National Unit specification: general information

Unit title: Aquatic Environments: An Investigation (SCQF level 3)

Unit code: H1SN 09

Superclass: MH

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Source: Scottish Qualifications Authority

Version: 01

Summary

The purpose of this Unit is to provide an introduction to aquatic environments, including the physical characteristics of freshwater and marine systems. The candidate will develop the knowledge and skills to identify aquatic flora and fauna at an introductory level. The Unit is aimed primarily at young people between the ages of 15 and 18 but is open to all age groups. The Unit is part of the National Progression Award in Angling and the Aquatic Environment at SCQF level 3, but can be taken as a free standing Unit. The candidate may progress to the National Progression Award in Angling and Fisheries Conservation at SCQF level 4.

Outcomes

1 Describe aquatic environments with reference to the hydrological cycle.
2 Identify the broad categories of aquatic flora for specified aquatic environments.
3 Identify the broad categories of aquatic fauna for specified aquatic environments.

Recommended entry

Entry is at the discretion of the centre. No prior knowledge and skills are required.

Credit points and level

1 National Unit credit at SCQF level 3: (6 SCQF credit points at SCQF level 3).

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

General information (cont)

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Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes of this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

National Unit specification: statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Outcome 1

Describe aquatic environments with reference to the hydrological cycle.

Performance Criteria

(a) Identify the main components of the hydrological cycle
(b) Describe the physical conditions in each zone of a typical river system
(c) Name the physical zones of a still water
(d) Describe the coastal zone of the marine environment

Outcome 2

Identify the broad categories of aquatic flora for specified aquatic environments.

Performance Criteria

(a) Identify macrophytes using simple identification keys
(b) Identify phytoplankton using simple identification keys

Outcome 3

Identify the broad categories of aquatic fauna for specified aquatic environments.

Performance Criteria

(a) Identify invertebrates using simple identification keys
(b) Identify vertebrates using images.

National Unit specification: statement of standards (cont)

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Evidence Requirements for this Unit

Evidence for all Outcomes and Performance Criteria should be gathered under open-book conditions.

Outcome 1

The evidence should be written or oral. The candidate must:

- identify five stages of the hydrological cycle on a diagram of the hydrological cycle
- describe the substrate and water flow conditions found in the upper, middle and lower zones of a river system
- name four physical zones of a still water on a cross sectional diagram
- name four coastal features on a map provided

Outcome 2

Outcomes 2 and 3 lend themselves to integrated assessment, based on the same aquatic environments.

The evidence should be written or recorded oral Evidence can be gathered in fresh water or marine intertidal environments on one occasion. Using live specimens or high quality images and simple keys, candidates must:

- Identify four macrophytes by their common names
- Identify four algae by their common names

Outcome 3

The evidence should be written or recorded oral Evidence can be gathered in fresh water or marine intertidal environments on one occasion. Using live specimens or high quality images and simple keys, candidates must:

- Identify four invertebrates by their common names
- Identify ten vertebrates stating which type of environment they are associated with, including:
  - five fish
  - three birds
  - two mammals

National Unit specification: support notes

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

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

Guidance on the content and context for this Unit

The basic physical processes that drive the hydrological cycle, evaporation, condensation and gravity, should be introduced at the outset, and related to the different water sources.

Candidates should develop a basic knowledge of the physical conditions found in three different types of aquatic environment, marine coastal, river and still water. An understanding of the influence of flow rate, substrate type, and light penetration on the distribution of aquatic flora and fauna should be developed and consolidated through field work.

Still water and river environments should be explored, developing basic identification skills for aquatic fauna and flora, using samples that have prominent indicative features. Candidates will learn to recognise common fish species, mammals and birds associated with freshwater environments. All flora and fauna should be referred to by their common names only.

Guidance on learning and teaching approaches for this Unit

Outcome 1: Hydrological cycle and aquatic environments

Candidates could be asked to name the natural water sources that they were aware of establishing their initial knowledge. A graphical representation of the hydrological cycle could be used to demonstrate the location of the different water sources. The use of ICT based ‘drag and drop’ graphical learning aids would assist the development of the candidates understanding of water movement between the atmosphere, rivers, still waters, ground water and the sea.

Maps, photographic images and diagrams could be used to illustrate the physical zones in river and still water environments, developing the candidates understanding of the influence of water movement on the physical condition of the substrate.

Candidates could locate coastal features on maps and ‘Google Earth’ to identify examples of:

- the Intertidal zone
- estuaries
- harbours
- sand banks
- spits
- reefs
- gravel bars

National Unit specification: support notes (cont)

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Under guidance, reference could be made to coastal Admiralty Charts, to illustrate the intertidal zone, submerged reefs and other coastal features for a specific location.

Candidatures should develop their knowledge of different river flow conditions and associated substrates through reference to data provided on flow rates and substrate compositions, including:

- torrential flow - Boulders
- moderate flow - Stones and gravel, some sand in the margins
- slow meandering flow - Silt and mud

Candidates should develop an understanding of the influence that light penetration has on the growth of plants, and the location of the productive littoral and lentic zones. This could be demonstration on still waters, through simple 'Sechi Disc' readings, used to assess the depth of the photic zone.

During freshwater field trips the candidates' recognition of physical zones in aquatic environments, and their associated physical features could be further developed. The relationship between river flow rates, substrate conditions and the distribution of different invertebrates could be demonstrated by 'kick sampling' rivers or streams.

