



City & Guilds Level 3 Advanced Technical Diploma in Land and Wildlife Management (540) (0173-35)

September 2023 Version 1.5

(For delivery from September 2023)

Qualification Handbook

Qualification at a glance

Industry area	Land – Countryside and Land and Wildlife
City & Guilds qualification number	0173-35
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	<p>To gain this qualification, candidates must successfully achieve the following assessments:</p> <ul style="list-style-type: none"> • One externally set, internally marked, externally moderated synoptic assignment • Two externally set, externally marked exams, sat under examination conditions • One portfolio of evidence • Optional unit assessments, externally set, internally marked, externally verified
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	<p>This qualification is graded Pass/Merit/Distinction/Distinction*</p> <p>For more information on grading, please see Section 7: Grading.</p>
Approvals	These qualifications require full centre and qualification approval
Support materials	<p>Sample assessments</p> <p>Guidance for delivery</p> <p>Guidance on use of marking grids</p>
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 synoptic assignments are subject to external moderation. Additional internally assessed units / optional assessments are subject to external verification. There is no direct claim status available for this qualification.

Title and level	Size (GLH)	TQT	City & Guilds qualification number	Ofqual accreditation number
City & Guilds Level 3 Advanced Technical Diploma in Land and Wildlife Management	540	900	0173-35	601/7558/8

Version and date	Change detail	Section
1.0 September 2017	New version	
1.1 September 2017	Amended the title for Unit 315 to make it consistent.	Qualification structure
1.2 November 2018	Assessment method for unit 301 amended	1. Introduction 5. Assessment
1.3 May 2019	Wording changed regarding retakes	5. Assessment – Summary of assessment methods and conditions 8. Administration – Re-sits and shelf-life of assessment results
1.4 May 2023	Amended assessment method for unit 301 Component number for assessment component changed from 301 to 300	5 Assessment
	Clarified moderation and external verification processes	5 Assessment 6 Moderation and standardisation of assessment
	Updated website links and references	3 Delivering Technicals qualifications - Support materials 8 Administration
1.5 September 2023	Revision to the exam specification for the health and safety test component (300)	5 Exam specification

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Unit 315	Undertake Grassland Habitat Management	128
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Unit 317	Deer Management	141
Unit 321	Heathland Habitat Management	147
Unit 322	Urban Habitat Conservation	154
Unit 323	Greenwood crafts	160
Unit 328	Ecology of Gamebird Species	167
Unit 329	Shooting Sport in the UK	175
Unit 330	Shoot Management	181
Unit 332	Working Dogs	188
Unit 333	Upland Game Management	196
Unit 334	Gamebird production	204
Unit 336	Fishery management	212
Unit 337	Game Meat Hygiene	218
Unit 338	River Fishery Creation and Management	226

Unit 339	Stillwater Fishery Creation and Management	231
Unit 340	Fresh water and wetland management	237
Unit 341	Aquatics Eco System	245
Unit 342	Coarse, game and sea angling techniques	250
Unit 343	Aquatics Welfare and Breed Development	255
Unit 344	Fish Health	263
Unit 345	Ornamental pool design, installation and management	269
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1 Introduction

The following purpose is for the **City & Guilds Level 3 Advanced Technical Diploma in Land and Wildlife Management (540)**

Area	Description
OVERVIEW	
Who is this qualification for?	This qualification is for you if you are 16 years or older and want to work within the countryside. It provides you with a range of specialist technical practical skills and knowledge which will equip you to seek employment or further learning and training within the land and wildlife management industries.
What does this qualification cover?	<p>This qualification gives you the opportunity to study a range of specialist technical practical skills and knowledge that build upon the core skills required to for working in the countryside such as estate maintenance skills, population surveys, safe use of equipment and machinery with further areas of study such as land use and recreation and pest and predator control. You can then learn further specialist skills such as woodland habitat management, water quality, angling techniques, heathland habitat management, and the ecology of game species or greenwood crafts.</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 wildlife industries or specialist further study.</p>
WHAT COULD THIS QUALIFICATION LEAD TO?	
Will the qualification lead to employment, and if so, in which job role and at what level?	<ul style="list-style-type: none"> • Fisheries worker • Estate worker • Assistant underkeeper • Fieldwork assistant
Why choose this qualification over similar qualifications?	This is typically a one year full-time course or you could take it alongside other Level 3 qualification such as A levels over a two year period. It equips you with the core skills and knowledge to enter employment in the land and wildlife management industries and enables progression to a broader range of options than the Technical Certificate. You would take this qualification if you really enjoy the hands-on aspects of working in the countryside.

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 gain 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?

