OCEANWATCH AUSTRALIA

NSW Seafood Industry Partnerships in Schools (SIPS 2030)

Teacher Resources Notes

Department of Primary Industries NSW GOVERNMENT

NSW Seafood Industry Council

Overview

This lesson series on sustainable seafood harvested in NSW provides you with a comprehensive set of resources tailored for Stage 4 and Stage 5 and Stage 6 students. The materials, including fact sheets, worksheets, activities and videos, are designed to facilitate both teacher-led and student-led approaches, adaptable for digital or printed formats. Extension activities are integrated to challenge higher ability students further. These resources aim to equip students with a critical understanding of sustainable practices in the seafood industry, fostering informed and conscious future choices.

Key Focus Area: These lessons align with the focus on environmental sustainability in the Science 7–10 curriculum.

ACARA link: Critical and Creative Thinking.

Lesson 1 - Understanding Sustainable Seafood - introduces students to the core concepts of sustainable seafood, including different fishing methods and their ecological impacts.

Lesson 2 - Careers in the Seafood Industry - students will explore the diverse career opportunities within the sustainable seafood industry, understanding the role of sustainability in various job roles and potential career paths.

Lesson 3 - **Exploring Local Sustainable Seafoods** - students will become familiar with local sustainable seafood options, learning to identify them and understanding their benefits, thereby encouraging informed and conscious choices in seafood consumption.

Linked Resources:

Student Instructions
Presentation Slides
Sustainability Sorting Cards
Fishing Method Factsheets
Fishing Methods Worksheets
NSW Printable Map
Seafood Industry Careers Carousel Worksheet
Seafood Menu Worksheet

NSW Curriculum Links:

- Stage 4 &5 Life Skills
- Stage 4&5 Science
- Stage 4&5 Science Marine and Aquaculture Technology
- Stage 6 Marine Studies

Lesson 1- Understanding Sustainable seafood

Objective:

To introduce students to the concept of sustainable seafood, different fishing methods used in Australia, the concept of bycatch, and ecological footprints of fisheries. This lesson is designed to engage students in critical thinking about the marine environment, focusing on sustainable fishing practices in Australia.

Curriculum Links:

Stage 4

- MAR4-1: Identifies the nature and scope of the marine and aquatic environment.
- MAR4-7 - A student identifies the need to care for and protect the marine environment.

Stage 5

- MAR5-2: Identifies, describes and evaluates the social and economic importance of marine ecosystems.
- MAR5-7: Identifies, describes and evaluates the ethical, social and sustainability issues related to the marine environment.

Stage 4 & 5

- Science Marine and Aquaculture Technology Optional Module 18 Fish Harvesting.
- Science Marine and Aquaculture Technology Optional Module 37 Maritime Industries and Employment.

7-10 Life Skills

- MARLS-1: Recognises features of marine and aquatic environments and life.
- MARLS-8: Recognises the need for marine and aquaculture environments to be managed and cared for.
- MARLS-10 uses a variety of strategies to locate and select information.

Stage 6

- Marine Studies Optional Module 10: Commercial and Recreational Fishing.
- Marine Studies Optional Module 11: Aquaculture.

Learning Intentions:

Students will:

- Be introduced to the principles of sustainable seafood, including the importance of maintaining a balance that ensures the well-being of future generations.
- Learn about fishing methods used in NSW identify the ecological footprints associated with each method.
- Develop the ability to think critically and analytically about the information presented, fostering a deeper understanding of the complex issues surrounding sustainable fishing practices.

- Articulate their understanding of the topics covered, presenting well-reasoned arguments and showing a deep understanding of the environmental, economic, and social impacts of different fishing practices.

Key Questions

- What does “sustainable” mean?
- What factors contribute to the sustainability of a food source?
- Why is sustainability important within the fishing industry?
- How do aquaculture and wild caught fisheries differ?

Instructions for Teachers:

Starter Activity: Sustainability Fishing Practices. The aim of this starter is to facilitate students' understanding of the concepts of sustainable and unsustainable practices in the seafood industry through an interactive card sorting activity.

