fundamentals of Aquatic Ecology, 2nd Edition Published by: Blackwell Science, 1991 ISBN: 0632029811	Barnes, R & Mann, K
Intensive Fish Farming Published by: Blackwell Science, 1992 ISBN: 063203467X	Bromage, N & Shepherd, C
Aquatic Weed Control Published by: Blackwell Science, 1988 ISBN: 0852381522	Seagrave, C
Water Quality and Fish Health Published by: FAO, 1993 ISBN: 9251034370	Svobodov, Z
Fresh water Fisheries Management, 2 nd Published by: Blackwell Science, 1995 ISBN: 085238209X	Edition Templeton R

Journals and magazines

- IFM

Websites

Centre for Environment Fisheries and Aquaculture Science	www.cefas.co.uk
Chartered Institution of Water and Environmental Management	www.ciwem.org
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
English Nature	www.english-nature.org.uk
Environment Agency	www.environment-agency.gov.uk
Fresh water Biological Association	www.fba.org.uk
Fish Base	www.fishbase.org
Fresh water Life	www.freshwaterlife.org
Health and Safety Executive	www.hsegov.uk
Institute of Fisheries Management	www.ifm.org.uk

UAN:	F/507/7096
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for learners to understand the principles of fish biology and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will understand the anatomy and physiology of fish, how an understanding of behaviour can be applied to fish management and the feeding and nutritional requirements of fish.

Learning outcomes

In this unit, learners will be able to

1. Understand the external and internal anatomy of fish
2. Understand the main processes of fish physiology
3. Understand the main processes of fish behaviour
4. Understand the main processes of fish nutrition

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the external and internal anatomy of fish

Topics

1.1 External features and functions of a fish

1.2 Internal features and functions of a fish

Topic 1.1

The learner will understand the external features of fish and their function:

- major external features:
 - skin, fins, eyes, nares, lateral line
 - types and functions of fish scales
 - fish ageing from scales, body shapes, changes in external features linked to environment and lifestyle of the fish
 - basic taxonomic classification of fish.

Topic 1.2

The learner will understand the main internal organs of fish and their function:

- position and function of internal organs:
 - reproductive, digestive, osmoregulatory and circulatory
 - normal or abnormal condition of internal organs
 - skeleton of teleost fish.

Learning outcome:

2. Understand the main processes of fish physiology

Topics

2.1 Function of physiological systems and sensory organs

2.2 Impact of environment on the physiological systems of fish

Topic 2.1

The learner will understand the main physiological systems and sensory organs of fish to include:

- circulatory
- digestive
- endocrine
- reproductive
- immune and nervous systems and osmoregulation
- respiration and excretion.

Topic 2.2

The learner will understand the impact of the environment on the physiological systems of fish eg:

- temperature
- water quality

- stress
- angling pressure.

Learning outcome:

3. Understand the main processes of fish behaviour

Topics

3.1 Normal behaviour in fish

3.2 Abnormal behaviour in fish

Topic 3.1

The learner will understand normal behaviour in fish, including:

- swimming
- feeding
- display
- breeding
- escape response.

Importance in relation to fish health and welfare issues; behaviour seen at points within the life cycles of fish.

Topic 3.2

The learner will understand abnormal behaviour and the causes that lead to abnormal behaviour, eg:

- presence of predators
- ill health
- water quality
- remedial action to alleviate abnormal behavior
- significance of abnormal behavior.

Learning outcome:

4. Understand the main processes of fish nutrition

Topics

4.1 Principles of fish nutrition

4.2 Fish feeding regimes

Topic 4.1

The learner understand the main components of fish nutrition and their roles:

- Proteins
- Fats
- Carbohydrates
- vitamins and minerals
- symptoms of deficiencies and excesses
- factors influencing the nutritional requirements and how they change with the fish and environmental conditions.

Topic 4.2

The learner will understand the fish feeding regimes and how they are developed. The learner will assess the efficiency of food usage and know methods used to produce fish food.

Guidance for delivery

On completion of this unit, the learner will have developed an understanding of the biology of fish, through knowledge of their structures and physiology. Learners will be able to apply this knowledge to inferences on the health and wellbeing of the fish and their husbandry and management. Therefore, it is important that delivery relates to species that are vocationally relevant to the learners- eg aquaculture and ornamental species. Many aspects of the content will benefit from practical demonstration and exploration such as scale reading, dissections and behavioural observations. It is likely that learners will also need to undertake independent study and research. Visiting expert speakers could add to the relevance of the subject for learners. For example, a fishery, fish farm or aquarium manager or aquarist could talk about their work and how knowledge of fish biology is essential to their job.

Learning outcome 1 requires the learner to identify the main internal and external structures of fish and their basic function. Learners will become aware of the major anatomy, how it differs between fish species and how these relate to their lifestyle and environment. They will also learn to recognize and distinguish healthy and unhealthy features. It is expected that learners will have opportunity to practically age fish and carry out dissections in order to identify internal and external structures.

Learning outcome 2 requires the learner to develop a deeper understanding of how the function and physiology of the features and structures identified in learning outcome 1. They will recognize normal physiological processes and the implications if normal functioning is not maintained.

Learning outcome 3 covers the importance of recognising normal and abnormal fish behaviour. It would be expected that direct observations of fish displaying a variety of behaviours would form part of the delivery of this learning outcome as well as formal lectures and discussions.

Learning outcome 4 looks at the principles of nutrition and the appropriate diets for a variety of fish species and should consider the feed requirement for a minimum of 3 different species from at least 2 different situations eg: farmed fish, aquarium kept fish. Learners will become aware of the formulation of diets but also how these diets may be delivered to the fish in the best way. Learners may have the opportunity to formulate and produce their own diet and develop the optimal feeding strategy for a food.

Suggested learning resources

Books

The Interpet Manual of Fish Health Published by: Interpet Publishing, 2002 ISBN: 1842860674	Andrews, C; Exell, A & Carrington, N
Biology of Fishes Published by: Barton, 2 nd Edition, 1996 ISBN: 9780120798759	Bond, C. E.
Biology of Fishes	Bone, Q & Moore, R

Published by: Taylor & Francis, 3rd Edition, 2005
ISBN: 0412741130X

Handbook of Fish Biology & Fisheries, Volume 1, Chapter 4: The Physiology of Living in Water
Brix, O

Published by: Blackwell Scientific
ISBN: 9780632054121

The Physiology of Fishes
Published by: CRC Press, 4th Edition, 2013
ISBN: 9781439880302
Evans, D. H. & Claiborne J.B. (Eds.)

Fish Nutrition
Published by: Academic Press, 2002
ISBN: 0080494927
Halver, J.E & Hardy, R. W.

Diversity of Fishes
Published by: Blackwell Scientific, 2nd Edition, 2009
ISBN: 978-1-4051-2494-2
Helfman, G. S; Collette, B. B; Facey, D. E

Environmental Biology of Fishes
Published by: Chapman & Hall, 1995
ISBN: 0412580802
Jobling, M

Nutrition and Feeding of Fish
Published by: Kluwer Academic Publishers, 2nd Edition, 1998
ISBN: 978146149093
Lovell, T

Fishes. An Introduction to Ichthyology
Published by: Prentice Hall, 1996
ISBN: 9780131008472
Moyle, P. B & Cech, J. J

Methods for Fish Biology
Published by: Amer Fisheries Society, 1st Edition, 1990
ISBN-10: 091323558X
ISBN-13: 978-0913235584
Schreck C. B & Moyle P.B

Journals and magazines

- Anglers Mail
- Angling Times
- FISH magazine
- Journal of Applied Ichthyology
- Journal of Fish Biology
- Journal of Fisheries Management and Ecology
- Progressive Fish Culturists
- Salmon and Trout

Websites

Department for the Environment, Food and Rural Affairs	www.defra.gov.uk
Environment Agency	www.environment-agency.gov.uk
Centre for Environment, Fisheries & Aquaculture Science	www.cefas.defra.gov.uk/
Online fish species database	www.fishbase.org
The Institute of Fisheries Management	www.ifm.org.uk
Ornamental Aquatic Trade Association	www.ornamentalfish.org
Salmon and Trout Association	www.salmon-trout.org

Unit 313

Business management in the land based sector

UAN:	A/507/4648
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for learners look at the businesses within the land based sector, the role and responsibilities of those employed in land-based businesses and resource requirements.

This unit links closely to Unit 302: Undertake and review work related experience in the Land-based Industries.

Learning outcomes

In this unit, learners will be able to

1. Understand the breadth and importance of an industry in the land-based sector
2. Understand business resources and structures
3. Understand the business marketplace
4. Understand how to use financial and physical record keeping systems

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the breadth and importance of an industry in the land-based sector

Topics

1.1 Importance to the economy

1.2 Associated businesses

In this outcome, learners will investigate the size, scope and importance of their specialist sector within the environment and land-based industries, and how this has developed over the last 50 years or so. They will also investigate the range of business types and other organisations that are represented in their sector, including important regulatory, professional or representative organisations. Wherever possible this should be related to specific businesses and organisations.

Topic 1.1

Learners will understand the importance of businesses within the industry to the economy:

- Using measures available to the industry, including:
 - value of output
 - contribution to Gross Domestic Product (GDP)
 - employment
 - land use
 - economic and social benefits
 - trends in importance
- Range of organisations:
 - typical types of businesses and other organisations (eg representative, regulatory, not-for-profit)
 - regional variations
 - changes and developments in the last 50 years.

Topic 1.2

Learners will understand the range of associated businesses allied to the industry, to include:

- relevant industries in primary, secondary and tertiary industrial sectors (eg suppliers of raw materials, processors, distributors, retailers, service providers)
- associated organisations:
 - specific interrelationships between one business and other associated organisations eg:
 - suppliers of goods and services
 - representative organisations and professional bodies
 - regulatory bodies
 - competitors
 - customers
 - aims and roles of important organisations in the sector.

Learning outcome:

2. Understand business resources and structures

Topics

2.1 Legal structure and organisation

2.2 Physical resource requirements

2.3 Job roles and responsibilities

This outcome focuses on the legal and resource implications of constituting a business. Learners will learn about the range of business organisations in the private and public sectors, and the legal and practical implications of different business types. This should be related to the types of business important in their sector. Learners will investigate the physical resource requirements of businesses, and how they are managed.

Topic 2.1

Learners will understand the legal structure and organisation for the following business types:

- sole trader
- partnership
- limited company
- not-for-profit organization
- charity
- public sector organisations
- organisation staffing structure.

Topic 2.2

Learners will understand the physical resource requirements of a selected land-based business, to include:

- property ie forms of tenure, appraisal of business potential
- vehicles and machinery
- tools and equipment
- materials ie stocks control procedures
- insurance of physical resources.

Topic 2.3

Learners will understand different job roles and responsibilities in a selected land-based business.

- Job roles relevant to the sector, including:
 - director
 - manager
 - supervisor
 - team worker
 - trainee
 - administrator
 - volunteer
 - sub contractor
- For each of the above job roles, learners will explore:
 - job description (eg responsibilities for financial physical and human resources, staff motivation and performance management)
 - person specification (typical skills, qualifications and experience required to fulfil the role)
 - legal rights and responsibilities in work (eg pay, working hours, holidays, equal opportunities, health and safety, employment protection).

Learners will know relevant employment legislation, including:

- Employment Act 2002
- National minimum wage Act 1998
- Working times regulation Act 1998
- Equality Act 2010.

Learning outcome:

3. Understand the business marketplace

Topics

- 3.1 Marketplace, customers and competitors
- 3.2 Supply chain
- 3.3 Quality management

In this outcome, learners will analyse the market for a specific land-based business. This could involve a case study project and should identify, for that business, information on the content listed. External influences should be relevant and current to that business. Specific competitors should be identified and analysed to identify strengths and weaknesses to the case study business. When investigating the supply chain learners will need to identify the flow of resources from production of raw materials, through relevant manufacture and processing, to end consumers. Quality management will include reference to any formal standards or approvals that are relevant. It should also consider the quality standards required by the industry, any systems and practices that are used to achieve quality, and implications of failing to meet prescribed or assumed levels of quality.

Topic 3.1

Learners will understand the marketplace, customers and competitors for a land-based business by investigating the following:

- size of market ie value of sales, number of customers
- external influences on the market ie political, economic, socio-cultural, technological
- customer base ie number, type, characteristics, market segments
- competitor analysis ie direct and indirect competitors.

Topic 3.2

Learners will understand the importance of efficiency and interdependency in a supply chain in a land-based context, considering the following:

- suppliers
- distributors
- customers
- supply chain assurance
- ethics.

Topic 3.3

Learners will understand quality management systems and practices within a land-based business:

- Important aspects of quality in the sector
- Formal quality standards or approval eg BALI approved, Plant Passports, British Standards
- Informal systems and practices to achieve quality
- Problems arising if quality is not achieved.

Learning outcome:

4. Understand how to use financial and physical record keeping systems

Topics

4.1 Financial records

4.2 Physical records

4.3 Monitor business performance and progress

This outcome focuses on the range of financial and physical records that are required to meet legal requirements as well as to ensure effective business operation. Learners will complete a range of financial records. They should be aware of paper-based and computerised systems for financial records but are not expected to become competent in the use of IT accounts software. The range of physical records investigated should be related to the needs of the learners' specialist sector, and should include important current examples of legally required records. In addition to completing a range of records, learners will investigate how specific examples can be used to aid decision making, monitor and control business performance.

Topic 4.1

Learners will understand the importance of keeping accurate financial records for a selected land-based business in relation to legal requirements and management efficiency. Learners will understand the following financial records:

- purchasing and ordering procedures
- order forms and orders
- deliveries and receipts
- invoices and sales records
- credit control
- payment methods
- bookkeeping ie cash analysis, petty cash, cash flow, budgets, computer accounts programmes
- basic accounts ie trading account, balance sheet, depreciation
- taxation ie VAT, income tax PAYE, national insurance contributions, corporation tax
- wage calculation.

Topic 4.2

Learners will understand the importance of recoding physical records for a selected land-based business, to include:

- production
- inputs
- staffing
- customers
- resource use
- data protection
- legal requirements to keep records eg pesticide use, veterinary medicines, transport, animal movement, passports.

Topic 4.3

Learners will understand how financial and physical records are used in monitoring business performance and progress, to include:

- production levels
- costs of production
- financial efficiency
- monitoring against targets

- budgets
- previous periods
- relevant review periods ie weekly, monthly, annually
- appropriate remedial actions
- staff roles in recording and analysing information.

Guidance for delivery

This unit is designed to provide the learner with an understanding of the business aspects of their industry. It is applicable to all sectors of the environment and land-based sector and learners focus their study on the sector most relevant to their vocational interests.

Centres are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of establishments to add depth to the learner experience.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are they are linked directly with interactive lessons in a real environment.

Unit 314

Farm Habitat Management

UAN:	D/507/6859
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to farm habitat management skills and knowledge and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

Upon completion of this unit the learner will have looked at changes in the farmed landscape since the advent of farming in the UK in the Neolithic (4000BC) to the present day and the various influences on and effects of these changes. They will consider ecological aspects and the wildlife value of farm habitat management. They will also develop skills in farm habitat surveying and practical habitat management.

Learning outcomes

In this unit, learners will be able to

1. Understand the development of the agricultural landscape
2. Understand the ecology of farm habitats and wildlife species
3. Carry out farm habitat and species surveys
4. Carry out practical farm habitat management

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the development of the agricultural landscape

Topics

1.1 Development of the agricultural landscape

1.2 Effects of legislation or policy on the development of the farmed landscape

1.3 Effects of organisations on the development of the farmed landscape

Topic 1.1

The learner understand the development of the agricultural landscape in the UK, including:

- Prehistoric
- Medieval
- pre-enclosure
- enclosure
- industrial revolution
- post 1940's
- modern day agriculture.

Topic 1.2

The learner will understand effects of legislation or policy on the development of the farmed landscape, including:

- Legislation or policy:
 - The General Enclosures Act 1845, Corn Laws, Agricultural Act 1947, Common Agricultural Policy (CAP) (Reforms; to include Greening 2015), Wildlife and Countryside Act 1981 (as amended), Environmental Protection Act 1990, Cross Compliance Nitrates Directive 1991(as amended), Hedgerows Regulations 1997, Environmental Impact Assessment (Agriculture) (England) Regulations 2006---

Ecological effect: change to agricultural landscape over time, species diversity, range and distribution, change to habitat types and characteristics, impact of intensive agricultural management on flora and fauna.

Topic 1.3

The learner will understand effects of organisations on the development of the farmed landscape, including:

- Dafra
- RSPB
- Natural England
- Environmental Agency
- Reval Payment Agency.

Learning outcome:

2. Understand the ecology of farm habitats and wildlife species

Topics

2.1 Ecological importance of habitat diversity

2.2 Biodiversity action plan

Habitat:

- Hedges
- stone walls
- ponds and lakes
- rivers and streams
- woodlands
- trees(veteran, ancient, deadwood)
- field margins
- conservation headlands and grasslands.

Topic 2.1

Learners will be able to explain the ecological importance of habitat diversity in a selected farmed landscape. Provision of habitat for a diverse range of species (flora and fauna), rare and uncommon species, species with specific habitat requirements, availability and access to food preferences.

Topic 2.2

Learners will be able to evaluate the effectiveness of a given biodiversity action plan, including:

- Habitat Action Plans (HAPs) for example:
 - ancient and or species rich hedgerows action plan
 - cereal field margin action plans
 - grassland action plans
 - species action plans
 - ecological importance of habitat diversity in the farmed landscape
 - process of species
 - habitat action planning.

Learning outcome:

3. Carry out farm habitat and species surveys

Topics

3.1 Ecological surveying of a farm habitat

3.2 Results of farm habitat and species surveying

Learning outcome 3 requires the learner to practically plan, carry out and report findings of farm habitat and species surveys. Learners are required to identify plant and animal species present as well as making assessments on the condition of the farm habitats and making suggestions as to ways these could be improved. It is anticipated that there will be some group activities during surveying but learners are encouraged to present their findings individually.

Topic 3.1

Carry out ecological surveying of a given farm habitat, including:

- Surveying:
 - whole farm assessments
 - Linking Environment and Farming (LEAF) audit
 - Farm Environmental Record
 - Farm Environmental Plans (Environmental Stewardship Schemes)
 - National Vegetation Classification (NVC)
 - hedgerow survey
 - farmland bird surveys
 - arable plants survey
 - farmland species

- ecological features
- nature conservation value
- habitat condition assessment
- potential biodiversity improvements
- Farm habitats:
 - Hedges
 - stone walls
 - ponds and lakes
 - rivers and streams
 - woodlands
 - trees (veteran, ancient, deadwood)
 - field margins
 - conservation headlands and grassland.

Topic 3.2

Learners will be able to report the results of farm habitat and species surveys, including:

- Report results:
 - Qualitative and quantitative
 - suitable presentation methods (for example tables, pie charts, annotated maps, histograms, scattergraphs)
 - statistical analysis to include for example mean, mode, distribution and correlation
 - establishing conclusion in relation to survey aims
 - identify potential sources of error within survey data
- Species:
 - Birds
 - Mammals
 - Invertebrates
 - Grasses
 - Shrubs
 - Trees
 - Wildflowers.

Learning outcome

4. Carry out practical farm habitat management

Topics

- 4.1 Equipment and resources for practical management
- 4.2 Practical management techniques
- 4.3 Improving farm habitat management

Learning outcome 4 requires the learner to plan and use equipment and resources to recommend and carry out practical farm habitat management and to devise a management scheme taking into account the needs of the sites they access. It links well into the previous outcomes where the learners have gained practical skills and knowledge to complete the task. The site to be used needs to comply with local legislation and have prior full permission from the landowner prior to implementing change.

Farm habitats:

- Hedges
- stone walls
- ponds and lakes
- rivers and streams
- woodlands
- trees (veteran, ancient, deadwood)
- field margins

- conservation headlands and grasslands.

Topic 4.1

The learner will be able to prepare equipment and resources for practical management of farm habitats, including:

- hand tools:
 - spades forks
 - shovels
 - secateurs
 - handsaws
 - clippers
 - hammers
 - pickaxes
 - billhooks
 - loppers
 - bowsaws
 - hand fencing equipment
- safe and correct use
- maintenance and storage
- sharpening of tools where appropriate
- suitable clothing
- Personal Protective Equipment (PPE).

Topic 4.2

The learner will be able to carry out practical management techniques safely, including:

- clearance (path, fence line)
- dry stone walling
- woodland management (coppicing, uprooting, planting, protection)
- hedge maintenance (pruning, thinning, planting, laying, dead hedging)
- grassland management (cutting, mowing, mulching, restoration and/or creation)
- pond, stream and ditch clearance/creation
- installing artificial habitats (bird boxes, deadwood habitats, dormouse boxes.)

Good practice:

- composting
- materials that can be composted
- re-used and/or recycled
- finding alternative uses
- methods of recycling
- avoid wastage.

Topic 4.3

The learner will be able to recommend improvements to the management of farm habitats, including:

- setting habitat management objectives
- planning activities and resources
- monitoring activities and resources
- reviewing outcomes against objectives recommendations and improvements.

Guidance for delivery

Upon completion of this unit, the learner will have looked at changes in the farmed landscape from Prehistoric times and the various influences on it, and effects of these changes. They will consider ecological aspects of farm habitat management. They will develop skills in farm habitat surveying and practical habitat management.

Delivery is likely to be a mixture of classroom learning and practical farm habitat surveying and management. Any sites to be used needs to comply with local legislation and have prior full permission from the landowner.

Where practical activities are used health and safety issues relating to working in an outdoor environment and handling animal material must be stressed and regularly reinforced, and risk assessments must be undertaken and recorded prior to practical activities. Adequate Personal Protective Equipment (PPE) must be provided. It is important that all learners are familiar with the tools, equipment, protocols and methods to be used in order to collect accurate data safely.

Work experience would be beneficial for learners wishing to pursue a career in this field. Visits from visiting speakers could add relevance to the subject including their work the situations they face and the methods they use.

Learning outcome 1 requires the learner to understand the development of the agricultural landscape and how this has altered from prehistoric times to the present day. They will be required to consider the influence of UK legislation, policies and organisations, effects of global and national events, and the changes to farming practices. This would include learners identifying biotic and abiotic effects eg how the removal of hedges, ditches, ponds, woodland, farm buildings, dry stone walls, grading of the watercourse, the use of pesticides and inorganic fertilisers, silting of water courses via soil erosion have affected the landscape. As well as classroom activity learners would benefit from practical sessions and visits to enhance learning and understanding. Tutors should be encouraged to use local sites wherever possible. Theory delivery can be through a series of formal lectures, directed study, internet and library associated research.

Learning outcome 2 requires the learner to understand farm habitats and wildlife species. Tutors should be encouraged to use local sites wherever possible. The outcome takes into consideration the influence of farm biodiversity, eg local and national Biodiversity Action Plans (BAP) as well as the biodiversity action planning process. The emphasis of the unit is for learners to explore the elements of the landscape occupied by semi natural habitats. Theory delivery can be through a series of formal lectures, directed study, internet and library associated research.

Suggested learning resources

Books

- | | |
|--|---------------------------------------|
| Future Nature: A Vision for Conservation
Published by: Routledge 2nd revised Edition, 2003
ISBN 978-1853839986 | Adams, W |
| Farming and Wildlife: A Practical Management Handbook
Published by: RSPB, 1994
ISBN 978-0903138673 | Andrews, J & Rebane, M |
| Environmental Law
Published by: OUP Oxford, 2013
ISBN 978 – 0199583805 | Bell, S; McGillivray, D & Pedersen, O |
| The Farm as Natural Habitat: Reconnecting Food Systems with Ecosystems | Bradley, N; Jackson, D & Jackson, L |

Published by: Island Press, 2002
ISBN 978-1559638463

Biotic Indicators for Biodiversity & Sustainable Agriculture Buchs, W
Published by: Elsevier Science, 2003
ISBN 978-0444515513

Introduction to Wildlife Conservation in Farming Burchett, S & Burchett, S
Published by: Wiley – Blackwell, 2010
ISBN – 13: 978-0470699348

Agriculture & International Trade: Law Cardwell, M; Grossman, M &
Policy & WTO Rodgers, C
Published by: CABI publishing, 2003
ISBN 978-0851996639

Habitat Management for Conservation: A Handbook of Techniques Ausden, M
Published by: OUP Oxford, 2007
ISBN 978-0198568735

Wildlife Habitat and Management McComb, B
Published by: CRC Press, 2007
ISBN 978-0849374890

The Illustrated History of the Countryside Rackham, O
Published by: Wakefield & Nicholson, 2003
ISBN 978-027843351

Monitoring Ecological Change Spellerburg, I. F
Published by: Cambridge University Press, 2005
ISBN 978-0521820288

Woodland Management: A Practical Guide Starr, C
Published by: Crowood Press 2nd Revised Edition, 2013
ISBN 978-1861267894

The Conservation Handbook Techniques in Research, Management & Policy Sutherland, W
Published by: Wiley Blackwell, 2000
ISBN 978- 0632053445

Habitat Conservation: Managing the Physical Environment Warren, A & French, JR
Published by: Wiley Blackwell, 2001
ISBN 978-0471984993

Journals

- British Wildlife
- Agriculture, Ecosystems and Environment

Websites

Campaign for farmed environment	www.cfeonline.org.uk
DEFRA	www.gov.uk
FWAG	www.fwagsw.org.uk
Game and Wildlife Trust	www.gwt.org.uk
Linking Environment and Farming	www.leafuk.org
Natural England	www.gov.uk
RSPB	www.rspb.org.uk
Soil Association	www.soilassociation.org
UK Agriculture	www.ukagriculture.com
Farmers weekly	www.fwi.co.uk

Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of the principles of grassland habitat management and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will examine the history and ecology of grasslands and develop skills necessary to survey and identify species of the grassland community. They will investigate the range of tools and operations available for the management of grasslands. They will plan, carry out and evaluate management for a particular site.

Learning outcomes

In this unit, learners will be able to:

1. Understand the history and ecology of grassland habitats
2. Carry out grassland species and habitats surveys
3. Understand management techniques for grassland sites
4. Carry out practical grassland habitat management

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the history and ecology of grassland habitats

Topics

- 1.1 The historical development of grassland in the UK
- 2.1 The ecology of grassland in the UK

Topic 1.1

The learner will understand the historical background of grasslands in the context of their development and current status, eg:

- Development of grasslands after the last glacial period
- Succession models eg Vera, Tansley
- Neolithic clearance of woodland and associated increase in extent of open 'rangeland' as farming develops
- Deforestation of Britain to create agricultural land
- Changes of land use since medieval times
- Enclosure Acts
- Grassland decline over the last 300 years due to agricultural development
- The influence of the world wars, afforestation and the subsequent loss of grassland and meadows, intensification of pastures
- Current initiatives eg agri-environment schemes

Topic 1.2

The learner will understand the ecological background of grasslands in the context of their development and current status, eg:

- Definition of a grassland
- Biotic and Abiotic factors that affect grassland
- Anthropogenic and natural threats to grassland habitats eg atmospheric Nitrogen deposition, climate change, land development, dog fouling, recreation
- Types of grassland eg acid, calcareous, mesotrophic, downland, flood meadows, hay meadows, upland grasslands, machair, calaminarian
- Classification of grasslands as improved, unimproved, semi-improved/semi-natural
- Plant adaptation to low nutrient levels
- Grassland specialist species including insects, fungi, mammals and birds
- National Vegetation Classification (NVC)
- Grassland habitat types

Learning outcome:

2. Carry out grassland species and habitats surveys

Topics

2.1 Plan surveying including appropriate techniques, equipment and permissions

2.2 Survey grassland habitats and species

2.3 Report on the structures, features and ecosystem surveyed

Topic 2.1

The learner will be able to plan and select an appropriate method and equipment to undertake a grassland survey:

- Choice of site
- Use of ordnance survey maps
- Permissions required (e.g. land owner)
- Rights of access
- Reasons for carrying out survey
- Time of year
- Choice of survey technique
- Equipment required
- Risk assessment
- Licences

Topic 2.2

The learner will be able to carry out grassland surveys, eg:

Flora surveys:

- NVC vegetation surveys using quadrats
- NVC data and species frequency or DAFOR eg Dominant, Abundant, Frequent, Occasional or Rare
- Scale and use of identification keys
- Site location
- Site width, length and area
- Features of site
- Assessment of previous land use and adjacent land use
- Evidence of current management

Fauna surveys, eg:

- Use of appropriate techniques for either Invertebrates, mammals, reptiles, birds, butterflies eg transects, use of tracks and trails, pit-fall traps, sweep-netting and simple observation techniques

Surveying equipment, eg:

maps, sweep nets, quadrats, identification books and guides, recording and reporting materials, pit-fall traps, sample jars, hand-lenses, camera and measuring devices

Topic 2.3

The learner will be able to record and interpret information from surveys using record forms, data collection and mapping.

Learning outcome:

3. Understand management techniques for grassland sites

Topics

- 3.1 Grassland management techniques
- 3.2 Grassland management objectives
- 3.3 Good practice for the management of grasslands

Topic 3.1

The learner will understand and be able to evaluate different grassland management techniques:

Grazing:

- Conservation management objectives for using livestock
- Choice of livestock species, breed and associated animal husbandry e.g. cattle, sheep, horses, goats, rare breeds
- 'Natural' grazers e.g. rabbits, deer
- Differences between species' grazing styles
- Grazing regimes e.g. stocking density
- Time of year e.g. seasonal, rotational
- Ecological benefits
- Potential conflicts eg other species, public sites)
- Resources required
- Health and welfare issues

Mechanical:

- Mowing and cutting
- Choice of machinery
- Ecological benefits and drawbacks
- Timing of operations
- Techniques e.g. height of cut
- Cutting pattern
- Controlling invasive species
- Cutting to encourage invertebrates
- Conflicts e.g. species that can be effected by incorrect cutting management and timing)
- Resources required
- Health and safety
- Disposal of arisings

Burning:

- Benefits and drawbacks of using burning as a management tool
- Burning methods
- Timings
- Size of burn
- Resources required eg staffing, equipment
- Health and safety measures

- Good practice and legal considerations eg Heather and Grass Burning Regulations 2007
- Burning and escape plans

Grassland restoration, creation and improvement techniques:

- Purpose and benefits
- Techniques eg soil preparation, seeding, establishment methods, post-establishment maintenance
- Health and safety

Topic 3.2

The learner will understand grassland management objectives:

- Ecological objectives: e.g. conservation value, rare or endangered habitats and species, preserving biological diversity, scientific value and use, buffer strips,
- Cultural objectives: e.g. aesthetics, recreational use (walking, horse-riding, dog-walking, bird watching, sports and other amenity use), use of rare breeds for grazing

Topic 3.3

The learner will understand good practice for the management of grasslands, eg:

- Management planning
- appropriate choice of management technique
- health and safety
- risk assessment
- human resources and volunteer work parties
- public consultation including environmental interpretation
- monitoring and reviewing of management plan

Learning outcome:

4. Carry out practical grassland habitat management

4.1 Prepare equipment and resources for practical management of grassland habitats

4.2 Carry out practical management of grassland habitats

Topic 4.1

The learner will prepare equipment and resources for practical management of grassland habitat:

- Mechanical and Non-Mechanical equipment eg tractors, mowers, strimmers, trailers, races, crushes, pens, hand tools
- Livestock eg cattle, sheep, horses, deer
- Fencing equipment
- Herding methods

Topic 4.2

The learner will carry out management of grassland habitats:

- Mowing/cutting
- Weed control
- Invasive plant (tree and shrub) removal
- Harvesting (hay cutting)
- Livestock handling and transportation

- Fencing
- Grassland creation and restoration
- Maintenance of established grasslands
- Soil preparation and drainage
- Pest control

Guidance for delivery

A range of techniques should be used in the delivery of this unit. Learners will benefit from lectures, guest speakers (for example from land managers and other practitioners of grassland habitat management), presentations, site visits, practical grassland management tasks including those undertaken during work experience placement, and research using library and internet sources.

Whichever delivery methods are used, it is essential that tutors stress the importance of sound environmental management. Learners should know that some grassland species are protected by law and that licences from Natural England are required to handle them.

Health and safety issues relating to the integration of safe working practices and environmental good practice into all practical activities must be stressed and regularly reinforced, and risk assessments must be undertaken prior to practical activities.

Learning outcome 1

Learners will gain an insight into the ecological and historical background of grasslands in the context of their development and current status. It is likely that this learning outcome will be delivered by formal lectures and group discussion. Ecosystem succession models should be explored in order to develop an understanding of dynamic systems in the natural environment. In particular, Vera's (1999) grazed forest model and Tansley's continuous woodland model should be explored in some detail.

An understanding of the ecology of grasslands is best delivered through specific site visits and, where possible, backed up by guided walks and talks from grassland habitat management practitioners. Where this is not possible, tutors should ensure that appropriate alternatives are used, for example by using high-quality audio-visual resources. The use of field identification keys is essential and there is an important link here to Outcome 2.

Learning outcome 2

Learners will gain the skills and knowledge required to carry out surveys. It is expected that learners have access to at least one grassland site in order to accomplish this. The time of year is an important consideration when undertaking these surveys and therefore spring and summer are the recommended periods to do this.

Learning outcome 3

Learners will understand the main methods employed in the management of grasslands. High quality audio-visual equipment can illustrate a variety of management tools, including both mechanical and the various forms of livestock which can be utilised. Management planning is also considered with respect to managing grasslands for conservation. Access to local grassland sites is important to give learners first-hand experience of management methods. Most of this outcome can be delivered by lecture, informal discussion and group activity.

Learning outcome 4

Learner will carry out practical grassland management. Learners are now required to use the knowledge gained from the previous learning outcomes and apply it to a grassland site or sites.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for teachers to develop a method of maintaining contact with a range of employers in the sectors may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

Suggested learning resources

Books

- | | |
|--|---------------------------|
| Habitat Management for Conservation:
A Handbook of Techniques
Published by: Oxford University Press 2007
ISBN: 978 019 856872 8 | Ausden, M. |
| Ecological Restoration
Published by: Cambridge University Press 2010
ISBN: 978 0 521 87711 4 | Comin, F.A. |
| Improved Grassland Management
Published by: Farming Press 2002
ISBN: 0 85236 543 8 | Frame, J. |
| Grassland Management
Published by: Northwood Publications 1981 | Parry, J., Butterworth, B |
| Agronomy of Grassland Systems. 2nd ed
Published by: Cambridge University Press 1997
ISBN: 0 521 56010 1 | Pearson, C.J., Ison, R.L. |
| Lowland Grassland and Heathland Habitats
Published by: Routledge 2003
ISBN: 0 415 18762 1 | Price, E.A.C. |
| Grasslands: Ecology, Management and
Restoration
Published by: Nova Science Publishers. | Schroder, H. |

Websites

Natural England	www.naturalengland.org.uk
Butterfly Conservation	www.butterfly-conservation.org/
Grazing Animals Project	www.grazinganimalsproject.org.uk/
The Wildlife Trusts	http://www.wildlifetrusts.org/
Wildfowl and Wetlands Trust	www.wwt.org.uk
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Welsh Assembly Government	www.wales.gov.uk
Scottish Executive Environment and Rural Affairs Department	www.scotland.gov.uk
Department of Agriculture and Rural Affairs (Northern Ireland)	www.dardni.gov.uk

Unit 316

Coastal Management

UAN:	A/507/7100
Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of the principles of coastal management and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The aim of this unit is to provide learners with an understanding of the processes affecting the coastal zone and the management of coastal habitats.

Learning outcomes:

In this unit, learners will be able to

1. Recognise the physical processes affecting coastal habitats
2. Carry out ecological surveys of coastal habitats
3. Understand the threats to coastal habitats
4. Understand suitable coastal management techniques

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Recognise the physical processes affecting coastal habitats

Topics

1.1 Structural features of coastal habitats

1.2 Influences of relevant physical processes on coastal habitats

Topic 1.1

Structural features:

- Cliffs
- cliff top land
- beaches
- spits
- sand dunes
- mudflats
- sandflats
- salt marshes
- estuaries
- caves
- blow holes
- sea stacks.

Topic 1.2

Influences:

- Effects of erosion (altering physical structures, creating new structures, for example sea stacks)
- loss of habitat, upstream pollution, changes to water course)
- long shore drift and saltation
- Effects of sediment redistribution (creation of new habitats, loss and changes to habitats).

Physical processes:

- Influence of tide (erosion, sediment redistribution) and wind (erosion)
- Science of tide, springs, tidal range.

Learning outcome:

2. Carry out ecological surveys of coastal habitats

Topics

2.1 Indicator species coastal habitats

2.2 Ecological surveys coastal habitats

Learners will know different coastal habitats:

- Inter-tidal
- fore shore
- cliff and cliff top
- sand dunes
- mud flats
- sand flats
- estuary
- beaches.

Topic 2.1

The learner will know indicator species of coastal habitats; as appropriate to habitat for example:

- Seaweeds
- Crustaceans
- Fish
- Molluscs
- Shellfish
- Invertebrates
- Flora
- Birds
- Species.

Learners will complete ecological surveys of coastal habitats using appropriate methods:

- Quantitative (for example quadrats and simple line transects) and qualitative (quality of habitat, species distribution), correlation of species and effects of abiotic factors
- Risk assessment: Identification of potential risks and hazards, severity of potential injury (hazard), likelihood of harm (risk), control methods to minimise or avoid risk.

Topic 2.2

Learners will present information from surveys in various forms, eg:

- Written
- data and pictorial graphs
- pie chart
- basic statistics.

Learning Outcome:

3. Understand the threats to coastal habitats

Topics

3.1 Threats to coastal habitats

3.2 Effects of threats on coastal habitats

Topic 3.1

The learner will understand the threats to coastal habitats:

- Natural threats: erosion (tide based, wind based), sediment movement and deposits, climate change, isotactic adjustment
- Human threats: pollution, tourism, access requirements, sea defences affecting sediment

movement, changes affecting rivers (eg building on flood plains, flood defences, redirecting rivers), and land use adjacent to rivers (eg for agriculture, for recreation and sport), general human development (off-shore wind farms).

Topic 3.2

The learner will understand the effects of threats on coastal habitats; impact on eco-systems and habitats eg managed retreats, consequential effects on other parts of the coast, loss of landscape, property loss, cost, loss of tourism.

Learning outcome:

4. Understand suitable coastal management techniques

Topics

4.1 Importance of legislation and planning for managing the coastal zone

4.2 Uses of practical management techniques for protecting coastal habitats

Topic 4.1

The learner will understand the importance of legislation and planning for managing the coastal zone.

Legislation:

- including Environmental Protection Act 1990, Water Framework Directive 2003, National authorities with responsibility for waste and recycling issues and coastal defence, Marine and Coastal Access Act, the role of environment agencies in terms of Habitat directive, Birds directive.

Planning:

- Setting coastal management objectives, CHAMPS, planning activities and resources, monitoring activities and resources, reviewing outcomes against objectives, recommendations and improvements eg shoreline management plans and management options.

Topic 4.2

The learner will understand the uses of practical management techniques for protecting coastal habitats:

- Use of permanent engineered structures, for example breakwaters, groynes, revetments, seawalls
- Consequential effects to other coastal areas eg beach starvation and erosion
- Use of natural processes and materials, for example beach recycling, beach re-nourishment, dune grass planting and marsh regeneration, footpaths, natural realignment, managed retreat, offshore barriers.

Guidance for delivery

This unit will provide the learner with the knowledge of how our coasts are constantly changing and how man and nature try to control the erosion and formation of the terrestrial landmass. By studying the coastal features which are so important for many migratory species learners will be able to see how fragile the habitats are to changes in land use human recreation and the weather. Global warming predicts a rise in sea level and it is likely that this will have a dramatic effect on existing coastal zones and in the creation of new coastal habitats. It is therefore vital to understand the natural processes to try to manage the change.

Learners will gain knowledge and understanding through formal lectures and case studies where man has ignored the coastal movement of material. For example, Dungeness, slitting up of ports and so on and how natural habitat features are being recreated to act as flood prevention (Essex coasts). Field trips to see similar examples are encouraged. The coastal habitats will be studied and surveyed both qualitatively and quantitatively.

In Learning outcome 1 the learner will cover the typical features of the coastal zone around Britain and how they change due to the weather and human activities.

Learning outcome 2 builds upon the previous outcome and looks at a specific coastal habitat, identifying the indicator species of that habitat as part of a qualitative survey. Research and survey of the main abiotic factors that control the habitats growth or decline is required, which can be carried out from a desk top survey from maps and photographs.

As part of Learning outcome 2 learners should be taught pie charts, kite diagrams and bar charts. Having identified potential threats to coastal habitats in Learning outcome 3 the learner needs to understand how legislation plays a part in managing the coastal zone via planning and environmental protection acts, including species protection. In Learning outcome 4, with the real threat of the sea level rising, the learner needs to review current coastal management practices and suggest new practical methods to sustain habitats wildlife **and human** land use requirements.

In Learning outcome 4, learners will gain an understanding of coastal management techniques. The delivery of this outcome will predominantly be theory-based, but real examples could be used to illustrate practical management techniques. The delivery of this outcome would benefit from visits to coastal sites to add depth to the learner experience.

The unit is has practical element for which a risk assessment and safe working practices must be observed, the theory will allow the learner to make informed decisions on coastal land use and management if and when the sea level raises.

Suggested learning resources

Books

Coasts and coastal management Published by: Hodder Education, 2004	Hill, M
Coastal and sea use management: reviews of approaches and techniques Published by: Marine Conservation Society, 1989	Gubbay, S
Future of the Coast proposals for the UK coastal zone Published by: , 1990	Gubbay, S
Coastal and estuarine management Published by: Routledge, 1997 ISBN: 0 415 13759 4	French, P

Unit 317

Deer Management

UAN:	F/507/7101
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to the skills and knowledge used in deer management and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

Learning outcomes:

In this unit, learners will be able to

1. Know wild UK deer
2. Understand the ecology and associated behaviour of UK deer
3. Understand the management of wild deer

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Know wild UK deer

Topics

1.1 Wild deer species found in the UK

1.2 Features of deer used to identify the species, sex and age of deer

1.3 Terminology to describe sex, age and species of deer

Topic 1.1

Learners will know wild deer species found in the UK, to include:

- Red
- Sika
- Fallow
- Roe
- Muntjac
- Chinese water deer.

Topic 1.2

Learners will know features of deer used to identify the species, sex and age of deer:

- Antlers
- Pizzle
- Tush
- Tusks
- Udder
- Pelage
- teeth
- build
- stance
- gait
- antlers
- size
- pelage.

Topic 1.3

Learners will know the terminology used to describe sex, age and species of deer:

- Bucks/Stags
- Does/Hinds
- kids/ calves
- fawns
- other terms in current use and regional variations.