Qualification structure

For the **City & Guilds Level 3 Advanced Technical Diploma in Land and Wildlife Management (540)** 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
Optional – Learners must be taught at least 240 GLH from the following units		
306	Principles of Physical and Biological Environmental Processes	60
307	Woodland habitat management	60
308	Pest and predator control	60
309	Use of Firearms in the Environmental and Land based sector	60
311	Water quality	60
312	Fish Biology	60
314	Farm Habitat Management	60
315	Undertake grassland habitat management	60
316	Coastal Management	60
317	Deer Management	60
321	Heathland Habitat Management	60
322	Urban Habitat Conservation	60
323	Greenwood crafts	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
337	Game Meat Hygiene	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
344	Fish Health	60
345	Ornamental pool design, installation and management	60
346	Cyprinid 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	Size (GLH)	TQT
City & Guilds Level 3 Advanced Technical Diploma in Land and Wildlife Management	540	900

Assessment requirements and employer involvement

To achieve the **City & Guilds Level 3 Advanced Technical Diploma in Land and Wildlife Management (540)** 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	
004	Level 3 Land and Wildlife Management - Synoptic assignment (1)*
001/501	Level 3 Land and Wildlife Management - Theory exam (1)*
300	Level 3 Principles of health and safety – Theory exam (evolve online)
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
308	Pest and predator control
307	Level 3 Woodland habitat management - Assignment
309	Level 3 Use of firearms in the environmental and land-based sector - Assignment
311	Level 3 Water quality - Assignment
312	Level 3 Fish biology - 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
321	Level 3 Heathland Habitat Management - Assignment
322	Level 3 Urban habitat conservation - Assignment
323	Level 3 Greenwood crafts - 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
337	Level 3 Game meat hygiene - 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
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** complete 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	
835	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.

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.

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.

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	Available on the qualification pages on the City & Guilds Website: www.cityandguilds.com
Technical Qualifications: Guide to Teaching, Learning and Assessment	Available on the City and Guilds website: 14-19-teaching-learning-assessment-guide-pdf.ashx (cityandguilds.com)
Quality Assurance Guide for Centres: Technical Qualifications and the Extended Project Qualification (EPQ)	Available on the City and Guilds website: technicals-quality-assurance-guide-for-centres-pdf.ashx (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 planner 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.

¹ As extracted from: Vocational qualifications for 16 to 19 year olds
2017 and 2018 performance tables: technical guidance for awarding organisations

² This 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**

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.*

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. E.g. 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
004	Synoptic assignment	<p>The synoptic assignment is 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. Remove this bit if not relevant.</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	Externally marked exams	<p>The exam are externally set and externally marked, and will be taken either online through City & Guilds' computer-based testing platform (001) or as a paper based test (501).</p> <p>The exam is 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>

Component numbers	Assessment method	Description and conditions
		<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 a maximum of two opportunities to retake.</p>
		<p>If the candidate fails the exam three times then they will fail the qualification. (Note: the third and final retake opportunity applies to Level 3 only.)</p>
		<p>For exam dates, please refer to the Assessment and Examination timetable.</p>
300	Evolve online on-demand exam	<p>This exam is externally set and externally marked and will be taken online through City & Guilds' computer-based testing platform under invigilated exam conditions. The exam is available on-demand and can be taken at any time in the year.</p>
		<p>There is no maximum number of retake attempts for this exam , however, learners should be given sufficient time and tutor support before resitting.</p>
302	Portfolio of evidence	<p>This unit will be evidenced by a portfolio of evidence.</p>
Optional Units 306, 307, 308, 309, 311, 312, 314, 315, 316, 317, 32,1 322, 323, 328, 329, 330, 332, 333, 334, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 348, 349, 350, 353	Unit Assignments	<p>The unit assignment are externally set, internally marked and externally verified. 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>

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 externally set, externally marked exam (001/501) 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.

Optional unit assessments are externally set, internally marked and externally verified.

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 exam (AOs 1, 2 and 4 only) can be found with the exam specification.

Assessment objective	City & Guilds Level 3 Advanced Technical Diploma in Land and Wildlife Management (540) Typical expected evidence of knowledge, understanding and skills	Approximate weighting (Assignment)
AO1 Recalls knowledge from across the breadth of the qualification.	Use of terminology, health and safety considerations, environmental impact, legislation, routine tasks	25%
AO2 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%
AO3 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%
AO4 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.	15%
AO5 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	10%

Exam specifications

AO weightings per exam

AO	Exam 001/501 weighting (approx. %)	Exam 300 weighting (approx. %)
AO1 Recalls knowledge from across the breadth of the qualification.	20	70
AO2 Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification.	60	30
AO4 Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	20	N/A

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 surveys, ecology and conservation	24	40
310	Undertake Estate Skills	12	20
N/A	Integration across the units	12	20
Total		60	100

Assessment type: Multiple-choice exam, delivered online *

Assessment conditions: Invigilated examination conditions

Grading: X/P

Level 3 Principles of health and safety - Theory exam (300)		Duration: 1 hour	
Unit	Learning outcome	Number of marks	%
Level 3 Principles of health and safety (301)	1. Understand health and safety legislation	9	30
	2. Understand the risk assessment process	8	26
	3. Understand first aid requirements	7	23
	4. Understand safe manual handling principles	2	6
	5. Understand the use of fire extinguishers	4	15
Total		30	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 synoptic 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.