Definition of Sustainability: Briefly define sustainability, emphasising the balance between meeting current needs without compromising the ability of future generations to meet their needs.

Contextual Relevance: Highlight the relevance of sustainability in the context of the seafood industry, touching upon the concepts introduced in the card sorting activity.

There are two ways this **starter activity** can be run:

1. **Using Presentation Slides:** Go through the slides in front of the class and have students make predictions about the different seafood terms and record on a piece of paper if they think it is sustainable or unsustainable. As they go through the slides they will find out if their predictions are correct or incorrect.
2. **Sustainable Sorting Cards:** Divide students into small groups and distribute the card sets. Facilitate the sorting activity of the cards into two piles - sustainable or unsustainable. Encourage groups to share their sorted cards and reasoning. To deliver this activity, teachers should have printed and cut the cards previously.

Activity Discussion: Lead a discussion on the importance of sustainability, encouraging students to consider environmental, economic, and social impacts.

Discussion Points:

1. Environmental Impacts:
    a. Biodiversity: Discuss how sustainable practices help in preserving marine biodiversity by preventing overfishing and habitat destruction.
    b. Ecosystem Health: Explain how maintaining the health of marine ecosystems is vital for the overall health of the oceans and fish populations.
2. Economic Impacts:
    a. Job Security: Talk about how sustainable practices can ensure job security in the long term by preventing the depletion of resources.
    b. Economic Stability: Discuss how a well-managed sustainable seafood industry can contribute to economic stability by providing a steady income for communities.
3. Social Impacts:
    a. Community Well-being: Discuss how sustainable practices can foster community well-being by ensuring a steady supply of resources and promoting cooperative management.
    b. Consumer Health: Talk about how sustainable practices can lead to healthier products, free from harmful chemicals used in unsustainable aquaculture.

Play Video #1:

Main Activity:

Students will use the Fishing Method Factsheets and Fishing Methods Worksheets to analyse the ecological footprints of different fishing methods and investigate the issue and benefits on marine ecosystems as well as comparing ecological footprints of different food production systems. Students will pick a number between 1 and 5 to rate the potential impact of each fishing method and then will pick a number between 1 and 5 to rate different food production systems. Activity steps:

1. **Research and Analysis:** Guide students in researching and analysing different fishing methods using the Fishing Method Factsheets.
2. **Group Activity:** Divide students into groups and allow them to complete the activity table in Fishing Method Worksheet with numbers ranging from 5 to 1 (5 being the highest impact and 1 the lowest).

3. **Group activity:** Instruct students to remain in their groups and in the same worksheet rate various food production systems' environmental impacts on a scale from 5 (highest) to 1 (lowest) using the graph in the **Fishing Method Factsheet** (bottom part). Encourage group discussion while assigning ratings.

Example answers:

Fishing Methods	Energy footprint	Habitat footprint	Bycatch footprint	Impact Rating
Trawling	3	4	2	9
Longlining	4	3	2	9
Pole-and-line	2	2	1	5
Trap or pot fishing	3	1	1	5
Oyster farming	4	1	1	6

Activity discussion:

1. Ask each group to share the key findings from their research on the assigned fishing method.
2. Facilitate a discussion on how technology can mitigate ecological impact. Potential ideas could include:
   a. Artificial Intelligence (AI) and Machine Learning. Predictive Analytics: Utilising AI to analyse data and predict fish migration patterns, helping to avoid overfishing in certain areas. Monitoring: AI can be used to monitor and enforce fishing regulations more effectively.
   b. Food Production Systems: Brainstorm sustainable solutions to reduce water consumption and biodiversity loss in different food production systems like water recycling and vertical farming.
   c. Aquaculture Innovations. Recirculating Aquaculture Systems (RAS): Closed-loop systems that recycle water, reducing waste and preventing pollution. Algae-Based Feeds: Developing feeds based on algae or other sustainable sources to reduce reliance on wild fish stocks.