Learning outcome:

2. Understand the ecology and associated behaviour of UK deer

Topics

2.1 Physiology and ecology of the deer species found in the UK

2.2 Habitat preferences of the deer species found in the UK

2.3 Signs of deer presence

Topic 2.1

The learner will understand the physiology and ecology of the deer species found in the UK, including Red, Sika, Fallow, Roe, Muntjac, Chinese water deer, their distribution and population status.

- CNS, Rumination, lymphatic systems, major organs, monogamy, polygamy, delayed implantation, rutting behaviour, diseases & parasites, annual life cycle (eg rut, birth, pelage/ antler casting and growth, seasonal & daily movement, territories, herding activity).

Topic 2.2

The learner will understand habitat preferences of the deer species found in the UK (including Red, Sika, Fallow, Roe, Muntjac, Chinese water deer):

- Broadleaved woodland
- coniferous forest
- upland
- farmland
- heath
- urban.

Topic 2.3

The learner will know signs of deer presence:

- Visual
- Calls
- tracks
- faeces
- scrapes
- wallows
- fraying
- hair
- browsing
- impact on habitats / other fauna and land use.

Learning outcome:

3. Understand the management of wild deer

Topics

3.1 Legal requirements that apply to the management of UK wild deer

3.2 Current deer management codes of practice and qualifications

3.3 Deer management plan

Topic 3.1

The learner will understand the legal requirements that apply to the management of UK wild deer:

- Seasons
- legal firearms
- Health and Safety
- game meat hygiene
- food hygiene
- common and statutory laws (eg Deer Acts, Firearms Acts, Health and Safety, Food Standards Agency, landowners liability).

Topic 3.2

The learner will understand current deer management codes of practice and qualifications:

- Deer Initiative best practice guide, BASC
- Deer stalking certificates level 1 and 2

Topic 3.3

The learner will understand the requirements of a deer management plan:

- Setting deer management objectives
- census techniques and calculation,
- impacts
- planning activities and resources
- monitoring activities and resources
- reviewing outcomes against objectives
- recommendations and improvements.

Guidance for delivery

This unit is designed to provide the learner with sound knowledge and skills required in deer management.

Throughout the unit, the emphasis should be on safe working. It is expected that learners will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working.

For Learning outcome 1 learners are expected to identify a minimum of six wild UK deer by species, sex, and age. They must also describe the condition of selected deer using correct terminology. Since all species are not usually available at any one site, the use of good quality audio-visual materials might be necessary to cover the full range. Tutors should identify the specific sites and learners should be encouraged to develop their identification skills at every opportunity when out on practicals or visits.

In Learning outcome 2 learners will explain wild UK deer ecology and behaviour. They should describe those aspects of deer ecology and behaviour (including life cycle) that identify deer as a group, comparing the differences between the selected species. This outcome would lend itself to a practical survey of habitats on an estate with an assessment of how valuable each one is for the deer species found there. Centres are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of establishments to add depth to the learner experience.

Learning outcome 3 requires learners to outline the common and statutory frameworks that affect wild UK deer and their habitats. As a minimum, learners should cover major influences (legal, codes of practice and qualifications) on deer management in the UK. Learners should be encouraged to undertake some research in this area to understand the requirements of a deer management plan. Along with formal teaching centres are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner.

Suggested learning resources

Books

- | | |
|--|-------------------------|
| Deer of Britain and Ireland: their origins and distribution
Published by: Swan Hill Press, 2000.
ISBN: 978-1840370911 | Carne, P |
| The deer stalking handbook
Published by: Quiller Publishing Ltd., 3 rd edition, 2013
ISBN: 978-1846891830 | Downing, G |
| How many deer? - A field guide to estimating deer population size
Published by: Forestry Commission, 1999
ISBN: 978-0855384050 | Mayle, B.A. |
| Deer: law and liabilities
Published by: Quiller Publishing, 2 nd edition, 2008
ISBN: 978-1846890475 | Parkes, C & Thornley, J |
| Deer stalking and management
Published by: The Crowood Press Ltd. 2008
ISBN: 978-1847970695 | Potter, L. |
| Roe deer - management and stalking
Published by: Quiller Publishing, 2010
ISBN: 978-1840371383 | Prior, R. |
| Muntjac: managing an alien species
Published by: Coch-y-Bonddu Books, 2004
ISBN: 978-1904784029 | Smith-Jones, C. |
| Deer Management in the UK
Published by: Quiller Publishing Ltd, 2011
ISBN: 978-1846891083 | Griffith, D |

Websites

- | | |
|------------------------------------|--|
| The Deer Initiative | www.thedeerinitiative.co.uk |
| The British Deer Society | www.bds.org.uk |
| Game & Wildlife Conservation Trust | www.gwct.org.uk |

Forestry Commission	www.forestry.gov.uk
Scottish Natural Heritage	www.snh.gov.uk
The Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Welsh Assembly Government	www.wales.gov.uk
Scottish Executive Environment and Rural Affairs Department	www.scotland.gov.uk
Department of Agriculture and Rural Affairs (Northern Ireland)	www.dardni.gov.uk

UAN:	J/507/7102
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to the skills and knowledge needed for ecological concepts and application, and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

The learner will investigate the theoretical concepts of ecology, and consider the practical applications of these concepts in the field. They will plan and carry out ecological surveys of plants and animals and develop their understanding of the behaviour and relationships these reveal.

Learning outcomes:

In this unit, learners will be able to

1. Understand the principles of behavioural ecology for life history strategies
2. Understand the principles of population dynamics and metapopulation theory
3. Ecological surveys for flora
4. Ecological surveys for fauna

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the principles of behavioural ecology for life history strategies

Topics

1.1 Aspects of behaviour that influence reproductive success

1.2 Relationships between parental investment and breeding systems

Topic 1.1

The learner will understand aspects of behaviour that influence reproductive success, competition, social systems, reproductive (eg maternal, paternal), social, territorial, communication.

Influences on behaviour (eg scales, individuals, species, communities, ecosystems, habitats, nutrient cycles, trophic levels, niches, natural selection mating systems).

Topic 1.2

The learner will understand relationships between parental investment and breeding systems:

- Parental investment, eg:
 - Paternal
 - Maternal
 - social groups
 - time
 - energy
- Breeding systems, eg:
 - selective (eg social/hierarchy related)
 - matings (including random or chance)
 - monogamy
 - polygamy
 - K and breeding strategies

Learning outcome:

2. Understand the principles of population dynamics and metapopulation theory

Topics

2.1 The metapopulation cycle

2.2 Habitat fragmentation and local extinction

Topic 2.1

The learner will know the principles of metapopulation theory:

- factors that influence metapopulations eg Increases and decreases, dissolution, emergence, prey/predator relationship, size, form, resources, demes, fluctuations, environment, predictable changes (eg seasonality), isolation
- biotic factors eg evolutionary age communities, primary productivity, community structure and competition, fecundity, natality, mortality, immigration, emigration, breeding strategies (r and K)
- abiotic factors eg growth, dispersion, genetic variability, continuity in time

Topic 2.2

The learner will understand habitat fragmentation and local extinction:

- human influence, eg:
 - agriculture
 - industry
 - regeneration
 - urbanisation
 - leisure use
 - deforestation
- non-human influence, eg:
 - natural disasters
 - seasonal events

Learning outcome:

3. Ecological surveys for flora

Topics

3.1 Plan a flora survey

3.2 Flora survey

3.3 Potential sources of survey error

Topic 3.1

The learner will plan to survey Flora:

- Objective setting and planning
- risk assessment
- selection of appropriate sampling and survey method (eg; quadrat, kick, transect)

Topic 3.2

The learner will undertake a survey of Flora, eg:

- Phase 2 surveys
- species surveys eg: NVC plant surveys.
- Data analysis methods
- presentation methods eg (written, data, pictorial, graphs, pie chart, basic statistics)

Topic 3.3

The learner will identify potential sources of error:

- Experimental
- Human
- Statistical
- equipment

Learning outcome:

4. Ecological surveys for fauna

Topics

4.1 Plan a fauna survey

4.2 Fauna survey

4.3 Potential sources of survey error

Topic 4.1

The learner will plan to survey Fauna:

- objective setting and planning
- risk assessment
- selection of appropriate sampling and survey method (eg quadrat, kick, transect)

Topic 4.2

The learner will undertake a survey of Fauna, eg:

- Phase 2 surveys
- species surveys eg: butterflies, reptiles, newts, birds, bats, mammals
- Data analysis methods
- presentation methods eg (written, data, pictorial, graphs, pie chart, basic statistics)

Topic 4.3

The learner will identify potential sources of error:

- Experimental
- Human
- Statistical
- equipment

Guidance for delivery

This unit is designed to enable the learner to investigate the theoretical concepts of ecology, and consider the practical applications of these concepts in the field. They will plan and carry out ecological surveys of plants and animals and develop their understanding of the behaviour and relationships these reveal.

This unit should consider a range of habitats and species (plants, mammals, reptiles, amphibians, invertebrates, birds) and should aim to take advantage of the local biogeography to enable the learner to fully engage with their community's ecology.

Throughout the unit the emphasis should be on the contextualisation of the principles of ecology discussed into real examples to enable the learner to fully engage with the concepts discussed. Safe working practices and compliance with relevant legislation, Codes of Practice and health and safety should be emphasised before and during practical surveying.

Learning outcome 1 encourages the exploration of the principles of behavioural ecology and its impact on reproduction and breeding populations. It should be discussed with reference to local, national and international contexts. Delivery is likely to be formal but should be complimented by, videos and case studies to encourage the learner to contextualise the behaviours discussed.

Learning outcome 2 encourages the exploration of the principles of metapopulation dynamics and should be discussed using relevant specific selected examples. Current and topical issues in metapopulation dynamics and conservation should be emphasised along with key theories eg; island biogeography. Delivery is likely to be formal but the use of case studies is strongly encouraged and should be complimented by site visits, visiting speakers, museums and exhibitions to ensure that the learner is able to contextualise the factors covered

In Learning outcome 3 the learner will develop surveying skills and be provided with opportunities to practise survey techniques for given National Vegetation Classification (NVC) communities. A

minimum of two surveys should be completed from at least two habitats using recognised NVC methodology. Learners will be required to plan, undertake and reflect on sampling in reference to method, sources of error, results, conclusions drawn, relevant legislation and health and safety.

Learning outcome 4 continues with development of practical ecological surveying skills. A minimum of two surveys should be completed from at least two taxonomic groups, using industry standard recognised methods in accordance with relevant legislation and licensing restrictions. Learners should be encouraged to plan, undertake and reflect on sampling in reference to method, sources of error, results, conclusions drawn, legislation and health and safety.

Learners are expected to have underpinning knowledge in animal and plant biology and should be able to relate this to the populations studied in this unit. This unit aims to build upon foundation knowledge to discover the complex relationships that exist within the natural world and how these influence populations of both plants and animals. Equal emphasis should be placed on the development of practical skills and the necessary knowledge to be able to interpret the results of surveys and contextualise these into short and long term impacts on populations and ecosystems. It is important that the learner understands the influence of legislation, Codes of Practice and health and safety in respect of ecological surveying.

Centres are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of habitats to add depth to the learner experience.

Suggested learning resources

Books

- | | |
|--|---|
| The Complete Textbook of Animal Health and Welfare
Published by: WB Saunders, 2009
ISBN: 0702029440 | Williams, J |
| Behavioural Ecology; An Evolutionary Perspective on Behaviour
Published by: OUP Oxford, 2008
ISBN: 0199206295 | Danchin, E; Giraldeua, L.A & Cezilly, F |
| Behavioural Ecology: An evolutionary approach
Published by: Wiley Blackwell, 1997
ISBN: 0632035463 | Krebs, JR & Davies, B |
| Conservation and the genetics of populations
Published by: Blackwell Pub., 2007
ISBN: 0470671459 | Allendorf, F & Luikart, G |
| Ecology
Published by: Blackwell Pub., 2006
ISBN: 1405111178 | Begon, M; Townsend, C & Harper, J |
| Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit: Field Manual
Published by: Joint Nature Conservation Committee, 1990
ISBN: 9780861396375 | JNCC |

The theory of island biogeography revisited
Published by: Princeton University Press, 2010
ISBN-10: 069113653X

Losos, J; Ricklefs, R & MacArthur, R

The theory of island biogeography
Published by: Princeton University Press, 2001
ISBN-10: 0691088365

MacArthur, R & Wilson, E

Ecological Census Techniques: A handbook, 2nd edition
Published by: Cambridge University Press, 2006
ISBN: 9780521606363

Sutherland, W(ed)

Practical field ecology
Published by: Wiley, 2011
ISBN-10: 0470694297

Wheater, C; Bell, J & Cook, P

Journals and magazines

- Journal of Ecology
- Ecology
- Behavioural Ecology
- Sustainable Development
- Ecologist
- British Wildlife

Websites

CIEEM	http://www.cieem.net
Natural England	www.gov.uk/government/organisations/natural-england
The Ecology Global Network	www.ecology.com
The Natural History Museum	www.nhm.ac.uk
Global Issues	www.globalissues.org.uk
JNCC	http://www.jncc.defra.gov.uk

UAN:	R/507/4638
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is to provide learners with an understanding of the principles of chainsaw maintenance, felling small trees (200- 300mm at felling height) and stump removal and how these can be applied in practice. This unit is aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will identify and understand a range of petrol-driven chainsaws and felling techniques currently used within the industry, to develop efficient chainsaw maintenance skills and to carry out basic repairs and troubleshooting.

If learners want to achieve the Level 2 Award in Chainsaw and Related Operations they will need to register and take the assessment separately through City & Guilds.

Learning outcomes

In this unit, learners will be able to

1. Recognise uses of chainsaws and commonly used methods for dealing with problem trees
2. Maintain chainsaws to manufacturer's recommendations
3. Safely fell and cross cut small diameter trees
4. Safely use stump and brush removal methods

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Recognise uses of chainsaws and commonly used methods for dealing with problem trees

Topics

- 1.1 The variety of uses of chainsaws
- 1.2 Assessing different problem trees
- 1.3 Methods for felling problem trees
- 1.4 Assessing tree felling activities

In this outcome the learners must assess a number of factors involved with tree felling and chainsaw use (these include problem trees). The learner will identify problem trees up to 380mm at felling height and explain how to deal with them but will not work on them.

Topic 1.1

The learners will understand the uses of chainsaws such as:

- felling
- cross cutting
- de-limbing / snedding
- logging
- tree surgery
- chainsaw carving.

Topic 1.2

The learners will assess different problem trees such as:

- leaning trees
- hung-up trees
- co-dominant stumps
- trees with damage
- trees with rot
- dead trees
- trees in difficult locations,
- trees close to other objects.

Topic 1.3

The learners will understand methods for felling problem trees including:

- dismantling
- use of mechanical aids (eg winch, felling lever, wedges)
- specialist cutting techniques (eg safe-corner cut, Danish pie, split level, dog tooth).

Topic 1.4

The learners will evaluate tree felling activities from the following standpoints:

- suitability for purpose
- end product
- disposal of waste
- finished state of site
- cost
- labour involved
- environmental impact
- disturbance to public
- risk involved.

Learning outcome

2. Maintain chainsaws to manufacturer's recommendations

Topics

2.1 Safety features of a chainsaw

2.2 Carry out maintenance operations on selected chainsaws in accordance with manufacturer's recommendations and health and safety guidelines

2.3 Common faults in chainsaws

In this outcome learners will carry out routine maintenance tasks on chainsaws with a maximum guide bar length of 380mm. They will also learn how to recognise common chainsaw faults. The faults may be engine related, assembly related or evident by chainsaw use and identified by cutting problems.

Topic 2.1

The learners will identify and state the function of the 10 safety features on a chainsaw. The safety features are:

- flared rear handle
- clearly marked and functioning on/off switch
- safety trigger interlock
- safety stickers
- anti-vibration mounts
- front hand guard incorporating the chain brake mechanism
- chain catcher
- exhaust directing fumes away from the operator
- bar and chain combination
- scabbard.

Topic 2.2

Learners will need to visually inspect chainsaws and carry out maintenance on the following components:

- air filter
- spark plug
- bar and chain
- anti-vibration mounts
- oil and fuel systems
- starter mechanism

- chain break mechanism
- exhaust.

Topic 2.3

Learners will recognise the common faults on chainsaws to include:

- uneven sharpening (left/right hand)
- incorrect depth gauges
- bent or worn bar
- blocked air filter
- faulty on/off switch
- symptoms of poor or incorrect fuel mix
- lack of chain oil
- worn or slack chain
- worn anti-vibration mounts
- dirty chainsaw.

Learning outcome

3. Safely fell and cross cut small diameter trees

Topics

3.1 Assess risks prior to felling and cross cutting operations

3.2 Methods for felling and cross cutting selected small diameter trees to meet given objectives

3.3 Dispose of waste using appropriate methods

In this outcome learners assess a site and if safe to do so fell small trees with a diameter up to 380mm. They will also cross cut the timber and dispose of the waste. Pre- start checks, safe starting techniques and safe cutting methods will be central to this outcome.

Topic 3.1

Learners must be able to assess risks prior to felling operations:

- ground conditions / undergrowth
- escape routes
- weather conditions
- above and below ground utilities
- loose or dangerous limbs overhead
- local dangerous trees including leaning, windblown, dead and rotten trees
- foreign objects in tree at cutting level such as wires or fencing.

Topic 3.2

Learners must be able to safely fell and cross cut trees whilst considering the following:

- pre felling:
 - risk assessment carried out
 - escape routes established
 - felling only if safe to do so
 - direction of fell
- felling:
 - correct use of chainsaw/felling aids
 - choice and positioning of cuts
 - appropriately sized hinge
 - body positioning/stance

- cross cut:
 - meeting given specifications
 - avoiding hitting ground with bar and chain
 - awareness of tension and compression
 - work technique
 - avoid 'pinching' the bar.

Topic 3.3

Learners must dispose of waste appropriately. Waste disposal should involve:

- meeting the requirements of the site
- cutting waste to a suitable size if required and stacking it as required
- burning or removing of waste if necessary
- considering waste as a secondary source of income.

Learning outcome:

4. Safely use stump and brush removal methods

Topics

- 4.1 Select appropriate stump and brush removal methods and equipment
- 4.2 Use appropriate stump and brush removal methods
- 4.3 Environmental impacts of removal method used
- 4.4 Commonly used stump and brush removal methods

In this outcome the learners must understand the methods and equipment available for stump and brush removal. They will be able to select and use an appropriate method for a given situation while paying particular attention to safe working practice and the need for PPE.

Topic 4.1

Learners must select appropriate stump and brush removal methods and equipment, eg:

Stump removal:

- stump grinder
- winching
- hand digging
- mechanical excavation
- mulcher
- fire
- chemical
- natural processes.

Brush removal:

- chipper
- mulcher
- fire
- brush mat
- dead hedging
- windrow
- brush baling/biomass.

Topic 4.2

Learners must safely use stump and brush removal methods, to include:

- signage and barriers as appropriate

- Personal Protective Equipment to include both eye and ear protection
- adherence to codes of practice
- use in accordance with manufacturer's instructions
- reinstatement of soil and ground post extraction.

Topic 4.3

Learners will know environmental impacts of removal methods used including:

- noise
- dust
- stump grindings
- wood chip
- exhaust gas pollution
- possible hydraulic oil pollution
- visual damage
- damage to ground and soil

Topic 4.4

The learners will understand commonly used stump and brush removal methods from the following perspectives:

- availability of machinery
- competency of operator
- cost (purchase and hire)
- access
- location
- timing of operations
- waste
- customer requirements
- tree species.

Guidance for delivery

This unit is designed to provide the learner with a sound knowledge of chainsaws and their use and the skills required to use a chainsaw to fell and cross cut and process the arisings of small trees. It also enables them to remove stumps and to identify and evaluate, but not deal with, problem trees.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery, therefore health and safety issues relevant to the equipment and tasks involved must be stressed and regularly reinforced. Adequate Personal Protective Equipment (PPE), appropriate to the learner, the equipment and the task must be provided and worn in accordance with the associated risk assessment, industry and operator's manual.

This outcome is best initially delivered in a workshop context with eventual move to a working woodland environment. Emphasis should also be put on the need for cleanliness throughout. The requirement for regular maintenance and sharpening and use of the manufacturer's manuals should also be identified.

This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations. If learners want to achieve the Level 2 Award in

Chainsaw and Related Operations they will need to register and take the assessment separately through City & Guilds.

It is recommended that simple trees are used initially and as the learner gains confidence and experience then the working area can be more challenging. It is advised that simulation of a real working environment is used in the first instance. Pre- start checks and safe starting techniques must form part of this outcome.

Particular attention must be made to safe working practice and the need for PPE. Possible danger to the public and fellow workers needs to be emphasised. Where winching is carried out, the learner needs to be aware of how to check and maintain cables and the particular danger of their use.

The learner will learn to identify problem trees but will not work on them. The learner will be made aware of methods of dealing with problem trees. This can all be taught in a real working environment. It is essential that risk assessments are carried out and the learner is not put at risk when examining problem trees. It is possible that some of this may initially be taught in the classroom using slides or PowerPoint presentations. The uses and maintenance of chainsaws will also be understood.

Suggested learning resources

Books

Winching Operations in Forestry
Published by: The Stationary Office, 2004
ISBN: 085538638X
Ireland, D

Chainsaw Operators Manual: The Safe Use of Chainsaws
Published by: Landlinks Press, 2005
ISBN: 0643090282
Kestel, B

Arborist Equipment: A Guide to the Tools and Equipment of Tree Maintenance and Removal
Published by: International Society of Arboriculture, 1995
ISBN: 188195613X
Shetterly, R. & Blair, D

Journals and magazines

- Arboricultural Advisory Information Service publications
- Arboricultural Association newsletter
- Forestry and British Timber
- Journal of Arboriculture
- NPTC workbooks 2001 / 2002 / 2004
- AFAG guides
- FISA guides

Websites

Husqvarna <http://www.husqvarna.com/uk/>

United States Department of Labor

support/working-with-chainsaws/different-techniques-for-the-felling-cut/

https://www.osha.gov/SLTC/etools/logging/manual/felling/cuts/special_techniques.html

Unit 320

Environmental interpretation in the Land-based sector

UAN:	Y/507/7105
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to environmental interpretation skills and understanding and how this can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

Learning outcomes:

In this unit, learners will be able to

1. Understand the role of environmental interpretation and media
2. Produce an interpretive plan for a site
3. Design a relevant piece of themed environmental interpretation
4. Understand how to evaluate the effectiveness of environmental interpretation

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the role of environmental interpretation and media

Topics

- 1.1 Environmental interpretation
- 1.2 Use of media to interpret sites

Topic 1.1

The learner will understand the aims, purpose and benefits of environmental interpretation:

- origination of concept of interpretation
- principles of interpretation eg Tilden's six principles, Beck and Cables principles Reasons for interpretation
- differences between interpretation and instruction
- types of audience eg captive, noncaptive, age, background, interests
- setting eg example country park, nature reserve, reservoir, nature walk, forest, botanical gardens, zoo.

Topic 1.2

The learner will understand media that can be used to interpret selected sites:

- guided interpretation eg guided trails, tours, talks, demonstrations, video production, role play, living history demonstrations, puppet shows, use of visual aids
- self-guided interpretation eg interpretive panels and boards, indoor and outdoor exhibits, signage, information centre, audio headsets, guide books, leaflets, maps, touch tables, DVDs, photographs
- reasons for using guided or self-guided interpretation methods.
- Use of Social Media eg Blogs, Forums, Twitter, Apps

Learning outcome:

2. Produce an interpretive plan for a site

Topics

- 2.1 Interpretive planning
- 2.2 Effective environmental interpretation planning

Topic 2.1

Learners will carry out interpretive planning:

- planning interpretive objectives; typical visitor numbers and profile eg age, interest, prior knowledge, language, educational level, reason for visiting, group sizes and dynamics
- gathering data
- planning interpretation to meet the needs of different visitor types
- selection of appropriate media, consideration of accessibility and relevance to setting
- planning guided and self-guided interpretive activities eg script/talk/story board,

- walks/trails, interactive media eg content, location and layout, planning themes
- importance of selecting themes, identification of themes, use of thematic map in planning walks/trails, using themes for verbal and written media
- meeting health and safety requirements

Topic 2.2

Learners will know features of effective environmental interpretation planning:

- Features of self-guided interpretation: appropriate content, use of design principles, organisation and layout eg size of text, text style, pictures and photographs, colour, interactive features, construction materials, health and safety considerations
- Features of guided interpretation: organisation of content, presentation skills, use of audio visual aids, use of props and resources, clarity of presentation

Learning outcome:

3. Design a relevant piece of themed environmental interpretation

Topics

3.1 Effective themed environmental interpretation

3.2 Carry out themed environmental interpretation

Topic 3.1

The learner will use Learning outcome 2 to understand the processes that make an effective piece of themed environmental interpretation.

- Effective: meets objectives for interpretation, conveys environmental information in an interesting, relevant, enjoyable and organised way, accessible for all visitors (physically and conceptually), meets safety requirements, within budget

Topic 3.2

The learner will carry out a themed environmental interpretation eg storyboard, poster, website, guided walk, audio guide

Learning outcome:

4. Understand how to evaluate the effectiveness of environmental interpretation

Topics

4.1 Techniques used to evaluate d environmental interpretation

4.2 Environmental interpretation evaluate

Topic 4.1

The learner will understand techniques used to evaluate selected environmental interpretation, through gathering information:

- self-evaluation eg using criteria, checklist
- evaluation by others eg questionnaire, interview, observation, direct and indirect questioning, open and closed questions, scoring and grading
- when to carry out evaluation eg before, during and after interpretation
- how to us evaluation to suggest recommendations and improvements

Topic 4.2

Learners will know what should be consider when evaluating environmental interpretation.

- meeting objectives
- conveying environmental information in an interesting, relevant, enjoyable and organised way
- accessibility for all visitors (physically and conceptually)
- meeting safety requirements
- cost effectiveness
- management implications
- sustainability

Guidance for delivery

This unit introduces learners to the principles and benefits of environmental interpretation, and enables them to develop practical skills in planning, carrying out and evaluating environmental interpretations.

As learners will be engaged in practical activity there should be an emphasis on safe working practices, including the use of appropriate Personal Protective Equipment (PPE), and appropriate risk assessments should be undertaken. At Level 3 it is expected that learners will take an active part in completing risk assessments, so that this becomes an integral part of all practical activity. Sustainability concepts should also be demonstrated where possible.

For Learning outcome 1 delivery is likely to include visits to a range of settings to enable learners to witness the plethora of environmental interpretive media and techniques in operation. Some classroom based and research activity is also anticipated, to enable learners to understand the concepts of interpretation and how it differs from instruction. A guest speaker involved in leading environmental interpretation would also help students to gain an understanding of the elements of planning involved.

For Learning outcome 2 learners will need to produce and interpret plans for a given site.

For Learning outcome 3 learners need to have the opportunity to develop practical skills in producing environmental interpretations. Learners will need to have supervised practice in developing the skills in leading a guided interpretation, as well as the construction skills in creating a self guided one. Delivery will also need to include consideration of themes, their importance and how they can be determined. It would be helpful for this to be delivered after the visits for outcome one have taken place, so that learners have an understanding of the types of media and their relative advantages and disadvantages.

For Learning outcome 4 learners will need to gain skills in evaluating environmental interpretation, which may include classroom based delivery and discussion. It will be most helpful if learners have the opportunity to practice evaluation of professionally produced materials, those of other learners and their own. This will enable valuable evaluative skills to be effectively developed.

Suggested learning resources

Books

Interpretation for the 21st Century: Fifteen Guiding Principles for Interpreting Nature and Culture
Beck, L & Cable, T

Published by: Sports Publishing, 2002
ISBN: 1571675221

A Sense of Place: An Interpretive Planning Handbook
Published by: Tourism and Environment Initiative, 1997

Carter, J

Environmental Interpretation: A Practical Guide for People with Big Ideas and Small Budgets
Ham, S

Published by: Fulcrum Publishing, 1993
ISBN: 1555919022

Museums and Their Visitors
Published by: Routledge, 1994
ISBN: 0415068576

Hooper–Greenhill, E

Explaining our World: Guide to Environmental Interpretation
Published by: Taylor and Francis, 1998
ISBN: 0419219404

Pierssene, A

The Passionate Fact: Storytelling in Natural History and Cultural Interpretation
Strauss, S

Published by: Fulcrum Publishing, 1996
ISBN: 1555919251

Interpreting our Heritage
Published by: University of South Carolina Press, 1970
ISBN: 0807840165

Tilden, F

Interpretive Master Planning
Published by: Verulam Publishing, 1994
ISBN: 1560442743

Veverka, J

Websites

Association for Heritage Interpretation	www.heritageinterpretation.org.uk
National Association for Interpretation	www.interpnet.com
Scottish Interpretors Network	www.scotinterpnet.org.uk
Zoolex Zoo Design Organisation	www.zoolex.org

Unit 321

Heathland Habitat Management

UAN:	H/507/7107
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to the skills and knowledge in heathland habitat management and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

The unit ensures that the learner is given the necessary knowledge, experience and management skills to enable them to manage an area of heathland effectively. Assessment methods include the presentation of a management plan, and practical skills assessment.

Learning outcomes

In this unit, learners will be able to

1. Recognise the origins and processes affecting heathland habitats
2. Carry out ecological surveys of heathland habitats
3. Recognise the threats to heathland habitats
4. Know appropriate management techniques for heathland habitats

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Recognise the origins and processes affecting heathland habitats

Topics

1.1 Development of heathlands

1.2 Types of heathland

Topic 1.1

The learner will explain the development of heathlands, eg: plant succession models, continuous woodland model), formation of podsollic soils, plant adaptation to low levels of nitrogen, stages of growth for heathers and gorses, factors relating to the existence and distribution of heathlands (eg historical, human, agricultural influences).

Topic 1.2

The learner will know the different types of heathland, eg:

- lowland heath and moorland
- wet and dry heath.

Learning outcome:

2. Carry out ecological surveys of heathland habitats

Topics

2.1 Indicator species of selected heathland habitats

2.2 Ecological surveys of selected heathland habitats

Topic 2.1

The learner will be able to identify indicator species of selected heathland habitats; as appropriate to habitat, eg:

- dwarf shrubs
- gorses
- mosses
- grasses
- bracken
- semi-aquatic
- invertebrates
- amphibians
- reptiles
- mammals
- birds.

Topic 2.2

Learners will be able to complete ecological surveys of selected heathland habitats using appropriate methods present data from surveys in an appropriate form.

Survey type:

- quantitative (for example quadrats and simple line transects) and qualitative (quality of habitat, species distribution)
- correlation of species
- effects of abiotic factors.

Data presentation, eg:

- written
- pictorial
- graphs
- pie chart
- basic statistics.

Learning outcome:

3. Recognise the threats to heathland habitats

Topics

3.1 Know the threats to heathland habitats

3.2 Explain the effects of threats on heathland habitats

Topic 3.1

The learner will know the threats to existing heathland: (eg: tree invasion, bracken invasion, grassland replacing heather, unmanaged fire, mire drying, erosion, pollution, recreational use (for example walking, horse riding), heathland loss due to road and housing development); relevant legislation to limit the impact (eg; Wildlife and Countryside Act 1981, Countryside and Rights of Way Directive 2000, Natural Environment and Rural Communities Act 2006, The Heather and Grass Burning Regulations 2008, designation as Sites of Special Scientific Interest, Special Protection Areas).

Topic 3.2

Describe the impact of these threats to existing heathland species and habitats (eg: damage or destruction of habitats, reduction in species numbers and diversity, loss of rare plants, loss of dependent species, accelerated succession, soil enrichment leading to non-heathland vegetation).

Learning outcome:

4. Know appropriate management techniques for heathland habitats

Topics

4.1 Ecological and cultural objectives for heathland management

4.2 Plan for and carry out practical heathland management

4.3 Evaluate selected practical heathland habitat management

Topic 4.1

The learner will describe ecological and cultural objectives for heathland management:

- Ecological objectives relating to site ecology, (eg; management for selected species of importance, improvements to species biodiversity, objectives for species recovery, heathland restoration, maintaining existing habitat, reducing fragmentation)
- cultural objectives (eg: relating to landscape character, historical features, archaeology, local community and user interests, cultural and amenity value).

Topic 4.2

The learner will carry out selected practical techniques available for heathland management, eg:

- scrub control (for example clear trees and scrub, treat regeneration, weed seedlings)
- grass control (for example scarify, mowing, grazing regimes, stocking rate density, choice of grazing livestock)
- heather management (for example burning, cut and collect)
- gorse management (for example coppicing, burning)
- bracken control (for example use of herbicide, cutting)
- timing and importance of timing of operations.

Topic 4.3

The learner will; evaluate selected practical heathland habitat management (eg; for meeting objectives, for improvements to heathland habitat, for improvements to conservation value, for timeliness of operation, sustainability of working practices, use of safe working practices, cost and funding implications, compliance with regulations) and make recommendations for improving management plans (eg; prioritisation of actions, timing of actions, balancing conflicting requirements, reviewing and recommending alternative management options).

Guidance for delivery

This unit is designed to provide learners with an understanding of the importance of heathland habitats for conservation, their historical development and the careful management required to maintain their characteristics. Learners will also gain the opportunity to develop their practical skills in heathland habitat management.

As learners will be engaged in practical activity there should be an emphasis on safe working practices, including the use of appropriate Personal Protective Equipment (PPE), and appropriate risk assessments should be undertaken. At Level 3 it is expected that learners will take an active part in completing risk assessments, so that this becomes an integral part of all practical activity. Sustainability concepts should also be demonstrated where possible and practical activities should be planned to minimise disruption to habitats and their species. Whichever delivery methods are used, it is essential that tutors stress that a number of heathland species are protected by law, and that licences from Natural England are required to handle them.

For Learning outcome 1, delivery is likely to be a mix of classroom activity and research relating to the development of heathland. It is anticipated that the ecology of heathland species and the characteristics of different heathland habitat categories will be explored through visits to a range of heathland areas. It is important that learners gain an understanding of the relationship between human activity through the ages and heathland development and distribution.

For Learning outcome 2, The learners need to undertake an ecological survey and identify the key flora and fauna indicator species, development of learners' identification of key elements of heathland species is likely to require learners to practice identifications. Where possible this should be carried out by viewing live specimens in situ, or alternatively using high quality photographs.

For Learning outcome 3, learners need to gain an understanding of the potential threats to heathland and their impact. Delivery could be assisted by visits to heathland areas, particularly those where threats or their impact are in evidence. A guest speaker, such as a countryside manager of a heathland area, could explain how they manage the area to mitigate the impact of threats. Learners also need to gain an overview of the relevant legislation and regulations, including the designation of heathland areas as SSSI.

For Learning outcome 4, learners will need supervised access to a heathland habitat to carry out practical management activity. Given the careful management planning of most UK heathland, it is important to plan this well in advance to fit with the timing planned by the land owner or managing body. The importance of health and safety should be stressed, as should the importance of minimising environmental impact through the habitat management activities.

Suggested learning resources

Books

- The Lowland Heathland Management Handbook
Published by: English Nature, 1993
ISBN: 1857160770
Gimtingham, G
- Countryside Conservation: Land Ecology, Planning and Management, 3rd Edition
Published by: Spoon Press, 1996
ISBN: 0419218807
Green B
- Grasslands, Heaths and Moors
Published by: Hodder Arnold, 1992
ISBN: 0340533706
Lane, A & Tait, J
- The Lowland Heath Management Booklet
Published by: English Nature, 1996
ISBN: 1857162668
Michael, N
- Lowland Grassland and Heathland Habitats
Published by: Routledge, 2002
ISBN: 041518763X
Price, E
- The Wild Flower Key: How to Identify Wild Plants, Trees and Shrubs in Britain and Ireland
Published by: Frederick Warne, 2006
ISBN: 0723251754
Rose, F
- Managing Habitats for Conservation
Published by: Cambridge University Press, 1995
ISBN: 0521447763
A practical guide to the restoration and management of lowland heathlands
Published by: RSPB, 2003
ISBN: 1901930386
Sutherland, W & Hill, D
Symes, N & Day, J
- New Forest: The History, Ecology and Conservation
Published by: New Forest Ninth Centenary Trust, 2001
ISBN: 0952612070
Tubbs, C
- Grazing Ecology and Forest History
Published by: CABI Publishing, 2000
ISBN: 0851994423
Vera, F

Websites

Ashdown Forest	www.ashdownforest.org
Department of Agriculture and Rural Development (NI)	www.dardni.gov.uk
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Welsh Assembly Government	www.wales.gov.uk
Scottish Executive Environment and Rural Affairs Department	www.scotland.gov.uk
Department of Agriculture and Rural Affairs (Northern Ireland)	www.dardni.gov.uk
Environment Agency	www.environment-agency.gov.uk
The New Forest	www.hants.org.uk/newforest
Joint Nature Conservation Committee	www.jncc.gov.uk
Natural England	www.naturalengland.org.uk
UK Biodiversity Action Plan	www.ukbap.org.uk
County Wildlife Trusts	www.wildlifetrusts.org

UAN:	K/507/7108
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to urban habitat conservation skills and knowledge and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further /higher education.

The learner will investigate major types of urban terrestrial and aquatic habitats and ecological processes of importance to urban habitats. They will study problem areas of urban ecology such as pollution and invasive species and their impacts. They will explore principles and constraints involved in the management of urban habitats. The unit is designed primarily for learners in a centre-based setting looking to progress into the sector or onto further education.

Learning outcomes

In this unit, learners will be able to

1. Survey the ecological characteristics of urban habitats
2. Understand ecological processes influencing urban habitats
3. Understand the problems caused by pollution and invasive species
4. Know the conservation value of urban habitats

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Survey the ecological characteristics of urban habitats

Topics

- 1.1 Urban habitat survey planning
- 1.2 Survey techniques and equipment
- 1.3 Urban terrestrial and aquatic habitat surveying
- 1.4 Structures, features and ecosystem of an urban habitat

Urban habitat: habitat (either naturally formed or man made) supporting species of flora and fauna within a town or city.

Topic 1.1

The learner will plan an urban habitat survey:

- Identify objectives, plan survey method and location, identify equipment and resources required, possible sources of error, methods to minimise errors

Topic 1.2

The learner will know the appropriate survey techniques and equipment:

- Species surveying: use of quadrat and transect methods, species identification, for example using keys, guide books, use of appropriate equipment, for example pitfall traps, sweep nets
- Environmental surveying: climate surveying eg light, wind, temperature, rainfall, water surveying for example temperature, nitrate level, flow, clarity, soil sampling, for example soil characteristics, mineral content, water content

Topic 1.3

The learner will safely carry out urban terrestrial and aquatic habitat surveying in accordance with Health and Safety at Work Act 1974, use of Personal Protective Equipment (PPE), completion of risk assessment, identification of hazards, methods to reduce risks, correct use of tools and equipment, consideration of safety of self and others.

Topic 1.4

The learner will understand the structures, features and ecosystem of an urban habitat:

- Record results, use of statistical analysis, presentation of results: quantitative (for example tables, charts, scatter graphs, histograms, pie charts), qualitative (for example annotated map, diagram, written report).

Learning outcome:

2. Understand ecological processes influencing urban habitats

Topics

- 2.1 Physical processes affecting urban habitats
- 2.2 Spatial processes affecting urban habitats
- 2.3 Biotic processes affecting urban habitats

Urban habitat: habitat (either naturally formed or man made) supporting species of flora and fauna within a town or city.

Topic 2.1

The learner will understand physical processes affecting urban habitats:

- Effect of climate and microclimate (rainfall, windspeed and prevailing direction, temperature, light, humidity)
- effect of soil (soil type, characteristics, mineral content, organic matter, water content)
- effect of man made physical processes, for example building, demolition, road creation
- effects on water courses for example building on flood plains, creation of flood defences
- sources of pollution.

Topic 2.2

The learner will understand the spatial processes affecting urban habitats:

- Habitat fragmentation
- edge effects
- ecotones
- metapopulation concept
- linear habitats for example road verges
- river banks
- railway embankments.

Topic 2.3

The learner will understand the biotic processes affecting urban habitats:

- Species adaptations to urban environments
- urban food chains
- predator and prey relationships
- effects of introduction on non-native species
- species dispersal
- movement between habitats
- human influence for example garden cultivations
- pet keeping
- species feeding.

Learning outcome:

3. Understand the problems caused by pollution and invasive species

Topics

3.1 Problems associated with urban pollutants and invasive species

3.2 Management strategies to counter urban pollutants and invasive species

Urban habitat: habitat (either naturally formed or man made) supporting species of flora and fauna within a town or city.

Topic 3.1

The learner will understand problems associated with urban pollutants and invasive species:

- Problems - Changes to species balance and biodiversity (decline of some species, increase in other species), effects of toxic pollutants on species (physiological response, avoidance, bioaccumulation, trophic transfer)
- Urban pollutants - Air and land pollutants (for example litter, heavy metals, particulates, sulphur dioxide, nitrogen oxide), water pollutants (for example nitrogen, oil, industrial and domestic effluents), other pollutants: light, noise, heat
- Invasive species - Non-indigenous species that adversely affect the habitat being invaded/introduced into, characteristics of invasive species that enable them to outcompete indigenous species, for example rapid reproduction, high growth rate, high dispersal ability, adaptability to environmental conditions, examples of plant and animal invasive species for example Japanese knotweed, Giant hogweed, Oxford ragwort, grey squirrel, Topmouth Gudgeon, Canada goose, Sika deer.

Topic 3.2

The learner will understand management strategies to counter urban pollutants and invasive species:

- Invasive species reduction (for example for animals planned cull programmes, capture and release, for plants use of herbicides, weeding), introduction of competitor species, changes to habitats to favour non-invasive species, air, water and soil monitoring, pollution reduction and avoidance, compliance with legislation.

Learning outcome:

4. Know the conservation value of urban habitats

Topics

4.1 Conservation value of urban habitats

4.2 Urban and rural habitat conservation

Urban habitat: habitat (either naturally formed or man made) supporting species of flora and fauna within a town or city.

Rural habitat: habitat (either naturally formed or man made) supporting species of flora and fauna within a countryside environment.

Topic 4.1

The learner will know the conservation value of urban habitats:

- Species (flora and fauna) presence and biodiversity, presence of specific or significant species (for example rare or endangered), value for amenity, recreation or educational use, importance for human quality of life.

Topic 4.2

The learner will know the differences between urban and rural habitat conservation:

- Management strategies, conservation objectives, other objectives (for example value for amenity, recreational or educational use), size and scale, species types and diversity, problems encountered, other land uses and conflicts, funding, community involvement.