Moderation is the process where external quality assurers are standardised to a national standard in order to review centre marking of internally marked assessments. These external quality assurers are referred to as 'moderators'. Moderators will review a representative sample of 'candidate work' across the mark range 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 within a reasonable range of mark tolerance, 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 (up or down) will be made to the marks of the whole cohort, retaining the centre's rank ordering. Due to the nature of the assessment and the marking grid across Assessment Objectives (AOs), it is not expected that the tutors mark and the moderators mark will match exactly.

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.

Additional unit and optional unit assessments are also subject to external quality assurance through a verification process. This involves external quality assurers scrutinising IQA records; sampling candidates' work across a range of units and also sampling across the mark/grade range. Centres are then provided with feedback and actions to ensure that results are valid and reliable.

For more detailed information, on the quality assurance process for synoptic assignments and additional unit and optional unit assessments please refer to 'Quality Assurance Guide for Centres: Technical Qualifications and the EPQ 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 work the centre is required to conduct internal standardisation to ensure that all work at the centre has been marked and / or graded 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.

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 or grades for external quality assurance. 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.

Post-quality assurance procedures

Once the external quality assurance processes have been completed, feedback is provided to the centre on the standard of the internal assessment, highlighting areas of good practice, and potential areas for improvement. This will inform future centre assessment, and standardisation activities, as well as external quality assurance and risk management activity.

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 **Level 3 Advanced Technical Diploma in Land and Wildlife Management (540)** will be reported on a four grade scale: Pass, Merit, 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 assignment in this qualification are:

Synoptic Assignment	Pass Mark (%)
004	40

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

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

Assessment method	Grade scale	% contribution
Synoptic Assignment (004)	X/P/M/D	60%
Exam (001/501)	X/P/M/D	40%

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. A 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
Assignment (004): 60%	6	12	18
Exam (001/501): 40%	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* 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 (synoptic assessments)
 - City & Guilds external verification (additional unit / optional assessments).

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 and verification 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 synoptic assignments. Requests must be submitted within the specified

period after the publication of results for individual assessments. Please see the **City & Guilds website** for more information.

Re-sits and shelf-life of assessment results

Re-sits and shelf-life of assessment results Candidates who have failed an exam or wish to re-take it in an attempt to improve their grade, can do so **twice**. 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

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**.

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**

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

What is this unit about?

I

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.hsegov.uk](http://www.hsegov.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.

Unit 303

Land based industry machinery operations

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
Ireland, D
Published by: Stationary Office Books, 2004
ISBN: 085538638X
- Tractors Fundamentals of Machine Operation
Hathaway, L
Published by: John Deere Publishing, 1994
ISBN: 0866912126
- Chainsaw Operator's Manual: The Safe Use of Chainsaws
Kestel, B
Published by: Landlinks Press, 2009
ISBN: 0643090282
- Tractor Operation and Maintenance
Southorn, N
Published by: Inkata Press, 1999
ISBN: 0750689145
- Tractor Power
Williams, M
Published by: Farming Press, 2000
ISBN: 0852365144

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>

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: 978052 1588027

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 Krebs, JR & Davies, B
Published by: Wiley Blackwell, 1977
ISBN: 0632035463

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 Published by: Scottish Natural Heritage, 2000 ISBN: 1 85397 087 5 B	SNH
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	Bedoyere, C

ISBN: 1844480135

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

Colebourne, P; Court, N &
Howe, J

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

Peterken, G

ISBN: 0412557304

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
ISBN: 1842124692

Rackham, O

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 predator

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.

Suggested learning resources

Books

Animal Tracks and Signs

Bang, P & Dahlstrom, P.

Published by: Oxford University Press, 2001

ISBN: 0198507963

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

Unit 309

Use of Firearms in the Environmental and Land-based Sector

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 arks
- 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, supper 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
Forestry Commission

www.wildlifetrusts.org
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.

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
Institute of Fisheries Management

www.hsegov.uk
www.ifm.org.uk

Unit 312

Fish Biology

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, 2nd Edition, 1996
ISBN: 9780120798759
Bond, C. E.
- Biology of Fishes
Published by: Taylor & Francis, 3rd Edition, 2005
ISBN: 0412741130X
Bone, Q & Moore, R
- Handbook of Fish Biology & Fisheries, Volume 1, Chapter 4: The Physiology of Living in Water
Published by: Blackwell Scientific
ISBN: 9780632054121
Brix, O
- 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

Schreck C. B & Moyle P.B

Published by: Amer Fisheries Society, 1st Edition, 1990

ISBN-10: 091323558X

ISBN-13: 978-0913235584

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 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
Published by: Island Press, 2002
ISBN 978-1559638463
Bradley, N; Jackson, D & Jackson, L
- Biotic Indicators for Biodiversity & Sustainable Agriculture
Published by: Elsevier Science, 2003
ISBN 978-0444515513
Buchs, W
- Introduction to Wildlife Conservation in Farming
Published by: Wiley – Blackwell, 2010
ISBN – 13: 978-0470699348
Burchett, S & Burchett, S
- Agriculture & International Trade: Law
Policy & WTO
Published by: CABI publishing, 2003
ISBN 978-0851996639
Cardwell, M; Grossman, M & Rodgers, C
- Habitat Management for Conservation: A Handbook of Techniques
Published by: OUP Oxford, 2007
ISBN 978-0198568735
Ausden, M
- Wildlife Habitat and Management
Published by: CRC Press, 2007
ISBN 978-0849374890
McComb, B
- The Illustrated History of the Countryside
Published by: Wakefield & Nicholson, 2003
ISBN 978-027843351
Rackham, O
- Monitoring Ecological Change
Published by: Cambridge University Press, 2005
ISBN 978-0521820288
Spellerburg, I. F
- Woodland Management: A Practical Guide
Published by: Crowood Press 2nd Revised Edition, 2013
ISBN 978-1861267894
Starr, C

