Government of **Western Australia**
School Curriculum and Standards Authority

Science: Biological sciences

Teaching, learning and assessment exemplar

Year 7

Feeding relationships

Acknowledgement of Country

Kaya. The School Curriculum and Standards Authority (the Authority) acknowledges that our offices are on Whadjuk Noongar boodjar and that we deliver our services on the country of many traditional custodians and language groups throughout Western Australia. The Authority acknowledges the traditional custodians throughout Western Australia and their continuing connection to land, waters and community. We offer our respect to Elders past and present.

Background

This teaching, learning and assessment exemplar (the exemplar) has been developed by the School Curriculum and Standards Authority (the Authority) as part of the *School Education Act Employees (Teachers and Administrators) General Agreement 2017* (Clause 61.1–61.3).

Disclaimer

Any resources such as texts, websites and so on that may be referred to in this document are provided as examples of resources that teachers can use to support their learning programs. Their inclusion does not imply that they are mandatory or that they are the only resources relevant to the course. Teachers must exercise their professional judgement as to the appropriateness of any they may wish to use.

This resource utilises electronic web-based resources, such as videos and image galleries. Teachers should be present while an electronic resource is in use and close links immediately after a resource, such as a video has played to prevent default 'auto play' of additional videos. Where resources are referred for home study, they should be uploaded through Connect, or an equivalent system, that filters advertising content.

2025/3703[v4]

Contents

The Western Australian Curriculum

The *Western Australian Curriculum and Assessment Outline* (the *Outline* – https://k10outline.scsa.wa.edu.au/) sets out the mandated curriculum, guiding principles for teaching, learning and assessment, and support for teachers in their assessment and reporting of student achievement. The *Outline* recognises that all students in Australian schools, or international schools implementing the Western Australian curriculum, are entitled to be given access to the eight learning areas described in the *Alice Springs* (*Mparntwe*) *Education Declaration*, December 2019.

The Science curriculum

The mandated curriculum is presented in the year level syllabus documents.

The Science curriculum delivers a sequential and age-appropriate progression of learning with the following key elements:

- a year level description that provides an overview of the context for teaching and learning in the year
- a series of content descriptions, populated through strands and sub-strands, that sets out the knowledge, understanding and skills that teachers are expected to teach and students are expected to learn
- an achievement standard that describes an expected level that the majority of students are achieving by the end of a given year of schooling. An achievement standard describes the quality of learning (e.g. the depth of conceptual understanding and the sophistication of skills) that would indicate the student is well-placed to commence the learning required in the next year.

This exemplar

This Science exemplar articulates the content in the *Outline* and approaches to teaching, learning and assessment reflective of the Principles of Teaching, Learning and Assessment. This exemplar demonstrates a sequence of teaching and learning, including suggested assessment points, for 12 lessons.

Catering for diversity

This exemplar provides a suggested approach for the delivery of the curriculum and reflects the rationale, aims and content structure of the learning area. When planning the learning experiences, consideration has been given to ensuring that they are inclusive and can be used in, or adapted for, individual circumstances. It is the classroom teacher who is best placed to consider and respond to (accommodate) the diversity of their students. Reflecting on the learning experiences offered in this exemplar will enable teachers to make appropriate adjustments (where applicable) to better cater for students' gender, personal interests, achievement levels, socio-economic, cultural and language backgrounds, experiences and local area contexts.

Safety

Science learning experiences may involve the use of potentially hazardous substances and/or hazardous equipment. It is the responsibility of the school to ensure that duty of care is exercised in relation to the health and safety of all students and that school practices meet the requirements of the *Work Health and Safety Act 2011*, in addition to relevant State health and safety guidelines.

Using this exemplar

This teaching, learning and assessment exemplar provides suggestions to support the delivery of the mandated curriculum content. The exemplar provides:

- a teaching and learning sequence
- the mandated curriculum content to be taught at each point of the teaching and learning sequence, suggested resources, a sample assessment task and marking key
- the number of lessons to deliver the teaching and learning experiences
- learning intentions and support notes that may provide focus questions and additional information and/or examples to assist with the interpretation of curriculum content
- support notes to assist teachers to unpack the content and support teaching and learning experiences
- teaching and learning experiences that outline the structure of the lesson. These explicitly state each activity that the lesson will progress through and the key focus area for that activity.

Links to electronic resources

This sequence of lessons may utilise electronic web-based resources, such as videos and image galleries. Teachers should be present while an electronic resource is in use and close links immediately after a resource, such as a video, has played to prevent default 'auto play' of additional videos. Where resources are referred for home study, they should be uploaded through Connect, or an equivalent system, that filters advertising content.

Best practice

Teaching and learning

The teaching and learning opportunities offered in this exemplar are not exhaustive. Thus, teachers are encouraged to make professional decisions about which learning experiences, and the sequence in which they are delivered, are best suited to their classroom context, taking into account the availability of resources and student ability.

This sample may prove a useful starting point for amplifying creativity in the classroom, while presenting the embedded expectations of the Western Australian Curriculum: Science.

Teachers may find opportunities to incorporate the General Capabilities and the Cross-curriculum Priorities into the teaching and learning program.

Ways of teaching – teachers can locate additional information on the Ways of teaching from the School Curriculum and Standards Authority (the Authority) website https://k10outline.scsa.wa.edu.au/home/wa-curriculum/learning-areas/science/overview/science-ways-of-teaching.

Assessing

Assessment, both formative and summative, is an integral part of teaching and learning. Assessment should arise naturally out of the learning experiences provided to students. In addition, assessment should provide regular opportunities for teachers to reflect on student achievement and progress. As part of the support it provides for teachers, this exemplar includes suggested assessment points. It is the teacher's role to consider the contexts of their classroom and students, the range of assessments required, and the sampling of content descriptions selected to allow their students the opportunity to demonstrate achievement in relation to the year-level achievement standard. Teachers are best placed to make decisions about whether the suggested assessment/s are used as formative or summative assessment and/or for moderation purposes.

Ways of assessing – a range of assessment strategies that can enable teachers to understand where students are in their learning is available on the Authority website https://k10outline.scsa.wa.edu.au/home/wa-curriculum/learning-areas/science/overview/science-ways-of-assessing.