Guidance for delivery

Urban habitats were once believed to be primarily for human benefit, through amenity and recreational use. It is now understood that they are significant in their own right as habitats, providing a range of habitat types and food sources for many species. This unit is designed to

provide learners with an understanding of the features of urban habitats and the factors affecting them, and to equip them with some practical surveying skills. As learners will be engaged in practical activity there should be an emphasis on safe working practices, including the use of appropriate Personal Protective Equipment (PPE), and appropriate risk assessments should be undertaken. At Level 3 it is expected that learners will take an active part in completing risk assessments, so that this becomes an integral part of all practical activity. Sustainability concepts should also be demonstrated where possible and practical activities should be planned to minimise disruption to habitats and their species.

For Learning outcome 1 delivery is likely to be predominantly practically based, with the opportunity to survey a range of urban habitats. This should include aquatic habitats, such as streams, rivers, ponds and canals as well as terrestrial habitats. It is important that delivery includes all aspects of completing a survey, from planning to reporting on results. Some classroom based delivery is likely to be required to enable learners to gain an understanding of statistical techniques and results presentation.

For Learning outcome 2 learners need to gain an understanding of the processes affecting urban habitats. Delivery is likely to include some classroom based activity and research in understanding the types of process which can affect habitats. It will be important to supplement this with visits, preferably to a range of urban habitats to explore the effects of different processes. This could be augmented by the use of audio visual materials to demonstrate the effects of different processes not evident in the local area.

For Learning outcome 3 delivery is likely to include learner research and classroom based activity to investigate the types of pollutants and invasive species and their effects on urban habitats and species biodiversity. Visits to urban habitats showing the effects of pollutants or invasive species would add interest. A guest speaker would also be of benefit, such as a head gardener describing management strategies to reduce invasive plant species.

For Learning outcome 4 learners will need access to an urban habitat so that they can assess its conservation value. This may well be linked with delivery for outcome 1. It will also be helpful for learners to visit a range of urban and rural habitats to enable them to identify differences. This could be supplemented with audio visual material showing habitats from other locations.

Suggested learning resources

Books

- | | |
|---|----------------------------|
| Urban Habitats
Published by: Hodder Arnold, 1993
ISBN: 0340533692 | Carr, S; Lane, A & Tait, J |
| Promoting Nature in Cities and Towns: A Practical Guide
Published by: Packard Publishing, 1986
ISBN: 0709909667 | Emery, M |
| Habitat Creation and Repair
Published by: Oxford University Press, 1998
ISBN: 0198549660 | Gilbert, O & Anderson, P |
| Urban Nature Conservation: Landscape Management in the Urban Countryside
Published by: Taylor and Francis, 1997 | Kendle, T & Forbes, S |

ISBN: 0419193006

Ecological Census Techniques
Published by: Cambridge University Press, 1998
ISBN: 978-0521478151

Sutherland, W

Managing Habitats for Conservation
Published by: Cambridge University Press, 1995
ISBN: 0521447763

Sutherland, W & Hill, D

Urban Habitats
Published by: Routledge, 1999
ISBN: 0415162653

Wheater, C

Websites

British Trust for Ornithology

www.bto.org

Department of Agriculture and Rural Development (NI)

www.dardni.gov.uk

Department for Environment, Food and Rural Affairs

www.defra.gov.uk

Welsh Assembly Government

www.wales.gov.uk

Scottish Executive Environment and Rural Affairs Department

www.scotland.gov.uk

Department of Agriculture and Rural Affairs (Northern Ireland)

www.dardni.gov.uk

Environment Agency

www.environment-agency.gov.uk

Royal Society for the Protection of Birds

www.rspb.org.uk

Trust for Urban Ecology

www.urbanecology.org.uk

Unit 323

Greenwood crafts

UAN:	M/507/7109
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to greenwood craft skills and knowledge and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/ higher education.

Learning outcomes:

In this unit, learners will be able to

1. Know commonly produced greenwood products
2. Understand appropriate woodland management for producing wood for greenwood crafts
3. Demonstrate practical techniques in greenwood crafts

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Know commonly produced greenwood products

Topics

1.1 Greenwood products produced from British woodlands

1.2 Features of wood used to produce greenwood products

1.3 End user of greenwood products

Topic 1.1

The learner will know greenwood products produced from British woodlands:

- furniture items, eg:
 - stools
 - chairs
 - benches
- garden items, eg:
 - garden furniture
 - pergolas
 - trellis
 - poles
 - pea and bean sticks
 - rakes
 - climbing plant supports
 - wattle hurdles/panels
- turned items, eg:
 - bowls
 - platters
 - treen
 - chair spindles and legs
 - tool handles
 - garden dibbers
 - rounders bats
 - skittles
 - rolling pins
- basketry items, eg:
 - willow woven baskets
 - cleft wood baskets eg: trugs, swill baskets
- living items, eg:
 - made from green willow, such as domes, fences/screens, sculptures, arches, walkways, arbours, tunnels, seats, revetments, riverbank strengthening, hides
- construction items, eg:
 - posts and rails for fencing
 - roof shingles
 - constructional timbers

- lathes
- wattle rods
- thatching spars
- liggers and sways
- hurdles
- hedge-laying items, eg:
 - stakes and binders
- tools and handles, eg:
 - beetles
 - mallets
 - rakes
 - hay forks
 - scythe handles
- other items, eg:
 - besoms
 - tent pegs
 - thatching spars
 - hop poles
 - walking sticks
 - horse jumps
 - coracles
 - clogs
 - spoons
 - staves for Morris dancers
 - musical instruments.

Topic 1.2

The learner will know the features of the wood used to produce greenwood products:

- Choice of tree species eg: Ash, Oak, Hazel, Field Maple, Beech, Sycamore, Apple, Cherry, Silver Birch, Sweet Chestnut, Willow
- quality of timber required eg: grain, odour, shrinkage when dried, texture, tendency to split, ease of working, density, hardness, flexibility, water resistance
- age of timber in relation to size of components/products.

Topic 1.3

The learner will know the end user for greenwood products:

- Retailers, private customers, local event, specialist venues, direct sales marketplaces, use on/within reserve, farm or estate where produced.

Learning outcome:

2. Understand appropriate woodland management for producing wood for greenwood crafts

Topics

2.1 Woodland management techniques used to produce suitable greenwood

2.2 Legislation relevant to greenwood production

Topic 2.1

The learner will understand appropriate woodland management techniques used to produce suitable wood for selected greenwood products.

- Management techniques, eg:
 - Coppice systems
 - Pollarding, tree species
 - Structure
 - Rotations
 - Productivity
 - timber quality
 - biodiversity
 - tree health
 - sustainability
 - planting
 - layering
 - singling
 - thinning
 - cuttings
- Techniques for obtaining timber, eg:
 - Felling
 - Splitting
 - riving/cleaving
 - peeling
 - pointing

Topic 2.2

The learner will understand the legislation relevant to greenwood production eg felling licences, site designations, wildlife legislation.

Learning outcome:

3. Demonstrate practical techniques in greenwood crafts

Topics

3.1 Tools and equipment needed to produce greenwood products

3.2 Techniques to produce greenwood products

For Learning outcome 3, learners will comply with relevant health and safety requirements, to include personal protective equipment, good working practice, risk assessment.

Topic 3.1

The learner will select and demonstrate the safe use of appropriate tools and equipment needed to produce greenwood products, eg:

- pole lathe
- shaving horse
- drawknife
- froe,
- chisels
- gouges

- brace and bits
- knives
- bow
- saw
- wedges
- axes
- adzes
- billhooks
- spoke shaves
- sharpening stones
- hammers
- maul
- clamps/cramps
- loppers
- cleaning
- sharpening
- handle replacement.

Topic 3.2

The learner will create greenwood products using appropriate techniques, eg:

- turning
- weaving
- carving
- cutting
- shaping
- drilling
- joint construction
- appearance
- smoothness
- size (in relation to specification)
- suitability for purpose.

Guidance for delivery

This unit is designed to combine the practical skills and knowledge of greenwood products and production methods with an understanding of the end user. Learners need to investigate the development of sustainable management techniques necessary to produce wood for greenwood products.

This unit should be delivered in a practical context wherever possible and for certain parts of the unit this is essential. Visits to commercial woodlands, engaging with local practitioners such as thatcher's, charcoal producers and willow weavers, visits to craft fairs and living museums, will enhance learner experience.

The nature of greenwood management and production is seasonal and care must be taken to ensure that tasks and activities are integrated within natural cycles.

In Learning outcome 1 learners will need to develop familiarity with the range of greenwood products that are, and have been, produced from British woodlands. Learners will need to study a minimum of **three** out of the eight groups of products. Learners will be able to observe these first hand through visits to producers, craftspeople, reserves, farms and estates and points of sale. Learners will need to know which types and characteristics of greenwood are most useful for the manufacture of products including identification of the typical end user.

In Learning outcome 2 Learners will look at the woodland species appropriate for greenwood products, their identification and management. The common uses of a range of species will also need to be explored. Site visits to woodlands to identify these species in their natural habitats is valuable. Learners will also need to know the different management techniques used to produce greenwood and how these can be applied to woodlands and a greenwood crop (a focus on sustainable cropping, should also be covered).

Learners should be made aware of the range of legislation affecting greenwood production.

Learning outcome 3 covers the practical techniques used to make greenwood products. Delivery will need to focus on the safe use of various tools as well as the various techniques for obtaining usable greenwood and transforming it into products. Learners will need to understand the health and safety issues arising from greenwood work, particularly the hazards and risks involved. The use of appropriate PPE will form an integral part of this unit, as well as demonstrations by tutors or craftspeople, followed by sufficient supervised practice time for learners to develop their competence.

Learners will need access to woodland that offers a variety of species and management techniques relevant to the study of greenwood products and production. They must have access to woodland to observe and identify relevant greenwood production. Learners will need tools and equipment relevant to the products they are required to make and adequate workshop facilities.

Suggested learning resources

Books

Green Woodwork: Working with Wood the Natural Way Abbott, M
Published by: Guild of Master Craftsman Publications (no longer in print, but some second-hand copies available), 1990
ISBN: 0946819181

Living Wood: From Buying a Woodland to Making a Chair, Second Edition Abbott, M
Published by: Living Wood Books, 2004
ISBN: 0954234510

Woodlands: A Practical Handbook Agate, E
Published by: BTCV, 2002
ISBN: 0946752338

Toolcare: A maintenance and workshop manual Agate, E
Published by: BTCV, 1991
ISBN: 0 946752 24 9

Caring for Small Woods Broad, K
Published by: Earthscan Publications, 1998

ISBN: 1853834548

The Tree Book

Milner, E

Published by: Collins and Brown, 1992

ISBN: 1855851326

The Encyclopedia of Green Woodworking

Tabor, R

Published by: Eco-Logic Books/Worldly Goods, 2000

ISBN 1899233075

Traditional Woodland Crafts

Tabor, R

Published by: BT Batsford, 1994

ISBN: 0713475005

Websites

Trust for Conservation Volunteers

www.btcv.org.uk British

Association of pole lathe turners

www.bodgers.org.uk

Coppices Products

www.coppice-products.co.uk

Forestry Commission

www.forestry.gov.uk

Promoting and supporting the wellbeing of small woods in the UK

www.smallwoods.org.uk

The Woodsmith's Store

www.woodsmithstore.co.uk

UAN:	H/507/7110
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for learners to understand the importance of volunteers to the countryside management sector and to furnish the learners with the skills and knowledge to safely and effectively manage those volunteers.

This unit will explore the importance of volunteers to the countryside management and closely related sectors, examining who they are and what motivates them to volunteer. As a countryside manager learners will need to recruit, maintain, and develop volunteers in a large proportion of the job roles they will be progressing into. The unit will give the learners skills in assessing and developing the skills of volunteers, as well as managing motivation and morale. The unit will also examine the duty of care in regards to health and safety of volunteers, and broader safeguarding issues.

Learning outcomes

In this unit, learners will be able to

1. Understand why and how to recruit volunteers
2. Understand how to support volunteers
3. Understand managing volunteers
4. Manage volunteers

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand why and how to recruit volunteers

Topics

- 1.1 Benefits of volunteering and role of volunteers
- 1.2 Types of people who volunteer
- 1.3 Promotion of volunteering
- 1.4 Recruitment of volunteers

In this outcome learners will understand the value volunteers make to an organisation's goals, the types of people who volunteer and how to recruit volunteers.

Topic 1.1

Learners will understand the benefits of volunteering, both to the individual, to the organisation and to society. Benefits to the individual include, for example meeting new people, keeping active, give something back to society, enhance CV, value the natural resource and learn from experts. Benefits to the organisation include, for example access to specialist skills, encourage community involvement, prioritise workload of employees and increase staffing capacity during periods of high demand. Learners should also be aware of the importance of communicating the value and contribution of volunteers to other stakeholders within an organisation.

Topic 1.2

Learners will identify attitudes to volunteering and recognize the types of people who volunteer, examining age profiles, motivations, and socio-economic information. Learners should be aware that there is no age limit to volunteering, although age restrictions may apply to specific activities or situations, particularly with young or vulnerable volunteers.

Topic 1.3

Learners will know the ways of promoting volunteering opportunities, focusing on the advantages and disadvantages of communication methods used to target groups of potential volunteers, for example volunteer websites, use of social media, local press and radio, stands at trade events, word of mouth and paper based marketing (eg, newsletters, adverts, flyers, posters). Learners should be aware of the importance of presenting a positive image of volunteering, including promotion of an organisation's commitment towards safeguarding and reflect upon how the ethos of an organisation is being presented. Learners should also consider diversity consideration to maximize accessibility of volunteering opportunities (eg, language, font size, typeface and colours) for a range of potential volunteers (eg, partially sighted, deaf or individuals whose first language is not English).

Topic 1.4

Learners will understand the processes and procedures associated with recruiting and inducting volunteers, including mechanisms to respond to unsolicited enquiries. This will include formal and informal mechanisms for capturing initial information from potential volunteers (eg, application forms, face to face and telephone interviews) and ensuring volunteers are appropriately briefed and aware of their roles and responsibilities (eg, maintaining professionalism, professional boundaries, things to say and not say, reporting of safeguarding concerns, emergency procedures), as well as induction and settling in periods. Learners will also be familiar with appropriate pre-start checks (eg DBS and List 99 checks), as well as screening of volunteers to identify opportunities and limitations

so that volunteers may be allocated appropriate tasks in line with organisational needs and legal considerations (eg, Equality Act 2010).

Learning outcome:

2. Understand how to support volunteers

Topics

- 2.1 Initial skills assessment of volunteers
- 2.2 Development of volunteers' skills
- 2.3 Motivational techniques for volunteers

In this outcome learners will understand how to support, develop and motivate volunteers. Learners will also understand that some individuals or groups of volunteers need additional support, and will recognise how to identify such additional needs, and potential methods of supporting those needs.

Topic 2.1

Learners will need to identify mechanisms to assess the initial abilities, knowledge and skills of new volunteers (eg, questionnaires, interviews, discussions and trial periods under supervision) in order to allocate appropriate tasks.

Topic 2.2

Learners will understand the importance of the continued development of volunteers and explain how to promote a culture of positive development and learning through the use of reflection and objective constructive feedback. Learners should be aware of mechanisms to increase knowledge/skills to enable the volunteer to fulfil a job role (eg, internal organisation training, setting of SMART targets, identification of potential external training, job coaches/mentors and regular appraisals/reflections). Learners should be able to design a skills plan and training log to use in developing volunteers' skills and knowledge further.

Topic 2.3

Learners will understand potential techniques to encourage and motivate volunteers, for example, good communication, praise, rewards (short term eg tea and biscuits, long term eg Christmas party), sense of achievement (eg setting and achieving goals), reflective practice, recording volunteer achievements (eg achievement logs/diaries).

Learning outcome:

3. Understand managing volunteers

Topics

- 3.1 Key responsibilities involved in managing volunteers
- 3.2 Establish working conditions
- 3.3 Management procedures
- 3.4 Poor performance

In this outcome learners will understand the legislation, policies, procedures, codes of practice and guidelines in relation to managing volunteers in the workplace. Learners will recognise the difference between volunteers and paid staff, including consideration of volunteer agreements and contracts of employment. They will understand how to establish good working conditions and manage and motivate volunteers to maximize their effectiveness. Learners will also understand how to address poor performance and potential options should the performance of a volunteer not improve.

Topic 3.1

Learners will know the key responsibilities involved in managing volunteers, including the importance of having a clear volunteer policy, a process for airing grievances, appropriate insurance cover and meeting legislative requirements (eg Health and Safety at Work Etc. Act 1974, Management of Health and Safety at Work Regulations 1999). Learners should also be familiar with the differences between engaging volunteers and employees (eg, Working Time Regulations 1998 and National Minimum Wage do not apply to volunteers).

Topic 3.2

Learners will understand how to establish and manage appropriate working conditions for volunteers (eg parking, expenses, provision of work clothing, rest breaks and support facilities (eg kitchen, transport, crèche).

Topic 3.3

Learners will understand procedures to manage the work of volunteers (eg work that is interesting and meaningful, a clearly defined area of responsibility, work which matches the volunteer's abilities as well as the volunteer being involved in planning and organising their own work) and recognise the need to balance managerial, educative and supportive approaches. Learners will also need to understand the importance supporting the individual (eg acknowledging external pressures and personal circumstances) as well as establishing a positive relationship and developing a spirit of co-operation between volunteers and other staff (eg opportunities to socialise with colleagues).

Topic 3.4

Learners will understand how to recognise and address problems with a volunteer's performance in line with the organisation's policies and procedures. Learners should be aware of a systematic approach to managing performance issues, for example:

- the volunteer is made aware of the particular behaviour causing concern
- the consequences of the behaviour (eg for the client, the organisation or the volunteer) are made clear
- the volunteer understands the change expected
- the volunteer has the opportunity to practice the correct behavior.

Learners will know potential options to address issues with a volunteer's performance should it not improve (eg reassign, retrain, revitalise by offering a break from their voluntary work, refer to an external support agency, or ending the relationship between the volunteer and the organisation).

Learning outcome:

4. Manage volunteers

Topics

- 4.1 Plan volunteer activities
- 4.2 Lead and supervise volunteers
- 4.3 Review volunteer performance

In this outcome learners will plan and supervise volunteers undertaking a practical task, subsequently reviewing their performance and providing appropriate feedback. This outcome could be covered by the learner managing a volunteer or group of volunteers to undertake a practical countryside activity, such as pond clearance, building a stile, erecting a fence, planting trees or clearing vegetation.

Topic 4.1

Learners will identify and plan an appropriate and achievable practical countryside activity suitable for volunteers to undertake. Learners are also expected to undertake an appropriate risk assessment, make arrangement for the necessary resources needed to complete the activity to be available and prepare specifications that the volunteers are expected to meet.

Topic 4.2

Learners will lead and supervise volunteers undertaking a practical countryside activity. This will include pre-activity briefing of the volunteers (eg, outcomes from the risk assessment and emergency procedures), allocation of tasks, ensuring volunteers work to the specifications, management of health and safety, motivation of the volunteers, dealing with any problems which arise, as well as minimising pollution and ensuring correct disposal of waste.

Topic 4.3

Learners will review volunteer performance following completion of a practical countryside activity and provide the volunteers with feedback on their performance. This should be objective and based against the specifications, identifying what went well, what could be improved and how the volunteers could further develop their knowledge and abilities.

Guidance for delivery

This unit examines the role of the volunteer in countryside management, the skills needed to motivate and manage volunteers, and the surrounding legal framework in regards to health and safety and safeguarding. It will be important that delivery relates to example situations that are vocationally relevant to the learners. It is envisaged that this will be a mainly theoretical delivery style, however there is scope for visiting speakers, and site visits to observe volunteer management in action to enhance the relevance of the subject to learners.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for teachers to develop a method of maintaining contact with a range of employers in the countryside sector may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

Suggested learning resources

Books

A-Z of Volunteer Management
Published by: Lulu.com, 2012
ISBN-10: 1471613895
ISBN-13: 978-1471613890

Crooks, B & Mouradian, J

The Complete Volunteer Management Handbook (3rd Revised Edition)

McCurley, S; Lynch, R & Jackson, R

Published by: Directory of Social Change, 2012
ISBN -10:1906294607
ISBN-13: 978-1906294601

The New Breed: Understanding and Equipping the 21st Century Volunteer Paperback (New Edition)

McKee, J & McKee, T.W.

Published by: Group Publishing 2012

ISBN-10: 0764486195

ISBN-13: 978-0764486197

Volunteering and Society in the 21st Century

Rochester, C; Paine, A.E &

Howlett, S

Published by: Palgrave Macmillan, 2012

ISBN-10: 0230367720

ISBN-13: 978-0230367722

Managing Volunteers: How to Maximize Your Most Valuable Resource

Sakaduski, N

Published by: Praeger Publishers, 2013

ISBN-10: 1440803641

ISBN-13: 978-1440803642

Websites

<https://do-it.org/>

<http://www.volunteering.org.uk/>

<https://www.ncvo.org.uk/ncvo-volunteering>

<http://www.volunteering-wales.net/>

<https://www.gov.uk/volunteering/find-volunteer-placements>

<http://www.volunteernow.co.uk/>

<http://www.tcv.org.uk/http://www.countryside-jobs.com/volunteers/intro.htm>

UAN:	K/507/7111
Level:	3
GLH:	60

What is this unit about?

Adventurous Activities are becoming increasingly popular, both within the UK and across the world. As a result, the ability to lead outdoor and adventurous activities is becoming an increasingly sought after skill.

Throughout this unit, learners will be required to participate in the leadership of adventurous activities, identifying and demonstrating the skills and attributes of an effective leader. The importance of these skills will then be demonstrated in the adventure setting, commenting on National Governing Body awards and industry specific requirements.

Students will be required to understand the importance of national governing body awards, developing a knowledge and understanding of the pathways into the NGB award systems, and relating the systems to activity leadership, understanding the remit of the qualifications.

Upon investigating into the skills, qualities and responsibilities of a successful adventurous activity leader, the learner should develop an understanding of these key attributes, recognising them in a leaders work, and developing them into their own practice.

Having led an activity, the learner is required to review their own performance in both the planning, and leadership of an adventurous activity. This should be completed under the supervision of a qualified instructor, whereby the instructor can take control of the situation should the need arise.

Learning outcomes

In this unit, learners will be able to

1. Understand the importance and pathway of National Governing Body awards in activity Leadership
2. Know the key attributes of a successful adventurous activity leader
3. Plan and lead, under supervision, a variety of adventurous activities
4. Review own performance in the planning and leading of an outdoor and adventurous activity

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the importance and pathway of National Governing Body awards in activity Leadership

Topics

- 1.1 National Governing Body within the UK
- 1.2 Pathways through National Governing Body

Topic 1.1

Learners will understand NGB's within the UK, and a brief understanding of what each NGB encompasses is key to choosing which leadership qualifications to train towards in the outdoor industry eg

- British Canoe Union
- British Mountaineering Council/ Mountain Training Association
- Royal Yachting Association
- British Orienteering
- British Caving Association.

Topic 1.2

Learners will know the pathways through a number of NGB award schemes should then be presented to the learner, allowing them to benchmark their current level of ability in comparison to NGB awards, and set accurate and aspirational goals.

Learning outcome:

2. Know the key attributes of a successful adventurous activity leader

Topics

- 2.1 Key attributes
- 2.2 Benefits of key attributes within industry

Topic 2.1

The learner will know the key attributes of a successful outdoor leader, eg:

- Communication
- Decision Making
- Improvisation
- equipment understanding
- knowledge
- technical ability/ skills
- confidence
- authority
- rapport
- organisation
- initiative

- conduct
- health and safety.

Topic 2.2

The learner will understand the usefulness of different attributes throughout the session.

Learning outcome:

3. Plan and lead, under supervision, a variety of adventurous activities

Topics

3.1 Planning adventurous activities

3.2 Leading adventurous activities

Throughout this outcome, the learner will plan and run a series of adventurous activities, considering the participants, resources, activity specific considerations, and conduct throughout the planning and running of the session, also focusing on the key leadership techniques when leading the session.

The learner will plan a variety of adventurous activities, considering:

- Participants: age, medical information, group size, specific needs (learning, physical and other)
- Resources: Equipment requirements PPE, activity specific equipment, first aid/ safety and leadership equipment, understanding the requirements for the storage, transport, availability and safe use of the equipment.
- Activity specific considerations: Mode of travel (to venue and style of activity), Costings of the activity, Environmental considerations (wild life, other area users, land owners, hazards, weather) and timing (setup/ take down time)
- Conduct: Code of conduct (NGB or organisation specific) Contingency planning, qualifications and NGB Guidelines.

Planning should be completed on a session planning template that is suitable for the activity being undertaken, for example for a paddle sports session, the BCU session planning template should be used to maintain consistency between qualifications.

Learners should be taught a number of session frameworks, such as EDICT and IDEAS. Once learners have an understanding of the frameworks, there should be an opportunity for them to observe and review a session run in such a manner.

Topic 3.1

The learner will lead adventurous activities under supervision.

Learning outcome:

4. Review own performance in the planning and leading of an outdoor and adventurous activity

Topics

4.1 SWOT

4.2 SMART

Topic 4.1

The learner will use SWOT analysis as well as taking into consideration the observations of their peers and observer, whilst also commenting on their intrinsic feedback.

Topic 4.2

The learner will use SMART goal setting following their SWOT analysis to support the continuation of their future development.

Guidance for delivery

This unit aims to provide the learner with the skills required to lead adventurous activities in a work based environment. The unit should be run in such a way that resembles working in an adventure centre setting, whereby a leader is required to obtain training on an activity or leadership style, before running a series of sessions in that activity, being observed by a senior member of the centre team (in this case the unit tutor). Throughout the unit, learners should regularly engage in practical activities, allowing them to gain the required skills to pass the unit.

In outcome 1, learners are required to gain an understanding of National Governing Body awards with regard to leadership in the outdoors, developing an understanding of the pathway through national governing body awards. This will allow the learner to benchmark their abilities with regard to the requirements for qualifications within the UK, allowing them to choose their own path into the industry, creating logbooks to suit their requirements. Throughout the unit there should be a clear understanding as to why NGB awards are required in the industry, and how they are utilized.

Regular reference should be made to logbooks. The logbooks should be suitable for the students' needs, for example a student working towards a Mountain Training Association award would be more suited to using the MTA, D Log system, whereas a student working towards a BCU qualification would be better suited to taking notes on a word processor or spreadsheet. Logbooks should be completed in digital format.

In Learning outcome 2, the learner should be able to observe the leadership of an experienced outdoor leader, commenting on their key attributes and the leadership techniques used by the leader. They should have a sound understanding of the way that the leader approaches the leadership task, and should be able to justify any comments made with regard to the leadership and group management techniques used.

In Learning outcome 3, the learner is required to plan, and lead an adventurous activity. In the interests of safety, there must always be a qualified member of staff leading or observing the session, however should the session be led by a learner; the learner should be allowed to manage the group alone, without unnecessary intervention from the tutor. The technical skills should be completed correctly and safely, and the key attributes of a leader observed.

Planning should be completed on a session planning template that is suitable for the activity being undertaken, for example for a paddle sports session, the BCU session planning template should be used to maintain consistency between qualifications.

Learners should be taught a number of session frameworks, such as EDICT and IDEAS. Once learners have an understanding of the frameworks, there should be an opportunity for them to observe and review a session run in such a manner

In Learning outcome 4, the learner should be able to review the performance of their tutors and peers, analyzing the sessions run throughout outcome 3 to build up a picture of the reviewing process. They may also be able to complete peer reviews, however extra care must be taken as to ensure that students do not feel vulnerable/ intimidated throughout the reviewing process. The assessment for this outcome should be by means of reviewing their session from objective 3.

Regular reference should be made to logbooks. The logbooks should be suitable for the students' needs, for example a student working towards a Mountain Training Association award would be more suited to using the MTA, D Log system, whereas a student working towards a BCU

qualification would be better suited to taking notes on a word processor or spreadsheet. Logbooks should be completed in digital format.

For learning outcome 4, the Learner should be taught a series of basic reviewing techniques, before running their own session; this should result in a deeper analytical understanding of reviewing on behalf of the learner, prior to the assessment of their review.

Throughout the teaching of the criteria, it is advised that the learner observes a number of sessions, providing feedback and independently reviewing others work, before reviewing their own.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for teachers to develop a method of maintaining contact with a range of employers in the sectors may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

Throughout objective 1, National Governing Body representatives could be utilised as part of the training for students on the pathways through the NGB awards. It is highly likely that anybody delivering such services also works in an adventure centre setting.

Employers could be utilised for learning outcome 3, to support the course tutor with the observation of activity sessions. This would also potentially support students opportunities having completed the course, with regard to future employment.

Suggested learning resources

Books

The adventure toolkit Published by: Vertebrate, 2007 ISBN: 8-1906148041	Burdett, D
British Canoe Union Coaching Handbook Published by: Pesda Press, 2006 ISBN: 978-0954706166	ed Ferrero, F
Canoe and Kayak Handbook: Handbook of the British Canoe Union Published by: Pesda Press, 2002 ISBN: 978-0953195657	ed Ferrero, F
Effective Leadership in Adventure Programming Published by: Human Kinetics, 2005 ISBN: 978-0736052504	Priest,S; Gass, M
Mountaincraft and Leadership, fourth edition Published by: Mountain Training Boards of England and Scotland, 2013 ISBN: 978-0956886903	Langmuir, E
Outdoor Leadership: Technique, Common Sense and Self-confidence	Graham, J

Published by: Mountaineers books, 1997
ISBN: 978-0898865028

Rock Climbing: Essential Skills & Techniques
Published by: UKMTB, 2011
ISBN: 978-0954151164

Peter, L

Safety, Risk and Adventure in Outdoor Activities
Published by Sage, 2006
ISBN: 978-1412920780

Barton, B

Journals and magazines

- Canoe focus
- CODE
- Summit
- Trail

Websites

British Canoe Union	http://www.bcu.org.uk/
British Cave Association	http://www.trycaving.org.uk/
British Mountaineering Council	https://www.thebmc.co.uk/
British Orienteering	http://www.britishorienteering.org.uk/
Mountain Training Association	http://www.mountain-training.org/
Royal Yachting Association	http://www.rya.org.uk/
British Canoe Union (Coaching Pathway)	http://www.canoe-england.org.uk/media/pdf/New%20Coaching%20Diagram%201-10.pdf
Mountain Training Association (awards pathway)	http://www.mountain-training.org/about/awards-pathway

UAN:	L/507/4637
Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of the principles of plant and soil science and how these can be applied in practice within land-based or related industries. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Learners will be able to develop an understanding of soil characteristics and their relationship to crop growth and development. They will investigate how plants grow and develop, through a knowledge of their structure and physiology. In addition, the learners have the opportunity to consider factors which influence production of commercial crops and other plants, which provides a basis for plant and soil management techniques.

Learning outcomes

In this unit, learners will be able to

1. Understand the function of plant structures
2. Understand the main processes of plant physiology, growth and development
3. Understand how soils affect plant growth and development

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the function of plant structures

Topics

- 1.1 Internal and external structures of plants
- 1.2 Function of plant structures

Topic 1.1

Learners will understand the major internal and external structures of plants:

- Major internal structures: cell structure (cytoplasm, organelles), parenchyma, collenchyma, sclerenchyma, xylem tissue, phloem tissue, cambium, epidermis, guard cells, and stomata
- Major external structures: roots, shoots, stem, leaves, buds, flowers, fruit and seeds
- Specialised cells, tissues and organs: eg pericycle, endodermis, lenticels, cotyledons, stolons, rhizomes, bulbs, corms, root and stem tubers.

Topic 1.2

Learners will understand the function of the major plant structures (eg photosynthesis, reproduction, support, transport, anchorage, absorption, storage, defence, attraction, gaseous exchange, respiration, division).

Learning outcome:

2. Understand the main processes of plant physiology, growth and development

Topics

- 2.1 Processes of plant physiology
- 2.2 Life cycle of selected plants
- 2.3 Growth and development of plants

In this outcome learners will explore the major processes of plant physiology and identify factors affecting growth and development of plants. Learners will also need an awareness of how knowledge of plant physiology can be applied within land-based management scenarios.

Topic 2.1

Learners will understand the major processes of plant physiology:

- Photosynthesis: process and equation for photosynthesis, chloroplasts, function of chlorophyll, functionality of guard cells and stomata, factors influencing the rate of photosynthesis (light, chlorophyll, temperature, carbon dioxide, water, leaf colour)
- Respiration: definition of aerobic and anaerobic respiration, equation for aerobic respiration, structure and function of mitochondria, diffusion, compensation point, factors influencing the rate of respiration (temperature, water availability, seasonal growth)
- Uptake, transport and loss of water and nutrients: osmosis, diffusion, plasmolysis, turgor, translocation, transpiration, factors influencing transpiration (eg temperature, humidity, air movement, water supply, light, stomata).

Topic 2.2

Learners will understand the life cycle of plants:

- life cycle types: ephemeral, annual, biennial, perennial
- germination: process and stages, types of germination (eg epigeal, hypogeal), types of reproduction (sexual reproduction eg flower structures, pollination and fertilisation, seed production, dispersal), (asexual reproduction eg vegetative propagation, parthenogenesis).

Topic 2.3

Learners will understand the growth and development of plants, to include: cell division, cell expansion, cell differentiation, apical meristems, lateral meristems, formation of roots, shoots, leaves and buds.

Learning outcome:

3. Understand how soils affect plant growth and development

Topics

- 3.1 Soil types and soil formation
- 3.2 Investigate characteristics of soil types
- 3.3 How soils affect plant growth and development
- 3.4 Cultural techniques that affect soil characteristics

In this outcome learners will need to investigate a range of soil types and carry out supervised basic soil experiments to investigate different soil characteristics. These could include investigating the proportion of sand, silt and clay through suspending in water, investigating the water holding capacity of different soil types, and determining soil pH. The learners' understanding of the effects of soil characteristics on plant growth and development could be supported by some controlled experiments, where learners grow plants in different soil types.

Delivery could be enhanced by visits to see different types of plants growing in different soil types. Visiting expert speakers' input would be useful, as they would describe practical aspects of managing soil structure and plant nutrition.

Topic 3.1

Learners will identify a range of soil types to include loams, clays, silts, sands, organic soils, and understand how soil is formed.

Topic 3.2

Learners will investigate the characteristics of a range of soil types and profiles to include:

- soil profiles and different horizons
- properties of soil particles and texture (clay, silt and sand),
- soil structure (i.e. crumb structure, aggregate sizes)
- water holding capacity
- aeration
- stability
- organic matter
- pH
- soil life: decomposers, mycorrhizae.

Topic 3.3

Learners will understand how soil properties and characteristics can affect plant growth and development, to include:

- rooting depth and plant stability
- pH and organic matter
- availability or lack of macronutrients and micronutrients
- effects of organic and inorganic fertiliser application
- nutrient retention to include cation exchange capacity
- drainage/water logging
- compaction/poor aeration
- effects of high or low soil water content
- effects on ability to prepare soil for planting.

Topic 3.4

Learners will understand how cultural techniques affect soil structure, to include:

- Soil amelioration (eg green manure, addition of lime, organic matter, hydrogels, mycorrhizae, textural amendment)
- Soil cultivation (eg sub-soiling, ploughing, single and double digging, rotavating, minimal cultivation, zero cultivation)
- Soil protection and prevention of damage (eg capping, erosion, cultivation pans, surface and subsurface compaction).

Guidance for delivery

On completion of this unit, the learner will have developed an understanding of how plants grow and develop, through knowledge of their structure and physiology. It will be important that delivery relates to plants that are vocationally relevant to the learners. Laboratory and field based practicals will be essential to help learners to explore soil characteristics, plant physiology and structure, and a series of visits to growing plants could help learners better understand plant growth and development. Learners are required to study a range of plants for this unit, although they should be able to focus upon plant types that are most relevant to their vocational area of study. Learners will also need to have access to a range of soils, as well as appropriate equipment and resources to undertake soil sampling and investigate soil profiles.

Visiting speakers could enhance relevance of the subject to learners. Development of areas within a college environment where learners are able to modify and manipulate plant environments may enhance understanding of the complexities of plants and their life cycles.

Suggested learning resources

Books

Principles of Horticulture. 6th Edition
Published by: Routledge, 2011
ISBN: 0080969577

Adams, C.R. & Early, M.

A Dictionary of Plant Science. 3rd Edition
Published by: OUP Oxford, 2012
ISBN: 0199600570

Allaby, M.

Essential Soil Science: A clear and concise introduction to soil science

Ashman, M & Puri, G

Published by: Wiley-Blackwell, 2008

ISBN: 0632048859

An Introduction to Plant Structure and Development: Plant Anatomy for the Twenty-First Century.

2nd Edition

Beck, C.B

Published by: Cambridge University Press, 2010

ISBN: 0521518059

Nature and Properties of Soils. 14th Edition

Brady, N.C. & Weil, R.R.

Published by: Pearson Education, 2014

ISBN: 9332519102

Plant Anatomy: An Applied Approach

Cutler, D.F; Botha, T & Stevenson, D.W.

Published by: John Wiley & Sons, 2008

ISBN: 1405126795

Biochemistry and Molecular Biology of Plants. 2nd Edition

Buchanan, B.B; Grusissem, W & Jones, R

Published by: Wiley-Blackwell, 2015

ISBN: 0470714212

Raven Biology of Plants. 8th Edition

Evert, R.F & Eichhorn, S.E.

Published by: WH Freeman & Co Ltd., 2012

ISBN: 1464113513

Instant Notes in Plant Biology. 2nd Edition

Lack, A & Evans, D

Published by: Taylor and Francis, 2005

ISBN: 0415356431

Botany: An Introduction to Plant Biology. 5th Edition

Mauseth, J.D.

Published by: Jones & Bartlett Publishers, 2014

ISBN: 1284068854

Advanced Biology

Reiss, M & Monger, G

Published by: Nelson Thornes, 2000

ISBN: 0174387326

Biology. 2nd Revised Edition

Roberts, M & Ingram, N

Published by: Nelson Thornes, 2001

ISBN: 0748762388

Plant Biology

Smith, A; Coupland, G; Dolan, L; Harberd, N;
Jones, J; Martin, C; Sablowski, R & Amey A

Published by: Garland Science, 2009

ISBN: 0815340257

Plant Physiology. 5th Edition

Taiz, L & Zeiger, E

Published by: Sinauer Associates, 2010
ISBN: 0878935657

Plant Cell Biology
Published by: Academic Press, 2009
ISBN: 0123747783

Wayne, R

Principles and Practice of Soil Science: The Soil as a Natural Resource. 4th Edition
White, R.E

Published by: Wiley-Blackwell, 2005
ISBN: 0632064552

Journals and magazines

- Arborist News
- Essential Arb
- Forestry Journal
- Journal of Arboriculture
- Quarterly Journal of Forestry
- The Arb Magazine
- Field mycology

Websites

Biotechnology and Biological Sciences Research Council	http://www.bbsrc.ac.uk
British Society of Soil Science	http://www.soils.org.uk/
DEFRA	http:// www.defra.gov.uk
Environment Agency	http:// www.environment-agency.gov.uk
Health and safety Executive	http:// www.hse.gov.uk
Science and Plants for Schools	http://www.saps.org.uk/
The Arboricultural Association	http://www.trees.org.uk/
The Forestry Commission	http://www.forestry.gov.uk

UAN:	R/507/7121
Level:	3
GLH:	60

What is this unit about?

This unit endeavours to explore the role of expeditioning, introducing its many facets. Throughout the unit, the learner should also grow familiar with historical or large scale expeditions, which should demonstrate key attributes such as teamwork, exploration, persistence, and comradeship. This may include both historical expeditions and modern day examples. The learner will then reflect upon the nature of such an expedition when planning, participating and reviewing their own expeditions.

Learners should be introduced to the skills required to successfully plan, and execute a multi-day expedition, evidencing their competency to complete such tasks regularly, incorporating their ability to utilise a wide range of expedition skills, whilst also demonstrating appropriate leadership and group supervision skills.

Learners will undertake at least two expeditions, which should develop a sound understanding of expeditioning, complementing the nature of their programme of study through the wider curriculum of skills taught.

Throughout this unit, learners should develop self-confidence, interpersonal skills and leadership skills in a safe learning environment. These skills will be developed through practical participation in planning, carrying out and evaluating day and multi-day expeditions. Learners will have the opportunity for personal development through completing single and multi day expeditions, enhancing physical, social, emotional and intellectual development.

Learning outcomes

In this unit, learners will be able to

1. Understand the types of multi-day expedition, demonstrating a knowledge of the safety, environmental and access considerations for multi-day expeditions
2. Plan different types of multi-day expedition
3. Undertake different types of multi-day expedition
4. Review planning and undertaking of different types of multi-day expedition

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the types of multi-day expedition, demonstrating a knowledge of the safety, environmental and access considerations for multi-day expeditions

Topics

1.1 Types of expeditions

1.2 Expedition descriptions

1.3 Safety consideration

Topic 1.1

The learners will know the types of expedition, eg:

- Individual eg: Ellen MacArthur- Round the world solo sail
- Commercial eg: many of the modern day Everest expeditions
- Group and teams eg: Shackletons expeditions to the south pole.
- Adventure eg: gap year trips, Long way Round, Dakar Rally
- Exploratory eg: space expeditions, or expeditions to undiscovered areas of rainforest
- Sponsored eg: Steve Fisher; The Inga Project (sponsored by Red Bull)
- Training eg: gaining new skills for a 'bigger' expedition.

Topic 1.2

The learner will know the different expedition descriptions:

- Duration:
 - single day
 - multi day
 - extended duration
- means:
 - mountaineering
 - trekking
 - sailing
 - canoe
 - kayak
 - caving
 - pony trekking
 - cycle
 - vehicle propelled
 - multi activity
 - by any means (travelling)
- aims:
 - military
 - discovery
 - experiential
 - aid
 - educational

- advertisement (commercial)
- competition
- entertainment
- scientific
- team cohesion
- training
- conquest
- objectives:
 - funding
 - opportunity/ experience
 - planning/ training
 - equipment advances
 - research.

Topic 1.3

The learner will understand the different expedition considerations:

- safety considerations:
 - Location
 - Other users
 - Local authorities
 - Local landowners
 - Criminal activities
 - Previous activity
 - Weather
 - Land formation
- environmental considerations:
 - Wildlife
 - Local residents
 - Litter and excrement
 - Weather risks
 - Erosion
 - Hostile/ armed forces activity
 - Pollution from travel
- access considerations, eg:
 - Access to inland waterways
 - Access to land and specific areas
 - Permissive access
 - Vehicle access arrangements
 - Camping/ accommodation arrangements
 - Toll charges.

The learners will understand that the different considerations vary greatly dependent upon the duration, means, aims and type of expedition that is being undertaken.

Learning outcome:

2. Plan different types of multi-day expedition

Topics

2.1 Planning multi-day expeditions

Topic 2.1

The learner will plan different types of multi-day expeditions. Learners will know the documents required to undertake expeditions both in the UK and internationally:

- documents required for expeditions:
 - ATA Carnet (for overseas travel with high value goods)
 - insurance
 - itinerary
 - maps (where available)
 - medical forms
 - route card
 - travel documents
- permission:
 - organisations
 - organisation management
 - governing body
 - local authorities
 - parental consent
 - participants
 - land owners
 - administrative bodies
- logistics:
 - staff ratios
 - transport
 - accommodation
 - equipment
 - food
 - contingency planning
- finance:
 - budgeting
 - food
 - transport
 - accommodation
 - staffing
 - contingency planning
- Health and safety:
 - medical forms
 - notification/ parental consent
 - emergency contact details
 - route cards:
 - route plan
 - expected return time
 - insurance
 - risk assessment
 - first aid qualifications
 - weather forecast
- skills/ techniques:
 - navigation:
 - scaling
 - distances
 - handrail features
 - use of a key

- interpretation
- grid references
- technical skills
 - weather forecast
 - avoidance of hazards
 - predicting conditions.

Learning outcome:

3. Undertake different types of multi-day expeditions

Topics

3.1 Multi-day expeditions

Topic 3.1

The learner will use skills to undertake different multi-day expeditions:

- travelling skills
- camp craft skills
- navigation skills.

Learning outcome:

4. Review planning and undertaking of different types of multi-day expedition

Topics

4.1 SWOT

4.2 SMART

Topic 4.1

The learner will use SWOT analysis as well as taking into consideration the observations of their peers and observer, whilst also commenting on their intrinsic feedback.

Topic 4.2

The learner will use SMART goal setting following their SWOT analysis to support the continuation of their future development.

Learners should keep a diary of events throughout the expeditions, be it in paper, video, audio or any other format. This diary of events can then be utilized to complete an in depth review of the expedition at a later date. There should be reference made to their emotions and feelings where possible, as to allow the learner to feel the emotion at the time of recording, reminding them of the finer details of the event.

Guidance for delivery

Throughout this unit, the learner is required to gain an understanding of multi day expeditions, and the skills, techniques and development that can be achieved through the participation in expeditions, be it a technical, psychological, physiological or other transformation. The unit should be delivered through practical means where possible, however this may not always be possible with some aspects of the unit.

As a centre, it should be ensured that learners have access to appropriate equipment, including any safety, personal and group equipment. If the student does not have suitable equipment, it is required that the equipment be sourced from an external source.

To provide a deepened understanding throughout this unit, the skills required to plan and undertake a multi-day expedition should be taught prior to the group commencing the planning process. The group should then be supported through the planning process with minimal tutor input. The students should be fully aware of the documentation and planning requirements for their chosen expedition.

Learners are required to research into the range of expeditions that have taken place, and are still taking place around the world, and into space. The centre should study celebrated historical examples of expeditions in the following forms:

- Individual eg: Ellen MacArthur- Round the world solo sail
- Commercial eg: many of the modern day Everest expeditions
- Group and teams eg: Shackletons expeditions to the south pole.
- Adventure eg: gap year trips, Long way Round, Dakar Rally
- Exploratory eg: space expeditions, or expeditions to undiscovered areas of rainforest
- Sponsored eg: Steve Fisher; The Inga Project (sponsored by Red Bull)
- Training eg: gaining new skills for a 'bigger' expedition.

By reviewing the aims and objectives of these expeditions, learners may find inspiration for their own expeditions. This learning objective is best taught utilising case studies, and the learners previous experiences. As a result, it is advised that the unit is taught with access to IT facilities and literature to research previous events.

For learners to successfully compete outcome two, they should understand the content of outcome one, before researching into the requirements for their chosen styles of expedition. They will need to have an understanding of the requirements of the expedition prior to planning. Upon moving on to the planning stage, the learner is required to complete the full plan of the expedition, undergoing any training required as to prepare for the expedition. To successfully undertake the expedition, the learner will require time, potentially in a similar environment, to learn and practice all of the skills associated with the expedition.

This learning and practice should be built up from short journeys in the local area, developing into longer day trips, before progressing into overnight stays. It is advised throughout the training stages that learners experience both old and new technologies, as to develop a deeper understanding of the skills acquired.

Throughout the duration of the expedition, learners could be remotely supervised, dependent on their level of training, however if learners do require direct supervision, the leader should take a more observational or laissez faire role wherever possible. If a leader is required to step in, their approach should be somewhat democratic, unless there is a high risk to the group, leader, or any other person, whereby the leader should take an autocratic leadership style within the group. The learners should be trained with relevant safety training, as to ensure that the group are appropriately equipped to travel through their chosen location safely.

To increase the understanding of expeditioning to the learner, they should take responsibility for their own planning and execution of the expeditions. As a result, the deepened understanding should lead to a more viable discussion topics, which can be utilised to evidence any points made throughout the review of the expedition.

Learners should also exercise reflective practice as to understand their, and others performance. This should involve benchmarking their own goals and expectations in conjunction with using SWOT analysis, as to develop an action plan for future developments in their personal practice.

Throughout the unit, learners should show an environmental understanding, both by their practice when participating in expedition activities, and in the work prior to, and in review of the expedition.

Suggested learning resources

Books

Adventure Motorcycling Handbook: A Route and Planning Guide Published by: Trailblazer Publications 2012 ISBN 978-1905864461	Scott, C
The adventure toolkit Published by: Vertebrate, 2007 ISBN: 8-1906148041	Burdett, D
Canoe and Kayak Handbook: Handbook of the British Canoe Union Published by: Pesda Press, 2002 ISBN: 978-0953195657	ed Ferrero, F
Effective Leadership in Adventure Programming Published by: Human Kinetics, 2005 ISBN: 978-0736052504	Priest,S & Gass, M
Expedition Planning Guide Published by: Lulu.com, 2011 ISBN: 978-1446790403	Edwards, D
Long Way Round: The Illustrated Edition Published by: Sphere, 2005 ISBN: 978-0316731706	Boorman,C & McGregor, E
Mountaincraft and Leadership, fourth edition Published by: Mountain Training Boards of England and Scotland, 2013 ISBN: 978-0956886903	Langmuir, E
The Royal Geographical Society's Expedition Handbook Published by: Profile books ltd, 2004 ISBN: 978-1861970442	ed Winsler, S
Safety, Risk and Adventure in Outdoor Activities Published by Sage, 2006 ISBN: 978-1412920780	Barton, B

Journals and magazines

- Canoe focus
- CODE
- Summit
- Trail

- Wanderlust

Websites

British Canoe Union	http://www.bcu.org.uk/
British Cave Association	http://www.trycaving.org.uk/
British Mountaineering Council	https://www.thebmc.co.uk/
British Orienteering	http://www.britishorienteering.org.uk/
Mountain Training Association	http://www.mountain-training.org/
Royal Yachting Association	http://www.rya.org.uk/

UAN:	J/507/7231
Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of the ecology of game species and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

This unit provides knowledge and skills in the identification, ecology and population assessment of wild game birds and in the management of their habitats.

Learning outcomes:

In this unit, learners will be able to

1. Know gamebird species found in the UK
2. Understand the ecology and associated behaviour of gamebird species
3. Manage gamebird habitats
4. Know techniques used to determine gamebird population size

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Know game species found in the UK

Topics

- 1.1 Gamebird species found in the UK
- 1.2 Differentiate between the sex of gamebirds, where appropriate
- 1.3 Differentiate between young and adult game birds

Topic 1.1

The learner will know gamebird species found in the UK:

- Gamebirds: pheasant, partridges (grey, red-legged), grouse (red, black), ptarmigan (Scotland only)
- Duck: mallard, teal, wigeon, pintail, shoveler, gadwall, tufted duck, pochard, goldeneye, scaup (NI only)
- Geese: pink footed, greylag, white fronted (England and Wales only), Canada, barnacle (Islay only)
- Waders: golden plover, common snipe, jack snipe (NI only), woodcock
- Rail: Coot (England, Wales and Scotland only), moorhen (England, Wales and Scotland only).

Topic 1.2

The learner will be able to differentiate between young and adult game birds; Male and female.

Topic 1.3

The learner will differentiate between young and adult game birds; chicks, poults, young, old.

Learning outcome:

2. Understand the ecology and associated behaviour of gamebird species

Topics

- 2.1 Breeding ecology and life cycle of gamebirds
- 2.2 Habitat requirements of different gamebirds species throughout the year
- 2.3 Habitats of a range of gamebird species
- 2.4 External influences that impact on gamebird species population

Topic 2.1

The learner will understand the breeding ecology and life cycle of gamebirds, eg:

- Monogamous/polygamous strategies, factors affecting brood survival rates
- Pairing-up, territoriality, breeding, nesting, hatching, brood rearing, fledging, brood dispersal, migration.

Topic 2.2

The learner will understand the habitat requirements of different gamebirds species throughout the year eg:

- Features: topography, structure, size and layout, cover, water, grit, presence of other species, food source and availability, predator presence or absence
- Requirements for: Breeding season, laying, nesting cover, incubation, brood rearing, escape cover, over-wintering and natural feeding.

Topic 2.3

The learner will know the habitats of a range of gamebird species, eg:

- Woodland
- Hedges
- cover crops
- field margins
- heather moorland
- wetlands
- grass margins
- beetle banks
- conservation headlands.

Topic 2.4

The learner will know the external influences that impact on gamebird species population, eg:

- Predation
- competitive and complementary species
- parasites and diseases
- human.

Learning outcome:

3. Manage gamebird habitats

Topics

3.1 Equipment required to carry out gamebird habitat management

3.2 Habitat management to maintain, improve or create habitats for gamebirds

3.3 Habitat management for gamebird species

Topic 3.1

The learners will select equipment required to carry out gamebird habitat management, eg:

- Hand tools:
 - Spades
 - Forks
 - Shovels
 - Secateurs
 - Handsaws
 - Clippers
 - Hammers
 - Pickaxes
 - hand fencing equipment
 - heather wand and floggers
 - safe and correct use
 - maintenance and storage
 - sharpening of tools where appropriate

- suitable clothing
- Personal Protective Equipment (PPE).

Topic 3.2

The learner will carry out practical habitat management to maintain, improve or create habitats for gamebirds, eg:

- Coppicing
- Planting
- thinning and layering
- hedge laying
- heather burning and cutting,
- weed clearance
- reedbed thinning and cutting
- mowing and topping.

Topic 3.3

The learner will understand habitat management for gamebird species:

- Optimising populations
- population trends
- factors impacting gamebird population (eg predators, re-introducing natural environment).

Learning outcome:

4. Know techniques used to determine gamebird population size

Topics

4.1 Methods commonly used to survey wild game populations

4.2 Equipment required to carry out a wild game survey

4.3 Specify the information and calculations required to estimate a game population

Topic 4.1

The learner will know the methods commonly used to survey wild game populations:

- Pair counts
- brood counts.

Topic 4.2

The learner will know the equipment required to carry out a wild game survey, eg:

- Binoculars
- Vehicle
- recording equipment
- map of area
- suitable dog breeds.

Topic 4.3

The learner will know how to specify the information and calculations required to estimate a game population:

- Pairs present in Spring

- average young per pair in Summer
- young to old ratio.

Guidance for delivery

Tutors delivering and assessing this unit should use as wide a range of techniques as possible. Lectures, discussions, presentations, site visits, supervised game management practical's, exercises, research using the internet and/or library resources and the use of personal and/or industrial experience could all be included.

Health and safety issues relating to safe working must be stressed and regularly reinforced, and risk assessments must be undertaken prior to practical activities. Adequate PPE must be provided and used following the production of suitable risk assessments.

Learning outcome 1 requires the learner to be familiar with all legal gamebird species so that they can accurately identify them in the field. For the common gamebird species the learners should also be able to differentiate between the sexes and age of birds when handling them either dead or alive. Ideally identification techniques should be taught using live birds, however, if these are not available then tutors should use high quality audio visual materials or preserved specimens. It would be beneficial for learners to visit habitats. Visits could be made to, for example, wildfowl collections such as a Wildfowl and Wetlands Trust reserve.

Learning outcome 2 covers the ecology of gamebird species. Learners should understand the breeding behaviour of the common gamebird species, their habitat requirements, how these vary at different times of year and identify a range of habitats. Additionally, learners will need to understand a range of external influences impacting the populations. From this understanding the learner should be able to undertake practical habitat management of a specific area to meet the needs of the gamebird species found there (in learning outcome 3).

Learning outcome 3 requires the learners to undertake practical habitat management that will benefit gamebird species. This is likely to be delivered by site visits and supervised habitat practicals supported by formal lectures, discussion and independent learner research. The learner should be familiar with a range of habitat management techniques used to encourage gamebird species.

Learning outcome 4 addresses how gamebirds numbers are calculated so that a sustainable population can be maintained. It is likely to be delivered by formal lectures, discussion, site visits, practicals and independent learner research. Ideally tutors will use real life situations to illustrate the techniques. If this is not possible then the use of case study materials is acceptable. Visiting expert speakers could add to the relevance of the subject for the learners. For example, a game conservancy advisor or game manager could talk about the use of estimation techniques that they use within their research or management work.

Centres are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of establishments to add depth to the learner experience.

This unit links with Principles of ecology and conservation and habitat species survey, pest and predator, upland game management.

Suggested learning resources

Books

- The Pheasant
Published by: BSP Professional, 1988
ISBN: 978-0632020119
Hill, D &
Roberston, P
- Pheasants of the world
Published by: Hancock Houses, 1993
ISBN: 978-0888392800
Howman, K
- Ecology and Management of Game Birds
Published by: BSP Professional, 1988
ISBN: 0632018345
Hudson, P & Rands, M
- Grouse in Space and Time: The Population Biology of a Managed Gamebird
Published by: Game Conservancy Ltd., 1992
ISBN: 0950013015
Hudson, P
- Pheasants of the World: Biology and Natural History, 2nd Edition
Published by: 1999
ISBN: 1840371291
Johnsgard, P
- Sporting Birds of the British Isles
Published by: 1984
ISBN: 0715384473
Martin, B.P
- Snipe and Woodcock: Sport and Conservation
Published by: Swan Hill Press, 1996
ISBN: 1853107139
McKelvie, C
- The Partridge: Pesticides, Predation and Conservation
Published by: Academic Press. 1990
ISBN: 0003832988
Potts, G.R
- A Natural History of the Pheasant
Published by: Swan Hill Press, 1997
ISBN: 978-1853105647
Robertson, P
- Game Heritage: An Ecological Review from Shooting and Gamekeeping Records
Published by: Game Conservancy Ltd., 1992
ISBN: 0950013021
Tapper, S

Websites

- The Game and Wildlife Conservation Trust www.gwct.org.uk

UAN:	L/507/7232
Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of the benefits and threats to shooting sports in the UK. This unit's focus is on live quarry shooting and has not been designed to encompass target shooting in any form. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

This unit provides the knowledge and understanding of internal and external factors associated with the game management industry. Learners will investigate how game management has shaped the countryside and will evaluate the main legislative acts and codes of practice along with the role of organisations associated with the industry.

Learning outcomes

In this unit, learners will be able to

1. Understand the historical development of shooting sports in the UK
2. Know the current impacts of shooting sports in the UK
3. Understand current regulation of shooting sports in the UK
4. Know factors that could influence the future of shooting sports in the UK

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the historical development of shooting sports in the UK

Topics

- 1.1 Changes in sporting quarry
- 1.2 Changes in technology that have affected shooting sports
- 1.3 Changes in society that have affected shooting sports
- 1.4 Influences of key historical changes in legislation on shooting sport

Topic 1.1

The learner will know changes in sporting quarry:

- trends in population
- species.

Topic 1.2

The learner will know the changes in technology that have affected shooting sports:

- development in sporting firearms
- game bird production techniques
- predator control
- ICT eg social media, GPS, mobile phones, computers.

Topic 1.3

The learner will know the changes in society that have affected shooting sports:

- Land use and ownership
- Social attitudes
- National and international events eg WWI, WWII
- Economics.

Topic 1.4

The learner will know the influences of key historical changes in legislation on shooting sports:

- Game Acts 1831
- Wildlife and Countryside Act 1981
- Deer Act 2007
- Animal Welfare Act 2006
- Hunting Act 2004
- Protection of Badgers Act 1992.

Learning outcome:

2. Know the current impacts of a shooting sports in the UK

Topics

- 2.1 The economic benefits of a shooting sport
- 2.2 The benefits and issues associated with habitat management for a shooting sport
- 2.3 The benefits and issues of shooting sports to wildlife species
- 2.4 Social benefits and issues associated with a shooting sport

Topic 2.1

The learner will know the economic benefits of a shooting sport:

- Direct/ indirect employment
- Total revenue
- Multiplier affect
- Total participation.

Topic 2.2

The learner will understand the benefits and issues associated with habitat management for a shooting sport, eg:

- Heather moorland
- Woodland
- Wetland
- Farmland.

Topic 2.3

The learner will understand the benefits and issues of shooting sport to wildlife species eg:

- Grey partridge
- Capercaillie
- hare species
- barn owl
- lapwing
- curlew
- skylark.

Topic 2.4

The learner will understand the social benefits and issues associated with a shooting sport:

- benefits, eg:
 - Health and wellbeing
 - Economic
 - camaraderie
- issues, eg:
 - cost
 - social issues
 - minority sports.

Learning outcome:

3. Understand current regulation of shooting sports in the UK

Topics

3.1 Impact of major legislation on a shooting sport

3.2 The impact of codes of practice on a shooting sport

3.3 The role of statutory bodies governing a shooting sport

Topic 3.1

The learner will understand the Impact of major legislation on a shooting sport, eg:

- Wildlife and Countryside Act 1981

- Game Act 1831
- Hunting Act 2004
- Wild Game Meat (Hygiene and Inspection) Regulations 1995
- Firearms Act 1982
- Criminal Justice and Public Order Act 1994
- Countryside Rights of Way Act 2006
- Animal Welfare Act 2006.

Topic 3.2

The learner will understand the impact of codes of practice on a shooting sport, eg:

- Code of good shooting practice
- respect for quarry
- neglect or abandonment
- animal welfare
- DEFRA snaring.

Topic 3.3

The learner will know the role of a statutory body governing a shooting sport, eg:

- Defra
- Food Standards Agency
- Natural England
- Forestry Commission
- Deer Initiative
- Scottish Natural Heritage
- Environment Agency.

Learning outcome:

4. Know factors that could influence the future of shooting sports in the UK

Topics

4.1 Non-governmental organisations that oppose shooting sports

4.2 Non-governmental organisations that lead or support shooting sport

4.3 Issues affecting the future of shooting sport

Topic 4.1

The learner will know the aims, objectives, activities and arguments of non-governmental organisations that oppose shooting sports, eg:

- Royal Society for the Protection of Birds (RSPB)
- League Against Cruel Sports (LACS)
- Royal Society for the Prevention of Cruelty to Animals (RSPCA).

Topic 4.2

The learner will know the aims, objectives, activities and arguments of non-governmental organisations that lead or support shooting sport, eg:

- British Association for Shooting and Conservation (BASC)
- National Gamekeepers Organisation (NGO)
- Game and Wildlife Conservation Trust (GWCT)

- The Countryside Alliance (CA), Masters of Foxhounds Association (MFHA)
- Scottish Gamekeepers Associated (SGA).

Topic 4.3

The learner will understand the issues affecting the future of shooting sport, eg:

- Raptor persecution
- lead shot
- animal welfare
- economics
- political
- social.

Guidance for delivery

Throughout the unit, the emphasis should be on safe working. It is expected that learners will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working.

Learning outcome 1 required the learner to be familiar with the historical changes of shooting sport from 1800 to present day. This will include changes in sporting quarry, development of firearms, and technological advances. The learner could research a given shooting sport eg wildfowling and discuss how these changes have impacted on this sport. Learners may benefit from visiting museums where firearms are exhibited. Visiting expert speakers could add to the relevance of the subject for the learners.

In Learning outcome 2 the learner will understand the current impacts of shooting sport in the UK, they should look at research completed on the value of shooting sports on the rural economy. Learners will also investigate the impact of shooting sports on a range of habitats and species. Social aspects of shooting sports should be discussed and evaluated. Visits to sites which exemplify these benefits will enhance their understanding.

Learning outcome 3 requires the learner to understand a range of laws and codes of practice that affect game management in the UK. Delivery techniques should be varied and should include formal lectures, demonstrations, simulated exercises, observation techniques and evidence gathering or recording.

Learning outcome 4 requires the learner to understand the role of a range of non-statutory bodies, and how these various organisations interact. A good way to cover this topic is to give each learner an organisation to study and get them to present their findings to the rest of the group.

Centres are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of establishments to add depth to the learner experience.

Suggested learning resources

Books

- The Game Shooting Handbook
Published by: The Crowood Press Ltd., 2005
ISBN: 978-1861268044
Barnes, M.
- The Game Book: a shooting anthology
Published by: Quiller Publishing, 2007
ISBN: 978-1846890161
Catlin, C.
- Gamekeeping.
Published by: Swan Hill Press, 2006
ISBN: 978-1904057734
Hudson, D.
- Game Heritage - an ecological review from shooting and gamekeeping records
Published by: Game Conservancy, 1992
ISBN: 978-0950013022
Tapper, S.C.
- The Big Shots, Edwardian Shooting Parties
Published by: Debrett's Peerage, 1977
ISBN: 978-0905649054
Ruffer, J.G.
- Modern Wildfowling
Published by: Swan Hill Press, 1991
ISBN: 978-1853101557
Begbie, E.
- The Shooting Field: One hundred and fifty years with Holland & Holland
Published by: Quiller Press, 1985
ISBN: 978-0907621621
King, P.

Websites

- The Department for Environment, Food and Rural Affairs
www.defra.gov.uk
- Welsh Assembly Government
www.wales.gov.uk
- Scottish Executive Environment and Rural Affairs Department
www.scotland.gov.uk
- Department of Agriculture and Rural Affairs (Northern Ireland)
www.dardni.gov.uk
- The British Association for Shooting and Conservation
www.basc.org.uk
- National Gamekeepers Organisation
www.ngo.org.uk
- The Royal Society for the Protection of Birds
www.rspb.org.uk
- The Countryside Alliance
www.countryside-alliance.org.uk

Natural England

[www.gov.uk/government/
organisations/natural-
england](http://www.gov.uk/government/organisations/natural-england)

RSPCA

www.rspca.org.uk

SGA

[www.scottishgame
keepers.co.uk](http://www.scottishgamekeepers.co.uk)

UAN:	R/507/7233
Level:	3
GLH:	60

What is this unit about?

An understanding of shoot management is essential for a person working towards a career in game management and with an emphasis on low-ground shoots. Game shoots are an integral part of the landscape and the rural economy.

The purpose of this unit is to provide learners with an understanding of the principles of shoot management and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training. It is an advantage if the centre has its own shooting enterprise allowing learners daily input. Failing this they should have significant access to a driven shoot with opportunities to input to the enterprise outside formal shoot days.

The learner will explore the administrative requirements of a shooting enterprise and consider the physical resource requirements. They will participate in pre shoot tasks. They will plan and manage a shoot day.

Learning outcomes

In this unit, learners will be able to

1. Understand the administrative requirements of a shooting enterprise
2. Understand the resource requirements of a shoot
3. Plan for a shooting season
4. Participate in the organisation and management of practical pre-shoot and shoot day operations

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the administrative requirements of a shooting enterprise

Topics

1.1 Administrative requirements of shooting enterprises

1.2 Marketing for shooting enterprises

Topic 1.1

The learner will understand the administrative requirements of shooting enterprises:

- Setting objectives
- Planning
- monitoring and record keeping (eg risk assessments, bag returns, insurance etc)
- marketing
- annual budget and costings
- staffing
- physical resources (eg pen costs, rental agreements, feeders, prices of birds and medication).

Topic 1.2

The learner will understand the marketing for shooting enterprises:

- Price
- Product
- promotion/advertising (eg where, when and medium)
- customer experience
- range of customers/clients
- contract.

Learning outcome:

2. Understand the resource requirements of a shoot

Topics

2.1 Physical resources required for shooting enterprises

2.2 Labour and capital resources required for shootings

2.3 Shooting resources required for shooting enterprises

Topic 2.1

The learner will understand the physical resources required for shooting enterprises:

- Land (type, location, vegetation, size, topography, habitat).

Topic 2.2

The learner will understand the labour and capital required for shooting enterprises:

- labour (contractors, employees, volunteers)
- capital (investment, working capital).

Topic 2.3

The learner will understand the shooting resources required for shooting enterprises:

- Quarry species (suitable species, number, age, released and wild)
- releasing facilities

- population management (wild game stocks)
- cover crops (planning, planting and maintaining)
- feed strategies
- range of machinery and equipment
- vehicles.

Learning outcome:

3. Plan for a shooting season

Topics

3.1 Planning physical resources for shooting enterprises

3.2 Planning logistics for shooting enterprises

3.3 Carry out marketing for shooting enterprises

This Learning outcome allows the learner to gain understanding of the planning requirements for a successful shooting season.

Topic 3.1

The learner will plan the physical resources for a shooting enterprise:

- Setting shoot management objectives
- planning activities and resources
- monitoring activities and resources
- reviewing outcomes against objectives
- recommendations and improvements.

Topic 3.2

The learner will plan logistics for a shooting enterprise:

- Number of days
- Format
- Dates
- number of guns
- guests
- fees
- number of birds
- drives
- availability of beaters
- dogs
- pickers-up
- transport
- hospitality
- game collection.

Topic 3.3

The learner will carry out marketing for shoot enterprises:

- advertising/promotion design
- placement
- targeted customer base.

Learning outcome:

4. Participate in the organisation and management of practical pre-shoot and shoot day operations

Topics

4.1 Pre-shoot operations

4.2 Shoot day operations

4.3 Shoot day evaluation

This Learning outcome allows the learner to gain practical skills and experience in pre shoot and shoot day operations.

Topic 4.1

The learner will carry out pre-shoot operations, eg:

- release game
- wild bird counting
- hand feeding
- hopper feeding
- dogging-in
- shoot peg construction
- pegging out
- hides
- drive planning
- flushing points
- ride clearance
- preparing larder/shoot vehicles/game handling equipment
- strings
- shoot cards
- making flags
- arranging shoot personnel including beaters
- flankers
- pickers-up
- loaders
- stops.

Topic 4.1

The learner will organise and manage shoot day operations:

- Organise - Drives, clients, beaters, pickers up, vehicles, larder, game collection facilities, health and safety briefing, rules and regulations, allocate peg numbers, format of the day, others (eg hospitality arrangements, facilities).
- Manage - Drives (completed to meet objectives), beaters, loaders and pickers-up (briefed, organised and directed), vehicles(eg transport of guns, beaters, pickers-up, loaders, game cart), game collected, transported and stored, record keeping.

Topic 4.3

The learner will evaluate a shoot day.

Guidance for delivery

Throughout the unit, the emphasis should be on safe working. It is expected that learners will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working.

Learning outcome 1 considers the administrative requirement of a shooting enterprise. Learners must understand how marketing, contractual work, health and safety and other legal requirements, finances and records are key to the successful running of a shooting enterprise. Site visits and case studies could be valuable methods of delivering this outcome. Where possible, learners should be given the opportunity to cover different types of shooting enterprises.

Learning outcome 2 looks at the resource requirements of a shoot. Delivery should cover all aspects of the complete shooting season (use of feeders, hand feeding, feed (wheat/barley/pellets etc), drinkers, pheasant and partridge release pens, wild game populations, game cover crops, woodlands, hedgerow habitats. Aspects of labour and capital use should be included. Where possible, learners should have the opportunity to work with relevant data that they have collected. Access to an area running formal driven shooting would be an advantage.

Learning outcome 3 covers the planning of a shooting season. As with Outcome 2 delivery should cover the complete shooting season, from the shooting potential of an area to the programme of game release in preparation for individual shoots informal boundary days, formal driven main days, cock shooting/end of season) and different types of shoot (eg released/ wild, driven, walked –up, over working dogs). Access to a formal driven shoot would assist delivery although use of maps and diagrams of an area may be possible. Learners should be given the opportunity to become actively involved in the management of a shoot to gain practical skills and experience where possible.

Learning outcome 4 covers preparing for organisation of, and delivery of a shoot day. Delivery will include all aspects of pre-shoot preparation and management – feeding, watering, dogging-in, habitat management (ride clearance, cover crop rides, flushing points), organising beaters, pickers up (loaders, if required), participants hospitality, vehicles, larder, game transportation. Delivery will require learners to actively assist in pre-shoot activities. Access to a driven shoot is essential.

Delivery will include all aspects of management from running the day to evaluation. Delivery will require learners to assist in running (under supervision) a shoot day. It is recommended that each learner should participate in at least one full day and within that day have a position of responsibility eg. Shoot Captain (organising the clients, safety briefing, hospitality, travel to and from drives); Headkeeper or Underkeeper (organising beaters, pickers-up, flankers, with key responsibility for completing at least one drive. Shot game must be handled and stored according to industry guidelines. Learners should be aware of health and safety implications for all participants. Learners must review the day, their role and suggest improvements of the shooting day/ season.

Centres are encouraged to introduce employers and professionals from industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of establishments, shoots and sporting estates to add depth to the learner experience.

This unit has links to pest and predator control, fire arms, health and safety, game meat hygiene, working dogs, game bird production, woodland management, deer management, ecology of game.

Employer engagement

Employer engagement is desirable in order to maximise the value of the learners' experience. Unless the establishment has its own driven shoot a partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for teachers to develop a method of maintaining contact with a range of employers and organisations in the sectors who may be able to help with keeping the pre-shoot work, planning, and delivery of the shoot day up to date with current practices.

For those establishments without direct access to a working driven shoot it will be essential to engage with employers who can provide access and offer practical management opportunities. This could be completed on a weekly basis or through an extended study tour period.

Suggested learning resources

Books

Game in Winrter: Feeding and Management Published by: Game Conservancy, 1986	Game Conservancy
The game shooting handbook Published by: The Crowood Press Ltd., 2005 ISBN: 1 86126 804 1	Barnes, M
Running your own shoot Published by: Shrewsbury: Swan Hill Press, 2 nd edition, 2007 ISBN: 978 1 84689 011 6	Hudson, D
Your shoot - gamekeeping and management Published by: A & C Black, 1986 ISBN: 9780394735048	
Rough shooting Published by: Swan Hill Press, 3 rd edition, 2007 ISBN: 1 84037 188 9	Swan, M

Websites

Health and Safety Executive	http://www.hse.gov.uk
Department for Environment, Farming and Rural Affairs	https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs
Welsh Assembly Government	http://wales.gov.uk
Scottish Executive Environment and Rural Affairs Department	http://www.scotland.gov.uk/Topics/farmingrural/Agriculture
National Gamekeepers Organisation	http://www.nationalgamekeepers.org.uk
Scottish Gamekeepers Association	http://www.scottishgamekeepers.co.uk
The British Association for Shooting and Conservation	http:// www.basc.org.uk

UAN:	D/507/7235
Level:	3
GLH:	60

What is this unit about?

Working dogs are an essential part of many countryside management tasks. They form an essential part of the shooting field, finding, flushing and retrieving game. They also fill a common role in pest control finding, flushing and in some cases dispatching pests and predators.

This unit aims to develop a learner who can identify common breeds of working dogs, train them to work effectively and care for them to maintain their working ability. In addition the learner will be able to design and run kennel facilities to support the use of working dogs. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Learning outcomes

In this unit, learners will be able to

1. Know common breeds of working dogs and their suitability for countryside management tasks
2. Know how to plan a structured training programme for a working dog
3. Understand how to care for dogs during different life stages
4. Understand the correct housing of working dogs

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Know common breeds of working dogs and their suitability for countryside management tasks

Topics

1.1 Breeds of pedigree working dog

1.2 Tasks that breed groups of dogs are intended to complete

Topic 1.1

Learners will need to know the breeds of pedigree working dog, to include:

- Retriever
- Spaniels
- Pointer/ setter
- HPR
- Hounds
- Terriers.

Topic 1.2

Learners will know the different tasks that breed groups of dogs are intended to complete:

- Retrievers: Primary use; retrieving. Secondary uses; hunting, flushing.
- Spaniels: primary use; hunting/flushing. Secondary use; retrieving.
- Hunt Point Retrieve (HPR): Primary use; hunting/pointing. Secondary use; retrieving.
- Hounds: primary; hunting*. Secondary uses: tracking, coursing*.
- Terriers: primary; flushing holes*. Secondary use: pest control*
- Tracking: multiple breed types for deer.

*As allowed under the Hunting Act 2004

Learning outcome:

2. Know how to plan a structured training programme for a working dog

Topics

2.1 Principals that underlie effective dog training

2.2 Dog training activities

2.3 Equipment required for dog training

Topic 2.1

The learner will know the principals that underlie effective dog training:

- Recognition that most training faults occur due to trainer error, not dog error and that the trainer has the most to learn.
- Canine Social Hierarchy: establishment and maintenance of trainer as dominant figure.
- Ability to assess dogs abilities: concentration spans, evaluation of dogs strengths and

weakness and influence on training structure. Exploitation of a dog's natural abilities and preferences. Need to make training play not work.

- Positive re-enforcement; high pitch voice, verbal praise, positive body language, stroking, food reward, physical reward with play.
- Negative re-enforcement; low pitch of voice, dominant body language, placing dog in submissive posture, withdrawal from training session, electronic training collars.
- General Principles: consistency of standard expected from dog, non-predictability, repetition, mastery of one skill before beginning new or advanced training. Correct sequence of training for dog age and ability.

Topic 2.2

The learner will know how to carry out dog training activities:

- Methods of Giving Commands: verbal, body language, hand signals, whistle.
- Obedience: walking to heel, sit, stay, recall.
- Confidences: socialisation, jumping obstacles, introduction to noise, introduction to dead game, entering and crossing water.
- Retrieving: single seen retrieves, double retrieves, directional control, multiple retrieves, unseen retrieves, water retrieves.
- Steadiness: stop on sit whistle, drop to shot, drop to flush, steadiness on peg.
- Hunting: following a scent, quartering.

Topic 2.3

The learner will know the equipment available for dog training, including any welfare issues eg:

- Slip leads
- Whistles
- Balls
- dummies (size variations)
- training bag
- fur/feather dummies
- simulated game dummies
- dummy launchers
- starting pistols
- shotgun
- shotgun blank adaptor
- blanks
- rabbit pens
- electronic training collars
- scent shoes.

Learning outcome:

3. Understand how to care for dogs during different life stages

Topics

3.1 Stages of a dog

3.2 Nutrition for dogs of different life stages

3.3 Prophylactic treatments for dogs of different life stages

3.4 Grooming for working dogs

Topic 3.1

The learner will understand the life stages of a dog:

- Puppy: Time scales for the development of normal: mobility, food dependency, hearing, vision, teeth, defecation, weaning and social skills.
- Adolescent: Teething, sexual development, normal growth rates, coat development. Issues with confirmation: spinal kinks, bow legs, hip displacement, recognised genetic eye problems. Appropriate level of exercise.
- Adult: Recognition of dog body conditions: malnourished, correct body mass, obesity and management. Recognition of correct confirmation for breed standard, coat moulting cycles. Mating, pro oestrus, oestrus, dioestrus, anoestrus, phantom pregnancies, gestation period, development of embryos, pregnant bitch care, pre whelping behaviour, whelping.
- Senior: problems associated with age, tooth loss and feeding, weight gain, fatty lumps/tumours, arthritis, cataracts, hearing loss, diabetes, incontinence, dementia. Appropriate care of common conditions, appropriate exercise.

Topic 3.2

The learner will know the correct nutrition and components of diets for dogs of different life stages: proteins, fats & oils, minerals, vitamins, carbohydrates.

Diets: puppy diets: Supplementary milk provision, complete puppy feeds. Types of adult diets, bones and raw food, complete dry feeds, mixed dry foods, wet foods and tripe/offal. Specially formulated senior diets.

Topic 3.3

The learner will understand the correct prophylactic treatment for dogs of different life stages and conditions commonly treated with prophylactics: External Parasites: Lice, fleas, mites.

Internal parasites: lung worm, tape worm, heartworms, roundworms, hookworms, tapeworms, and whipworms. Diseases: Kennel Cough, Canine parvovirus, Canine distemper virus, Leptospirosis, Infectious canine hepatitis.

Correct use of prophylactic treatments at different life stages: vaccinations, vaccination boosters, wormers, flea treatments, tail docking and dew claw removal.

Topic 3.4

The learner will understand the correct grooming for working dogs:

- correct coat washing techniques
- cutting coat to maintain health and working condition
- removal of matted hair
- cleaning of dogs ears
- clipping and trimming claws
- tooth cleaning
- tick removal
- thorn and grass seed removal.

Learning outcome:

4. Understand the correct housing of working dogs

Topics

4.1 Facilities, spaces and services required to house working dogs

4.2 Suitability of materials, construction methods and locations of kennel facilities

4.3 Animal welfare requirements of working dogs housed in a kennel

Topic 4.1

The learner will facilities, spaces and services required to house working dogs:

- Types of Kennel: Indoor, outdoor, appropriate scale of kennel facility for needs of operation.
- Dog housing: bedding areas, runs, isolation kennels.
- Grooming Space: washing facilities, grooming facilities, minor medical and prophylactic treatment space.
- Whelping space: whelping boxes, puppy runs, heat provision.
- Kitchen: food preparation space/equipment, washing facilities. Storage for: feeding equipment, medication.
- Support areas: cleaning, bedding and equipment storage. Exercise yards.
- Services for kennels: water, drainage, electricity, lighting, heat, ventilation, waste disposal.
- Security: fencing, locks, cameras, alarms, staffing of kennels.

Topic 4.2

The learner will understand the suitability of materials, construction methods and locations of kennel facilities:

- Types and appropriateness of construction materials/methods: brick/block/stone, wood, plastic metal; super structure, sheets, preformed sections.
- Floors: concrete, rubber, high grip resin.
- Dimensions and layout of spaces: Size of bedding boxes, runs, whelping spaces etc. to be able to accommodate all breeds identified in outcome 1. Best layout of facilities to ease use of kennels and maintain dog welfare.
- Site of kennel: reduction of noise pollution, security, protection from prevailing weather.

Topic 4.3

The learner will understand animal welfare requirements of working dogs housed in a kennel:

- Legislation: Animal Welfare Act (2006), five freedoms
- Bedding options: cloth, sawdust, straw, rubber mats, bedding renewal routines
- Provision of food: hoppers, bowls. Feeding routines
- Water: automatic drinkers, bowl, bowl holders. Replenishment of water routines
- Cleaning routines and methods for: feeding equipment, water bowls, fabric bedding, bedding boxes, runs, other areas.

Guidance for delivery

Learning outcome 1 requires the learner to be able to identify the major pedigree breeds of gundogs, terriers and hounds recognised by the Kennel Club. The students should be able to identify from high quality images or live animals the full range of breeds listed in the unit content. In addition the learner should be able to name the intended primary and secondary uses of each group of dogs eg: Retriever Breeds = Primary; retrieving, Secondary; hunting, flushing. This outcome should be delivered through physical examination of as many different live animals as possible. Where this cannot be achieved individual research followed by photo quizzes and flash cards should be used to embed the knowledge. When covering the uses of terriers and hounds consideration must be shown to the regulations created under the Hunting Act 2006.

Learning outcome 2 expects the learner to show a knowledge of principals of dog training to produce an animal fit to complete countryside management tasks. This should primarily focus on gundog training as this is where the vast bulk of the published training literature focus. However

where local need dictates the training of dogs for tracking, working to ground or pest control can be included. The outcome should be delivered via mix of practical and theory sessions. Prior to practical sessions the learner should understand the principals of dog psychology and the way this can be influenced to make practical training more effective. The practical delivery where possible should allow the learner to be coached while practicing training with dogs. As this method can be limit by the availability of dogs practicing dog trainers could be used to demonstrate training methods. However if this method is selected careful checking of the learners understanding must be undertaken.

Learning outcome 3 has been designed to teach the learner how to carry out day to day care of working dogs. The learner should be able to demonstrate an understanding of dog life stages and how this affects the care given. In addition the learners need to be able to understand grooming, nutrition, conditions requiring prophylactic treatments and the correct application of the treatments. This should be delivered as a mix of theory and practical sessions. Where possible the learner should gain hands on experience of grooming and prophylactic treatment application.

Learning outcome 4 should enable the learner to be able to design an appropriate kennel facility for working dogs. This could be specific to a breed of dog or a range of breed of dogs. The learners should be able to visit examples of kennels constructed by different methods. Planning exercises should be undertaken to explore the effects of laying out spaces in different ways. The learner should be able to demonstrate an understanding of basic construction methods and materials and how this affects dog welfare. This could be delivered by practical experimentation. The learners are also required to understand the cleaning, feeding and water replenishment routines within a kennel. Where possible this should be delivered by the learners carrying out the practical running of a kennel.

Employer Engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for lecturers to develop a method of maintaining contact with a range of employers in the sectors may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

This unit has the possibility to involve employers through visits to boarding kennels, professional gundog training kennels or other professionals that house and work dogs. Visits or practical work placements to shooting estates, boarding kennels or professional trainers could help put the learning into context and broaden the learners understanding of dog breeds and training.

Suggested learning resources

Books

Veterinary Advice for Gundog Owners Published by: Ringpress Books Ltd., 1997	Averis, G
Gundog Training Made Easy Published by: Lulu Press Inc., 2006	Begbie, E
Breeding Working Dogs Published by: Quiller Publishing Ltd, 2008	Brander, M
Hunt-Point-Retrieve Dogs for Work and Showing Published by: The Crowood Press Ltd., 2009	Dear, N

Dog Breeding, Whelping and Puppy Care Published by: Wiley-Blackwell, 2012	England, G
The Working Labrador Published by: Swan Hill Press, 2011	Hudson, D
The Kennel Club's Illustrated Breed Standards: The Official Guide to Registered Breeds Published by: Ebury Press, 2011	Kennel Club
Kennel Design: The Essential Guide to Creating Your Perfect Kennels Published by: David Key Kennel and Cattery Design, 2008	Key, D; Bailey, G & Key, K. (Ed)
Training The Working Spaniel Published by: Quiller Publishing Ltd, 2010	Menzies, J

Journals and magazines

- British Association for Shooting and Conservation, Shooting and Conservation Magazine
- Earth Dog - Running Dog Magazine
- National Gamekeepers Organisation, Keeping the Balance Magazine
- Shooting Times and Country Magazine
- Shooting Gazette
- The Countryman's Weekly
- The Kennel Club Journal
- The Kennel Club Working Trials Monthly

Websites

Fell and Moorland Working Terrier Club	http://www.fellandmoorlandwtceastmids.com/workingterriers.htm
National Working Terrier Federation	http://www.terrierwork.com/
Kennel Club Breed Information Centre	http://www.thekennelclub.org.uk/services/public/breed/
Gundog Training	http://www.gundog-training.com/training-a-gundog-puppy-to-sit/
BASC Gundogs	http://basc.org.uk/gundogs/
BASC Code of Practice, Gundogs	http://basc.org.uk/cop/gundogs/
BASC Code of Practice, Use of a Dog Below Ground in England and Wales	http://basc.org.uk/cop/use-of-a-dog-below-ground-in-england-and-wales/

Unit 333

Upland Game Management

UAN:	H/507/7236
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for learners to gain an understanding of the principles of upland game management and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

This unit is primarily concerned with the management of Red and Black Grouse for sporting purposes. The learner will explore how to assess and manage upland game populations with specific reference to habitat and disease management including physical resource requirements. Learners will gain an understanding of diseases affecting upland game species and the management of those diseases. They will understand the various shooting activities taking place for game species on the uplands.

Learners will participate in practical vegetation management and the construction/ maintenance of structures relevant to upland shooting.

Learning outcomes

In this unit, learners will be able to

1. Understand methods of assessment and management of upland game populations
2. Carry out habitat management for an upland game population
3. Understand the management of common diseases and parasites within upland game populations
4. Construct and maintain upland shooting structures

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand methods of assessment and management of upland game populations

Topics

- 1.1 Methods of population assessment for upland game species
- 1.2 Upland game population survey
- 1.3 Population assessment in relation to sporting shooting/harvesting
- 1.4 Biotic and abiotic influences

This Learning outcome considers methods of assessing and managing common upland game management populations including assessment of upland game populations, influences on the population including predation, vegetation and shooting activities. Learners will need to be aware of current codes of practice and legislation relevant to upland game management. Where possible the learner should have access to an upland area where gamebirds are managed.

Topic 1.1

The learner will understand methods of population assessment for upland game species:

- Observation (of leks), transect and block counting.

Topic 1.2

The learner will understand how to survey an area to assess an upland game population:

- Game species: eg. red grouse, black grouse, capercaillie, ptarmigan, grey partridge
- Survey: Direct methods – transect, block counting

Topic 1.3

The learner will understand how population assessment is related to sporting shooting/harvesting:

- methods of sustainable shooting
- walked-up
- pointers
- driven
- levels of harvest
- timing
- old: young ratios, percentage recommended culls.

Topic 1.4

The learner will understand the biotic and abiotic influences on the size of upland gamebird populations:

- Grazing pressure (domestic/wild)
- predation (avian and mammalian pest and predator species, heather beetle (*Lochmaea suturalis*))
- habitat
- food
- grit

- water
- weather
- diseases and parasites (Louping ill, cryptosporidiosis, strongyid worm).

Learning outcome:

2. Carry out habitat management for an upland game population

Topics

- 2.1 Flora species and habitats influencing upland game populations
- 2.2 Suitability for upland game species
- 2.3 Influences affecting an area of upland for game species
- 2.4 Habitat management for an area of upland

This Learning outcome allows the learner to assess an area of upland for the suitability of game species, understand methods of vegetation management and carry out practical habitat management on an upland area.

Topic 2.1

The learner will know key flora species and habitats influencing upland game populations:

- Flora species eg: Heathers (Ling, bell, cross-leaved heath), grasses (matt, purple moor, sheep's fescue), bracken, cotton sedge (single, multi headed), birch sp, willow sp, rowan, alder, scots pine, juniper, gorse, sedge sp, sensitive habitats and flora
- Habitats eg: Heather moorland, wetlands, white-ground, woodland, gills, blanket bog

Topic 2.2

The learner will survey an area of upland to identify its suitability for upland game species.

Topic 2.3

The learner will assess influences affecting an area of upland for game species eg:

- grazing impacts (domestic and wild fauna)
- burning
- cutting
- age
- quality
- heather beetle.

Topic 2.4

The learner will undertake Habitat management on an area of upland eg:

- Management/burning plans eg. maps, rotations, no burn areas, hazards, water courses, emergency access points and contacts, fire escape plans. To include as appropriate and given seasonal/annual influences and variations - cutting, burning, grazing, reseeding, planting, ditching, burning equipment (eg. PPE: masks, clothing, gloves, footwear). Legislation/Guidance eg. Heather and Grass Burning.

Learning outcome:

3. Understand the management of common diseases and parasites within upland game population

Topics

- 3.1 Diseases and parasites affecting upland game species
- 3.2 Methods of assessment for diseases and parasites affecting upland game populations
- 3.3 Assessing parasite levels within an upland game species
- 3.4 Management methods for diseases and parasites in upland game species

This Learning outcome allows the learner to gain understanding of diseases and parasites currently affecting the management of upland game populations including their impact on the viability of shooting.

Topic 3.1

The learner will understand diseases and parasites affecting upland game species:

- Diseases:
 - Louping ill
 - Cryptosporidiosis
 - strongylosis
- Parasites:
 - Strongyle worm (*Trichostongyllus tenuis*)
 - sheep tick (*Ixodes ricinus*).

Topic 3.2

The learner will understand methods of assessment for diseases and parasites affecting upland game populations; identification of symptoms, identification of disease/parasite, methods for assessing level/impact of disease/parasites.

Topic 3.3

The learner will know how to assess parasite levels within an upland game species.

Topic 3.4

The learner will understand management methods for diseases and parasites in upland game species:

- Domestic stock
- wild fauna (deer sp, lagomorphs)
- game population management (levels of shooting, gridding methods, direct dosing, tick mopping, wildlife vector control).

Learning outcome:

4. Construct and maintain upland shooting structures

Topics

- 4.1 Structure/ facilities preparation
- 4.2 Equipment and materials
- 4.3 Construction, repair or maintenance

This Outcome allows the learning to gain practical skills in the construction and maintenance of upland shooting structures.

Topic 4.1

The learner will prepare structures/facilities, eg:

- shooting butts - simple screens, single, return or "H", stone, wooden; fences affecting shoot management, roads, paths, ditches/drains/water courses, grips, bridges,

lunch/storage huts, floggers/beaters, cage traps.

Topic 4.2

The learner will prepare and ready equipment and materials; based on instructions, health and safety, sustainable practice, cost implications.

Topic 4.3

The learner will carry out the construction, repair or maintenance of selected upland structures and/or facilities to meet given specifications, undertaking safely (risk assessment, appropriate Personal Protective Equipment) and to the required standard.

Guidance for delivery

Learning outcome 1 covers theories and practices within upland game management. Delivery should include population assessment (spring and winter counts including transect and block counting), predation management (mammalian and avian predator control and management of protected species), vegetation management (burning, cutting, misting, crushing, spraying, re-seeding, use of domestic stock, use of relevant machinery, timing, the Law, safe practices) shoot day practices (including driven, pointers, walked-up shooting, beaters, flankers, pickers-up, assisted loading. It would be more relevant to the learner if there was access to an upland estate or farm where management for shooting upland game takes place. This outcome will link with Unit 307 Undertaking Vertebrate Pest and Predator Control, Unit 337 Undertaking Upland Habitat Management and Unit 320 Undertaking Shoot Management.

Learning outcome 2 allows the learner to assess and carry out practical habitat management for upland game species. Theoretical delivery of this outcome should include recognised upland game habitats (peat areas, heather moorland, grassland (white-ground), upland wetlands, arctic/alpine, woodland, tree/scrub areas) and relevant plant species (including scrub, tree, heather, palatable/unpalatable grasses, rush, moss and sedge species). Upland game species are primarily red grouse and black grouse although ptarmigan, upland waders and wildfowl should be discussed. The impact of domestic stocking densities and grazing impacts is also relevant to this outcome.

Practical vegetation management for the learner could include burning and/or cutting, tree planting for black grouse, crushing/weed wipes/ spraying of bracken. It is essential that any practical work is carried out within recognised health and safety guidelines.

Access to an upland area for the learners to identify/assess the plant species and carry out practical habitat management is essential. This unit links to Unit 337 Undertaking Upland Habitat Management. As learners will be engaged in practical activity there should be an emphasis on safe working practices, including the use of appropriate personal protective equipment (PPE), and appropriate risk assessments should be undertaken.

Learning outcome 3 allows the learner to identify and understand diseases and parasites currently affecting the management of upland game populations including cryptosporidiosis, louping ill, strongylosis, sheep tick, heather beetle. It would be beneficial to the learner if this was delivered in both theory and practical sessions. It may be useful to have guest speakers with specific knowledge of identification of diseases and parasites. It would benefit learners if they were able to practically participate in parasite/disease assessment in the laboratory/ classroom. Samples would need to be collected and stored at the appropriate time of year.

It may be possible for the learners to participate in practical disease management through direct dosing or gritting, disinfection of grit trays, bracken control, tick population assessment etc. Visits to observe management (dosing) of domestic stock may also be beneficial for the learners.

Learning outcome 4 allows learners to gain hands-on skills and experience in the construction and maintenance of structures relevant to upland shooting. These could include shooting butts (single/"H"/round butts, screens, wooden/stone, sunken), bridges, fenced stink-pits etc. Access to

an upland area for the learners to carry out practical work is essential. As learners will be engaged in practical activity there should be an emphasis on safe working practices, including the use of appropriate personal protective equipment (PPE), and appropriate risk assessments should be undertaken. It is essential that any practical work is carried out within recognised health and safety guidelines. This outcome links to Unit 303 Undertake Estate Skills.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for teachers to develop a method of maintaining contact with a range of employers and organisations in the sectors who may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

For those establishments without direct access to their own upland area it will be essential to engage with employers who can provide access to upland habitats and offer practical management opportunities. This could be completed on a weekly basis or through an extended study tour period.

Suggested learning resources

Books

An Illustrated Guide to British Upland Vegetation Published by: Joint Nature Conservation Committee, 2004 ISBN: 1861075537	Averis, A & Averis, B
Foxing with Lamp and Rifle Published by: Foxearth Publishing, 2001 ISBN 0954020606	Bucknell, R
The Upland Management Handbook Published by: English Nature, 2001 ISBN: 1857164024	Backshall, J; Manley, J & Rebane M
Repairing Upland Path Erosion: A Best Practice Guide Published by: Lake District National Park Authority, 1996 ISBN: 090642142X	Davies, P & Loxham, J
Upland Habitats Published by: Routledge, 1999 ISBN: 0415180864	Fielding, A & Haworth, P
Grouse in Space and Time Published by: Game Conservancy, 1992 ISBN: 0950013013	Hudson, P
A Manual of Red Grouse and Moorland Management Published by: Game Conservancy, 1995 ISBN: 1901369080	Hudson, P & Newborn, D
The Black Grouse Published by: Merlin Unwin Books, 2012 ISBN 9781906122430	Laurie, P

Moorland Management: For agriculture, Conservation and Field Sports
Phillips, P

Published by: Quiller Publishing Ltd, 2012
ISBN: 1846891229

Managing Habitats for Conservation
Published by: Cambridge University Press, 1995
ISBN: 0521447763

Sutherland, W & Hill, D

Websites

Department of Agriculture and Rural Development (NI)	http://www.dardni.gov.uk
Department for Environment, Food and Rural Affairs	http://www.defra.gov.uk
Welsh Assembly Government	http://www.wales.gov.uk
Scottish Executive Environment and Rural Affairs	http://www.scotland.gov.uk
Environment Agency	http://www.environment-agency.gov.uk
Forestry Commission	http://www.forestry.gov.uk
Joint Nature Conservation Committee	http://www.jncc.gov.uk
The Moorland Association	http://www.moorlandassociation.org
National Parks	http://http://www.nationalparks.gov.uk
Natural England	http://www.naturalengland.org.uk
National Gamekeepers Organisation	http://www.nationalgamekeepers.org.uk
Scottish Gamekeepers Association	http://www.scottishgamekeepers.co.uk
The British Association for Shooting and Conservation	http://www.basc.org.uk
The Game Conservancy Trust	http://www.gct.org.uk
The Heather Trust	http://www.heathertrust.co.uk
Scottish Natural Heritage	http://www.snh.gov.uk

UAN:	K/507/7237
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to the skills used in and understanding of gamebird production and how these can be applied in practice. After completing this unit learners should be able to produce eggs, set up gamebird housing incubate eggs and rear gamebird poults.

It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

Learning outcomes

In this unit, learners will be able to

1. Know how to produce gamebird eggs
2. Operate an incubator/hatcher to produce day old chicks
3. Plan and establish gamebird rearing
4. Rear gamebirds from day-old to poultry stage

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Know how to produce gamebird eggs

Topics

1.1 Methods for obtaining gamebird eggs for incubation

1.2 Requirements of breeding stock

1.3 Factors that affect the health and welfare of reared gamebirds

Topic 1.1

The learner will know the commonly used methods for obtaining gamebird eggs for incubation:

- Commonly used methods for obtaining gamebird eggs for incubation: pair boxes, raised laying cages, harem pens and large flock mating pens.
- Appropriate sex ratios and stocking densities for each species/penning system.
- Components of laying pens: nest boxes, shelter, feeders, drinkers, nets etc.
- Egg collection: Timeliness of egg collection, egg handling and collection techniques, Recording systems, paper and electronic based.
- Welfare considerations: Stocking densities, DEFRA Code of Practice for the Welfare of Gamebirds Reared for Sporting Purposes.

Topic 1.2

The learner will know the requirements of breeding Stock:

- Sources of eggs and breeding stock: buying in eggs, buying in laying stock, catching up laying stock, overwintered/closed flocks. Advantages and disadvantages of systems
- Identification of laying stock: Partridge; Grey, Red-Legged. Pheasant; Old English Black Neck (Caucasus), common ring necks, Japanese Green, Byzanty, Mitichigan/Kansas blue backs, White, Melansitic. Ducks; Mallard. Sexing laying stock: sexual dimorphic traits of identified species, physical inspection of vent.
- Management of inputs to maximise egg production: pre-breeder pellets, breeder pellets, grit /oyster shell, water, light.
- Annual cycle for producing eggs for each species: catching up, sexing, pre-breeding maintenance, laying period, over wintering.

Topic 1.3

The learner will know the factors that affect the health and welfare of reared gamebirds:

- Input factors that reduce quality and quantity of eggs: quality of laying stock, cleanliness of pens, egg eating by stock and pests, length of time eggs is in contact with floor. Insufficient and inadequate feed, stress. Lack of: grit/oyster shell, water, light
- Viruses: Avian influenza, Newcastle's Disease, viral enteritis. Protoza: Hexamita (Trichomoniasis, Histomoniasis), Coccidiosis.
- Bacteria: Mycoplasmosis, bacterial enteritis, botulism, salmonella, e-coli.
- Fungi: Aspergilosis. Internal Parasites: *Gapes*, intestinal worms. External parasites: Mites, lice, fleas.
- Other issues: fighting, feather pecking, treading damage, crash injuries from flight in pens.
- Treatments for disease: antibiotics, wormers, electrolites, euthanasia.
- Preventative measures: pro-biotics and vaccinations, bio-security, bits, bumper bits, specks, saddles, wing brails, feather trimming, health plans and treatment records.

Learning outcome:

2. Operate an incubator/hatcher to produce day old chicks

Topics

2.1 Hatchery activities for the incubation of a batch gamebird eggs

2.2 Egg Handling

2.3 Incubation

2.4 Embryo monitoring

2.5 Hatching

Topic 2.1

The learner will plan hatchery activities for the incubation of a batch gamebird eggs:

- Appropriate Gamebirds: Pheasant, Grey Partridge, Red-Legged Partridge, Duck, Quail
- Time spans for: sanitization, sorting, traying, storage, pre heating, setting, transfer, hatching, weighing/embryo monitoring, candling, embryo development
- Adjustments of incubator environment for embryo development: humidity, turning, air vents.

Topic 2.2

The learner will sanitize, sort and store gamebird eggs correctly:

- Sanitisation: methods eg. fogging, roto-maid, bubble washers, conveyor belt washers. Egg sanitants; correct mixing, operation temperatures and refresh rates
- Egg Sorting: cleanliness, size, damage, color, imperfections
- Storage: turning, humidity, temperature, light, time.

Topic 2.3

The learner will safely carry out incubation of gamebird eggs:

- Egg incubation: running incubators up prior to use, sanitising incubators. Pre-heating eggs, setting eggs in trays, monitoring/maintaining humidity and temperature.
- Monitoring Equipment: thermometers including wet and dry bulb type's digital data loggers. Operation of vents and egg turning. Creating egg incubation records. Types of incubator eg; convection, force air, manual, automatic, transfer or full term systems, broody hens.

Topic 2.4

The learner will monitor the development gamebird eggs and adapt activates in relation to factors that affect incubation, egg candling, weighing eggs including percentage weight loss and extrapolation of final weight loss. Alterations to incubator settings from findings.

Transfer

Fertility confirmation methods: candling, weighing of eggs. Egg transfer to hatcher baskets. Appropriate temperature for transfer space. Disposal of infertile eggs.

Topic 2.5

The learner will know how to hatch gamebird eggs and process day old chicks, eg:

- Effect of changes in humidity on egg membranes. Removal of turning. Peak hatch, drying down and timing of chick removal.
- Sorting day old chicks for deformities, boxing of day-old chicks, despatch of deformed chicks, and disposal of hatchery waste.

Importance of record keeping, risk assessment and PPE.

Learning outcome:

3. Plan and establish gamebird rearing

Topics

3.1 Number of poults, day olds, eggs, laying birds required for shooting

3.2 Gamebird housing

3.3 Properties of Liquid Petroleum Gas (LPG) brooders

3.4 Waterlines and drinkers for gamebirds

Topic 3.1

The learner will calculate numbers of poults, day olds, eggs, laying birds required for shooting.

Assess shoot day numbers and bag requirements, percentage bag returns. Calculation of an estimation of poults to put to wood, day old to rear, eggs to incubate using percentage loss calculations. Calculation of number of laying hens and fertile cocks based on incubator capacity and number of eggs required.

Topic 3.2

The learner will maintain, disinfect and construct gamebird housing:

- Gamebird housing systems: Sheds eg.; 8X8, 12X12, 18X24. Night shelters, raised verandas, grass runs. Indoor rearing units, sectional units and large movable shed.
- Maintenance: eg. replacement of damaged components, timber treatments.
- Disinfection: cleaning to remove bedding residue, correct mixing and use of disinfectants, disinfection techniques for housing.
- Construction: eg. transportation of sections/sheds, marking out site, correct order elements rearing field units should be constructed in. Methods of joining sections together eg. bolts, string, sack ties, cable ties. Waterproofing sheds, correct erection and fitting of roof nets.
- Safe Working Practices eg. manual handling, protection from timber treatments.

Topic 3.3

The learner will understand Properties of Liquid Petroleum Gas (LPG): Stored as liquid, expands into gas, Sinks in sheds if unburnt as LPG weighs more than air, added odour to make detectable.

Combustion: Chemical formula for LPG combustion, Flame colour of complete and in complete combustion. Different exhaust gasses produced from types of combustion and their effects on birds.

LPG Safety Principals: Correct shed ventilation (top and bottom), smoking, storage, moving cylinders.

Maintenance of Gas Brooders: eg. Expiry dates of pipes and replacement. Replacement of thermocouples/sensors, air filter cleaning, gas jet cleaning/replacement.

Gas Brooder Set Up: Regulators/change over valves, fitting hoses to gas bottles, correct methods/materials for hanging brooders, height adjustment, leak checking, safe ignition of brooders, correct setting of thermo sensor.

Topic 3.4

The learner will understand Basic Plumbing concepts to correctly set up waterlines and drinkers for gamebirds of different ages: fall, head, air lock, pressure, reduction in bore size as pipes branch.

- Waterline components: Supply, stop taps, header tanks, ballcocks, alkatheine pipe, alkatheine pipe connectors/bends, stop ends and taps. Saddles, small bore black pipe, in line filters, connectors and T pieces
- Waterline Construction: Construction, location and frequency of water towers. Cutting

alkatheine pipes, correct fitting of connectors to alkatheine pipes, fitting saddles, use of stop taps and stop ends. Use of PTE Tape. Connecting small bore pipes, connectors and drinkers. Sanitising water lines. Pressurising water lines

- Drinkers: Correct use of manual drinkers; fountain drinkers. Setting up and maintenance automatic drinkers; trough type drinkers, nipple type drinkers

Learning outcome:

4. Rear gamebirds from day-old to poultry stage

Topics

4.1 Chicks welfare

4.2 Bio-Security and Disease Management

4.3 Handle Birds

Topic 4.1

The learner will ensure the welfare of chicks is maintained:

Environment:

- Heat: judging correct heat setting using thermometers and monitoring birds. Adjusting heat to harden off birds.
- Light: maintenance of correct light to limit feather pecking but allow feeding.
- Ventilation: adjustment of vents to maintain temperature and air flow.
- Bedding: Floor linings; plastic membranes, corrugated card, chick paper etc. Bedding Types: shredded paper, chopped card, chopped straw, wood shavings etc. Advantages/disadvantage of bedding systems. Correct time and methods of applying bedding. Disposal of bedding.
- Space: correct stocking densities, provision of extra space as birds grow. Use of rings/corners and introduction to shelters and runs.

Welfare:

- Providing Food: feed types and sizes appropriate for age/species. Chick feeding systems, poult feeding systems, correct methods for changing feed types.
- Supplements: application of electrolytes, pro-biotics. Grit.
- Bits: correct methods and time to fit bits, correct removal of bits.
- Medication: Correct mixing and application of medication.
- Checking Frequency: appropriate checks for age of birds. Signs of: good bird health, poor bird health.
- Health Plans: appropriate involvement of vets, planning to prevent disease and quick medication intervention.
- DEFRA Code of Practice for the Welfare of Gamebirds Reared for Sporting Purposes.

Topic 4.2

The learner will understand Bio-Security and Disease Management:

- Chemical barriers: Disinfectant bedding powder, footbaths, disinfecting equipment, water-line sanitants, wheel washes.
- Human vector limitation: over shoes, gloves, masks, restriction on visitors.
- Stock management: isolation, eutanasia, ground rotation, reduction of stocking densities removal of wildlife vectors.

Topic 4.3

The learner will handle birds:

- Preparing Crates: Cleaning crates, disinfecting crates, bedding crates.
- Catching: correct handling techniques, counting birds.

Health and Safety

Correct PPE, Risk Assessment, Safe Working Techniques.

Guidance for delivery

Delivery of this unit can involve practical assessments, written assessment, visits to suitable collections and will link to work experience placements. Whichever methods that are used, it is essential that tutors highlight the current relevant industry codes of practice to ensure that these are understood and followed. Health and safety issues relating to gamebird rearing must be stressed and reinforced regularly and risk assessments must be undertaken before any practical activities. Adequate Personal Protective Equipment must be provided and used following the production of suitable risk assessments.

Learning outcome 1 requires learners to know how laying stock is managed to produce fertile eggs for incubation. It is likely this outcome will largely be delivered via formal lecturers supported by visits to local gamebird producers to observe laying pens and stock management. Visiting speakers such as gamebird vets, gamekeepers

Learning outcome 2 requires the learners to practically undertake the incubation of a batch of gamebird eggs. This should either take the form of small groups of students incubating several small batches of eggs or large groups of students on a rota basis working within an industrial scale incubation unit to produce large batches of day old chicks. Understanding of the practical delivery should be re-enforced by theoretical delivery to allow the learners to relate the practice to the theory of the subject.

Learning outcome 3 requires the learner to be able to plan rearing activities and set up rearing units and equipment. This should be delivered via a mix of theory and practical sessions. The planning and gas safety elements of the outcome are best delivered via theory teaching. The heater servicing and plumbing elements of the outcome should be delivered via workshop sessions to allow learners to master the skills before using them on final part of the outcome where they have to construct rearing units. This could be delivered on a centre run facility, in partnership with a local rearing establishment or on the learners work placement.

Learning outcome 4 requires learners to rear a batch of gamebird chicks from day old to 6 week old poults. This should be delivered in a largely practical setting with learners taking responsibility for the care of the birds. Learners should undertake all normal husbandry activities and be shown how to respond to welfare issues. Site visits would enable learners to witness the use of a variety of techniques at first hand. These would ideally include a range of small-scale to large-scale operations. Visiting expert speakers could add to the relevance of the subject. For example, a game farm manager or gamekeeper could talk about the methods that they use.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for lecturers to develop a method of maintaining contact with a range of employers in the sectors may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

This unit has great potential to link with local game producers, many business operating rearing units actively recruit people undertaking training in game management to help staff their facilities during spring and summer. Centres should encourage this activity via work placements and partnership programs to allow students to access real world experience of rearing.

Suggested Learning Resources

Books

New Incubation Book Hardcover Anderson-Brown, A.F & Robbins, G.E.S
Published by: Hancock House Publishers Ltd, 2003

Diseases of gamebirds and wildfowl Hardcover Beer, J. V.
Published by: The Game Conservancy, Fordingbridge. 1988

Modern Pheasant Farming Chappel, L
Published by: Gold Cockerel Books, Great Yarmouth, 2006

Egg production and incubation Game Conservancy
Published by: The Game Conservancy, Fordingbridge, 1993

Modern Partridge Farming Hodgson, C
Published by: Gold Cockerel Books, Great Yarmouth, 2009

Gamebird Diseases: A Gamekeeper's Guide Pearson, A & Carr, P
Published by: Blaze Publishing, Coventry, 2014

Rearing Game Birds and Gamekeeping Williams, B
Published by: Quiller Publishing Ltd, Shrewsbury, 2013

Journals and magazines

- Shooting Times and Country Magazine
- Modern Gamekeeper
- British Association for Shooting and Conservation, Shooting and Conservation
- National Gamekeepers Association, Keeping the Balance
- Gamefarmers Association, Game Farming

Websites

Code of Practice for the Welfare of Gamebirds Reared for Sporting Purposes
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69379/pb13356-game-birds-100720.pdf

Game and Wildlife Conservation Trust; Pheasant
<http://www.gwct.org.uk/research/species/birds/common-pheasant/>

National Animal Disease Information Service
<http://www.nadis.org.uk/livestock/game-birds.aspx>

Pukka Pens Ltd. (Housing Systems)
<http://www.pukkapensltd.com/>

Unit 336

Fishery management

UAN:	T/507/7113
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to fishery skills and management and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

Learning outcomes:

In this unit, learners will be able to

1. Understand commonly used fresh water fish stock maintenance and improvement methods
2. Know the main mammalian and avian predators of fish and the methods used to legally control them
3. Use suitable methods of sport fishery bank maintenance, stock assessment and vegetation control
4. Understand business requirements of a sport fishery

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand commonly used fresh water fish stock maintenance and improvement methods

Topics

1.1 Sport fishery species

1.2 Maintenance and improvement of sport fishery stock through habitat management

1.3 Maintenance and improvement of sport fishery stock through direct stocking

1.4 Maintenance and improvement of sport fishery stock through angler behaviour

Topic 1.1

The learner will know fish species common to sport fishery eg:

- brown trout
- atlantic salmon
- chub
- barbell
- grayling
- bream
- perch
- roach
- rudd
- common carp
- tench
- pike.

Topic 1.2

The learner will understand the maintenance and improvement of sport fishery stock through habitat management:

- water quality
- poor recruitment
- competition
- the status of wild stocks and causes of decline
- habitat improvement techniques (eg gravel cleaning, revetments, river restoration, fish ladders)
- aquatic invertebrates
- stillwater fishery design.

Topic 1.3

The learner will understand the maintenance and improvement of sport fishery stock through direct stocking:

- Stocking policy
- stocking density

- fishery objectives
- source of stock fish
- fish health
- angler success
- overpopulation.

Topic 1.4

The learner will understand the maintenance and improvement of sport fishery stock through angler behaviour:

- The methods used to regulate different disciplines of angling eg bio security, seasons, restrictions on equipment.

Topics 1.2, 1.3, 1.4

Any relevant current legislation, codes of practice and bylaws.

Learning outcome:

2. Know the main mammalian and avian predators of fish and the methods used to legally control them

Topics

2.1 Avian and mammalian predators of fish at a sport fishery

2.2 Methods used to legally control avian and mammalian predators

Topic 2.1

The learner will know the avian and mammalian predators of fish at a sport fishery, including:

- Otter
- Mink
- Cormorant
- grey heron
- goosander
- merganser
- The impacts on fish populations and fisheries
- The lifecycles of predators
- signs and evidence eg footprints, fish wounds, and spraints.

Topic 2.2

The learner will know the methods used to legally control avian and mammalian predators eg:

- Trapping
- Scaring
- shooting
- The licences to control predators, relevant current legislation, codes of practice.

Learning outcome:

3. Use suitable methods of sport fishery bank maintenance, stock assessment and vegetation control

Topics

- 3.1 Fish stock assessment
- 3.2 Practical bank maintenance
- 3.3 Practical vegetation control

Topic 3.1

The learner will use fish stock assessment methods including methods of fish capture, their advantages and disadvantages in different situations eg rod and line, seine nets, fyke nets, electro-fishing apparatus and piscicides. Methods used to estimate fish populations, eg tagging and marking techniques, hydro acoustics. Specific health and safety issues, eg drowning, electrocution and Weil's disease.

Topic 3.2

The learner will use practical bank maintenance to restore banks and prevent erosion, eg the use of hard landscaping techniques, use of soft landscaping techniques.

Topic 3.3

The learner will use practical vegetation control including reasons for aquatic weed control, the commonly used methods of aquatic weed control eg cutting by hand, machine cutting, dyes, straw bales, shading and the use of herbivorous fish. The reasons for bankside vegetation control, commonly used methods to control bankside vegetation eg hand-held tools, strimmer's, chainsaws. The environmental impact of vegetation control eg nesting birds season, weed cutting, silt deposition, flood risk, habitat damage

Learning outcome:

4. Understand business requirements of a sport fishery

Topics

- 4.1 Factors affecting daily management
- 4.2 Sport fishery facilities
- 4.3 Duties within sport fishery management

Topic 4.1

The learner will understand the major factors affecting daily management of a sports fishery including the size and nature of the industry, specific organisations relevant to the promotion of angling, daily business management eg costs, ticket pricing policy, angler types and numbers, angler success, competition, marketing, stock availability, location, fish health, public's perception, stock prices and sources, fishery rules.

Topic 4.2

The learner will know the sport fishery facilities required by anglers (eg angling pegs; car parks; equality of access, angling lodge; café; tackle shop; toilets; seating; information boards; footpaths; life rings; net dips; shelters).

Topic 4.3

The learner will know the duties of those involved in sports fishery management, the annual duties of water keepers, bailiffs, fisheries officers and other employees (depending on locality). Preventing poaching. Other responsibilities of employees eg recognising and reporting signs of ill health in fish, dealing with anglers and members of the general public (including potential confrontational issues).

Guidance for delivery

Learning outcome 1 identifies the major species found in a sport fishery and looks at the commonly used fresh water fish stock maintenance and improvement methods. Learners will look at how habitat management and the introduction of stocked fish can be used to maintain a healthy stock.

Learning outcome 2 covers the six major avian and mammalian predators of fish in the UK. Learners need to be able to identify the main predators of fish and the legal ways in which they can be controlled, explaining the possible impact on a given fishery if they were not controlled.

Learning outcome 3 focuses on the methods used to assess the fish stock, maintain banks and control aquatic and bankside vegetation within sport fisheries. Learners will assist with a minimum of three different fish stock assessment methods, one bank maintenance project, one aquatic and one bankside vegetation control task.

Learners will complete a risk assessments for each of the tasks undertaken identifying the environmental, fish and animal welfare issues relating to the work being carried out.

Learning outcome 4 covers the business management requirements of a sport fishery, facilities and the typical duties of those who work within the sector. Tutors should provide a general overview of the business requirements, reinforced where appropriate by the use of local sport fisheries to provide specific examples. Regional differences, for example in the duties of employees, legislation and bylaws, should be discussed to raise learner awareness of these issues.

This unit could be delivered using formal lectures, case studies, practical demonstrations and activities, independent learner research, group discussions, site visits and talks by guest speakers.

Tutors should provide a general overview of the methods used, reinforced where appropriate by the use of local sport fisheries to provide specific examples. Visiting expert speakers could add to the relevance of the subject for learners. For example, a sport fishery manager could talk about their work and the methods they use.

Suggested learning resources

Learners will need supervised access to a range of river and still water fisheries to allow them to develop a realistic understanding of the theory behind fishery management and to develop essential practical skills. Resources for stock assessment, bank maintenance and vegetation control work should include waders, wading sticks, buoyancy aids and throw ropes for safety purposes, appropriate fish capture equipment for fish stock surveys, appropriate identification guides, a range of hand and power tools and materials, and appropriate equipment, tools and materials for controlling vegetation.

Books

Sparsholt Guide to the Management of Carp Fisheries
Published by: Mitchellwing Publications, 2001
ISBN: 0954005406

Seagrave, C

Fundamentals of Aquatic Ecology, 2nd Edition
Published by: Blackwell Science, 1991
ISBN: 0632029838

Barnes, R & Mann, K

Rehabilitation of Rivers For Fish
Published by: Food and Agriculture Organization of the UN, 1998
ISBN: 9251040184

Cowx, I & Wellcomme, R

Fresh water Fishes in Britain: The Species and Their Distribution
Published by: Harley Books, 2004
ISBN: 0946589763

Harding, P

Aquatic Weed Control
Published by: Blackwell Science, 1988
ISBN: 0852381522

Seagrave, C

Fresh water Fisheries Management, 2nd Edition
Published by: Blackwell Science, 1995
ISBN: 085238209X

Templeton, R

Environment Agency – Code of Practice for Safety in Electric Fishing Operations

Websites

The Angling Trust	www.anglingtrust.com
Atlantic Salmon Trust	www.atlanticsalmontrust.org
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Environment Agency	www.environment-agency.gov.uk
The Game Conservation Trust	www.gct.org.uk
Health and Safety Executive	www.hsegov.uk
Institute of Fisheries Management	www.ifm.org.uk
Salmon and Trout Association	www.salmon-trout.org
The Wild Trout Trust	www.wildtrout.org

UAN:	A/507/7114
Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of the principles of river fishery creation and management and how these can be applied in practice, including how rivers across the United Kingdom are managed for angling. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training. It allows the learner to study river habitats and relate this to how they can be managed sustainably for anglers, taking into account the important needs of the environment and other users.

Learning outcomes:

In this unit, learners will be able to

1. Understand the ecology of different rivers
2. Understand the causes of river degradation and methods of river restoration
3. Know the types of river fisheries found in the UK and their characteristics
4. Plan the creation and management of a riverine fishery

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the ecology of different rivers

Topics

1.1 The characteristics of the typical habitats found in selected river fisheries

1.2 The habitat requirements of a range of river fish species

Topic 1.1

The learner will understand the characteristics of the typical habitats found in selected river fisheries

- Channel characteristics eg length, depth and width; river zonation; river characteristics eg Pool, riffle, glide, gravels, over hanging vegetation, woody debris, aquatic weed, under cut banks.

Topic 1.2

The learner will understand the habitat requirements for riverine fish species:

- Habitat requirements for coarse fish eg Roach, Bream, Chub, Pike, Barbel, Dace, Bleak, Zander
- Habitat requirements for game fish eg Salmon, Brown Trout, Rainbow Trout, Grayling, Sea Trout.

Learning outcome:

2. Understand the causes of river degradation and methods of river restoration

Topics

2.1 The major causes of river degradation

2.2 Methods of river restoration

Topic 2.1

The learner will understand the causes of river degradation:

- Pollution (agricultural, industrial)
- Eutrophication
- Afforestation
- Abstraction
- over shading
- under shading
- impoundments(eg weirs and dams)
- siltation
- channelization
- erosion (eg human, livestock)
- non-native plant species (eg Himalayan Balsam)
- non-native animal species (eg Signal crayfish, American mink).

Topic 2.2

The learner will understand the methods of river restoration:

- Bank top methods (eg post and wire fencing, buffer strips, tree planting, pollarding)
- bankside work (eg faggots, revetment, gabions) in channel features (eg deflectors, islands, woody debris, boulder placement)
- organisations involved in river restoration (eg state, private groups, trusts and foundations)
- relevant current legislation and codes of practice.

Learning outcome:

3. Know the types of river fisheries found in the UK and their characteristics

Topics

3.1 Types of river fisheries found in the UK

3.2 Characteristics of river fisheries found in the UK

Topic 3.1

The learner will understand the types of river fisheries founded in the UK, eg:

- Salmon Fishing on the Scottish rivers
- Sea Trout Fishing in Wales
- the Chalkstreams in southern England and the coarse rivers of the Midlands

Topic 3.2

The learner will understand the characteristics of river fisheries:

- Geographical areas and reasons for geographical differences eg latitude, altitude and gradient, climate, geology, stocking, species present (eg coarse and game), catch and release; fishing rights and riparian ownership; relevant current legislation the use of bylaws and codes of practice.

Learning outcome:

4. Plan the creation and management of a riverine fishery

Topics

4.1 Creation of a river fishery

4.2 Management of riverine habitats

Topic 4.1

The learner will plan the creation of river fishery:

- Identifying specific river fishery management objectives eg game, coarse, migratory
- planning activities and resources
- identifying access points monitoring activities and resources
- reviewing outcomes against objectives, recommendations and improvements.

Topic 4.2

The learner will management of riverine habitats:

- Legal predator control
- fish stock management
- stocking

- bankside vegetation control
- aquatic vegetation control
- poacher checks
- angler liaison
- fish population management/surveys
- maintaining access points eg bridges, stiles, gates, steps
- maintaining boundaries eg fences, biological and chemical water quality checks
- maintaining in-stream structures eg deflectors, islands, faggots, habitat improvement works.

Guidance for delivery

In Learning outcome 1, the learner will be required to understand the ecology of a river system and the habitats required for a range of fish species. This outcome will require some formal delivery, but it should also be delivered in practical situations and site visits where learners can visually see the different river habitats. Learners should be encouraged to research different fish species found in rivers and understand their habitat requirements throughout the year.

Learning outcome 2 covers river degradation and river restoration. It is anticipated that the delivery of this outcome will be through formal lectures, it should include a site visit or study tour to an area which has encountered river degradation and river restoration. Learners should also focus on local and national case studies across the UK and look at the work undertaken by river trusts and the Environment Agency.

In Learning outcome 3, the learner will be required to understand the different river systems for angling across the UK. Emphasis should be placed on the main types of angling, for example Salmon Fishing on the Scottish rivers, Sea Trout Fishing in Wales, the Chalkstreams in southern England and the coarse rivers of the Midlands. Guided learner research and formal lectures should form the main part of the teaching for this outcome, with study tours and site visits where necessary.

In Learning outcome 4 the learner will be able to understand the objectives and planning involved in creating a river fishery and the need for ongoing evaluation. Learners will understand the typical duties undertaken by those employed in river fishery management eg river keepers, ghillies. Learners should be familiar with specific management techniques for improving the riverine habitats.

Where possible, learners should have the opportunity to undertake a range practical task on a variety of river fisheries. Alternatively a river keeper could talk about his/her role and duties.

Centres are encouraged to introduce case studies, employers and specific professionals from industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of rivers to add depth to the learner experience.

Learners must be given the opportunity to study the range of river fisheries found across the UK.

Suggested Learning Resources

Books

Fundamentals of Aquatic Ecology, 2nd Edition
 Published by: Blackwell Science, 1991
 ISBN: 0632029838

Barnes, R & Mann, K

Rehabilitation of Rivers for Fish
Published by: Food and Agriculture Organization of the UN, 1998
ISBN: 9251040184

Cowx, I & Wellcomme, R

Fresh water Fishes in Britain: The Species and Their Distribution
Published by: Harley Books, 2004
ISBN: 0946589763

Harding, P

Aquatic Weed Control
Published by: Blackwell Science, 1988
ISBN: 0852381522

Seagrave, C

Fresh water Fisheries Management, 2nd Edition
Published by: Blackwell Science, 1995
ISBN: 085238209X

Templeton, R

Environment Agency – Code of Practice for Safety in Electric Fishing Operations

Websites

The Angling Trust	www.anglingtrust.com
Atlantic Salmon Trust	www.atlanticsalmontrust.org
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Environment Agency	www.environment-agency.gov.uk
The Game Conservation Trust	www.gct.org.uk
Health and Safety Executive	www.hsegov.uk
Institute of Fisheries Management	www.ifm.org.uk
Salmon and Trout Association	www.salmon-trout.org
The Wild Trout Trust	www.wildtrout.org

Unit 339

Stillwater Fishery Creation and Management

UAN:	K/507/7240
Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of the principles of Stillwater fishery creation and management and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

It allows learners to study the various characteristics of stillwaters, enabling learners to understand how to plan, create and manage fisheries to meet the requirements of the anglers and the fish.

Learning outcomes:

In this unit, learners will be able to

1. Understand the ecology of stillwater sport fisheries
2. Understand the creation of a stillwater sports fishery
3. Understand the management of fish stocks in stillwater sport fishery
4. Undertake a range of stillwater fisheries management tasks

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the ecology of stillwater sport fisheries

Topics

1.1 Characteristics of different stillwater sport fishery types

1.2 Habitat requirements of a range of stillwater fish species

Topic 1.1

The learner will understand the characteristics of different stillwater sport fishery types:

- Fishery types:
 - Lakes
 - Pools
 - gravel pits
 - ponds
- Characteristics:
 - Size
 - shape and depth
 - carrying capacity
 - water quality (biological and chemical)
 - temperature
 - aquatic vegetation
 - bankside vegetation
 - cover
 - spawning and nursery habitat
 - pollution

Topic 1.2

The learner will understand the habitat requirements of a range of stillwater fish species:

- Habitat requirements for coarse fish eg common carp, roach, perch, bream, pike, tench, crucians
- Habitat requirements for game fish eg brown trout and rainbow trout

Learning outcome:

2. Understand the creation of a stillwater sports fishery

Topics

2.1 Plan for the creation of a stillwater fishery

2.2 Creation of a stillwater fishery from a greenfield site

2.3 Creation of a fishery from an existing stillwater

Topic 2.1

The learner will understand the planning for the creation of a Stillwater fishery:

- Setting objectives (eg Coarse, trout, mixed, pleasure, match, specimen), consumer

demand and local competition, analysis of existing resources

Topic 2.2

The learner will understand the creation of a stillwater fishery from a greenfield site:

- Logistics (eg. site surveys,
- test holes, local plans), water source (spring fed, on line, off line), the planning requirements and process (eg environmental impact and associated legislation of the construction), location and siting, design, construction methods, costs, timescale, features (eg islands, bars, landscaping, planting schemes), facilities for the anglers (eg car park, access, angling pegs, lodge, equality of access and angler welfare), potential funding sources.

Topic 2.3

The learner will understand the creation of a fishery from an existing stillwater site:

- Implication of using an existing Stillwater (eg lakes, pools, gravel pits, ponds), water quality checks, management issues, fish population surveys, disease risks from existing stocks, environmental impact.

Learning outcome:

3. Understand the management of fish stocks in stillwater sport fisheries

Topics

- 3.1 The factors affecting the management of fish stocks in a range of stillwater fisheries
- 3.2 Fishery rules and regulations for a range of stillwater fisheries

Topic 3.1

The learner will understand the factors affecting the management of fish stocks in Stillwater fisheries eg lakes, pools, gravel pits, ponds, newly created stillwater fishery.