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:

5. 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, rakes, crushers, 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: Ausden, M.
A Handbook of Techniques
Published by: Oxford University Press 2007
ISBN: 978 019 856872 8

Ecological Restoration Comin, F.A.
Published by: Cambridge University Press 2010
ISBN: 978 0 521 87711 4

Improved Grassland Management Frame, J.
Published by: Farming Press 2002
ISBN: 0 85236 543 8

Grassland Management Parry, J., Butterworth, B
Published by: Northwood Publications 1981

Agronomy of Grassland Systems. 2nd ed Pearson, C.J., Ison, R.L.
Published by: Cambridge University Press 1997
ISBN: 0 521 56010 1

Lowland Grassland and Heathland Habitats Price, E.A.C.
Published by: Routledge 2003
ISBN: 0 415 18762 1

Grasslands: Ecology, Management and Schroder, H.
Restoration
Published by: Nova Science Publishers.

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

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.

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

Deer of Britain and Ireland: their origins and distribution Carne, P
Published by: Swan Hill Press, 2000.
ISBN: 978-1840370911

The deer stalking handbook Downing, G

Published by: Quiller Publishing Ltd., 3rd edition, 2013

ISBN: 978-1846891830

How many deer? - A field guide to estimating deer population size

Mayle, B.A.

Published by: Forestry Commission, 1999

ISBN: 978-0855384050

Deer: law and liabilities

Parkes, C & Thornley, J

Published by: Quiller Publishing, 2nd edition, 2008

ISBN: 978-1846890475

Deer stalking and management

Potter, L.

Published by: The Crowood Press Ltd. 2008

ISBN: 978-1847970695

Roe deer - management and stalking

Prior, R.

Published by: Quiller Publishing, 2010

ISBN: 978-1840371383

Muntjac: managing an alien species

Smith-Jones, C.

Published by: Coch-y-Bonddu Books, 2004

ISBN: 978-1904784029

Deer Management in the UK

Griffith, D

Published by: Quiller Publishing Ltd, 2011

ISBN: 978-1846891083

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

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 heath 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, 3 rd 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 | Sutherland, W & Hill, D |
| A practical guide to the restoration and management of lowland heathlands
Published by: RSPB, 2003
ISBN: 1901930386 | 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

Unit 322

Urban Habitat Conservation

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 manmade) 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
Gilbert, O & Anderson, P

Published by: Oxford University Press, 1998

ISBN: 0198549660

Urban Nature Conservation: Landscape Management in the Urban Countryside

Kendle, T & Forbes, S

Published by: Taylor and Francis, 1997

ISBN: 0419193006

Ecological Census Techniques

Sutherland, W

Published by: Cambridge University Press, 1998

ISBN: 978-0521478151

Managing Habitats for Conservation

Sutherland, W & Hill, D

Published by: Cambridge University Press, 1995

ISBN: 0521447763

Urban Habitats

Wheater, C

Published by: Routledge, 1999

ISBN: 0415162653

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

Unit 328

Ecology of Gamebird Species

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

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 Association (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 Barnes, M.
Published by: The Crowood Press Ltd., 2005
ISBN: 978-1861268044

The Game Book: a shooting anthology Catlin, C.
Published by: Quiller Publishing, 2007
ISBN: 978-1846890161

Gamekeeping. Hudson, D.
Published by: Swan Hill Press, 2006
ISBN: 978-1904057734

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

RSPCA

www.rspca.org.uk

SGA

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, 2nd 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, 3rd 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](http://www.basc.org.uk)

Unit 332

Working Dogs

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 Principals: 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, strongyl 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
 - strongyllosis
- Parasites:
 - Strongylle 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, strongyllosis, 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 is 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	Fielding, A & Haworth, P

Published by: Routledge, 1999
ISBN: 0415180864

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](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>

Unit 334

Gamebird production

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 stoking 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, colour, 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, eg 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

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|--|--|
| 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 337

Game Meat Hygiene

UAN:	T/507/7239
Level:	3
GLH:	60

What is this unit about?

This unit aims to provide learners with an understanding of the legislation and hygienic handling practices surrounding the processing of wild game meat. This unit is primarily aimed at learners within a centre based setting looking to progress into the sector or further/higher education and training.

Within the game and countryside sector the correct handling of wild game meat has become an important legal requirement for anyone dealing in game meat products with intent to sell to processors, retailers or final consumers. The skills associated with the ability to process small game, deer and large boar ready for final consumption are also widely recognised as been an essential part of many jobs associated with shooting and its affiliated industries.

Learning outcomes

In this unit, learners will be able to

1. Understand the legal standards, specifications and practices required associated with game larders
2. Understand the correct inspection and handling of small game carcasses
3. Understand the correct inspection and handling of large game carcasses
4. Carry out handling, evisceration and butchery of large or small game carcass

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 legal standards, specifications and practices associated with game larders**

Topics

- 1.1 Legal hygiene requirements and responsibilities associated with wild game meat handling and storage
- 1.2 Causes of meat contamination at all stages of processing
- 1.3 Design and construction of meat handling facilities and equipment

Topic 1.1

The learner will understand the legal Requirements and Responsibilities:

- The Wild Game Meat (Hygiene and Inspection) Regulations (1995). Responsibilities for different sizes of food business including:
 - Hazard Analysis and Critical Control Point Planning,

- correct storage temperatures for large and small game,
- registration of food business with local authorities,
- legal training requirements of staff,
- registration as approved game handling establishments, notifiable disease procedure, waste disposal.
- Traceability records including: carcass tags,
- origins,
- disposals and destinations.
- Other record keeping including: cleaning, tool replacement, medication prescriptions and withdrawal periods.

Topic 1.2

The learner will understand the sources of Meat Contamination and how it can be prevented

- Categories of contamination: biological, chemical, physical
- Biological: invertebrates, rodents, moulds, bacteria, virus, companion or working animals, gut contents, open wounds on staff, sick staff, infected dead game, human and animal effluent, non-potable water, cooked and uncooked food
- Chemical: fly spray, rodenticides, pesticides, lubricants, cleaning chemicals, fuel, veterinary medication and tobacco smoke
- Physical: dirt, grit, hair, feathers, shot, bullet fragments, plastic larder waste, straw and sawdust.

Prevention:

- Limiting cross contamination: separation of fur and feathered game, separation of processed and un-processed game. Separation of space and tools for clean and dirty processing
- Correct chilled store use: storage temperatures to limit bacterial growth, hanging space and capacity to allow air flow and efficient chiller operation. Cold chain, correct storage technique for frozen game
- Hygiene of Staff: Hand washing, PPE; plastic gloves, hair nets, larder overalls/aprons, dedicated larder footwear. Correct wound dressing and management of staff illness
- Pest Control: Fly control, rodent control. Correct waste storage and handling
- Cleaning: correct mixing of chemicals, detergents for removing dirt, disinfectants and their approvals for use in food establishments. Correct tool sterilisation. Responsibility and overseeing of hygiene processes.

Topic 1.3

The learner will understand the correct design and construction of meat handling facilities and equipment:

- Range of equipment: Hanging equipment, processing tools, work surfaces, cleaning equipment, etc.
- Construction specifications: non-porous, sealed impervious materials eg: plastic, stainless steel, no wood, bone antler etc.
- Correct cleaning and sterilisation: techniques for tools and equipment. Importance of monitoring condition and timely replacement to prevent cross contamination

Learning outcome:

2. Understand the correct inspection and handling of small game carcasses

Topics

2.1 Normal anatomy and behaviour of small game

2.2 Symptoms of ill health in small game and the potential consequences to human health

2.3 Correct handling of small game carcasses prior to processing

Topic 2.1

The learner will understand normal anatomy and behaviour of small game:

- Small Game:
 - Mammals: Rabbits, brown hare, mountain hare and grey squirrel.
 - Birds: Pheasant, Red-legged Partridge, Grey Partridge, Red Grouse, Woodcock, Snipe, Duck Species, Goose Species, Wood Pigeon.
 - Game: Waders, Wild...
- Anatomy and Behaviour:
 - External Anatomy (as appropriate to species): Normal and abnormal plumage/fur colour variations. Normal size, movement and number of limbs. Shape and condition of body parts: head, legs, wings, toes/claws, joints, mammary tissues, genitals and anus/vent
 - Internal Anatomy (as appropriate to species): Locations and normal appearance of respiratory organs, digestive organs, urinary tract, reproductive organs, abdominal cavity, major bone and muscle groups (Meat)
 - Behaviour: Normal reaction of game to humans and factors that can change reactions to humans. Normal reactions of game to predators, working animals, food and water provision, natural behaviours.

Topic 2.2

The learner will understand the signs of ill health in small game and the potential consequences to human health

- Symptoms of Major Disease:
 - Birds: Avian Influenza, Newcastle's Disease, Hexameter, Coccidiosis, Mycoplasmosis, Avian Tuberculosis, viral and bacterial enteritis, paramyxovirus, Botulism, Sarcocystis (Rice Brest Disease), Gapes, Louping Ill, Strongylosis and Cryptosporidiosis
 - Small Mammals: Rabbit Viral Haemorrhagic Disease, Myxomatosis and Rabies.
 - Other Cause of ill health: Wounds, malnutrition, (lice, fleas, tumours, tape worm, parasites) and pesticides.
- Consequences for Human Health:
 - Recognition of need to reject abnormal carcasses from food chain due to: zoonosis, legal actions required on recognition of notifiable diseases eg bird flu protection and control zones. Inferior quality of meat product. Food poisoning and associated legal action.

