National Unit specification: general information

Unit title: Aquaculture: Aquatic Environments

Unit code: H036 11

Superclass: SJ

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Summary

The purpose of this Unit is to enable candidates to develop an understanding of selected aquatic environments, relating the environmental conditions to the environmental requirements of a specific aquaculture system. Candidates will develop the skills to measure water characteristics of most significance to aquaculture, and will develop basic identification skills for relevant aquatic flora and fauna.

On completion of this Unit candidates should understand how environmental conditions and seasonal fluctuations determine whether a specified aquaculture enterprise is feasible in a given location.

The Unit is suitable for candidates who are either new entrants or those already working in aquaculture and for those who are interested in the environmental impacts of modern aquaculture on the aquatic environment.

This is an optional Unit in the NPA in Fish Husbandry (SCQF level 5), and the NPA in Fish Health and Nutrition (SCQF level 5). It is also available as a freestanding Unit.

Outcomes

1 Describe water sources suitable for specific aquaculture activities.
2 Gather information on a local aquatic environment with aquaculture potential.
3 Assess the suitability of an aquatic environment for a specified aquaculture enterprise.

Recommended entry

Entry is at the discretion of the centre.

General information (cont)

Unit title: Aquaculture: Aquatic Environments (SCQF level 5)

Credit points and level

1 National Unit credit at SCQF level 5 (6 SCQF credit points at SCQF level 5*).

*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.

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

Unit title: Aquaculture: Aquatic Environments (SCQF level 5)

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.

All activities must be carried out according to current legislation and recognised Standard Operating Procedures (SOP).

Outcome 1

Describe water sources suitable for specific aquaculture activities.

Performance Criteria

(a) Describe the hydrological cycle.
(b) Describe the water quality characteristics relevant to aquaculture.
(c) Describe the role of regulatory bodies in monitoring and licensing the water supply for a given aquaculture site.

Outcome 2

Gather information on a local aquatic environment with aquaculture potential.

Performance Criteria

(a) Extract and interpret information from maps.
(b) Measure key water quality characteristics.
(c) Record measured water quality characteristics in the appropriate units.
(d) Identify and record local aquatic flora and fauna, including indicator and predator species, using common names.

Outcome 3

Assess the suitability of an aquatic environment for a specified aquaculture enterprise.

Performance Criteria

(a) Describe the topography and physical characteristics of the aquatic environment and its immediate surrounds.
(b) Interpret water quality data.
(c) Record a range of values for seasonal water quality characteristics accurately.
(d) Assess the impact of the proposed aquaculture enterprise on flora and fauna.
(e) Produce a report on the aquatic environment for a given aquaculture site.

National Unit Specification: statement of standards (cont)

Unit title Aquaculture: Aquatic Environments (SCQF level 5)

Evidence Requirements for this Unit

Evidence is required to demonstrate that candidates have achieved all Outcomes and Performance Criteria.

Candidates should have access to a laboratory and water analysis equipment to achieve the practical competences. All activities must be carried out in accordance with current legislation.

Outcome 1 — Written and/or oral recorded evidence is required that demonstrates that the candidate can:

- describe stages of the hydrological cycle accurately.
- describe water quality characteristics for two different water sources.
- describe the roles of regulatory bodies in monitoring and licensing a given aquaculture site.

Evidence will be produced in closed-book conditions.

Outcome 2 — Performance, written and/or oral recorded evidence is required that demonstrates that, for a potential aquaculture site the candidate can:

- use maps to extract, interpret and record a minimum of three site characteristics.
- measure and record a minimum of three water quality characteristics in the appropriate Units.
- identify and record a minimum of four common aquatic flora and a minimum of six aquatic fauna, including site specific indicator/predator species.

Evidence will be produced in supervised open-book conditions.

Outcome 3 — Performance, written and/or oral recorded evidence is required that demonstrates that the candidate can:

- describe a minimum of two topographic and two physical characteristics for the chosen site.
- interpret annual water quality data accurately for a given aquaculture site.
- record seasonal profiles accurately for a minimum of four water quality characteristics.
- assess the impact on the recorded flora and fauna on the given aquaculture site.
- present findings effectively.

Evidence will be produced in supervised open-book conditions.

National Unit Specification: support notes

Unit title Aquaculture: Aquatic Environments (SCQF level 5)

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

This is an optional Unit in the NPA in Fish Husbandry (SCQF level 5), and the NPA in Fish Health and Nutrition (SCQF level 5). It is also available as a freestanding Unit.

This Unit is aligned to the following LANTRA Sector Skills Council's National Occupational Standard (NOS):

- Aqu 12 Monitor the aquatic production environment
- Aqu 13 Maintain environmental conditions within holding Units
- Aqu 37 Work safely in an aquatic environment

The candidate could be introduced to the aquatic environments used for aquaculture in Northern Europe, illustrating the main differences between the water characteristics of each (marine, running freshwater and still freshwater). The water quality characteristics will be explored, developing an awareness of how water characteristics can be modified during different stages of the hydrological cycle.

Candidates should have access to a laboratory and water analysis equipment to achieve the practical competencies.

