Higher National Unit specification

General information for centres

Unit title: Fish Hatchery Management (Salmonid)

Unit code: F4N4 34

Unit purpose: This Unit is designed to enable candidates to gain knowledge and understanding of hatchery operations and develop the skills required to assess potential, plan production, manage fish stocks and conduct hatchery operations.

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

1 Describe the design and function of hatchery equipment.
2 Estimate the production potential of a hatchery.
3 Explain the principles of hatchery stock management.
4 Conduct ova production and husbandry operations.
5 Conduct juvenile fish rearing operations.

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 the following National Units: D854 11 *Fish Farming: Water Supply* and D853 11 *Fish Farming: Salmonid Ova Production* or equivalent or if they had some previous hatchery work experience.

Core Skills: There are opportunities to develop the Core Skills of *Problem Solving* at SCQF level 6 and *IT* and *Working with Others* at SCQF level 5 and the Core Skills components of Written Communication and Using Number at SCQF level 5 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 this Unit is assessed using a combination of closed-book tests, case study and practical performance evidence.

Outcome 1 and Outcome 3 could be assessed by extended response questions.

Outcome 2 could be assessed by a case study based on a given scenario at an existing hatchery site.

Outcome 4 and Outcome 5 could be assessed by performance evidence and candidates' records.

Higher National Unit specification: statement of standards

Unit title: Fish Hatchery Management (Salmonid)

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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 the design and function of hatchery equipment

Knowledge and/or Skills

- Commercial ova incubation systems
- Holding units for juvenile fish
- Hatchery environmental control equipment
- Ova and juvenile fish production equipment

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can describe the operation and design of:

- two types of commercial salmonid ova incubation system
- two types of holding Unit for juvenile salmonid fish
- salmonid hatchery environmental control equipment to include one example of equipment used to control each of the following: water supply; water quality; lighting
- salmonid ova and juvenile fish production equipment, to include one type of equipment for each of the following: administering feed; controlling hygiene; grading fish; treating disease; vaccinating fish

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

Assessment Guidelines

This Outcome could be assessed using extended response questions.

Higher National Unit specification: statement of standards (cont)

Unit title: Fish Hatchery Management (Salmonid)

Outcome 2

Estimate the production potential of a hatchery

Knowledge and/or Skills

- Hatchery water supplies
- Physical hatchery design characteristics
- Ova and fish production potential
- Hatchery operation equipment

Evidence Requirements

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

- analyse the quantity and quality of a given water source with reference to its suitability for use in a salmonid hatchery
- produce a hatchery design from given physical characteristics to ensure efficient use of available space
- estimate the number of salmonid ova and juvenile fish that could be produced from a given situation and water supply
- produce a list of equipment, with justification for each item and type, that would be required in order to produce the estimated number of salmonid ova and fish

The evidence for this Outcome should relate to an existing hatchery site.

Assessment Guidelines

This Outcome could be assessed by a case study carried out in open-book conditions.

Higher National Unit specification: statement of standards (cont)

Unit title: Fish Hatchery Management (Salmonid)

Outcome 3

Explain the principles of hatchery stock management

Knowledge and/or Skills

- Principles of salmonid broodstock selection
- Principles of sex reversal in salmonids
- Husbandry of salmonid broodstock
- Salmonid broodstock stripping
- Salmonid ova incubation
- Ova husbandry and hygiene procedures
- Alevin husbandry and hygiene procedures
- Principles of rearing juvenile salmonid fish

Evidence Requirements

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

- explain the selection criteria for salmonid broodstock, to include age and size of fish, origin, genetics and conformation
- explain the principles and techniques used to achieve single sex and sterile populations of salmonid fish
- describe the husbandry requirements of salmonid broodstock, including reference to holding units, stocking density, nutrition, disease control and life span
- describe salmonid broodstock stripping techniques, to include production of mixed sex, single sex and triploid ova
- describe industry recognised salmonid ova hygiene and husbandry procedures from the point of fertilisation to hatching, to include washing off excess milt, water hardening, counting, incubation, picking out mortalities, shocking and transportation techniques
- describe industry recognised alevin hygiene and husbandry procedures from hatching to first feeding to include lighting, picking out mortalities and assessment of yolk sac utilisation
- describe industry recognised procedures used to rear juvenile salmonid fish, to include hygiene, feeding, grading, stocking density, sample weighing, environmental control and disease control

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

Assessment Guidelines

This Outcome could be assessed using extended response questions.

Higher National Unit specification: statement of standards (cont)

Unit title: Fish Hatchery Management (Salmonid)

Outcome 4

Conduct ova production and husbandry operations

Knowledge and/or Skills

- Salmonid broodstock selection
- Salmonid broodstock sexual products
- Salmonid ova fertilisation and incubation
- Quantifying salmonid ova production
- Salmonid ova and alevin hygiene

Evidence Requirements

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

- select ripe salmonid broodstock based on physical indications of sexual maturity on three occasions
- remove sexual products from salmonid broodstock females and males on three occasions
- fertilise and prepare salmonid ova for incubation, on three occasions
- count the number of fertilised salmonid ova produced on three occasions
- incubate salmonid ova, monitor their environment and development and record the results twice weekly over the period from incubation to hatching
- remove dead salmonid ova and alevins at appropriate stages of development on three occasions

All of the above must be carried out under supervised conditions.

Assessment Guidelines

This Outcome could be assessed using performance evidence observed and recorded at an existing hatchery site together with candidates' records.