Outcomes 2–4: Flora/fauna identification

It is advisable to introduce candidates to commonly occurring flora and fauna through access to diagrams and digital photographs, prior to practical field trips to familiarise them with the aquatic life they are likely to encounter.

Streams can be more safely accessed and sampled than rivers, using hand nets to collect 'invertebrate kick samples' which can be identified in the field, or taken back to a laboratory, allowing physical features including gills, and tail structures to be examined under microscopes.

Still waters should only be sampled under close supervision by some one familiar with the terrain, avoiding deep water and unstable substrates. Some still water flora and fauna, such as phytoplankton, zooplankton and small invertebrates, require specialised fine mesh nets for sample collection, and microscopes for the identification of live specimens. Where this is impractical, high quality digital photographs and diagrams can be used as an alternative.

The intertidal zone can be accessed for field work with due care and attention to tidal water movements and substrate conditions to ensure safe access.

The identification of aquatic flora and fauna can be assisted by reference to simple illustrative keys that emphasise the most obvious indicative features.

- leaf arrangement
- leaf shape
- growth habit

should be demonstrated to underpin plant identification.

National Unit specification: support notes (cont)

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Candidates should be familiarised with the basic anatomy of the main categories of Invertebrates before sampling still waters or rivers, including:

- insect larvae
- insect nymphs
- molluscs
- crustaceans
- worms
- beetles

Candidates should be familiarised with the external fish feature, including:

- fins
- scales
- the mouth parts

in preparation for species identification. The use of a real fish is recommended to demonstrate the structure of external features, in the first instance. Reference should be made to fin shape and position, morphology, colouration, and mouth parts when demonstrating how to identify common fish species, to include the following freshwater species:

- pike
- salmon
- brown trout
- rainbow trout
- roach
- common bream
- tench
- carp
- eel
- chub

Candidates should be made familiar with the following marine species:

- cod
- bass
- mackerel
- bream
- thornback ray
- tope
- common skate

The identification of birds and mammals could be based on the recognition of key physical features. High quality photographs may be needed to complement the identification of real specimens, which are often unavailable, other than in a natural history museum.

Candidates should be made familiar with the following birds

- heron
- kingfisher
- goosander
- cormorant
- dipper
- moorhen
- wagtail
- mallard

Candidates should be made familiar with the following mammals:

- otter
- mink
- common seal
- grey seal
- water vole

Essential skills

By adopting the above learning and teaching approaches and/or through the Outcomes and corresponding Evidence Requirements, the Unit should provide candidates with an opportunity to develop the following essential skill for life, learning and work:

Sustainability — the Unit could develop skills in sustainable development as it focuses on understanding the significances of maintaining the general health of aquatic environments and dependant flora and fauna for the use of future generations.

Guidance on approaches to assessment for this Unit

The assessment of Outcome 1 early on in the delivery, provides a platform for the field work and practical assessments to follow. Outcomes 2 and 3 can be integrated for assessment purposes, based on field visits to chosen aquatic environments.

Outcome 1

The Outcome could be assessed as an open-book activity with reference to text books or ICT based resources.

The names of the stages of the hydrological cycle could be provided and used by candidates to label a diagram of the hydrological cycle. This would include atmospheric water, river water, still water, ground water and the sea.

National Unit specification: support notes (cont)

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The following descriptions of flow and substrate conditions could be provided and used to label a cross sectional diagram of a river system that included, an upper middle and lower course:

The flow descriptions are:

- torrential flow
- moderate flow
- slow meandering flow

The substrate descriptions are:

- boulders
- gravel and stones
- mud and silt

The following still water zones could be provided and used to label a cross sectional diagram of a still water

- marsh
- littoral
- lotic
- benthic

An Admiralty Chart could be provided that demonstrates four of the following features below, and a grid references provided to each feature. The candidates could find the feature from the reference, and match the appropriate name to it.

The named features provided could include:

- the Intertidal zone
- estuaries
- harbours
- sand banks
- spits
- reefs
- gravel bars

Outcomes 2 and 3

The identification of flora and fauna can supported by simple keys that provide the common names of broad categories at the taxonomic Order level. Alternatively, high quality diagrams or photographs can be used to support the identification process.

It is advisable to narrow the scope of the identification work to include distinctive, easily recognisable specimens only.

The assessment feedback and therefore learning can be enhanced by asking candidates to provide a record of the definitive feature(s) that led them to their conclusions when identifying specimens.

Opportunities for the use of e-assessment

E Assessment could be developed using 'drag and drop' graphics, allowing names and descriptions to be matched to features, to describe the hydrological cycle, physical conditions in different river zones, still water zones and the coastal environment.

Opportunities for developing Core Skills

In this Unit candidates will be develop knowledge of water characteristics within a range of aquatic environments and the flora and fauna associated with such environments.

Candidates will:

- describe the hydrological cycle in different aquatic environments
- identify the aquatic flora and fauna of specified aquatic environments

This means that as candidates are doing this Unit they will be developing aspects of the Core Skills in *Communication* and *Working with Others* through field work conducted as a group activity, *Problem Solving* skills through the interpretation of simple keys in order to identify flora and fauna.

Candidates will also get opportunities to develop *Numeracy* skills through reading Admiralty Charts references, in order to locate features.

Disabled candidates and/or those with additional support needs

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

History of changes to Unit

Version	Description of change	Date