

NZ Curriculum:

Key competencies

Thinking; Managing Self;
Relating to others

Science

Level 3: *The Nature of Science: Participating and contributing:*
Use their growing science knowledge when considering issues of concern to them.

Level 4: *The Nature of Science: Participating and contributing:*
Explore various aspects of an issue and make decisions about possible actions.

Level 5: *The Nature of Science: Participating and contributing:*
Develop an understanding of socio-scientific issues by gathering relevant scientific information in order to draw evidence based conclusions and take action where appropriate

Geography

Level 6, 7, 8: Geographic research
- Contemporary New Zealand geographic issue
- Geographic topic at a global scale
- Application of geographic concepts

NZ Curriculum: Social Sciences

Level 3: Understand how people make decisions about access to and use of resources differently

Level 4: Understand how producers and consumers exercise their rights and meet their responsibilities.

Level 5: Understand how people's management of resources impacts on environmental and social sustainability

NZ Curriculum: Other

This resource can also be used to support the teaching of Achievement Objectives in:
Te Reo Māori, Maths & English

LEARNING OBJECTIVES:

- LO1 Describe the idea of 'sustainable fishing' and a catch of fish that is a 'sustainable catch'
- LO2 Understand the concept of maximum sustainable yield
- LO3 Investigate the role of science in ensuring fisheries are sustainably fished
- LO4 Describe how we assess the sustainability of fisheries in Aotearoa New Zealand
- LO5 Explain two or more impacts on people and environment when fish stocks decline
- LO6 Use scientific and fishery related vocabulary

POSSIBLE WONDERINGS:

- How do I support sustainable fisheries?
- How do I make sure the fish I eat and catch are sustainable?
- How does the Marine Stewardship Council decide if a fishery is sustainable?
- What is a sustainable yield?
- What does a fishery scientist actually do?
- What happens when fish stocks do decline? Why does it matter?

Te Marautanga o Aotearoa

Pūtaiao Level 4+: *Uses of Science*

Level 4+: *Philosophy and History of Science*

Level 4+: *The Natural World*

Tikanga-ā-iwi

Level 4+: *Kotahi tonu te matua o te tangata Māori, ko Ranginui e tū nei, ko Papa-tū-ā-nuku e takoto nei.* (Place and environment)

Level 4+: *E tama, e hine, tangata i ākonga ki te whare, tū ana ki te marae, tau ana* (The Changing World)

Level 4+: *E kore e ngaoko te rākau ki te tīkina i te pūtake whakangaoko ai engari, me tiki ki te matamata* (The Economic World)

Hauora Level 3+: *Relationships to earth and sky (natural environments)*

CONCEPTUAL UNDERSTANDINGS:

1. Sustainable fishing and a sustainable catch can carry on indefinitely
2. Maximum sustainable yield is a tool used by fishery managers to manage fisheries sustainably
3. Scientists play an important part in ensuring fisheries are sustainably fished
4. Scientific data is used to assess the sustainability of fisheries in Aotearoa New Zealand
5. There are social, economic as well as ecological consequences when fish stocks decline
6. Specialised words & terms are used

POSSIBLE ACTIONS:

- THINK about what we can do to ensure we catch and eat sustainable fish
- LOOK for the Marine Stewardship Council label when you buy fish
- ASK whānau about their fishing and the fishing of tūpuna [ancestors]
- SHARE new knowledge with whānau at home
- MAKE a poster/ imovie/ game/ presentation informing an audience about sustainable fishing
- DO something good for our local marine environment

LEARNING EXPERIENCES OVERVIEW

LESSONS 1 & 2: Sustainable fishing and a sustainable catch

FOCUS QUESTION: What is sustainable fishing and what do we mean by a 'sustainable catch'?

- WATCH [What is the MSC and why is certified seafood important](#) [1:29] [slide 9]. Discuss why it might be important to know where your kai moana comes from
- BRAINSTORM (using the prior knowledge chart) what we already know about sustainable fishing [slide 10]
- DISCUSS how this topic relates to me! Do I know where the fish that I eat come from?... [slide 11]
- DISCUSS key terms [slide 11] and standards the MSC uses to assess whether fisheries are sustainable or not! [slide 12]
- INVITE a grandparent or kaumātua to visit & talk about how fishing has changed over time and what sustainability measures have been used locally over time to ensure sustainable fishing [Teacher notes slide 11]
- WATCH the short film clips on ['Overfishing'](#) [2:55] and ['Sustainable Fishing'](#) [2:55] [slide 13]
- PLAY the matching game using Sustainable fishing concept cards [Teacher Outline] or use the [Kahoot](#) quiz [Slide 13]
- DISCUSS how fisheries must meet three principles if they wish to be Marine Stewardship Council certified [slide 14]
- WATCH a short film about [three principles](#) [0:52] [slide 14]
- WATCH video clip [Sustainable Fish Stocks](#) [2:34] [slide 15]
- READ the information and complete [Sustainable fish stocks worksheet](#) (includes questions and answers) [slide 15]
- BRAINSTORM (using the brainstorm chart) what information helps the Marine Stewardship Council tell if a fish stock is sustainable? [slides 15, 16, 17] (Answers on slide 17)
- GUESS the missing words. Then write your own sentences about sustainable fish stocks using the words 'scientist', 'ecosystem' and 'reproduce' [slide 18]
- Investigate and deepen the INQUIRY [see [Teacher Outline](#))]

LESSONS 3 & 4: Scientists & the Maximum Sustainable Yield FOCUS QUESTION:

What is a 'maximum sustainable yield'? What role does science play in ensuring fisheries are fished sustainably?

