



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **SFIAQUA308C Maintain water quality and environmental monitoring**

**Release: 1**

## SFIAQUA308C Maintain water quality and environmental monitoring

### Modification History

Not Applicable

### Unit Descriptor

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| <b>Unit descriptor</b> | <p>This unit of competency involves monitoring water quality and environmental parameters, and using this information for the maintenance of appropriate conditions for <b><i>cultured or held stock</i></b>. It covers interpreting instructions, appropriately using equipment, data entry and analysis and conveying information. Skills to supervise staff undertaking various activities are covered by RTE3704A Coordinate worksite activities.</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

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| <b>Application of the unit</b> | <p>All enterprise or workplace procedures and activities are carried out according to <b><i>relevant government regulations, licensing and other compliance requirements</i></b>, including <b><i>occupational health and safety (OHS) guidelines, food safety and hygiene regulations and procedures</i></b>, and <b><i>ecologically sustainable development (ESD) principles</i></b>.</p> <p>Equipment operation, maintenance, repairs and calibrations are undertaken in a safe manner that conforms to manufacturer instructions. Appropriate <b><i>personal protective equipment (PPE)</i></b> is selected, checked, used and maintained.</p> |
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### Licensing/Regulatory Information

Refer to Unit Descriptor

## Pre-Requisites

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| <b>Prerequisite units</b> |  |  |
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## Employability Skills Information

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| <b>Employability skills</b> | This unit contains employability skills. |
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## Elements and Performance Criteria Pre-Content

|                                                                   |                                                                                                                                                                                                                                                                                                                  |
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| 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| 1. Plan and organise for monitoring  | <p>1.1. Monitoring schedule is read or heard, and confirmed with senior personnel.</p> <p>1.2. <b>Stock behaviour, routine water quality and environmental parameters</b> to be monitored are identified.</p> <p>1.3. <b>Non-routine water quality and environmental parameters</b> to be measured are identified.</p> <p>1.4. <b>Equipment</b> requirements for water quality and environmental monitoring are determined, checked for availability and serviceability, and readied for use.</p> <p>1.5. <b>Repairs and calibrations</b> are made.</p> <p>1.6. Options for mechanisation or automation of process or activity are determined, including the use of specialised contract services.</p> <p>1.7. Staff undertaking routine monitoring are briefed on responsibilities according to monitoring schedule.</p> |
| 2. Carry out monitoring and sampling | <p>2.1. Monitoring and sampling tests are undertaken.</p> <p>2.2. <b>Samples for external analysis</b> are preserved, packaged and sent to laboratory according to laboratory requirements.</p> <p>2.3. Specific and general observations are made.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 3. Complete monitoring activities    | <p>3.1. Clean up of work area, including repairs and storage of equipment, is supervised and condition report prepared.</p> <p>3.2. Relevant monitoring data, observations or information are recorded legibly and accurately, and any out of range or unusual records are checked.</p> <p>3.3. Compliance and other required reports are prepared and conveyed to senior personnel advising of the effectiveness of monitoring, and recommendations made for improvements.</p> <p>3.4. Feedback is given or sought on effectiveness of the monitoring operations.</p>                                                                                                                                                                                                                                                    |

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

**REQUIRED SKILLS AND KNOWLEDGE**

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

**Required skills**

- communicating with senior personnel on monitoring schedule, and staff on responsibilities
- communicating ideas on possible improvements
- maintaining and repairing monitoring equipment
- operating monitoring equipment
- recognising normal/abnormal stock behaviour and environmental conditions
- reporting orally and in writing on monitoring activities to senior personnel
- supervising staff.

**Literacy skills used for:**

- reading and interpreting monitoring schedules
- recording monitoring information.

**Numeracy skills used for:**

- calculating volumes, and measuring mass and volume
- drawing calibration curves
- reading monitoring machines or test kits.

**Required knowledge**

- biology and chemistry of water bodies
- correct collection and submission of samples for external analyses
- monitoring equipment calibration and operating methods
- monitoring equipment maintenance and advanced repairs
- monitoring equipment options and limitations
- OHS and ESD principles
- options for mechanisation or automation of process or activity, including the use of specialised contract services
- water quality tests to be undertaken.

