

## Describe the principles of aquatic ecology and relate to aquaculture

**Level** 3

**Credits** 10

**Purpose** People credited with this unit standard are able to describe: energy and nutrient flows in the aquatic ecosystem; patterns in phytoplankton abundance and how they relate to aquaculture; interactions between organisms and how they relate to aquaculture; tides and tidal patterns and how they relate to aquaculture; zonation in the aquatic environment and how it relates to aquaculture; the potential ecological impacts of aquaculture and the farming techniques used to minimise these impacts; and how the ecological impacts of human activities on land and in the aquatic environment can impact on aquaculture.

**Subfield** Seafood

**Domain** Aquaculture

**Status** Registered

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**Entry information** Open.

**Accreditation** Evaluation of documentation and visit by NZQA and industry.

**Standard setting body (SSB)** Primary Industry Training Organisation

**Accreditation and Moderation Action Plan (AMAP) reference** 0123

This AMAP can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

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### Special notes

- 1 For the purpose of this unit standard the candidate must choose one aquatic species from any of the following categories: molluscs, fin fish, crustaceans, and echinoderms. The same species must be described for each element.
- 2 Aquaculture can include marine or freshwater farming at any stage of the lifecycle.

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## Elements and performance criteria

### Element 1

Describe energy and nutrient flows in the aquatic ecosystem.

#### Performance criteria

- 1.1 The description includes three main chemical elements required by most living organisms.
- 1.2 The description outlines energy flows through an ecosystem and their implications on the structure of ecosystems.
- Range food chains, food webs, pyramids of biomass.
- 1.3 The description outlines how organisms obtain nutrients.
- Range producers and consumers.
- 1.4 The description outlines the role of decomposers in the cycling of nutrients in the aquatic environment.
- 1.5 The description outlines a nutrient cycle for one of the chemical elements in the aquatic environment.

### Element 2

Describe patterns in phytoplankton abundance and how they relate to aquaculture.

#### Performance criteria

- 2.1 The description includes the spatial patterns in phytoplankton abundance and what causes them.
- Range depth, small scale patchiness and large scale variation.
- 2.2 The description includes the temporal patterns in phytoplankton abundance and what causes them.
- Range seasonal patterns, species succession.
- 2.3 The description includes the impacts of phytoplankton patterns on aquaculture.

### Element 3

Describe interactions between organisms and how they relate to aquaculture.

#### Performance criteria

- 3.1 The description includes a definition for each type of interaction.
- Range predation, commensalism, parasitism, interspecific competition, intraspecific competition.
- 3.2 The description includes four interactions of potential economic significance between the aquaculture species and other species.
- 3.3 The description includes two ways in which the impacts of undesirable interactions are minimised.
- 3.4 The description includes the effects of competition within the aquaculture species.
- Range may include but is not limited to – growth rate, condition, mortality, shell shape, stock loss and food conversion rate; evidence is required for three.

### Element 4

Describe tides and tidal patterns and how they relate to aquaculture.

#### Performance criteria

- 4.1 The description includes tides and tidal patterns in terms of high, low, spring and neap tides.
- 4.2 The description includes the effects of tides and tidal patterns on the aquaculture species.

### Element 5

Describe zonation in the aquatic environment, and how it relates to aquaculture.

#### Performance criteria

- 5.1 The description includes a definition of zonation and includes one example.
- 5.2 The description includes three key factors determining zonation patterns.
- 5.3 The description includes the relationship between zonation and the techniques of aquaculture.
- Range may include but is not limited to – catching depth, over settlement, control of catching densities, control of fouling, tank design; evidence is required for one.

## Element 6

Describe the potential ecological impacts of aquaculture, and the farming techniques used to minimise these impacts.

### Performance criteria

- 6.1 The description includes the impacts on the physical environment.
- Range may include but is not limited to – sedimentation, organic enrichment, anaerobic sediments; evidence is required for two.
- 6.2 The description includes the impacts on the biological environment.
- Range may include but not limited to – species diversity and abundance, fouling organisms, phytoplankton abundance; evidence is required for two.
- 6.3 The description includes farming techniques used in aquaculture to minimise ecological impacts.
- Range evidence is required for two techniques.

## Element 7

Describe how the ecological impacts of human activities on land and in the aquatic environment can impact on aquaculture.

### Performance criteria

- 7.1 The description includes an example of one impact on the physical environment.
- 7.2 The description includes an example of one impact on the biological environment.
- 7.3 The description includes how human activities on land and in the aquatic environment can be managed to minimise the impact on aquaculture.
- Range evidence is required for two impacts.

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### Please note

Providers must be accredited by NZQA, or an inter-institutional body with delegated authority for quality assurance, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be accredited by NZQA before they can register credits from assessment against unit standards.

Accredited providers and Industry Training Organisations assessing against unit standards must engage with the moderation system that applies to those standards.

Accreditation requirements and an outline of the moderation system that applies to this standard are outlined in the Accreditation and Moderation Action Plan (AMAP). The AMAP also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

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**Comments on this unit standard**

Please contact the Primary Industry Training Organisation [standards@primaryito.ac.nz](mailto:standards@primaryito.ac.nz) if you wish to suggest changes to the content of this unit standard.