Reflecting

Reflective practice involves a cyclic process during which teachers continually review the effects of their teaching and make appropriate adjustments to their planning. The cycle involves planning, teaching, observing, reflecting and replanning.

This exemplar supports reflective practice and provides flexibility for teachers in their planning. The exemplar shows how content can be combined and revisited throughout the year. Teachers will choose to expand or contract the amount of time spent on developing the required understandings and skills according to their reflective processes and professional judgements about their students' evolving learning needs.

Feeding relationships

The teaching and learning sequence will develop students' understanding of the feeding relationships within ecosystems, and how these relationships can be displayed through food chains and food webs. Students will be provided with opportunities to engage with and explore feeding relationships in a variety of ecosystems to analyse and interpret.

The teaching and learning sequence enables students to develop the knowledge required to start exploring the idea of how human activity may affect ecosystems, to contextualise their understanding and apply it to the real world. This prepares them to effectively demonstrate their understanding in the summative assessment.

Year level description

In the early adolescence phase of schooling, students align with their peer group and begin to question established conventions, practices and values. Learning and teaching programs assist students to develop a broader and more comprehensive understanding of the contexts of their lives and the world in which they live.

Science provides opportunities for students to continue developing their understanding of important concepts and making connections between different areas of science and applications observed in their daily life.

In Year 7, students explore the diversity of life on Earth and continue to develop their understanding of the role of classification in ordering and organising information. They use and develop models, such as food chains and food webs, to represent energy flow in ecosystems and predict impacts of human activity. They use the particle theory to explain the motion and arrangement of atoms and molecules in the different states of matter and select appropriate techniques to separate pure substances from mixtures. They explore different types of celestial objects, investigate relationships in the Earth-Sun-Moon system and use models to predict and explain events. They consider the impact of forces acting on objects, represent and predict the effects of unbalanced forces on motion and determine the type of mechanical advantage provided by simple machines.

Students propose questions and make predictions based on scientific knowledge. They recognise risks when planning and conducting reproducible investigations. They construct appropriate representations to organise and process data. They analyse data to describe patterns and relationships and use evidence to support conclusions. They identify possible sources of error in their methods and suggest improvements. They use appropriate language and text features for their purpose and audience when communicating their ideas and findings. They examine situations where development of scientific knowledge has benefited from collaboration and influenced the development of human activity.

Achievement standard

By the end of the year:

Students use classification tools to classify and group organisms based on observable features. They represent the flow of energy in ecosystems and predict the impacts of human activity. They describe the motion and arrangement of atoms and molecules in solids, liquids and gases and describe techniques to separate pure substances in a mixture. They can classify celestial objects based on their observable properties and describe how the relative positions of Earth, the Sun and Moon affect phenomena on Earth. They can identify situations when friction, gravitational, magnetic and electrostatic forces are acting, represent and predict the effects of unbalanced forces on motion and identify the type of mechanical advantage provided by simple machines.

Students plan and conduct reproducible investigations to test relationships and aspects of scientific models. They identify risks involved in conducting investigations. They use equipment to generate and record data with precision. They construct appropriate representations to organise data and information. They analyse data and information to describe patterns and relationships. They identify possible sources of error in methods and suggest improvements to their methods. They draw simple conclusions that identify patterns or relationships evident in their data. They identify evidence to support their conclusions and support or dispute claims. They select and use language and text features appropriately for their purpose and audience when communicating their ideas and findings. They identify situations where development of scientific knowledge has benefited from collaboration and has influenced the development of human activity.

Lessons 1–12

Feeding relationships

Lesson 1: Producers, consumers and decomposers

The Western Australian Curriculum content addressed in this lesson is below.

Science understanding

Biological sciences

- Food chains and food webs can be used to represent energy flow in ecosystems and predict possible impacts of human activity

---

Teacher information

- Producers are organisms, usually green plants or algae, that use the sun's energy to make their own food.
- Consumers are animals that eat other organisms.
    - Herbivores are animals that only eat plants.
    - Omnivores are animals that eat algae, plants, fungi and animals.
    - Carnivores are animals that only eat other animals.
- Decomposers are organisms that source energy from breaking down dead matter and waste products.
    - Detritivores are animals that feed on dead and decaying organic material.

Lesson outline

Learning intentions
Students will: • compare the role of producers, consumers and decomposers • describe the role of herbivores, omnivores, carnivores and detritivores.

Introduction

- Inform students they will explore feeding relationships in ecosystems over the next few weeks.
- Inform students that they will set up an experiment to conduct over the next couple of lessons. Materials required include:
  - a potted plant; for example, a bean or geranium
  - two pieces of aluminium foil large enough to completely enclose a leaf
  - a sticky label.
- Provide each group of students with a potted plant and two pieces of aluminium foil (large enough to completely enclose a leaf) and a sticky label.
- Ask students to select two leaves and completely enclose each leaf in foil.
- Ensure students label their plant, then leave the plant near a window for the next lesson.

Lesson activities

Activity

- Provide students with images of a variety of organisms representing producers, herbivores, omnivores, carnivores and decomposers.
- Ask students to group the organisms based on how they obtain food and to provide each group with a name based on how they obtain food.
- Discuss student groupings and names; prompt students to generate the groupings' producers, consumers and decomposers.
- Prompt students further to generate names for the different types of consumers, such as herbivores, omnivores, carnivores and detritivores.

Concluding activity

- Provide students with a glossary sheet, or have students start their own glossary to record the definitions they encounter throughout the unit.
- Students record the biology definitions for producer, consumer, decomposer, herbivore, omnivore, carnivore and detritivore to their glossary and provide examples of each.

Lessons 2–3: Photosynthesis and respiration

The Western Australian Curriculum content addressed in these lessons is below.

