



Australian Government

Department of Education, Employment and Workplace Relations

SFIAQUA502C Develop and implement an aquaculture breeding strategy

Release: 1

SFIAQUA502C Develop and implement an aquaculture breeding strategy

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	<p>This unit of competency involves developing and implementing a breeding strategy, determining breeding objectives and broodstock or progeny selection criteria and applying them to an aquaculture or ornamental enterprise.</p> <p>Licensing, legislative, regulatory or certification requirements may apply to this unit. Therefore it will be necessary to check with the relevant state or territory regulators for current licensing, legislative or regulatory requirements before undertaking this unit.</p>
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Application of the Unit

Application of the unit	<p>This unit has application to aquaculture and ornamental enterprises that undertake breeding. It may be a dedicated breeding facility or be part of a vertically integrated production enterprise.</p> <p>Breeding enterprises operate under strict permits that stipulate requirements necessary to comply with environmental protection regulations.</p> <p>All enterprise or workplace procedures and activities are carried out according to <i>relevant government regulations, licensing and other compliance requirements</i>, including <i>occupational health and safety (OHS) guidelines</i> and <i>ecologically sustainable development (ESD) principles</i>.</p> <p>Equipment operation, maintenance, repairs and calibrations are undertaken in a safe manner that conforms to manufacturer instructions. Appropriate <i>personal protective equipment (PPE)</i> is selected, checked, used and maintained.</p>
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Determine breeding objectives	<p>1.1. Breeding strategy requirements are determined taking into account the capacity of the facility, relevant characteristics of cultured or held stock and marketing and production plans.</p> <p>1.2. Breeding and production records are interpreted and used as the base line for breeding strategy.</p> <p>1.3. Economic assessments are undertaken to establish the feasibility of breeding objectives.</p> <p>1.4. Selection aims or goals are determined according to enterprise or customer requirements.</p>
2. Determine and apply selection criteria	<p>2.1. Visual and objective methods of good stock selection are determined.</p> <p>2.2. Criteria are established for female and male selection.</p> <p>2.3. Broodstock that fail to meet selection criteria are culled.</p> <p>2.4. Broodstock and genetic material are identified, samples sent for analysis by external laboratory, results received and genetic and disease implications assessed.</p>
3. Manage the breeding program	<p>3.1. Breeding facilities are planned and managed to meet veterinary guidelines and broodstock requirements.</p> <p>3.2. Broodstock maturation or spawning treatments, where applicable, are implemented.</p> <p>3.3. Fertilisation and progeny rearing strategy is determined according to breeding objectives.</p> <p>3.4. Stock for sale are identified according to the breeding strategy and sale complies with ESD principles and environmental protection permit requirements.</p> <p>3.5. Breeding objectives are evaluated.</p> <p>3.6. Replacement broodstock are selected according to the breeding strategy.</p> <p>3.7. Mechanisation or automation of process or activity, including the use of specialised contract services, is researched and recommendations made to management.</p> <p>3.8. Data from stock selection and sales is gathered and analysed to determine the success of the breeding program against breeding strategy and objectives.</p>

ELEMENT	PERFORMANCE CRITERIA
	3.9. Breeding plan is documented to detail all procedures and updated for changes in the breeding objectives. 3.10. Personnel are directed on the implementation of the breeding plan.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- analysing economic and production data
- calculating genetic gain and evaluating it
- developing breeding strategy and setting breeding objectives
- directing personnel on implementing the breeding plan
- researching veterinary guidelines and broodstock requirements
- selecting female and male broodstock
- selecting genetic resources.

Literacy skills used for:

- compiling detailed stock records
- designing and documenting programs
- interpreting laboratory reports and permit requirements
- reading and assessing literature.

Numeracy skills used for:

- calculating percentage per proportion of sexes used, and traits passed on to progeny
- counting stock.

