Unit 7: Understanding the Principles of Wildlife Populations, Ecology and Conservation

Unit code: J/601/0106

QCF Level 3: BTEC National

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to introduce learners to the skills and knowledge associated with wildlife populations, ecology and conservation 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.

Unit introduction

Awareness and understanding of the importance of ecology and conservation has increased in recent times. This is due to the promotion of causes and campaigns to slow down climate change for the benefit of humans and the animals we share the planet with.

This unit is designed to enable learners to study the principles of ecology and how they relate to conservation. Learners should be encouraged to undertake as much practical work as possible.

Learning outcomes

On completion of this unit a learner should:

1 Understand changes in global ecosystems

2 Understand national and international conservation strategies for wildlife and their habitats

3 Understand population dynamics

4 Be able to conduct a field study of habitats and wildlife populations.

Unit content

1 Understand changes in global ecosystems

Global ecosystems: definitions (ecosystem, habitats); energy flow; trophic levels; biogeochemical cycles (carbon, nitrogen, water, phosphorous, oxygen); niches (carnivore, herbivore, omnivore, generalist, specialist); food chains; food webs; ecological pyramids

Changes: shifts in abundance and distribution of species; introduction of non-native species; increasing carbon dioxide (CO_2) levels; climate change; human impact; interspecies competition

2 Understand national and international conservation strategies for wildlife and their habitats

Conservation strategies: creation, maintenance and restoration of functional combinations of habitats; reducing the vulnerability of isolated habitats and species populations; making sites more robust for populations; wildlife action planning; comprehensive wildlife conservation strategies

3 Understand population dynamics

Population dynamics: fecundity; natality; mortality; immigration; emigration; basic breeding strategies (r and K); concepts of carrying capacity, density dependent population control, boom and bust cycling, life tables and survivorship; predator/prey relationships; age classes

4 Be able to conduct a field study of habitats and wildlife populations

Conduct a field study: objective setting; survey planning eg timing, equipment requirements, staff requirements; methods eg assessment of animal population by mark recapture methods, quadrat and transect surveys of plant species in a given habitat, kick sampling; assumptions inherent in such surveys; sources of error; record keeping methods; methods used to analyse data; health and safety; risk assessment; relevant current legislation and codes of practice

Basic habitat surveys: Phase 1 habitat survey techniques eg deciduous woodland, semi-natural coniferous woodland, semi-natural grassland, river corridors, lowland heaths, heather moorland, chalk, limestone grassland, sand dune, saltmarsh

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 explain global changes in ecosystems [IE1; CT1; SM1]		**D1** examine in detail methods and reasons for protecting ecosystems
P2 illustrate wildlife population changes in ecosystems [CT2; EP1; IE1]		
P3 assess reasons for global wildlife population fluctuations [CT1; IE1; EP2]		
P4 review national conservation strategies for wildlife and their habitats [CT2; RL2; SM3]	**M1** examine in detail the conservation strategy for a given wildlife species	
P5 discuss international conservation strategies for wildlife and their habitats [IE2; CT2; SM3; RL2]		
P6 explain predator prey interactions within wildlife populations [IE3; CT2; SM1; RL6]	**M2** analyse a population boom or bust for a given wildlife species, suggesting reasons for the change in population	**D2** explain in detail changes to the past and present population of a given wildlife species.
P7 discuss types of evolution within animal populations [CT1; RL5; SM1]		
P8 plan ecological surveys of habitats [EP3; TW1]	**M3** summarise the results of wildlife and habitat surveys, suggesting potential improvements to the habitats to stabilise wildlife populations.	
P9 carry out ecological surveys of habitats [EP3; TW1]		
P10 carry out wildlife population surveys. [EP3; TW1]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical and written assessments and visits to suitable wildlife habitats. It could link to work experience placements.

To successfully complete this unit, learners should be given opportunities for practical fieldwork, to include carrying out surveys and assessing wildlife habitats and populations.

Centres should be encouraged to give learners appropriate access to a variety of wildlife animals and habitats. Animal welfare and health and safety are of paramount importance. Access needs to be planned carefully to prevent the stress or suffering of animals, or the disturbance of their habitats.

Learners should be encouraged to carry out independent research for this unit, enabling them to develop their research and independent thinking skills.