Science understanding

Biological sciences

- Food chains and food webs can be used to represent energy flow in ecosystems and predict possible impacts of human activity

Science inquiry

Questioning and predicting

- Propose investigable questions and make predictions based on scientific knowledge to explore scientific models, identify patterns and test relationships

Planning and conducting

- Plan and conduct reproducible investigations to answer questions; recognising and managing risks and considering ethical issues

Evaluating

- Reflect on scientific investigations, including evaluating the quality of the data collected, and identifying improvements

---

Teacher information

- Plants make their own food in the process of photosynthesis. The food they produce is glucose. The word equation for photosynthesis is:
  light energy + carbon dioxide + water → glucose + oxygen.
- Plants use the food they produce, and animals use the food they consume in the process of respiration.
- Respiration is the process all living things use to produce energy for cell processes, movement and reproduction.
- The word equation for respiration is:
  glucose + oxygen → energy + carbon dioxide + water.
- A risk assessment requires students to identify potential hazards, assess the risk and outline strategies to reduce the risk.
- A hazard is something that has the potential to do harm; for example, boiling water splashing out of the beaker.
- A risk is the chance that somebody could be harmed by the hazard. When assessing risk, determine what could happen if someone is exposed to the hazard; for example, skin burns.
- A strategy to reduce the risk is the action to be taken to control the risk; for example, do not overfill the beaker.

Lesson outline

Learning intentions
Students will: • define photosynthesis and respiration • write the word equations for photosynthesis and respiration • compare the processes of photosynthesis and respiration

Introduction

- Materials required:
  - Potted plant from Lesson 1
  - Beaker (large enough for floating leaf)
  - Water
  - Scissors
- Students use their plant from the previous lesson to set up an experiment as follows:
  - Fill the beaker with water.
  - Cut a green leaf from the plant and place it on top of the water in the beaker.
  - Place the beaker in a sunny location until later in the lesson or the following lesson.

Lesson activities

Activity 1

- Explicitly teach students that:
  - all living things use food to make energy for cell process, growth, reproduction and movement
  - respiration is the process living things use to make energy
  - plants use the food they produce in respiration and animals use the food they eat in respiration.
- Write the word equation for respiration on the board and identify the reactants and products.
- Students take notes from presented information.

Activity 2

- Ask students if they know the name of the process green plants use to make food. Write the word 'photosynthesis' on the board.
- Ask students if they know the reactants and products for photosynthesis. Students may need to be prompted. Write the word equation for photosynthesis on the board.
- Inform students that plants convert the glucose produced in photosynthesis to starch and store the starch in their leaves.

Activity 3

- Materials required:
  - Leaf floating in a beaker of water set up at the start of the lesson
  - Magnifying glass or hand lens
- Students complete the experiment as follows:
  - Place the leaf in the beaker. Use a magnifying glass or hand lens to observe the underside of the leaf and the sides of the beaker.
  - Record observations by drawing a labelled diagram of the beaker and leaf.
- Discuss student observations. Students should observe small bubbles on the underside of the leaf and the sides of the beaker. These bubbles are oxygen, a product of photosynthesis.

Activity 4

- Materials required:
  - Potted plant from Lesson 1
  - Equipment for heating water, such as kettle, hotplate, Bunsen burner and tripod
  - 250 mL beaker
  - Two large test tubes, one labelled 'covered' and the other labelled 'uncovered'
  - Water
  - Methylated spirits or ethanol
  - White tile or plate
  - Dropper bottle of iodine
- Students conduct a risk assessment prior to the commencing the experiment. This could be completed individually, in groups or as a class. The following table could be used for the risk assessment.

Hazard	Risk	Strategy to reduce risk

- Ask students to predict which leaves will contain starch: those covered in foil or those left uncovered. Students record their prediction and the reasoning behind their prediction.
- Students conduct the experiment as follows:
  - Cut the covered leaves from the plant, remove the foil and place the leaves in a beaker of boiling water for one minute. The boiling water kills the leaves, stopping any chemical reactions from taking place.
  - Remove the leaves from the beaker and place them in a test tube labelled 'covered'.
  - Cut two of the uncovered leaves from the plant and place the leaves in the beaker of boiling water for one minute. Remove the leaves from the beaker and place them in a test tube labelled 'uncovered'.
  - Cover the leaves in each test tube with methylated spirits or ethanol and place the test tubes in a beaker of boiling water for five minutes. Methylated spirits remove the green colour from the leaves, making it easier to observe a colour change.
  - Rinse the leaves with tap water and place them on a white tile or plate.
  - Use the dropper to cover the leaves with iodine and record observations. Iodine is an indicator for starch. Students should observe the uncovered leaves change colour/turn black.

- Ask students:
  - if their prediction was correct
  - why they used leaves from the same plant in both test tubes
  - why they used two leaves in each test tube, instead of just one.
- Discuss the results of the experiment.
- Respiration occurs 24 hours a day, whereas photosynthesis only occurs during the day when sunlight is available. When there is no sunlight, plants use the stored starch in respiration.
- The covered leaves are not exposed to sunlight, so photosynthesis is not occurring, therefore the starch has been used for respiration.

Concluding activity

- Students:
  - add the biology definitions for photosynthesis and respiration to their glossary sheet
  - write the word equations for photosynthesis and respiration
  - compare photosynthesis and respiration.

Optional activity

- Science Buddies – Measure photosynthesis with floating leaves
  https://www.sciencebuddies.org/stem-activities/photosynthesis-floating-leaves

  In this activity, students quantitatively measure oxygen production in leaves. This activity could be modified into an investigation on:
  - the effect of temperature, light or amount of carbon dioxide on the amount of oxygen produced by green plants
  - comparing oxygen produced by different plants.

Lesson 4: Food chains

The Western Australian Curriculum content addressed in this lesson is below.

Science understanding

Biological sciences

- Food chains and food webs can be used to represent energy flow in ecosystems and predict possible impacts of human activity

Science inquiry

Processing, modelling and analysing

- Construct appropriate representations, including tables, graphs, models and mathematical relationships, to organise and process data and information

Communicating

- Communicate ideas, findings and information for specific purposes and audiences, including selection of appropriate content, language and text features, using digital tools as appropriate

---

Resources

- Department of Biodiversity, Conservation and Attractions: Western Shield – Western Shield Action Pack Activity 5.1 https://www.dbca.wa.gov.au/management/threat-management/invasive-animals/western-shield.
- Murray–Darling Basin Authority – Lesson packages downloads: Food web cards https://www.mdba.gov.au/publications-and-data/publications/lesson-packages-downloads These cards could be used to illustrate a number of different food chains for the activity in the lesson.
- Primary Connections – Changing habitats https://primaryconnections.org.au/teaching-sequences/year-4/sustain-the-chain/lesson-7-changing-habitats

Teacher information

- Food chains show the flow of energy from one organism to another and show feeding relationships.
- Green plants are called producers and are in the first trophic level of a food chain.
- Herbivores are known as first-order consumers. First-order consumers are the second trophic level.
- Animals that feed on herbivores are known as second-order consumers and are found in the third trophic level.
- The number of trophic levels in a food chain is limited by the amount of energy available. Only 10% of the energy available in one trophic level is transferred to the next level.