Species selection (eg coarse, game, native and non-native species), sources of fish, timing of stocking, stocking densities, costs, sizes, numbers, health checks and disease, implications of over stocking, competition, poor recruitment and invasive species. Habitat creation (eg fish refuges, spawning areas), support measures (eg aeration and feeding). Relevant legislation eg Centre for Environment, Fisheries and Aquaculture Centre Fishery Registration scheme, Keeping & Introduction of Live Fish (England and River Esk catchment) Regulations 2015 – Fishery/Supplier Permit system, Stocking Codes of Practice.

Topic 3.2

The learner will understand the fishery Rules and Regulations for a range of Stillwater fisheries:

- 2.1 Fishery rules (eg catch and kill, catch and release, net dips, unhooking mats, barbless hooks, bait, rig, keepnet and bite alarms restrictions)
- 2.2 Legislation and regulatory rules (eg Wildlife and Countryside Act 1981
- 2.3 Fishery Byelaws
- 2.4 Salmon & Fresh water Fisheries Act 1975)
- 2.5 codes of conduct.

Learning outcome:

4. Undertake a range of stillwater fisheries management tasks

Topics

- 4.1 Fish capture operations
- 4.2 Fishery management and maintenance tasks

Topic 4.1

The learner will undertake fish capture operations:

- Fish capture methods (eg seine netting, electro fishing, fixed nets/traps, drain downs and rod & line methods), Fish Welfare, Salmon and Fresh water Fisheries Act 1975, current legislation and codes of practice.

Topic 4.2

The learner will undertake fishery management and maintenance tasks:

- Fishery Maintenance (eg banks, access points, angling pegs, paths, steps, boundaries, surfaces, seats/benches, car parks)
- Bankside, marginal and submerged plant management, (eg Strimming, coppicing, pollarding, pruning, cutting slashing, raking, mechanical, biological and chemical), Silt management. Environmental impact of works

Guidance for delivery

This unit is designed to provide the learner with sound knowledge and skills required to create and manage stillwater fisheries. The context of teaching will differ depending on the outcome being delivered, however it is expected that a mixture of theory and practical session should be used. The unit should cover a range of coarse and game stillwater sport fisheries.

Throughout the unit, the emphasis should be on safe working. It is expected that learners will be aware of safe working practices and be familiar with current legislation and the environmental implications of the content of this unit.

In Learning outcome 1, the learner will be required to recognise the different types of stillwater sport fisheries found in the United Kingdom and how these have developed over the last twenty years. Learners should gain an understanding of both coarse and game fisheries. In addition learners will know about the different fish species found in such fisheries and habitat requirements of each.

It is accepted that this outcome will require some formal delivery and guided learner research. However visits to local fisheries should also be encouraged.

Learning outcome 2 covers the planning and construction of new stillwater sport fisheries. It is anticipated that the delivery of this outcome will be through formal lectures, but it would be beneficial for learners to visit newly created fisheries and talk to fishery managers to see real life examples. Learners need to be aware of current legislation with regard to local and national planning policies and the costs involved in constructing new sport fisheries.

In Learning outcome 3, the learner will be required to understand the management of fish stocks in stillwater sport fisheries. Learners should know the species, sizes, appropriate densities and costs for stocking coarse and game stillwater sport fisheries. They should also be aware of how these fish should be managed once stocked. Current legislation, Codes of Practice and fish welfare issues should also be covered. It is expected that this outcome will be delivered by formal lectures, group work and discussion.

In Learning outcome 4 the learner will be able to carry out a range of practical fishery management tasks. Tasks must include a minimum of **two** fish capture operations and a minimum of **one** maintenance tasks and **one** vegetation task, all undertaken at a stillwater fishery. This learning outcome links to learning outcome 3 of the Fishery Management unit and learning outcome 310 of the Estate Skills unit.

Learners should be fully involved in undertaking risk assessments and safe working practices. They should also be aware of the environmental implications of the work and how fisheries should be managed sustainably. Emphasis should be placed on current legislation and Codes of Practice.

This unit could be delivered using formal lectures, case studies, practical demonstrations and activities, independent learner research, group discussions, site visits and talks by guest speakers.

Centres are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner. This could include a local planning officer, a fishery manager, a fish farmer or an Environment Agency Fisheries Officer. Teaching would also benefit from visits to a local coarse and game fisheries.

Employer Engagement

The role of employer engagement is essential within this unit to maximise the learners experience and understanding. Links with both local and larger nationally recognised fisheries should be developed and can play an important part in the delivery of this unit. This can take the form of visits to the fisheries, guest lectures by fishery managers along with practical sessions where fishery management tasks are undertaken. This will give learners an overview of the industry, current practices, trends and develop potential links with employers in terms of future work placements and job opportunities.

Other employer links that would be applicable to this unit are; CEFAS, The Environment Agency, Fishery Consultants, Fish Health Consultants and fish suppliers.

Suggested learning resources

Books

The Sparsholt Guide to the Management of Carp Fisheries Published by: Mitchellwing Publications, 2001 ISBN: 0954005406	Baldwin C et al.
Fundamentals of Aquatic Ecology Published by: Blackwell, 1991 ISBN: 0632029838	Barnes, R S K & Mann, K H
Fresh water Fisheries Management Published by: Fishing News Books, 1995 ISBN: 085238209X	Templeton, R G
Aquatic Weed Control Fishing News Books, 1988 ISBN: 0852381522	Seagrave, C
Keys to the Fresh water Fish of Britain and Ireland Published by: Fresh water Biological Association, 2004	Maitland, P. S
Fisheries management, A manual for Still-water Coarse Fisheries Published by: Wiley – Blackwell, 2010 ISBN: 1405133325	Welby, I. et al

Environments for fish, Water plants their function and management, Coarse fish biology and management, A Guide to Stocking of Recreational Fisheries

Shears, V.P

Published by: Environment Agency Guides

Websites

Centre for Environment, Fisheries and Aquaculture Science

www.cefas.co.uk

Department for Environment, Food and Rural Affairs

www.defra.gov.uk

Natural Resources Wales

www.naturalresources.wales.gov.uk

Scottish Executive Environment and Rural Affairs Department

www.scotland.gov.uk

Department of Agriculture and Rural Affairs (Northern Ireland)

www.dardni.gov.uk

The Environment Agency

www.environment-agency.gov.uk

Institute of Fisheries Management

www.ifm.org.uk

Unit 340

Fresh water and wetland management

UAN:	M/507/7241
Level:	3
GLH:	60

What is this unit about?

In this unit the learner will investigate the full range of fresh water habitats found in the UK (lentic, lotic and wetland) and their ecology. They will undertake practical surveys of fresh water habitats and use their results to evaluate the conservation importance of the sites and undertake practical management of a fresh water site for the conservation management of fresh water habitats. This unit is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

Learning outcomes:

In this unit, learners will be able to

1. Understand ecological characteristics of lentic fresh water habitats
2. Understand ecological characteristics of lotic fresh water habitats
3. Understand ecological characteristics of fresh water habitats
4. Carry out fresh water habitat conservation management activities

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand ecological characteristics of lentic fresh water habitats

Topics

1.1 Ecology of lentic fresh water habitats

1.2 Survey and record ecological characteristics of lentic fresh water habitat

1.3 Interpret lentic fresh water data

Topic 1.1

The learner will understand the ecology of Lentic fresh water habitat:

- fresh water habitat in standing or still water (eg lake, pond, pool, reservoir, gravel pit), Abiotic characteristics: physical characteristics (eg size: length, width, depth, volume, perimeter; shape, turbidity, location and catchment), chemical characteristics (eg pH, nitrates, phosphates, dissolved oxygen, Biochemical Oxygen Demand), water clarity, Biotic characteristics: eg bacteria, algae, invertebrates, fish, amphibians, reptiles, birds, mammals, vegetation.

Topic 1.2

The learner will understand the survey and record the ecological characteristics of lentic fresh water habitat:

- Plan survey:
 - identify objectives
 - plan survey method
 - location
 - timing
 - identify equipment and resources required
 - possible sources of error
 - methods to minimise errors
- Species survey and record:
 - species identification, (eg using keys, guides, guide books)
 - use of appropriate equipment
 - use of survey methods (eg National Pond Survey, pond dipping, netting, National Amphibian and Reptile Recording Scheme)
- Environmental survey and record:
 - climate surveying
 - water surveying
 - surveying physical characteristics.

Topic 1.3

The learner will understand how to interpret use of statistical analysis, presentation of results:

- quantitative (eg tables, charts, scatter graphs, histograms, pie charts)
- qualitative (eg annotated map, diagram, written report)
- interpretation: comparison with survey objectives, draw conclusions.

Learning outcome:

2. Understand ecological characteristics of lotic fresh water habitats

Topics

2.1 Ecology of lotic fresh water habitats

2.2 Survey and record the ecological characteristics of lotic fresh water habitat

2.3 Interpret lotic fresh water data

Topic 2.1

The learner will understand the ecology of lotic fresh water habitats:

- fresh water habitat in moving water (eg river, stream, spring), Abiotic factors: river channel form (eg long profile, cross sectional shape, planform), flow, breadth, depth, particle type and size, catchment area and characteristics, riparian area characteristics, bank type and features, river features (eg meanders, pools, riffles, oxbows), climate characteristics (eg light, temperature, rainfall), chemical characteristics (eg pH, nitrates, phosphates, dissolved oxygen, Biochemical Oxygen Demand). Biotic characteristics: bacteria, algae, invertebrates, fish, amphibians, reptiles, birds, mammals, vegetation.

Topic 2.2

The learner will understand how to survey and record of the ecological characteristics of lotic fresh water habitat:

- Plan survey: identify objectives, plan survey method and location, timing of survey, identify equipment and resources required, possible sources of error, methods to minimise errors
- Survey and record: Vegetation Survey (eg River Habitat), Bird Survey (eg Waterways Breeding Bird Survey) Wetland Bird Survey, Phase 1/National Vegetation Classification (NVC) methodology, species identification, (eg using keys, guide books), use of appropriate equipment, use of line transects and quadrats

Topic 2.3

The learner will understand the use of statistical analysis, presentation of results:

- quantitative (eg tables, charts, scatter graphs, histograms, pie charts), qualitative (eg annotated map, diagram, written report), interpretation: comparison with survey objectives, draw conclusions.

Learning outcome:

3. Understand ecological characteristics of fresh water wetland habitats

Topics

3.1 Ecology of fresh water wetland habitats

3.2 Survey and record the ecological characteristics of fresh water wetland habitat

3.3 Interpret fresh water wetland data

Topic 3.1

The learner will understand ecology of fresh water wetland habitats:

- Ramsar international wetland conservation treaty, Abiotic characteristics: physical characteristics (eg size: length, width, area, perimeter, depth, shape, location, catchment, flow), chemical characteristics (eg pH, nitrates, phosphates, dissolved oxygen, Biochemical Oxygen Demand, salt content). Biotic characteristics: bacteria, algae, invertebrates, fish, amphibians, reptiles, birds, mammals, vegetation.

Topic 3.2

The learner will understand how to survey and record of the ecological characteristics of lotic fresh water habitat:

- identify objectives
- plan survey method and location
- identify equipment and resources required
- possible sources of error
- methods to minimise errors

Species survey and record:

- Wetland Bird Survey
- Phase 1/National Vegetation Classification (NVC) methodology
- species identification, (eg using keys, guide books)
- use of appropriate equipment
- use of line transects and quadrats

Environmental survey and record:

- climate surveying
- water surveying
- surveying physical characteristics.

Topic 3.3

Record results, use of statistical analysis, presentation of results:

- quantitative (eg tables, charts, scatter graphs, histograms, pie charts), qualitative (eg annotated map, diagram, written report), interpretation: comparison with survey objectives, draw conclusions.

Learning outcome:

4. Carry out fresh water habitat conservation management activities

Topics

- 4.1 Conservation management on a fresh water lentic site
- 4.2 Conservation management on a fresh water lotic site
- 4.3 Conservation management on a fresh water wetland site

Topic 4.1

The learner will carry out conservation management on a fresh water lentic site:

- lake/pond creation and/or management (eg clearing, planting, managing succession, managing invasive species).

Topic 4.2

The learner will carry out conservation management on a fresh water lotic site:

- restoration of natural features, creation of off stream ponds, river margin manipulation, channel enhancement (eg dredging, desilting), bank protection and enhancement, planting, footpath creation and maintenance, improvement of habitats for specific species (for example construction of otter holts, bat boxes).

Topic 4.3

The learner will carry out conservation management on a fresh water wetland site eg:

- use of grazing (livestock choice, stocking density, grazing regime), water level management, grassland management, reed bed planting and management, scrub and tree management, visitor management (eg reducing disturbance to winter wildfowl).

Guidance for delivery

This unit is designed to provide learners with an understanding of the range of fresh water habitats and their characteristics, together with the species they support. Learners will also gain practical skills in surveying the different types of fresh water and wetland habitat, and in practical habitat management.

As learners will be engaged in practical activity in and near water there should be an emphasis on safe working practices in accordance with Health and Safety at Work Act 1974. Learners should use Personal Protective Equipment (PPE), complete risk assessment, identify hazards and methods to reduce risks, use tools and equipment correctly, consider safety of self and others.

Sustainability concepts should also be demonstrated where possible, and practical activities should be planned to minimise disruption to habitats and their species.

For Learning outcome 1, learners need to gain an understanding of the characteristics of lentic habitats, and the types of survey that will inform future management and conservation planning and action. It is likely that delivery will include visits to a range of ponds, lakes and other features such as gravel pits, and it will be particularly useful if this includes habitats of very different sizes. Learners will need the opportunity to develop their practical surveying skills within a range of these habitats.

For Learning outcome 2, delivery is likely to include visits to a range of rivers, streams and springs, including learners gaining skills in practical surveying in a range of settings. It will be useful for learners to witness a river at different stages, for example near to its source contrasted with meanders further downstream. Learners will also need the opportunity to practice species identification using keys and guides.

For Learning outcome 3, learners will need to gain an understanding of the types of fresh water wetland habitat that exist in the UK. Learners will need the opportunity to visit areas of wetland, and take part in practical surveying. A guest speaker may add interest, for example discussing grazing management on wetland areas.

For Learning outcome 4, learners will need supervised access to a range of fresh water habitats to carry out a variety of practical management tasks.

To support the delivery of learning, learners may benefit from the use of case studies, these could include; Water Vole, Wading/Wetland Birds, Otters, Fish populations (coarse, salmonids), Invertebrates.

the examples of legislation, policies and codes of practice used in the taught content, up to date.

Suggested learning resources

Books

European Wet Grassland: Guidelines for Management and Rehabilitation

Benstead, P; Jose, P; Joyce, C
& Wade, P

Published by: RSPB, 1999
ISBN: 1901930017

The Biology of Lakes and Ponds, 2nd Edition

Bronmark, C & Hansson, L

Published by: Oxford University Press, 2005
ISBN: 0198516134

Wildlife and Fresh water: An Agenda for Sustainable Management English Nature
Published by: English Nature, 1997
ISBN: 1857162609

Wicken Fen: The Making of a Wetland Nature Reserve Friday, L
Published by: Harley Books, 1997
ISBN: 094658933X

Water and Wetlands Furniss, P; Lane, A & Tait, J
Published by: Hodder Arnold, 1992
ISBN: 0340533684

The Biology of Streams and Rivers Giller, P & Malmqvist, B
Published by: Oxford University Press, 1998
ISBN: 0198549776

Rivers and Wildlife Handbook Holmes, N
Published by: A&C Black, 1994
ISBN: 0903138700

Wet Grassland Guide Treweek, J; Drake, M et al.
Published by: A&C Black, 1997
ISBN: 0903138867

Conservation Management of Fresh water Habitats: Lakes, Rivers and Wetlands Morgan, N C & Maitland, P S
Published by: Conservation Biology, 1997
ISBN: 0412594102

Habitat Creation Handbook for the Minerals Industry White, G & Gilbert, J
Published by: A&C Black, 2003
ISBN: 1901930378

Pond Book: A Guide to the Management and Creation of Ponds Williams, P J.
Published by: Ponds Conservation Trust, 1999
ISBN: 0953797104

Websites

The Broads Authority	www.broads-authority.gov.uk
British Trust for Ornithology	www.bto.org.uk
Centre for Ecology and Hydrology	www.ceh.ac.uk
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Welsh Assembly Government	www.wales.gov.uk
Scottish Executive Environment and Rural Affairs Department	www.scotland.gov.uk
Department of Agriculture and Rural Affairs (Northern Ireland)	www.dardni.gov.uk
Environment Agency	www.environment-agency.gov.uk
The Great Fen Project	www.greatfen.org
Health and Safety Executive	www.hsegov.uk

Pond Conservation	www.pondconservation.org.uk
The Ramsar Convention on Wetlands	www.ramsar.org
The Royal Society for the Protection of Birds	www.rspb.org
Scottish Environment Protection Agency	www.sepa.org.uk
The River Restoration Centre	www.therrc.co.uk
UK Biodiversity Action Plan	www.ukbap.org.uk
Wildfowl and wetlands trust	www.wwt.org.uk

Unit 341

Aquatics Eco System

UAN:	T/507/7242
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for learners to understand the key ideas and principles of aquatic ecosystems and how understanding these principles is essential in their practical management and protection. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will understand energy and nutrient flows in aquatic ecosystems, the habitats and flora/fauna of fresh water and marine ecosystems and how to conduct ecological surveys to determine the health and structure of fresh water and marine ecosystems.

Learning outcomes

In this unit, learners will be able to

1. Understand the fundamental principles of aquatic ecology
2. Understand the characteristics of fresh water ecosystems
3. Understand the characteristics of marine ecosystems
4. Demonstrate and evaluate the methods used to survey aquatic ecosystems

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the fundamental principles of aquatic ecology

Topics

- 1.1 Nutrient cycles
- 1.2 Energy movement

Topic 1.1

The learner will be able to describe:

- nutrient cycles including the nitrogen cycle and the carbon cycle
- how nutrient levels can be manipulated in an aquatic ecosystem to improve productivity (eg: liming, manuring, clearing vegetation, desilting)
- effects of biotic and abiotic factors on productivity within an aquatic ecosystem (eg: competition, substrate type)
- the impact of nutrient imbalances.

Topic 1.2

The learner will be able to describe energy movement in the food chain (eg; primary producers, primary consumers etc) including food chains; food webs; pyramids of number and biomass; predator/prey relationships and adaptations.

Learning outcome:

2. Understand the characteristics of fresh water ecosystems

Topics

- 2.1 Flora and fauna of fresh water ecosystems
- 2.2 Habitat of fresh water ecosystems

Topic 2.1

The learner will know fresh water flora and fauna:

- identification of fresh water aquatic plants
- invertebrates and fish species and their preferred requirements and habitats
- adaptations to their environment.

Topic 2.2

The learner will know:

- a range of fresh water habitats (eg: lotic, lentic, riparian, tropical, temperate)
- the environmental characteristics of these habitats (eg: substrate, temperature, dissolved oxygen, pH, nutrient levels, pollution, suspended solids, water depth and light levels).

Learning outcome:

3. Understand the characteristics of marine ecosystems

Topics

3.1 Flora and fauna of marine ecosystems

3.2 Habitat of marine ecosystems

Topic 3.1

The learner will know marine flora and fauna: identification of marine algae and plants, invertebrates and fish species and their preferred requirements and habitats, adaptations to their environment

Topic 3.2

The learner will know:

a range of marine habitats (eg reef, pelagic, benthic, estuarine, littoral), shoreline zonation and the biotic and abiotic reasons for organism zonation)

the environmental characteristics of these habitats (eg; temperature, dissolved oxygen, pH, nutrient levels, pollution, suspended solids, salinity, wave action, substrate and exposure).

Learning outcome:

4. Demonstrate and evaluate the methods used to survey aquatic ecosystems

Topics

4.1 Methods used to survey aquatic populations and environments

4.2 Survey a fresh water ecosystem, interpret data and report on findings

4.3 Survey a marine ecosystem, interpret data and report on findings

Topic 4.1

Learners will know:

- the methods used to sample water and survey physical features of water bodies
- methods used to measure basic water chemistry eg dissolved oxygen, pH, suspended solids
- methods used to survey flora and fauna, types and use of keys
- methods used to analyse collected data from aquatic environments
- use of biotic indices, benefits and limitations of physical and chemical analysis to identify the status of aquatic ecosystems.

Topic 4.2

Learners will undertake a survey and report their findings of a fresh water ecosystem using appropriate methods and techniques.

Topic 4.3

Learners will undertake a survey and report their findings of a marine ecosystem using appropriate methods and techniques.

Guidance for delivery

Aquatic ecosystems are widely recognised as some of the most important and imperilled habitats on Earth. There is increasing interest in the best ways of managing them in order to satisfy the interests of capture fisheries, aquaculture, conservation, recreation, commerce and industry, and

aesthetics. This unit is designed to develop knowledge of the range of aquatic environments, typical examples of flora and fauna that live in them, and the different ways of sampling the environments and evaluating the results so that learners can engage with vocations using, managing, and conserving all aquatic habitats.

Learning outcome 1 requires the learner to understand the systems and forces shaping and powering aquatic ecosystems, and how these are affected by humans. This would be related to, and provide the underpinning knowledge for understanding the subsequent teaching on aquatic ecosystems.

Learning outcome 2 requires the learner to appreciate the range and diversity of fresh water aquatic ecosystems and should study a minimum of 2 different fresh water aquatic ecosystems, they should be able to identify a minimum of 6 fresh water aquatic flora and a minimum of 6 fresh water aquatic fauna. Learners should understand the significance of the environment on the flora and fauna to be surveyed in Learning outcome 4.

Learning outcome 3 requires the learner to be aware of the range and diversity of marine aquatic ecosystems and should study a minimum of 2 different marine aquatic ecosystems, they should be able to identify a minimum of 6 marine flora and a minimum of 3 marine fauna. Learners should understand the significance of zonation and the environment on the flora and fauna to be surveyed in Learning outcome 4.

Learning outcome 4 addresses the methods used to survey aquatic ecosystems. Learners should undertake two aquatic surveys, one of a fresh water ecosystem and one of a marine ecosystem, they should be able to identify the flora and fauna of each when they undertake the surveys and be able to measure the environmental characteristics. Learners should be able to interpret the distribution of biota in terms of their preferred habitat and environmental requirements.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

This unit focuses on the nature, inhabitants and management/conservation of aquatic habitats. Learners will be able to experience the importance and methods of aquatic habitat management through site visits to conservation areas, talks by conservation bodies and work experience on any pertinent habitat management (eg river/lakes).

Suggested learning resources

Books

Fundamentals of Aquatic Ecology, 2nd Edition
Published by: Blackwell Science, 1991
ISBN: 0632029838

Barnes, R & Mann, K

Key to the Major Groups of British Fresh water Invertebrate Animals
Published by: Field Studies Council, 1986
ISBN: 1851531815

Croft, P

Photographic Guide to Sea and Shore Life of Britain and North-west Europe

Published by: Oxford University Press, 2001 ISBN: 0198507097	Gibson, R; Hextall, B & Rogers, A
Fresh water Ecology: Principles and Applications Published by: John Wiley and Sons, 1996 ISBN: 0471946958	Jeffries, M & Mills, D
Handguide to the Fishes of Britain and Europe Published by: HarperCollins Publishers, 1980 ISBN: 0002197510	Miller, P & Nicholls, J
Small Fresh water Creatures Published by: Oxford University Press, 2001 ISBN: 0198507984	Olsen, L-H; Pedersen, B & Sunesen, J
Fresh water Fisheries Management, 2nd Edition Published by: Blackwell Science, 1995 ISBN: 085238209X	Templeton, R

Journals

- Journal of Applied Ecology (Blackwell Science)
- Journal of Fisheries Ecology and Management (Blackwell Science)
- Journal of Marine Ecology (Blackwell Science)
- Journal of Fisheries Management and Ecology

Website

Centre for Ecology and Hydrology	www.ceh.ac.uk
Centre for Environment Fisheries & Aquaculture Science	www.cefas.co.uk
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Environment Agency	www.environment-agency.gov.uk
Sector Skills Council for Environment and Land-based Industries	www.lantra.co.uk
The Institute of Fisheries Management	www.ifm.org.uk

UAN:	A/507/7243
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to the skills and knowledge needed for coarse, game and sea angling, and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

Learning outcomes:

In this unit, learners will be able to

1. Understand the sport of angling in the UK
2. Understand tackle and its uses
3. Undertake organisation of an angling event
4. Undertake a range of angling techniques

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the sport of angling in the UK

Topics

- 1.1 The types of angling undertaken in the UK
- 1.2 Angling opportunities in a differing geographical areas
- 1.3 The role of the main national angling organisations
- 1.4 Fish welfare issues and current threats to the future of angling in the UK

Topic 1.1

The learner will identify the opportunities in angling in the UK, history and trends of angling in the UK, the major species fished for in coarse, game and sea angling in the UK, participant numbers for each discipline. Major changes within the industry and the factors affecting change eg introduction of new technologies, materials, equipment

Topic 1.2

The learner will know the reasons for geographical differences in angling participation, employment opportunities, angling's environmental, social and economic importance eg value of angling to national and regional economies, types of venue for the sport within an area, eg commercial, non-commercial, disciplines associated with specific geographical areas eg game angling in chalk streams and Scottish rivers, sea angling in South-west, coarse angling in the SE England and Midlands.

Topic 1.3

Types, location and roles of organisations associated with angling in the UK eg Environment Agency, CEFAS, The Angling Trust, The Salmon and Trout Association. Types of angling events eg National fishing week, Take a friend fishing week, coashing events.

Topic 1.4

Threats to angling eg anti-field sports groups, diseases, animal welfare and health and safety issues. Relevant current legislation and codes of practice eg rod licences, fish movements.

Learning outcome:

2. Understand tackle and its uses

Topics

- 2.1 The design of selected items of tackle for coarse, game and sea angling.
- 2.2 The design of selected items of tackle to improve the health and welfare of fish caught by anglers

Topic 2.1

The learner will be able to evaluate tackle manufacture and design including major manufacturers, distribution networks and economic status of retail trade, the uses, design, construction, repair and modification of major tackle items eg rods, reels, lines, hooks, floats, lures, flies, bite indicators, unhooking mats. Development of major tackle items (eg; materials used, construction, durability and limitations), designs or features specific to each of the angling disciplines.

Topic 2.2

The learner will be able to describe the animal welfare issues relating to tackle use, design and manufacture; codes of practice

Learning outcome:

3. Undertake organisation of an angling event

Topics

3.1 Angling event organisation

3.2 Human health, safety and welfare requirements for an organised angling event

Topic 3.1

The learner will be able to contribute to the organisation of angling events including; types of event eg angling match, coaching days, administration required for the event (eg event objectives, organisation and planning, costing, advertising, stewarding, equipment requirements, problem solving, logistics, match rules and regulations), angling rules for venues.

Topic 3.2

The learner will know the relevant health and safety policies, equipment; human welfare and amenities (eg toilets, access, parking, food; angler disciplinary procedures), relevant current legislation and codes of practice required to organise an angling event.

Learning outcome:

4. Undertake a range of angling techniques

Topics

4.1 Game, coarse and sea angling techniques

4.2 Bait preparation for coarse, game and sea angling.

4.3 Terminal rigs for coarse, game and sea angling

4.4 Methods of managing the catch from coarse, game and sea angling situations

Topic 4.1

The learner will undertake common techniques used for coarse, game and sea angling, angling methods employed for different situations eg rivers, lakes, beaches and boats. Animal care and welfare issues, relevant current codes of practice and legislation.

Topic 4.2

The learner will prepare angling baits for coarse, game and sea fish species including bait preparation and manufacture (eg production of cooked baits, digging and farming of sea baits), manufacture of artificial lures (eg flies, plugs), preparation of natural baits, storage of baits, animal welfare issues including nutrition and fish health.

Topic 4.3

The learner will prepare terminal rigs for coarse angling (eg carp rigs, pike rigs, feeder rigs, pole rigs), game angling (eg fly leaders, bait rigs), sea angling (eg shore rigs, boat rigs).

Topic 4.4

The learner will demonstrate effective fish handling: 'catch-and-release' techniques, fish care and handling techniques, the use of keepnets and landing nets. Fishery rules. Humane dispatch techniques and carcass disposal relevant to current legislation and codes of practice.

Guidance for delivery

Learning outcome 1 is likely to be delivered through formal lectures, visits to angling organisations, discussions and independent learner research. Learners will be aware of angling as a sport, geographical location by discipline, its status, nature, opportunities and associated legislation.

Learning outcome 2 covers the manufacture and distribution of tackle, tackle technology, design, construction, repair and modification. It is likely to be delivered through formal lectures, independent learner research, group work and discussion, practical activities, site visits and visiting speakers. Learners will be aware of the many choices and decisions to be made when selecting tackle appropriate for a particular discipline, species, technique or venue. They will also learn to consider the properties and qualities of materials and their value and limitations for particular uses.

Learning outcome 3 requires learners to consider the administrative and organisational aspects of angling as a sport in a given situation. It could be delivered through formal lectures with guided group discussion to develop learners' understanding of the issues associated with planning and organising an angling event. Centres are strongly encouraged to facilitate an event for the learners to plan and organise which could be for a visiting group or for the learners themselves.

Learning outcome 4 looks at a wide range of angling techniques and includes the selection and preparation of tackle and bait. It is likely to be delivered through a combination of formal lectures, group discussion, classroom practical work, together with site visits and practical angling activities. Independent learner research is a key within this learning outcome. Fish welfare is a fundamental element and must be stressed and reinforced during practical angling tasks.

Health and safety consideration and completion of appropriate risk assessments should be an integral aspect of the delivery of this unit.

Visiting expert speakers could add to the relevance of the subject for learners. For example, an Environment Agency fisheries officer could talk about their work in widening participation in angling and future strategies. Sport fishery managers, tackle shop owners or noted anglers could talk about the major changes, economic importance, venues, organisations and legislation in angling.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for teachers to develop a method of maintaining contact with a range of employers in the sectors may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

Suggested learning resources

Learners will need access to a range of fisheries in order to develop the skills required for the practical angling element of this unit (still water, running water and sea) and for the angling event. In addition, supervised access to an equipped workshop for the rig making and bait activities may be required. Angling equipment will include a range of fishing tackle appropriate for the three disciplines. Health and safety equipment, such as hats, glasses, buoyancy aids, chest waders, wading sticks and throw ropes, will also be required.

Books

Fundamentals of Fresh water Fishing
Published by: Swan Hill Press, 1999
ISBN: 1853109967
Bingham, C & Allen, A

Pike
Published by: Robert Hale, 2000
ISBN: 070906599X
Buller, F

History of Carp Fishing
Published by: Arrow Books, 1999
ISBN: 0091743710
Clifford, K & Clifford, A

How to Fish (Coarse, Game, Sea)
Published by Southwater
ISBN-10: 1780194234
Vaughn, B

Baits and Artificial Lures
Published by: Boxtree, 2001
ISBN: 0752219294
Wilson, J

Coarse Fishing Knots
Published by: CreateSpace Independent Publishing Platform 2014
ISBN-10: 1502876728
Steer, A

Journals and magazines

- Angler's Mail
- Angling Times
- Carp World
- Sea Angler
- Trout Fisherman

Websites

The Angling Trust	www.anglingtrust.net
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Environment Agency	www.environment-agency.gov.uk
Institute of Fisheries Management	www.ifm.org.uk
National Association of Fisheries and Angling Consultatives	www.nafac.co.uk
The Association of Stillwater Game Fishery Managers	www.troutfisheries.co.uk

UAN:	K/507/7139
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for learners to understand the general care and management of a variety of aquatic species commonly kept in captivity. The unit includes the specific nutrition, accommodation, health and breeding needs of aquatic species. The unit will provide learners with an awareness of different aquatic establishments and an understanding of the natural habitats and physical adaptations of aquatic species to suit their environments.

Throughout the unit, the delivery should be focused on aspects of health and safety (eg working with electricity and water, toxicity and disease transmission) incorporated when working with aquatic species.

Learning outcomes

In this unit, learners will be able to

1. Understand how to develop and maintain aquatic systems
2. Understand commonly kept fish species and aspects of their biology
3. Analyse foods and feeding techniques for aquatic species
4. Understand common fish diseases and causes of ill health
5. Explore different aquatic systems and establishments and the ethics surrounding sourcing aquatic species

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Throughout the unit, the emphasis should be on safe working. It is expected that the learners are guided towards safe working practices and maintaining the welfare of the animals by recognising and minimising stress.

The following is a guided list of the legislation that applies in the Animal Care sector. For purposes of assessment, there is no requirement for detail; however learners should be able to summarise the aims and purpose of the legislation, linking to other learning outcomes within this unit. Centres should be up to date with legislation, policies and codes of practice used in the taught content.

- Zoo Licence Act (1981)
- Animal Welfare Act (2006)
- CITES
- Import of Live Fish Act (1980)
- Pet Shops Act (1951)
- Dangerous animals.

The learner should select commonly kept aquatic species from the range which may include:

- tetras, rasboras and danios
- cichlids
- anabantids
- livebearers
- catfish
- goldfish, koi carp
- cyprinids
- tangs
- damselfish
- butterflyfish
- angelfish
- marine invertebrates, soft corals.

The learner should become familiar with aquatic set ups from the following environments:

- temperate fresh water
- tropical fresh water
- tropical marine
- brackish.

Learning outcome:

1. Understand how to develop and maintain aquatic systems

Topics

1.1 Equipment requirements for fresh water, brackish and marine aquariums

1.2 The Importance of water quality and filtration (nitrification process)

1.3 Suitability of locations for an aquarium

1.4 Health and safety requirements of a given aquarium

1.5 How a given aquarium system complies with relevant current legislation

In this outcome, learners will become familiar with the different types of equipment available for use in aquaria and understand how to correctly set up and maintain aquaria. Health and safety is an important aspect of this outcome and learners will be expected to be aware of risks and how to reduce them. Learners should be aware of how legislation affects different aquaria and aquatic establishments.

Topic 1.1

Learners need to recognise the equipment requirements for fresh water, brackish and marine aquaria which includes:

- lighting (LED's, T-5's and T8's, metal halide, light spectrum)
- filter types (under gravel, foam, power, mechanical, chemical, biological, UV steriliser, foam fractionation, activated charcoal/carbon and ozone)
- substrate choice (gravel, sand, no substrate)
- heater and thermostat
- enrichment and aqua-scaping (live plants, rocks, woods and artificial decoration).

Topic 1.2

Learners will need to develop an understanding of the Importance of water quality and filtration (nitrification process) is essential for a successful aquarium, to include:

- water quality
- filtration
- the nitrification process (ammonia, nitrite and nitrate)
- water changes.

Topic 1.3

The learner will understand the importance of the aquarium location in various setting, which may include:

- aquatic establishments
- home
- workplace.

The learner needs to consider the following when siting an aquarium:

- proximity to power
- proximity to water
- proximity to light/windows
- waste disposal
- floor loading
- passing traffic
- air quality
- noise.

Topic 1.4

The learner need to understand the importance of the following health and safety requirements of a given aquarium:

- circuit breakers
- damaged equipment
- hygiene

- Health and Safety at Work Act (1974).

Topic 1.5

The learner needs to evaluate how a given aquarium system complies with relevant current legislation, to consider the following:

- Zoo Licence Act (1981)
- Animal Welfare Act (2006)
- CITES
- Import of Live Fish Act (1980)
- Pet Shops Act (1951)
- Dangerous animals eg piranhas, stingrays, corals and other venomous species.

Learning outcome:

2. Understand commonly kept fish species and aspects of their biology

Topics

- 2.1 Develop an understanding of fish classification and identify commonly kept species
- 2.2 Identify the functions of the physical features of given fish species
- 2.3 Investigate different reproductive strategies of fish species
- 2.4 Develop an appreciation of natural habitats and fish adaptations

In this outcome, the learner will develop an understanding of fish classification, the associated internal and external physiology of a fish and physical adaptations. The learner will also investigate a range of contrasting reproductive strategies employed by fish species. The learner will develop an appreciation of the different natural habitats aquatic species inhabit in the wild and related physical adaptations to suit their natural environments.

Topic 2.1

The learner will develop an understanding of fish species classification system and identify significant physical features of the following:

- chondrocytes
- agnatha
- osteocytes

The learner will identify commonly kept fish species from the range.

Topic 2.2

The learner will identify the functions of physical features of given fish species, to include:

- fins (dorsal, anal, caudal, adipose, pelvic and pectoral)
- lateral line
- gills and lungs
- eyes
- mouth and dentition
- scales and mucous
- swim bladder
- heart
- digestive tract (stomach, lack of stomach, anus)
- kidney, liver, gall bladder
- gonads and genital opening
- male and female reproductive organs.

Topic 2.3

The learner should evaluate the benefits of different reproductive strategies and parental care of different fish species, to include:

- egg scattering
- egg depositors
- mouth brooders
- substrate brooding
- nest building
- live bearing
- sequential hermaphrodites.

Topic 2.4

The learner will need to develop an appreciation of natural habitats and fish adaptations by considering the following:

- natural habitats (open ocean, mangrove swamp, flooded forest, estuary, coral reef, rock pool, river, lake, natural pond)
- adaptations (eg aestivation, labyrinth fish and lung fish).

Learning outcome:

3. Analyse foods and feeding techniques for aquatic species

Topics

3.1 Feeding strategies of given fish species

3.2 Methods of presenting foods to fish in an aquarium

3.3 How incorrect feeding of fish can impact on water quality

In this outcome, the learner will become familiar with the different types of food available for aquatic species and the methods of feeding fish. Learners need to relate the digestive system of fish (stomach size), to frequency of feeding. Emphasis could be placed on feed/fast strategy normally used with fish, and its effects on waste products. This can be linked to physical adaptations and mouth positions in fish to aid their feeding strategy.

There is a direct link with Learning outcome 4 (causes of fish disease) and Outcome 2 (internal structure of digestive tract).

Topic 3.1

The learner will need to understand various feeding strategies of given fish species, to include:

- carnivores, herbivores, omnivores, insectivores, browsers
- surface feeders, mid water feeders and substrate feeders
- filter feeders.

Topic 3.2

The learner will be able to identify and evaluate appropriate methods of presenting foods to fish in an aquarium, to include:

Methods:

- scatter feeding
- automatic feeding
- hand feeding
- drip feeding
- frequency of feeding.

Food types:

- flake food
- pellets
- live food
- frozen food
- fresh food
- freeze dried.

To incorporate nutritional constituents, water soluble vitamins and colour enhancers as necessary to the species.

Topic 3.3

The learner will need to explain how incorrect feeding of fish can impact water quality in an aquarium by considering the following:

Incorrect feeding:

- overfeeding
- starvation
- incorrect food type
- bite size.

Effect of overfeeding on water quality:

- oxygen level
- ammonia level
- pH.

Learning outcome:

4. Understand common fish diseases and causes of ill health

Topics

4.1 Common causes of disease in fish

4.2 Records which should be kept for a given aquarium/establishment

In this outcome, learners should be able to recognise and report on common pathogenic and husbandry induced diseases of fish. The learner will investigate the life cycles of common disease organisms and identify suitable treatments. There are links to Outcome 1 and 3 as water quality is common to both outcomes. Practical activities such as fish health observations and skin scrapes may be beneficial.

Topic 4.1

The learner will be able to identify and treat common causes of disease in fish and be able to differentiate between husbandry (water quality) and pathogenic induced causes, to include:

Water quality:

- pH
- water hardness
- temperature
- ammonia
- nitrite / nitrate
- stresses (eg aggression/breeding)

Pathogens:

- bacteria
- protozoa
- fungi
- nematode
- digenea, monogenea
- common diseases such as costia, trichodina, Ichthyophthirius and camellanus.

Learners to consider other factors such as stress (aggression, breeding) and desirable and undesirable deformities.

Topic 4.2

The learner will need to understand the requirement for appropriate records which should be kept for a given aquarium/establishment which may include:

- species and numbers
- age
- sex
- births / deaths
- arrival date / removal date
- destination
- source of new livestock
- diseases / treatments
- water change date
- water test readings (eg temperature, date, nitrite, nitrate, ammonia, pH)

Learning outcome:

5. Explore different aquatic systems and establishments and the ethics surrounding sourcing livestock

Topics

5.1 Different types of aquatic establishments and aquarium systems

5.2 Ethics of sourcing livestock

In this outcome, learners will look at different types aquatic establishments and how they source their livestock. Learners will be made aware of the different sources of obtaining commonly kept fish species and discuss the ethics behind each method – this will include capture methods of wild species, captive breeding, and how species are transported. Learners can learn through research and debate. Learners will be in a position to question for themselves ethics behind keeping aquatic species in captivity.

Topic 5.1

The learner will have an appreciation of the differences between types of private and public aquatic establishments, which may include :

- public aquaria
- zoos
- pet shops
- home aquaria.

Topic 5.2

The learner will understand the eethical considerations of sourcing livestockk for different establishments, to include the following:

- wholesale
- importers
- farms
- specialist breeders
- hobbyists.

Guidance for delivery

This unit is designed to provide the learner with the knowledge and understanding required to improve the welfare of aquatic species commonly kept in captivity.

Whilst this unit could be delivered entirely formally, it is expected that practical activities such as fish health observations, skin scrapes and dissections would enhance delivery. Guest speakers from industry, and visits to aquatic establishments will provide interest, experience and add depth to the learner knowledge.

Some aspects of the learning outcomes could be acquired from industry placements, learners could be encouraged to add their experiences to the delivery. Learners must be given the opportunity to deal with a range of aquatic species in different situations which reflects current industry practice. Health and safety is an important aspect of this outcome and learners will be expected to be aware of risks and how to reduce them. Safe working practice should be emphasized throughout the unit.

Unit 344

Fish Health

UAN:	J/507/7245
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for learners to understand the principles of fish health and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

For a range of disease causes both pathogenic (viruses, bacteria, fungi and parasites) and non-pathogenic (genetic, nutritional and environmental) learners will be able to describe the biology, aetiology and possible symptoms of a disease outbreak. Learners will then go on to investigate treatment and, more importantly, preventative measures that can be used to mitigate against the development of diseases. Learners will also understand the legal implications of fish diseases and their statutory responsibilities for maintaining fish health and welfare.