Tutors should be encouraged to formulate links with external wildlife organisations to provide a 'real' view of wildlife ecology and conservation. Links could be made through visits and guest lectures from professionals such as animal experts, representatives from wildlife rescue centres, charities and other organisations.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and assessment
Introduction to the unit and tour of the estate to observe wildlife populations and habitats.
Global ecosystems: changes in systems, wildlife populations and reasons for changes.
Assignment 1: Ecosystems (P1, P2, P3, P4, P5, M1, D1) Tutor introduces the assignment brief. Learner-centred research.
National conservation strategies: how they work and success/failure rates for given species.
Evolution of populations of wildlife, predator/prey relationships and examples.
Assignment 2: Evolution of Populations (P6, P7, M2, D2) Tutor introduces the assignment brief. Learner-centred research.
Planning ecological and habitat surveys: what to look for, how to carry them out, when to carry them out, etc.
Current wildlife and ecological surveys: analysis of results and reasons for results.
Assignment 3: Ecological and Wildlife Surveys (P8, P9, P10, M3) Tutor introduces the assignment brief. Learner-centred research.
Carrying out ecological and wildlife population surveys: practical examples and assessments.
Unit review and evaluation.

Assessment

For P1, P2, P3, P4 and P5, learners are required to investigate global ecosystems, how they have changed, reasons for the changes, wildlife population fluctuations and national and international conservation strategies. Evidence could be a written assignment based around a case study chosen by the tutor, for example a particular population decline related to a change in an ecosystem, the reasons for the population decline, and the national and international conservation strategies in place to halt this decline. The global nature of P1, P2, P3, P4 and P5 should be interpreted through a case study related to one plant or animal species. Learners should be encouraged to carry out background research and analysis at this level.

For M1, learners need to focus on a given wildlife species and strategy used to conserve it. This could be evidenced through a presentation or written assignment.

For D1, learners need to examine in detail the methods and reasons for protecting ecosystems. Evidence could be in the form of a report or presentation.

For P6, learners need to investigate predator/prey relationships, giving at least two examples and examining how both parties are affected. Evidence could be in the form of a presentation or article, and learners should focus on both the positive and negative impact of the relationships. Learners should then, for P7, link this to the evolution of animal populations, giving specific examples of species and how and why their populations have evolved over time.

For M2, learners should be given an example of a species and a time when that species experienced a population 'boom or bust', and analyse the factors that contributed to this and reasons for the change. This could be presented via a report.

For P8, P9 and P10, learners should be assessed planning and carrying out both ecological surveys of habitats and wildlife population surveys. They should show evidence of planning the surveys including methods, potential hazards or risk assessment, and equipment needed. This could be carried out as a small-group exercise to avoid too much disturbance of habitats or wildlife. If group tasks are selected, tutors must ensure that each learner individually produces sufficient evidence to meet the criteria. Tutors should complete observation records to confirm individual learner achievement.

For M3, learners could summarise their results and suggest improvements for the habitats they have surveyed to stabilise or improve wildlife populations. Evidence is best produced as an individual report.

For D2, learners need to explain in detail changes to the past and present population of a given wildlife species. This will encourage learners to think both long term and 'outside the box' when it comes to the impact of population changes on wildlife and habitats.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, P5, M1, D1	Ecosystems	You work for an environmental research department. You need to examine how ecosystems can be protected and why this is important. You need to examine a conservation strategy that has been employed to protect a given wildlife species and expand this to consider national and international wildlife conservation strategies.	Report. Presentation. Observation record.
P6, P7, M2, D2	Evolution of Populations	You have been asked to explain wildlife population changes over time using relevant examples. You need to collect information on how and why populations change. You must include information on predator and prey interactions and the types of evolution within animal populations.	Report.
P8, P9, P10, M3	Ecological and Wildlife Surveys	You need to plan and carry out a wildlife population and an ecological survey on a given area as part of a group. You should summarise your own results and interpretation and use this to suggest potential habitat improvements for the benefit of wildlife species.	Practical research and data collection. Report/presentation. Observation records.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Land-based sector suite. This unit has particular links with the following units in the BTEC Land-based suite and the BTEC Environmental Sustainability suite:

Level 2	Level 3
Understand the Principles and Practices of Animal Establishments	Science for Environmental Technicians
Understanding Ecology of Trees, Woods and Forests	Undertake an Investigative Project in the Environmental Sustainability Sector
	Scientific Practical Techniques
	Informatics for Environmental and Sustainability Industries

Essential resources

Learners need supervised access to a range of semi-natural habitats in the local area including permission to carry out habitat surveys. Learners need access to personal protective equipment relevant to the survey methods being used.

Employer engagement and vocational contexts

Learners could be introduced to a variety of professionals from organisations such as the Royal Society for the Protection of Birds, Department for Environment, Food and Rural Affairs, Wildfowl and Wetlands Trust, Bat Conservation Trust, Wild Front Trust etc to broaden their depth of knowledge and make the learning experience interesting and contextualised. This could be through guest lectures or off-site visits to different establishments.

