



## Higher National Unit specification

### General information for centres

**Unit title:** Fish Science: Freshwater Fish

**Unit code:** F4S8 34

**Unit purpose:** This Unit is designed to enable candidates to gain knowledge and understanding of fish identification, classification and biology. It will also develop the skills required to identify fish species and carry out routine fish dissection work.

On completion of the Unit the candidate should be able to:

- 1 Describe and classify fish.
- 2 Explain the life cycles of British freshwater fish.
- 3 Explain the anatomy and physiology of fish.
- 4 Identify the external and internal anatomical features of fish using examination and dissection techniques.

**Credit points and level:** 2 HN credits at SCQF level 7: (16 SCQF credit points at SCQF level 7\*)

*\*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.*

**Recommended prior knowledge and skills:** Access to this Unit is at the discretion of the centre; however, it would be beneficial if candidates have achieved Biology at SCQF level 6.

**Core Skills:** There are opportunities to develop the Core Skill of IT at SCQF level 5 and the Core Skills components of Written Communication (*Communication*) at SCQF level 5 and Planning and Organising (*Problem Solving*) at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

**Context for delivery:** If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

**Assessment:** It is recommended that Outcome 1 is assessed in conjunction with Outcome 3 using restricted response questions. In addition, performance evidence supported by keying out records in open-book conditions could be used for fish identification and classification.

Outcome 2 could be assessed using an open-book investigation and associated report.

Outcome 4 could be assessed by fish dissections carried out during practical laboratory sessions.

## **Higher National Unit specification: statement of standards**

**Unit title:** Fish Science: Freshwater Fish

**Unit code:** F4S8 34

The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

### **Outcome 1**

Describe and classify fish

#### **Knowledge and/or Skills**

- ◆ Taxonomic groupings of fish
- ◆ Anatomical features used in fish classification
- ◆ Classification of British freshwater fish
- ◆ Anatomical features used in British freshwater fish classification
- ◆ Taxonomic keys for identification and classification of British freshwater fish to species level

#### **Evidence Requirements**

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ for two major taxonomic groups of fish, describe three key distinguishing anatomical features.
- ◆ describe the classification of four species of British freshwater fish to order and family.
- ◆ describe two distinguishing anatomical features of two families of British freshwater fish.
- ◆ identify and classify 15 British freshwater fish to species level by common and scientific names from specimens, photographs or drawings, using a taxonomic key. Candidates must have access to a recognised taxonomic key and must record routes through the key.

Apart from the identification and classification of fish, all of the above must be carried out under closed-book conditions.

#### **Assessment Guidelines**

The identification and classification of fish could be conducted in open-book conditions.

Apart from the identification and classification of fish, this Outcome could be assessed in conjunction with Outcome 3, details of which are given at the end of Outcome 3.

## Higher National Unit specification: statement of standards (cont)

**Unit title:** Fish Science: Freshwater Fish

### Outcome 2

Explain the life cycles of British freshwater fish

#### Knowledge and/or Skills

- ◆ Life cycle stages
- ◆ Behaviour
- ◆ Growth rates
- ◆ Environmental requirements of the different stages of the life cycle

#### Evidence Requirements

Candidates must cover **two** species of British freshwater fish of his/her choice from **two** separate families, and for the two species selected they will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ explain the life cycle stages, which must include: ova, first feeding, early development, and maturity
- ◆ explain the behaviour of all life cycle stages, which must include: territoriality, shoaling, migration, feeding, and spawning
- ◆ explain the growth rates
- ◆ explain the environmental requirements of the different stages of the life cycle, this must include: physical, chemical, and biological requirements

#### Assessment Guidelines

This Outcome could be assessed using an open-book investigation and associated report.

### Outcome 3

Explain the anatomy and physiology of fish

#### Knowledge and/or Skills

- ◆ Structure of external features of fish: skin; fin; gill
- ◆ Function of external features of fish: skin; fin; gill
- ◆ Structure of internal systems of fish: muscle; skeletal; circulatory; digestive; excretory; osmoregulatory; reproductive; nervous; endocrine
- ◆ Function of internal systems of fish: muscle; skeletal; circulatory; digestive; excretory; osmoregulatory; reproductive; nervous; endocrine

#### Evidence Requirements

Evidence for this Outcome will be generated through sampling as detailed below.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion to prevent the candidates being able to predict what they will be asked.