The candidate should analyse the seasonal profiles of water characteristics for an aquatic environment and explain the differences with reference to information on the water catchments derived from maps.

The candidate should select a local aquaculture site and investigate the water's physical and chemical parameters (such as temperature, dissolved oxygen, salinity, pH and ammonia) and biological characteristics. The field data is gathered applying standard techniques for each parameter, supplemented by additional data, revealing typical seasonal changes in water characteristics. The candidate should determine the influence of physical factors such as depth and topography in the case of marine environments and fresh still water, and gradients, in the case of running fresh water, on water characteristics such as salinity, water currents/flows, water chemistry and the distribution of flora and fauna.

The field work should include an exploration of flora and flora common to the site, but with particular emphasis on species impacting on aquaculture, such as predator species, parasites, and fouling organisms, shellfish spat, and biological indicators of water quality.

The suitability of the aquatic environment investigated for a specific aquaculture enterprise is determined with reference to the species tolerance limits and the conditions of the environment, culminating in the production of a short report.

National Unit Specification: support notes (cont)

Unit title Aquaculture: Aquatic Environments (SCQF level 5)

The importance of carrying out all monitoring and sampling activities in line with current health and safety legislation should be emphasised including reference to SOPs and the requirements for appropriate personal protective equipment (PPE).

Guidance on learning and teaching approaches for this Unit

This Unit lends itself to a range of teaching and learning approaches that give consideration to the Curriculum for Excellence capacities and Equalities legislation, through reasonable adjustment for all candidates. Tutor led knowledge development can be used effectively in the early stages, building an understanding of underpinning concepts, including the hydrological cycle, the factors influencing the water characteristics of different environments and the environmental requirements of North European Aquaculture enterprises.

There is scope for candidate centred learning exercises based on text references, web based resources and interactive IT based learning objects presented within a virtual learning environment (VLE). Interactive exercises and regular formative assessment, incorporating online multiple-choice is recommended, in order to develop the candidates understanding of the inter-relationships between the landscape, geology, land use and the aquatic environment. An awareness of the distribution of fish farm enterprises in Scotland could be established through candidate enquiry, with reference to Government statistics on the aquaculture industry.

It would be advantageous to have learning packages for each water type (marine, running freshwater, still freshwater) to allow independent study following the introduction of underpinning concepts.

Skills in using a wide range of paper based or on-line maps is required, including hydrological, geological, soil type and land use maps, in order to determine the influences on water characteristics in specific aquatic environments. Practical instruction must be included covering water sampling, water testing and map interpretation.

Field work can be either teacher led or, if it is practicable and safe, groups of candidates can plan and organise their own field work, thereby providing opportunities for team leadership, team work and communication.

The Unit could be enhanced considerably though site visits to a range of aquatic environments and aquaculture sites illustrating key concepts. Talks from aquaculture Unit managers, emphasising the influence that the conditions of the aquatic environment have on their aquaculture operation, are encouraged.

The candidate should be introduced to the concept of species ‘tolerance limits’ and optimum conditions, prior to evaluating the aquaculture potential of a chosen site.

National Unit Specification: support notes (cont)

Unit title Aquaculture: Aquatic Environments (SCQF level 5)

Guidance on approaches to assessment for this Unit

A range of assessment approaches is envisaged, including restricted response, observation of practical tasks with accompanying checklists, and the completion of a short report to a given structure.

Outcome 1 could be assessed using short response or multiple choice questions.

Outcome 2 requires a portfolio of evidence.

Outcome 3 could be assessed using a project or short report.

Centres must be satisfied that the evidence submitted is the work of individual candidates.

Assessor observation checklists and other assessment records should be maintained and kept up to date to keep track of candidate progress and to provide evidence for internal and external verification purposes.

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by information and communications technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003), SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

Opportunities for developing Core Skills

In this Unit candidates will develop skills in determining the suitability of aquatic environments as aquaculture sites.

Candidates will:

- identify the main differences between the water characteristics of marine, running freshwater and still freshwater.
- analyse the seasonal profiles of water characteristics for an aquatic environment and explain the differences with reference to information on the water catchments derived from maps.
- investigate water's physical and chemical parameters including temperature, dissolved oxygen, salinity, pH and ammonia and biological characteristics.
- gather field data to identify and monitor typical seasonal changes in water characteristics while adhering to current health and safety legislation.

- determine the influence of physical factors on water characteristics such as salinity, water currents/flows, water chemistry and the distribution of flora and fauna.
- explore impact flora and fauna have on aquaculture.

This means that as candidates are doing this Unit they will be developing aspects of the Core Skills of *Problem Solving* and *Numeracy*.

In addition, whilst completing this Unit, candidates may develop aspects of the following Core Skills where specific learning and teaching approaches are adopted:

- *Communication* — candidates may use a wide range of paper based or on-line maps, including hydrological, geological, soil type and land use maps, in order to determine the influences on water characteristics in specific aquatic environments.
- *ICT* — candidates may use ICT for supporting data analysis through spreadsheets, tabulation, graphical presentation of data. In addition, candidates may use word processing and or power point to produce their report on an aquaculture site.
- *Working with Others* — candidates may be required to discuss and agree suitable field trip locations.

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