Indicative reading for learners

Textbooks

Chapman J and Reiss M – *Ecology: Principles and Applications* (Cambridge University Press, 1998) ISBN 9780521588027

Gurnell J and Flowerdew J – *Live Trapping Small Mammals* (Mammal Society, 2006) ISBN 9780906282540

JNCC – *Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit: Field Manual* (Joint Nature Conservation Committee, 1990) ISBN 9780861396375

Sutherland W (ed) – *Ecological Census Techniques: A Handbook, 2nd Edition* (Cambridge University Press, 2006) ISBN 9780521606363

Townsend C, Begon M and Harper J – *Essentials of Ecology, 3rd Edition* (Wiley-Blackwell, 2008) ISBN 9781405156585

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Independent enquirers	explaining changes in ecosystems illustrating population changes assessing reasons for changes reviewing national and international strategies for conservation explaining predator/prey relationships
Creative thinkers	explaining changes in ecosystems illustrating population changes assessing reasons for changes reviewing national and international strategies for conservation explaining predator/prey relationships discussing evolution of animal populations
Reflective learners	reviewing national and international strategies for conservation discussing evolution of animal populations
Team workers	planning and carrying out ecological and wildlife habitat and population surveys
Self-managers	explaining changes in ecosystems reviewing national and international strategies for conservation explaining predator/prey relationships discussing evolution of animal populations
Effective participators	illustrating population changes assessing reasons for changes planning and carrying out ecological and wildlife habitat and population surveys.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Independent enquirers	planning and carrying out research activities related to the unit
Creative thinkers	trying out alternatives or new solutions to wildlife and conservation adapting ideas as circumstances change, eg changes to animal welfare legislation
Reflective learners	setting goals for themselves, eg conquering a fear of handling an animal
Team workers	working with others to plan and monitor wildlife in their habitats and group activities in class reaching clear agreements regarding who is carrying out which tasks during practicals working together when working on habitat and population surveys or on work experience

Skill	When learners are ...
Self-managers	showing initiative and commitment to animals and their healthcare dealing with pressures in an emergency animal situation managing emotions when it comes to animal welfare and healthcare
Effective participators	discussing issues of concern when finding an animal in a less than ideal welfare situation identifying improvements to current habitats and conservation programmes.

Functional skills – Level 2

Skill	When learners are ...
ICT – using ICT	
Plan solutions to complex tasks by analysing the necessary stages	planning and carrying out wildlife and ecological surveys
Select, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts	completing assignments using ICT facilities
ICT – finding and selecting information	
Use appropriate search techniques to locate and select relevant information	researching topics via the internet
Select information from a variety of sources to meet requirements of a complex task	researching topics via the internet
ICT – developing, presenting and communicating information	
Enter, develop and refine information using appropriate software to meet requirements of a complex task	producing reports designing presentations
Use appropriate software to meet the requirements of a complex data-handling task	collecting data and analysing the results of wildlife and ecological surveys
Combine and present information in ways that are fit for purpose and audience	producing reports designing presentations
Evaluate the selection, use and effectiveness of ICT tools and facilities used to present information	producing reports designing presentations
Mathematics – representing	
Understand routine and non-routine problems in familiar and unfamiliar contexts and situations	calculating habitat sizes and measurements and recording these
Identify the situation or problems and identify the mathematical methods needed to solve them	calculating habitat sizes and measurements and recording these
Choose from a range of mathematics to find solutions	calculating habitat sizes and measurements and recording these
Mathematics – analysing	
Apply a range of mathematics to find solutions	calculating habitat sizes and measurements and recording these
Use appropriate checking procedures and evaluate their effectiveness at each stage	calculating habitat sizes and measurements and recording these
Mathematics – interpreting	
Interpret and communicate solutions to multistage practical problems in familiar and unfamiliar contexts and situations	calculating habitat sizes and measurements and recording these

Skill	When learners are ...
Draw conclusions and provide mathematical justifications	calculating habitat sizes and measurements and recording these
English – Speaking, Listening and Communication	
Make a range of contributions to discussions in a range of contexts, including those that are unfamiliar, and make effective presentations	presenting information to a group of people, eg peers
English – Reading	
Select, read, understand and compare texts and use them to gather information, ideas, arguments and opinions	reading material on the subject from a variety of sources for their assignment work reading around subjects and producing clear and concise documents using correct animal health terminology
English – Writing	
Write a range of texts, including extended written documents, communicating information, ideas and opinions, effectively and persuasively	producing reports.