Lesson Extension Activity:
Introduce the extension activity involving mapping various fishing methods onto a local geography map. Students will explore the Master Fishermen Website (https://oceanwatchmasterfisherman.org.au) and use this printable map to record the examples of various fishing methods onto their local geography.

Lesson 2 - Careers in the Seafood Industry

Objective:

To provide students with an understanding of the diverse career opportunities available within the Australian seafood industries, and to highlight the importance of sustainability in various roles within the industry.

Curriculum Links:

Stage 4
- MAR4-11: Identifies employment opportunities in aquaculture, marine, and maritime industries.

Stage 5
- MAR5-11: identifies and describes a range of aquaculture, marine and maritime vocations and leisure pursuits.

Stage 4 & 5
- Science Marine and Aquaculture Technology Optional Module 35 Local Fishing Industries

Stage 6
- Marine Studies Core Module 5: Maritime Industries and Employment

Life Skills
- MARLS-9 explores the opportunities provided within marine and aquaculture environments for leisure, community work and employment.
- MARLS-5 investigates ways in which marine and aquaculture environments affect our daily lives.

Key Questions:

- What are some careers in the seafood industry?
- What skills and education do you need for a sustainable career in the seafood industry?

- How can people working in the seafood industry help the environment and society?
- What are some career pathways in the seafood industry?

Learning Intentions

Students will:
- Gain insight into the variety of careers available in the sustainable seafood industry in Australia.
- Understand the role of sustainability in different job roles within the seafood industry.
- Develop the ability to critically analyse and discuss the current challenges and opportunities in the Australian sustainable seafood industry.

Starter Activity :

Initiate a discussion by asking students to list potential jobs in the Australian seafood industry and to explain why it is important for these jobs to sustainably manage ocean resources.

Teacher's Notes:

To lead the discussion effectively, it's important to set the stage for students and provide context for the importance of sustainable practices in the Australian seafood industry. Begin by briefly explaining the significance of sustainability within this industry. You can mention that Australia has a rich marine ecosystem, which is home to a wide variety of seafood species. However, due to overfishing and unsustainable practices in the past, many of these species have faced depletion and challenges in their populations.

Highlight the fact that the seafood industry in Australia plays a crucial role in both economic and environmental terms. It supports livelihoods, contributes to the national economy, and provides a significant source of protein for the population. At the same time, emphasise that the industry is managed sustainably to ensure the long-term health of marine ecosystems, protect vulnerable species, and guarantee seafood availability for future generations.

Encourage students to think about how various jobs within the seafood industry, from fishers to seafood processors, play a role in ensuring sustainable practices. Explain that these jobs are not just about catching or processing seafood; they also involve making choices that benefit the environment, such as avoiding overfishing, reducing bycatch, and adhering to sustainable fishing methods.

Play Video#2:

Play video focusing on the life of an oyster farmer to give students a real-world insight into a career in the seafood industry.

Main Activity: Career Fact Sheet Carousel.

Arrange different stations around the room, each featuring **Seafood Industry Careers** factsheets on various roles in the Australian seafood industries, or alternatively, present the information through slides to the entire class.

Activity: Students rotate between stations, spending about 3 minutes at each to learn about the skills, educational paths, sustainability practices, and daily impacts of different roles.

Worksheet: Provide students with a **Seafood Industry Careers Carousel Worksheet** to fill in as they move through the carousel, encouraging them to analyse and note down the specifics of different job roles, including the training and career pathways associated with them. Students will choose a specific career of interest to them, reflecting on their potential place in the seafood industry.

Activity Discussion: Challenges and Opportunities: Lead a discussion on the current challenges and opportunities in the Australian sustainable seafood industries, focusing on how these factors might influence future careers in the sector.

Lesson Extension / Stage 6 Research Activity:
Students will explore the Seafood Careers Australia website (https://seafoodcareers.com.au/) and choose a career role of their interest. Then, students should prepare a short presentation showcasing a 'day in the life' of the chosen role, emphasising aspects related to career pathways, certificates needed to succeed in that role, location within Australia where that role could take place, and how they would contribute the sustainability of the industry.