Topic 2.3

The learner will understand the correct handling of small game carcasses prior to processing:

- Field Handling: Prior to hunting; cleaning of game handling equipment eg game bags, carriers, crates, carts etc. Retrieval from ground; immediate retrieval from ground, use of soft mouthed dogs for retrieval, hygienic dispatch of wounded game. Effect of animal effluent on handling
- Field Transportation: correct game transport design, construction and use for different hunting activities eg summer grouse shooting, winter pheasant shooting
- Storage: Suitability of game to enter storage – initial inspection for damage, environmental contamination or disease. Correct storage; temperature, chiller capacity and hanging. Maintenance of cold chain.

Learning outcome:

3. Understand the correct inspection and handling of large game carcasses

Topics

3.1 Normal anatomy and behaviour of large game

3.2 symptoms of ill health in large game and the potential consequences to human health

3.3 correct handling of large game carcasses prior to processing

Topic 3.1

The learner will understand normal anatomy and behaviour of large game:

- Large game:
 - Deer: Red, Sika, Fallow, Roe, Chinese Water Deer, Muntjac
 - Wild Boar
- Anatomy and Behaviour:
 - External Anatomy (as appropriate to species): Normal and abnormal coat colour variations. Normal size, movement and number of limbs. Shape and condition of body parts: head, legs, hoofs, joints, mammary tissues, genitals and anus
 - Internal Anatomy (as appropriate to species): Locations and normal appearance of respiratory organs, digestive organs, urinary tract, reproductive organs, abdominal cavity, major bone and muscle groups (Meat) and lymphatic nodes
 - Behaviour: Normal reaction of game to humans and factors that can change reactions to humans. Normal reactions of game to predators, working animals, food and water provision, natural behaviours.

Topic 3.2

The learner will know the signs of ill health in large game and the potential consequences to human health.

Symptoms of Major Disease:

- Deer: Bovine Tuberculosis, Foot and Mouth Disease, Chronic Wasting Disease, Blue Tongue, Warble Fly, Nasal Bot Fly, tape worm, lung worm, liver fluke.
- Boar: Trichinella, Aujeszky's disease.
- Other Cause of Ill health: Wounds, malnutrition, lice, fleas, tumours, imobilon/Revivon and pesticides.

Consequences for Human Health:

- Recognition of need to reject abnormal carcasses from food chain due to: zoonosis, legal actions required on recognition of notifiable diseases eg Bovine TB control zones. Inferior quality of meat product. Food poisoning and associated legal action.

Topic 3.3

The learner will understand the correct handling of large game carcasses prior to processing.

Prior to hunting: cleaning of game handling equipment eg knives, bags, vehicles, trailers etc.

Target Acquisition and Shooting: Observation of animal behaviour prior to shot. Effect of head, neck, heart/lung and miss-placed shots on the suitability of carcass to enter human food chain.

Post shot: hygienic dispatch of wounded game, observation of external condition; coat/body condition, wounds, head condition, foot and mouth checks.

Field Evisceration: Hygienic field bleeding and gualoching practice. Need for trained hunter inspection of gualoch and mesenteric lymph nodes. Correct disposal of gualoch. Need for appropriate PPE.

Transport to Larder: Hygienic practices for extraction to vehicle eg sledges, drag bags, roe sacks etc. Sources of contamination while dragging; soil, vegetation, animal effluent, non-potable water etc. correct game transport design, construction and use for different hunting activities eg dead box (carcass tray/ box) for small deer, clean hanging rack or surface for large deer.

Storage: Suitability of game to enter storage – initial inspection for damage, environmental contamination or disease. Correct storage; temperature, chiller capacity and hanging. Maintenance of cold chain.

Learning outcome:

4. Carry out handling, evisceration and butchery of large or small game carcasses

Topics

4.1 Eviscerate large or small game safely

4.2 Pluck or skin large or small game safely

4.3 Butcher large or small game safely

4.4 Handle game large or small hygienically

Topic 4.1

The learner will eviscerate large or small game safely:

- Evisceration
 - Small Game: Removal of urine (Mammals only), correct cuts for the opening of the abdomen, removal of digestive system and reproductive system, correct method for detaching rectum. Correct removal of respiratory system. Inspection of viscera and abdominal cavity/thorax for signs of abnormality by trained hunter
 - Large Game: techniques to remove bladder and genitals (sex appropriate), open thorax, removal of pluck, inspection of pluck by trained hunter condition to include; lungs, heart, liver, kidneys, major lymph nodes. In Wild Boar retention of diaphragm for inspection

Topic 4.2

The learner will pluck or skin large or small game safely.

Plucking:

- Removal of bird's feathers by appropriate means eg: hand plucking, plucking machines, waxing, wet plucking, burning down etc.
- Correct handling of waste feathers: eg separation of feathers from finished plucked birds, sweeping up, industrial vacuums, appropriate PPE; dust masks, gloves.

Skinning:

- Preparing carcasses for skinning: appropriate positions to support dead game for skinning. Head and limb removal techniques. Knife cuts required to start skinning.
- Skin Removal Methods: eg removal with knife, skin removal without knife.