Lesson outline

Learning intentions
Students will: • construct a food chain to show the feeding relationships and flow of energy • classify organisms based on their trophic level • explain why a food chain is limited to five or six trophic levels

Introduction

- Write the names of a plant and two animals on the board in food chain order, without the arrows; for example:

  grass rabbit fox
- Ask students to recall how to draw a food chain from primary school and draw this on the board, ensuring the arrow is pointing in the correct direction, showing the direction of energy flow.

  grass → rabbit → fox
- Explain how the food chain is a model that shows the feeding relationships and direction of energy flow between organisms. The grass obtains light energy from the sun to make the food (photosynthesis) and uses the food to make energy (respiration). The rabbit uses the food from the grass it eats to make energy (respiration) and the fox eats the rabbit then uses the food from the rabbit to make energy (respiration).

Lesson activities

Activity 1

- Provide students with seven to eight examples that show feeding relationships between organisms within a food chain.
- Print images of organisms with arrows so students can create food chains at different stations.
- Students work in groups around the room to build food chains at each station.
- Students draw/record food chains digitally or on paper.

Activity 2

- Inform students that when a producer is eaten by a herbivore (first-order consumer), the stored energy is passed on. The herbivore will use most of the energy to maintain life and for movement, while some energy is lost as heat. Only a small amount of the energy from the plant is available to be passed on the next energy level (trophic level) in the food chain.
- Set up a demonstration to illustrate that the number of steps in a food chain is limited by the amount of energy available. Only 10% of energy from one level is passed on to the next trophic level.
  - Labelled beakers could be used to represent the different trophic levels. A known volume of coloured liquid or quantity of beads, marbles or small balls could be used to represent the available energy in the first trophic level (producers).
  - Ten per cent of the energy can then be transferred to the second and subsequent trophic levels.
  - It should be evident that about five or six trophic levels is the maximum that could be sustained by the producer.

Concluding activity

- Students draw a food chain and label the producer, first-order consumer, second-order consumer and third-order consumer.
- Students
  - identify where the original source of energy in the food chain comes from
  - state what the arrow in a food chain represents
  - explain why a food chain is usually no longer than five or six organisms.
- Students add definitions for new terms to their glossary sheet.

Lessons 5–6: Food webs

The Western Australian Curriculum content addressed in these lessons is below.

Science understanding

Biological sciences

- Food chains and food webs can be used to represent energy flow in ecosystems and predict possible impacts of human activity

Science inquiry

Processing, modelling and analysing

- Construct appropriate representations, including tables, graphs, models and mathematical relationships, to organise and process data and information

Communicating

- Communicate ideas, findings and arguments for specific purposes and audiences, including selection of appropriate content, language and text features, using digital tools as appropriate

Resources

- Department of Biodiversity, Conservation and Attractions: Western Shield – Western Shield Action Pack Activity 5.1 and 5.2 https://www.dbca.wa.gov.au/management/threat-management/invasive-animals/western-shield.
- Murray–Darling Basin Authority – Lesson packages downloads: Food web cards https://www.mdba.gov.au/publications-and-data/publications/lesson-packages-downloads
- Primary Connections – Changing habitats https://primaryconnections.org.au/teaching-sequences/year-4/sustain-the-chain/lesson-7-changing-habitats
- Queensland Museum – Learning resources: Marine food web https://www.museum.qld.gov.au/learning-resources/learnings/marine-food-web
- Queensland Museum – Learning resources: Exploring Australian Food Webs https://www.museum.qld.gov.au/learning-resources/learnings/exploring-australian-food-webs

Teacher information

- Joining different food chains from an ecosystem together produces a food web.
- Food webs show all the feeding relationships between producers, consumers and decomposers within ecosystems.

Lesson outline

Learning intentions
Students will: • construct food webs to show relationships between organisms • use food webs to interpret relationships between organisms

Introduction

- Review food chains.
- Explicitly teach the concepts of feeding relationships using a food web (identifying location of producers, consumers and decomposers within the food web, and the use of arrows to show the relationship/flow of energy).
- Model the construction of a food web.
- Instruct students to take notes on the presented information.

Lesson activities

Activity 1

- Allow students the opportunity to interpret food webs, source seven to eight examples of food webs from different ecosystems (beach, desert, swamp, etc.).
- Facilitate a class discussion about how there are many food chains as part of the food webs, and model how to identify food chains within food webs.
- Provide groups of students with a food web and ask them to identify:
  - producers and consumers within the food web
  - two to three food chains within each food web.

Activity 2

- Instruct students to create a food web with copies of images/cards of plants and animals
- Students draw/record their food web digitally or on paper and compare their food webs with others.
- Provide students with a table or paragraph describing the feeding relationships in an ecosystem.
- Students use the table or paragraph to construct a food web.

Concluding activity

- Provide students with a worksheet or text questions on
  - constructing food webs
  - interpreting feeding relationships between organisms in a food web
- Students add definitions for new terms to their glossary sheet.

Lesson 7: Impacts of human activity on food webs

The Western Australian Curriculum content addressed in this lesson is below.