Lesson 3 - Exploring Local Sustainable Seafoods

Objective:
To familiarise students with local sustainable seafood options available in Australia and equip them with the knowledge and skills to identify and choose sustainable seafood products.

Curriculum Links:

Stage 4
- SC4-9WS: Presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations.

Stage 5
- SC5-8WS: Applies scientific understanding and critical thinking skills to suggest possible solutions to identified problems.

Stage 4 & 5
- Science Marine and Aquaculture Technology Optional Module 36 Food from the Sea

Stage 6
- Marine Studies Optional Module 15: Seafood Handling and Processing

Life Skills
- MARLS-4 recognises a range of marine and aquaculture plants and animals that can be grown to provide food.

Key Questions:

- What are some of the most common NSW harvested seafood?
- How can we include seafood dishes in our daily life?
- What are some of the benefits of eating seafood?
- Where in NSW is seafood harvested?

Learning Intentions:

Students will:
- Learn how to identify sustainable seafood options.
- Develop the skills to create a sustainable seafood menu considering various factors including seasonality, fishing methods and species.
- Research and present local sustainable seafood options effectively.

Starter Activity :

Compile a list of local and sustainable seafood products that are available in your region. Include a variety of options such as fish, shellfish, and seaweed. Facilitate a discussion or reflect on where the seafood they have listed might come from and what methods could be used to obtain it.

Play Video #3:

Main Activity :

Part 1: Watch Seafood presentation and encourage students to pick their 2 favourite seafood species and write them down in the top part of the Seafood Menu Worksheet considering factors such as fishing methods, flavour, species, nutrients, and seafood dish.

Part 2: Encourage students to use the information gathered to design a sustainable seafood menu, incorporating a variety of local and sustainable seafood options. Briefly revisit the concept of sustainability, emphasising the importance of using local and sustainable seafood products. Students can inspired with different cooking methods from Sydney Fish Market Website.

APPENDIX 1

Key terms:

- **Aquaculture**: The cultivation of aquatic organisms in controlled environments for commercial purposes.
- **Bycatch**: Unintended marine species that are caught while targeting specific fish or shellfish.
- **Ecological Footprint**: A measure of the environmental impact of an individual, community, or organisation based on resource consumption and waste generation.
- **Fish Stocks**: Populations of fish that are managed and assessed for sustainable use.
- **Overfishing**: The act of depleting fish stocks faster than they can naturally replenish.
- **Sustainability**: The ability to meet the needs of the present without compromising the future, taking into account environmental, economic, and social considerations.
- **Master Fishermen Program**: A certification program aimed at ensuring best practices in sustainable fishing, typically involving advanced training and assessment.
- **Wild Caught:** Seafood that is caught in its natural environment, as opposed to being farmed.
- **Trawling**: A fishing method where a large net is dragged through the water.
- **Long-lining**: A commercial fishing technique involving the use of a long fishing line with baited hooks.
- **Pole-and-Line**: A method of fishing where each fish is caught individually using a hook attached to a pole.
- **Fisheries Management**: The integrated process that aims to sustainably use fishery resources.
- **Ecosystem-based Management:** A approach to fisheries management that considers not just fish stocks but the wider ecosystem.
- **Traceability:** Methods that allow consumers to trace the origin of their seafood, ensuring it's sustainably sourced.
- **Consumer Responsibility:** The role of consumers in choosing sustainable options to support ethical and ecological practices.

- L**ocal Catch:** Seafood that is caught and consumed within a specific geographical area, often considered more sustainable due to reduced transport emissions.
- **Seasonality:** The practice of consuming seafood at certain times of the year when it is naturally abundant.
- **Economic Viability:** The long-term financial sustainability of a fishing method or seafood industry segment.
- **Ethical Fishing:** Practices that consider the welfare of marine life, ecosystems, and human communities involved in fishing.
- **Stakeholders:** Groups or individuals with a vested interest in how natural resources are managed, such as fishers, policy-makers, and consumers.
- **Blue Economy:** An economic model that sustainably utilises ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems.