

Title	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 species 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.
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Classification	Seafood > Aquaculture
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Available grade	Achieved
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Guidance Information

- 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 outcome.
- Aquaculture can include marine or freshwater farming at any stage of the lifecycle.

Outcomes and performance criteria

Outcome 1

Describe energy and nutrient flows in the aquatic ecosystem.

Performance criteria

- 1.1 Describe the three main chemical elements required by most living organisms.
- 1.2 Describe energy flows through an ecosystem and their implications on the structure of ecosystems.

Range food chains, food webs, pyramids of biomass.
- 1.3 Describe how organisms obtain nutrients.

Range producers and consumers.

- 1.4 Describe the role of decomposers in the cycling of nutrients in the aquatic environment.
- 1.5 Describe a nutrient cycle for one of the chemical elements in the aquatic environment.

Outcome 2

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

Performance criteria

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

Outcome 3

Describe interactions between species and how they relate to aquaculture.

Performance criteria

- 3.1 Describe each type of interaction.
- Range predation, commensalism, parasitism, interspecific competition, intraspecific competition.
- 3.2 Describe four interactions of potential economic significance between the aquaculture species and other species.
- 3.3 Describe two ways in which the impacts of undesirable interactions are minimised.
- 3.4 Describe 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 of three effects is required.

Outcome 4

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

Performance criteria

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

Outcome 5

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

Performance criteria

- 5.1 Describe zonation and how it relates to aquaculture.
- Range evidence of one example is required.
- 5.2 Describe three key factors determining zonation patterns.
- 5.3 Describe 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 of one is required.

Outcome 6

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

Performance criteria

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

Outcome 7

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

Performance criteria

7.1 Describe an example of the ecological impact of human activities on the physical environment.

Range evidence of one impact is required.

7.2 Describe an example of ecological impact of human activities on the biological environment.

Range evidence of one impact is required.

7.3 Describe how human activities on land and in the aquatic environment can be managed to minimise the impact on aquaculture.

Range evidence of two impacts is required.

Planned review date	31 December 2028
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 May 1999	31 December 2024
Review	2	16 December 2003	31 December 2024
Review	3	12 December 2008	31 December 2024
Review	4	28 October 2021	N/A
Rollover	5	29 February 2024	N/A

Consent and Moderation Requirements (CMR) reference	0123
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact the Muka Tangata - People, Food and Fibre Workforce Development Council qualifications@mukatangata.nz if you wish to suggest changes to the content of this unit standard.