Science understanding

Biological sciences

- Food chains and food webs can be used to represent energy flow in ecosystems and predict possible impacts of human activity

Science inquiry

Questioning and predicting

- Propose investigable questions and make predictions based on scientific knowledge to explore scientific models, identify patterns and test relationships

Processing, modelling and analysing

- Construct appropriate representations, including tables, graphs, models and mathematical relationships, to organise and process data and information
- Analyse data and information to describe patterns and relationships, identify anomalies and draw conclusions based on evidence

Communicating

- Communicate ideas, findings and arguments for specific purposes and audiences, including selection of appropriate content, language and text features, using digital tools as appropriate

---

Resources

- Department of Biodiversity, Conservation and Attractions: Western Shield – Western Shield Action Pack Activity 5.1 and 5.2. https://www.dbca.wa.gov.au/management/threat-management/invasive-animals/western-shield
- Murray–Darling Basin Authority – Lesson packages downloads: Food web cards https://www.mdba.gov.au/publications-and-data/publications/lesson-packages-downloads
- Primary Connections: Changing habitats https://primaryconnections.org.au/teaching-sequences/year-4/sustain-the-chain/lesson-7-changing-habitats

Teacher information

- Joining various food chains together produces a food web.
- Food webs show feeding relationships between producers, consumers and decomposers within ecosystems.
- Changes in the populations of organisms within the food web will affect the population of other organisms and their feeding relationships within ecosystems; for example, introduced species.

Lesson outline

Learning intentions
Students will: • use food webs to predict impacts of human activity on the food web

Introduction

- Use the food web created from the images/cards of plants and animals used in Lessons 5–6 to predict the impacts of human activity on the food web.
- Provide students with an introduced species image/card and ask them to predict the impact of the introduced species on the food web.
- Discuss as a class how the food web may be impacted by the introduction of a new predator.

Lesson activities

Activity 1

- Ask students to brainstorm other ways humans could impact food webs and record them on the board, including introduced species in the list.
- Impacts may include:
  - introduced species
  - fishing or hunting
  - land clearing for agriculture, logging, mining and urbanisation
  - diseases.

Activity 2

- Provide students with a marine food web and use it to predict the impact of increased fishing on organisms in the food web in the short and long term.

Concluding activity

- Provide students with a worksheet or text questions on predicting the impact of human activity on food webs.
- Students add definitions for new terms to their glossary sheet.

Lessons 8–10: Introduced species

The Western Australian Curriculum content addressed in these lessons is below.

Science understanding

Biological sciences

- Food chains and food webs can be used to represent energy flow in ecosystems and predict possible impacts of human activity

Science inquiry

Processing, modelling and analysing

- Construct appropriate representations, including tables, graphs, models and mathematical relationships, to organise and process data and information
- Analyse data and information to describe patterns and relationships, identify anomalies and draw conclusions based on evidence

Communicating

- Communicate ideas, findings and arguments for specific purposes and audiences, including selection of appropriate content, language and text features, using digital tools as appropriate

Collaborating and applying

- Illustrate how science understanding and skills have influenced the development of individual, community and workplace practices

---

Resources

- Behind the News – Threaten Species Day
  https://www.youtube.com/watch?v=KKKOwnpqbNc
- The Department of Biodiversity, Conservation and Attractions – Western Shield
  https://www.dbca.wa.gov.au/management/threat-management/invasive-animals/western-shield.
  - There is also a video on this site that provides a good introduction.
- The Department of Biodiversity, Conservation and Attractions – Western Shield fox and feral cat baiting locations
  https://www.dbca.wa.gov.au/management/threat-management/invasive-animals/western-shield/western-shield-fox-and-feral-cat-baiting-locations
  - The website also provides a map of Western Shield fox and feral cat 1080 baiting locations in Western Australia. There could be a site close to your school community.
- Department of Biodiversity, Conservation and Attractions: Western Shield – Western Shield Action Pack Activity 4.1
  https://www.dbca.wa.gov.au/management/threat-management/invasive-animals/western-shield
- Department of Biodiversity, Conservation and Attractions – Threatened and priority fauna resources
  https://www.dbca.wa.gov.au/management/threatened-species-and-communities/resources/threatened-and-priority-fauna-resources
- Department of Biodiversity, Conservation and Attractions – Threat management
  https://www.dbca.wa.gov.au/management/threat-management

Teacher information

- An invasive or introduced species is an organism that has established itself outside its natural range and is causing harm to the ecosystem.
- Animals that eat other animals are referred to as predators. Prey is the animal that is eaten.
- The Department of Biodiversity, Conservation and Attractions Western Shield program was established to managed introduced predators, such as foxes and feral cats.
- There are conservation programs in many communities to manage other introduced species, such as cane toads, rabbits and weeds.

Lesson outline

Learning intentions
Students will: • illustrate the impacts of introduced species on ecosystems

Note: These lessons could be adapted to introduced species that are impacting the local community.

Introduction

- Show an appropriate video as an introduction to threatened species, such as:
  - Behind the News – Threatened species day https://www.youtube.com/watch?v=KKKOwnpqbNc
- Inform students that the main threat to native species in Western Australia is introduced predators, such as foxes and feral cats.

Lesson activities

Activity 1

- Provide students with information on the Department of Biodiversity, Conservation and Attractions Western Shield program.
- Students complete Western Shield Action Pack Activity 4.1 or similar on a conservation strategy to save threatened species from introduced predators.

Activity 2

- Source or create a set of data surrounding introduced species for students to analyse and interpret. Data sets can be found in biology and science textbooks and science journals.
  - Examples of data could include:
    - invasion rate over a period of time
    - cumulative number of species over a period of time.
  - Examples of data analysis/interpretation could include:
    - providing students with raw data to create a table to display the data
    - providing students with a table of data and asking them to graph the data.
- Provide students with the opportunity to both process and analyse the data to draw conclusions and make predictions (including interpolation and extrapolation) about the impact of introduced species on the Australian environment.

Concluding activity

- Provide students with a worksheet or text questions on the following as revision for the summative assessment
  - constructing food webs
  - predicting impacts of human activity on food webs
  - processing and analysing data to draw conclusions.
- Students add definitions for new terms to their glossary sheet.

Optional activities

- Western Shield Action Pack Activity 4.2 and 4.3
- Explore issues arising from biological control, such as:
  - myxomatosis and calicivirus

- dung beetle
- cane toad
- cactoblastis moth.

- Create an illustrated poster or infographic on the impact of introduced species in the local community, Western Australia or Australia, which includes:
  - two to three examples of introduced species
  - their effect on the environment
  - method of control
  - diagrams and images.

Lessons 11–12: Summative assessment

The Western Australian Curriculum content addressed in these lessons is below.

Science understanding

Biological sciences

- Food chains and food webs can be used to represent energy flow in ecosystems and predict possible impacts of human activity

Science inquiry

Processing, modelling and analysing

- Construct appropriate representations, including tables, graphs, models and mathematical relationships, to organise and process data and information
- Analyse data and information to describe patterns and relationships, identify anomalies and draw conclusions based on evidence

Communicating

- Communicate ideas, findings and arguments for specific purposes and audiences, including selection of appropriate content, language and text features, using digital tools as appropriate

Resources

- Appendix A: Summative assessment

Teacher information

This task is split into two parts:

- In Part A, students will create a food web based on the feeding relationships within the Great Barrier Reef.
- In Part B, students will complete a data analysis task.

Students work in groups or independently to complete Part A and independently, under test conditions, for Part B.

Allow two 50-minute lessons.

Lesson outline

Learning intentions
Students will: • construct a food web to show the feeding relationships in an ecosystem • illustrate the impacts of human activity on feeding relationships in an ecosystem • analyse and interpret second-hand data

Introduction

- Follow instructions in the summative task in Appendix A.

Lesson activities

Part A

- Part A should be completed in the lesson prior to Part B.
- Part A can be completed in groups, with each student making their own copy of the food web to use for Part B.
- Collect food webs and provide them to students in the following lesson.

Part B

- Part B should be completed individually, under test conditions.
- Students will need a copy of their food web from Part A to complete the task.

Appendix A

Assessment task

The impact of human activity on ecosystems

Task details

Title	The impact of human activity on ecosystems
Description	This task is split into two parts: Part A: Students will create a food web based on the feeding relationships within the Great Barrier Reef. Part B: Students will complete a data analysis task.
Ways of assessing	Complete Part A, which will be used to complete Part B
Evidence to be collected	Part A: Create a food web Part B: Data analysis
Suggested time	Two 50-minute lessons
Differentiation	Teachers should differentiate their teaching and assessment to meet the specific learning needs of their students, based on their level of readiness to learn and their need to be challenged. Where appropriate, teachers may either scaffold or extend the scope of the assessment tasks.

Content descriptions

Science understanding

Biological sciences

- Food chains and food webs can be used to represent energy flow in ecosystems and predict possible impacts of human activity

Science inquiry

Processing, modelling and analysing data

- Construct appropriate representations, including tables, graphs, models and mathematical relationships, to organise and process data and information
- Analyse data and information to describe patterns and relationships, identify anomalies and draw conclusions based on evidence

Communicating

- Communicate ideas, findings and information for specific purposes and audiences, including selection of appropriate content, language and text features, using digital tools as appropriate

Collaborating and applying

- Illustrate how science understanding and skills have influenced the development of individual, community and workplace practices

Key concepts

Feeding relationships; Constructing and interpreting food webs

Information for teacher

This task has two parts:

- Part A: Create a food web
- Part B: Data analysis

Part A: Create a food web

Reinforce students' prior knowledge about constructing and interpreting food webs before they start this task. Students have practised constructing and interpreting food webs during the teaching and learning sequence.

Students will be provided with a passage that describes feeding relationships between organisms in the Great Barrier Reef. Students will be required to construct a food web to show the feeding relationships in the Great Barrier Reef. This will be used to complete Part B of this task.

Students may work in small groups to develop the food webs. This will provide opportunities to assess students (formatively) and determine their level of understanding, and the level of assistance they may require to complete Part B of the task.

Encourage students to complete a draft before completing the worksheet.

Part B: Data analysis

Students will use the food web constructed in Part A to answer questions, in addition to analysing and interpreting data.

Students to complete individually, under test conditions in one 50-minute lesson.

Instructions to students

This task has two parts:

- Part A: Create a food web
- Part B: Data analysis

Part A: Create a food web

You will be required to draw on your knowledge of constructing and interpreting food webs for this task.

You will be provided with a passage that describes feeding relationships between organisms in the Great Barrier Reef. You will be required to draw a food web showing these relationships. You may work in small groups to construct the food web. This food web will be used to complete Part B.

Tips

- Create a draft before drawing your final version.
- Try and be as neat and clear as possible.

Part B: Data analysis

You will be required to complete a data analysis task under test conditions. You may use the food web constructed in Part A to assist you.

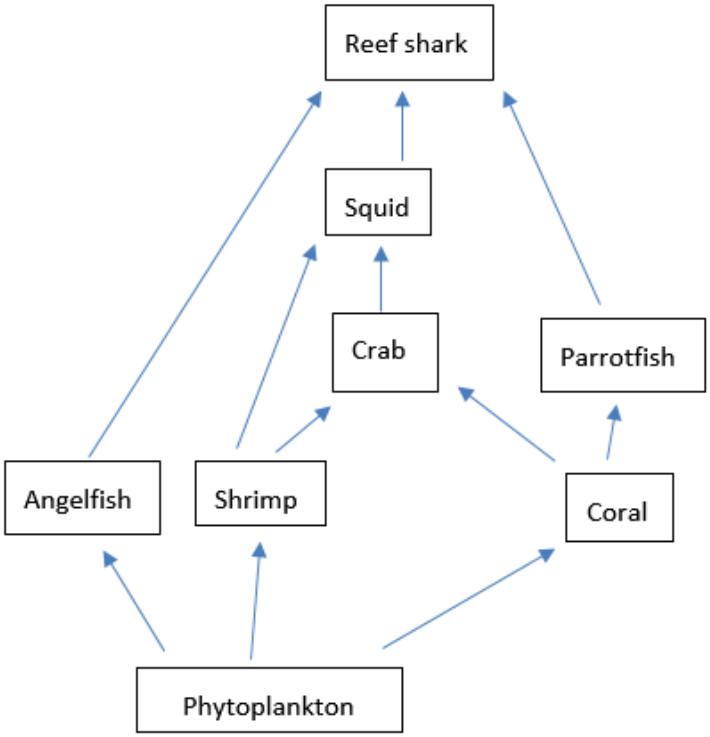
Part A: Create a food web

The passage below shows feeding relationships between organisms in the Great Barrier Reef.