Topic 4.3

The learner will butcher large or small game safely.

Butchery:

- Birds: eg filleting breast meat, crowning, spatchcock, correct presentation of plucked birds for roasting.
- Mammals: locations of major cuts including; loin, haunch, hock, shank, shoulder, spare ribs, flank, neck, offal. Methods of final presentation as appropriate: eg Filleting, roasting joints, boning, chops, steaks, rolls, dicing for stewing meat, mincing, drying, smoking, sausage and burger making.

Safe Processing:

- Safe lifting limits and techniques. Correct selection and use of PPE for task eg larder boots, plastic gloves, chain mail, aprons, wound dressings, correct knife use techniques.

Topic 4.4

The learner will handle game large or small hygienically:

- Personal Hygiene, Rejection isolation of carcase when abnormality is found as necessary. Tool and equipment selection and regular sterilisation. Processing room cleaning. Separation of clean and dirty process. Correct and timely waste disposal.

Guidance for Delivery

This unit is designed to be delivered in a vocational setting and be backed up with theory delivery to support understanding of the important legal regulations underpinning the skills gained by the learners. To undertake the unit learners must have access to dead game, deer and a suitable larder or processing facility to practice the practical skills delivered. This could be in partnership with a game meat handling business or a specialist teaching facility. It is also envisaged that by the end of this unit learners will be competent to move forward for assessment under one of the nationally recognised certificates of competence that allow trained hunter status to be applied for in relation to local authority approval for game meat handling establishments.

For learning outcome 1 it is envisaged the delivery will be predominantly based in a classroom where the learners will have to investigate the legislation controlling the handling of dead game meat and their associated food products. This theory delivery should be supported where possible by visits to Local Authority approved game meat handling facilities to put the theory learning into context. Guest speakers and examples of specialist equipment could also be used to enhance delivery.

For learning outcomes 2 and 3 the learners should carry out as much practical dissection of different game and deer species as possible, to gain a good understanding of normal anatomy and physiology possible. This dissection should be backed up with theory sessions to re-enforce understanding of the functions of the biological systems observed. Learners would also benefit from access to live populations of game and deer to study their natural behaviour, this can be accomplished by visiting wildlife collections, deer parks, shooting estates or taxonomical collections. The field game/deer handling element of the unit would be best taught via shoot day and stalking practicals or simulations to show the student best handling practice in action. Some theory learning should take place to ensure learners understand the legal implications surrounding correct inspection and handling of game and deer. During theory sessions learners should also examine the symptoms of ill health, a visiting veterinarian speaker could help provide specialist knowledge.

Learning outcome 4 requires the learners to have ready access to large quantities of dead game or deer and a suitable game meat processing facility. Learners should have sufficient access to be shown correct processing techniques and then practice the techniques until they are competent to produce food ready for human consumption. This could be achieved by working in partnership with a local shooting estate, wild game meat handling facility or in a specialist teaching facility.

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.

There are strong possibilities with this unit to develop links with local shooting estates, deer parks or game dealers to allow learners to observe or take part in practical handling of wild game meat. Links could also be formed with affiliated industries such as restaurants, hotels and butchers who supply game meat to final consumers to see butchery or game cookery.

Suggested Learning Resources

Books

- Food Hygiene
Published by: Hodder Education, 10th edition, 2007
Blanch, S
- Human Diseases from Wildlife
Published by: CRC Press, 2014
Conover, M & Vail, R
- Basic Butchering of Livestock and Game
Storey Books, 2003
Mettler, J
- Game Meat Hygiene in Focus: Microbiology, Epidemiology, Risk Analysis and Quality Assurance
Published by: Wageningen Academic Publishers, 2011
Paulsen, P

Journals and magazines

- Shooting Times and Country Magazine
- Shooting Gazette
- Sporting Gun
- British Deer Society - Deer, The Journal of the British Deer Society
- British Association for Shooting and Conservation, Shooting and Conservation
- National Gamekeepers Organisation, Keeping the Balance

Websites

- British Association for Shooting and Conservation
<http://basc.org.uk/cop/picking-up/>
- Food Standards Agency
<http://www.food.gov.uk/business-industry/farmingfood/wildgameguidance>
- Government of HM Queen Elizabeth II
<https://www.gov.uk/meat-and-meat-hygiene>
- Scottish Deer Steering Group
<http://www.bestpracticeguides.org.uk/>
- The National Archive
<http://www.legislation.gov.uk/uksi/1995/2148/made>
- The Deer Initiative
http://www.thedeerinitiative.co.uk/best_practice/meat_hygiene.php

Unit 338

River Fishery Creation and Management

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

Barnes, R & Mann, K

ISBN: 0632029838

Rehabilitation of Rivers for Fish

Cowx, I & Wellcomme, R

Published by: Food and Agriculture Organization of the UN, 1998

ISBN: 9251040184

Fresh water Fishes in Britain: The Species and Their Distribution Harding, P

Published by: Harley Books, 2004

ISBN: 0946589763

Aquatic Weed Control

Seagrave, C

Published by: Blackwell Science, 1988

ISBN: 0852381522

Fresh water Fisheries Management, 2nd Edition

Templeton, R

Published by: Blackwell Science, 1995

ISBN: 085238209X

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:	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:

- Fishery rules (eg catch and kill, catch and release, net dips, unhooking mats, barbless hooks, bait, rig, keepnet and bite alarms restrictions)
- Legislation and regulatory rules (eg Wildlife and Countryside Act 1981)
- Fishery Byelaws
- Salmon & Fresh water Fisheries Act 1975)
- 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

Baldwin C et al.