- DISCUSS how fish stocks grow and shrink over time. CREATE a diagram (using pieces provided on slide 20) showing how fish stocks change in number (abundance) over time [slides 19, 20, 21] (Answers on slide 21)
- DISCUSS the maximum sustainable yield diagram [slide 22]
- TEST key words knowledge using [Go Fish Vocab Cards](#) [Teacher outline]. PLAY [Go Fish game](#) [slide 23]
- BRAINSTORM unknown factors affecting ongoing sustainability of catches? [slides 23, 24] (Answers slide 24)
- CATEGORISE factors and deepen the inquiry using the ([Teacher Outline](#)) [slide 24]
- For more advanced learners INVESTIGATE the idea of biomass and fishing effort in sustainable yield calculations [slides 25, 26, 27]
- DISCUSS the idea that size of fish does matter when catching fish sustainably [slide 28]
- BRAINSTORM a list of research topics that fisheries scientists might look at [slide 29]
- FIND or STUDY a scientific paper about fish or fisheries. What is it about? What is the meaning of words like methodology, findings, results, discussion, conclusions etc. Discuss the role of fisheries scientists and scientific protocols for research and presenting research [slide 29] (see [Teacher Outline](#))
- Investigate and deepen the INQUIRY [see [Teacher Outline](#)]

LESSON 5: How fish stocks are assessed in Aotearoa

FOCUS QUESTION: How do we assess fisheries in Aotearoa NZ? What is the role of science in ensuring fisheries are fished sustainably?

- DISCUSS management of commercial fisheries, QMS and the role of scientists [slides 30, 31, 32]
- WATCH the short film about [fishing observer Holly Lane](#) [1:15] [slide 30]
- READ [A fisheries Scientist Story](#) and ANSWER the questions at the end of the story. Ask a local fisheries scientist to come and talk about what they do [slide 32]
- INVESTIGATE (using the links provided) how we determine the age of a fish and the status of NZ fisheries [slide 32]
- REFLECT and DISCUSS – What role do scientists play in looking after fisheries under the QMS?
- Investigate and deepen the INQUIRY [see [Teacher Outline](#)]

LESSON 6: When Fish Stocks Decline & 3.5 Reviewing Key Concepts

FOCUS QUESTION: How are people & environments impacted when fish stocks decline? What new words and concepts have we learnt?

- BRAINSTORM what impacts there are on the environment and people when fish stocks decline and CATEGORISE answers under the headings Environmental, Social, Economic and Cultural [slide 33]
- READ about some Aotearoa New Zealand examples of fish stocks declining and quota being cut by completing activity 'When fish stocks decline' [see [Teacher Outline](#) and slide 33]
- INVESTIGATE rāhui as a traditional response to fish stock decline [slide 34] and WATCH the [Guardianship](#) [4:48] film clip and discuss rāhui in response to declining fish stocks [slide 34]
- Investigate and deepen the INQUIRY [see [Teacher Outline](#)]
- ACT out your own definition of one of the key concepts covered in this topic and complete the topic summary quiz on Kahoot or make your own Kahoot [slide 35] or complete the quiz provided [slides 36-45]

KEY WORDS AND CONCEPTS (FOR TEACHERS)

Sustainable fishing	<u>Sustainable fishing</u> means looking after the environment where fish live and not overfishing. Sustainable fishing means leaving enough fish in the ocean, respecting habitats and ensuring people who depend on fishing can maintain their livelihoods.
Sustainable stock	A particular harvested population of fish that is more or less isolated from other stocks of the same species and hence when fished in a sustainable manner is self-sustaining (a fish population becomes a stock when it is a fished or harvested population).
Sustainable fishery	A Sustainable fishery is a fishery that has been fished in such a way as to leave enough fish (from that fishery) in the ocean, respecting habitats and ensuring people who depend on fishing from that fishery can maintain their livelihoods.
Sustainable catch	A sustainable catch means catching an amount of fish that can carry on forever
Maximum sustainable yield	The maximum catch that can be harvested sustainably is called the Maximum Sustainable Yield (MSY)
Rāhui	A rāhui is not simply a 'fishing ban' as is usually reported because the rāhui has long been used in te ao Māori (the Māori world). A rāhui is the tikanga (customary practise) that prohibits access to an area (either on water or land) or resources. It is a form of tapu.
Environmental sustainability	Acting in a way that maintains natural resources and avoids jeopardizing the ability for future generations to meet their needs.
Economic sustainability	The ability of an economy to support a defined level of economic production indefinitely.
Social & cultural sustainability	Social Sustainability promotes wellbeing of people while supporting the ability of future generations to maintain a healthy community. Social sustainability can include health, education, lifestyle and general wellbeing. Cultural sustainability relates to the ability of people to enhance and maintain cultural beliefs, cultural practices, heritage conservation, culture as its own entity, and attempts to answer the question of whether or not any given cultures will exist in the context of the future.
Fisheries science	Fisheries science is a branch of marine science that deals with studies on the life history and state of fish stocks.
Abundance (fish)	The amount of a fish species in a given area.
QMS	Quota Management System. System used to manage commercial fisheries in Aotearoa New Zealand.
Migration	Movement in and out of fish stock or population.
Mortality	Deaths.
Biomass	The total weight of fish in a stock or population of fish.
Fishing effort / pressure	A measure of the total amount of fishing.
Food web	Can be described as a "who eats whom". A diagram that shows the complex feeding relationships in an ecosystem.
Ecosystem	A community of living organisms in conjunction with the nonliving components of their environment, interacting as a system.