Required knowledge

- assessment criteria to determine the effectiveness of breeding
- basic principles of genetics
- breeding and life cycle biology of cultured or held stock
- breeding strategy available
- breeding techniques and programs which maximise genetic gain
- economic assessment of production characteristics

REQUIRED SKILLS AND KNOWLEDGE

- genetic development in aquaculture and ornamental stock
- mechanisation or automation of process or activity
- risks associated with breeding program
- use of specialised contract services.

Evidence Guide

EVIDENCE GUIDE	
<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment evidence required to demonstrate competence in this unit	<p>Assessment must confirm the ability to:</p> <ul style="list-style-type: none"> • select desired trait • select suitable broodstock and genetic material • plan and manage breeding facilities • implement maturation or spawning treatments • manage the breeding program • assess effectiveness of strategy. <p>Assessment must confirm knowledge of:</p> <ul style="list-style-type: none"> • assessment criteria to determine effectiveness of breeding strategies • breeding and life cycle biology of culture stock • breeding strategies.
Context of and specific resources for assessment	<p>Assessment is to be conducted at the workplace or in a simulated work environment. Assessment will need to cover several breeding cycles and at least two (2) species common to the region.</p> <p>Resources may include:</p> <ul style="list-style-type: none"> • broodstock and genetic material • broodstock handling facility.
Method of assessment	<p>The following assessment methods are suggested:</p> <ul style="list-style-type: none"> • demonstration • practical exercises • project work • written or oral short-answer testing.
Guidance information for assessment	<p>This unit may be assessed holistically with other units within a qualification.</p>

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Relevant government regulations, licensing and other compliance requirements may include:

- ESD principles, environmental hazard identification, risk assessment and control
- aquaculture regulations, permits, licences, quotas, catch restrictions and other compliance requirements, including international treaties and agreements
- imports quarantine and inspection, and importing approved arrangements for Australian Quarantine Inspection Service (AQIS), Australian Customs Service (ACS) and Biosecurity Australia (BA)
- Indigenous native title, land claims and cultural activities, including fishing by traditional methods
- land, buildings and vehicles:
 - buildings and structures design and appearance, constructions and additions
 - poaching, trespass and theft
 - road laws for use of motor vehicles, bikes, trucks and other transport equipment
 - soil and water management
 - use of chemicals and biological agents
 - use of firearms and powerheads
 - use of utilities, including water, natural gas, electricity and sewage
 - water or land lease, tenure or ownership and use
- OHS hazard identification, risk assessment and control
- product quality assurance:
 - correct naming and labelling (e.g. country of origin, Australian Fish Names Standard and eco-labelling)
 - correct quantities, sizes and other customer

RANGE STATEMENT	
	<p>requirements</p> <ul style="list-style-type: none"> • third-party certification (e.g. Australian Grown and ISO 14001:2004 Environmental management systems).
<i>OHS guidelines</i> may include:	<ul style="list-style-type: none"> • appropriate workplace provision of first aid kits and fire extinguishers • clean, uncluttered, hygienic workplace • codes of practice, regulations and/or guidance notes which may apply in a jurisdiction or industry sector • enterprise-specific OHS procedures, policies or standards • hazard and risk assessment of workplace, maintenance activities and control measures • induction or training of staff, contractors and visitors in relevant OHS procedures and/or requirements to allow them to carry out their duties in a safe manner • OHS training register • safe lifting, carrying and handling techniques, including manual handling, and the handling and storage of hazardous substances • safe systems and procedures for outdoor work, including protection from solar radiation, fall protection, confined space entry and the protection of people in the workplace • systems and procedures for the safe maintenance of property, machinery and equipment, including hydraulics and exposed moving parts • the appropriate use, maintenance and storage of PPE.
<i>ESD principles</i> may include:	<ul style="list-style-type: none"> • controlling use and recycling of water, and managing water quality and quantity • increasing use of renewable, recyclable and recoverable resources • managing environmental hazard identification, risk assessment and control • managing imported products quarantine and inspection, facility biosecurity, translocation of livestock and genetic material, and health certification • managing stock health and welfare, especially

RANGE STATEMENT	
	<p>for handling, holding, transport and slaughter</p> <ul style="list-style-type: none"> • managing sustainable fisheries or broodstock/seedstock collection requirements, such as size limits, quotas, season restrictions, population dynamics, fishing impacts, reducing by-catch, fisheries management strategies and maintaining biodiversity • managing, controlling and treating effluents, chemical residues, contaminants, wastes and pollution • minimising noise, dust, light or odour emissions • planning environmental and resource efficiency improvements • preventing genetically modified and live cultured or held organisms from escaping into environment • protecting native and protected flora and fauna, marine or land parks or areas, adhering to the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), the Ramsar Convention, World Heritage and other international treaties for which Australia is a signatory • reducing emissions of greenhouse gases • reducing use of non-renewable resources • reducing disturbances to soils, erosion and surface water flows from machinery use and other activities • reducing energy use and introducing alternative energy sources.
PPE may include:	<ul style="list-style-type: none"> • buoyancy vest or personal floatation device (PFD) • gloves, mitts or gauntlets, and protective hand and arm covering • hard hat or protective head covering • hearing protection (e.g. ear plugs and ear muffs) • insulated protective clothing for freezers or chillers and refrigeration units • non-slip and waterproof boots (gumboots) or other safety footwear • personal locator beacon or Emergency

RANGE STATEMENT	
	Position Indicating Radio Beacon (EPIRB) <ul style="list-style-type: none"> • protective eyewear, glasses and face mask • protective hair, beard and boot covers • protective outdoor clothing for tropical conditions • respirator or face mask • safety harness • sun protection (e.g. sun hat, sunscreen and sunglasses) • uniforms, overalls or protective clothing (e.g. mesh and waterproof aprons) • waterproof clothing (e.g. wet weather gear and waders).
<i>Breeding strategy requirements</i> may include:	<ul style="list-style-type: none"> • crosses and use of hybrids • emasculation or single sex manipulation • induced spawning • natural spawning • other sterilising methods • polyploidy • source of broodstock (wild caught or captive breed) check for local strains • source of stock (wild caught or captive breed) - check for local strains • stripping of gametes.
<i>Facility</i> may include:	<ul style="list-style-type: none"> • broodstock holding facility • nursery • spawning and larval rearing facility (hatchery).
<i>Characteristics of cultured or held stock</i> may include:	<ul style="list-style-type: none"> • numbers required • optimum size or grade to stock culture units • optimum time to stock culture units • size or life cycle phase required.
<i>Economic assessments</i> may include:	<ul style="list-style-type: none"> • condition • costs and benefits of alternative strategies • feed conversion ratio (FCR) • growth rates • percentage improvement per generation • proportion of desired traits • survival rates and hardiness.
<i>Selection aims or goals</i> may include:	<ul style="list-style-type: none"> • breeding goals • disease resistance

RANGE STATEMENT	
	<ul style="list-style-type: none"> • family selection criteria • faster growth • improved production history • improved profitability • improved survival hardiness • strain selection criteria.
Visual methods may include:	<ul style="list-style-type: none"> • age • general appearance and colour • percentage deformity • sex ratio • size • temperament.
Objective methods may include:	<ul style="list-style-type: none"> • body weight • condition and gonad maturation • disease infestations or parasites • disease susceptibility and survivability • flesh colour and condition • growth rate • previous breeding success • standard selection indices • vitality and hardiness.
Genetic material may include:	<ul style="list-style-type: none"> • cell cultures • ova (non-fertilised and fertilised) • sperm.
Maturation or spawning treatments may include:	<ul style="list-style-type: none"> • eyestalk and ablation • food availability • hormonal or chemical • light • pH • salinity • stripping of gonadesgonads • temperature • tidal or water flow.

Unit Sector(s)

Unit sector	Aquaculture operations
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Co-requisite units

Co-requisite units		

Competency field

Competency field	
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