## Evidence Guide

| <b>EVIDENCE GUIDE</b>                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| 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. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Overview of assessment</b>                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Critical aspects for assessment evidence required to demonstrate competence in this unit</b>                                                                                                                        | <p>Assessment must confirm the ability to:</p> <ul style="list-style-type: none"> <li>correctly use advanced water quality tests and monitoring equipment in carrying out the aquaculture operation's quality and environmental monitoring program and to supervise staff carrying out basic water quality testing and monitoring.</li> </ul> <p>Assessment must confirm knowledge of:</p> <ul style="list-style-type: none"> <li>advanced water quality tests and water sampling</li> <li>operation, maintenance and calibration of monitoring equipment</li> <li>preservation of samples</li> <li>submission of samples for external analyses.</li> </ul>   |
| <b>Context of and specific resources for assessment</b>                                                                                                                                                                | <p>Assessment is to be conducted at the workplace or in a simulated work environment. It should reflect the range of monitoring equipment and tests typically used on aquaculture farms or holding/display facilities in the local region and it should involve supervision of staff carrying out basic water quality tests and monitoring.</p> <p>Resources may include:</p> <ul style="list-style-type: none"> <li>cameras</li> <li>culture or holding structure and medium</li> <li>monitoring equipment</li> <li>on-site scenario or case study</li> <li>research reference material</li> <li>staff to supervise</li> <li>water quality tests.</li> </ul> |
| <b>Method of assessment</b>                                                                                                                                                                                            | <p>The following assessment methods are suggested:</p> <ul style="list-style-type: none"> <li>project work related to on-site scenario or based on a case study</li> <li>research assignment</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| EVIDENCE GUIDE                             |                                                                                                                |
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|                                            | <ul style="list-style-type: none"> <li>• role play</li> <li>• written or oral short-answer testing.</li> </ul> |
| <b>Guidance information for assessment</b> | This unit may be assessed holistically with other units within a qualification.                                |

## Range Statement

| RANGE STATEMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| <p>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.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p><b><i>Cultured or held stock</i></b> may include:</p>                                                                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>• adults, broodstock (ready to breed), seedstock or stockers, eggs and sperm, fertilised eggs, larvae, post-larvae, seed, spat, hatchlings, yearlings, juveniles, fry, fingerlings, yearlings, smolt, sporophytes, seedlings and tissue cultures</li> <li>• finfish, crustaceans, molluscs, aquatic reptiles, amphibians, polychaete and oligochaete worms, plankton, micro-algae, seaweed, aquatic plants, live rock, sponges and other aquatic invertebrates</li> <li>• for human consumption (seafood), stockers for other farms, stockers for conservation or recreational fishing, display or companion animals (ornamentals), and other products, including pearls, skins, shells, eggs, chemicals and pigments</li> <li>• wild caught, hatchery or nursery reared.</li> </ul> |
| <p><b><i>Relevant government regulations, licensing and other compliance requirements</i></b> may include:</p>                                                                                                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>• biodiversity and genetically modified organisms</li> <li>• biosecurity, translocation and quarantine</li> <li>• business or workplace operations, policies and practices</li> <li>• correct marketing names and labelling</li> <li>• environmental hazard identification, risk</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| <b>RANGE STATEMENT</b>                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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|                                                                               | <ul style="list-style-type: none"> <li>assessment and control</li> <li>food safety/Hazard Analysis Critical Control Point (HACCP), hygiene and temperature control along chain of custody, and Australian Quarantine Inspection Service (AQIS) Export Control (Fish) orders</li> <li>health and welfare of aquatic animals</li> <li>maritime operations, safety at sea and pollution control</li> <li>OHS hazard identification, risk assessment and control.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b><i>OHS guidelines</i></b> may include:                                     | <ul style="list-style-type: none"> <li>appropriate workplace provision of first aid kits and fire extinguishers</li> <li>codes of practice, regulations and/or guidance notes which may apply in a jurisdiction or industry sector</li> <li>enterprise-specific OHS procedures, policies or standards</li> <li>hazard and risk assessment of workplace, maintenance activities and control measures</li> <li>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</li> <li>OHS training register</li> <li>safe lifting, carrying and handling techniques, including manual handling, and the handling and storage of hazardous substances</li> <li>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</li> <li>systems and procedures for the safe maintenance of property, machinery and equipment, including hydraulics and exposed moving parts</li> <li>the appropriate use, maintenance and storage of PPE.</li> </ul> |
| <b><i>Food safety and hygiene regulations and procedures</i></b> may include: | <ul style="list-style-type: none"> <li>Australian Shellfish Sanitation program</li> <li>equipment design, use, cleaning and maintenance</li> <li>exporting requirements, including AQIS Export Control (Fish) orders</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| <b>RANGE STATEMENT</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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|                                    | <ul style="list-style-type: none"> <li>• HACCP, food safety program, and other risk minimisation and quality assurance systems</li> <li>• location, construction and servicing of seafood premises</li> <li>• people, product and place hygiene and sanitation requirements</li> <li>• Primary Products Standard and the Australian Seafood Standard (voluntary)</li> <li>• product labelling, tracing and recall</li> <li>• receipt, storage and transportation of food, including seafood and aquatic products</li> <li>• requirements set out in Australian and New Zealand Food Authority (ANZFA) Food Standards Code and state and territory food regulations</li> <li>• temperature and contamination control along chain of custody.</li> </ul> |
| <b>ESD principles</b> may include: | <ul style="list-style-type: none"> <li>• applying animal welfare ethics and procedures</li> <li>• control of effluents, chemical residues, contaminants, wastes and pollution</li> <li>• improving energy efficiency</li> <li>• increasing use of renewable, recyclable and recoverable resources</li> <li>• minimising noise, dust, light or odour emissions</li> <li>• preventing live cultured or held organisms from escaping into environment</li> <li>• reducing emissions of greenhouse gases</li> <li>• reducing energy use</li> <li>• reducing use of non-renewable resources</li> <li>• undertaking environmental hazard identification, risk assessment and control.</li> </ul>                                                             |
| <b>PPE</b> may include:            | <ul style="list-style-type: none"> <li>• buoyancy vest or personal floatation device (PFD)</li> <li>• hard hat or protective head covering</li> <li>• hearing protection (e.g. ear plugs and ear muffs)</li> <li>• non-slip and waterproof boots (gumboots) or other safety footwear</li> <li>• personal locator beacon or Emergency Position Indicating Radio Beacon (EPIRB)</li> <li>• protective outdoor clothing for tropical</li> </ul>                                                                                                                                                                                                                                                                                                           |

| <b>RANGE STATEMENT</b>                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|                                                                        | <ul style="list-style-type: none"> <li>conditions</li> <li>• safety harness</li> <li>• sun protection (e.g. sun hat, sunscreen and sunglasses)</li> <li>• uniforms, overalls or protective clothing (e.g. mesh and waterproof aprons)</li> <li>• waterproof clothing (e.g. wet weather gear and waders).</li> </ul>                                                                                                                                                                                                 |
| <b>Stock behaviour</b> may include:                                    | <ul style="list-style-type: none"> <li>• aggressive or cannibalistic</li> <li>• colour changes</li> <li>• feeding</li> <li>• piping, darting, flashing or whirling movement</li> <li>• predator avoidance</li> <li>• reproduction or courtship</li> <li>• schooling or individuals</li> <li>• swimming (finfish), crawling (crustaceans or gastropods) or gaping (bivalves).</li> </ul>                                                                                                                             |
| <b>Routine water quality and environmental parameters</b> may include: | <ul style="list-style-type: none"> <li>• alkalinity</li> <li>• ammonia</li> <li>• dissolved oxygen</li> <li>• hardness</li> <li>• major organisms in surrounding environment</li> <li>• nitrate</li> <li>• nitrite</li> <li>• pH</li> <li>• salinity and conductivity</li> <li>• temperature</li> <li>• tides, water flow and wave action</li> <li>• turbidity (secchi disc and transparency)</li> <li>• weather, rain and wind.</li> </ul>                                                                         |
| <b>Non-routine water quality parameters</b> may include:               | <ul style="list-style-type: none"> <li>• bacterial (e.g. E. coli and faecal coliforms)</li> <li>• biological oxygen demand (BOD)</li> <li>• carbon dioxide, methane and hydrogen sulphide gas</li> <li>• changes in native land-based and/or aquatic life around the farm, including macro-invertebrates and macrophytes</li> <li>• chlorophyll and algal species identification and counts</li> <li>• clay content of soil, types of sediments</li> <li>• contaminants/chemicals, including pesticides,</li> </ul> |

