**Activity: Similarities and differences: wild and farmed green-lipped mussels**

In this activity, students use a paper-based Venn diagram to illustrate the key similarities and differences between how wild and farmed green-lipped mussels live.

By the end of this activity, students should be able to:

* describe the key similarities and differences between farmed and wild green-lipped mussels
* understand how to use a Venn diagram to graphically organise information.

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**Introduction**

Wild green-lipped mussels grow abundantly in New Zealand’s coastal waters, and green-lipped mussels are also cultivated (farmed) here. At present, most farmed mussels begin their lives in the wild – they are grown from spat that has washed ashore on seaweed on Ninety Mile Beach and elsewhere. This means that wild and farmed mussels are not distinct populations. This differs from the traditional concept of ‘farming’, in which farmed animals or plants are isolated from their wild counterparts and bred in captivity over successive generations. (Note, though, that some green-lipped mussel larvae are raised in hatcheries, and mussel breeding programmes are under way.)

Although they arise from the same wild populations, there are some key differences between how wild and farmed mussels live during the adult phase of their life cycle. Exploring those similarities and differences can provide students with a framework for developing their knowledge of mussel biology and aquaculture. The following table provides a summary of similarities and differences. Refer to the articles [Life of a green-lipped mussel](https://www.sciencelearn.org.nz/resources/733-life-of-a-green-lipped-mussel) and [New Zealand’s green-lipped mussel industry](https://www.sciencelearn.org.nz/resources/751-new-zealand-s-green-lipped-mussel-industry) to find the information that is required to complete the activity.

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| --- | --- | --- |
| **Wild mussels only** | **Both wild and farmed mussels** | **Farmed mussels only** |
| * Grow up to 24 cm long
* Can live for many years
* May live on rocks and other mussels
* Previously fished by dredging
 | * Feed on phytoplankton
* Filter feeders
* Release eggs or sperm into the water
* Can contain pea crab parasites
* Larvae are free-swimming
* Food source for fish and sea stars
* Larvae settle onto seaweed
* Spat may move from site to site
* Mature females have orange flesh
* Can accumulate toxins
* Endemic to New Zealand
 | * Harvested when about 10 cm long
* Harvested after 18 months’ growth
* Live on ropes in the water
* Seeded onto ropes using mussock
* Some spat is grown in hatcheries
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***Venn diagrams***

Venn diagrams have been used for over a hundred years as a visual way to show the similarities and differences between two or more things (for example, concepts or products).

In a Venn diagram, two or more circles overlap – features present in only one thing appear in its circle, and features common to both appear in the overlapping area of the circles.

For example, farmed mussels (but not wild mussels) are grown on ropes suspended in the ocean, so this feature belongs in the ‘Farmed mussels only’ area, but both wild and farmed mussels feed on phytoplankton, so this feature belongs in the overlapping area (both wild and farmed mussels).

**What you need**

* Access to the printed [list of features](#features) and [Venn diagram worksheet](#venn)
* Access to the articles [Life of a green-lipped mussel](https://www.sciencelearn.org.nz/resources/733-life-of-a-green-lipped-mussel) and [New Zealand’s green-lipped mussel industry](https://www.sciencelearn.org.nz/resources/751-new-zealand-s-green-lipped-mussel-industry)
* Access to the [Mussel life cycle](https://www.sciencelearn.org.nz/images/815-mussel-life-cycle) diagram

**What to do**

1. Have the students read the articles [Life of a green-lipped mussel](https://www.sciencelearn.org.nz/resources/733-life-of-a-green-lipped-mussel) and [New Zealand’s green-lipped mussel industry](https://www.sciencelearn.org.nz/resources/751-new-zealand-s-green-lipped-mussel-industry).
2. Draw a sample Venn diagram on the board and discuss with the students what it can be used to show. It might be helpful to model how it works with another example, such as a lake and the sea.
3. Allow the students sufficient time to complete the Venn diagram, either individually or in small groups. Provide the [list of features](#features) either as a handout or put up on the board and ask students to complete the [Venn diagram worksheet](#venn) in pencil.
4. Give individuals or groups the opportunity to feed back. Any disagreements can be resolved by referring to resources within [Farming green-lipped mussels](https://www.sciencelearn.org.nz/resources/513-farming-green-lipped-mussels-introduction).

**Discussion points**

* Are all mussels in New Zealand farmed using the same methods? Which stage in the farming process varies the most?
* What constitutes ‘farming’? How does mussel farming differ from other species that are farmed on land in New Zealand (such as sheep or cattle)?

**Extension activities**

* Annotate the [Mussel life cycle](https://www.sciencelearn.org.nz/images/815-mussel-life-cycle) diagram on an interactive whiteboard to demonstrate at which stages the lives of farmed and wild mussels differ (and how).
* Write a first-person account of the life of a farmed and a wild mussel.
* View the video series [Mating mussels](https://www.sciencelearn.org.nz/search?term=%20green-lipped%20mussels&dFR%5Btype%5D%5B0%5D=Video) to learn about the mussel breeding programme at the Cawthron Institute in Nelson.

**List of features**

|  |  |
| --- | --- |
| Can accumulate toxins | Larvae settle onto seaweed  |
| Can contain pea crab parasites | Live on ropes in the water |
| Can live for many years | Mature females have orange flesh |
| Endemic to New Zealand | May live on rocks and other mussels |
| Feed on phytoplankton | Previously fished by dredging  |
| Filter feeders | Release eggs or sperm into the water  |
| Grow up to 24 cm long | Seeded onto ropes using ‘mussock’ |
| Harvested after 18 months’ growth | Some spat grown in hatcheries |
| Harvested when about 10 cm long | Spat may move from site to site |
| Larvae are free-swimming |  |

**Venn diagram worksheet**

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