## **Higher National Unit specification: statement of standards (cont)**

### **Unit title:** Fish Science: Freshwater Fish

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ for one species of fish, describe the structure of any two external features
- ◆ for one species of fish, explain the function of any two external features
- ◆ for one species of fish, describe the structure of any five internal systems
- ◆ for one species of fish, explain the function of any five internal systems

For each assessment occasion as a whole, knowledge of a minimum of two species of fish is required.

All of the above must be carried out under closed-book conditions.

### **Assessment Guidelines**

This Outcome could be assessed in conjunction with Outcome 1 using restricted response questions. Note that the identification and classification of fish in Outcome 1 could be assessed separately in open-book conditions.

### **Outcome 4**

Identify the external and internal anatomical features of fish using examination and dissection techniques

#### **Knowledge and/or Skills**

- ◆ Fish dissection techniques
- ◆ Fish examination techniques
- ◆ External and internal organ location and identification skills: skin; fin; gill; muscle; skeletal; circulatory; digestive; excretory; osmoregulatory; reproductive; nervous; endocrine
- ◆ External organ sampling and microscopic examination techniques: skin; fin; gill
- ◆ Internal system sampling and microscopic examination techniques: muscle; skeletal; circulatory; digestive; excretory; osmoregulatory; reproductive; nervous; endocrine
- ◆ Record keeping skills for laboratory dissection

#### **Evidence Requirements**

Evidence for this Outcome will be generated through sampling as detailed below.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion to prevent the candidates being able to predict what they will be asked.

## **Higher National Unit specification: statement of standards (cont)**

### **Unit title:** Fish Science: Freshwater Fish

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can for a single species:

- ◆ dissect a fish
- ◆ locate, identify, sample and examine microscopically two external organs
- ◆ locate, identify, sample and examine microscopically four internal systems
- ◆ produce concise and illustrated laboratory records of dissection

All of the above should be carried out under supervised conditions and should be supported by candidates' laboratory records.

It is anticipated that this Outcome will be assessed over a period of time and not on a single occasion. If the selected species of fish is not available for a particular examination technique, an alternative species may be used.

### **Assessment Guidelines**

This Outcome could be assessed by fish dissections carried out during practical laboratory sessions.

## Administrative Information

**Unit code:** F4S8 34  
**Unit title:** Fish Science: Freshwater Fish  
**Superclass category:** RH  
**Original date of publication:** August 2008  
**Version:** 01

### History of changes:

Version	Description of change	Date

**Source:** SQA

© Scottish Qualifications Authority 2008

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre for further details, telephone 0845 279 1000.

## Higher National Unit specification: support notes

### Unit title: Fish Science: Freshwater Fish

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 80 hours.

### Guidance on the content and context for this Unit

This Unit is intended for candidates who are working in or seeking a career in the aquaculture and fisheries management industries. The teaching and learning of this Unit should be delivered in this context, particularly with regard to the range of species considered. Health and safety procedures should always be followed especially in the practical components of this Unit where individuals are dissecting fish.

Additional information relating to each Outcome is given below:

**Outcome 1** is intended to provide a broad overview of the classification and evolutionary relationships of the major groups of living fish and the main features shared by each major taxonomic group. It is intended to provide the candidate with an introduction to the diversity of fish species in general with more detailed reference to the families and species of British freshwater fish in particular. Those covered in more detail could include commonly farmed species and those of particular significance to freshwater fisheries management. The Outcome will also provide the candidate with the skills necessary to identify species of freshwater fish using a taxonomic key.

**Outcome 2** provides the candidate with an understanding of the behaviour, natural life cycles and environmental requirements of selected examples of British freshwater fish. Species of particular relevance to the British aquaculture and fisheries management industries could normally be covered. Candidates will have the opportunity to research species of particular interest to their own field of work.

**Outcome 3** covers the anatomy and physiology of fish with particular reference to British freshwater fish species. All major external and internal structures and their functions could be covered, including reference to the differences that exist between the main groups of fish being studied. The importance of the anatomical structures and their physiological functions to the health and well being of the fish should be emphasised. Wherever possible a strong link could be made between the theoretical delivery in this Outcome and the practical skills of Outcome 4.