Higher National Unit specification: statement of standards (cont)

Unit title: Fish Hatchery Management (Salmonid)

Outcome 5

Conduct juvenile fish rearing operations

Knowledge and/or Skills

- Juvenile salmonid fish husbandry
- Sample weighing of juvenile fish
- Disease treatment of juvenile fish

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can, over a period of twelve weeks:

- monitor juvenile salmonid fish development and behaviour when the yolk sac is nearly depleted on two occasions
- monitor daily feed utilisation and feed juvenile salmonid fish accordingly
- monitor the environmental conditions for juvenile salmonid fish to include daily water temperature check and weekly water flow rate check
- monitor and remove waste and mortalities on a daily basis
- grade juvenile salmonid fish according to size on three occasions
- monitor and record on a weekly basis, juvenile salmonid fish sample weights in two holding units
- observe and record any abnormal behaviour in a juvenile salmonid fish population in a hatchery holding Unit on two occasions
- record disease treatments and daily mortalities in a population of juvenile salmonid fish

All of the above must be carried out under supervised conditions.

Assessment Guidelines

This Outcome could be assessed using performance evidence observed and recorded at an existing hatchery site together with candidates' records.

Administrative Information

Unit code: F4N4 34

Unit title: Fish Hatchery Management (Salmonid)

Superclass category: SJ

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History of changes:

Version	Description of change	Date

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Higher National Unit specification: support notes

Unit title:

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 salmonid aquaculture industry or for candidates working in the fisheries management industry.

The teaching and learning of this Unit should be delivered in this context.

Health and safety procedures should always be followed especially in the practical components of this Unit.

Additional information relating to each Outcome is given below:

1 This Outcome covers the design and function of hatchery equipment.
Ova incubation units, fish holding units, environmental control equipment and ova/fish production equipment should all be covered.

2 This Outcome covers the evaluation of the production potential of a hatchery.
Water quantity and quality should be covered, as well as the physical parameters of the site. Equipment needs should also be assessed so that an overall production figure can be calculated for the site with the given constraints.

3 This Outcome covers the principles of hatchery management.
Areas to be covered are broodstock selection, husbandry and sex reversal, stripping of broodstock, ova husbandry and hygiene, alevin husbandry and hygiene and rearing of juvenile fish from first feeding to target size.

4 This Outcome covers ova production and husbandry.
Areas to be covered are selection of ripe broodstock, stripping of broodstock, fertilisation and preparing eggs for incubation, counting ova, ova incubation and hygiene, ova shocking, ova picking, hatching, alevin husbandry and control of the environment for ova and alevins.

5 This Outcome covers juvenile fish rearing.
Areas to be covered are husbandry of first feeding fry, feeding regimes, sample weighing of fish, control of rearing conditions for fish, disease treatments, size grading of fish, fish observation.

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 salmonid aquaculture and fisheries management industries. It could also be a stand alone Unit for those wishing to improve their knowledge and understanding of salmonid fish rearing.

There is a major practical component to this Unit. Candidates will have to look after ova and fish to ensure that they have the practical skills to complement the theoretical knowledge gained in this Unit.

Photographs, videos, slides, visits to salmonid hatcheries and presentations by visiting speakers could all enhance this Unit. This will reinforce learning and widen the candidate's range of experience.

There are two theory assessments, one case study and two practical assessments.

The theory assessments for Outcome 1 and Outcome 3 could be assessed by extended response questions.

Outcome 2 could be assessed by a case study based on a given scenario at an existing hatchery site.

The practical assessments for Outcome 4 and Outcome 5 could be assessed by performance evidence.

Opportunities for developing Core Skills

This Unit provides the opportunity to develop communication skills in the form of closed-book assessments, written reports and oral questioning while performing practical tasks. Candidates will also need to follow written and oral instruction from the tutor.

There are opportunities to develop the Core Skills of *Problem Solving* at SCQF level 6 and *IT* and *Working with Others* at SCQF level 5 and the Core Skills components of Written Communication and Using Number at SCQF level 5 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

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. In particular, candidates will require access to a salmonid hatchery.

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)**.

General information for candidates

Unit title: Fish Hatchery Management (Salmonid)

The credit value of this Unit is 2 HN credits at SCQF level 7 (16 SCQF credit points at SCQF level 7).

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

The Unit has five main subject areas. Each subject has a separate Outcome.

In Outcome 1 you will study the design and function of salmonid hatchery equipment. This equipment is used to maintain as near optimal conditions as possible for ova and fish and also to aid the production process. Some of this Unit may be integrated with the content of the Unit *Fish Production Technology*.

The second Outcome will enable you to assess a hatchery to quantify the production potential of the site. Environmental and physical constraints to production will be investigated and the use of technology will be evaluated.

The third Outcome will develop your knowledge of the criteria for selection of broodstock, sex reversal and triploidy. Husbandry of broodstock to ensure viable ova and sperm and the principles of stock management in a hatchery will also be covered.

In the fourth Outcome you will gain practical skills and apply knowledge to produce viable salmonid ova and incubate them successfully to the alevin stage.

In the fifth Outcome you will gain practical skills and apply knowledge to produce fish of the required size and quality from first feeding.

It is recommended that you supplement your learning by gaining as much practical experience as possible. Visits or voluntary work would allow you to increase both your practical skills and knowledge and understanding of the many different aspects of work in a salmonid hatchery.

There are opportunities to develop Core Skills in this Unit, as follows:

Problem Solving at SCQF level 6; *IT* and *Working with Others* at SCQF level 5; the Core Skills components of Written Communication and Using Number at SCQF level 5.

To complete this Unit successfully you will have to achieve a satisfactory level of performance in all assessments. Outcomes 1 and 3 will be assessed in closed-book conditions; for Outcome 2 you will carry out a case study; the practical skills for Outcomes 4 and 5 will be assessed by observation under supervised conditions.