Phytoplankton is a microscopic plant that is eaten by angelfish, shrimp and coral. Crabs eat shrimp and coral, and squid like to eat crabs and shrimp. Coral is eaten by parrotfish, and reef sharks like to eat angelfish, squid and parrotfish.

Using your knowledge, construct a food web in the space below.

Marking key

Description	Marks
Draw a food web	
Shows all 11 correct feeding relationships without assistance.	3
Shows 4–8 correct feeding relationships without assistance.	2
Shows 2–4 correct feeding relationships without assistance OR Completes feeding relationships with assistance.	1
Subtotal	**/3**
Specific information could include:  	
Presentation	
Presents a diagram that is neat and clear to read	1
Subtotal	**/1**
Total	**/4**

Part B: Data analysis

Australia's national science agency, CSIRO, estimates there are 14 million tonnes of microplastics on the seafloor due to humans' overuse of plastics (Barrett, Chase, Zhang, et al., 2020).

Microplastics are tiny pieces of plastic that are less than 5 mm in length, that have been broken down from larger pieces of plastic, that may harm marine ecosystems. Microplastics are also present in many health and beauty products used by humans and pass through the waterways and end up in areas such as the Great Barrier Reef.

Once introduced to the ecosystem, microplastics may be ingested by various organisms which mistake them for food.

The average number of microplastics present in the Great Barrier Reef over the years is shown in Table 1.

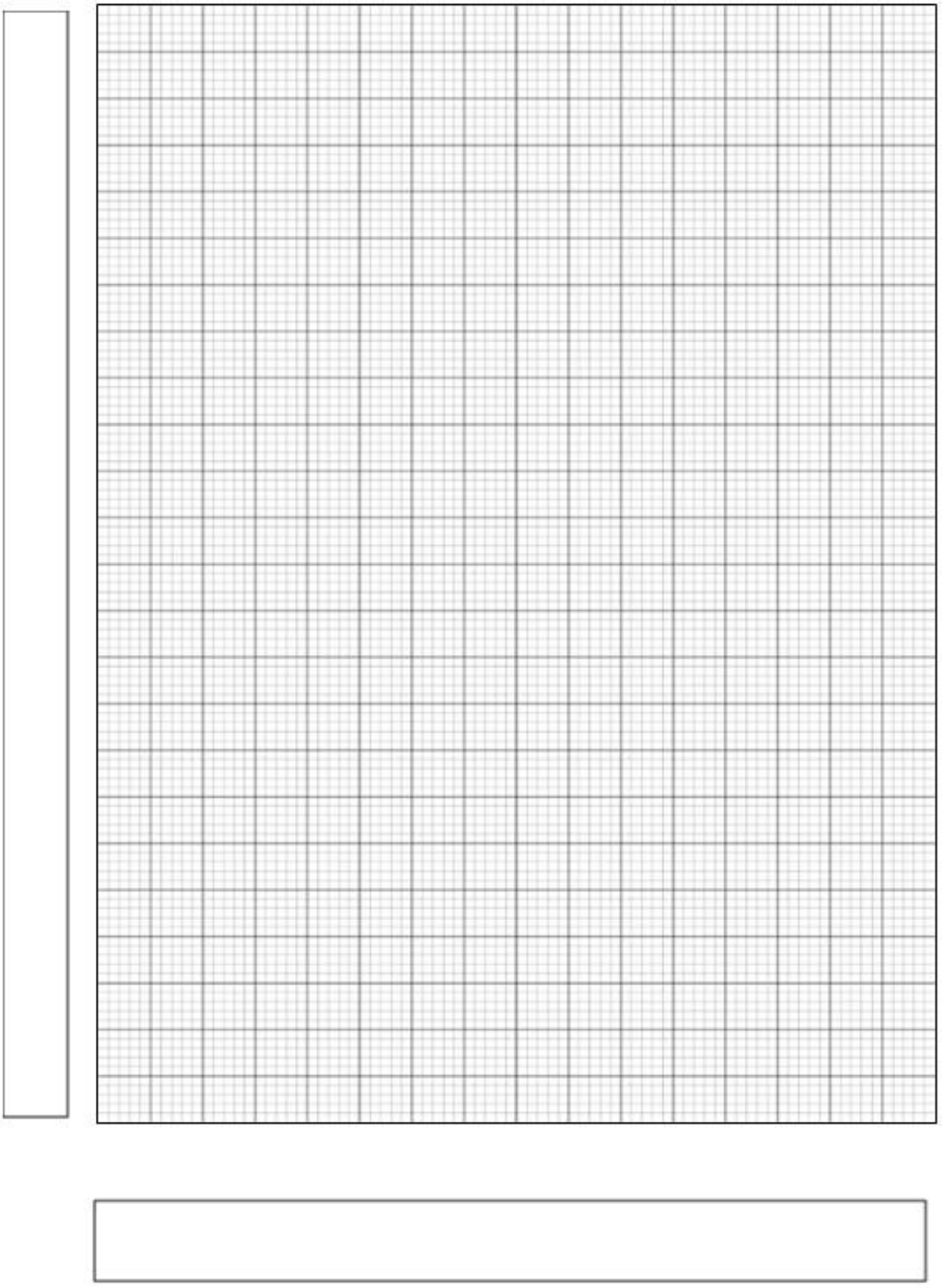
Table 1: Average number of microplastics present in the Great Barrier Reef per year 2013–2020.

Year	Average number of microplastics per cubic metre (m^3)
2013	40
2014	45
2015	55
2016	75
2017	-
2018	110
2019	120
2020	135

1. Graph the data in the table. Label each of the axes and include appropriate units.

(5 marks)

Graph title: _____



2. Using data from the graph, describe the relationships or patterns in the results. (2 marks)

_____

_____

_____

_____

3. There was no average available for 2017, as the equipment used to record data did not work properly.

   Using the graph, predict the average number of microplastics in 2017. (1 mark)

   _____

4. Scientists studying the Great Barrier Reef ecosystem noticed that the population of crabs had significantly decreased due to the consumption of microplastics.

   (a) Draw a food chain that includes crabs. (2 marks)

   (b) As a result of the decreased numbers of crabs, populations of other organisms within the food web would have been affected.