Published by: Mitchellwing Publications, 2001

ISBN: 0954005406

Fundamentals of Aquatic Ecology

Barnes, R S K & Mann, K H

Published by: Blackwell, 1991

ISBN: 0632029838

Fresh water Fisheries Management

Templeton, R G

Published by: Fishing News Books,1995

ISBN: 085238209X

Aquatic Weed Control

Seagrave, C

Fishing News Books,1988

ISBN: 0852381522

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 Welby, I. et al
Published by: Wiley – Blackwell, 2010
ISBN: 1405133325

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.

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
Published by: Oxford University Press, 2005
ISBN: 0198516134
Bronmark, C & Hansson, L
- Wildlife and Fresh water: An Agenda for Sustainable Management
Published by: English Nature, 1997
ISBN: 1857162609
English Nature
- Wicken Fen: The Making of a Wetland Nature Reserve
Published by: Harley Books, 1997
ISBN: 094658933X
Friday, L
- Water and Wetlands
Published by: Hodder Arnold, 1992
ISBN: 0340533684
Furniss, P; Lane, A & Tait, J
- The Biology of Streams and Rivers
Published by: Oxford University Press, 1998
ISBN: 0198549776
Giller, P & Malmqvist, B
- Rivers and Wildlife Handbook
Published by: A&C Black, 1994
ISBN: 0903138700
Holmes, N
- Wet Grassland Guide
Published by: A&C Black, 1997
ISBN: 0903138867
Trewick, J; Drake, M et al.
- 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
Published by: A&C Black, 2003
ISBN: 1901930378
White, G & Gilbert, J
- 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.hse.gov.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 Croft, P
 Published by: Field Studies Council, 1986
 ISBN: 1851531815
- Photographic Guide to Sea and Shore Life of Britain and North-west Europe
 Gibson, R; Hextall, B &
 Rogers, A
 Published by: Oxford University Press, 2001
 ISBN: 0198507097
- Fresh water Ecology: Principles and Applications Jeffries, M & Mills, D
 Published by: John Wiley and Sons, 1996
 ISBN: 0471946958
- Handguide to the Fishes of Britain and Europe Miller, P & Nicholls, J
 Published by: HarperCollins Publishers, 1980
 ISBN: 0002197510
- Small Fresh water Creatures Olsen, L-H; Pedersen, B &
 Sunesen, J
 Published by: Oxford University Press, 2001
 ISBN: 0198507984
- Fresh water Fisheries Management, 2nd Edition Templeton, R
 Published by: Blackwell Science, 1995
 ISBN: 085238209X

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 |

Unit 342

Coarse, game and sea angling techniques

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, coaching 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.

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

Buller, F

ISBN: 070906599X

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

Unit 343

Aquatics Welfare and Breed Development

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.

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 Published by: Iowa State University Press, 2010 ISBN-13: 9780813806976	Noga, E. J
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 Published by: EAFP Publications, 1998 ISBN 0952624206	Schlotfeldt, H.J & Alderman, DJ

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 Robinson, P

Published by: Southwater 2014
ISBN: 1780194072

Websites

Gardens Guide www.gardenvisit.com

Health and Safety Executive www.hse.gov.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

Seagrave, C

Published by: Mitchellwing Publications, 2001

ISBN: 0954005406

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.hse.gov.uk
Ornamental Aquatic Trade Association (OATA)	www.ornamentalfish.org

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
- NH₃
- NO₂
- NO₃
- PO₄
- O₂
- CO₂
- 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 (OATA)	http://www.ornamentalfish.org/

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
- NH₃
- NO₂
- NO₃
- PO₄
- O₂
- CO₂
- 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 zooxanthellae 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) Micheal, S W
Published by: t.f.h
ISBN: 9781890087388

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) Delbeek, C J; Sprung, J
Published by: Ricordea
ISBN: 1883693144

Aquarium Corals: Selection, Husbandry and Natural History (2001)
Published by: t.f.h
ISBN: 1890087475

Borneman, E

Aquarium Sharks and Rays (2001)
Published by: t.f.h (Microcosm)
ISBN: 1-890087-57-2

Micheal, S W

The Biology of Fishes (2007)
Published by Taylor & Francis
ISBN: 978-0415375627

Bone, Q; Moore, R

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

Unit 350

Warm water and marine aqua culture

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 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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City & Guilds Group

The City & Guilds Group is a leader in global skills development. Our purpose is to help people and organisations to develop their skills for personal and economic growth. Made up of City & Guilds, City & Guilds Kineo, The Oxford Group and ILM, we work with education providers, businesses and governments in over 100 countries.

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