Learning outcomes:

In this unit, learners will be able to

1. Understand the causes, symptoms and management of viral and bacterial diseases in fish
2. Understand the causes, symptoms and management of fungal and parasitic diseases in fish
3. Understand the causes and management of nutritional and environmental health problems in fish
4. Know the relevant codes of practice and legislation relating to the management of fish health in the UK

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the causes, symptoms and management of viral and bacterial diseases in fish

Topics

- 1.1 Viral infections
- 1.2 Bacterial infections

Topic 1.1

The learner will understand the biology of viruses, structure, life cycles, significant viral diseases of fish, (eg Koi Herpes Virus, Spring Viraemia of Carp, Infectious Pancreatic Necrosis); pathology; symptoms of major viral infections of fish; methods used to identify viral infections; methods used in the management of viruses, (eg biosecurity, hygiene, husbandry, vaccination); environmental and economic risks of the continued spread of viral diseases

Topic 1.2

The learner will understand the biology of bacteria, structure, life cycles, significant fish bacteria species (eg *Aeromonas*, *Renibacterium*, *Yersinia*, *Mycobacter*, *Flexibacter*,) modes of pathology (eg obligate/facultative pathogens); diagnosis of bacterial pathogens through their aetiology and symptoms; identification of bacterial pathogens; methods used to treat or manage bacterial diseases (eg biosecurity, hygiene, husbandry, antibiotics); environmental and health risks of using antibiotics; environmental, zoonotic and economic risks of the spread of bacterial diseases.

Learning outcome:

2. Understand the causes, symptoms and management of fungal and parasitic diseases in fish

Topics

- 2.1 Fungal infections
- 2.2 Parasitic infections

Topic 2.1

The learner will understand fungal infections in fish: biology of fungi, structure, life cycles; significant fungal infections, (eg Saprolegnia, Branchiomycosis); symptoms, pathology; identification/diagnosis of fungal pathogens through their aetiology and symptoms; methods used to treat or manage fungal infections (eg biosecurity, hygiene, husbandry, therapeutics); environmental and economic risks of the spread of fungal diseases.

Topic 2.2

The learner will understand parasitic infections in fish: Classification of parasites (eg protozoan, mesozoan, ectoparasites, endoparasities), biology of parasites, structure, life cycles (eg obligate/facultative parasites primary, secondary, paratenic hosts) significant parasitic infections (eg whitespot, *Ichthyobodo*, Ergasilids; nematodes, cestodes), modes of pathology; identification/diagnosis of parasitic pathogens through their aetiology and symptoms; methods used to treat or manage parasitic infections (eg biosecurity, hygiene, husbandry, therapeutics); environmental and economic risks of the spread of parasitic diseases.

Learning outcome:

3. Understand the causes and management of nutritional and environmental health problems in fish

Topics

3.1 Nutritional health problems

3.2 Environmental health problems

Topic 3.1

The learner will understand nutritional health problems in fish: symptoms, frequency and causes of nutritional problems; significant nutritional disorders (eg ocular disease, vertebral deformity); diagnosis of nutritional problems through their aetiology and symptoms; methods used to manage and avoid nutritional problems.

Topic 3.2

The learner will understand Environmental health problems in fish: significant environmental problems (eg hyperplasia/lamellar fusion, gas bubble disease, brown blood disease); symptoms and causes of environmental health problems; diagnosing environmental health problems; methods used to manage and avoid environmental problems.

Learning outcome:

4. Know the relevant codes of practice and legislation relating to the management of fish health in the UK

Topics

4.1 EU and UK legislation covering the management of fish health in the UK

Topic 4.1

The learner will know the development and purpose of the legislation; relevant legislation (eg Diseases of Fish Act 1983, Salmon and Fresh water Fisheries Act 1975, Aquatic Animal Health Directive 2006, animal Welfare Act 2006; Aquatic Animal Health (England and Wales) Regulations 2009, Veterinary Medicine Act 2006, Small Animal Exemption Scheme); dangers of transferring new species and diseases into new geographical locations; Government agencies involved in fish health and welfare issues (eg the Fish Health Inspectorate (FHI), Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Department of the Environment, Food and Rural Affairs (DEFRA) and The Environment Agency); other organisations involved in fish health and welfare issues, (eg Ornamental and Aquatic Trade Association (OATA), Salmon and Trout Association (STA), Institute of Fisheries Management (IFM), Angling Trust (AT)); codes of practice for fish stocking, fish transport, fish husbandry, humane slaughter; record-keeping.

Guidance for delivery

Diagnosing and managing fish health and disease is a challenging and fascinating subject that provides learning opportunities through lectures, discussions, site visits, supervised laboratory and fish health management practicals, diagnosis and treatment case studies and simulations, research using the internet and library resources, and the use of personal and/or industrial experience. The practical application of knowledge gained is as crucial as the understanding of the theory in successfully managing fish health, so both aspects should be equally weighted in the delivery plan.

Learning outcomes 1 and 2 are directly linked: they require the learner to understand the biology, aetiology, identification features and control/treatment of pathogenic diseases of fish. This will

necessitate theory and practical teaching and may be linked to Learning outcome 4 where appropriate.

Learning outcome 3 requires the learner to be aware of the range of non-pathogenic diseases of fish. The development of the symptoms is crucial in diagnosis so the use of case studies would be invaluable in learning the development and management of these diseases.

Learning outcome 4 covers the legislation and codes of practice relevant to fish kept in the EU and UK. Delivery of this learning outcome must be linked to the delivery of Learning outcomes 1, 2 and 3, as they deal with the health issues and pathogens covered in the legislation. Codes of practice and statutory documentation are increasingly important, there should be opportunity to find and complete exemplar documents to embed the practicalities of fish health management.

Employer engagement

Due to the evolving nature of legislation, it is vital that the learner is kept up to date with the most recent guidelines and requirements. To this end, bringing in the expertise and experience of governmental regulators and monitors, non-governmental organisations involved in fish welfare, and those involved directly in fish management, would be invaluable in providing practical, realistic application of unit content. During work experience placements, it would be beneficial if learners and supervisors were made aware of the requirements of this unit, so that the skills and knowledge gained through the unit can be practically applied during work experience. For example, learners may have the opportunity to conduct fish health checks, complete fish examinations, identify parasites and assist in treatment and management regimes.

Suggested learning resources

Books

The Interpet Manual of Fish Health, 2nd Edition Published by: Interpet Publishing, 2002 ISBN: 1842860674	Andrews, C; Exell, A & Carrington, N
Infectious Disease in Aquaculture: Prevention and Control Published by: Woodhead Publishing, 2012 ISBN: 9780857095732	Austin, B
The Interpet Manual of Koi Health Published by: Interpet Publishing, 2004 ISBN: 1842860992	Holmes, K & Pitham, T
Diseases of Carp and Other Cyprinid Fish Published by: Blackwell Science, 2001 ISBN: 0852382529	Hoole, D; Bucke, D; Burgess, P & Wellby, I
Koi Medicine Published by: Kingdom Books, 2001 ISBN: 1852791772	Jepson, L
The Super Simple Guide to Common Fish Diseases Published by: TFH Publications, 2005 ISBN: 9780793834556	Jepson, L
Fish Disease: Diagnosis and Treatment	Noga, E. J

Published by: Iowa State University Press, 2010
ISBN-13: 9780813806976

Handbook of Trout and Salmon Diseases, 3rd Edition
Published by: Blackwell Science, 1997
ISBN: 0852382448

Roberts,R & Shepherd, C

Fish Pathology, 3rd Edition
Published by: Elsevier Health Sciences, 2001
ISBN: 0702025631

Roberts, R

European Association of Fish Pathologists 'What Should I Do' Practical Guide for Fresh water Fish Farmers

Schlotfeldt, H.J &
Alderman, DJ

Published by: EAFP Publications, 1998
ISBN 0952624206

Journals and magazines

- Fish Farmer magazine
- Fish Farming International magazine
- FISH Journal – Institute of Fisheries Management
- Fisheries Management and Ecology
- Journal of Fish Diseases
- Koi Carp magazine
- Practical Fishkeeping magazine

Websites

Centre for Environment Fisheries & Aquaculture Science

www.cefas.co.uk

Department for Environment, Food and Rural Affairs

www.defra.gov.uk

Environment Agency

www.environment-agency.gov.uk

Fish disease diagnosis and treatments

www.fishdoc.co.uk

Fish Health Inspectorate

[https://www.gov.uk/government/
groups/fish-health-inspectorate](https://www.gov.uk/government/groups/fish-health-inspectorate)

Ornamental Aquatics Trade Association (OATA)

www.ornamentalfish.org

The Institute of Fisheries Management

www.ifm.org.uk

Unit 345

Ornamental pool design, installation and management

UAN:	L/507/7246
Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of ornamental pond design, installation and maintenance. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Learning outcomes

In this unit, learners will be able to

1. Understand the principles of planning and designing ornamental pools
2. Select appropriate materials and equipment used in the construction and installation of ornamental pools
3. Construct an ornamental pool or water feature
4. Manage an ornamental pool or water feature

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning Outcome:

1. Understand the principles of planning and designing ornamental pools

Topics

- 1.1 The environmental and physical factors influencing the location of an ornamental pool and water features
- 1.2 The human, animal and plant health and welfare issues associated with the design of an ornamental pool

Topic 1.1

The learner will understand the environmental (eg sunlight, temperature,) and physical factors (eg substrate type, water table) affecting the positioning and design of ornamental pools eg koi pools, natural or wild pools, informal and formal pools and design of associated water features eg fountains, waterfalls.

Topic 1.2

The learner will understand the interpretation of client briefs, the production of designs or plans to meet objectives, the human health and safety issues associated with ornamental pools (eg drowning), the animal health and welfare issues (eg de-oxygenation), the plant health issues (eg light availability), relevant current legislation (eg Health & Safety at Work Act, Animal Welfare Act) and codes of practice.

Learning outcome:

2. Select appropriate materials and equipment used in the construction and installation of ornamental pools

Topics

- 2.1 The equipment and materials required to construct and install an ornamental pool to a specified design
- 2.2 Cost calculation and sources of materials and equipment required to establish an ornamental pool to a specified design

Topic 2.1

The learner will know the materials and equipment (eg drains, pumps, filters, liners, clarifiers, predator control, water quality monitoring and pipework) including the evaluation of the types, costs, uses and sources required to construct an ornamental pool, eg formal and informal pools, sunken and raised pools, flexible lined and rigid lined pools.

Topic 2.2

The learner will estimate the cost of materials and equipment required to construct an ornamental pool.

Learning outcome

3. Construct an ornamental pool or water feature

Topics

3.1 Construction of an ornamental pool or water feature planning

3.2 Construct of an ornamental pool or water feature

Topic 3.1

The learner will plan the construction and installation of pools including; construction plans and building schedules from stated design criteria, contracts and tenders, site surveying, laying out, human health and safety issues, animal health and welfare and relevant current legislation and codes of practice eg Environment Act 1995, Planning Acts

Topic 3.2

The learner will understand construction techniques for flexible and rigid liners, raised and sunken pools, the installation of appropriate life support and maintenance equipment.

Learning outcome

4. Manage an ornamental pool or water feature

Topics

4.1 Maintenance of an ornamental pool or water feature

4.2 Factors that affect maintenance of a specified ornamental pool or water feature

Topic 4.1

The learner will be able to undertake pool or water feature management including; maintenance programmes for daily, weekly and seasonal management of ornamental pools and water features, monitoring and maintenance of water quality, flora (plant husbandry) and fauna.

Topic 4.2

The learner will know the factors that influence feeding schedules, algal and legal predator control measures, fish and plant health eg temperature, light, species; and maintenance, equipment and materials maintenance, costs of maintaining ornamental pools and water features. The establishment of contracts and tenders for the management of ornamental pools and water features.

Guidance for delivery

It would be beneficial if learners and supervisors were made aware of the requirements of this unit prior to any work-related activities so that naturally occurring evidence can be collected at the time. For example, learners will have the opportunity to construct an ornamental pool or water feature and they should be encouraged to ask for observation records and/or witness statements to be provided as evidence of this. Visiting expert speakers could add to the relevance of the subject for learners. For example, a professional pool construction engineer could talk about their work, the situations they face and the methods they use. Whichever delivery methods are used, it is essential that tutors stress the importance of animal welfare, sound environment management and the need to manage the resource using legal methods. Health and safety issues relating to working in and around water must be stressed and regularly reinforced, and risk assessments must be undertaken prior to practical activities. Adequate personal protective equipment (PPE) must be provided and used following the production of suitable risk assessments. Tutors should consider integrating the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments learners may also be taking as part of their programme of study.

Learning outcomes 1 and 2 are directly linked. These are likely to be delivered by formal lectures, discussion, site visits and practical's, and independent learner research. Site visits to a range of

ornamental pools with or without associated water features and to materials and equipment suppliers would be extremely valuable to the learners. Design, planning, sourcing and costing should be to a specification agreed in conjunction with the learner and tutor and ideally should be the ornamental pool or water feature that will be constructed and managed in Learning Outcomes 3 and 4.

Learning outcomes 3 and 4 cover the construction and maintenance of ornamental pools and water features, learners are **expected to contribute** to the construction of an ornamental pool or water feature (to include both a flexible liner and rigid liner). Delivery techniques should be varied and linked to the delivery of Learning outcomes 1 and 2. It is expected that formal lectures, discussions, supervised practical's and site visits would form part of the delivery of these learning outcomes.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for teachers to develop a method of maintaining contact with a range of employers in the sectors may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

Suggested learning resources

Learners will require access to an area with existing ornamental pools and space for the construction of pools and water features.

They will also require appropriate personal protective equipment (PPE), a full range of water testing equipment, a range of materials and equipment needed for the construction and maintenance of ornamental pools or water features, a computer with appropriate software, a library and resource centre, and a calculator.

Books

- | | |
|--|-------------------------------------|
| The Interpet Manual of Fish Health | Andrews,C; Excell, A & Carrington N |
| Published by: Interpet Publishing, 2002
ISBN: 978-1842860670 | |
| Creating a Koi Pond: An Essential Guide to Building and Maintaining a Koi Pond | Holmes, K & Pitham, T |
| Published by: Interpet Publishing, 2002
ISBN: 978-1842860632 | |
| A Fishkeeper's Guide to Garden Ponds | Papworth, D |
| Published by: Interpet Publishing, 1999
ISBN: 978-1902389547 | |
| An Essential Guide to Choosing Pond Fish and Aquatic Plants | Quick, G |
| Published by: Interpet Publishing, 2000
ISBN: 978-1902389974 | |
| The Royal Horticultural Society Water Gardening | Robinson, P |

Published by: Dorling Kindersley, 1997
ISBN: 0751303046

The Illustrated Practical Guide to Water & Rock Gardening
Published by: Southwater 2014
ISBN: 1780194072

Robinson, P

Websites

Gardens Guide	www.gardenvisit.com
Health and Safety Executive	www.hsegov.uk
Koi Water Garden Ltd	www.koicarp.org.uk
Ornamental Aquatic Trade Association	www.ornamentalfish.org
Wildlife and Countryside Services	www.wildlifeservices.co.uk
Pond Conservation	www.freshwaterhabitats.org.uk

Unit 346

Cyprinid Farming

UAN:	R/507/7247
Level:	3
GLH:	60

What is this unit about?

Cyprinid fish are farmed on a large scale worldwide not only for food but also for the coldwater ornamental fish industry (such as koi and goldfish) and as an increasingly important element in the development of sports fisheries.

Initially the unit considers the global cyprinid farming industry and the major principles behind the pond culture of cyprinids. This provides the knowledge required to move onto the more practical elements of hatchery production of young fish, pond maintenance, the systems used for on-growing and the essential aspects of husbandry, movement and monitoring techniques .

Learning outcomes

In this unit, learners will be able to

1. Understand the requirements of globally important cyprinid species
2. Know the principles of cyprinid farm design and culture
3. Know cyprinid hatchery operations
4. Undertake on-growing cyprinid farming operations

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the requirements of globally important cyprinid species

Topics

- 1.1 The distribution of the major farmed species of cyprinid fish in the UK and globally
- 1.2 The environmental requirements of the major farmed species of cyprinid fish species

Topic 1.1

The learner will understand the cyprinid farming industry including the history, development and current status of cyprinid farming in the UK and globally.

Topic 1.2

The learner will understand the environmental requirements (eg water quality, temperature, pond type) of economically important species (eg Common carp, Silver carp, Bighead carp), environmental issues and relevant current legislation (eg Water Framework Directive, Fish movements), impact of farming cyprinid fish species globally including the roles of government and non-government organisations in regulating cyprinid aquaculture.

Learning outcome:

2. Know the principles of cyprinid farm design and culture

Topics

- 2.1 The design and structure of a cyprinid farm
- 2.2 Site selection for a cyprinid farming
- 2.3 Culture of cyprinid species

Topic 2.1

The learner will know cyprinid farm design, plans and function, water quality and quantity requirements, biosecurity, health and safety, environmental issues and relevant current legislation.

Topic 2.2

The learner will know the requirements to select a site for cyprinid farming, suitable geology and soil types, effects of topography, water source, farm access and services, national and local regulatory authorities in the process of site development.

Topic 2.3

The learner will know the principles of pond culture, design and function of on-growing ponds, use of recirculation systems.

Learning outcome:

3. Know cyprinid hatchery operations

Topics

- 3.1 Cyprinid hatchery operations to prepare for breeding
- 3.2 Techniques involved in the artificial spawning of a selected cyprinid species
- 3.3 Invertebrate feed production and larvae diet management

Topic 3.1

The learner will know the life cycles of economically important species (eg koi, common carp), selection, requirements and preparation of cyprinid broodstock, signs of sexual maturity, natural reproduction control.

Topic 3.2

The learner will know the requirements for hatchery design and function, hormonal (including artificial hormones) control of reproduction, egg development in broodstock, use of Dubisch ponds, use of anaesthetics in commercial farming practice, hypophysation technique, egg preparation, incubation and treatment, larval rearing in the hatchery, bio security, animal welfare issues and relevant current legislation.

Topic 3.3

The learner will know larvae diet preparation and use for producing cyprinid youngstock.

Learning outcome:

4. Undertake on-growing cyprinid farming operations

Topics

- 4.1 Husbandry tasks on a commercial cyprinid farm.
- 4.2 The annual cycle of pond management practices in the production cycle of a cyprinid farm
- 4.3 legislation associated with the production and sale of a named cyprinid fish species within the UK market
- 4.4 fish transport techniques used for cyprinid fish species

Topic 4.1

The learner will undertake cyprinid farm management and husbandry skills, including netting, grading, sorting, counting, water quality monitoring, stocking density calculations, production plans, fish health monitoring, feeding and nutrition.

Topic 4.2

The learner will know the annual cycle of cyprinid farm management, pond draining and preparation (including liming, fertilising), stocking (including identification of zooplankton and phytoplankton species, succession of plankton and recognition of key invertebrate groups), pest and predator control, pond bankside maintenance, equipment maintenance (eg aeration equipment).

Topic 4.3

The learner will know relevant current legislation (eg Salmon and Fresh water Fisheries Act 19xx, Animal Transport Licensing, Abstract and Discharge Licences) associated with the production and sale of cyprinid fish species in the UK, animal welfare issues.

Topic 4.4

The learner will understand fish transport methods to include open and closed systems, associated biosecurity risks.

Guidance for delivery

Delivery of this unit will involve practical activities, lectures and visits to suitable cyprinid fish farms.

Learning outcome 1 is likely to be delivered through formal lectures, discussion, and independent learner research. Learners will become aware of the major farmed cyprinid species, development, potential, current status and global standing of the UK cyprinid farming industry.

Learning outcome 2 covers the criteria used to define the requirements of a cyprinid farm, identify suitable sites for cyprinid farms, how they are designed, constructed and legislation relating to their construction and use. Delivery techniques should be varied and formal lectures, discussions and supervised site visits would form part of the delivery.

Learning outcome 3 looks at the life cycle of the cyprinid, breeding and hatchery processes. It would be expected that formal lectures, practical activities, group discussion and supervised visits would form part of the delivery. Particular emphasis should be placed on the practical aspects of spawning fish and include the selection of broodstock, artificial spawning of carp and the production of viable fry and first feeding. Learners must have access to a working cyprinid hatchery.

Learning outcome 4 looks at the on-growing of stock produced in a hatchery and the annual operating tasks associated with running a cyprinid farm. It would be expected that formal lectures, practical activities, group discussion, supervised visits and work experience placement would form part of the delivery. Particular emphasis is placed on the annual production cycles in a pond system, the production and management of invertebrate foods for the stock and the harvest of stock. Learners must have access to an operational cyprinid fish farm.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

It would be helpful for teachers to develop a method of maintaining contact with a range of employers in the sectors may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date.

Suggested learning resources

Learners will need access to a cyprinid hatchery and fish farm capable of rearing a range of cyprinids using a variety of equipment and holding units. They will also need all the necessary equipment to maintain cyprinid eggs, larvae and fry in a condition that meets the requirements of relevant codes of practice and fish welfare guidelines. Commercially acceptable equipment must be used.

Books

The Sparsholt Guide to the Management of Carp Fisheries
Published by: Mitchellwing Publications, 2001
ISBN: 0954005406

Seagrave, C

Broodstock Management and Egg and Larval Quality
Published by: Blackwell Science, 1994
ISBN: 0632035919

Bromage, N & Roberts, R

Aquaculture of Cyprinids
Published by: INRA, 1994
ISBN: 2853407918

Billard, R

Carp: Biology and Culture
Published by Springer-Verlag, 1999
ISBN: 1852331186

Billard, R

Fresh water Fisheries Management

Published by: Blackwell Publishing, 2010
ISBN: 1405133325

Girdler, A; Welcomme, R &
Wellby, I

Carp and Pond Fish Culture, 2nd Edition

Published by: Blackwell Science, 2002
ISBN: 0852382820

Horvath, L; Tamas, G &
Seagrave, C

Manual on the Production and Use of Live Food for Aquaculture
Published by: FAO of the UN, 1997
ISBN: 9251039348

Lavens, P & Sorgeloos, P

Aquaculture: Principles and Practices
Published by: Blackwell Publishing, 2005
ISBN: 1405105321

Pillay, T & Kutty, M

Journals and magazines

- Aquaculture International
- Fish Farmer
- Fish Farming International

Websites

Department for Environment, Food and Rural Affairs

www.defra.gov.uk

Environment Agency

www.environment-agency.gov.uk

Institute of Fisheries Management

www.ifm.org.uk

Centre for Environment, Fisheries and Aquaculture Science

www.cefas.co.uk

Health and Safety Executive

www.hsegov.uk

Ornamental Aquatic Trade Association (OATA)

www.ornamentalfish.org

Food and Agriculture Organisation of the United Nations

www.fao.org

Unit 347

Salmonid Farming

UAN:	Y/507/7248
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to the skills and understanding associated with salmonid farming. It is designed for learners in centre-based settings looking to progress into the sector or onto further education and training.

The unit will study the principles of salmonid farming and how these relate to commercial farm practices.

The unit aims to provide practical skills training in salmonid hatchery and on-growing operations.

Learning outcomes

In this unit, learners will be able to

1. Understand the biological requirements of salmonid species and how this relates to their production on the farm
2. Understand the site requirements for salmonid farming and the methods used to farm salmonid species
3. Carry out salmonid hatchery operations
4. Carry out salmonid on-growing operations

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the biological requirements of salmonid species and how this relates to their production on the farm

Topics

1.1 The biological requirements of salmonids

1.2 The main production processes in relation to the biological requirements of salmonids

Topic 1.1

The learner will understand the biological requirements of salmonids: life cycles of the main farmed salmonids in the UK (Atlantic salmon, rainbow trout and brown trout); water quality and quantity, nutrition and feeding

Topic 1.2

The learner will understand the main production processes in relation to the biological requirements of salmonids relate to:

Production processes: commercial production cycles and systems for farming trout and salmon.

Learning outcome:

2. Understand the site requirements and different methods for producing farmed salmonids

Topics

2.1 Site requirements

2.2 Production methods

Topic 2.1

The learner will understand the influence of geographical and environmental factors on farm site selection; water quality and quantity requirements for farmed salmonids; relevant current legislation and planning consents, water abstraction and discharge, farm registration; relevant current codes of practice.

Topic 2.2

The learner will understand the working principles of the main holding units currently used for trout and salmon farming eg tanks, raceways, earth ponds, cages; their applications, advantages and disadvantages; environmental and animal welfare issues; health and safety issues.

Learning outcome:

3. Carry out salmonid hatchery operations

Topics

3.1 Breeding

3.2 Predator control

Topic 3.1

The learner will select broodstock, assessment and stripping; photoperiodic maturation, fertilising, incubating, shocking, counting, picking, disinfecting, transporting eggs; all-female and triploid production; use of artificial incubation substrates; diets and first feeding; juvenile rearing (eg fry, fingerling, parr and smolt)

Topic 3.2

The learner will know the main predators and methods to control them; health management and biosecurity; relevant current legislation and codes of practice relating to predator control; environmental and animal welfare issues.

Learning outcome:

4. Carry out salmonid on-growing operations

Topics

4.1 Feeding and growth

4.2 Handling, harvest and movement

4.3 Health and welfare

Topic 4.1

The learner will know how to:

- Calculate:
 - feed rations
 - feed conversion ratios
 - feed costs
- plan diets and feed storage
- calculate fish growth and stocking densities
- measure water flows and volumes.

Topic 4.2

The learner will grade live stock; transport live fish, harvest, slaughter and process stock, recognize fish spoilage; identify markets and quality standards.

Topic 4.3

The learner will understand health management and biosecurity; predator control; removal and disposal of mortalities; relevant current legislation and codes of practice relating to on-growing; environmental and animal welfare issues.

Guidance for delivery

This unit is designed to provide learners with sound knowledge and practical skills in the farming of salmonids. Delivery will primarily comprise formal lectures, farm visits and applied skills training in salmonid farming operations by way of demonstration and instruction; and will link closely to work experience placements.

Throughout the unit, emphasis should be placed on the importance of animal welfare, environmental issues and safe working practice. Access to a salmonid rearing unit is essential in the delivery of this unit.

Learning outcome 1 will develop learners' knowledge of the biology of farmed salmonids and the production cycles used in commercial fish farms. This will concentrate particularly on the main biological requirements of the main UK farmed species and how fish farms meet those requirements. This outcome can be delivered through formal lectures and instruction, visits to hatcheries and on-growing farms and guided learner research.

Learning outcome 2 will develop learners' knowledge of the site requirements for farms and the current methods for farming salmonids. Delivery of this outcome can include formal lectures, discussions, farm visits and case studies. Visiting expert speakers (eg CEFAS, Environment Agency or Planning Authority) could provide an insight into current farm registration, environmental legislation and planning consents.

Learning outcome 3 allows learners to develop the knowledge and skills needed to manage salmonid hatchery operations. Delivery of this outcome will primarily involve practical skills training in current hatchery practices. This can include some formal lectures but should mainly include demonstrations, supervised practical instruction, practical sessions and farm visits to examine and undertake commercial hatchery practices.

Learning outcome 4 allows learners to develop the knowledge and skills needed to manage salmonid on-growing operations. Delivery of this outcome will primarily involve practical skills training in current on-growing practices. This can include some formal lectures but should mainly include demonstrations, supervised practical instruction, practical sessions and farm visits to examine and undertake commercial on-growing practices.

Employer engagement

Due to the applied nature of the unit, links with a salmonid farms should be established to develop the learners knowledge and experience. This can take the form of visits and/or study tours to a range of salmonid farms including a hatchery and an on-growing farm and can also include practical skills training in salmonid farming operations. This will give learners an insight into the industry, its current practices as well as provide potential links with employers for future work placements and job opportunities.

Suggested learning resources

Books

Cage Aquaculture, 3rd Edition
Published by: Fishing News Books, 2004
ISBN: 1405108428

Beveridge, M

Salmon Aquaculture Published by: Blackwell Science, 1993 ISBN: 0852382049	Heen, K; Monahan, R & Utter, F
Salmon and Trout Farming Published by: Ellis Horwood, 1994 ISBN: 0137883242	Laird, L & Needham, T
Aquaculture: Fish and Shellfish Farming Published by: Blackwell Science, 2003 ISBN: 0852382227	Lucas, J & Southgate, P
Handbook of Trout and Salmon Diseases, 3rd Edition Published by: Blackwell Science, 1997 ISBN: 0852382448	Roberts, R & Shepherd, C
Salmon Farming Handbook Published by: Blackwell Science, 1989 ISBN: 0852381581	Sedgwick, S
Trout Farming Handbook, 6th Edition Published by: Blackwell Science, 1995 ISBN: 0852382324	Sedgwick, S
Intensive Fish Farming Published by: Blackwell Science, 1992 ISBN: 063203467X	Shepherd, C & Bromage, N
Aquaculture: An Introductory Text Published by: CABI Publishing, 2005 ISBN: 0851990819	Stickney, R
Fish Hatchery Management, 2nd Edition Published by: CABI Publishing, 2002 ISBN: 0851996272	Wedemeyer, G
Manual of Salmonid Farming Published by: Blackwell Science, 1999 ISBN: 0852382456	Willoughby, S

Journals and magazines

- Aquaculture journal
- Fish Farmer magazine
- Fish Farming International magazine

Websites

Aquafeed	www.aquafeed.co.uk
British Trout Association	www.britishtrout.co.uk
Centre for Environment, Fisheries, Agricultural Science	www.cefas.co.uk
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
The Environment Agency	www.environment-agency.gov.uk
Health and Safety Executive	www.hse.gov.uk
Sector Skills Council for the Environmental and Land-based Industries	www.lantra.co.uk
The Scottish Government	www.scotland.gov.uk
Scottish Salmon	www.scottishsalmon.co.uk
The Crown Estate	www.thecrownestate.co.uk

Unit 348

Fresh water captive environment

UAN:	D/507/7249
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for the learners to develop the knowledge and skills that will allow them to maintain and evaluate fresh water organisms in a captive environment

As potential or current fish keepers understanding the environment that fresh water fish and plants need in captivity to not only survive but thrive in is of key importance. This unit will help the learner to understand and interpret the scientific background to decisions that they make not only when setting up a tank and adding fish, but also through their life span. They will delve into dedicated fresh water topics such as plant husbandry, fish specialists, fresh water aquarium equipment, water quality parameters and of course the practical management and set up of an environment itself.

Learners will not only be able to critique their own work but also their work against other displays, but also in terms of legislation ensuring animal welfare and health and safety of all involved are of up most importance.

Learning outcomes:

In this unit, learners will be able to

1. Understand the requirements of fresh water aquatic organisms, including specialist adaptations
2. Understand the suitability of fish and plant species to be kept in a fresh water environment
3. Know the principles of breeding fresh water fishes
4. Design, construct, maintain and critique an environment suitable for selected fresh water organisms

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

All content can be classroom based except for learning outcome 3 and 4 which needs to involve a practical element. The depth of the learning outcomes is detailed and explained below. Elements of these learning outcomes will build on foundation knowledge learnt in other units, such as live food, specialist anatomical adaptations, and the mechanisms of fresh water equipment.

The welfare of animals and learners must take precedence over the outcome of the unit and the teacher should supervise practicals at all times and help students choose suitable species for the facilities and equipment available.

Learning outcome:

1. Understand the requirements of fresh water aquatic organisms, including specialist adaptations

Topics

1.1 Fresh water water quality

1.2 Specialist fresh water species adaptations

1.3 Aquatic plants: identification of common aquatic ornamental plant species

This learning outcome focuses on the fresh water environment and the adaptations that plants and organisms use to survive and excel.

Topic 1.1

The learner will understand the effects the below parameters can have on a captive fresh water fish and plants and how to manage them optimally:

- pH
- GH
- KH
- NH_3
- NO_2
- NO_3
- PO_4
- O_2
- CO_2
- Fe (plants only)
- P (plants only)
- N (plants only)

Topic 1.2

The learner will understand the functions and impact of these features have on husbandry; life cycles and reproductive strategies for the given fish:

- 'Lung' of Lungfish,
- Labyrinth organs of Anabantids;
- The electric organs of the Mormyrids/Gymnotiformes,
- Specialised mouths of the Rift Valley Cichlids,

- The gonopodium of livebearers
- The eye of the Anapleb

Topic 1.3

The learner will know the common aquatic ornamental plants, including structure, function and adaptations of aquatic plants. Plants must include:

- *Elodea densa*,
- *Cambomba* sp
- *Hygrophylia polysperma*
- *Anubias barterii*

Learning outcome:

2. Understand the suitability of fish and plant species to be kept in a fresh water environment

Topics

2.1 Characteristics and compatibility of different organisms

2.2 Problems caused by unsuitable environments for fish and plants

This learning outcome focuses on the choice of fish and plants and how it can impact positively and negatively on a display and the organisms themselves.

Topic 2.1

The learner will understand the characteristics and compatibility of different organisms; fish and invertebrate stocking numbers for shoaling, predatory, and solitary species. Compatibility between species of fish, plants and invertebrates. Creating a mixed community tank using species that fill all levels of the display.

Topic 2.2

The learner will understand problems caused by unsuitable environments for fish and plants;

- *Fish*: Overcrowding, incorrect water quality, incorrect photoperiod, incorrect sex ratio, incorrect species compatibility, contamination caused by theming or plants.
- *Plants*: Incorrect mineral balance, incorrect temperature; incorrect illumination, lack of CO₂, incorrect depth, incorrect humidity

Learning outcome:

3. Know the principles of breeding fresh water fishes

Topics

3.1 Broodstock for common species

3.2 Suitable breeding environment for common species

3.3 Suitable fry environment for common species

3.4 Culturing of fresh water live foods

This learning outcome focuses on breeding fresh water fishes and culturing live food.

Topic 3.1

The learner will know a suitable broodstock for common species, eg:

- Siamese fighting fish
- Angelfish
- Zebrafish

- Guppy
- *Labidochromis caeruleus*
- *Neolamprologus multifasciatus*

Identify sex, conditioning of broodstock, spawning strategy for broodstock.

Topic 3.2

The learner will create and manage a husbandry protocol for breeding each of the fish selected in 3.1 including:

- Broodstock selection
- Breeding strategy
- Age of maturation
- Sex ratio
- Water quality parameters
- Tank design including spawning materials

Topic 3.3

The learner will create and manage a suitable fry environment for each of the fish selected in 3.1 including:

- Tank design and filtration
- water quality
- first food
- days of major events such as hatch
- first feed etc.

Topic 3.4

The learner will know the culturing of fresh water live foods eg:

- Daphnia sp.
- Microworms
- Infusoria
- Bloodworms
- Vinegar eels

Describe culture methods and enrichment for the selected live food items.

Learning outcome:

4. Design, construct, maintain and critique an environment suitable for selected fresh water organisms

Topics

4.1 Fresh water equipment mechanics

4.2 Aquarium aquascapes

4.3 Introducing fish to the new environment

4.4 Design, construct and evaluate a given tank and system for given fresh water species

This learning outcome focuses on the actual design, equipment and set up of the tank itself, ensuring that learners can evaluate their work.

Topic 4.1

The learner will know how each piece of equipment works and how it can be used to best advantage. Must include:

- LED, Halide, and fluorescent lighting (spectrums and intensities)
- CO₂ injector – yeast and canister based
- internal and external filters (linking to mechanical, biological and chemical filtration)

- air pumps
- heating systems
- automatic water testing equipment (such as a seneye device)
- R.O unit
- UV sterilization
- carbon filters

Topic 4.2

The learner will understand the key aquascapes (eg; Amazonian, Lake Malawi and *Tanganyika*, Native river biotopes). Understand aquascape planning techniques (eg; rule of thirds, golden ratio, focal point) and how to identify them in an aquascape.

Topic 4.3

The learner will identify potential problems of moving fish from one water body to another – (eg; water quality differences, pathogen transfer). Detail the importance of the acclimation process - using drip line method, and floating bag method.

Topic 4.4

The learner will follow the steps of setting up a basic fresh water tank and centralized system and assess its effectiveness for species selection, welfare, current legislation, health and safety and aesthetic design.

Guidance for delivery

On completion of this unit the learner will have a broad knowledge of fresh water captive environments and be able to manage fish, plants and invertebrates.

This unit is best taught in combination with ‘Aquatics Husbandry and Welfare’ as this unit will give the student the overall knowledge of aquarium systems as well as specialising in fresh water environments.

Learning outcomes 1-3 can be developed completely in the classroom but would benefit from practical elements such as breeding the given fresh water fish, culturing live food and carrying out acclimations.

For topics 3.1, 3.2 and 3.3 learners need to study a minimum of three of the listed fish.

For topic 3.4 learners need to study a minimum of three of the listed culture types.

Learning outcome 4 must allow students to practically develop their own or group tank in accordance with Learning outcome 4 criteria. Visits to public aquaria and retail environments could also help to broaden the student’s horizons when studying aquascaping and tank design.

For topic 4.4 the given species can be chosen by the learners in agreement with the teacher and in accordance with all current legislation.

Learners should be encouraged to use the theory they gain in class in their work placements and part time jobs. These experiences should then be shared with the class as they feel comfortable to encourage peer teaching and ensuring current industry practices are being discussed.

Employer engagement

Employer engagement is essential in order to maximise the value of learners’ experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

Industry links can enable the teacher to access up to equipment for demonstration purposes that they may otherwise not have available to them.

Specialist breeder communities are also ideal points of contact for learning outcome 3, as they will have specialist resources and broodstock that may be able to share specialist breeding tips.

Suggested learning resources

Books

Plankton Culture Manual
Published by: Florida aqua farms, Inc, 2007
ISBN: 978-0-9662960-4-4

Hoff, Frank H; Snell, T W

The 101 Best Aquarium Plants
Published by: Microcosm, 2008
ISBN: 978-1890087197

Sweeney, M E

Mini Encyclopedia of Aquarium Plants
Published by: Interpet
ISBN: 9781842861042

Hiscock, P

What Fish?: A Buyer's Guide to Tropical Fish
Published by: Interpet, 2006
ISBN: 978-1842861196

Various

The Perfect Aquarium: The Complete Guide to Setting Up and Maintaining an Aquarium
Published by: Hamlyn, 2005
ISBN: 978-0600612162

Gay, J

The Biology of Fishes
Published by: Taylor & Francis, 2007
ISBN: 978-0415375627

Bone, Q & Moore, R

The Super Simple Guide to Fresh water Fish Breeding
Published by: t.f.h, 2005
ISBN: 978-0793834570

Muha, L

Journals and magazines

- Practical Fishkeeping
- Amazonas magazine
- Journal of Fish Biology

Websites

Rainforest to Reef fresh water Angelfish Breeding
<http://www.reef2rainforest.com/2014/01/03/angelmania-lee-gordons-angelfish-rearing-videos/>

Bubbles and Betta website	http://bubblesandbettas.blogspot.co.uk/
Advanced Aquarist Fishkeeping Magazine	http://www.advancedaquarist.com/
University of Florida Tropical Aquaculture Laboratory	http://tal.ifas.ufl.edu/publications.htm
Ornamental Trade Association (OTA)	http://www.ornamentalfish.org/

Unit 349

Saltwater captive environments

UAN:	R/507/7250
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for the learners to develop knowledge and skills that will allow them to maintain and evaluate saltwater organisms in a captive environment

As potential or current fish keepers understanding the environment that a marine fish or invertebrate needs in captivity to not only survive but thrive is of key importance. This unit will help the learner to understand and interpret the scientific background to decisions that they make not only when setting up a tank and adding fish, but also through their life span. They will delve into dedicated marine topics such as, fish and invertebrate specialists, the mechanics of marine aquarium equipment, water quality parameters, live food culture and of course the practical management and of an environment itself.

Since many public aquaria and aquatic shops house medium to large marine species a learning outcome surrounding education has been included to encourage the learner to think about responsible signage and conservation messages they can help to spread in combination with displays.

Learners will not only be able to critique their own aquascaping work against other displays, in terms of aesthetics but also in regards to legislation ensuring animal welfare and health and safety of all involved are of up most importance.

Learning outcomes:

In this unit, learners will be able to

1. Understand the requirements of marine aquatic organisms, including specialist adaptations
2. Understand the suitability of fish and invertebrate species to be kept in a saltwater environment
3. Know the principles of live food culture for saltwater fishes
4. Design, maintain and critique an environment suitable for selected saltwater organisms
5. Understand the use and composition of public aquaria and aquatic shop signage and education

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand the requirements of marine aquatic organisms, including specialist adaptations

Topics

1.1 Marine water quality

1.2 Specialist saltwater species adaptations

1.3 Invertebrates: identification of common ornamental invertebrate species and husbandry considerations

This learning outcome focuses on the marine environment and the adaptations that invertebrates and fish use to survive and excel.

Topic 1.1

The learner will understand the effects that marine water quality parameters can have on captive marine fish and invertebrates and how to manage them optimally:

- pH
- Water hardness
- NH_3
- NO_2
- NO_3
- PO_4
- O_2
- CO_2
- Ca
- Mg
- K
- salinity/specific gravity
- micro and macro elements.

Topic 1.2

The learner will understand how to outline form and function of specialist invertebrate anatomical features:

- Radula and exoskeleton.
- Beak, Iridophores/chromatophores, feet suckers of cephalopod,
- Elasmobranch features including Leydig and Epigonal organ, Spiracles, Intestinal valve, Dermodonticles, Ampullae of Lorenzini.
- lure of frogfish
- hydrostatic skeleton of starfish
- general anemone and coral polyp anatomy including zooxanthae and nematocysts

Topic 1.3

The learner will know common invertebrates including gross structure, defence and feeding

functions and how these impact on husbandry. To include:

- Peacock Mantis shrimp (*Odontotodactylus scyllarus*)
- Blue legged hermit crab (*Clibanarius tricolor*)
- Feather duster worm (*Sabellastarte* sp)
- Bubble Coral (*Plerogyra sinuosa*)
- Ricordea (*Ricordea florida*)
- Tridacna clams (*Tridacna* sp.)
- Turbo snail (*Turbo* Spp.)
- Rose anemone (*Entacmaea quadricolor*)

Learning outcome:

2. Understand the suitability of fish and invertebrate species to be kept in a saltwater environment

Topics

2.1 Characteristics and compatibility of different organisms

2.2 Problems caused by unsuitable environments for fish and invertebrates

This learning outcome focuses on the choice of fish and invertebrates and how it can impact positively and negatively on a display and the organisms themselves.

Topic 2.1

The learner will know marine fish and invertebrate stocking numbers for shoaling, predatory, and solitary species, compatibility between species, create a mixed community tank using species that fill all levels of the display.

Topic 2.2

The learner will understand problems caused by unsuitable marine environments; *Fish*: Overcrowding, incorrect water quality, incorrect photoperiod, incorrect sex ratio, incorrect species compatibility.

Invertebrates: incorrect mineral balance, incorrect temperature, pH, Alkalinity; incorrect illumination, incorrect depth and flow

Learning outcome:

3. Know the principles of live food culture for saltwater fishes

Topics

3.1 Marine and brackish live foods

3.2 Benefits and drawbacks of feeding live food

3.3 Culture, maintain and harvest a marine algae species, Rotifer sp., Artemia sp and a copepod sp.

This learning outcome focuses on a selection of live food organisms and how to culture them.