   State the possible effects on the populations of the following organisms as a result of a decrease in the population of crabs, and explain your reasoning.

   Reef sharks (2 marks)

   _____

   _____

   _____

   Phytoplankton (2 marks)

   _____

   _____

   _____

5. The population of shrimp has been significantly affected by the increased amount of microplastics in the Great Barrier Reef.

If shrimp were removed from the food web, explain the effect this would have on the rest of the food web. (3 marks)

_____

_____

_____

_____

_____

_____

6. Using your knowledge, propose two ways humans could reduce the amount of microplastics in the marine environment. (2 marks)

_____

_____

_____

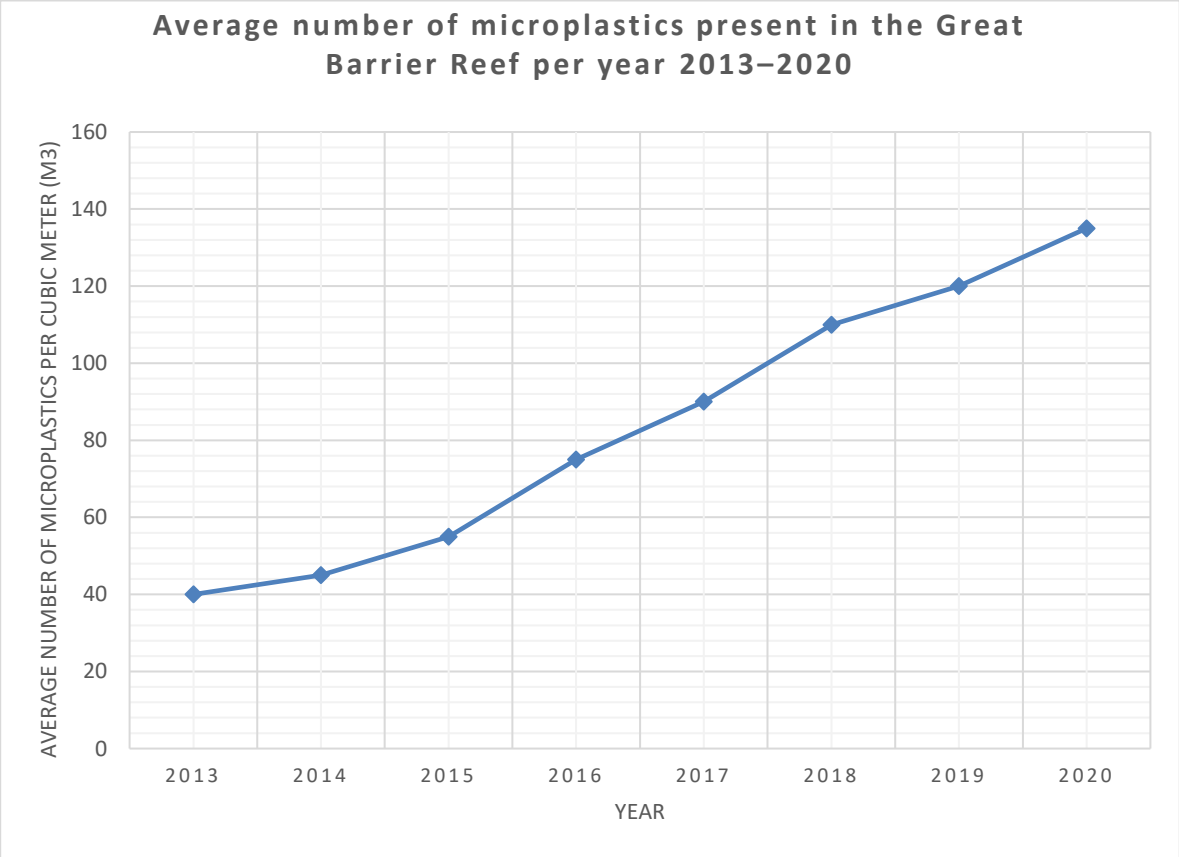
_____

_____

Marking key

Description	Marks
1. Graph the results of the investigation.	
Provides an appropriate graph title	1
Labels axes correctly with appropriate units	1
Uses an appropriate scale	1
Plots results correctly	1
Draws the appropriate type of graph	1
Subtotal	**/5**

Specific information could include:
Graph shows data for 2017 to display answer for question 3. Note: students do not need to plot this.



2. Describe the relationships or patterns in the results.	
Outlines relationships or patterns in results	1
Provides an explanation of the relationships or patterns in the results	1
Subtotal	**/2**

Specific information could include:

- Since 2013, the number of microplastics found in the Great Barrier Reef has been increasing every year.
- This is due to increased human consumption/use of microplastics.

Description	Marks
3. Using the graph, predict the average number of microplastics in 2017.	
90 m3	1
Subtotal	**/1**
Note: units not required for the full mark.	
4. (a) Draw a food chain that includes crabs.	
Organisms in correct order	1
Shows correct flow of energy using arrows	1
Subtotal	**/2**
(b) State the possible effect on the populations of reef sharks and phytoplankton and explain your reasoning.	
Reef sharks (1 mark for effect, 1 mark for explanation) • Population may decrease, as their prey has decreased.	2
Phytoplankton (1 mark for effect, 1 mark for explanation) • Population may increase, as they have one less predator.	2
Subtotal	**/4**
5. If shrimp were removed from the food web, what effect would this have on the rest of the food web?	
All levels/organisms of/within the food web would be affected, stating specific examples	1–3
Subtotal	**/3**
6. Using your knowledge, propose two ways that humans could reduce the number of plastics in the marine environment.	
Any two relevant ways humans could reduce the number of plastics in the marine environment	1–2
Subtotal	**/2**
Specific information could include: • Reducing use of single-use plastics (plastic bags) • Correct recycling processes • Not using health and beauty products that contain microplastics	
Total	**/19**

Acknowledgements

Appendix A

Part B: Data analysis Information from: Barrett, J., Chase, Z., Zhang, J., et al. (2020, October 5). Microplastic Pollution in Deep-Sea Sediments from the Great Australian Bight. *Marine Conservation and Sustainability, 7*. Retrieved February, 2026, from https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2020.576170/full