| <b>RANGE STATEMENT</b>                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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|                                                                 | <ul style="list-style-type: none"> <li>herbicides and heavy metals</li> <li>• density and types of fouling organisms</li> <li>• density and types of natural feeds</li> <li>• dissolved or suspended solids or wastes</li> <li>• ozone</li> <li>• phosphorus (total and orthophosphate)</li> <li>• presence of severe weather conditions (e.g. king tides, extreme temperatures and fluctuations)</li> <li>• redox potential</li> <li>• soil or sediment pH</li> <li>• toxic micro-algae.</li> </ul> |
| <b><i>Non-routine environmental parameters</i></b> may include: | <ul style="list-style-type: none"> <li>• changes in native land-based and/or aquatic life around the farm, including macro-invertebrates and macrophytes</li> <li>• predators, pests, pathogens, fouling organisms and natural foods</li> <li>• presence of severe weather conditions (e.g. king tide)</li> <li>• on-farm and external chemicals</li> <li>• sediment and debris levels</li> <li>• toxic micro-algae</li> <li>• wastes and contaminants.</li> </ul>                                   |
| <b><i>Equipment</i></b> may include:                            | <ul style="list-style-type: none"> <li>• advanced chemical tests</li> <li>• electronic machines and specialised machinery, such as spectrophotometer and chlorinometer</li> <li>• flow injection auto analysers</li> <li>• micropipettes</li> <li>• probes, grabs, nets, dredges, traps, cages, plankton nets and water sample bottles</li> <li>• refractometer</li> <li>• soil analysis kits</li> <li>• still and video cameras, remote controlled cameras or vehicles.</li> </ul>                  |
| <b><i>Repairs and calibrations</i></b> may include:             | <ul style="list-style-type: none"> <li>• adjustment of probes or other settings for calibration</li> <li>• replacement of electronic parts, covers and probes.</li> </ul>                                                                                                                                                                                                                                                                                                                            |
| <b><i>Samples</i></b> may include:                              | <ul style="list-style-type: none"> <li>• culture or holding equipment</li> <li>• pests, predators or fouling organisms</li> <li>• sediments or soils</li> </ul>                                                                                                                                                                                                                                                                                                                                      |

| <b>RANGE STATEMENT</b>                |                                                                                                                                                                                                                                                                                                     |
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|                                       | <ul style="list-style-type: none"> <li>• stock</li> <li>• vegetation (land and aquatic)</li> <li>• water</li> <li>• weather station/meteorological data.</li> </ul>                                                                                                                                 |
| <i>External analysis</i> may include: | <ul style="list-style-type: none"> <li>• contaminants, such as heavy metals, pesticides, herbicides and other chemicals</li> <li>• feeds</li> <li>• pathology</li> <li>• proximate analysis of culture or other organisms</li> <li>• trace elements and mineral content of waters/soils.</li> </ul> |

## Unit Sector(s)

|                    |                        |
|--------------------|------------------------|
| <b>Unit sector</b> | Aquaculture operations |
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## Co-requisite units

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| <b>Co-requisite units</b> |  |  |
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## Competency field

|                         |  |
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| <b>Competency field</b> |  |
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