Topic 3.1

The learner will know (and where possible sex) live food either via naked eye and/or under a microscope. This must include:

- Marine algae species - *Isochysis galbana* and *Nannochloropsis oculata*
- A marine/brackish Rotifer species - *Brachionus plicatilis* "L" strain

- *Artemia salina* at all life stages
- A calanoid marine rotifer species such as *Arctodiaptomus salinus*

Topic 3.2

The learner will know the feeding of live food; nutritional composition, feed stimulus, gut loading, size and species variation, difficulty of culturing organisms, space utilisation, water pollution, pathogen transfer and cost.

Topic 3.3

The learner will design set ups for non-continuous culturing and harvesting of:

Nannochloropsis oculata

Brachionus plicatilis "L" strain

Artemia salina

Arctodiaptomus salinus

Learning outcome:

4. Design, maintain and critique an environment suitable for selected saltwater organisms

Topics

4.1 Marine equipment mechanics

4.2 Set-up of basic marine tank

This learning outcome focuses on the actual design, equipment and set up of the tank itself, ensuring that learners can evaluate their work.

Topic 4.1

The learner will know a range of aquarium equipment, its function and how it can be used to best advantage. To include:

- lighting - LED, Halide, and fluorescent lighting (spectrums and intensities)
- filtration - internal and external filters (mechanical, biological and chemical filtration), sumps and refugiums, UV sterilisation, Calcium reactors, Phosphate removers, Protein skimmers, Fluidised sand beds, Trickle towers, Ozonisers link to redox monitors and controllers
- heating/chilling systems
- R.O unit
- artificial/natural salt mixes
- automatic top up systems
- wave makers

Topic 4.2

The learner will be able to undertake the set-up of a basic marine tank and centralized aquatic shop marine system; assess its hypothetical effectiveness for species selection, welfare, health and safety and aesthetic design.

Learning outcome:

5. Understand the use and construct of public aquaria and aquatic shops education

Topics

5.1 The importance of signs and education in aquatic shops and public aquaria

5.2 Key points for a customer/visitor on an aquatics shop sign and public aquaria exhibit signs

5.3 Innovative/inventive education strategy to promote sustainability in elasmobranchs in public aquaria

This learning outcome focuses on the signage and education linking to conservation and responsible ownership in both public aquaria and also an aquatic shop setting.

Topic 5.1

The learner will consider learning styles and abilities and how these impact on the public's views and actions; why signs are important in shops and aquaria; dissemination of visitor information; species selection (responsible buying and selling); customer retention; legislation (eg Equality Act); Institution/shop reputation, role of zoo's and Zoo Licensing Act, for aquatic shops and OATA code of conduct.

Topic 5.2

The learner will Identify key elements of signage for public aquaria (eg Species common and scientific name, image of the animal, habitat and range, conservation status (Red List and CITES)); Identify key elements of signage for aquatic shops (eg Species common and scientific name, image of the animal, compatibility of the animal (behaviour/feeding strategy), adult size, water quality preferences, cost).

Topic 5.3

The learner will be able to identify the main problems elasmobranchs face in the wild (eg fining, habitat loss and bycatch), use innovative/inventive education strategy to promote elasmobranch sustainability to formal and non-formal groups in public aquaria.

Guidance for delivery

On completion of this unit the learner will have a broad knowledge of both fish and invertebrates in a marine captive environments as well produce live food and formulate educational ideas for displays.

This unit is best taught in combination with 'Aquatics Husbandry and Welfare' as this unit will give the student the overall knowledge of aquarium systems as well as specialising in marine environments.

Learning outcomes 1-2 can be developed completely in the classroom but would benefit from practical elements such as water testing and seeing animals use adaptations in different captive environments.

Learning outcome 3 can be taught using photographs and videos, however it would be advantageous to students to be able to set up the given species cultures as this will allow for a greater understanding of the 'quirks' of live food culture. This can be done in groups.

Learning outcome 4 does not need to involve the learner setting up a marine tank from the outset but they must have access to a display that allows them to maintain it. Visits to marine specialists will help learners to formulate designs for their aquascaping.

Learning outcome 5 should include visits to aquatic shops and public aquaria to experience the range of signage and educational activities on offer. This could encourage greater class debate about which method is best to inform which group of visitors/buyers. If trips cannot be planned the teacher must have a portfolio of signage and educational examples to show the students to ensure they are exposed to range of designs to formulate their own ideas. Again for Learning outcome 5 if local aquatic shops or marine conservation groups have open/fun days these could be useful for students to get involved with to help them to practically apply the theory and diversity behind

educating customers/visitors. This learning outcome requires the use of The Education Aims in Zoos Expert Committee Handbook, Nov 2012 p. 42 (3.1) to structure discussions on how technology, interactive exhibits and guided tours can be used to meet these aims with groups of formal (School/college/special needs groups) and non-formal (visitors) participants.

Learners should be encouraged to use the theory they gain in class in their work placements and part time jobs. These experiences should then be shared with the class as they feel comfortable to encourage peer teaching and ensuring current industry practices are being discussed.

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

Industry links can enable the teacher to access up to equipment for demonstration purposes that they may otherwise not have available to them.

Talks from online live food companies may help the students to envisage a business they could set up on a small scale and motivate them.

Large public aquaria will have education staff so these would be ideal people to link with for learning outcome 5 either just the teacher to access resources or with the students for a talk looking at educational strategy.

Suggested learning resources

Books

- | | |
|--|---------------------------|
| Plankton Culture Manual
Published by: Florida aqua farms, Inc (2007)
ISBN: 978-0-9662960-4-4 | Hoff, Frank H; Snell, T W |
| Advanced Marine Aquarium Techniques (2006)
Published by: t.f.h
ISBN: 0-7938-0565-1 | Hemdal, J F |
| The 101 Best Marine Invertebrates (2008)
Published by: t.f.h (Microcosm)
ISBN: 987-1-890087-23-4 | Michael, S W |
| Marine Fishes: 500+ Essential-to-know Aquarium Species (PocketExpert Guide) (2001)
Published by: t.f.h
ISBN: 9781890087388 | Micheal, S W |
| Teaching Today a Practical Guide (2014)
Published by: Nelson Thornes Ltd
ISBN: 9781408523148 | Petty, G |
| The Reef Aquarium, Volume Three: Science, Art, and Technology (2005)
Published by: Ricordea
ISBN: 1883693144 | Delbeek, C J; Sprung, J |

Aquarium Corals: Selection, Husbandry and Natural History (2001) Borneman, E
Published by: t.f.h
ISBN: 1890087475

Aquarium Sharks and Rays (2001) Micheal, S W
Published by: t.f.h (Microcosm)
ISBN: 1-890087-57-2

The Biology of Fishes (2007) Bone, Q; Moore, R
Published by Taylor & Francis
ISBN: 978-0415375627

Journals and magazines

- Practical fishkeeping
- Coral
- Journal of Fish Biology

Websites

Reefquest Biology of sharks and rays	http://www.elasmo-research.org/
London Zoo Education Programme	http://www.zsl.org/zsl-london-zoo/schools/education-sessions
Advanced Aquarist Fishkeeping Magazine	http://www.advancedaquarist.com/
University of Florida Tropical Aquaculture Laboratory	http://tal.ifas.ufl.edu/publications.htm
Reefkeeping online magazine	http://www.reefkeeping.com/joomla/index.php/reefkeeping-blog
Ornamental Trade Association (OATA)	http://www.ornamentalfish.org/
Zoo expert committee handbook (2012)	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69611/pb13815-zoos-expert-committee-handbook1.pdf

UAN:	Y/507/7251
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to the skills and knowledge associated with warmwater and marine aquaculture and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

Warmwater and marine aquaculture is an essential part of food production worldwide and is a growing sector of fish production. This unit introduces the important global and domestic species and a range of issues that now affect them, such as sustainability, marketing and the risks associated with introducing non-native species.

Learners will then move on to look at the current husbandry and practices used to farm warmwater fish and marine fish which will include aquaculture units, equipment, biological requirements of a range of species, nutrition, biosecurity and disease. This ultimately leads onto developing practical skills in the key areas of production, harvest and use of live food.

Learning outcomes

In this unit, learners will be able to

1. Understand main components of the warmwater and marine aquaculture industries
2. Know the principles and practices used to farm warmwater fresh water fish
3. Know the principles used to farm marine fish
4. Produce live food for warmwater and marine aquaculture

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Understand main components of warmwater and marine aquaculture industries

Topics

- 1.1 The main global warmwater and marine aquaculture industries
- 1.2 Production capabilities of the main global warmwater and marine aquaculture industries to that of capture fisheries and other major aquaculture industries

Topic 1.1

Learners will understand the main areas of global warmwater and marine aquaculture; development of warmwater and marine aquaculture industries globally, major species farmed and the factors which make them suitable for farming, issues of sustainable development both economically and environmentally, development of and limitations to the growth warmwater and marine aquaculture in the UK, potential risks of farming non-native fish species, (eg market development, escapees, diseases).

Topic 1.2

Learners will understand the production levels of the main global warmwater and marine aquaculture industries compared to that of capture fisheries and other major aquaculture industries; comparison of production from warmwater and marine aquaculture with wild capture fisheries, existing markets for farmed warmwater and marine species and potential markets and competitors for these species.

Learning outcome:

2. Know the principles and practices used to farm warmwater fresh water fish

Topics

- 2.1 The husbandry requirements for an on-growing farm for warmwater fresh water species
- 2.2 Natural and artificial techniques used in the breeding of a selected warmwater fresh water species

Topic 2.1

Learners will know the following husbandry requirements used to farm warmwater fish; water and site requirements of farms rearing warmwater fresh water species,(eg recirculated systems, preparation and use of ponds), aquaculture requirements of main species, eg carp, tilapia and catfish, importance of natural diets for these species, range of husbandry options available to intensify production, methods used to harvest these species, main diseases and biosecurity issues associated with warmwater fish production.

Topic 2.2

Learners will know natural and artificial techniques used in the breeding of a selected warmwater fresh water species including; methods used to recognise gender in each species, diets for broodstock, methods of natural and artificial spawning, incubating eggs and fry rearing; first feeding indicators of fry and subsequent feeding schemes.

Learning outcome:

3. Know the principles used to farm marine fish

Topics

3.1 The methods used to rear commercially cultured marine fish

3.2 The biological and nutritional requirements of farmed marine fish

Topic 3.1

Learners will know the methods used to farm marine fish (excluding salmonids); farming cycles and production problems, methods used to spawn broodstock, incubate eggs, rear larvae and fry, methods used to on-grow and harvest farmed marine fish (onshore and offshore), main disease problems and biosecurity associated with marine fish production.

Topic 3.2

Learners will know the biological requirements of farmed marine fish; water quality, larvae, fry and broodstock nutritional requirements, methods of controlling contamination; environmental and sustainability issues.

Learning outcome:

4. Produce live food for warmwater and marine aquaculture

Topics

4.1 Live food rearing

4.2 Selection of live food rearing techniques

Topic 4.1

The learners will rear live food used in commercial warmwater fresh water aquaculture or in commercial marine fish aquaculture; methods used to rear and produce live foods eg rotifers, artemia, copepods, methods of nutritional manipulation (enrichment) of live foods, issues associated with live food production methods eg contamination, nutritional deficiency, mesocosm strategy pond preparation and live food harvesting, disinfection requirements.

Topic 4.2

The learners will know the reasons for selecting a live food technique; requirements of warmwater and marine fish for live foods, sustainability issues and biosecurity issues associated with using live foods.

Guidance for delivery

This unit will be delivered through mixture of classroom learning and practical aquaculture activities. Learners must have the opportunity to undertake the production of live foods and produce evidence of their competence. Industry speakers are vital to complete the learning process and enrich the experience. For example a fish farm manager or an aquarium curator responsible for live food production could talk about their work, the situations they face and the methods they use. The learners must appreciate the importance of sound environmental management, bio security and the need to manage the resource using good practice.

Health and safety issues relating to working around water must be stressed and reinforced regularly, and risk assessments must be undertaken before any practical activities. Laboratory practicals involving live foods should involve evaluation of health and safety issues, for example control of substances hazardous to health (COSHH) assessments associated with the activity.

Adequate personal protective equipment (PPE) must be provided and used for laboratory and practical sessions.

Learning outcome 1 covers the development and current production levels of warmwater and marine aquaculture industries globally and in the UK and a comparison with wild capture fisheries. The available markets must be included. This is likely to be delivered using formal lectures, discussion, site visits and independent learner research. Use of various websites, for example the Food and Agriculture Organisation (FAO) website, can give current information on the industries and provide details on the production of a range of species.

Learning outcome 2 covers the principal farming and husbandry techniques associated with warmwater fish. This area is likely to be delivered using formal lecture, discussion, site visits and independent learner research. Site visits are likely to play an important role in the delivery of this outcome to ensure learners can contextualise the industry

Learning outcome 3 covers the principles farming and husbandry techniques associated with marine fish. This area is likely to be delivered using formal lecture, discussion, site visits and independent learner research. Site visits are likely to play an important role in the delivery of this outcome, however if this is not possible then learners must utilize internet resources in order to visualise common practice.

Learning outcome 4 covers the diverse range of live foods available for aquaculture. This area is likely to be covered initially, through formal lectures, discussion and independent learner research. Laboratory or hatchery-based supervised practical sessions will then be used to cover the practical elements of live food production and manipulation. Access to live food culture is essential. Site visits and visiting speakers will develop learners' knowledge further.

Suggested learning resources

Books

Cage Aquaculture, 3rd Edition Published by: Fishing News Books, 2004 ISBN: 1405108428	Beveridge, M
Water Quality Management for Pond Fish Culture Published by: Elsevier, 1982 ISBN: 0444420541	Boyd, C
Broodstock Management and Egg and Larval Quality Published by: Blackwell Science, 1994	Bromage, N & Roberts, R
Rural Aquaculture (CABI Publishing, 2002) ISBN 0851995659	Edwards, P; Little D & Demaine, H
Dynamics of Pond Aquaculture Published by: Lewis Publishers US, 1997 ISBN 1566702747	Egna, H & Boyd, C
Carp and Pond Fish Culture, 2nd Edition Published by: Blackwell Science, 2002	Horvath, L; Tamas, G & Seagrave, C

Culture of Coldwater Marine Fish
Published by: Blackwell Science, 2004

Moksness, E; Kjorsvik, E & Olsen, Y

Aquaculture: Principles and Practices
Published by: Blackwell Publishing, 2005
ISBN 1405105321

Pillay, T & Kutty, M

Intensive Fish Farming
Published by Blackwell Science, 1992
ISBN 063203467X

Shepherd, C & Bromage, N

Responsible Marine Aquaculture
(CABI Publishing, 2002)
ISBN 0851996043

Stickney, R & McVey

Live Feeds in Marine Aquaculture
(Blackwell Publishers, 2003)
ISBN 0632054956

Tottrup, J & McEvoy, L

Journals and Magazines

- Aquaculture
- Aquaculture Europe
- Aquaculture International
- Fish Farming International
- Journal of World Aquaculture Society
- Progressive Fish Culturist

Websites

Arizona Aquaculture

www.ag.arizona.edu/azaqua

Institute of Aquaculture

www.aquaculture.stir.ac.uk

Aquatic Network

www.aquanet.com

Aquatic Network Information Centre

www.aquanic.org

Department for Environment, Food and Rural Affairs

www.defra.gov.uk

European Aquaculture Society

www.easonline.org

Marine Finfish Aquaculture Network

www.enaca.org

Food and Agriculture Organisation

www.fao.org/fishery/en

The Federation of European Aquaculture Producers

www.feap.info/feap

Pearling and Aquaculture

www.fish.wa.gov.au/aqua

Reed Mariculture site information on instant algae

www.reed-mariculture.com

The World Aquaculture Society

www.was.org

Unit 351

Archaeology and landscape history

UAN:	D/507/7252
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to archaeology and landscape history and how this knowledge can be applied in practice. It is designed for learners in a centre-based setting looking to progress into the sector or onto further/higher education.

The learner will investigate how the British countryside has been used from pre-history to present day. They will learn how to 'read' the landscape and consider how its uses have resulted in present day habitats and landscapes. They will learn the integration of archaeological heritage conservation into current countryside management.

Learning outcomes

In this unit, learners will be able to

1. Know the characteristics of prehistoric earthworks and landscape features
2. Know the changing patterns of land use between the Iron Age and the parliamentary enclosures
3. Understand the transformations in British landscape from the industrial revolution enclosure to the present day
4. Plan site management of archaeological features

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Know the characteristics of prehistoric earthworks and landscape features

Topics

- 1.1 Prehistoric earthworks and landscape features
- 1.2 Uses and characteristics of monuments

Topic 1.1

Prehistoric earthworks and landscape features and their uses.

Learners are expected to know two from each of the following:

- Neolithic eg. Causewayed enclosures, mortuary enclosures, long barrows, cursuses, henges, avenues, stone alignments, timber and stone circles, portal tombs, passage graves, long cairns or bank barrows, court cairns, recumbent stone circles, villages, ritual landscapes, flint and stone extraction, sarsen stones.
- Bronze Age eg. Bowl, bell, disc and pond barrows, linear earthworks, field boundaries, reaves, coaxial field systems, clearance cairns, burnt mounds, settlement patterns, agricultural crops and livestock, modified landscapes, heathlands
- Iron Age eg. Hillforts, raths and rounds, duns, crannogs, brochs, courtyard houses, souterrains, farmsteads, corn pits, banjo enclosures.

Topic 1.2

The learner will know the possible uses of the above eg:

- construction methods
- orientation and the characteristics eg religious, ceremonial, habitation.

Learning outcome:

2. Know the changing patterns of land use between the Iron Age and the beginning of parliamentary enclosures

Topics

- 2.1 Changes in patterns of land use

Topic 2.1

The learner will know the patterns of land use between the Iron Age and the parliamentary enclosure:

- Farming and husbandry eg. Roman introductions, influences of the Anglo-Saxons and Vikings cultures, the manorial system, the open field system, commons and wastes, field boundaries, crops and livestock, fish ponds, rabbit warrens, deer parks, industrial crops, strip lynchets. Monastic buildings and estates, parish churches, tythes and glebes
- Highways eg. Roman roads, holloways, droves, lanes, tracks
- Forests and woodland eg. Coppicing, assarting, wood pasture, pannage
- Rural industries eg. Extractive industries, clay, stone, salt, coal. Charcoal, lime burning, hemp and flax, wool, wind and water mills, food processing and other regionally important industries

- Military and defence eg. Motte and bailey, castles, fortified manor houses, moats
- Rural settlement patterns eg. Early farmsteads, Roman towns and forts, villas, villages, Black Death, deserted medieval settlements, market towns, dissolution of the monasteries
- Place names.

Learning outcome:

3. Understand the transformations in British landscape from industrial revolution to the present day

Topics

3.1 Land use and landscape patterns since the industrial revolution

3.2 Evidence of changing patterns of land use

Topic 3.1

Learners will understand the patterns of land use from industrial revolution to the present day:

- Farming eg. effects of improved livestock breeding, effects of ownership of large estates, market gardening, high farming, model farming, changes in the dairy industry, fruit and vegetable production
- Changes eg. Open and Close villages, decline of rural and cottage industries, social unrest, growth of cities, suburbs, industrial centres, changes in the extractive industries, highland clearances, moving from rural areas to towns
- Transport eg. Turnpikes, canals, railways, roads, motorways, ports and airports
- Increased leisure time
- Changes post 1945 eg. Field size and hedge removal, mechanisation, land drainage, mono-culture and new crops, intensive livestock rearing, grass silage, forestry, agriscience, heathland destruction, National Parks, tourism and recreation, military installations, milk quotas, orchard removal, poly tunnels, EU subsidies, heathland regeneration, effect of world trade on home market.

Topic 3.2

The learner will know the evidence of changing patterns of land use:

- Influences of land use eg Geology, topography, drainage pattern, land cover, historical land use, settlement, enclosure, perceptual and aesthetic values
- Map evidence eg: Geology (British Geological Survey Data (1:50,000 or 1:63,360)); Topography/Landform (Ordnance Survey Data (1:50,000 or 1: 25,000)); Soils (Soil survey Data (1:250,000)); Land cover/Vegetation (Phase 1 Habitat surveys, Natural Area Profiles (England), Natural Heritage Futures (Scotland)); Trees /Woodland (OS Data, Aerial photography, Forestry Commission woodland inventory, Historical maps); Land Use (Enclosure maps, Land cover map 2000, MAFF/ DEFRA Agricultural Land Classification, Aerial photographs, OS maps, Tythe apportionment maps); Settlement Patterns (Historical maps and data, Rural Settlement Atlas (England), OS maps, Census data).

Learning outcome:

4. Plan site management of archaeological features

Topics

4.1 Processes and frameworks of archaeological investigation and protection

4.2 Threats to archaeological features

4.3 Management planning techniques for archaeological site

Topic 4.1

The learner will know the processes and frameworks of archaeological investigation and protection:

- Desk top study eg. Maps and documents, National Monuments Records, Sites and Monuments Records/ Historic Environment Records, RCHME volumes, Portable Antiquities Scheme, English Heritage's "gateway"
- Non-invasive investigative techniques eg. Contour surveying, aerial photography and LIDAR, crop and soil marks, field walking, geophysical methods – resistivity, magnetometry, magnetic susceptibility, ground penetrating radar, infra red photography
- Physical analysis eg. Carbon dating, pollen analysis, dendrochronology, plant and animal remains
- Legal protection: eg. Ancient Monuments and Archaeological Areas Act 1979, Natural Heritage Act 1983, Agriculture Act 1986, Electricity Act 1989, Water Resources Act 1991, Forestry Planning Regs. 1991, Local Authorities, Planning Policy Statement 5, Scheduling and English Heritage, Treasure Act 1996/2006.

Topic 4.2

The learner will understand the different threats to archaeological features.

Topic 4.3

The learner will use management planning techniques; Setting objectives and parameters, timescales, consulting stakeholders, investigating sources of funding.

Threats to an archaeological site eg. Ploughing, burrowing animals, trees and scrub, erosion, metal detecting, damage caused by visitors, health and safety on site. Conserving both natural and archaeological features on a site, development application.

Guidance for delivery

This unit is designed to provide the learner with an understanding of British archaeology and landscape history. Most locations will have evidence of former uses and it is the role of the countryside manager to ensure that they are identified, recorded and protected for future generations. The unit will cover an overview of how the countryside has changed since the Neolithic period to the present day discussing the factors that have influenced those changes.

Delivery is likely to be a mixture of classroom based learning and local site visits. Additional site visits with reconstructions of buildings or lifestyles will help to reinforce underpinning knowledge. If it can be arranged, visits to local archaeological digs can be of interest, but tutors should be aware of the archaeological issues surrounding these site visits. Learners are not expected to participate in excavations, but would clearly gain from the experience if the opportunity was available, for example through a suitable work placement. The integration of site safety, environmental awareness and good practice into all site-based activities is expected.

Where practical activities are used health and safety issues relating to working in an outdoor environment must be stressed and regularly reinforced, and risk assessments must be undertaken and recorded prior to practical activities. Adequate Personal Protective Equipment (PPE) must be provided. It is important that all learners are familiar with the tools, equipment, protocols and methods to be used in order to collect accurate data safely.

In Learning outcome 1 the learner will gain an overview of prehistoric earthworks and landscape features. Classroom based study should be carried out to gain an understanding of different types of features and how these relate to the landscape. Examples should be chosen from around the

country which best illustrate the prominent characteristics of that type. The evolution of different types of monuments should be discussed and an understanding of how features relate to others in the area. Possible uses should be discussed with an understanding of the difficulty of interpreting lifestyles and values of prehistoric civilisations.

Where possible visits to local sites should be undertaken to identify and compare monuments and landscape features with maps and documents from a desktop study. The desktop study research prior to the visit will link with Learning outcomes 3 and 4 in this unit.

Learning outcome 2 requires the learner to understand changing patterns of land use between the Iron Age and the parliamentary enclosures. The tutor should choose an area which demonstrates as many examples of land use changes as possible and these should be introduced to the learners via classroom study and sites visits as in outcome 1.

Learning outcome 3 requires the learner to explain changes in patterns of land use for a selected area from the industrial revolution to the present day. For an area consider a combination of influences and compare and contrast with a different distinct landscape types. This could be the same area as in Outcome 2 or a different area which provides suitable examples of land use changes. Site visits and class room study are recommended to introduce these features to the learner.

The class room study could include a landscape character assessment of a distinct area involving an investigation into the different landscape and map evidence available. Through this study the learners will develop an understanding of the contributions different influences have had on the landscape and its use, different landscape types and the availability and range of map evidence. This outcome links to all other outcomes in the unit.

Learning outcome 4 requires the learner to prepare a plan for the future management of an archaeological site. They will understand the scope of the legislation that applies to protect the archaeological features of a site . They will understand the processes and frameworks of archaeological investigation including desktop study, non-invasive investigative techniques and physical analysis. Learners will consider a range of possible threats to archaeological sites and prepare a management plan to protect a selected archaeological site.

All outcomes link with each other and so where possible one suitable site could be used for all case studies. Learners should be encouraged to visit as many sites as possible and take photographs to keep as evidence. These case studies could form the basis of the assignment.

Suggested learning resources

Books

Interpreting the Landscape: Landscape, Archaeology and Local History Aston, M
Published by: Taylor and Francis, 2001
ISBN: 0415151406

Interpreting the Landscape form the Air Aston, M
Published by: The History Press, 2003
ISBN: 0752428462

English Heritage Book of Prehistoric Settlements Bewley, R
Published by: Anova Books, 1994
ISBN: 071346853X

Unravelling the Landscape Published by: Tempus 1999 ISBN: 07524 1447 X	Bowden, M
English Heritage Book of Iron Age Britain Published by: Anova Books, 1994 ISBN: 0713472995	Cunliffe, B
The Landscape of Roman Britain Published by: Sutton Publishing, 1998 ISBN: 0750918748	Dark, K & Dark, P
A Landscape Revealed 10,000 Years on a Chalkland Farm Published by: Tempus 2000 ISBN: 0 7524 1490 9	Green, M
Archaeology An Introduction Published by: Routledge, 1998 ISBN: 0 415 16607 1	Greene, K
Archaeological Resource Management in the UK Published by: Sutton Publishing, 2001 ISBN: 0 7509 1607 9	Hunter, J & Ralston, I
The New Reading the Landscape: Fieldwork in Landscape History Published by: University of Exeter Press, 2006 ISBN: 0859895807	Muir, R
Britain AD: A Quest for Arthur, England and the Anglo-Saxons Published by: HarperCollins Publishers, 2004 ISBN: 0007181868	Pryor, F
The Illustrated History of the Countryside Published by: Orion Publishing Co, 2003 ISBN: 0297843354	Rackham, O
Ancient Woodland Published by: Castlepoint Press, 2003 ISBN 0 897604 27 0	Rackham, O
Archaeology Theories Methods and Practice Published by: Thames and Hudson, 2000 ISBN: 0 500 281475	Renfrew, C & Bahn, P
Later Anglo-Saxon England Published by: Tempus, 2002 ISBN: 07524 2513 7	Reynolds, A
Viking Age England Published by: Tempus, 2000 ISBN: 07524 1489 5	Richards, JD

Archaeology is Rubbish: A Beginner's Guide Published by: Pan Macmillan, 2003 ISBN: 0752215302	Robinson, T & Aston, M
Rural England – An Illustrated History of the Landscape Published by: OUP, 2000	Thirsk, J Ed.
Landscape Character Assessment Guidance for England and Scotland Now available via Natural England website	Swanwick C
British Barrows A Matter of Life and Death Published by: Tempus, 2002 ISBN: 07524 1468 2	Woodward, A
RCHME volumes for the respective study area	
The Buildings of England County editions	Pevsner, N & Newman, J
Monographs for specific monuments or areas	

Journals and magazines

- British Archaeology
- Current Archaeology
- Landscapes

Websites

Archaeology Data Service	www.ads.ahds.ac.uk
BBC Archaeology	www.bbc.co.uk/history/archaeology
Council for British Archaeology	www.britarch.ac.uk/info/uklinks.html
Historic environment service of the Welsh Assembly Government	www.cadw.wales.gov.uk
English Heritage	www.english-heritage.org.uk
Historic Scotland	www.historic-scotland.gov.uk
Regia Anglorum	www.regia.org/listings.htm
Roman Britain	www.roman-britain.org
UKAgriculture	www.ukagriculture.com/countryside/countryside_history.cfm

UAN:	H/507/7253
Level:	3
GLH:	60

What is this unit about?

This unit aims to introduce learners to captive deer herd management skills and understanding and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

This unit provides the knowledge and skills required to manage park deer, select animals for culling, carry out a cull and deal with carcasses in an appropriate manner.

Learning outcomes

In this unit, learners will be able to

1. Know the biology, ecology and behaviour of deer in a captive environment
2. Understand captive deer nutritional requirements
3. Handle firearms safely and accurately
4. Process deer carcasses hygienically and keep records

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Know the biology, ecology and behaviour of deer in a captive environment

Topics

1.1 Annual life cycle of Red, Sika and Fallow deer.

1.2 Physiology and ecology of the deer species found in deer parks in the UK

1.3 Habitat preferences of the park deer species

Topic 1.1

eg Annual life cycle Rut, birth, antler casting and growth, seasonal and daily movement, territories, herding activity.

Topic 1.2

eg Physiology & ecology CNS, Rumination, lymphatic systems, major organs, monogamy, polygamy, delayed implantation, rutting behaviour, diseases & parasites.

Topic 1.3

eg Habitat preferences Broadleaved woodland, coniferous forest, heath, parkland pasture types.

Learning outcome:

2. Understand captive deer nutritional requirements

Topics

2.1 Deer physiology and specific nutritional requirements

2.2 Changes of deer nutritional requirements throughout the production cycle

2.3 Meeting the nutritional requirements of deer in a captive environment

Topic 2.1

The learner will understand the physiology of ruminant livestock and their nutritional requirements along with specific ailments associated with dietary imbalances.

Topic 2.2

The learners will understand the changing requirements for nutrients throughout the annual life cycle of each species / sex of deer. Specifically covering antler growth and rutting in stags and pregnancy and lactation in hinds.

Topic 2.3

Learners will understand how to manage parkland pasture to provide nutritional requirements of deer and some of the limitations to fertilizer and herbicide use in historic parklands. The learner will know supplementary feeding techniques and suitable winter feed stuffs that will provide appropriate nutrition including all micro-nutrients required.

Learning outcome:

3. Handle firearms safely and accurately

Topics

3.1 Handling firearms safely

3.2 Handling firearms accurately

3.3 Firearms shooting positions and distances

Topic 3.1

The learner will handle firearms safely:

- loading/unloading procedure
- muzzle awareness
- use of safety catch
- safe carrying position
- safe back stops
- transportation and storage of firearm/s.

Topic 3.2

The learner will handle firearms accurately:

- correct shot placement
- importance of ideal shots (relating to specific circumstances).

Topic 3.3

The learner will select firearms using appropriate shooting positions and distances (must be a deer legal calibre; sound moderators):

- positions:
 - prone
 - sitting
 - kneeling
 - standing
 - from a vehicle and highseat
- distances:
 - short
 - medium
 - long range.

Learning outcome:

4. Handle deer carcasses hygienically and keep records

Topics

4.1 Hygiene inspection on deer carcass

4.2 Preparation of deer carcass for food chain

4.3 Record keeping of deer culled

Topic 4.1

The learner will carry out hygiene inspection on deer carcass:

- external and internal inspection
- organs and lymph nodes
- notifiable diseases including bovine tuberculosis and foot and mouth as well as parasites eg lung worm, liver fluke, ticks, keds, lice and warble fly
- storage methods.

Topic 4.2

The learner will prepare deer carcass for food chain:

- Gralloch
- remove head and feet and process carcass to requirement.

Topic 4.3

The learner will keep records of deer culled:

- Cull records
- meat hygiene inspection
- larder weights.

Guidance for delivery

For Outcome 1, learners must know the biology, ecology and associated behaviour of the main 3 species of deer (Red, Fallow and Sika) found in UK deer parks and should be able to relate this knowledge to the practical management of these species within a captive environment. The learners would also benefit from researching the biology, ecology and associated behaviour of an exotic species of deer found in deer parks and/or domestic livestock so that they can compare and contrast how each species should be managed and discuss what compromises would have to be made within a multi species park and how this could be managed.

Outcome 2 requires the learners to understand the nutritional requirements of park deer species and how these can be provided for both from the grazing available within the park and through supplementary feeding especially through the winter months. Learners should also be aware of the restrictions affecting the management of many historic parks in terms of pasture management and the conservation importance of many parkland habitats.

Outcome 3 requires learners to demonstrate the safe handling and humane use of selected firearms using appropriate shooting positions and distances to meet given objectives. This will require practical assessment, during which learners demonstrate that they can adopt prone, sitting/kneeling and standing shooting positions and achieve a suitable level of accuracy in each. Assessment taking place on a rifle range should be carried out under the protocol developed for the DMQ Deer Stalking Certificate Level 1 shooting test.

For Outcome 4, learners must carry out carcass hygiene inspection according to current legislation and codes of practice, keeping relevant records to meet given objectives. Outcome 4 could be assessed by a combination of practical and other forms of assessment. Inspection could be assessed by practical demonstration and must include both external and internal inspection. Learners are expected to identify all of the major organs and lymph nodes and to be aware of their normal appearance. Learners should be aware of notifiable diseases including Bovine Tuberculosis and Foot & Mouth Disease as well as parasites such as lung worm, liver fluke, ticks, keds, lice and warble fly. Learners must show that they know the correct procedure for isolating suspect parts or carcasses and informing the appropriate organisations. They must also provide evidence of appropriate records for cull records and meat hygiene regulations.

Each learner will prepare a deer caucus to enter the food chain.

Suggested learning resources

Books

Deer of Britain and Ireland: their origins and distribution.
Published by: Swan Hill Press, 2000.
ISBN 978-1840370911

Carne, P

How many deer? - A field guide to estimating deer population size. Published by: Forestry Commission, 1999 ISBN 978-0855384050	Mayle, B.A
Deer: law and liabilities. 2nd ed. Published by: Quiller Publishing, 2008 ISBN 978-1846890475	Parkes, C & Thornley, J
Deer stalking and management Published by: The Crowood Press Ltd. 2008. ISBN 978-1847970695	Potter, L.
Deer Management in the UK. Published by: Quiller Publishing Ltd, 2011 ISBN 978-1846891083	Griffith, D
Fallow Deer: Their History, Distribution and Biology Published by: Cochy-Bonddu Books, 1997	Chapman, D.I. & Chapman, N.G
Red Deer: Behaviour and Ecology of Two Sexes Published by: Edinburgh University Press and Chicago University Press, 1982	Clutton-Brock, T.H; Guinness, F.E. & Albon, S.D
The Deer Manager's Companion: A Guide to Deer Management in the Wild and in Parks Published by: Swan Hill Press, 2004	Putman R.J

Website

The Deer Initiative	www.thedeerinitiative.co.uk
The British Deer Society	www.bds.org.uk
Forestry Commission	www.forestry.gov.uk
Scottish Natural Heritage	www.snh.gov.uk
The Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Welsh Assembly Government	www.wales.gov.uk
Scottish Executive Environment and Rural Affairs Department	www.scotland.gov.uk
Department of Agriculture and Rural Affairs (Northern Ireland)	www.dardni.gov.uk

Unit 353

Undertake a specialist project in the land based sector

UAN:	D/507/4643
Level:	3
GLH:	60

What is this unit about?

The purpose of this unit is for learners to gain an understanding of the principles of undertaking a specialist project and how this can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Learners will develop project knowledge and skills by studying a chosen topic area through a project. They will explore topic areas that interest them and select one topic for their project. They will plan and carry out their specialist project working to meet deadlines and monitoring performance. Learners will prepare an evaluative report looking at how the project performed, if the schedule plan met the project aims and objectives and how improvements could be made in the future.

Learning outcomes

In this unit, learners will be able to

1. Develop proposals for specialist projects
2. Plan for specialist projects
3. Carry out specialist projects
4. Evaluate specialist projects

Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

Learning outcome:

1. Develop proposals for specialist projects

Topics

1.1 Research topics for specialist sources using information sources

1.2 Project proposal

In this outcome, learners will need to identify a suitable topic for their investigative project. This should be relevant to their programme of study and have a particular interest for them, for example in relation to a special area of interest, experience or future employment of study ambitions. Ideal project topics could have a practical or theoretical focus, but all projects should include potential for research into existing literature and information sources as well as a practical investigation or application, so should be chosen in agreement with the tutor. Learners are likely to need guidance on suitable project topics and tutor support to ensure that selected topics are achievable in the timescale and with the resources available. The proposal should outline the aims and objectives, information sources, resource requirements, and the methodology by which the learner intends to complete the project, as well as their justification for topic selection. If appropriate to the investigation, a hypothesis should be included as part of the methodology.

Topic 1.1

Learners will use a range of information sources to research topics for specialist project, including:

- textbooks
- journals
- magazines
- internet
- trade literature
- television and radio
- subject experts.

Learners will comment on the validity and reliability of each type of information source.

Learners will carry out research using methods appropriate to the topic, for example:

- literature review
- trials, experiments
- practical activities
- questionnaires
- interviews
- surveys.

Topic 1.2

Learners will produce proposals for specialist projects, to include:

- Title
- aims/objectives
- methodology
- information sources
- resources required for completion of the project ie advice and support, computers, materials
- justification of proposed project.

Learning outcome:

2. Plan for specialist projects

Topics

2.1 Planning operations and resources

2.2 Selection of resources

In this outcome, learners will complete a detailed action plan for completion of the specialist project within the set timescale. This should include, as a minimum:

- a detailed breakdown of key milestones from starting the project up to submission of the completed project report
- resources required at each stage (and reasons for their selection)
- time expected for completion and interim target completion dates.

Learners should also consider possible setbacks to their planned schedule and contingency plans to ensure timely completion of the project.

Topic 2.1

Learners will plan operations required to carry out a selected specialist project, to include:

- Project planning techniques
 - critical path analysis
 - Gantt charts
- sequencing of activities
- working to deadlines
- allowing for other commitments
- project action plan:
 - aims
 - objectives
 - specific operations / tasks
 - start and completion dates
 - time required
 - resources required
 - possible disruptions to plan eg illness, IT problems, resource problems, cost
 - Contingencies
 - remedial actions.

Topic 2.2

Learners will justify reasons for resources selected based on suitability, availability and cost, to include:

- people
- time
- buildings
- equipment
- animals
- materials
- literature and media eg internet, trade magazine
- IT applications and budget.

Learning outcome:

3. Carry out specialist projects

Topics

3.1 Monitor progress

3.2 Health and safety implications

In this outcome, learners will conduct and complete their specialist project, collecting supporting evidence as appropriate, for example literature review, artefacts, witness statements, photographs or videos. Whilst doing this, they should maintain a log or diary of all actions, and regularly monitor their progress against their action plan. It would be appropriate for tutors to conduct progress reviews at key stages of the project. As part of conducting the project, learners should discuss any health and safety implications of their work, and identify any relevant legislation or codes of practice. Risk assessments may contribute to evidence of this.

Topic 3.1

When carrying out their project, learners will monitor progress against deadlines using a diary or action log.

Learners will monitor performance against :

- schedule plan ie daily, weekly, monthly progress
- budget
- other appropriate measures for each tasks.

Learners will capture reasons and remedial actions if falling behind schedule using a diary or action log.

Deadlines can be defined as interim, key milestones or final, and should be reviewed at regular intervals by tutor/supervisor.

Topic 3.2

Learners will discuss the health and safety implications, where applicable, of the specialist project, taking into consideration:

- health and safety
- risk assessment
- Personal Protective Equipment (PPE)
- relevant regulations and legislation
- codes of practice.

Learning outcome:

4. Evaluate specialist projects

Topics

4.1 Report on project

4.2 Evaluating achievements and areas for improvement

In this outcome, learners will produce a summary report of their project and the process of its completion. This should cover, as a minimum:

- title
- aims / objectives
- review of existing literature / information
- methodology
- results / findings
- conclusions
- references.

Topic 4.1

Learners will report on the project either in a written report format, or verbally through a

presentation.

Topic 4.2

Learners will evaluate achievements and areas for improvement for their specialist projects, including:

- conduct and management of the project:
 - action plan
 - keeping to deadlines
 - problems and remedial actions
 - project results/findings
 - strengths and weaknesses .

- Areas for improvement:
 - Planning
 - Implementation methodology
 - results/findings
 - report
 - topics for further investigation.

Guidance for delivery

This unit is designed to encourage and develop learners' independent thinking and research skills. The concept of the project is applicable across all of the vocational areas in the environmental and land-based sector, and learners should be guided and encouraged to select a project topic that is particularly relevant to their interests. Suitable project topics could include:

- trial or experiment
- investigation of an issue important to the sector
- production of a structure or artefact
- training programme
- improving a process
- investigation of a new product or service.

All referencing should comply with academic conventions.

The project evaluation should consider the strengths and weaknesses of the finished project and the process of its completion. Consideration of the usefulness and importance of project planning, and ways in which the project could have been improved.

Appendix 1 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training Providers homepage** on www.cityandguilds.com.

City & Guilds Centre Manual

This document provides guidance for organisations wishing to become City & Guilds approved centres, as well as information for approved centres delivering City & Guilds qualifications. It covers the centre and qualification approval process as well as providing guidance on delivery, assessment and quality assurance for approved centres.

It also details the City & Guilds requirements for ongoing centre and qualification approval, and provides examples of best practice for centres. Specifically, the document includes sections on:

- the centre and qualification approval process
- assessment, internal quality assurance and examination roles at the centre
- registration and certification of candidates
- non-compliance and malpractice
- complaints and appeals
- equal opportunities
- data protection
- management systems
- maintaining records
- internal quality assurance
- external quality assurance.

Our Quality Assurance Requirements

This document explains the requirements for the delivery, assessment and awarding of our qualifications. All centres working with City & Guilds must adopt and implement these requirements across all of their qualification provision. Specifically, this document:

- specifies the quality assurance and control requirements that apply to all centres
- sets out the basis for securing high standards, for all our qualifications and/or assessments
- details the impact on centres of non-compliance

The **centre homepage** section of the City & Guilds website also contains useful information on

- **Walled Garden:** how to register and certificate candidates on line
- **Events:** dates and information on the latest Centre events
- **Online assessment:** how to register for e-assessments.

Useful contacts

UK learners

General qualification information

E: learnersupport@cityandguilds.com

International learners

General qualification information

E: intcg@cityandguilds.com

Centres

Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results

E: centresupport@cityandguilds.com

Single subject qualifications

Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change

E: singlesubjects@cityandguilds.com

International awards

Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports

E: intops@cityandguilds.com

Walled Garden

Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems

E: walledgarden@cityandguilds.com

Employer

Employer solutions, Mapping, Accreditation, Development Skills, Consultancy

E: business@cityandguilds.com

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