**Outcome 4** is designed to provide the candidate with the skills to carry out routine dissection work on fish. The Outcome could also serve to reinforce the theory delivered in Outcome 3. Dissection work could be carried out on species relevant to the candidate's field of interest where possible. Basic laboratory skills involved in sampling tissues and preparing samples for microscopic examination could also be covered.

Note that assessment for Outcomes 3 and 4 involves sampling. It must be emphasised that all Knowledge and/or Skills must be taught regardless of the sample used for assessment on any particular occasion.

## Higher National Unit specification: support notes (cont)

**Unit title:** Fish Science: Freshwater Fish

### Guidance on the delivery and assessment of this Unit

This Unit is likely to be part of a Group Award designed to provide candidates with the ability to work in the aquaculture and fisheries management industries. It could also be a stand alone Unit for those with a particular interest in fish.

Where the Unit forms part of the HNC Fish Farming it should ideally be delivered after the Unit F4N5 34 *Water Resources for Aquaculture and Fisheries* and prior to delivery of the Unit F4S5 34 *Fish Health and Disease*.

Note that assessment for Outcomes 3 and 4 involves sampling. It is emphasised again that all Knowledge and/or Skills must be taught even though it is not all assessed on any particular occasion.

For Outcome 1, the identification and classification of fish could be assessed separately under open-book conditions in a laboratory if fresh specimens are being used. The remainder of Outcome 1 and Outcome 3 could be assessed by a closed-book restricted response question paper. The structure and function of the organs of species from contrasting groups of fish, for example the cyprinids and the salmonids, could form the basis for the minimum requirement for two species in Outcome 3.

Outcome 2 could be assessed by a candidate investigation and report of approximately 2,000 words or equivalent into two selected species of freshwater fish.

Outcome 4 could be assessed by performance evidence and the requirement for the candidate to submit records of the laboratory dissection work.

#### *Opportunities for developing Core Skills*

This Unit provides the opportunity to develop Core Skills in the following areas:

- ◆ Written Communication skills at SCQF level 5 in the form of written reports
- ◆ *IT* at SCQF level 5 in the preparation of the report for Outcome 2
- ◆ Planning and Organising component of *Problem Solving* at SCQF level 6 in carrying out research for the Outcome 2 investigation.

### Open learning

If this Unit is delivered by open or distance learning methods, additional resources will be required for candidate support, assessment and quality assurance. Distance learning materials produced or approved by the centre will need to be made available to candidates. As well as paper-based materials, remote access to the centre's virtual learning environment and the internet could be facilitated.

### Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* ([www.sqa.org.uk](http://www.sqa.org.uk)).



## General information for candidates

### Unit title: Fish Science: Freshwater Fish

This Unit is intended to help prepare you for work in the aquaculture and fisheries management industries but is equally valuable if you have a general interest in freshwater fish.

When you undertake the Unit you will study the major groups of fish that exist today and gain an understanding of their broad diversity and relationships. You will also look in more detail at the families and species of freshwater fish that are found in and around the British Isles, with particular emphasis being placed on those that are of particular interest to fish farming and freshwater fisheries management in this country.

The Unit will also provide you with the necessary skills to identify any species of fish using an identification key.

You will undertake your own study into the natural life cycles, behaviour, growth rates, habitat and environmental requirements of two selected species of freshwater fish that are of particular interest to you.

The Unit covers the basic structure and function of the major external and internal organs of fish, linking those to the physiological process they control or are involved with. An understanding of fish anatomy and physiology is critically important for those working with live fish and therefore involved in the management of their health and welfare.

Finally you will have the opportunity to gain the practical skills involved in the clinical dissection of fish and the preparation and microscopic examination of a range of tissue samples. These practical exercises will reinforce the theoretical information gained earlier in the Unit.

The Unit will also afford you the opportunity to develop the Core Skill of *IT* to SCQF level 5 and the Core Skills components of Written Communication to SCQF level 5 and Planning and Organising (*Problem Solving*) to SCQF level 6.

In order to achieve this Unit, you will have to pass each component assessment. There will be one closed-book test consisting of restricted response questions. There will be one open-book exercise involving performance evidence supported by keying out records for fish identification and classification. One assessment will be an open-book investigation and associated report of the life cycles, behaviour, growth rates, habitat and environmental requirements of two species of British freshwater fish. The practical dissection work will be assessed under supervised conditions using performance evidence supported by your laboratory dissection records.